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Wei Lin, Michel Faure, Xian-Hua Li, Yang Chu, Wenbin Ji, et al.. Detrital zircon age distribution from Devonian and Carboniferous sandstone in the Southern Variscan Fold-and-Thrust belt (Montagne Noire, French Massif Central), and their bearings on the Variscan belt evolution. *Tectonophysics*, 2016, 677-678, pp.1-33. 10.1016/j.tecto.2016.03.032 . insu-01303804

HAL Id: insu-01303804

<https://insu.hal.science/insu-01303804v1>

Submitted on 18 Apr 2016

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Accepted Manuscript

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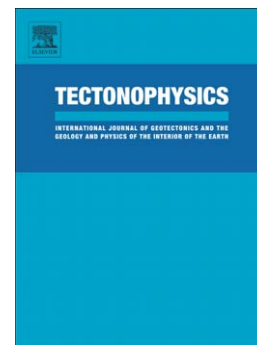
PII: S0040-1951(16)30027-0
DOI: doi: [10.1016/j.tecto.2016.03.032](https://doi.org/10.1016/j.tecto.2016.03.032)
Reference: TECTO 127024

To appear in: *Tectonophysics*

Received date: 19 January 2016
Revised date: 21 March 2016
Accepted date: 23 March 2016

Please cite this article as: Lin, Wei, Faure, Michel, Li, Xian-hua, Chu, Yang, Ji, Wenbin, Xue, Zhenhua, Detrital zircon age distribution from Devonian and Carboniferous sandstone in the Southern Variscan Fold-and-Thrust belt (Montagne Noire, French Massif Central), and their bearings on the Variscan belt evolution, *Tectonophysics* (2016), doi: [10.1016/j.tecto.2016.03.032](https://doi.org/10.1016/j.tecto.2016.03.032)

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Detrital zircon age distribution from Devonian and Carboniferous sandstone in the Southern Variscan Fold-and-Thrust belt (Montagne Noire, French Massif Central), and their bearings on the Variscan belt evolution

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Abstract

In the Southern French Massif Central, the Late Paleozoic sedimentary sequences of the Montagne Noire area provide clues to decipher the successive tectonic events that occurred during the evolution of the Variscan belt. Previous sedimentological studies already demonstrated that the siliciclastic deposits were supplied from the northern part of the Massif Central. In this study, detrital zircon provenance analysis has been investigated in Early Devonian (Lochkovian) conglomerate and sandstone, and in Carboniferous (Visean to Early Serpukhovian) sandstone from the recumbent folds and the foreland basin of the Variscan Southern Massif Central in Montagne Noire. The zircon grains from all of the samples yielded U-Pb age spectra ranging from Neoproterozoic to Late Paleozoic with

several age population peaks at 2700 Ma, 2000 Ma, 980 Ma, 750 Ma, 620 Ma, 590 Ma, 560 Ma, 480 Ma, 450 Ma, and 350 Ma. The dominant age populations concentrate on the Neoproterozoic and Paleozoic. The dominant concordant detrital zircon age populations in the Lochkovian samples, the 480-445 Ma with a statistical peak around 450 Ma, are interpreted as reflecting the rifting event that separated several continental stripes, such as Armorica, Mid-German Crystalline Rise, and Avalonia from the northern part of Gondwana. However, Ediacaran and Cambrian secondary peaks are also observed. The detrital zircons with ages at 352-340 Ma, with a statistical peak around 350 Ma, came from the Early Carboniferous volcanic and plutonic rocks similar to those exposed in the NE part of the French Massif Central. Moreover, some Precambrian grains recorded a more complex itinerary and may have experienced a multi-recycling history: the Archean and Proterozoic grains been firstly deposited in Cambrian or Ordovician terrigenous rocks, and secondly re-sedimented in Devonian and/or Carboniferous formations. Another possibility is that ancient grains would be inherited grains, scavenged from an underlying but not exposed Precambrian basement.

Keywords: Detrital zircon provenance analysis; Foreland basin; Fold-and-Thrust belt; Variscan Belt; Montagne Noire

1. Introduction

Sedimentological and provenance studies of the terrigenous detritus found in the foreland basins are used since a long time to analyze the geomorphologic and tectonic evolution of orogens, particularly the uplift and erosion of the inner zones of mountain belts. More recently, age distribution probability of detrital zircon enclosed in terrigenous unmetamorphosed or low-grade metasedimentary rocks became a popular method to infer the possible source area of the sediments (e.g. Dickinson and Gerhels, 2009; Fedo et al., 2003). This approach has been applied all along the Paleozoic Variscan belt from Iberia to Turkey, through Central Europe (e.g. Fernández-Suárez et al.,

2002, 2003; Martínez Catalán et al., 2004, 2008, 2016; Linnemann et al., 2004; Okay et al., 2011; Dinis et al., 2012). Nevertheless, such inherited detrital zircon provenance analyses are rare in the French Variscan Belt. Studies are limited to the Southern Massif Armoricaïn (Ducassou et al., 2014) or Massif Central (Melleton et al., 2010). This last work dealt with magmatic and metamorphic rocks: 7 orthogneiss, one metarhyolite, and 6 paragneiss sampled in the western part (Limousin area) of the French Massif Central. Only one Cambrian metasandstone was investigated. Provenance studies from detrital zircon have never been carried out in the southern foreland basin that crops out in the southern part of the French Massif Central. This study focuses on the detrital zircon age distribution of the Late Viséan-Early Serpukhovian turbiditic sandstone, and also on Early Devonian (Lochkovian) detrital rocks that unconformably overlie the Ordovician sandstone involved in the recumbent folds of the southern flank of the Montagne Noire (Fig. 1). The significance of the statistical distribution of zircon ages for the tectonic evolution of the French Massif Central is discussed.

2. The Variscan French Massif Central

The Variscan orogen is a complex belt built up by multiple collisions of continents and microcontinents that develops from SW Iberia to Poland over ca 5000 km along strike and 1000 km in width. A general zonation, and several geodynamic evolution models have been proposed (e.g. Matte, 1986, 2001; Cocks, 2000; Franke, 2000, 2014; Martínez Catalán et al., 2009; Faure et al., 2005, 2009; Ballèvre et al., 2009; Schulmann et al., 2009; Lardeaux et al., 2014).

The French Massif Central (FMC; Fig. 1) is one of the largest Variscan massifs. It consists of a stack of nappes developed at the expense of sedimentary and magmatic rocks belonging to the southern margin of Gondwana (e.g. Faure et al., 2009 and enclosed references). From top to bottom, and globally from North to South, the following units are recognized. The Upper Gneiss Unit (UGU) is formed by a bimodal magmatic association (termed the "leptynite-amphibolite complex") with acidic and mafic rocks, and paragneiss. This unit contains high-pressure rocks (eclogites and

granulites) dated at ca 420-400 Ma (Pin and Peucat, 1986). The upper part of the UGU consists of migmatites yielding zircon U-Pb ages around 385-380 Ma. The Lower Gneiss Unit (LGU) is composed of metagreywacke, metapelite, metarhyolite, and a small amount of mafic rocks, metamorphosed into amphibolites. Cambrian and Ordovician alkaline porphyritic granites, now transformed into augen orthogneiss, intruded the sedimentary-volcanic series. Like the UGU, the LGU experienced a Late Devonian crustal melting dated around 375-370 Ma. The Para-autochthonous Unit consists of a metapelite-metagreywacke series with rare mafic lava, and intruded by rare orthogneiss. Zircon from the magmatic rocks indicates Ordovician ages. The southernmost part of the FMC contains clastic sediments of Late Viséan to Serpukhovian age, which were incorporated into the grossly southward propagating fold and thrust belt. The southern foreland basin consists of a Middle Viséan basin. Since the last two units are well developed in the Montagne Noire that constitutes the topic of this paper, stratigraphic and structural details will be provided in the following section.

Other lithotectonic and magmatic units of the FMC are exposed in limited areas. Devonian rocks crop out in the NE part (Montagne Bourbonnaise and Morvan area, Fig. 1). The Brévenne ophiolitic Unit, exposed west of Lyon, consists of mafic rocks (gabbro, diabase, pillow lava, and volcano-clastites), serpentinites, and siliceous sedimentary rocks (e.g. Pin and Paquette, 1998; Leloix et al., 1999). To the North, the Somme series consists of acidic to intermediate volcanic rocks (lava flows, pyroclastites) interlayered with sandstones, grauwackes, conglomerates and limestones (Delfour, 1989; Schneider et al., 1989). The Somme series and Brévenne ophiolites are interpreted as a magmatic arc and a back arc basin, respectively. This system developed in the upper plate of a South-directed subduction (Faure et al., 2009). The low metamorphic grade Upper Units that develop from the southern margin of Limousin to the Albigeois area, North of the Montagne Noire, consist of Cambrian-Ordovician sedimentary and volcanic formations.

Furthermore, in the northern part of the FMC, the Late Viséan "Tufs anthracifères" series formed by conglomerates, sandstone, mudstone with coal measures and rhyolitic to dacitic volcanites and volcano-sedimentary rocks represent an important time marker, as this series unconformably covers the tectono-metamorphic stack of nappes of northern Massif Central whereas, at the same time,

in the south, the Fold-and-Thrust belt is still developing. The Variscan magmatism is also well developed in the FMC. After an Early Carboniferous event represented by the biotite (\pm cordierite) Guéret massif, the Visean magmatism, represented by "red granites", microgranites, and dykes coeval with the "Tufs anthracifères" series, is dominant in the NE Massif Central, in Morvan and Montagne Bourbonnaise (e.g. Duthou et al., 1984; Leistel and Gagny, 1984; Binon and Pin, 1989; Pin and Duthou, 1990; Pin, 1991). Lastly, Serpukhovian to Baskhirian (or Namurian to Westphalian in the W. European stratigraphic scale) plutons, represented by two-mica peraluminous and biotite-K feldspar megacrysts monzogranites, are widespread all over the FMC.

This stack of nappes was built up throughout several tectonic-metamorphic events. A polyorogenic evolution accounts well for the present architecture (e.g. Faure et al., 2009; Fig. 1). In this view, a Silurian-Devonian eo-Variscan cycle was responsible for the development of the high pressure-medium temperature (D_0 event), followed by the crustal melting (D_1 event) observed in the UGU and LGU. The Variscan orogenic cycle developed during the Latest Devonian (Famennian) and Carboniferous. The major tectono-metamorphic event (D_2), coeval with a medium pressure-medium temperature metamorphism, is characterized by a top-to-the-NW ductile shearing. This D_2 event was dated at ca 365-360 Ma (Melleton et al., 2009; Do Couto et al., 2015). The next D_3 event developed in the southern MCF with a clear geographic and chronological evolution. From North-South, the UGU and LGU were reactivated, and transported upon the Para-autochthonous Unit, itself emplaced upon the Fold-and-Thrust Belt, and then in the foreland basin. The consistent top-to-the-South shearing and thrusting became younger and younger from North to South, namely from Early Visean (ca 345 Ma) in the Margeride up to Late Visean- Early Serpukhovian (ca 330-325 Ma) in the Montagne Noire.

At the scale of the entire Massif Central, the Late Visean period represents a turning point since the D_3 nappe stacking active in the southern part was coeval with the onset of orogenic extension in the northern part of the massif. The emplacement of the Late Visean (ca 330 Ma) dyke swarm belonging to the "Tufs Anthracifères" series was controlled by a NW-SE crustal stretching. Nevertheless, the main time for crustal extension, as represented by the syntectonic emplacement of peraluminous granites and K-feldspar porphyritic monzogranites, took place in Late Serpukhovian to

Bashkirian (ca 320-315 Ma; Fig. 1). This tectono-magmatic phase will not be presented here as this event post-dates the deposition of the sedimentary rocks in the foreland basin. On the contrary, the Tournaisian to Middle Viséan magmatism observed in the northern FMC will be presented in the discussion section as it might be interpreted as a possible source for the detrital zircons deposited in the Late Viséan-early Serpukhovian foreland basin.

3. The Montagne Noire

Since early works (e.g. Gèze, 1949; Arthaud, 1970), the Montagne Noire, in the southernmost part of the FMC, is subdivided into a northern flank and a southern flank formed by folded and thrust sedimentary formations, separated by a metamorphic, granitic, and migmatitic Axial zone (Fig. 2). Due to the low metamorphic grade experienced by the sedimentary series, the southern flank is a well-known area for Paleozoic biostratigraphy (e.g. Alabouvette et al., 2003). In the following, only a brief lithostratigraphic outline is provided here; details can be found in numerous papers (e.g. Engel et al., 1980-1981; Feist, 1985; Feist and Galtier, 1985; Alvaro and Vizcaïno, 1998; Vizcaïno and Alvaro, 2001; Poty et al., 2002; Vachard and Aretz, 2004).

The Early Ordovician rocks (Fig. 3) conformably overlie Early Cambrian green sandstone, grauwacke and limestone. A ca 15-20m thick white massive quartzite covers a 500 to 800 m thick alternation of sandstone, siltstone and mudstone of Tremadocian age. These turbidites are interpreted as contourites (e.g. Alabouvette et al., 2003) deposited along a passive continental margin during the rifting event that separated the Armorica microcontinent from the main part of Gondwana (Matte, 2001; Faure et al., 2009). In the Montagne Noire, the upper Ordovician and Silurian deposits are generally missing, except in the olistoliths known as the "Ecaïlles de Cabrières" (or Cabrières Schuppen, Fig. 2). There, they consist of mudstone, sandstone, black shale and rare limestone. The absence of the late Ordovician and Silurian rocks is interpreted as a consequence of the emersion and erosion of rift shoulders that followed the early Ordovician rifting (Alabouvette et al., 2003). Under

tropical climatic conditions, a Fe-rich laterite developed. The Devonian formations are known only in the southern flank of the Montagne Noire. The Early Devonian (Lochkhovian, ca 416-411 Ma), deposit unconformably overlies the Early Ordovician sandstone (Fig. 4a). The basal conglomerate reworks lithic fragments, laterite, andesites, silcrete, phosphatic clasts, micaschists, volcanic quartz grains, and magmatic or metamorphic minerals such as garnet, zircon, monazite, rutile, tourmaline, allanite (Feist, 1985; Quémart et al., 1993). Sedimentological studies indicate that this material was supplied from a northern source (Feist and Schönlaub, 1973, Feist, 1985, Quémart et al., 1993). The sedimentary series continues with iron rich sandstone, oolitic ferruginous sandstone, and dolomite. This ca 15 m thick basal sequence is overlain by white massive sandstone with quartz arenite called "mur quartzeux" (quartzose wall) reworking abundant zircon, rutile, and tourmaline (Figs 3, 4b).

The Middle and Upper Devonian rocks consist of shallow water limestone and dolomite. The carbonate platform develops widely in the North Gondwana margin in Pyrenees, Mediterranean Variscan massifs, (SE Spain, Calabria, Kabylia, Sardinia, Sicily), and farther East in Middle East, up to SE Asia. The Late Devonian (Famennian) carbonates are represented by typical red nodular limestone known as "griotte facies" (Fig. 3) that denotes a high-energy slope environment indicating the onset of the drawing carbonate platform. The Early Carboniferous (Tournaisian) is represented by a ca 30 m thick black radiolarian chert (lydite), and a ca 20 m thick succession of siliceous limestone, clayed and bioclastic limestone, argillite, breccia and limy turbidite locally known as "calcaire de Faugères". The Devonian carbonate platform that progressively subsided during the Tournaisian was replaced by silico-clastic sedimentation during the Late Viséan. The cm-scale alternations of siltstone and sandstone representative of distal turbidite were followed by more proximal deposits characterized by 1 to 5 m thick coarse-grained sandstone with intraformational conglomerate, disrupted beds, and slumps, Fig. 4c, d, e). Lastly, the chaotic sedimentation gave rise to an olistostrome with m- to km-sized olistoliths composed by Viséan or Devonian limestone, and rare Silurian and Ordovician sandstone and lava. The lower part of this turbiditic series yielded late Viséan goniatite (Bohm, 1935; Engel et al., 1980-81). Early Serpukhovian (Namurian A) plants have been recovered from turbiditic mudstone (Feist and Galtier, 1985). More recently, corals, foraminifera, and algae indicating a Late

Visean to Early Serpukhovian age for some of the limestone blocks have been documented (Poty et al., 2002; Vachard and Aretz, 2004). Thus in the present state of knowledge, a Serpukhovian age (ca 325 Ma) is inferred for the olistostrome.

From the structural point of view, the Montagne Noire is well known for km-scale, south-verging recumbent folds (Arthaud, 1970). The uppermost recumbent fold, called the Pardailhan nappe, consists of an inverted series of Cambrian, Ordovician and Devonian sedimentary rocks tectonically overlying another inverted series of Ordovician, Devonian, and Carboniferous series, called the Mt-Peyroux nappe. This lower recumbent fold tectonically overlies a series of autochthonous and para-autochthonous tectonic units emplaced within the Late Visean-Serpukhovian foreland basin that can be considered as a flexural basin (Fig. 5). Whatever the detail of this complex fold-and-thrust belt, the mechanism of which remains poorly understood (e.g. Perrin et al., 2013), there is a general agreement to acknowledge both a northern origin of the detritus reworked in the foreland basin, and also a bulk southward direction of the tectonic transport responsible for the emplacement of the recumbent folds and the formation of the flexural basin. Although the root zone of the recumbent folds is not precisely settled, on the basis of stratigraphy and facies correlations, it should be located in the southern part of the Montagne Noire north flank, and partly in the northernmost part of the Axial zone (Arthaud, 1970; Demange, 1993; Alabouvette et al., 2003). It is worth to note that the Axial Zone does not represent a pre-Variscan basement since most of the orthogneiss exposed there are Early Paleozoic granitoids (Roger et al., 2004; Faure et al., 2010). Instead, the Axial Zone was involved in the south-directed tectonics responsible for the recumbent folds (e.g. Alabouvette et al., 2003; Faure et al., 2014, and enclosed references). The metamorphic Axial zone, and the recumbent folds represent the infrastructure and suprastructure of the same stack of nappes, respectively (Fig. 5).

4. Sample description

In this study, samples for detrital zircon analysis come from two parts of the stratigraphic column (Fig 3; Table 1). The basal Devonian (Lochkhovian) black microconglomerate (MO 23, 24) crops out in the northern subunit of the upper recumbent fold (Malviès synform). The overlying white quartzite was sampled in the lower recumbent fold, near the Lower Landeyran bridge (MO 18); and in La Guette, west of Roquebrun (MO 22A).

The analyzed black microconglomerate samples (MO 23, 24) consist essentially of 1mm to 1cm-sized clasts of quartz and subordinate feldspar and lithic elements enclosed in a black matrix (Fig 6d). The quartz grains exhibit deformation microstructures such as undulose extinction, subgrain boundaries, and more rarely dynamic recrystallization with core and mantle structure.

The white quartzite (MO 18, MO 22A) is formed by well rounded quartz grains. Heavy minerals such as zircon, monazite, rutile, and tourmaline can be sometimes observed under the microscope (Fig 6c).

The Late Viséan-Serpukhovian terrigenous rocks belong either to the lower recumbent fold (MO 17, 13 FR 52) or to the autochthonous foreland basin (MO 15, MO 16, and MO 26). Whatever their structural position, the analyzed samples are mature sandstone with mm-sized quartz grains. Detrital muscovite is commonly observed (Figs. 6 a, b).

5. LA-ICP-MS zircon U-Pb analytical procedure

Standard heavy liquid and magnetic separation techniques have been used to separate zircons from samples. After handpicking, zircon grains were mounted in epoxy resin and then polished to section the crystals for analysis. Before experiments, all zircons were photographed in both transmitted and reflected light under a microscope, and cathodoluminescence (CL) images were obtained by a CAMECA electron microscope. Based on these photographs, internal structures of zircons have been carefully examined.

Laser ablation ICP-MS zircon U-Pb analyses were conducted on an Agilent 7500a ICP-MS with a 193 nm laser at the MC-ICP-MS laboratory, Institute of Geology and Geophysics, Chinese Academy of Sciences in Beijing. U-Th-Pb ratios and absolute abundances were determined relative to the standard zircon. Detailed analytical procedures are described by Xie et al. (2008). The spot diameter is 44 μm or 60 μm in size. Correction of common lead was applied following the method described by Andersen (2002). The GLITTER program was used for data processing (van Acherbergh et al., 2001). Uncertainties on individual analyses in data tables are reported at a 1 σ level. Age diagrams of samples plotted using the Isoplot program (Ludwig, 2003). Zircon ages younger than 1000 Ma are based on $^{206}\text{Pb}/^{238}\text{U}$ ratios whereas ages older than 1000 Ma are based on $^{207}\text{Pb}/^{206}\text{Pb}$ ratios. In this study, we excluded zircon age analyses with >10% discordance.

6. Description of the zircon U-Pb analytical results

All analyzed samples, yield zircon detrital grains with a wide range in size from 50 μm to 200 μm (Fig. 7). Except several prismatic, most of the grains have a rounded shape with abraded crystallographic faces indicating important fluvial transportation. Most of the grains exhibit a zonal structure with an inherited core surrounded by recrystallization rims with clear oscillatory zoning. Due to analytic constraints on the beam size, only the large grains have been dated.

6.1. Detrital zircons from the Lower Devonian (Lochkovian) rocks

Two samples were collected on the basal Devonian (Lochkovian) black microconglomerate (Fig. 6d) situated in the northern subunit of the upper recumbent fold (also called Pardailhan nappe).

MO 23

Among the 100 analyses on 100 zircon grains, 4 are discordant (Table 2). Except seven zircon grains that yield Th/U ratio lower than 0.1, most analytical results have higher Th/U ratio. Combined with the CL images, these features of the zircons indicate a magmatic origin for these grains (Fig. 7). Most of the zircon ages cluster between 850 Ma and 436 Ma, with several ages older than 1500 Ma.

The diagram shows one pronounced age peak around 450 Ma, and three subordinate peaks around 590 Ma, 620 Ma, and 750 Ma (Fig. 8).

MO 24

Among the 100 analyses conducted on 100 zircons for sample MO24, 98 are concordant within uncertainties (Table 2). All zircons have Th/U ratios varying from 0.10 to 2.37 (Table 2). Similarly with the MO 23 sample, most of the concordant ages range from 850 Ma to 436 Ma, with two dominant peaks at 620 Ma and 450 Ma, and three subordinate peaks around 590 Ma, 620 Ma, and 750 Ma (Fig. 8). Several grains indicate a Paleoproterozoic source around 2000 Ma (Fig. 8).

In this work, two samples of Early Devonian white quartzite were collected in the lower recumbent fold (or Mt-Peyroux nappe). As these rocks consist of well sorted, nearly pure quartz, deposited in a more distal part of the basin than the previous samples (MO23 and MO 24), they will allow us to compare detrital zircons in a sedimentary setting different from that of the microconglomerate.

MO 18

One hundred analyses of 100 zircons were made (Table 2). Among these analyses, 91 are concordant within uncertainties. These ages range from 3249 Ma to 234 Ma. Th/U ratios of all zircons but two are higher than 0.1. Almost all ages vary from 1000 Ma to 416 Ma, with 6 grains older than 1800 Ma (Fig. 8). Two major peaks at 630 Ma and 460 Ma, and two subordinate peaks around 970 Ma and 750 Ma are identified (Fig. 8). It is worth to note that this sample shows a minor difference with the others as five grains (analytical points 25, 51, 65, 68, 72) are younger (such as 234 Ma) than the Early Devonian sedimentary age of the rock, and four grains yield ages comprised between 384 Ma and 332 Ma (Table 2). The CL images of these abnormal grains reveal that analytical spots involved cracks or inclusions, leading to Pb loss and unreliable ages. Thus they have been discarded from the age spectra distribution.

MO 22A

In this sample, 100 zircon grains were selected to conduct 100 analyses and obtain 91 concordant ages. Zircon ages range from 2748 Ma and 435 Ma with 11 zircons older than 1800 Ma, and Th/U ratios vary from 0.04 to 2.90 (Table 2). Except 3 grains, the remaining ones correspond to magmatic zircons. The diagram shows one major group at 1000-435 Ma with two age peaks at 457 Ma and 618 Ma; one subordinate peak around 980 Ma is identified; an unseparated cluster between 795 Ma and 700 Ma is also fixed (Fig. 8). Ages older than 1000 Ma are concentrated around 1980 Ma.

6.2. Detrital zircons from the Carboniferous (Late Visean-Serpukhovian) rocks

Two mature sandstone, with mm-sized quartz grains, were collected on the lower recumbent fold (Fig. 6a)

MO 17

A total of 100 analyses of 100 grains were undertaken and 2 are discordant (Table 3). Ninety-eight zircons yield ages ranging from 2879 Ma to 328 Ma, with Th/U ratios from 0.12 to 1.44, except 3 between 0.02 and 0.06. More than 80% analytical results are situated between 760-330 Ma with four major groups of Phanerozoic ages: 350 Ma, 470 Ma, 580 Ma, and 630 Ma (Fig. 9). In this sample, 14 zircon grains are older than 1500 Ma with a cluster around 2700 Ma.

13 FR 52

One hundred analyses of 100 zircon grains have been conducted, and only 3 zircon ages are discordant (Table 3). All but one zircon (13FR52-02) show magmatic features with Th/U ratio > 0.1. The concordant ages range from 2682 Ma to 319 Ma; around 15% analytical result indicated the ages more than 1000 Ma with a small peak around 2100 Ma (Fig. 9). In fact, most of concordant ages range from 680 Ma and 320 Ma with two dominant peaks at 490 Ma and 350 Ma, and two subordinate peaks around 540 Ma and 610 Ma (Fig. 9).

Three mature sandstones were analyzed from the autochthonous foreland basin (Fig. 6b).

MO 15

In this sample, we analyzed 100 spots of 100 zircon grains, among which 6 ages are discordant (Table 3). Except 3 grains, Th/U ratios of all zircons are higher than 0.1. Similar to the 13FR52, 16 zircons are older than 1500 Ma with a cluster around 2100 Ma. Most zircons yield ages range from 670 Ma and 320 Ma with three dominant peaks at 542 Ma, 489 Ma, and 340 Ma (Fig. 9). The youngest zircon age is 315 Ma.

MO 16

Among the 100 analyses on 100 zircon grains, 90 are concordant ages within uncertainties (Table 3). Two grains yield Th/U ratio lower than 0.1. 67 zircons are grouped between 680 Ma and 330 Ma, and a small group at 2150-1800 Ma with two peaks around 1890 Ma and 2140 Ma also exists (Table 3 and Fig. 9). The diagram shows one conspicuous age peak at 452 Ma, and four subordinate peaks at 352 Ma, 504 Ma, 571 Ma, and 616 Ma, respectively (Fig. 9).

MO 26

One hundred spots on 100 zircons were analyzed, and 89 yield concordant ages within uncertainties. Th/U ratios of all zircons but one are higher than 0.1 (Table 3). The concordant ages range from 2966 Ma to 325 Ma; nearly 30% of the analytical result indicated ages older than 1000 Ma, and a cluster at 2060-1940 Ma with a peak around 2053 Ma. This sample contains the largest number of Archean or Proterozoic ages (Table 3 and Fig. 9). In fact, most zircons yield ages <700 Ma with two dominant peaks at 496 Ma and 352 Ma, and two subordinate peaks around 559 Ma and 586 Ma (Fig. 9).

6.3. Synthetic view of inherited zircons

The four Devonian samples yield similar age distribution spectra (Fig. 8). The main peak of inherited grains ranges between 460 and 445 Ma (Ordovician) with a peak around 450 Ma (Fig. 10a). A secondary maximum appears at 628-551 Ma (Cryogenian-Ediacaran) with a peak around 620 Ma (Fig. 10a). Furthermore, several minor secondary peaks represented by a few grains indicate a Paleoproterozoic to Neoproterozoic cluster between 2000 Ma (samples MO 18 and MO 24), 1980 Ma (sample MO 22A and MO 23), and 750 Ma (Fig. 10a). Finally, single isolated grains yield Neoproterozoic ages (ca 2500 Ma to 3200 Ma) with a small peak around 2700 Ma (sample MO 18; Fig. 10a). It is worth to note that eo-Variscan zircon grains, i.e. slightly younger than 415 Ma, are relatively rare. This can be explained by the fact that analytic spots focus on zircon core rather than rims.

The five Late Viséan to Early Serpukhovian sandstone samples exhibit comparable detrital zircon age distribution patterns whatever their structural position whether in the foreland basin or in the recumbent fold (Fig. 11). A significant peak corresponds to Early Carboniferous ages around 352 Ma to 340 Ma (Fig. 9) with a maximum around 350 Ma (Fig. 10b). All these 5 samples even have ages as young as Viséan at 340 Ma. The main peak yields Early Paleozoic ages at 490 to 452 Ma with a statistical peak around 485 Ma (Fig. 10b). Three Neoproterozoic peaks around 620 Ma, 580 Ma, and 560 Ma are also represented. On the contrary, Paleoproterozoic ages cluster around 2000 Ma (Fig. 10b). Similar with the analytical results of Devonian samples, single isolated grains yield Neoproterozoic ages (ca 2500 Ma to 3200 Ma) with a small statistical peak around 2700 Ma (Fig. 10b). Furthermore, Middle Devonian to Silurian ages, i.e. 440 Ma to 380 Ma, are quite rare: 2 grains in sample MO 15, 1 grain in sample MO 16, 2 grains in sample MO 17, and 3 grains in sample MO 26.

Whatever their structural position, all the samples show two significant peaks around 350 Ma and 450 Ma or 480 Ma (Fig. 11). Concerning the Ediacaran ages, the samples (MO 15, MO 16, MO 26) from the foreland basin show a peak around 559 Ma that is shifted to 585 Ma in the recumbent fold (MO 17, 13 Fr 52, Fig. 11). The Paleoproterozoic to Archean zircons recovered from the foreland basin define a significant cluster around 2000 Ma; on the contrary, a small peak around 2700 Ma is shown in the population from the recumbent fold. The difference in the Precambrian age results suggests that the source that supplied the zircons may have changed slightly from the foreland basin to

the recumbent fold. Furthermore, it is worth to note that such Precambrian rocks are presently not exposed in the Massif Central.

7. Discussion

The zircon age distribution spectra displayed by the Early Devonian and Late Viséan-Serpukhovian terrigenous rocks of the Montagne Noire recumbent folds and foreland basin are similar (Fig. 11). According to the sedimentological data suggest a northern source, i.e. from the already deformed and metamorphosed part of the inner part of the Massif Central. In the following, the possible provenance for the pre-Devonian zircons will be discussed together for Devonian and Carboniferous rocks. Then the case of the Late Devonian to Early Carboniferous zircons will be examined separately.

7.1. Ordovician ages

All the analyzed samples dominantly rework Ordovician zircons ranging between 490 and 445 Ma with statistical peaks around 450 Ma and 480 Ma (Fig. 10). The Ordovician magmatism is well documented in the Variscan belt, where it is interpreted as a consequence of the rifting event that separated several continental stripes, such as Armorica, Mid-German Crystalline Rise, and Avalonia from the northern part of Gondwana (e.g. Matte, 2001; Martínez Catalán et al., 2004, 2009; Faure et al., 2005; Ballèvre et al., 2009). In the French Massif Central, the Ordovician magmatism is mainly represented by alkaline porphyritic granite now transformed into augen orthogneiss. These rocks were probably still buried when the Early Devonian and Carboniferous detritus were deposited in the southern part of the Montagne Noire, however, Ordovician lava and volcanic-sedimentary rocks crop out in the Para-autochthonous Unit, Lower Gneiss Unit and Upper Gneiss Unit (e.g. Pin and Marini, 1993; Alabouvette et al., 2003; Faure et al., 2009). These formations are the most likely potential source rocks that supplied the detrital zircons. A small difference appears between the microconglomerate (MO 23, 24), and the black sandstone (MO 18 and MO 22A) samples. The older

has a zircon peak around 450 Ma, and the younger around 460 Ma (Fig. 8). However, given the error bars of the analysis, the difference between these two peaks is not significant. Moreover, the Late Viséan-Serpukhovian samples exhibit a prominent statistical peak around 480 Ma (Fig. 9 and 10). The reasons for these differences might be due to a change in the zircon source between the Devonian and the Carboniferous.

7.2. Neoproterozoic-Early Cambrian ages

Most of the samples yield Neoproterozoic ages with population peaks at 620 Ma, 590 Ma and 560 Ma (Figs. 8, 9, and 10), and the early Devonian sedimentary rocks show a smaller peak around 980 Ma, and 750 Ma (Fig. 10). It is often argued that the magmatic rocks emplaced during the Ediacaran Cadomian orogeny (650 - 550 Ma), developed along on the margin of the Gondwana continent, and supplied the late Precambrian zircons. Such a possibility cannot be ruled out (Fig. 12). However, it is worth to note that in contrast to the Massif Armoricain, in the FMC, evidence for an Early Cambrian unconformity supporting a Cadomian orogeny is absent, although Neoproterozoic sedimentary and magmatic rocks do exist in the FMC. Indeed, Neoproterozoic-Cambrian magmatic rocks are recognized in most of the litho-tectonic units of the FMC. For instance, Early Cambrian acidic volcanites, known as "porphyroids" crop out in the Cévennes, Albigeois, Rouergue, Limousin. Also, ca 560 Ma diorite and quartz diorite plutons intrude the grauwacke series belonging to the Lower Gneiss Unit in the Lot series (Fig 1; Pin and Lancelot, 1978), the Cévennes Para-autochthonous Unit (Caron, 1994) or the UGU and LGU in the Rouergue area (Lafon, 1986; Lévêque, 1990). Thus several source rocks for the Tonian-Cryogenian-Ediacaran-Early Cambrian detrital zircons can be speculated in the litho-tectonic units exposed north of the Montagne Noire. Presently there are no exposures of 980 Ma, 750 Ma and 620 Ma rocks in the FMC. One possibility is that these zircons were already present in Cambrian or Ordovician detrital rocks that form the host-rocks of the magmatic rocks. In such a case, the primary source for the Neoproterozoic-Early

Cambrian ages would be located in the Gondwana, more to the South than the MCF, and transported to the North by the river drainage network (Fig 12).

7.3. Paleoproterozoic and Neoproterozoic

In spite of absence of outcrop exposing such old rocks in the FMC, Precambrian inherited zircons are frequently found, but always with a small number of grains, as xenocrysts, in Early Paleozoic magmatic rocks (Cocherie et al., 2005; Lafon, 1986; Alexandrov, 2000; Melleton et al., 2010). A 2000 Ma age cluster is indicated in all the samples (Figs 8, 9). On the contrary, a small peak around 2700 Ma is exhibited in the Late Viséan-Serpukhovian samples. Thus, in the Montagne Noire terrigenous rocks, these grains were possibly supplied by the erosion of Early Paleozoic magmatic rocks or sedimentary formations that already contained different Paleoproterozoic and Neoproterozoic age populations. If those zircons were supplied by the erosion of Neoproterozoic, Cambrian or Ordovician magmatic rocks, the Paleoproterozoic and Neoproterozoic zircon record is an indirect evidence for a Paleoproterozoic, and even Archean, basement underneath the Variscan belt.

7.4. Late Devonian to Early Carboniferous

The Late Viséan-Serpukhovian turbidite yields also Famennian-Tournaisian detrital zircons. Metamorphic and magmatic rocks of this age are well known in the Lower Gneiss Unit. Biotite-garnet-staurolite gneiss are well developed in the Lower Gneiss Unit where they yield monazite U-Th-Pb ages around 365-350 Ma (Melleton et al., 2009; Do Couto et al., 2015), but metamorphic zircon ages have not been measured in these rocks. 355-350 Ma magmatic rocks, well exposed in the NW part of the FMC, correspond to the emplacement age of the biotite \pm cordierite Guéret granite (Fig 1; Cartannaz et al., 2007). These rocks are suitable sources for the Montagne Noire detrital zircons since they were already exhumed in Tournaisian-Early Viséan, as documented by the fossiliferous sandstone

and limestone series that overlies the Guéret massif (Mamet et al., 1970). Furthermore, mafic and felsic rocks belonging to the Brévenne ophiolitic series of Eastern Massif Central yielding ca 366±5 Ma ages are also possible source rocks (Fig. 1; Pin and Paquette, 1998).

Lastly, 345 to 335 Ma (Early and Middle Visean) magmatic rocks crop out in the NE part of the FMC, namely Montagne Bourbonnaise and Morvan areas (Fig. 1). There, several sedimentary and volcanic series dated of Tournaisian, Early and Middle Devonian by foraminifera and corals in limestone, and plants debris in terrigenous formations, are covered by the Late Visean "Tufts Anthracifères" (Peyrel and Didier, 1983; Duthou et al., 1984; Leistel and Gagny, 1984; Binon and Pin, 1989; Delfour, 1989; Pin and Duthou, 1990; Pin, 1991; Leloix et al., 1999; Faure et al., 2002; Fig 13). The various volcanic rocks, such as rhyolite, dacite, trachyte, and basaltic lava flows, pyroclastites, volcanic breccias and grauwackes are potential sources for the detrital zircons recovered in the Montagne Noire turbidite.

The NE Massif Central and Montagne Noire are presently separated by ca 250 km where Tournaisian-Visean rocks are presently lacking. However such a rocks might have been exposed there and eroded to supply the material recovered in the Montagne Noire foreland basin. Contemporaneous plutonic rocks are also reported in the Montagne Bourbonnaise (Fig. 13), particularly the biotite-K-feldspar (±hornblende) Bois Noirs and Mayet-de-Montagne massifs dated at 328±6, and 328±4 Ma, respectively (Binon and Pin, 1989). Nevertheless, it is not settled yet if plutons contemporaneous to these ones were already exposed in Late Visean.

Furthermore, the eo-Variscan rocks, either HP/LT metamorphic rocks or HT/LP gneiss and migmatites with ages ranging from 440 to 400 Ma, and 385-375 Ma, respectively are rare in the sedimentary record, both in Early Devonian and Carboniferous terrigenous rocks. A possible interpretation of this phenomenon is that the eo-Variscan deep seated metamorphic rocks were not already exposed to the surface in the Devonian or Late Variscan to Early Serpukhovian. Moreover, this scarcity may also result of selective sampling of the analyzed grains as large magmatic zircons were preferentially chosen instead of the small metamorphic rims. In a future work, detail analyses

should be done to investigate the recrystallization rims around zircon in order to reveal the eo-Variscan magmatic and metamorphic events.

On the basis on our results, a Viséan reconstruction of the paleotopography of the Massif Central, showing the possible sources and drainage patterns, is proposed in Fig. 14. Moreover, as discussed above, it must not be forgotten that a part of the detrital zircon grains enclosed in the Devonian and Carboniferous sandstones may have experienced multiple reworking and recycling, as already documented for the magmatic rocks (Alexandrov, 2000; Cocherie et al., 2005; Ducassou et al., 2014; Faure et al., 2010; Melleton et al., 2010). Thus, the search for a source to the North of the Massif Central is not the only possibility. Particularly, the Proterozoic and Archean grains might have been eroded and deposited several times in the Early Paleozoic sedimentary rocks or scavenged by the magmas before their final depositions.

8. Conclusion

This first study of the detrital zircons deposited in the Early Devonian and the Viséan-Serpukhovian detrital rocks of the Montagne Noire area shows that a wide range of detrital zircons were supplied from the northern inner part of the Variscan belt of the FMC. The zircon grains from all of the samples yielded U-Pb age spectra ranging from Neoproterozoic to Late Paleozoic with several age population peaks at 2700 Ma, 2000 Ma, 980 Ma, 750 Ma, 620 Ma, 590 Ma, 560 Ma, 480 Ma, 450 Ma, and 350 Ma. The Precambrian grains recorded more complex itinerary and may be experienced a multi-recycling history. The Ordovician magmatism (around 450 Ma) appears as the main component of detrital zircons.

The subordinate ages of detrital zircons were 352-340 Ma with a statistical peak around 350 Ma in the Late Viséan-Early Serpukhovian turbidite complies with the Tournaisian Guéret type granites emplaced at the end of the main Variscan phase, and exhumed in Early Carboniferous. Since Tournaisian magmatic rocks crop out only in the northern part of the FMC, this result complies with

the previous conclusion inferred from sedimentological studies that the drainage pattern was southward directed (Fig. 14). Concerning the provenance of the Early to Middle Visean detritus, a northern source is also inferred on the basis of sedimentology. Presently, magmatic rocks of this age crop out only in the Montagne Bourbonnaise-Morvan area, ca 250 km to the North of the deposition area, suggesting also a south-directed drainage towards the Late Visean-Serpukhovian Variscan foreland basin. Nevertheless, a presently eroded, closer source cannot be ruled out.

Acknowledgements

This work is supported by the State Key Laboratory of Lithospheric Evolution, IGG-CAS, “Strategic Priority Research Program” of the Chinese Academy of Science (XDB03010802), and the National Natural Science foundation of China (grant 41273070, 41225009, 41202079). A part of the expenses for M. F. has been also provided by UMR 7327 CNRS-Université d'Orléans. Constructive comments and suggestions by W. Franke and J.R. Martínez Catalán to improve the manuscript are deeply acknowledged.

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Figure Captions

- Fig. 1. Structural map of the Variscan French Massif Central (modified from Faure et al., 2009).
- Fig. 2. Structural map of the Montagne Noire with location of the dated detrital zircons samples.
- Fig. 3. Lithostratigraphic log of the Paleozoic series cropping out in the Montagne Noire (modified from Arthaud, 1970; Alvaro and Vizcaïno, 1998; and Vizcaïno and Alvaro, 2001).
- Fig. 4. Field picture of Devonian quartzite and Carboniferous turbidite. (a). Devonian unconformity overlying Early Ordovician sandstone (due to the Carboniferous tectonics, the unconformity is upside down); (b). Early Devonian massive white quartzite (Mur quartzite), sample MO 18; (c). Visean-Serpukhovian turbidite with intraformational matrix-supported conglomerate; (d). General view of the Visean-Serpukhovian turbidite; (e). Close-up of D showing intraformational conglomerate with white quartz, radiolarian chert, and black siltite clasts (sample MO 17).
- Fig. 5. Schematic cross section of Montagne Noire with sample location; italics: Devonian sandstone, plain: Visean-Serpukhovian sandstone. (Modified from Faure et al., 2014).

Fig. 6. Microscope thin sections representative of dated rocks. Late Viséan-Serpukhovian rocks, (a). Fine grained sandstone (13FR 52), (b). Coarse grained sandstone (MO 15) with detrital muscovite. Early Devonian rocks, (c). White quartzite with detrital zircon (MO 18), (d). Black microconglomerate (MO 24).

Fig. 7. Representative cathodoluminescence (CL) images of selected detrital zircons with a wide range in size and morphology. Most of the analyzed grains exhibit an inherited core surrounded by several recrystallization rims. The circles represent U-Pb analytical sites; Analytical numbers and ages presented below; the scale length is 100 μm .

Fig. 8. Cumulative probability plots of detrital zircon U-Pb ages in Early Devonian sandstone, see Figs 2 and 5, and Table 1 for location.

Fig. 9. Cumulative probability plots of detrital zircon U-Pb ages in Late Viséan-Early Serpukhovian sandstone, see Figs 2 and 5, and Table 1 for location.

Fig. 10 Synthetic and comparison of the cumulative probability plots of detrital zircon U-Pb ages from the (a). Early Devonian sandstone, (b). Late Viséan-Early Serpukhovian sandstone, and (c). Histograms of all the concordant detrital zircon ages obtained in this study.

Fig. 11. Synthetic cumulative probability plots of detrital zircon U-Pb ages from the Carboniferous autochthonous foreland basin and the Carboniferous and Devonian from the recumbent folds.

Fig. 12. Schematic paleogeographic map of the main continents at 550 Ma - 490 Ma showing the situation of the French Massif Central (FMC) in the northern margin of Gondwana, and the Avalonia, Mid-German Crystalline Rise (MGCR) and Armorica microcontinents separated from Gondwana in Early Ordovician. Arrows indicate the possible source areas for the detrital zircons. In the Neoproterozoic-Early Cambrian, both northern (from the Cadomian belt), and southern (from the West African craton) sources are possible. In Ordovician, due to the rifting, only a southern (i.e.

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Fig. 13. Schematic geological map and lithostratigraphic logs of Devonian-Visean series recognized in NE Massif Central (modified from Leistel and Gagny, 1984; Binon and Pin, 1989; Delfour, 1989; Leloix et al., 1999). Ages of Visean plutons are from Binon and Pin (1989) for zircon ages, and A. Cocherie (personal communication) for monazite. Zr: zircon, mz: monazite. In the map, due to their limited extension, the middle Visean series (V2) have been grouped with the early Visean (V1) ones. The late Visean (V3) "Tufs Anthracifères" series unconformably covers all previous series.

Fig. 14. Schematic topographic reconstruction of the French Massif Central during the Visean and the possible sources for the detrital zircons of the Foreland basin.

Table 1. Summary of samples from the foreland basin of the Variscan Southern Massif Central in Montagne Noire

Table 2. Analytical data for the dated Devonian zircons: MO 18, MO 22A, MO 23, MO 24.

Table 3. Analytical data for the dated Carboniferous zircons: 13 FR 52, MO 15, MO 16, MO 17, MO 26.

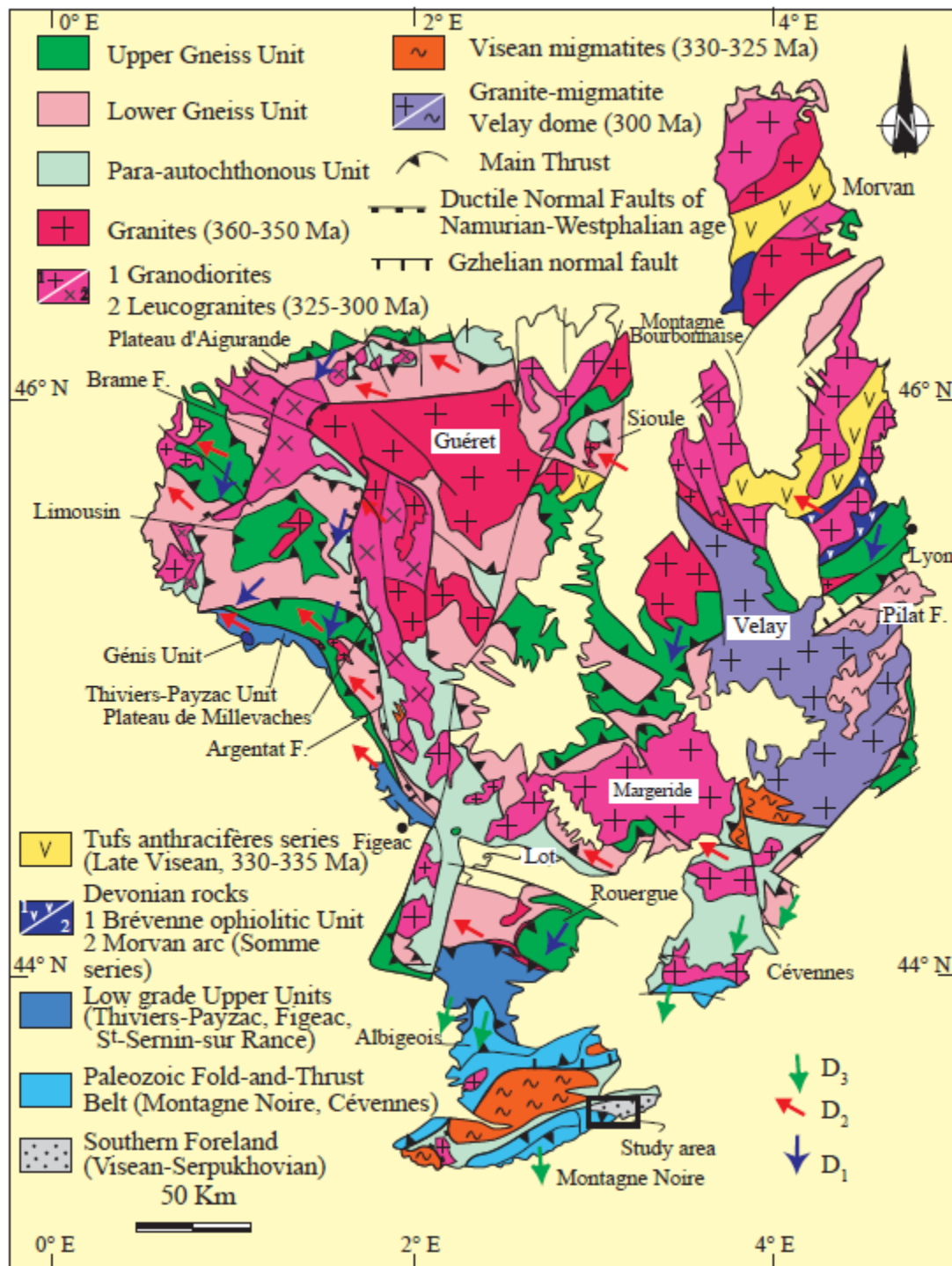


Fig. 1. Structural map of the Variscan French Massif Central (modified from Faure et al., 2009).

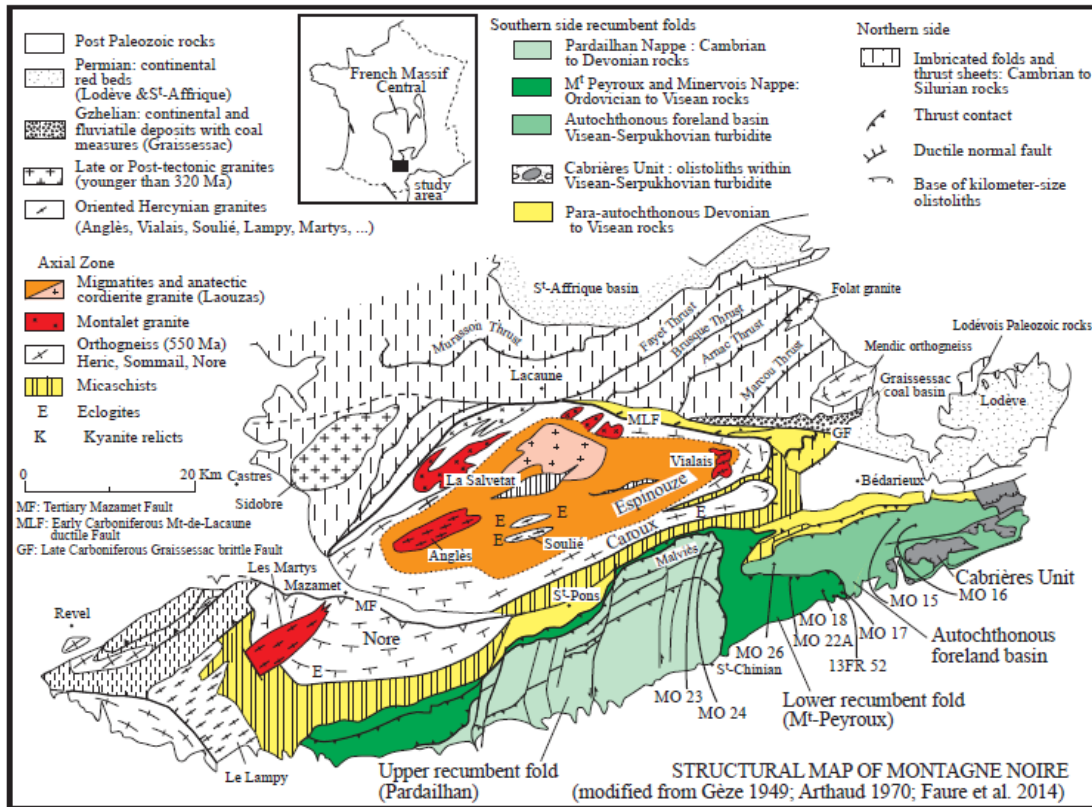


Fig. 2. Structural map of the Montagne Noire with location of the dated detrital zircons samples.

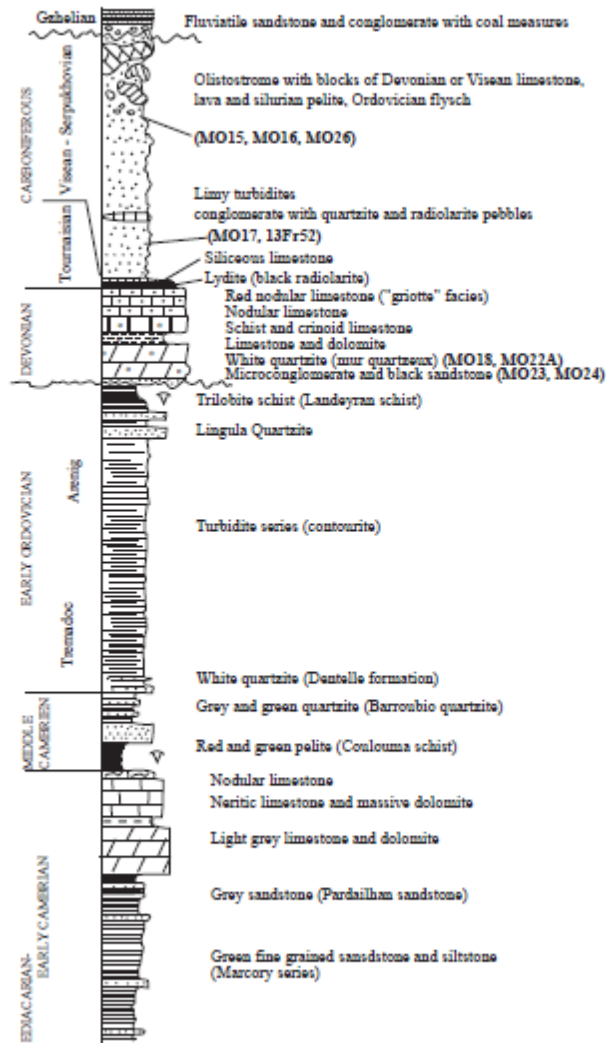


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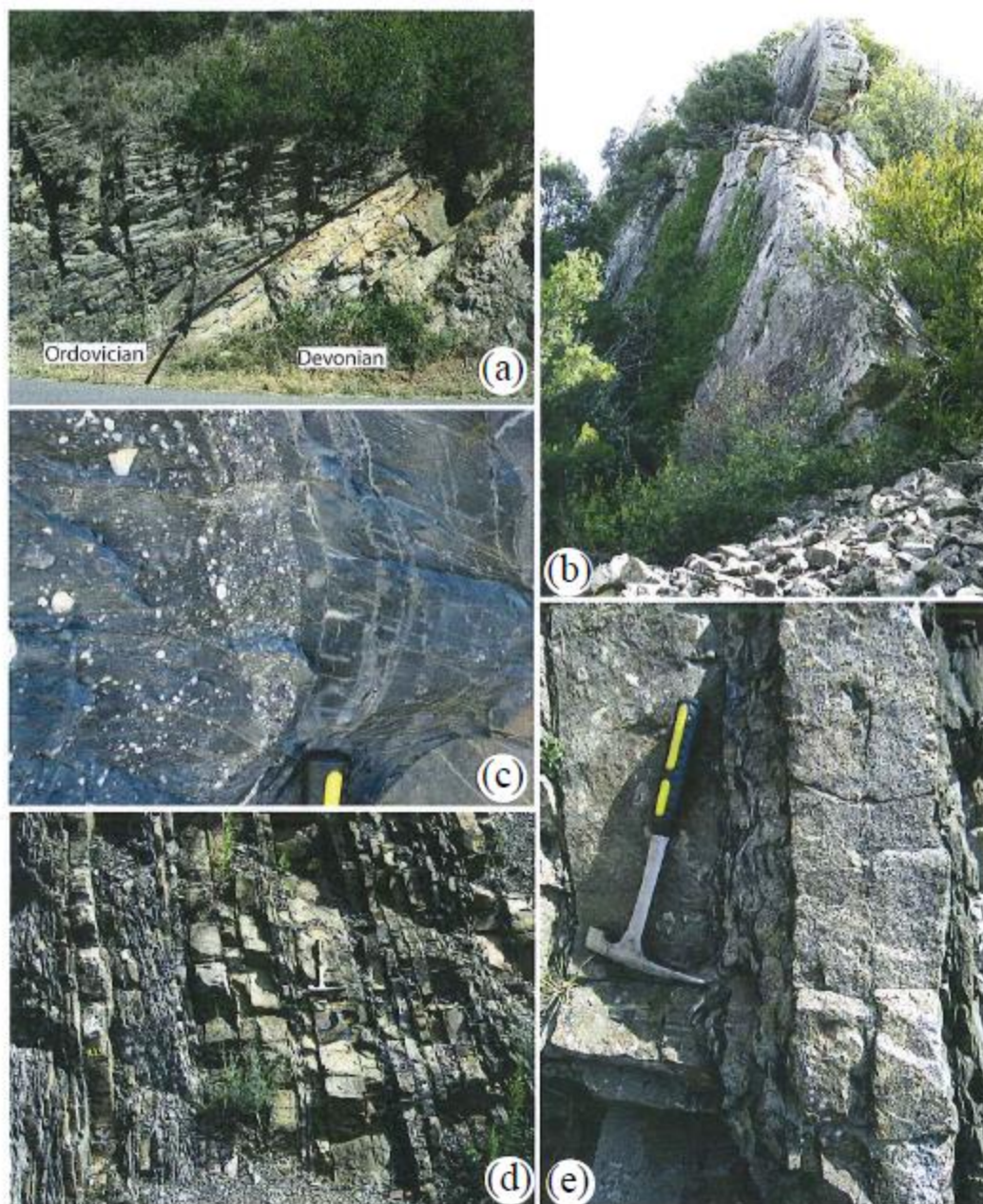


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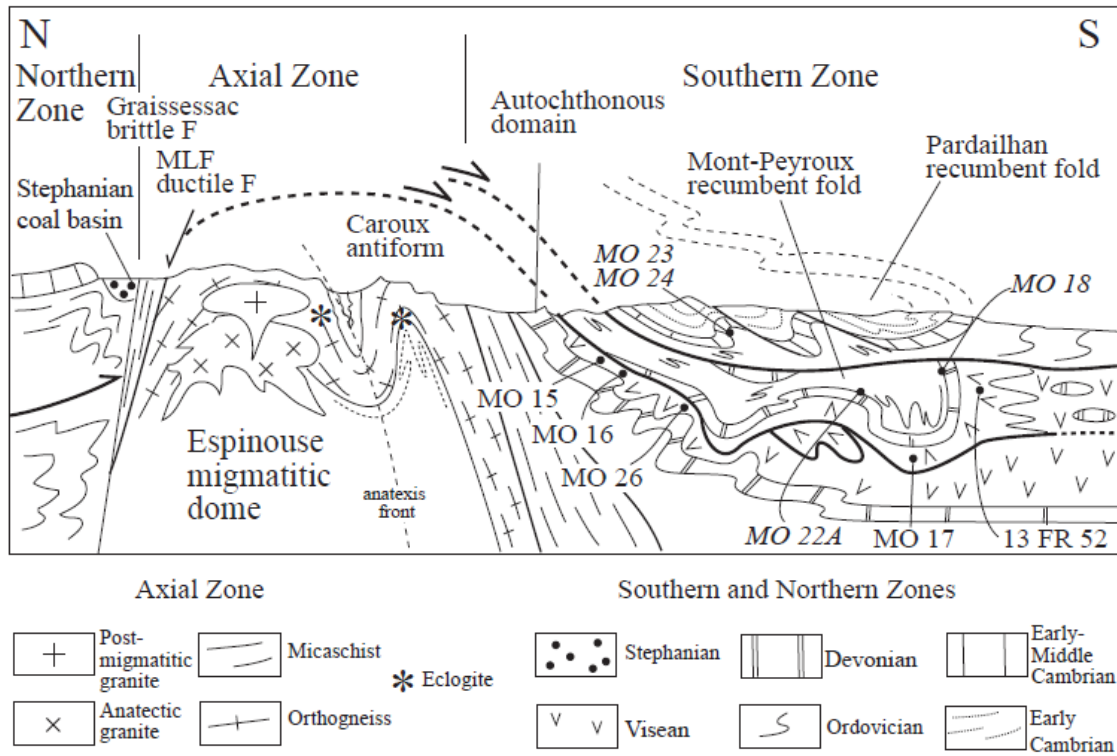


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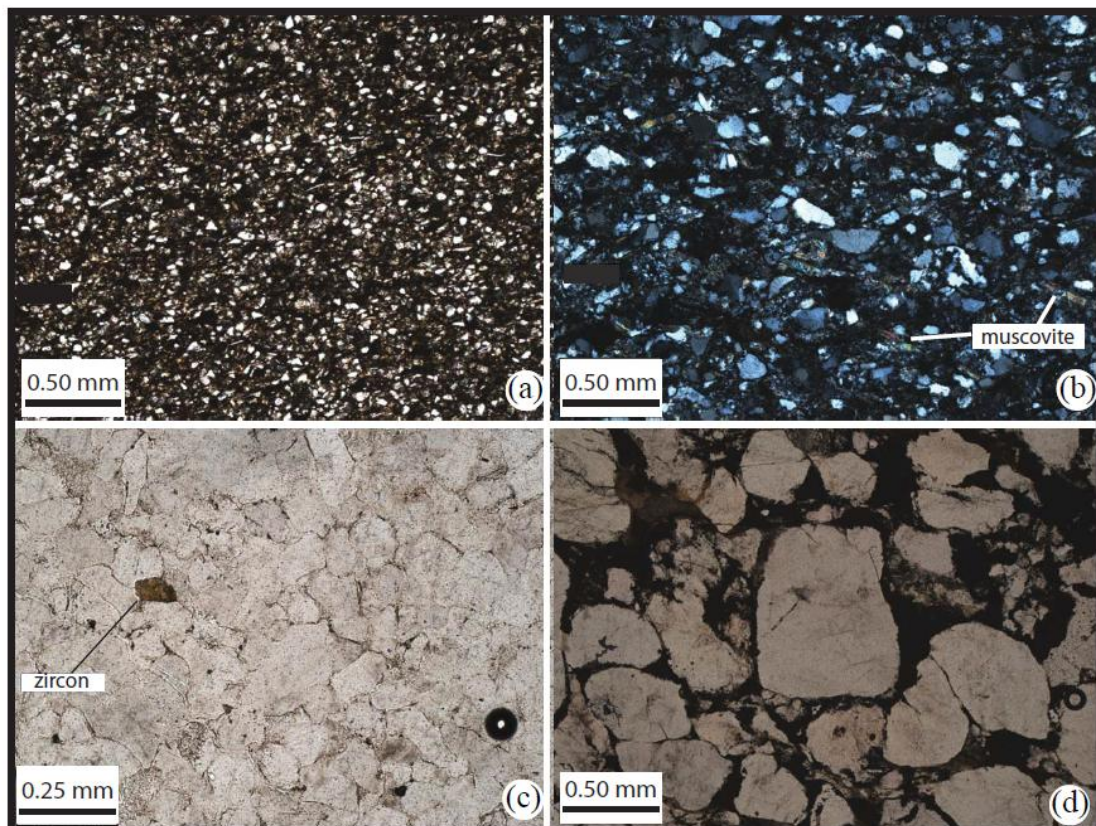


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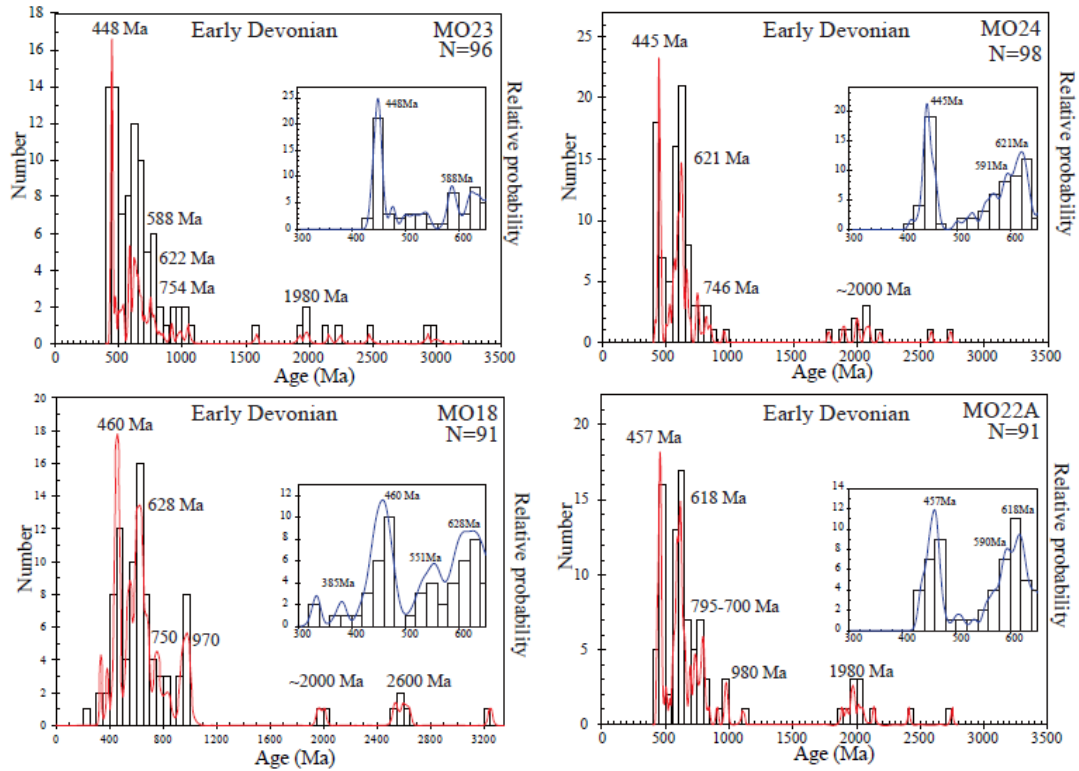


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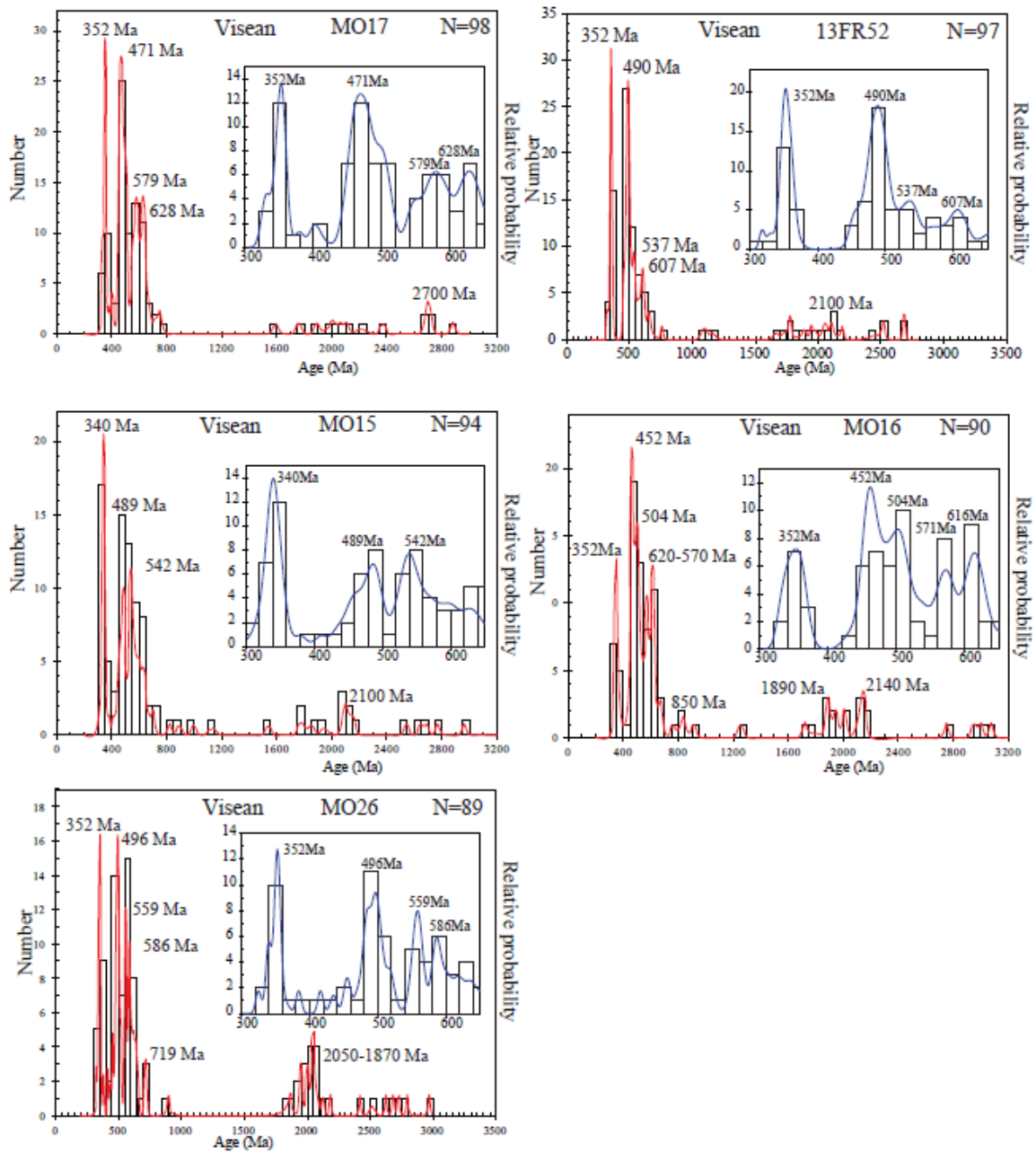


Fig. 9. Cumulative probability plots of detrital zircon U-Pb ages in Late Visean-Early Serpukhovian sandstone, see Figs 2 and 5, and Table 1 for location.

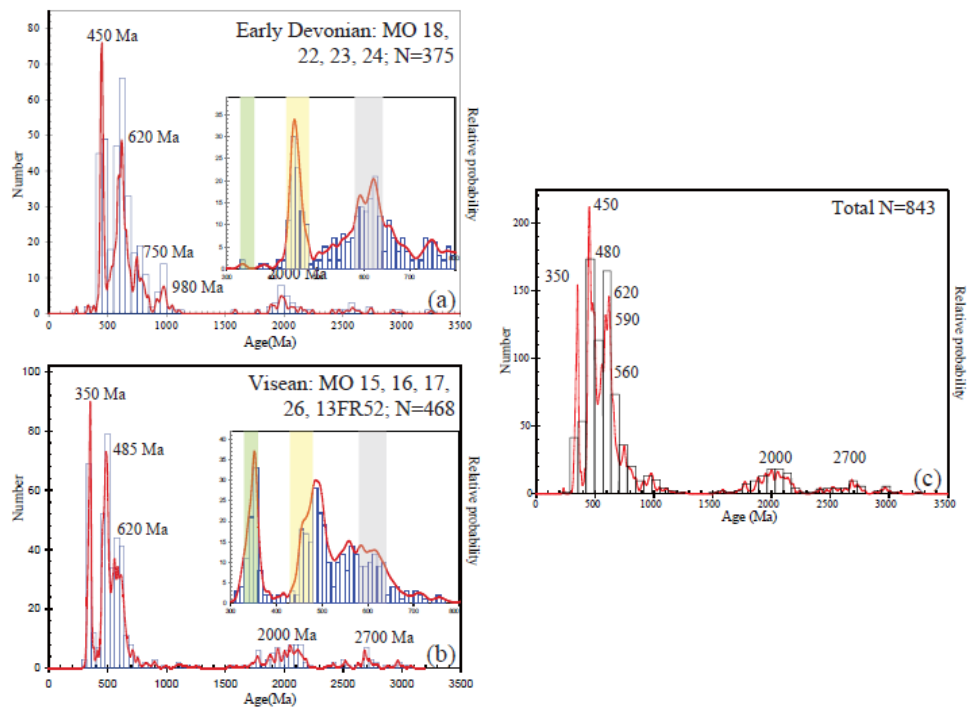


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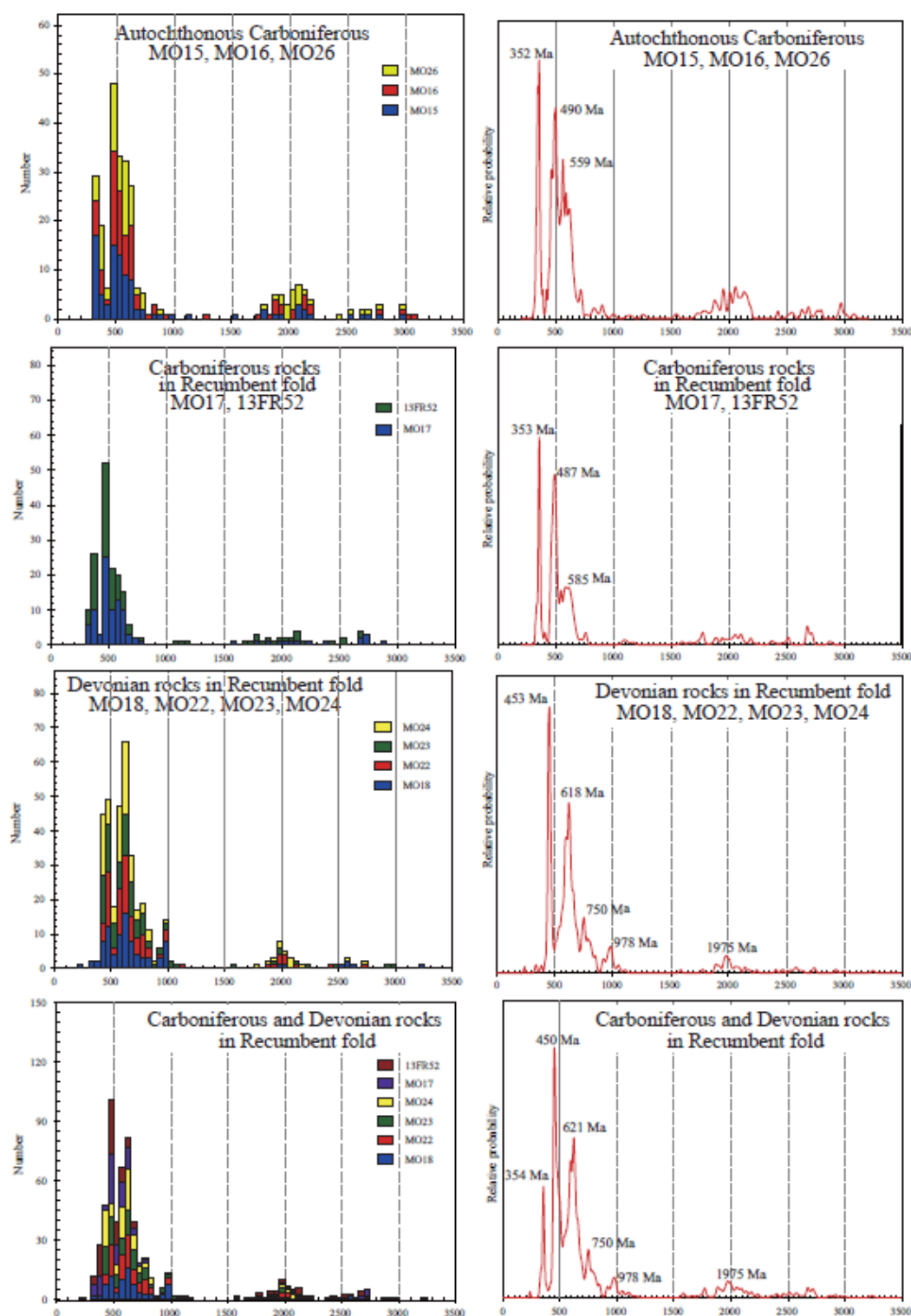


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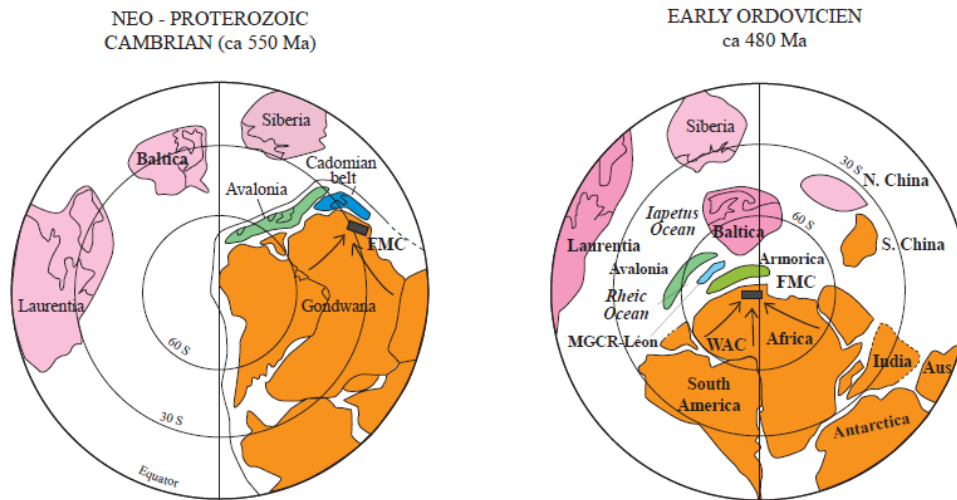


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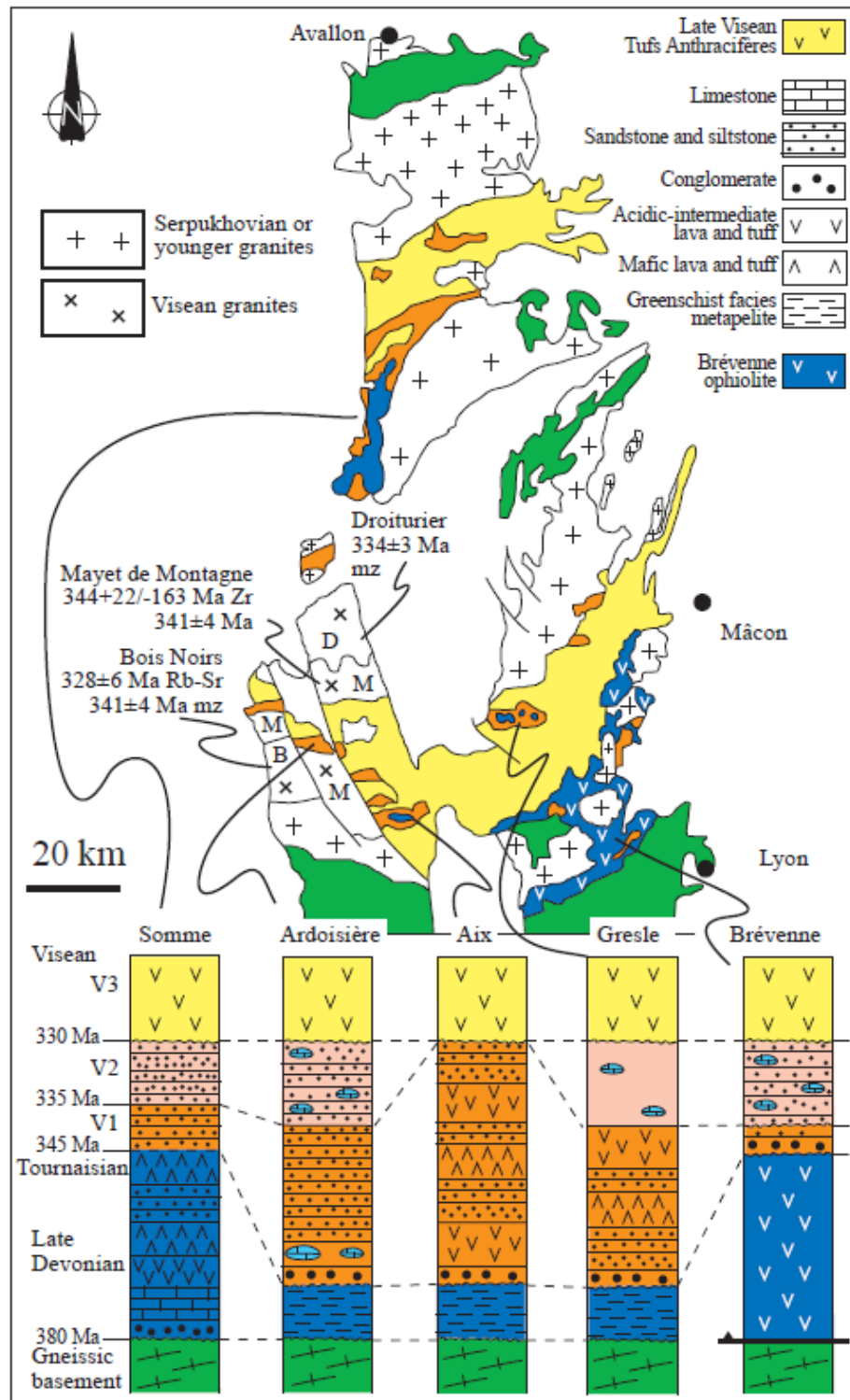


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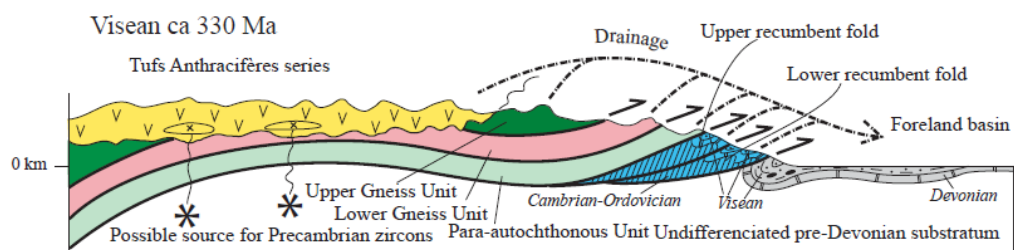


Fig. 14. Schematic topographic reconstruction of the French Massif Central during the Visean and the possible sources for the detrital zircons of the Foreland basin.

ACCEPTED

Table 1 Summary of samples from the foreland basin of the Variscan Southern Massif Central in Montagne Noire

Stratigraphic Age	Sample n°	GPS location	Petrography	Tectonic position
Serpukhovian	MO 15	43° 32' 24.41"	Sandstone	Autochthonous
	Cabrerolles	03° 07' 47.30"		
to	MO16	43° 31' 55.33"	Sandstone	Autochthonous
	Lenthéric	03° 08' 58.50"		
	MO 26	43° 31' 38.54"	Sandstone	Autochthonous
	Roquebrun	03° 02' 19.52"		
Viséan	MO 17	43° 29' 54.72"	Microconglomerate	Lower recumbent fold
	Barrac	03° 06' 57.02"		(Mt-Peyroux)
Devonian	13 FR 52	43° 28' 37.18"	Sandstone	Lower recumbent fold
	Landeyran	03° 04' 03.63"		(Mt-Peyroux)
	MO 18	43° 28' 56.58"	Quartzite	Lower recumbent fold
	Landeyran	03° 03' 51.42"		(Mt-Peyroux)
	MO 22A	43° 29' 58.8"	Quartzite	Lower recumbent fold
	Roquebrun	03° 02' 56.4"		(Mt-Peyroux)
	MO 23	43° 32' 31.70"	Microconglomerate	Upper recumbent fold
	Malviès	02° 55' 50.03"		(Pardailhan)
	MO 24	43°32' 43.58"	Microconglomerate	Upper recumbent fold
	Fenouillède	02° 56' 24.13"		(Pardailhan)

Table 2. Analytical data for the dated Devonian zircons: MO 18, MO 22A, MO 23, MO 24.

Spot No.	Th (ppm)	U (ppm)	Th/U	Ratios						Ages (Ma)						Discor-dance (%)	Best Ages	$\pm 1\sigma$
				$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$			
MO18-01	8811	318	0.28	0.06135	0.0014	0.00983	0.0019	0.828	0.0066	652	19	605	11	615	9	1.65%	605	11
MO18-02	1239	225	0.55	0.07501	0.00206	0.00803	0.00172	0.834	0.0054	875	20	494	11	568	23	14.98%		
MO18-03	1361	363	0.37	0.06669	0.00128	0.00261	0.00240	1.106	0.0024	724	85	763	14	753	18	-1.31%	763	14
MO18-04	9789	989	0.99	0.07417	0.00212	0.00629	0.00365	1.666	0.0036	1046	24	973	20	996	17	2.36%	973	20
MO18-05	4114	1136	0.36	0.05830	0.00270	0.00765	0.00200	0.6153	0.0062	541	50	475	12	487	17	2.53%	475	12
MO18-06	1062	1632	0.65	0.06259	0.00199	0.00909	0.00201	0.786	0.00294	694	29	561	12	588	13	4.81%	561	12
MO18-07	1297	372	0.35	0.05942	0.00127	0.00960	0.00185	0.780	0.00534	583	9	591	11	589	9	-0.34%	591	11
MO18-08	1282	1895	0.68	0.06256	0.00166	0.0043	0.00218	0.9004	0.0019	693	23	640	13	652	12	1.88%	640	13
MO18-09	6492	1933	0.33	0.05551	0.00195	0.00722	0.00163	0.5531	0.00790	433	35	450	10	447	12	-0.67%	450	10
MO18-10	5703	228	0.25	0.05976	0.00184	0.00756	0.00164	0.6235	0.00760	595	28	470	10	492	11	4.68%	470	10
MO18-11	1341	432	0.31	0.07196	0.0047	0.00904	0.0031	0.8977	0.0038	641	23	551	18	569	44	3.27%	551	18

11					0		0		4										
M O1 8- 12	1 3 2	1 9 6	0. 6 8	0.06 253	0. 00 17 5	0.1 017 9	0. 00 21 5	0.8 778 7	0. 02 24 7		692 2 5	625 1 3	640 1 2	2.4 0%	6 2 5	1 3			
M O1 8- 13	4 6	1 6 4	0. 2 8	0.06 480	0. 00 17 8	0.1 128 0	0. 00 24 0	1.0 081 8	0. 02 53 8		768 2 4	689 1 4	708 1 3	2.7 6%	6 8 9	1 4			
M O1 8- 14	8 2	1 1 5	0. 7 1	0.06 964	0. 00 20 9	0.1 350 1	0. 00 30 1	1.2 968 5	0. 03 56 3		918 2 6	816 1 7	844 1 6	3.4 3%	8 1 6	1 7			
M O1 8- 15	6 7	9 0 4	0. 7 4	0.07 196	0. 00 21 1	0.1 706 6	0. 00 38 3	1.6 940 0	0. 04 56 0		985 2 5	101 6 1	100 6 7	- 3.0 5%	9 8 5	2 5			
M O1 8- 16	9 1	1 2 6	0. 7 2	0.06 275	0. 00 21 2	0.1 039 6	0. 00 23 7	0.8 998 3	0. 02 79 7		700 3 2	638 1 4	652 1 5	2.1 9%	6 3 8	1 4			
M O1 8- 17	6 6	3 4 6	0. 1 9	0.06 182	0. 00 14 5	0.0 896 6	0. 00 17 9	0.7 644 7	0. 01 63 8		516 8 6	551 1 1	544 1 4	- 1.2 7%	5 5 1	1 1			
M O1 8- 18	8 9	1 8 1	0. 4 9	0.05 810	0. 00 19 5	0.0 712 4	0. 00 15 9	0.5 709 3	0. 01 76 6		534 3 3	444 1 0	459 1 1	3.3 8%	4 4 4	1 0			
M O1 8- 19	2 0	6 5 0	0. 3 0	0.06 096	0. 00 28 0	0.1 009 8	0. 00 27 1	0.8 489 8	0. 03 58 7		638 4 7	620 1 6	624 2 0	0.6 5%	6 2 0	1 6			
M O1 8- 20	2 4 9	5 1 8	0. 4 8	0.06 790	0. 00 12 5	0.0 984 2	0. 00 18 6	0.9 217 3	0. 01 53 5		866 1 7	605 1 1	663 8	9.5 9%	6 0 5	1 1			
M O1 8- 21	1 9	4 6 1	0. 4 1	0.06 692	0. 00 34 4	0.1 289 5	0. 00 36 9	1.1 900 5	0. 05 68 9		835 5 4	782 2 1	796 2 6	1.7 9%	7 8 2	2 1			
M O1 8- 22	2 8	5 4 3	0. 5 3	0.07 168	0. 00 32 3	0.1 049 8	0. 00 29 1	1.0 378 2	0. 04 25 3		977 4 2	644 1 7	723 2 1	12. 27 %					
M O1 8- 23	1 4 6	1 5 9	0. 9 2	0.07 909	0. 00 21 3	0.1 037 8	0. 00 22 4	1.1 320 2	0. 02 75 2		820 1 6 1	627 1 4	670 3 5	6.8 6%	6 2 7	1 4			
M O1 8- 24	5 7	1 2 1	0. 4 7	0.05 604	0. 00 23 7	0.0 731 4	0. 00 18 2	0.5 653 1	0. 02 19 9		454 4 5	455 1 1	455 1 4	0.0 0%	4 5 5	1 1			
M	9	6	0.	0.06	0.	0.0	0.	0.3	0.		293	1	234	5	239	8	2.1	2	5

38					4		0		8										
M O1 8- 39	1 5 1	9 0 3	0. 1 7	0.19 693	0. 00 48 5	0.0 315 5	0. 00 07 3	0.8 568 5	0. 01 66 1		154 5	1 4 6	173	5	312	1 9	80. 35 %		
M O1 8- 40	7 9	1 0 9	0. 7 3	0.06 008	0. 00 22 3	0.0 977 2	0. 00 23 3	0.8 096 2	0. 02 76 8		606	3 6	601	1 4	602	1 6	0.1 7%	6 0 1	1 4
M O1 8- 41	1 0 9	1 0 9	1. 0 1	0.12 042	0. 00 21 0	0.3 514 9	0. 00 71 5	5.8 364 0	0. 09 43 1		196 2	1 7	194 2	3 4	195 2	1 4	1.0 3%	1 9 6 2	1 7
M O1 8- 42	1 2 6	5 2 4	0. 2 4	0.06 885	0. 00 14 2	0.0 755 9	0. 00 14 7	0.7 176 2	0. 01 33 9		567 7	8 7	464	9	482	1 3	3.8 8%	4 6 4	9
M O1 8- 43	4 8	1 7 3	0. 2 8	0.07 474	0. 00 23 7	0.0 778 7	0. 00 17 9	0.8 024 9	0. 02 29 0		491 2	1 4	473 1	1	476	2 2	0.6 3%	4 7 3	1
M O1 8- 44	1 0 3	3 3 0	0. 3 1	0.05 649	0. 00 16 1	0.0 720 3	0. 00 15 2	0.5 610 6	0. 01 46 6		472 6	2 6	448	9	452	1 0	0.8 9%	4 4 8	9
M O1 8- 45	1 9	3 1	0. 6 1	0.06 122	0. 00 45 9	0.1 200 9	0. 00 42 0	1.0 137 5	0. 07 17 0		647 3	9 3	731	2 4	711	3 6	- 2.7 4%	7 3 1	2 4
M O1 8- 46	8 6	1 6 2	0. 5 3	0.07 695	0. 00 17 8	0.1 664 7	0. 00 34 7	1.7 663 4	0. 03 72 5		112 0	1 9	993	1 9	103 3	1 4	4.0 3%	9 9 3	1 9
M O1 8- 47	1 5 0	3 1 6	0. 4 7	0.05 471	0. 00 14 5	0.0 740 1	0. 00 15 2	0.5 583 6	0. 01 36 5		400 5	2 5	460	9	450	9	- 2.1 7%	4 6 0	9
M O1 8- 48	7 2	1 3 0	0. 5 5	0.07 242	0. 00 21 3	0.1 717 2	0. 00 39 4	1.7 148 6	0. 04 63 1		998 5	2 5	102 2	2 2	101 4	1 7	- 2.3 5%	9 9 8	2 5
M O1 8- 49	8 2	1 4 6	0. 5 6	0.07 600	0. 00 25 1	0.1 013 6	0. 00 23 7	1.0 622 1	0. 03 18 5		109 5	2 8	622	1 4	735	1 6	18. 17 %		
M O1 8- 50	1 3 8	1 4 1	0. 9 8	0.06 214	0. 00 22 2	0.1 040 3	0. 00 24 5	0.8 913 5	0. 02 93 5		679 4	3 4	638	1 4	647	1 6	1.4 1%	6 3 8	1 4
M O1 8- 51	2 3	3 6 1	0. 0 6	0.05 937	0. 00 19 1	0.0 536 7	0. 00 11 9	0.4 394 0	0. 01 29 0		453 3	9 3	336	7	351	1 0	4.4 6%	3 3 6	7
M	1	8	1.	0.05	0.	0.1	0.	0.8	0.		600	4	662	1	648	1	-	6	1

O1 8- 52	0 3	5	2	991	00 25 9	081 0	00 28 1	930 1	03 56 3		4		6		9	2.1 1%	6 2	6
M O1 8- 53	8 9	2 3	0. 3	0.06 300	0. 00 20 3	0.0 740 5	0. 00 16 7	0.6 433 0	0. 01 88 7		708 2 9	461	1 0	504	1 2	9.3 3%	4 6 1	1 0
M O1 8- 54	8 4	2 5	0. 3	0.05 749	0. 00 17 1	0.0 858 8	0. 00 18 5	0.6 808 2	0. 01 86 7		510 2 8	531 1	1 1	527	1 1	- 0.7 5%	5 3 1	1 1
M O1 8- 55	1 2	1 2	1. 0	0.07 210	0. 00 20 1	0.1 593 3	0. 00 35 3	1.5 838 3	0. 04 05 5		989 2 3	953	2 0	964	1 6	1.1 5%	9 5 3	2 0
M O1 8- 56	9 1	2 3	0. 3	0.06 646	0. 00 31 0	0.0 767 5	0. 00 21 2	0.7 032 8	0. 02 98 9		624 1 7 9	473	1 3	500	3 0	5.7 1%	4 7 3	1 3
M O1 8- 57	7 7	1 3	0. 5	0.04 974	0. 00 64 6	0.0 761 9	0. 00 39 4	0.5 225 1	0. 06 40 0		183 1 8 0	473	2 4	427	4 3	- 9.7 3%	4 7 3	2 4
M O1 8- 58	9 7	1 8	0. 5	0.06 120	0. 00 19 5	0.1 063 8	0. 00 23 7	0.8 976 0	0. 02 63 6		646 3 0	652	1 4	650	1 4	- 0.3 1%	6 5 2	1 4
M O1 8- 59	5 7	3 5	0. 1	0.06 607	0. 00 15 0	0.1 225 0	0. 00 24 7	1.1 159 3	0. 02 33 0		809 2 0	745	1 4	761	1 1	2.1 5%	7 4 5	1 4
M O1 8- 60	4 3	1 8	0. 2	0.05 896	0. 00 19 3	0.1 036 8	0. 00 23 3	0.8 428 0	0. 02 55 0		566 3 1	636	1 4	621	1 4	- 2.3 6%	6 3 6	1 4
M O1 8- 61	6 6	2 1	0. 3	0.05 809	0. 00 19 6	0.0 720 8	0. 00 16 4	0.5 772 1	0. 01 78 4		533 3 2	449	1 0	463	1 1	3.1 2%	4 4 9	1 0
M O1 8- 62	3 3	7 8	0. 4	0.06 003	0. 00 43 7	0.1 403 5	0. 00 45 5	1.1 616 1	0. 08 06 0		605 9 5	847	2 6	783	3 8	- 7.5 6%	8 4 7	2 6
M O1 8- 63	1 5	2 2	0. 6	0.05 658	0. 00 27 1	0.0 947 3	0. 00 24 4	0.7 389 9	0. 03 31 9		475 5 5	583	1 4	562	1 9	- 3.6 0%	5 8 3	1 4
M O1 8- 64	2 5	1 5	1. 5	0.05 785	0. 01 22 8	0.1 224 6	0. 00 89 6	0.9 765 6	0. 19 89 6		524 3 2 2	745	5 1	692	1 0 2	- 7.1 1%	7 4 5	5 1
M O1 8-	4 4	1 8	0. 2	0.05 875	0. 00 34	0.0 600 8	0. 00 17	0.4 866 3	0. 02 64		558 6 9	376	1 1	403	1 8	7.1 8%	3 7 6	1 1

65					3		6		2										
M	2	4	0.	0.06	0.	0.1	0.	0.9	0.		731	2	686	1	697	1	1.6	6	1
O1	2	0	0	368	00	123	00	859	02			4		4	3		0%	8	4
8-		2	5		17	1	24	9	51									6	
66					7		0		5									6	
M	1	2	0.	0.05	0.	0.0	0.	0.5	0.		535	2	428	9	445	1	3.9	4	9
O1	0	1	5	814	00	686	00	501	01			8			0		7%	2	8
8-	5	0	0		17	5	14	7	51									2	8
67					4		7		7									8	
M	4	3	0.	0.05	0.	0.0	0.	0.4	0.		509	2	384	8	403	8	4.9	3	8
O1	3	3	1	746	00	614	00	867	01			4					5%	8	
8-		5	3		15	5	12	9	18									4	
68					3		7		7									4	
M	1	1	0.	0.06	0.	0.0	0.	0.7	0.		606	2	530	1	544	1	2.6	5	1
O1	6	7	9	008	00	856	00	095	01			6		1	1		4%	3	1
8-	8	3	7		17	7	18	6	87									0	
69					3		5		5									0	
M	6	1	0.	0.05	0.	0.0	0.	0.5	0.		426	3	446	1	443	1	-	4	1
O1	6	8	3	535	00	716	00	465	01			4		0	1		0.6	4	0
8-		2	6		18	3	16	8	70								7%	6	
70					7		1		5									6	
M	8	1	0.	0.06	0.	0.1	0.	1.1	0.		839	2	737	1	763	1	3.5	7	1
O1	4	9	4	705	00	211	00	200	02			0		4	1		3%	3	4
8-		9	2		15	9	24	5	38									7	
71					6		9		2									7	
M	5	1	0.	0.05	0.	0.0	0.	0.3	0.		346	6	332	9	333	1	0.3	3	9
O1	7	2	4	340	00	528	00	886	02			9			5		0%	3	
8-		4	5		29	0	14	7	00									2	
72					4		3		5									2	
M	3	1	0.	0.05	0.	0.0	0.	0.5	0.		505	4	438	1	449	1	2.5	4	1
O1	9	1	3	735	00	703	00	559	02			5		0	4		1%	3	0
8-		0	5		24	2	17	1	18									8	
73					4		4		8									8	
M	5	7	0.	0.06	0.	0.1	0.	1.0	0.		889	7	670	2	723	3	7.9	6	2
O1	4	5	7	867	00	095	00	371	06			5		1	2		1%	7	1
8-			2		46	7	37	7	48									0	
74					1		0		1									0	
M	6	1	0.	0.07	0.	0.1	0.	1.6	0.		948	2	101	2	990	1	-	9	2
O1	5	3	4	066	00	695	00	517	03			1	0	0	4		6.1	4	1
8-		7	8		17	9	35	2	70								4%	8	
75					2		8		0									8	
M	5	1	0.	0.26	0.	0.6	0.	23.	0.		324	1	326	4	325	1	-	3	1
O1	9	4	4	046	00	586	01	646	27			6	2	9	4		0.4	2	6
8-		3	1		31	2	25	34	05								0%	4	
76					0		9		6									9	
M	2	2	1.	0.06	0.	0.1	0.	1.4	0.		904	1	926	1	919	1	-	9	1
O1	5	1	1	916	00	544	00	727	02			8		7	2		0.7	2	7
8-		8	8		14	8	30	5	80								6%	6	
77					3		7		7									6	
M	5	3	0.	0.06	0.	0.0	0.	0.7	0.		604	2	537	1	550	1	2.4	5	1
O1	6	3	1	000	00	869	00	191	01			2		1	0		2%	3	1
8-		8	7		14	4	17	1	61									7	
78					7		8		6									7	
M	1	3	0.	0.07	0.	0.1	0.	1.5	0.		997	1	941	1	958	1	1.8	9	1

O1 8- 79	6 9	0 5	5 6	238	00 13 3	571 9	00 30 6	682 4	02 64 3		8		7		0	1%	4 1	7	
M O1 8- 80	1 2	3 9	0. 3	0.05 677	0. 00 14 2	0.0 701 3	0. 00 14 3	0.5 487 7	0. 01 26 2		483 2 3		437 9		444 8		1.6 0%	4 3 7	9
M O1 8- 81	2 1	2 4	0. 8	0.11 730	0. 00 17 8	0.2 543 7	0. 00 49 3	4.1 128 4	0. 05 70 1		191 5 7		146 1 5		165 7 1		31. 07 %		
M O1 8- 82	3 1	2 5	1. 2 5	0.06 617	0. 00 16 0	0.1 024 0	0. 00 21 2	0.9 339 5	0. 02 07 1		812 2 1		628 1 2		670 1 1		6.6 9%	6 2 8	1 2
M O1 8- 83	1 1	2 1	0. 5	0.06 132	0. 00 17 3	0.0 956 1	0. 00 20 7	0.8 080 7	0. 02 08 6		650 2 5		589 1 2		601 1 2		2.0 4%	5 8 9	1 2
M O1 8- 84	4 2	7 1	0. 5 6	0.11 750	0. 00 13 8	0.2 575 1	0. 00 47 0	4.1 705 8	0. 04 51 1		191 9 8		147 7 4		166 8 9		29. 93 %		
M O1 8- 85	9 8	9 2	1. 0 7	0.06 391	0. 00 22 8	0.1 402 1	0. 00 33 6	1.2 351 0	0. 04 08 2		739 3 4		846 1 9		817 1 9		- 3.4 3%	8 4 6	1 9
M O1 8- 86	9 3	1 4	0. 6 3	0.05 821	0. 00 23 5	0.0 763 0	0. 00 18 8	0.6 121 9	0. 02 27 8		538 4 1		474 1 1		485 1 4		2.3 2%	4 7 4	1 1
M O1 8- 87	7 0	2 8	0. 2 5	0.05 839	0. 00 17 6	0.0 666 1	0. 00 14 5	0.5 360 8	0. 01 48 7		544 2 8		416 9		436 1 0		4.8 1%	4 1 6	9
M O1 8- 88	1 6	2 5	0. 6 6	0.12 209	0. 00 19 8	0.2 321 8	0. 00 45 9	3.9 067 4	0. 05 71 9		153 0 7		130 2 6		139 1 0		17. 51 %		
M O1 8- 89	2 3	8 4	0. 2 7	0.21 319	0. 00 23 0	0.2 923 7	0. 00 53 1	8.5 906 9	0. 08 48 3		276 1 0		160 6 7		217 3 3		71. 92 %		
M O1 8- 90	4 0	1 0	0. 3 8	0.16 789	0. 00 25 8	0.4 872 3	0. 00 99 5	11. 273 86	0. 16 35 9		253 7 7		255 9 3		254 6 4		- 0.8 6%	2 5 3 7	1 7
M O1 8- 91	9 2	3 5	0. 2 6	0.17 226	0. 00 21 1	0.3 299 6	0. 00 61 8	7.8 332 7	0. 08 80 1		256 1 0		183 4 0		220 0 2		39. 64 %	2 5 6 1	4 0
M O1 8- 92	1 0	1 8	0. 5 5	0.05 881	0. 00 19	0.1 016 2	0. 00 23	0.8 235 5	0. 02 49		560 3 1		624 1 4		610 1 4		- 2.2 4%	6 2 4	1 4

92					3		1		9										
M O1 8- 93	1 7 8	1 8 1	0. 9 8	0.17 427	0. 00 22 5	0.4 983 3	0. 00 96 1	11. 968 15	0. 14 62 2		259 9	1 7	260 7	4 1	260 2	1 1	- 0.3 1%	2 5 9 9	1 7
M O1 8- 94	4 1	1 5 8	0. 2 6	0.06 431	0. 00 20 4	0.1 118 9	0. 00 25 4	0.9 916 5	0. 02 88 9		752	2 8	684	1 5	700	1 5	2.3 4%	6 8 4	1 5
M O1 8- 95	6 9	6 6	1. 0 4	0.07 190	0. 00 39 9	0.1 740 0	0. 00 56 5	1.7 240 5	0. 08 85 9		983	5 5	103 4	3 1	101 8	3 3	- 4.9 3%	9 8 3	5 5
M O1 8- 96	1 9 3	3 1 2	0. 6 2	0.06 526	0. 00 15 9	0.0 903 3	0. 00 18 8	0.8 124 5	0. 01 80 5		783	2 1	557	1 1	604	1 0	8.4 4%	5 5 7	1 1
M O1 8- 97	1 2 4	2 3 7	0. 5 2	0.05 973	0. 00 15 6	0.0 993 2	0. 00 20 9	0.8 174 9	0. 01 95 7		594	2 3	610	1 2	607	1 1	- 0.4 9%	6 1 0	1 2
M O1 8- 98	1 1 9	3 5 1	0. 3 4	0.06 827	0. 00 11 6	0.1 646 6	0. 00 31 6	1.5 491 4	0. 02 42 0		877	1 8	983	1 7	950	1 0	- 3.3 6%	9 8 3	1 7
M O1 8- 99	7 8	1 7 6	0. 4 4	0.06 031	0. 00 19 1	0.1 004 5	0. 00 22 7	0.8 348 8	0. 02 44 0		615	2 9	617	1 3	616	1 4	- 0.1 6%	6 1 7	1 3
M O1 8- 10 0	5 0	1 3 7	0. 3 6	0.05 596	0. 00 22 5	0.0 829 3	0. 00 20 1	0.6 396 0	0. 02 39 5		451	4 3	514	1 2	502	1 5	- 2.3 3%	5 1 4	1 2
M O2 2A - 01	7 0	7 9	0. 8 9	0.06 064	0. 00 17 2	0.8 213 0	0. 02 14 0	0.0 982 5	0. 00 16 9		626	2 9	609	1 2	604	1 0	0.8 3%	6 0 4	1 0
M O2 2A - 02	9 1	1 5 3	0. 6 0	0.05 792	0. 00 11 5	0.8 383 8	0. 01 54 4	0.1 050 1	0. 00 14 8		527	1 9	618	9	644	9	- 4.0 4%	6 4 4	9
M O2 2A - 03	3 4	3 5	0. 9 6	0.12 613	0. 00 22 1	6.2 663 9	0. 10 14 0	0.3 604 0	0. 00 58 3		204 5	1 3	201 4	1 4	198 4	2 8	3.0 7%	2 0 4 5	1 3
M O2 2A -	6 8	8 8	0. 7 7	0.11 994	0. 00 14 0	6.0 474 3	0. 06 66 6	0.3 657 3	0. 00 48 3		195 5	1 1	198 3	1 0	200 9	2 3	- 2.6 9%	1 9 5 5	1 1

- 15					4		9		5										
M O2 2A	1 7 4	2 5 0	0. 7 0	0.05 538	0. 00 11 0	0.5 669 3	0. 01 04 6	0.0 742 6	0. 00 10 3		428	1 9	456	7	462	6	- 1.3 0%	4 6 2	6
- 16																			
M O2 2A	2 0 4	2 4 0	0. 8 5	0.06 170	0. 00 10 3	0.8 126 0	0. 01 24 8	0.0 955 3	0. 00 12 6		664	1 5	604	7	588	7	2.7 2%	5 8 8	7
- 17																			
M O2 2A	9 1	1 7 3	0. 5 3	0.19 065	0. 00 14 0	13. 536 17	0. 09 92 2	0.5 149 9	0. 00 60 9		274 8	1 0	271 8	7	267 8	2 6	2.6 1%	2 7 4 8	1 0
- 18																			
M O2 2A	1 1 8	1 4 5	0. 8 1	0.06 429	0. 00 14 0	0.8 863 1	0. 01 77 1	0.0 999 9	0. 00 15 0		751	2 0	644	1 0	614	9	4.8 9%	6 1 4	9
- 19																			
M O2 2A	6 9	1 1 7	0. 5 9	0.06 727	0. 00 14 8	0.9 582 0	0. 01 92 7	0.1 033 2	0. 00 15 7		846	2 0	682	1 0	634	9	7.5 7%	6 3 4	9
- 20																			
M O2 2A	9 7	1 7 2	0. 5 6	0.06 108	0. 00 13 4	0.8 973 8	0. 01 81 9	0.1 065 6	0. 00 15 7		642	2 1	650	1 0	653	9	- 0.4 6%	6 5 3	9
- 21																			
M O2 2A	5 3 9	6 6 4	0. 8 1	0.07 867	0. 00 07 0	1.7 630 7	0. 01 49 9	0.1 625 5	0. 00 18 8		116 4	1 1	103 2	6	971	1 0	6.2 8%	9 7 1	1 0
- 22																			
M O2 2A	9 2	1 3 2	0. 7 0	0.06 590	0. 00 13 1	1.1 681 7	0. 02 13 9	0.1 285 7	0. 00 18 6		803	1 8	786	1 0	780	1 1	0.7 7%	7 8 0	1 1
- 23																			
M O2 2A	1 2 0	2 3 7	0. 5 1	0.05 639	0. 00 10 8	0.5 692 9	0. 01 01 1	0.0 732 3	0. 00 10 0		468	1 8	458	7	456	6	0.4 4%	4 5 6	6
- 24																			
M O2 2A	1 7 0	3 0 5	0. 5 6	0.05 619	0. 00 11 7	0.6 983 5	0. 01 35 3	0.0 901 5	0. 00 12 6		460	2 1	538	8	556	7	- 3.2 4%	5 5 6	7
- 25																			
M O2	1 4	1 6	0. 8	0.06 266	0. 00	0.8 685	0. 01	0.1 005	0. 00		697	1 7	635	8	618	8	2.7 5%	6 1	8

2A - 26	1	8	4		12 0	7	53 2	4	14 1								8			
M O2 2A - 27	2 2 7	2 9 9	0. 7 6	0.06 345	0. 00 09 2	1.0 703 0	0. 01 44 4	0.1 223 4	0. 00 15 5		723 1 3	739	7	744	9		- 0.6 7%	7 4 4	9	
M O2 2A - 28	3 5 6	2 9 4	1. 2 1	0.06 056	0. 00 09 2	0.8 572 0	0. 01 21 3	0.1 026 6	0. 00 13 1		624 1 4	629	7	630	8		- 0.1 6%	6 3 0	8	
M O2 2A - 29	1 9 7	2 8 6	0. 6 9	0.05 577	0. 00 10 8	0.5 556 3	0. 00 99 3	0.0 722 7	0. 00 09 9		443 1 9	449	6	450	6		- 0.2 2%	4 5 0	6	
M O2 2A - 30	1 8 8	2 7 2	0. 6 9	0.07 225	0. 00 08 9	1.6 444 5	0. 01 89 1	0.1 650 8	0. 00 20 3		993 1 1	987	7	985	1 1		0.2 0%	9 8 5	1 1	
M O2 2A - 31	7 6 2	1 0 2	0. 7 4	0.06 196	0. 00 16 8	0.8 249 2	0. 02 04 8	0.0 965 6	0. 00 16 1		673 2 7	611	1 1	594	9		2.8 6%	5 9 4	9	
M O2 2A - 32	1 7 4	6 0 3	0. 2 9	0.06 219	0. 00 07 3	0.8 712 0	0. 00 96 1	0.1 016 0	0. 00 12 1		681 1 1	636	5	624	7		1.9 2%	6 2 4	7	
M O2 2A - 33	6 5 2	2 7 2	0. 2 4	0.04 605	0. 00 65 3	0.4 375 2	0. 06 16 0	0.0 689 1	0. 00 12 2			2 5 8	369	4 4	430	7		- 14. 19 %		
M O2 2A - 34	7 5 5	1 0 5	0. 7 1	0.06 118	0. 00 14 3	0.8 978 5	0. 01 93 2	0.1 064 3	0. 00 16 3		646 2 2	651	1 0	652	9		- 0.1 5%	6 5 2	9	
M O2 2A - 35	1 1 8	2 1 9	0. 5 4	0.06 179	0. 00 11 4	0.8 218 6	0. 01 39 9	0.0 964 7	0. 00 13 2		667 1 7	609	8	594	8		2.5 3%	5 9 4	8	
M O2 2A - 36	1 4 2	3 6 7	0. 3 9	0.05 651	0. 00 09 7	0.5 861 4	0. 00 93 2	0.0 752 3	0. 00 09 9		472 1 6	468	6	468	6		0.0 0%	4 6 8	6	
M	1	3	0.	0.05	0.	0.6	0.	0.0	0.		557	1	479	7	462	6	3.6	4	6	

O2 2A - 37	6 5 1 5	0 1 5	874	00 10 9	022 3	01 03 5	743 6	00 10 1		7						8%	6 2	
M O2 2A - 38	6 7 4 6	2 4 6 7	0.06 529	0. 00 09 7	1.0 795 0	0. 01 49 0	0.1 199 3	0. 00 15 4		784 1 3	743 7	730 9			1.7 8%	7 3 0	9	
M O2 2A - 39	8 7 4 3	2 4 3 6	0.05 425	0. 00 11 5	0.5 577 6	0. 01 09 6	0.0 745 7	0. 00 10 5		381 2 1	450 7	464 6			- 3.0 2%	4 6 4	6	
M O2 2A - 40	1 1 4	9 8 6	1. 0.13 283	0. 00 15 3	7.0 824 2	0. 07 73 6	0.3 867 1	0. 00 51 1		213 6	212 2	210 8	2 4		1.3 3%	2 1 3 6	1 0	
M O2 2A - 41	2 6 3	7 4 8	0. 0.12 110	0. 00 07 5	5.9 907 4	0. 03 75 8	0.3 587 8	0. 00 39 7		197 2	197 5	197 6	1 9		- 0.2 0%	1 9 7 2	1 1	
M O2 2A - 42	4 4 3	1 5 9	0. 0.05 588	0. 00 14 1	0.5 723 7	0. 01 32 5	0.0 743 0	0. 00 11 5		448 2 6	460 9	462 7			- 0.4 3%	4 6 2	7	
M O2 2A - 43	4 9 6	3 3 8	1. 0.06 785	0. 00 25 9	1.1 943 6	0. 04 16 8	0.1 276 7	0. 00 27 6		864 3 8	798 1	775 6	1 6		2.9 7%	7 7 5	1 6	
M O2 2A - 44	4 5 1	1 3 4	0. 0.05 782	0. 00 17 3	0.6 051 3	0. 01 66 0	0.0 759 1	0. 00 13 0		523 3 2	480 1	472 8			1.6 9%	4 7 2	8	
M O2 2A - 45	1 6 3	1 5 5	1. 0.05 938	0. 00 12 6	0.8 213 2	0. 01 60 9	0.1 003 1	0. 00 14 5		581 2 0	609 9	616 8			- 1.1 4%	6 1 6	8	
M O2 2A - 46	9 6 7	2 7 5	0. 0.06 151	0. 00 09 7	0.8 521 0	0. 01 24 9	0.1 004 8	0. 00 13 0		657 1 4	626 7	617 8			1.4 6%	6 1 7	8	
M O2 2A - 47	7 6 3	1 6 6	0. 0.84 080	0. 00 45 2	271 .68 826	1. 72 71 6	2.3 436 4	0. 02 67 3		499 2	569 5	778 1	5 2		- 35. 84 %			

M O2 2A - 48	3 2 5 3	2 5 3	0. 1 3	0.05 940	0. 11 1	0.6 594 8	0. 13 6	0.0 805 2	0. 10 9	582	1 7	514	7	499	7	3.0 1%	4 9 9	7
M O2 2A - 49	9 4 0	2 6 0	0. 3 6	0.05 842	0. 10 5	0.6 938 4	0. 15 6	0.0 861 4	0. 11 5	546	1 7	535	7	533	7	0.3 8%	5 3 3	7
M O2 2A - 50	1 0 4	8 8 9	1. 1 9	0.08 403	0. 37 1	1.9 854 7	0. 12 5	0.1 713 6	0. 28 1	129 3	8 8	111 1	2 8	102 0	1 5	26. 76 %		
M O2 2A - 51	1 7 5	3 9 4	0. 0 4	0.12 394	0. 08 9	6.5 959 8	0. 71 6	0.3 860 0	0. 43 8	201 4	1 1	205 9	6	210 4	2 0	- 4.2 8%	2 0 1 4	1
M O2 2A - 52	1 6 3	1 8 5	0. 8 8	0.06 105	0. 11 9	0.8 588 5	0. 54 5	0.1 020 4	0. 14 2	641	1 8	629	8	626	8	0.4 8%	6 2 6	8
M O2 2A - 53	9 8 7	2 9 3	0. 3 3	0.06 034	0. 11 4	0.6 086 7	0. 05 6	0.0 731 7	0. 10 0	616	1 7	483	7	455	6	6.1 5%	4 5 5	6
M O2 2A - 54	4 0 9	8 1 9	0. 4 9	0.06 044	0. 17 3	0.8 621 8	0. 27 7	0.1 034 7	0. 17 6	619	2 9	631	1 2	635	1 0	- 0.6 3%	6 3 5	1 0
M O2 2A - 55	1 4 0	2 0 5	0. 6 8	0.06 829	0. 10 5	1.3 120 6	0. 87 3	0.1 393 6	0. 18 1	877	1 3	851	8	841	1 0	1.1 9%	8 4 1	1 0
M O2 2A - 56	3 5 0	4 4 0	0. 8 0	0.11 796	0. 28 6	2.9 077 6	0. 20 1	0.1 787 9	0. 32 9	192 6	1 7	138 4	1 6	106 0	1 8	81. 70 %		
M O2 2A - 57	8 2 9	2 4 3	0. 3 3	0.05 595	0. 13 3	0.5 583 1	0. 21 9	0.0 723 8	0. 10 8	450	2 4	450	8	450	6	0.0 0%	4 5 0	6
M O2 2A -	1 3 4	2 7 9	0. 4 8	0.05 848	0. 18 1	0.5 632 4	0. 59 4	0.0 698 5	0. 12 3	548	3 3	454	1 0	435	7	4.3 7%	4 3 5	7

- 69					3		4		4										
M O2 2A - 70	3 2 1	4 6 6	0. 6 9	0.11 535	0. 00 09 0	5.1 440 4	0. 03 90 8	0.3 234 7	0. 00 36 9		188 5	1 0	184 3	6 6	180 7	1 8	4.3 2%	1 8 8 5	1 0
M O2 2A - 71	1 0 1	2 2 7	0. 4 4	0.06 152	0. 00 12 6	0.6 989 1	0. 01 31 8	0.0 824 1	0. 00 11 7		657	1 9	538	8	510	7	5.4 9%	5 1 0	7
M O2 2A - 72	1 0 5	2 8 3	0. 3 7	0.05 716	0. 00 11 7	0.5 556 9	0. 01 05 1	0.0 705 1	0. 00 09 8		498	2 0	449	7	439	6	2.2 8%	4 3 9	6
M O2 2A - 73	7 7	6 4 1	0. 1 2	0.06 962	0. 00 08 3	1.2 507 7	0. 01 39 6	0.1 303 2	0. 00 15 6		917	1 1	824	6	790	9	4.3 0%	7 9 0	9
M O2 2A - 74	1 1 4	5 3 6	0. 2 1	0.05 885	0. 00 08 9	0.6 003 1	0. 00 84 6	0.0 740 0	0. 00 09 2		562	1 4	477	5	460	6	3.7 0%	4 6 0	6
M O2 2A - 75	3 1 8	3 5 8	0. 0 9	0.12 125	0. 00 09 3	5.5 027 9	0. 04 11 3	0.3 292 1	0. 00 37 4		197 5	1 0	190 1	6 6	183 5	1 8	7.6 3%	1 9 7 5	1 0
M O2 2A - 76	6 9 1	1 0 9	0. 6 3	0.06 635	0. 00 40 1	0.8 455 0	0. 04 96 0	0.0 924 3	0. 00 13 3		817	1 3 0	622	2 7	570	8	9.1 2%	5 7 0	8
M O2 2A - 77	2 3 7	3 0 2	0. 7 8	0.06 446	0. 00 09 9	1.0 069 5	0. 01 43 0	0.1 133 2	0. 00 14 5		757	1 3	707	7	692	8	2.1 7%	6 9 2	8
M O2 2A - 78	1 2 7	2 0 1	0. 6 3	0.05 812	0. 00 13 4	0.5 603 3	0. 01 18 5	0.0 699 4	0. 00 10 3		534	2 3	452	8	436	6	3.6 7%	4 3 6	6
M O2 2A - 79	1 6 9	1 7 0	1. 0 0	0.05 634	0. 00 15 0	0.5 436 2	0. 01 33 2	0.0 699 9	0. 00 11 0		466	2 8	441	9	436	7	1.1 5%	4 3 6	7
M O2	3 3	2 9	1. 1	0.06 064	0. 00	0.8 098	0. 01	0.0 968	0. 00		626	1 7	602	8	596	8	1.0 1%	5 9	8

2A - 80	7	2	5		11 0	8	36 3	9	13 0									6		
M O2 2A - 81	1 5 7	2 7 3	0. 5 8	0.06 270	0. 00 10 7	0.8 687 9	0. 01 37 5	0.1 005 3	0. 00 13 2		698	1 5	635	7	618	8		2.7 5%	6 1 8	8
M O2 2A - 82	2 0 7	4 5 0	0. 4 6	0.06 080	0. 00 08 7	0.8 007 9	0. 01 06 1	0.0 955 5	0. 00 11 8		632	1 3	597	6	588	7		1.5 3%	5 8 8	7
M O2 2A - 83	4 5	1 0 2	0. 4 4	0.06 760	0. 00 16 0	1.0 617 2	0. 02 30 6	0.1 139 3	0. 00 17 8		856	2 2	735	1 1	696	1 0		5.6 0%	6 9 6	1 0
M O2 2A - 84	2 4 4	3 3 8	0. 7 2	0.07 188	0. 00 09 0	1.4 953 4	0. 01 74 7	0.1 509 1	0. 00 18 4		983	1 1	928	7	906	1 0		2.4 3%	9 0 6	1 0
M O2 2A - 85	1 4 7	3 2 8	0. 4 5	0.05 825	0. 00 11 8	0.5 831 6	0. 01 08 9	0.0 726 3	0. 00 10 1		539	1 9	466	7	452	6		3.1 0%	4 5 2	6
M O2 2A - 86	3 5	7 3	0. 4 8	0.06 183	0. 00 19 9	0.9 238 0	0. 02 73 5	0.1 084 0	0. 00 19 8		668	3 4	664	1 4	663	1 2		0.1 5%	6 6 3	1 2
M O2 2A - 87	2 7 1	3 5 3	0. 7 7	0.07 713	0. 00 10 8	1.8 123 7	0. 02 35 9	0.1 704 7	0. 00 21 7		112	1 2	105	9	101	1 2		10. 84 %		
M O2 2A - 88	8 9	1 4 9	0. 6 0	0.04 651	0. 00 55 9	0.4 685 5	0. 05 55 2	0.0 730 6	0. 00 15 0		24	2 3 9	390	3 8	455	9		- 14. 29 %		
M O2 2A - 89	1 8 0	1 1 8	1. 5 3	0.06 294	0. 00 15 9	0.8 736 7	0. 02 02 8	0.1 007 1	0. 00 15 8		706	2 5	638	1 1	619	9		3.0 7%	6 1 9	9
M O2 2A - 90	7 9	2 1 8	0. 3 6	0.06 030	0. 00 13 0	0.7 792 2	0. 01 54 5	0.0 937 5	0. 00 13 5		614	2 1	585	9	578	8		1.2 1%	5 7 8	8
M	3	8	0.	0.06	0.	1.2	0.	0.1	0.		839	2	816	1	809	1		0.8	8	1

O2 2A - 91	3	8	3	703	00 16 5	347 5	02 79 7	336 4	00 21 4		3		3		2	7%	0 9	2
M O2 2A - 92	3 3 8	1 1 7	2 9 0	0.06 000	0. 00 16 2	0.7 923 0	0. 01 97 4	0.0 958 1	0. 00 15 5		604 2 8	592	1 1	590	9	0.3 4%	5 9 0	9
M O2 2A - 93	1 3 3	3 0 4	0. 4 4	0.06 183	0. 00 11 0	0.7 869 0	0. 01 29 4	0.0 923 4	0. 00 12 3		668 1 6	589	7	569	7	3.5 1%	5 6 9	7
M O2 2A - 94	1 2 9	2 8 2	0. 4 6	0.06 776	0. 00 11 4	1.2 388 4	0. 01 92 4	0.1 326 5	0. 00 17 6		861 1 4	818	9	803	1 0	1.8 7%	8 0 3	1 0
M O2 2A - 95	2 2 4	2 2 7	0. 9 9	0.06 900	0. 00 13 0	0.8 583 8	0. 01 47 7	0.0 902 7	0. 00 12 5		899 1 6	629	8	557	7	12. 93 %		
M O2 2A - 96	7 4	1 3 6	0. 5 4	0.06 175	0. 00 15 3	0.8 479 6	0. 01 92 8	0.0 996 4	0. 00 15 5		665 2 4	624	1 1	612	9	1.9 6%	6 1 2	9
M O2 2A - 97	1 4 2	1 9 2	0. 7 4	0.06 595	0. 00 12 9	1.0 760 4	0. 01 93 5	0.1 183 8	0. 00 16 6		805 1 7	742	9	721	1 0	2.9 1%	7 2 1	1 0
M O2 2A - 98	3 5 8	2 1 9	1. 6 3	0.07 641	0. 00 12 2	1.8 068 7	0. 02 66 2	0.1 715 8	0. 00 22 9		110 6	104 8	1 0	102 1	1 3	8.3 3%	1 1 0 6	1 3
M O2 2A - 99	2 2 8	2 4 2	0. 9 4	0.12 560	0. 00 34 8	6.5 079 4	0. 15 72 1	0.3 758 1	0. 00 51 1		203 7	204 7	2 1	205 7	2 4	- 0.9 7%	2 0 3 7	5 0
M O2 2A - 10 0	4 9	1 0 6	0. 4 6	0.06 428	0. 00 18 8	0.8 219 9	0. 02 19 8	0.0 927 9	0. 00 16 0		751 2 9	609	1 2	572	9	6.4 7%	5 7 2	9
M O2 3-	2 3	2 8	0. 0 8	0.05 949	0. 00 04	0.8 332 6	0. 00 64	0.1 015 7	0. 00 10		585 1 1	615	4	624	6	- 1.4 4%	6 2 4	6

01					8		5		9										
M	2	3	0.	0.05	0.	0.5	0.	0.0	0.		407	1	452	3	460	5	-	4	5
O2	1	8	5	488	00	603	00	740	00			2					1.7	6	
3-	6	0	7		04	2	44	4	08								4%	0	
O2					5		2		0										
M	6	5	0.	0.12	0.	5.9	0.	0.3	0.		196	1	196	6	196	1	0.2	1	1
O2	5	1	1	061	00	132	03	555	00		5	0	3	1	1	8	0%	9	0
3-					08	9	98	4	38									6	
O2					3		7		8									5	
M	1	1	0.	0.05	0.	0.5	0.	0.0	0.		461	1	448	3	446	5	0.4	4	5
O2	0	1	8	621	00	551	00	716	00			1					5%	4	
3-	2	9	6		05	3	53	2	08									6	
O2					8		6		0										
M	1	3	0.	0.05	0.	0.5	0.	0.0	0.		357	1	440	3	456	5	-	4	5
O2	1	4	3	367	00	422	00	732	00			2					3.5	5	
3-	0	7	2		04	3	41	7	07								1%	6	
O2					2		0		8										
M	1	6	0.	0.05	0.	0.6	0.	0.0	0.		570	1	535	3	526	6	1.7	5	6
O2	4	1	2	907	00	931	00	851	00			1					1%	2	
3-	4	3	4		05	4	57	0	09									6	
O2					2		9		3										
M	1	3	0.	0.05	0.	0.5	0.	0.0	0.		439	1	451	3	453	5	-	4	5
O2	7	7	4	567	00	584	00	727	00			1					0.4	5	
3-	3	5	6		05	4	51	5	08								4%	3	
O2					4		4		0										
M	5	3	0.	0.11	0.	5.6	0.	0.3	0.		192	1	192	5	192	1	0.0	1	1
O2	4	0	1	772	00	345	03	471	00		2	1	1	1	1	8	5%	9	1
3-					07	7	41	1	37									2	
O2					2		3		0									2	
M	9	1	0.	0.05	0.	0.8	0.	0.1	0.		562	1	641	6	664	7	-	6	7
O2	3	9	4	885	00	805	01	085	00			2					3.4	6	
3-					07	7	03	2	12								6%	4	
O2					4		2		7										
M	3	1	0.	0.06	0.	0.9	0.	0.1	0.		646	1	655	3	657	7	-	6	7
O2	6	1	3	118	00	057	00	073	00			2					0.3	5	
3-					04	4	62	7	11								0%	7	
O2					3		2		4										
M	2	2	0.	0.06	0.	1.0	0.	0.1	0.		751	1	746	4	744	8	0.2	7	8
O2	2	8	0	427	00	845	00	223	00			1					7%	4	
3-					05	5	85	8	13									4	
O2					3		5		3										
M	1	2	0.	0.06	0.	1.0	0.	0.1	0.		754	1	753	4	753	8	0.0	7	8
O2	7	7	6	439	00	997	00	238	00			2					0%	5	
3-	3	8	2		04	1	76	6	13									3	
O2					6		2		2										
M	2	4	0.	0.05	0.	0.5	0.	0.0	0.		425	1	444	4	448	5	-	4	5
O2	5	8	5	531	00	489	00	719	00			2					0.8	4	
3-	6	0	3		06	6	63	8	08								9%	8	
O2					8		1		3										
M	1	2	0.	0.07	0.	1.6	0.	0.1	0.		969	1	998	5	101	1	-	9	1
O2	1	1	5	142	00	721	01	698	00			1		1	0		4.1	6	1
3-	7	4	5		06	7	43	0	18								5%	9	
O2					5		3		9										
M	1	1	0.	0.05	0.	0.5	0.	0.0	0.		428	1	446	6	449	5	-	4	5

O2 3- 15	6 2	7 5	9 2	539	00 09 5	512 5	00 87 9	721 8	00 09 1		6						0.6 7%	4 9	
M O2 3- 16	3 4	8 6	0. 3 9	0.07 414	0. 14 9	1.8 417 1	0. 03 06 5	0.1 801 7	0. 00 20 4		104 5	4 2	106 0	1 1 8	1 1		- 2.1 5%	1 0 4 5	4 2
M O2 3- 17	8 8	2 2 0	0. 4 0	0.06 102	0. 07 5	0.8 781 5	0. 01 01 4	0.1 043 7	0. 00 12 2		640	1 1	640 5	640 7			0.0 0%	6 4 0	7
M O2 3- 18	6 9	1 1 6	0. 6 0	0.06 808	0. 07 3	1.3 236 8	0. 01 33 2	0.1 410 0	0. 00 16 2		871	1 1	856 6	850 9			0.7 1%	8 5 0	9
M O2 3- 19	8 5	1 1 7	0. 7 7	0.05 839	0. 06 6	0.6 148 0	0. 00 64 8	0.0 763 6	0. 00 08 7		544	1 1	487 4	474 5			2.7 4%	4 7 4	5
M O2 3- 20	1 0 9	1 9 0	0. 5 0	0.12 203	0. 10 6	6.0 702 6	0. 05 05 6	0.3 607 7	0. 00 41 7		198 6	1 0	198 6	7 198 6	2 0		0.0 0%	1 9 8 6	0
M O2 3- 21	2 2	2 8 1	0. 0 8	0.05 994	0. 06 5	0.7 859 9	0. 00 79 5	0.0 951 1	0. 00 10 7		601	1 1	589 5	586 6			0.5 1%	5 8 6	6
M O2 3- 22	1 5 2	2 1 0	0. 7 2	0.06 415	0. 03 9	1.0 230 0	0. 00 62 3	0.1 156 6	0. 00 12 2		747	1 2	715 3	706 7			1.2 7%	7 0 6	7
M O2 3- 23	1 6 1	9 1 7	0. 1 8	0.05 942	0. 06 4	0.6 554 7	0. 00 65 8	0.0 800 0	0. 00 09 0		583	1 1	512 4	496 5			3.2 3%	4 9 6	5
M O2 3- 24	6 6	2 0 7	0. 3 2	0.14 124	0. 07 7	7.7 378 6	0. 04 26 9	0.3 973 4	0. 00 41 8		224 2	1 1	220 1	5 215 7	1 9		3.9 4%	2 2 4 2	1
M O2 3- 25	1 3 8	3 3 9	0. 4 1	0.05 618	0. 05 9	0.5 558 0	0. 00 54 7	0.0 717 5	0. 00 08 0		459	1 1	449 4	447 5			0.4 5%	4 4 7	5
M O2 3- 26	1 2 1	3 2 0	0. 3 8	0.05 951	0. 05 5	0.7 239 5	0. 00 63 5	0.0 882 4	0. 00 09 7		586	1 1	553 4	545 6			1.4 7%	5 4 5	6
M O2 3- 27	3 3 6	2 6 9	1. 2 5	0.06 640	0. 12 9	1.0 264 2	0. 01 83 4	0.1 121 2	0. 00 15 6		819	1 7	717 9	685 9			4.6 7%	6 8 5	9
M O2 3-	4 1	5 6	0. 7 4	0.06 226	0. 00 05	0.9 568 2	0. 00 81	0.1 114 5	0. 00 12		683	1 1	682 4	681 7			0.1 5%	6 8 1	7

28					6		4		2										
M	1	2	0.	0.06	0.	0.8	0.	0.1	0.		619	1	632	3	636	6	-	6	6
O2	1	3	4	044	00	641	00	037	00			2					0.6	3	6
3-	4	1	9		03	6	55	1	11								3%	6	6
29					9		0		0										
M	6	8	0.	0.05	0.	0.8	0.	0.0	0.		600	1	609	4	612	7	-	6	7
O2	4	4	7	989	00	222	00	995	00			1					0.4	1	1
3-	1	6	6		06	5	79	8	11								9%	2	2
30					1		5		1										
M	2	2	0.	0.06	0.	0.9	0.	0.1	0.		696	1	679	7	673	8	0.8	6	8
O2	1	6	0	265	00	511	01	101	00			3					9%	7	8
3-		6	8		09	0	27	1	13									3	
31					0		0		4										
M	3	8	0.	0.06	0.	1.0	0.	0.1	0.		814	1	728	6	701	8	3.8	7	8
O2	0	0	3	625	00	492	01	148	00			1					5%	0	8
3-			8		07	2	12	7	13									1	
32					6		9		3										
M	7	1	0.	0.05	0.	0.5	0.	0.0	0.		492	1	459	4	453	5	1.3	4	5
O2	2	1	6	701	00	718	00	727	00			1					2%	5	5
3-		5	2		06	2	56	4	08									3	
33					0		7		1										
M	1	2	0.	0.06	0.	0.9	0.	0.1	0.		695	1	668	8	660	8	1.2	6	8
O2	0	3	4	261	00	310	01	078	00			6					1%	6	8
3-	1	2	4		11	5	56	5	14									0	
34					4		5		3										
M	4	1	0.	0.22	0.	16.	0.	0.5	0.		299	2	292	8	281	2	6.2	2	2
O2	5	1	3	184	00	767	13	481	00			4	2	8	8	5	5%	9	2
3-		8	8		30	38	87	9	60									9	3
35					7		2		8									4	
M	1	2	0.	0.06	0.	1.0	0.	0.1	0.		752	1	753	6	754	8	-	7	8
O2	2	4	5	431	00	995	01	240	00			1					0.1	5	
3-	8	9	1		07	9	15	2	14								3%	4	
36					2		2		2										
M	4	1	0.	0.05	0.	0.5	0.	0.0	0.		481	1	452	3	446	5	1.3	4	5
O2	0	5	2	672	00	606	00	717	00			1					5%	4	
3-		6	6		04	8	43	0	07									6	
37					6		9		7										
M	2	5	0.	0.05	0.	0.5	0.	0.0	0.		394	1	435	4	442	5	-	4	5
O2	2	8	3	456	00	342	00	710	00			1					1.5	4	
3-	8	0	9		06	7	57	3	08								8%	2	
38					3		9		1										
M	7	2	0.	0.05	0.	0.5	0.	0.0	0.		462	1	447	4	444	5	0.6	4	5
O2	0	1	3	624	00	523	00	712	00			2					8%	4	
3-		0	3		07	2	65	3	08									4	
39					1		0		3										
M	1	2	0.	0.06	0.	1.0	0.	0.1	0.		805	5	741	1	720	8	2.9	7	8
O2	3	0	6	596	00	738	02	180	00			0		1			2%	2	
3-	2	3	5		15	3	18	8	13									0	
40					5		6		9										
M	2	2	0.	0.09	0.	3.5	0.	0.2	0.		158	1	154	7	151	1	4.5	1	1
O2	1	6	0	792	00	789	02	651	00			0	5	6	5		5%	5	0
3-		7	8		08	8	95	0	30									8	
41					5		3		0									5	
M	9	1	0.	0.06	0.	0.8	0.	0.1	0.		691	1	639	4	624	6	2.4	6	6

O2 3- 42	5	8	5	248	00 05 2	758 9	00 69 8	016 8	00 11 1		1						0%	2 4	
M O2 3- 43	1 3 1	3 0 8	0. 4 3	0.07 056	0. 11 9	1.4 868 4	0. 01 92 8	0.1 528 3	0. 00 16 6		945 3 5	925 8	917 9				0.8 7%	9 1 7	9
M O2 3- 44	1 1 4	3 7 2	0. 3 1	0.06 175	0. 07 9	0.8 207 4	0. 00 97 9	0.0 964 1	0. 00 11 4		665 1 2	608 5	593 7				2.5 3%	5 9 3	7
M O2 3- 45	1 7 1	1 3 1	1. 3 0	0.21 296	0. 14 4	16. 234 99	0. 10 96 1	0.5 529 5	0. 00 62 0		292 8	1 0	289 1	6 7	283 2 6		3.2 1%	2 9 2 8	1 0
M O2 3- 46	5 7	5 9	0. 9 6	0.05 947	0. 05 1	0.7 841 2	0. 00 64 6	0.0 956 4	0. 00 10 4		584 1 1	588 4	589 6				- 0.1 7%	5 8 9	6
M O2 3- 47	2 4 6	3 2 6	0. 7 5	0.06 249	0. 07 7	0.8 951 3	0. 01 02 7	0.1 038 9	0. 00 12 1		691 1 1	649 6	637 7				1.8 8%	6 3 7	7
M O2 3- 48	8 0 9	1 3 5	0. 8 8	0.06 119	0. 07 9	0.7 875 3	0. 00 94 5	0.0 933 5	0. 00 11 0		646 1 2	590 5	575 6				2.6 1%	5 7 5	6
M O2 3- 49	1 1 9	1 0 6	1. 1 2	0.06 420	0. 06 8	0.9 027 9	0. 00 89 8	0.1 020 0	0. 00 11 6		748 1 1	653 5	626 7				4.3 1%	6 2 6	7
M O2 3- 50	9 1 2	1 6 2	0. 5 6	0.06 905	0. 04 7	1.2 966 8	0. 00 86 0	0.1 362 1	0. 00 14 5		900 1 2	844 4	823 8				2.5 5%	8 2 3	8
M O2 3- 51	2 0 6	2 5 8	0. 0 8	0.18 060	0. 31 5	10. 399 57	0. 13 41 9	0.4 176 3	0. 00 49 2		265 8	3 0	247 1	1 2	225 0 2		18. 13 %		
M O2 3- 52	2 6 5	2 8 0	0. 9 5	0.07 574	0. 06 8	1.7 353 6	0. 01 47 2	0.1 661 8	0. 00 18 5		108 8	1 0	102 2	5 991	1 0		3.1 3%	9 9 1	1 0
M O2 3- 53	3 4 0	1 3 0	0. 2 6	0.05 683	0. 07 5	0.5 688 1	0. 00 70 4	0.0 725 9	0. 00 08 5		485 1 2	457 5	452 5				1.1 1%	4 5 2	5
M O2 3- 54	8 6 5	1 9 5	0. 4 4	0.16 113	0. 11 9	10. 283 52	0. 07 47 7	0.4 629 1	0. 00 52 4		246 8	1 0	246 1	7 245	2 3		0.6 5%	2 4 6 8	1 0
M O2 3-	6 3	6 9	0. 9 0	0.06 118	0. 04	0.8 775 1	0. 00 64	0.1 040 3	0. 00 11		646 1 2	640 3	638 7				0.3 1%	6 3 8	7

55					6		2		2										
M	2	5	0.	0.05	0.	0.8	0.	0.0	0.		586	1	597	4	600	6	-	6	6
O2	1	0	4	952	00	004	00	975	00			1					0.5	0	0
3-	3	5	2		05	9	72	5	10								0%	0	0
56					6		0		8										
M	1	2	0.	0.05	0.	0.6	0.	0.0	0.		495	1	480	4	477	5	0.6	4	5
O2	7	4	7	710	00	041	00	767	00			1					3%	7	7
3-	5	3	2		06	6	66	5	08									7	7
57					7		7		8										
M	6	2	0.	0.07	0.	1.4	0.	0.1	0.		932	1	925	8	922	1	0.3	9	1
O2	2	4	2	011	00	861	01	537	00			2			0		3%	2	0
3-		0	6		09	0	84	5	18									2	2
58					3		6		7										
M	4	8	0.	0.05	0.	0.5	0.	0.0	0.		493	1	447	4	438	5	2.0	4	5
O2	2	0	5	704	00	528	00	703	00			2					5%	3	8
3-			2		07	3	64	0	08									8	
59					1		5		1										
M	1	1	0.	0.06	0.	0.9	0.	0.1	0.		677	1	656	7	650	8	0.9	6	8
O2	2	9	6	207	00	077	01	060	00			4					2%	5	8
3-	0	1	3		09	7	32	9	13									0	
60					8		8		4										
M	1	2	0.	0.05	0.	0.5	0.	0.0	0.		437	5	440	7	441	5	-	4	5
O2	9	4	0	562	00	423	01	707	00			4					0.2	4	
3-			8		13	6	13	3	08								3%	1	
61					3		8		1										
M	9	2	0.	0.05	0.	0.5	0.	0.0	0.		477	1	462	4	459	5	0.6	4	5
O2	1	5	3	662	00	762	00	738	00			1					5%	5	
3-		3	6		06	2	60	2	08									9	
62					3		2		4										
M	1	2	0.	0.06	0.	1.1	0.	0.1	0.		896	1	789	6	752	8	4.9	7	8
O2	0	5	4	891	00	757	01	237	00			1					2%	5	
3-	2	3	0		08	1	29	6	14									2	
63					1		3		5										
M	3	1	0.	0.06	0.	0.8	0.	0.0	0.		668	7	605	1	588	8	2.8	5	8
O2	9	1	3	183	00	147	02	955	00			7		5			9%	8	
3-		7	4		21	3	62	8	12									8	
64					6		2		9										
M	2	5	0.	0.05	0.	0.5	0.	0.0	0.		515	6	459	1	448	5	2.4	4	5
O2	9	8	5	762	00	710	01	718	00			6		0			6%	4	
3-			0		17	7	53	9	08									8	
65					0		9		6										
M	1	2	0.	0.06	0.	0.7	0.	0.0	0.		635	1	558	4	539	6	3.5	5	6
O2	1	2	5	087	00	326	00	872	00			1					3%	3	
3-	9	7	2		05	0	66	9	09									9	
66					8		4		7										
M	1	2	0.	0.05	0.	0.5	0.	0.0	0.		428	1	438	5	440	5	-	4	5
O2	0	5	3	540	00	391	00	705	00			3					0.4	4	
3-	0	4	9		07	4	70	8	08								5%	0	
67					7		4		4										
M	1	1	0.	0.05	0.	0.5	0.	0.0	0.		428	1	446	3	449	5	-	4	5
O2	1	7	6	540	00	514	00	722	00			1					0.6	4	
3-	8	5	7		05	2	52	0	08								7%	9	
68					5		4		0										
M	8	3	0.	0.05	0.	0.5	0.	0.0	0.		459	1	451	3	449	5	0.4	4	5

O2 3- 69	3	2	2	617	00 05 4	588 0	00 51 0	721 6	00 08 0		1						5%	4 9	
M O2 3- 70	1 9 1	3 5 7	0. 5 3	0.05 640	0. 00 08 7	0.5 667 5	0. 00 81 3	0.0 728 8	0. 00 08 9		468 1 4	456 5	453 5	5			0.6 6%	4 5 3	5
M O2 3- 71	1 9 1	2 4 1	0. 0 8	0.05 601	0. 00 05 6	0.5 610 2	0. 00 52 8	0.0 726 6	0. 00 08 1		453 1 1	452 3	452 5	5			0.0 0%	4 5 2	5
M O2 3- 72	2 1 3 6	3 3 8	0. 6 4	0.07 412	0. 00 05 6	1.7 366 7	0. 01 27 7	0.1 699 4	0. 00 18 4		104 5	102 2	5 101 2	1 0			3.2 6%	1 0 4 5	1 1
M O2 3- 73	3 9 7	2 9 1	1. 3 6	0.06 653	0. 00 14 0	1.1 821 7	0. 02 10 0	0.1 288 7	0. 00 14 5		823 4 5	792 1 0	1 781 8	8			1.4 1%	7 8 1	8
M O2 3- 74	7 5 3	2 2 3	0. 3 4	0.13 385	0. 00 09 5	6.9 461 3	0. 04 82 5	0.3 764 0	0. 00 41 6		214 9	210 5	6 205 9	1 9			4.3 7%	2 1 4 9	1 0
M O2 3- 75	5 4 9	1 0 4 9	0. 4 9	0.07 105	0. 00 06 0	1.2 604 5	0. 01 01 1	0.1 286 8	0. 00 14 1		959 1 1	828 5	780 8	8			6.1 5%	7 8 0	8
M O2 3- 76	4 5 8	1 9 3	0. 2 3	0.06 157	0. 00 18 4	0.8 707 3	0. 02 37 5	0.1 025 6	0. 00 12 6		659 6 6	636 1 3	1 629 7	7			1.1 1%	6 2 9	7
M O2 3- 78	7 5 6	1 3 5 6	0. 5 5	0.06 172	0. 00 04 9	0.8 511 2	0. 00 65 7	0.1 000 2	0. 00 10 8		664 1 1	625 4	615 6	6			1.6 3%	6 1 5	6
M O2 3- 79	3 1 3	3 9 6	0. 7 9	0.07 966	0. 00 13 8	1.8 943 5	0. 02 52 7	0.1 724 7	0. 00 18 9		118 9	107 9	9 102 6	1 0			15. 89 %		
M O2 3- 80	1 3 1	3 3 8	0. 3 9	0.06 166	0. 00 05 9	0.7 346 4	0. 00 67 0	0.0 864 1	0. 00 09 6		662 1 1	559 4	534 6	6			4.6 8%	5 3 4	6
M O2 3- 81	1 8 1	2 3 1	0. 0 8	0.06 252	0. 00 07 2	0.7 123 0	0. 00 76 9	0.0 826 3	0. 00 09 5		692 1 1	546 5	512 6	6			6.6 4%	5 1 2	6
M O2 3- 82	2 4 6	2 8 9	0. 8 5	0.06 299	0. 00 05 6	0.9 248 8	0. 00 78 1	0.1 065 0	0. 00 11 7		708 1 1	665 4	652 7	7			1.9 9%	6 5 2	7
M O2 3- 83	2 2 6	2 9 5	0. 7 7	0.06 290	0. 00 05	0.8 752 3	0. 00 70	0.1 009 2	0. 00 11		705 1 1	638 4	620 6	6			2.9 0%	6 2 0	6

O2 3- 97	4 4	8 1	1 1	441	00 06 0	252 8	01 34 4	681 6	00 18 4		3	1	8		2	0	9%	0 5 3	1
M O2 3- 98	1 5 9	2 0 4	0. 7 4	0.06 813	0. 07 3	1.1 874 9	0. 01 20 3	0.1 264 2	0. 14 5		873	1 1	795	6	767	8	3.6 5%	7 6 7	8
M O2 3- 99	1 2 8	1 4 5	0. 8 9	0.06 735	0. 11 3	0.8 905 7	0. 01 37 8	0.0 959 0	0. 12 5		849	1 4	647	7	590	7	9.6 6%	5 9 0	7
M O2 3- 10 0	9 4	7 6	1. 2 4	0.06 483	0. 07 4	1.0 726 4	0. 01 15 6	0.1 199 9	0. 13 9		769	1 1	740	6	731	8	1.2 3%	7 3 1	8
M O2 4- 01	1 8 3	4 3 1	0. 4 1	0.06 934	0. 15 1	1.3 243 5	0. 02 66 4	0.1 385 1	0. 20 2		909	2 0	856	1 2	836	1 1	2.3 9%	8 3 6	1
M O2 4- 02	6 7 2	1 5 4	0. 4 4	0.06 038	0. 08 1	0.7 997 5	0. 00 99 9	0.0 960 6	0. 11 3		617	1 2	597	6	591	7	1.0 2%	5 9 1	7
M O2 4- 03	1 1 0	3 6 2	0. 3 0	0.06 298	0. 08 2	0.9 678 0	0. 01 16 9	0.1 114 5	0. 13 2		708	1 2	687	6	681	8	0.8 8%	6 8 1	8
M O2 4- 04	4 0 6	2 6 6	0. 1 5	0.05 682	0. 11 2	0.5 877 4	0. 00 94 3	0.0 750 1	0. 08 6		485	4 5	469	6	466	5	0.6 4%	4 6 6	5
M O2 4- 05	6 1 4	1 4 2	0. 4 2	0.06 073	0. 08 8	0.8 718 0	0. 01 17 3	0.1 041 2	0. 12 7		630	1 3	637	6	639	7	- 0.3 1%	6 3 9	7
M O2 4- 06	1 0 6	1 1 9	0. 8 9	0.05 618	0. 10 5	0.5 721 5	0. 00 99 8	0.0 738 6	0. 09 6		459	1 8	459	6	459	6	0.0 0%	4 5 9	6
M O2 4- 07	3 7 0	6 8 7	0. 5 4	0.07 201	0. 04 6	1.5 856 3	0. 01 00 4	0.1 597 0	0. 16 9		986	1 2	965	4	955	9	1.0 5%	9 5 5	9
M O2 4- 08	2 3 3	2 9 5	0. 7 9	0.06 657	0. 06 7	1.1 181 7	0. 01 05 8	0.1 218 3	0. 13 7		824	1 1	762	5	741	8	2.8 3%	7 4 1	8
M O2 4- 09	2 7 9	2 5 6	1. 0 9	0.06 256	0. 06 5	0.8 546 1	0. 00 83 5	0.0 990 7	0. 11 1		693	1 1	627	5	609	7	2.9 6%	6 0 9	7
M	2	2	1.	0.06	0.	0.8	0.	0.0	0.		674	1	622	5	608	7	2.3	6	7

O2 4- 10	4 7 7	0 7 9	1 9	200 07 2	00 459 2	00 989 2	00 92 2	00 5 4		1						0%	0 8	
M O2 4- 11	5 4 5	2 5 1	0. 2 1	0.13 619 08 0	0. 7.5 318 2	0. 04 041 1	0.4 011 0	0. 00 42 5		217 9 1	1 7 5	217 4 0	2 0		0.2 3%	2 1 7 9	1 1	
M O2 4- 12	1 9 0	1 7 9	1. 0 6	0.06 067 07 0	0. 0.9 014 6	0. 00 97 1	0.1 077 7	0. 00 12 3		628 1 1	653 5 660	7			- 1.0 6%	6 6 0	7	
M O2 4- 13	7 4 6	1 7 2	0. 4 2	0.06 481 97 5	0. 0.6 482 9	0. 19 68 2	0.0 725 5	0. 00 19 8		768 6 1 5	507 1 1	452 2 1	1 2		12. 17 %			
M O2 4- 14	2 8 5	4 4 0	0. 6 5	0.06 620 04 9	0. 1.2 320 6	0. 00 87 9	0.1 349 7	0. 00 14 4		813 1 1	815 4 816	8			- 0.1 2%	8 1 6	8	
M O2 4- 15	3 4 3	2 2 3	1. 5 4	0.05 963 06 4	0. 0.8 153 9	0. 00 81 7	0.0 991 8	0. 00 11 2		590 1 1	605 5 610	7			- 0.8 2%	6 1 0	7	
M O2 4- 16	1 0 7	1 0 0	1. 0 7	0.06 176 09 7	0. 0.9 035 4	0. 01 31 5	0.1 061 1	0. 00 13 2		666 4	654 7 650	8			0.6 2%	6 5 0	8	
M O2 4- 17	1 9 3	3 0 3	0. 6 4	0.06 131 06 2	0. 0.9 144 2	0. 00 87 8	0.1 081 7	0. 00 12 1		650 1 1	659 5 662	7			- 0.4 5%	6 6 2	7	
M O2 4- 18	9 4 9	1 5 9	0. 5 9	0.05 579 08 6	0. 0.5 614 5	0. 00 80 5	0.0 729 9	0. 00 08 9		444 4	452 5 454	5			- 0.4 4%	4 5 4	5	
M O2 4- 19	1 2 9	2 0 6	0. 6 2	0.10 861 07 4	0. 4.8 845 5	0. 03 24 4	0.3 261 9	0. 00 35 2		177 6 0	180 0 0	182 0 7	1 7		- 2.4 2%	1 7 6	1 0	
M O2 4- 20	9 3 7	3 0 0	0. 3 0	0.05 649 06 0	0. 0.5 585 8	0. 00 56 0	0.0 717 1	0. 00 08 0		472 1 1	451 4 446	5			1.1 2%	4 4 6	5	
M O2 4- 21	1 1 7	2 9 5	0. 4 0	0.12 729 07 5	0. 6.5 866 8	0. 03 89 2	0.3 752 9	0. 00 39 7		206 1 1	205 8 5	205 4 9	1 9		0.3 4%	2 0 6 1	1 1	
M O2 4- 22	1 4 3	1 2 1	1. 1 9	0.12 357 09 1	0. 6.2 616 1	0. 04 49 0	0.3 675 3	0. 00 40 6		200 8 0	201 3 6	201 8 9	1 9		- 0.5 0%	2 0 0 8	1 0 0	
M O2 4- 23	1 1 2	6 1 4	1. 8 4	0.06 770 12	0. 0.9 416 5	0. 01 62	0.1 008 8	0. 00 13		859 7	674 8 620	8			8.7 1%	6 2 0	8	

23					7		5		7									
M	4	7	0.	0.06	0.	1.1	0.	0.1	0.	799	1	764	7	752	9	1.6	7	9
O2	0	1	5	576	00	221	01	237	00		3					0%	5	2
4-			7		09	9	53	6	15									
24					7		3		3									
M	1	4	0.	0.05	0.	0.7	0.	0.0	0.	598	1	562	4	553	6	1.6	5	6
O2	9	1	4	984	00	396	00	896	00		1					3%	5	3
4-	5	5	7		05	9	62	5	09									
25					3		7		8									
M	1	8	1.	0.18	0.	13.	0.	0.5	0.	273	1	268	7	263	2	3.8	2	1
O2	4	0	8	871	00	108	09	038	00	1	0	7		0	4	4%	7	0
4-	3		0		13	42	30	0	56								3	1
26					6		0		9									
M	1	9	0.	0.06	0.	0.8	0.	0.0	0.	647	1	619	3	612	6	1.1	6	6
O2	9	3	2	123	00	404	00	995	00		2					4%	1	2
4-	1	8	0		04	8	54	6	10									
27					0		1		5									
M	2	4	0.	0.06	0.	0.7	0.	0.0	0.	608	1	579	3	571	6	1.4	5	6
O2	6	8	0	011	00	683	00	927	00		1					0%	7	1
4-	6	6	5		04	2	59	0	10									
28					8		2		0									
M	8	1	0.	0.06	0.	0.8	0.	0.1	0.	613	1	620	5	623	7	-	6	7
O2	5	8	4	025	00	423	00	014	00		1					0.4	2	3
4-	7	7	6		06	9	86	0	11							8%		
29					5		0		4									
M	9	1	0.	0.06	0.	0.8	0.	0.0	0.	709	1	614	5	588	7	4.4	5	7
O2	6	3	7	301	00	303	00	955	00		1					2%	8	8
4-	6	6	0		07	8	97	8	11									
30					9		3		2									
M	2	1	2.	0.12	0.	6.0	0.	0.3	0.	199	1	198	6	197	1	1.3	1	1
O2	3	0	2	294	00	661	04	578	00	9	0	5		2	9	7%	9	0
4-	3	4	3		08	3	17	8	39								9	9
31					7		2		1									
M	1	2	0.	0.06	0.	0.7	0.	0.0	0.	627	1	568	4	553	6	2.7	5	6
O2	5	6	5	066	00	489	00	895	00		1					1%	5	3
4-	3	0	9		05	5	68	5	09									
32					9		7		9									
M	1	2	0.	0.05	0.	0.5	0.	0.0	0.	494	1	448	4	439	5	2.0	4	5
O2	4	3	6	706	00	550	00	705	00		1					5%	3	9
4-	4	7	1		06	4	61	5	08									
33					8		9		1									
M	8	2	0.	0.05	0.	0.6	0.	0.0	0.	568	1	527	4	517	6	1.9	5	6
O2	6	7	3	903	00	796	00	835	00		1					3%	1	7
4-	5	5	1		06	9	65	1	09									
34					1		6		3									
M	1	1	0.	0.05	0.	0.5	0.	0.0	0.	532	1	434	5	415	5	4.5	4	5
O2	0	9	5	807	00	328	00	665	00		4					8%	1	5
4-	4	0	5		09	4	76	6	08									
35					0		4		2									
M	9	1	0.	0.06	0.	0.7	0.	0.0	0.	608	1	579	5	572	6	1.2	5	6
O2	2	6	5	013	00	692	00	927	00		1					2%	7	2
4-	4	4	6		06	7	82	9	10									
36					9		0		6									
M	1	2	0.	0.06	0.	0.8	0.	0.1	0.	676	5	629	1	616	7	2.1	6	7

O2 4- 37	4 4	5 0	5 8	206	00 16 2	573 3	02 01 3	001 9	00 11 5		7		1			1%	1 6	
M O2 4- 38	9 2	2 5	0. 4 1	0.05 530	0. 00 06 3	0.5 230 7	0. 00 55 7	0.0 686 0	0. 00 07 7		424 1 1	427 4	428 5			- 0.2 3%	4 2 8	5
M O2 4- 39	1 2 1	1 2 1	1. 0 0	0.05 679	0. 00 09 3	0.5 510 1	0. 00 83 7	0.0 703 7	0. 00 08 7		483 5	446 5	438 5			1.8 3%	4 3 8	5
M O2 4- 40	2 0 6	5 8 4	0. 3 5	0.05 596	0. 00 04 6	0.5 558 3	0. 00 44 1	0.0 720 5	0. 00 07 7		451 1 1	449 3	448 5			0.2 2%	4 4 8	5
M O2 4- 41	1 9 9	1 8 7	1. 0 6	0.06 094	0. 00 06 5	0.8 134 5	0. 00 81 5	0.0 968 2	0. 00 10 9		637 1 1	604 5	596 6			1.3 4%	5 9 6	6
M O2 4- 42	1 2 0	1 2 0	1. 0 0	0.06 367	0. 00 08 4	1.0 642 2	0. 01 30 2	0.1 212 4	0. 00 14 4		731 2	736 6	738 8			- 0.2 7%	7 3 8	8
M O2 4- 43	9 2	3 9	2. 3 7	0.11 643	0. 00 11 8	5.4 422 7	0. 05 21 6	0.3 390 4	0. 00 40 7		190 2	189 0	188 2	2 0		1.0 6%	1 9 0	1 0
M O2 4- 44	8 6	8 6 2	0. 1 0	0.05 665	0. 00 07 8	0.5 554 8	0. 00 50 1	0.0 711 1	0. 00 07 4		478 3 1	449 3	443 4			1.3 5%	4 4 3	4
M O2 4- 45	6 3	1 9 0	0. 3 3	0.05 723	0. 00 13 8	0.5 696 1	0. 01 20 1	0.0 721 9	0. 00 08 4		500 5 4	458 8	449 5			2.0 0%	4 4 9	5
M O2 4- 46	3 8 3	6 9 5	0. 5 5	0.06 563	0. 00 04 5	0.8 990 3	0. 00 59 7	0.0 993 5	0. 00 10 5		795 2	651 3	611 6			6.5 5%	6 1 1	6
M O2 4- 47	7 9	1 2 0	0. 6 6	0.05 879	0. 00 08 5	0.5 774 3	0. 00 77 4	0.0 712 4	0. 00 08 5		559 3	463 5	444 5			4.2 8%	4 4 4	5
M O2 4- 48	1 3 0	1 5 4	0. 8 4	0.06 742	0. 00 06 3	1.2 446 7	0. 01 09 5	0.1 339 1	0. 00 14 8		851 1	821 5	810 8			1.3 6%	8 1 0	8
M O2 4- 49	1 0 3	2 4 4	0. 4 2	0.05 802	0. 00 13 5	0.6 868 9	0. 01 40 3	0.0 858 6	0. 00 09 6		531 5 2	531 8	531 6			0.0 0%	5 3 1	6
M O2 4-	7 1	8 0	0. 8 8	0.12 211	0. 00 09	6.0 432 0	0. 04 51	0.3 589 7	0. 00 40		198 7	198 0	197 2	7 9		0.5 1%	1 9 8	1 0

50					5		0		0								7		
M	2	2	0.	0.06	0.	1.1	0.	0.1	0.		793	1	765	4	755	8	1.3	7	8
O2	0	5	8	559	00	243	00	243	00			1					2%	5	5
4-	9	1	3		05	5	89	4	13										
51					5		3		4										
M	1	1	0.	0.06	0.	0.8	0.	0.1	0.		669	1	634	5	624	7	1.6	6	7
O2	1	4	8	185	00	670	00	016	00			1					0%	2	4
4-	5	0	2		07	3	94	7	11										
52					2		2		6										
M	3	4	0.	0.11	0.	5.3	0.	0.3	0.		188	1	188	8	187	1	0.6	1	1
O2	0	9	6	546	00	736	05	375	00		7	0	1	5	9		4%	8	0
4-			2		11	5	08	9	40									8	8
53					6		5		2									7	7
M	9	2	0.	0.05	0.	0.5	0.	0.0	0.		462	1	440	4	436	5	0.9	4	5
O2	8	0	4	625	00	428	00	699	00			1					2%	3	6
4-		6	8		06	2	60	9	08									6	6
54					7		5		0										
M	1	2	0.	0.06	0.	0.9	0.	0.1	0.		737	1	685	4	670	7	2.2	6	7
O2	0	2	4	385	00	636	00	094	00			1					4%	7	7
4-	3	1	6		05	6	82	8	12									0	0
55					8		6		0										
M	2	3	0.	0.06	0.	1.1	0.	0.1	0.		790	2	785	1	784	1	0.1	7	1
O2	4	2	7	549	00	673	02	292	00			4		2	1		3%	8	1
4-			5		16	2	63	9	19									4	4
56					0		5		9										
M	2	2	0.	0.06	0.	0.8	0.	0.0	0.		740	6	624	1	592	7	5.4	5	7
O2	0	7	7	396	00	488	02	962	00			5		3			1%	9	7
4-	0	1	4		19	6	32	6	11									2	2
57					1		7		3										
M	9	2	0.	0.05	0.	0.7	0.	0.0	0.		599	4	569	8	562	6	1.2	5	6
O2	5	6	3	988	00	521	01	911	00			7					5%	6	6
4-		1	6		12	4	35	0	10									2	2
58					7		5		2										
M	2	1	0.	0.14	0.	5.3	0.	0.2	0.		233	2	187	7	148	1	57.		
O2	9	9	1	922	00	302	04	590	00		7	4	4	5	5		37		
4-		7	5		20	6	47	6	28								%		
59					6		1		4										
M	8	1	0.	0.05	0.	0.5	0.	0.0	0.		521	1	454	5	441	5	2.9	4	5
O2	4	0	8	778	00	637	00	707	00			4					5%	4	5
4-		0	4		09	9	81	7	08									1	1
60					0		6		7										
M	1	1	0.	0.12	0.	6.6	0.	0.3	0.		209	1	206	5	202	1	3.5	2	1
O2	2	8	6	985	00	081	03	691	00		6	0	0	5	8		1%	0	0
4-	4	3	8		07	1	97	5	39									9	9
61					9		4		1									6	6
M	1	1	0.	0.05	0.	0.6	0.	0.0	0.		543	1	509	5	501	6	1.6	5	6
O2	6	1	1	835	00	501	00	808	00			2					0%	0	6
4-		0	5		07	2	80	2	09									1	1
62					7		1		5										
M	1	2	0.	0.06	0.	0.8	0.	0.1	0.		617	1	619	4	620	6	-	6	6
O2	0	1	4	036	00	398	00	009	00			1					0.1	2	6
4-	3	0	9		05	0	77	2	11								6%	0	0
63					9		5		1										
M	9	9	0.	0.05	0.	0.7	0.	0.0	0.		577	1	596	6	601	7	-	6	7

O2 4- 64	2	4	9	928	00 08 4	979 9	01 05 8	976 4	00 11 6		3						0.8 3%	0 1	
M O2 4- 65	1 0 7	3 0 0	0. 3 6	0.12 857	0. 00 07 2	6.4 036 1	0. 03 57 2	0.3 612 9	0. 00 37 7		207 9	1 1	203 3	5	198 8	1 8	4.5 8%	2 0 7 9	1 1
M O2 4- 66	1 5 0	1 6 7	0. 9 0	0.06 360	0. 00 06 0	0.9 936 5	0. 00 89 0	0.1 133 2	0. 00 12 5		728	1 1	701	5	692	7	1.3 0%	6 9 2	7
M O2 4- 67	5 6 8	1 6 3	0. 3 3	0.05 848	0. 00 13 2	0.7 363 1	0. 01 43 2	0.0 913 2	0. 00 10 3		548	5 0	560	8	563	6	- 0.5 3%	5 6 3	6
M O2 4- 68	1 1 3	2 2 8	0. 4 9	0.05 541	0. 00 06 1	0.5 504 5	0. 00 57 0	0.0 720 5	0. 00 08 1		429	1 1	445	4	448	5	- 0.6 7%	4 4 8	5
M O2 4- 69	6 8 6	2 2 0	0. 3 0	0.05 696	0. 00 06 1	0.5 594 0	0. 00 56 7	0.0 712 4	0. 00 07 9		490	1 1	451	4	444	5	1.5 8%	4 4 4	5
M O2 4- 70	1 3 2	4 5 5	0. 2 9	0.06 204	0. 00 04 6	0.9 199 4	0. 00 65 1	0.1 075 6	0. 00 11 4		675	1 1	662	3	659	7	0.4 6%	6 5 9	7
M O2 4- 71	1 2 2	3 9 2	0. 3 1	0.06 109	0. 00 04 7	0.9 168 7	0. 00 67 7	0.1 088 8	0. 00 11 6		642	1 1	661	4	666	7	- 0.7 5%	6 6 6	7
M O2 4- 72	1 2 9	3 3 4	0. 3 9	0.06 542	0. 00 05 2	0.9 319 9	0. 00 70 3	0.1 033 3	0. 00 11 1		788	1 1	669	4	634	6	5.5 2%	6 3 4	6
M O2 4- 73	5 9 1	1 6 7	0. 3 7	0.05 676	0. 00 07 1	0.5 741 1	0. 00 67 0	0.0 733 7	0. 00 08 4		482	1 2	461	4	456	5	1.1 0%	4 5 6	5
M O2 4- 74	5 9 2	2 2 7	0. 2 7	0.05 442	0. 00 05 9	0.5 361 1	0. 00 55 0	0.0 714 6	0. 00 07 9		388	1 1	436	4	445	5	- 2.0 2%	4 4 5	5
M O2 4- 75	4 8 7	8 5 7	0. 5 7	0.06 282	0. 00 21 6	0.7 698 8	0. 02 44 6	0.0 888 8	0. 00 11 6		702	7 5	580	1 4	549	7	5.6 5%	5 4 9	7
M O2 4- 76	5 9 8	1 3 3	0. 4 3	0.05 910	0. 00 07 3	0.6 959 7	0. 00 80 2	0.0 854 2	0. 00 09 8		571	1 1	536	5	528	6	1.5 2%	5 2 8	6
M O2 4- 77	1 1 5	3 5 6	0. 3 2	0.05 294	0. 00 04	0.5 221 8	0. 00 44	0.0 715 4	0. 00 07		326	1 1	427	3	445	5	- 4.0 4%	4 4 5	5

77					8		7		7										
M	9	1	0.	0.05	0.	0.5	0.	0.0	0.		466	1	460	4	459	5	0.2	4	5
O2	2	5	5	634	00	730	00	737	00			2					2%	5	9
4-		5	9		07	1	67	7	08										
78					1		6		5										
M	1	2	0.	0.05	0.	0.5	0.	0.0	0.		532	1	458	3	444	5	3.1	4	5
O2	0	3	4	805	00	703	00	712	00			1					5%	4	4
4-	5	1	5		05	0	53	7	07										4
79					8		9		8										4
M	1	3	0.	0.05	0.	0.8	0.	0.1	0.		583	2	611	9	618	8	-	6	8
O2	4	7	3	943	00	246	01	006	00			1					1.1	1	8
4-			9		12	9	61	7	14								3%		
80					6		3		0										
M	2	2	0.	0.05	0.	0.7	0.	0.0	0.		600	1	589	4	587	6	0.3	5	6
O2	0	9	7	990	00	866	00	952	00			1					4%	8	6
4-	8	7	0		05	6	64	6	10										7
81					2		3		3										
M	2	1	1.	0.06	0.	1.3	0.	0.1	0.		916	1	869	5	851	9	2.1	8	9
O2	0	6	2	958	00	531	01	410	00			0					2%	5	9
4-	3	8	1		06	8	15	7	15										1
82					3		7		5										
M	1	1	1.	0.06	0.	0.8	0.	0.1	0.		634	1	630	5	629	7	0.1	6	7
O2	3	1	1	086	00	604	00	025	00			1					6%	2	7
4-	2	5	5		07	8	97	7	11										9
83					4		1		8										
M	1	1	1.	0.06	0.	0.8	0.	0.0	0.		641	1	604	4	594	6	1.6	5	6
O2	8	8	0	106	00	129	00	965	00			1					8%	9	6
4-	3	0	2		06	3	77	7	10										4
84					2		5		7										
M	5	5	1.	0.06	0.	0.8	0.	0.0	0.		721	1	612	2	583	8	4.9	5	8
O2	5	0	0	339	00	272	03	946	00			0		2			7%	8	8
4-			9		31	0	89	4	13			7							3
85					2		7		6										
M	1	1	0.	0.05	0.	0.8	0.	0.1	0.		602	1	623	5	629	7	-	6	7
O2	2	4	8	996	00	476	00	025	00			1					0.9	2	7
4-	1	9	1		06	2	87	5	11								5%		9
86					6		1		5										
M	5	2	0.	0.06	0.	0.8	0.	0.1	0.		660	1	637	4	631	6	0.9	6	6
O2	9	6	2	159	00	731	00	028	00			1					5%	3	6
4-		1	3		05	2	73	4	11										1
87					4		1		1										
M	9	1	0.	0.05	0.	0.5	0.	0.0	0.		508	1	451	4	440	5	2.5	4	5
O2	6	9	4	742	00	592	00	706	00			1					0%	4	5
4-		9	8		06	1	59	4	08										0
88					6		9		0										
M	1	3	0.	0.06	0.	0.8	0.	0.1	0.		651	1	629	4	623	6	0.9	6	6
O2	8	1	5	134	00	579	00	014	00			1					6%	2	6
4-	3	6	8		04	4	65	6	10										3
89					9		1		8										
M	4	6	0.	0.06	0.	1.0	0.	0.1	0.		732	1	744	7	748	9	-	7	9
O2	0	2	6	372	00	807	01	230	00			3					0.5	4	9
4-			5		09	6	48	3	15								3%		8
90					4		0		1										
M	1	1	0.	0.05	0.	0.8	0.	0.0	0.		585	1	600	4	604	6	-	6	6

O2 4- 91	4 2	7 0	8 4	948	00 06 1	052 3	00 78 0	982 0	00 10 9		1						0.6 6%	0 4		
M O2 4- 92	7 6	2 6	0. 2	0.17 231	0. 00 10 2	10. 841 54	0. 06 39 9	0.4 564 3	0. 00 48 4		258 0	1 0	251 0	5 4	242 4	2 1		6.4 4%	2 5 8 0	1 0
M O2 4- 93	2 5	7 0	0. 3	0.05 881	0. 00 04 0	0.7 463 3	0. 00 48 8	0.0 920 5	0. 00 09 6		560	1 2	566	3	568	6		- 0.3 5%	5 6 8	6
M O2 4- 94	7 6	1 8	0. 4	0.05 565	0. 00 06 6	0.5 663 2	0. 00 62 8	0.0 738 2	0. 00 08 3		438	1 1	456	4	459	5		- 0.6 5%	4 5 9	5
M O2 4- 95	4 6	8 0	0. 5	0.05 978	0. 00 08 4	0.7 742 3	0. 01 01 5	0.0 939 6	0. 00 11 2		596	1 3	582	6	579	7		0.5 2%	5 7 9	7
M O2 4- 96	3 3	9 1	0. 3	0.06 109	0. 00 07 7	0.8 569 6	0. 01 00 7	0.1 017 6	0. 00 11 8		642	1 1	628	6	625	7		0.4 8%	6 2 5	7
M O2 4- 97	3 6	9 5	0. 3	0.05 980	0. 00 07 7	0.8 316 4	0. 01 00 3	0.1 008 8	0. 00 11 8		596	1 2	615	6	620	7		- 0.8 1%	6 2 0	7
M O2 4- 98	4 9	8 7	0. 5	0.05 542	0. 00 08 9	0.5 632 9	0. 00 84 3	0.0 737 3	0. 00 09 1		429	1 5	454	5	459	5		- 1.0 9%	4 5 9	5
M O2 4- 99	2 3	3 9	0. 5	0.06 054	0. 00 04 8	0.8 101 2	0. 00 61 9	0.0 970 8	0. 00 10 4		623	1 1	603	3	597	6		1.0 1%	5 9 7	6
M O2 4- 10 0	9 3	2 6	0. 3	0.05 713	0. 00 05 4	0.5 667 9	0. 00 50 3	0.0 719 7	0. 00 07 8		497	1 1	456	3	448	5		1.7 9%	4 4 8	5

Table 3. Analytical data for the dated Carboniferous zircons: 13 FR 52, MO 15, MO 16, MO 17, MO 26.

Spot No.	Th (ppm)	U (ppm)	Th/U	Ratios						Ages (Ma)						Discor-dance (%)	Best Ages	$\pm 1\sigma$
				$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$			
13 FR 52 - 01	136485	16485	0.8	0.05704	0.00196	0.75868	0.02380	0.09651	0.00184	4937	37	57314	14	59411	11	-3.54%	594	11
13 FR 52 - 02	8472	54702	0.8	0.05992	0.00101	0.81344	0.0264	0.09849	0.00129	6015	15	6047	7	6068	8	-0.33%	606	8
13 FR 52 - 03	26033	8033	0.8	0.05244	0.00410	0.59476	0.0293	0.08229	0.00292	30511	11	47427	27	5107	7	-7.06%	510	7
13 FR 52 - 04	84710	84710	0.8	0.16437	0.00214	10.37135	0.0288	0.45763	0.00502	25012	22	24687	77	24292	22	2.96%	242	22
13 FR 52 - 05	888	3188	2.8	0.06159	0.00457	0.71064	0.00841	0.08371	0.00291	6607	87	54529	29	5187	7	5.21%	518	7
13 FR 52 - 06	124062	2062	0.8	0.13188	0.00355	6.81295	0.0214	0.37468	0.00561	2123	48	20870	20	20516	26	3.51%	205	26
13 FR 52 - 07	1975	2675	0.8	0.10868	0.00104	5.27113	0.0076	0.35189	0.00418	1777	10	18684	84	19440	20	-8.59%	194	20
13 FR 52 - 08	2023	2483	0.8	0.05742	0.00133	0.79225	0.00688	0.10011	0.00150	5083	23	59210	10	6159	9	-3.74%	615	9
13 FR 0	109	29	0.8	0.05535	0.0000	0.42089	0.0001	0.05517	0.0000	42632	32	3578	8	3466	6	3.18%	346	6

52 - 09	8	1	3 7		16 3		12 8		09 2									6	
13 FR 52 - 10	2 9	1 0 9	0 . 2 7	0.07 874	0. 00 20 8	2.18 217	0. 05 25 5	0.20 106	0. 00 36 5		116 6	2 2	117 5	1 7	118 1	2 0	- 1.2 7%	1 1 6 6	2 2
13 FR 52 - 11	6 0	1 5 2	0 . 3 9	0.15 755	0. 00 36 7	9.59 402	0. 16 95 4	0.44 165	0. 00 67 0		243 0	4 0	239 7	1 6	235 8	3 0	3.0 5%	2 4 3 0	4 0
13 FR 52 - 12	2 5	4 0	0 . 6 1	0.06 109	0. 00 47 2	0.93 716	0. 06 61 0	0.11 130	0. 00 42 8		642 7	8 7	671	3 5	680	2 5	- 1.3 2%	6 8 0	2 5
13 FR 52 - 13	3 2 6	1 1 4 7	0 . 2 8	0.05 068	0. 00 08 6	0.35 429	0. 00 55 3	0.05 072	0. 00 06 4		226	1 6	308	4	319	4	- 3.4 5%	3 1 9	4
13 FR 52 - 14	3 7	4 3 4	0 . 0 9	0.05 505	0. 00 15 8	0.57 675	0. 01 51 0	0.07 601	0. 00 12 6		414	3 1	462	1 0	472	8	- 2.1 2%	4 7 2	8
13 FR 52 - 15	4 9	1 6 9	0 . 2 9	0.05 635	0. 00 19 4	0.61 724	0. 01 94 1	0.07 947	0. 00 15 0		466	3 8	488	1 2	493	9	- 1.0 1%	4 9 3	9
13 FR 52 - 16	6 0	1 3 6 4	0 . 4 4	0.05 641	0. 00 21 2	0.59 320	0. 02 04 7	0.07 628	0. 00 15 1		469	4 3	473	1 3	474	9	- 0.2 1%	4 7 4	9
13 FR 52 - 17	6 9	1 6 9	0 . 4 1	0.05 383	0. 00 21 6	0.41 752	0. 05 52 7	0.05 627	0. 00 11 6		364	4 6	354	1 1	353	7	0.2 8%	3 5 3	7
13 FR 52 - 18	5 2	9 8	0 . 5 3	0.06 005	0. 00 25 5	0.71 241	0. 02 75 6	0.08 607	0. 00 19 3		605	4 6	546	1 6	532	1 1	2.6 3%	5 3 2	1 1
13 FR 52 - 19	1 8 6	3 4 5 4	0 . 5 4	0.05 412	0. 00 15 2	0.39 267	0. 01 01 0	0.05 263	0. 00 08 5		376	3 0	336	7	331	5	1.5 1%	3 3 1	5
13	1	2	0	0.05	0.	0.43	0.	0.05	0.		450	3	370	9	357	6	3.6	3	6

FR 52 - 20	1 7	0 7	. 5 6	593 00 18 6	902	01 33 0	694	00 10 4			6					4%	5 7	
13 FR 52 - 21	5 0	1 8 1	0 .2 8	0.05 658	0. 00 30 9	0.62 290	0. 03 18 2	0.07 985	0. 00 15 3	475	1 2 4	492	2 0	495	9	- 0.6 1%	4 9 5	9
13 FR 52 - 22	4 0	1 1 7	0 .3 4	0.05 481	0. 00 22 8	0.59 842	0. 02 28 3	0.07 921	0. 00 17 0	404	4 8	476	1 5	491	1 0	- 3.0 5%	4 9 1	1 0
13 FR 52 - 23	8 3	1 4 3	0 .5 8	0.13 705	0. 00 17 1	7.34 841	0. 08 54 2	0.38 895	0. 00 52 8	219 0	1 1	215	1 0	211	2 5	3.4 0%	2 1 9 0	1 1
13 FR 52 - 24	3 3 1	3 6 4	0 .9 1	0.06 024	0. 00 20 3	0.79 393	0. 02 43 9	0.09 562	0. 00 18 3	612	3 5	593	1 4	589	1 1	0.6 8%	5 8 9	1 1
13 FR 52 - 25	1 3 3	5 0 5	0 .2 6	0.05 782	0. 00 11 7	0.57 658	0. 01 06 4	0.07 234	0. 00 10 0	523	1 9	462	7	450	6	2.6 7%	4 5 0	6
13 FR 52 - 26	1 1 7	2 0 7	0 .5 6	0.05 635	0. 00 16 5	0.61 435	0. 01 64 4	0.07 909	0. 00 13 3	466	3 1	486	1 0	491	8	- 1.0 2%	4 9 1	8
13 FR 52 - 27	1 0 4	1 5 6	0 .6 7	0.07 619	0. 00 18 5	2.06 253	0. 04 58 6	0.19 637	0. 00 33 2	110 0	2 1	113	1 5	115	1 8	- 4.8 4%	1 1 0 0	2 1
13 FR 52 - 28	4 4	7 1	0 .6 2	0.12 133	0. 00 24 7	6.07 912	0. 11 40 9	0.36 346	0. 00 64 1	197 6	1 5	198	1 6	199	3 0	- 1.1 5%	1 9 7 6	1 5
13 FR 52 - 29	5 0	9 2	0 .5 4	0.05 866	0. 00 26 2	0.75 395	0. 03 08 6	0.09 324	0. 00 21 5	555	5 0	571	1 8	575	1 3	- 0.7 0%	5 7 5	1 3
13 FR 52 - 30	8 3	2 6 5	0 .3 1	0.11 656	0. 00 22 4	4.49 336	0. 06 50 8	0.27 958	0. 00 35 2	190 4	3 5	173	1 2	158	1 8	19. 82 %		

13 FR 52 - 31	8 1 5	5 0 1	0 . 6	0.11 914	0. 00 09 8	5.88 898	0. 04 59 8	0.35 855	0. 00 40 9		194 3	1 0	196 0	7	197 5	1 9	- 1.6 2%	1 9 4 3	1 0
13 FR 52 - 32	1 3 2	1 7 6	0 . 5	0.06 137	0. 00 16 8	0.91 299	0. 02 28 1	0.10 792	0. 00 18 1		652	2 7	659	1 2	661	1 1	- 0.3 0%	6 6 1	1 1
13 FR 52 - 33	1 2 3	2 9 3	0 . 2	0.05 297	0. 00 15 6	0.40 650	0. 01 09 9	0.05 566	0. 00 09 2		328	3 3	346	8	349	6	- 0.8 6%	3 4 9	6
13 FR 52 - 34	9 4	1 6 4	0 . 7	0.05 709	0. 00 19 6	0.57 761	0. 01 81 5	0.07 339	0. 00 13 7		495	3 8	463	1 2	457	8	1.3 1%	4 5 7	8
13 FR 52 - 35	5 2	1 1 0	0 . 7	0.05 722	0. 00 20 6	0.68 220	0. 02 24 3	0.08 649	0. 00 17 0		500	3 9	528	1 4	535	1 0	- 1.3 1%	5 3 5	1 0
13 FR 52 - 36	5 7	1 8 7	0 . 1	0.05 607	0. 00 17 6	0.59 928	0. 01 72 0	0.07 753	0. 00 13 7		455	3 4	477	1 1	481	8	- 0.8 3%	4 8 1	8
13 FR 52 - 37	6 6	1 0 8	0 . 1	0.13 059	0. 00 19 9	7.02 280	0. 09 92 4	0.39 008	0. 00 58 3		210 6	1 2	211 4	1 3	212 3	2 7	- 0.8 0%	2 1 0 6	1 2
13 FR 52 - 38	1 2 6	2 8 6	0 . 4	0.05 215	0. 00 16 2	0.40 570	0. 01 15 7	0.05 643	0. 00 09 6		292	3 5	346	8	354	6	- 2.2 6%	3 5 4	6
13 FR 52 - 39	1 1 8	1 3 5	0 . 7	0.05 970	0. 00 21 3	0.74 753	0. 02 43 6	0.09 082	0. 00 17 9		593	3 8	567	1 4	560	1 1	1.2 5%	5 6 0	1 1
13 FR 52 - 40	8 0	9 9	0 . 1	0.05 669	0. 00 26 8	0.81 034	0. 03 50 5	0.10 369	0. 00 25 3		479	5 4	603	2 0	636	1 5	- 5.1 9%	6 3 6	1 5
13 FR 52 -	5 8	2 3 7	0 . 5	0.05 093	0. 00 17 3	0.40 340	0. 01 25 9	0.05 745	0. 00 10 2		238	4 0	344	9	360	6	- 4.4 4%	3 6 0	6

41																		
13 FR 52 - 42	6 2	1 5 0	0 . 4 2	0.05 711	0. 00 20 2	0.63 727	0. 02 05 3	0.08 093	0. 00 15 6	496	3 9	501	1 3	502	9	- 0.2 0%	5 0 2	9
13 FR 52 - 43	7 5	1 2 6	0 . 6 0	0.05 921	0. 00 21 0	0.65 145	0. 02 11 0	0.07 981	0. 00 15 4	575	3 8	509	1 3	495	9	2.8 3%	4 9 5	9
13 FR 52 - 44	4 4	1 2 4	0 . 3 6	0.05 697	0. 00 20 5	0.60 429	0. 01 98 9	0.07 694	0. 00 15 0	490	4 0	480	1 3	478	9	0.4 2%	4 7 8	9
13 FR 52 - 45	3 7	3 8	0 . 9 8	0.10 582	0. 00 28 4	4.26 257	0. 10 43 2	0.29 217	0. 00 59 2	172 9	2 0	168 6	2 0	165 2	3 0	4.6 6%	1 7 2 9	2
13 FR 52 - 46	6 1	4 5	1 . 3 5	0.11 561	0. 00 26 9	5.29 397	0. 11 28 2	0.33 214	0. 00 62 7	188 9	1 7	186 8	1 8	184 9	3 0	2.1 6%	1 8 8 9	1
13 FR 52 - 47	1 1	2 3 0	0 . 5 0	0.05 192	0. 00 17 6	0.40 109	0. 01 24 6	0.05 603	0. 00 10 0	282	4 0	342	9	351	6	- 2.5 6%	3 5 1	6
13 FR 52 - 48	3 0	1 2 2	0 . 2 5	0.05 355	0. 00 24 6	0.43 772	0. 01 84 4	0.05 929	0. 00 13 3	352	5 6	369	1 3	371	8	- 0.5 4%	3 7 1	8
13 FR 52 - 49	1 3	2 4 2	0 . 5 7	0.04 989	0. 00 19 6	0.38 533	0. 01 39 5	0.05 602	0. 00 11 1	190	4 8	331	1 0	351	7	- 5.7 0%	3 5 1	7
13 FR 52 - 50	1 4	3 1 1	0 . 4 5	0.05 355	0. 00 15 2	0.41 736	0. 01 08 6	0.05 654	0. 00 09 1	352	3 1	354	8	355	6	- 0.2 8%	3 5 5	6
13 FR 52 - 51	3 5	1 0 4	0 . 3 4	0.05 550	0. 00 24 3	0.60 256	0. 02 42 4	0.07 875	0. 00 17 4	432	5 1	479	1 5	489	1 0	- 2.0 4%	4 8 9	1
13 FR 52	5 3	7 3	0 . 7	0.10 832	0. 00 20	5.18 906	0. 08 97	0.34 748	0. 00 55	177 1	1 4	185 1	1 5	192 3	2 7	- 7.9 0%	1 7 7	1 4

- 52			2		2		0		9								1			
13 FR 52 - 53	6 1 3	1 0 3	0 . 5 9	0.05 908	0. 00 22 3	0.75 208	0. 02 59 1	0.09 233	0. 00 18 8		570 4 1		569 1 5	569 1 1			0.0 0%	5 6 9	1 1	
13 FR 52 - 54	5 0	5 5	0 . 9 1	0.12 706	0. 00 25 0	6.53 296	0. 11 85 7	0.37 293	0. 00 64 7		205 8	1 4	205 0	1 6 3	204 3 0		0.7 3%	2 0 5 8	1 4	
13 FR 52 - 55	5 2	9 8	0 . 5 3	0.06 054	0. 00 28 8	0.70 646	0. 03 06 1	0.08 464	0. 00 20 6		623 5 3		543 1 8	524 1 2			3.6 3%	5 2 4	1 2	
13 FR 52 - 56	5 3	1 4 5	0 . 3 7	0.05 711	0. 00 28 0	0.63 658	0. 02 85 0	0.08 084	0. 00 20 0		496 5 6		500 1 8	501 1 2			- 0.2 0%	5 0 1	1 2	
13 FR 52 - 57	5 1	3 7 6	0 . 1 4	0.05 618	0. 00 12 8	0.58 414	0. 01 22 2	0.07 541	0. 00 11 0		459 2 3		467 8	469 7			- 0.4 3%	4 6 9	7	
13 FR 52 - 58	6 1	8 2	0 . 7 4	0.05 777	0. 00 24 2	0.64 958	0. 02 48 8	0.08 156	0. 00 17 7		521 4 7		508 1 5	505 1 1			0.5 9%	5 0 5	1 1	
13 FR 52 - 59	7 2	1 7 9	0 . 4 0	0.05 672	0. 00 19 3	0.61 827	0. 01 92 5	0.07 906	0. 00 14 8		481 3 7		489 1 2	491 9			- 0.4 1%	4 9 1	9	
13 FR 52 - 60	1 5 4	3 3 8	0 . 4 5	0.06 581	0. 00 12 0	1.13 152	0. 01 89 5	0.12 470	0. 00 17 0		800 1 6		768 9	758 1 0			1.3 2%	7 5 8	1 0	
13 FR 52 - 61	7 5	1 6 5	0 . 4 5	0.11 251	0. 00 34 3	4.87 586	0. 12 61 4	0.31 431	0. 00 50 9		184 0	5 7	179 8	2 2	176 2	2 5		4.4 3%	1 8 4 0	5 7
13 FR 52 - 62	6 5	9 7	0 . 6 7	0.07 585	0. 00 20 9	1.95 739	0. 04 91 3	0.18 717	0. 00 34 0		109 1	2 4	110 1	1 7	110 6	1 8		- 1.3 6%	1 0 9 1	2 4
13 FR	7 2	1 8	0 .	0.11 374	0. 00	2.63 787	0. 06	0.16 821	0. 00		186 0	5 8	131 1	1 9	100 2	1 6		85. 63		

52 - 63		9 8	3		35 5		94 6		28 3								%		
13 FR 52 - 64	3 7	6 6	0 .	0.05 769	0. 00	0.62 441	0. 03	0.07 850	0. 00	518 6	6 4	493 2	2 0	487 1	1 3	1.2 3%	4 8	1 3	
13 FR 52 - 65	7 7	2 5	0 .	0.05 875	0. 00	0.70 221	0. 01	0.08 670	0. 00	558 2	2 5	540 1	1 0	536 8	8	0.7 5%	5 3	8 6	
13 FR 52 - 66	5 4	1 7	0 .	0.05 771	0. 00	0.63 639	0. 01	0.07 998	0. 00	519 3	3 2	500 1	1 1	496 8	8	0.8 1%	4 9	8 6	
13 FR 52 - 67	1 0	3 6	0 .	0.05 819	0. 00	0.79 005	0. 01	0.09 848	0. 00	537 2	2 0	591 8	8 605	8	- 2.3 1%	6 0	8 5		
13 FR 52 - 68	1 0	4 6	2 .	0.05 772	0. 00	0.62 251	0. 04	0.07 823	0. 00	519 8	8 8	491 2	2 5	486 1	1 5	1.0 3%	4 8	1 5	
13 FR 52 - 69	8 7	4 0	0 .	0.16 615	0. 00	9.91 445	0. 11	0.43 278	0. 00	251 9	1 0	242 7	1 0	231 8	2 7	8.6 7%	2 5	1 0	
13 FR 52 - 70	7 8	2 8	0 .	0.05 613	0. 00	0.61 896	0. 01	0.07 998	0. 00	458 3	3 0	489 1	1 0	496 8	8	- 1.4 1%	4 9	8 6	
13 FR 52 - 71	1 3	1 0	1 .	0.18 298	0. 00	13.1 198	0. 14	0.52 002	0. 00	268 0	1 0	268 8	1 0	269 9	3 0	- 0.7 0%	2 6	1 0	
13 FR 52 - 72	3 5	7 2	0 .	0.10 218	0. 00	4.02 474	0. 09	0.28 566	0. 00	166 4	2 1	163 9	2 0	162 0	2 9	2.7 2%	1 6	2 1	
13 FR 52 - 73	7 7	2 7	0 .	0.06 077	0. 00	0.63 096	0. 09	0.07 530	0. 00	631 3	3 4	497 5	5 7	468 2	2 1	6.2 0%	4 6	2 1	
13	5	1	0	0.05	0.	0.64	0.	0.08	0.	425	3	506	1	524	9	-	5	9	

13 FR 52 - 85	7 5 5	7 4 6	1 . 0 1	0.05 792	0. 00 11 7	0.58 702	0. 01 08 8	0.07 350	0. 00 10 1		527	1 9	469	7	457	6	2.6 3%	4 5 7	6
13 FR 52 - 86	1 4	2 3	0 . 5 9	0.06 131	0. 00 48 2	0.77 288	0. 05 58 9	0.09 143	0. 00 33 6		650	9 3	581	3 2	564	2 0	3.0 1%	5 6 4	2 0
13 FR 52 - 87	3 1	8 9	0 . 3 5	0.05 290	0. 00 24 5	0.56 270	0. 02 39 1	0.07 715	0. 00 17 6		325	5 6	453	1 6	479	1 1	- 5.4 3%	4 7 9	1 1
13 FR 52 - 88	9 7	1 6 0	0 . 6 1	0.05 374	0. 00 19 7	0.41 593	0. 01 39 9	0.05 613	0. 00 10 7		360	4 3	353	1 0	352	7	0.2 8%	3 5 2	7
13 FR 52 - 89	2 4	4 4	0 . 5 5	0.13 044	0. 00 72 5	6.30 511	0. 31 90 3	0.35 055	0. 01 45 3		210 4	4 0	201 9	4 4	193 7	6 9	8.6 2%	2 1 0 4	4 0
13 FR 52 - 90	3 3 2	6 4 6	0 . 5 1	0.05 926	0. 00 10 5	0.63 301	0. 01 03 2	0.07 747	0. 00 10 1		577	1 6	498	6	481	6	3.5 3%	4 8 1	6
13 FR 52 - 91	1 2 7	3 0 1	0 . 4 2	0.05 217	0. 00 13 8	0.41 752	0. 01 01 5	0.05 805	0. 00 08 9		293	2 9	354	7	364	5	- 2.7 5%	3 6 4	5
13 FR 52 - 92	1 6 2	2 9 6	0 . 5 5	0.05 311	0. 00 14 8	0.41 545	0. 01 06 2	0.05 673	0. 00 09 0		333	3 1	353	8	356	5	- 0.8 4%	3 5 6	5
13 FR 52 - 93	1 5 3	3 4 3	0 . 4 5	0.05 121	0. 00 13 5	0.39 573	0. 00 96 1	0.05 604	0. 00 08 5		250	2 9	339	7	351	5	- 3.4 2%	3 5 1	5
13 FR 52 - 94	7 1	2 7 7	0 . 2 5	0.18 317	0. 00 15 0	13.0 245 8	0. 10 26 5	0.51 570	0. 00 60 0		268 2	1 0	268 1	7	268 1	2 6	0.0 4%	2 6 8 2	1 0
13 FR 52 -	1 9 1	3 5 9	0 . 5 3	0.05 175	0. 00 13 5	0.41 289	0. 00 98 8	0.05 786	0. 00 08 8		274	2 9	351	7	363	5	- 3.3 1%	3 6 3	5

95																		
13 FR 52 - 96	3 3 6	3 6 9	0 . 2	0.05 905	0. 00 40 5	0.64 556	0. 04 06 2	0.07 929	0. 00 25 4	569	8 2	506	2 5	492	1 5	2.8 5%	4 9 2	1 5
13 FR 52 - 97	5 2 1	9 1 .	0 . 5 7	0.05 897	0. 00 23 4	0.71 042	0. 02 57 1	0.08 737	0. 00 18 4	566	4 4	545	1 5	540	1 1	0.9 3%	5 4 0	1 1
13 FR 52 - 98	1 2 1	2 9 6	0 . 4 1	0.05 462	0. 00 13 8	0.41 969	0. 00 97 3	0.05 572	0. 00 08 4	397	2 7	356	7	350	5	1.7 1%	3 5 0	5
13 FR 52 - 99	4 6 1	1 5 3 1	0 . 3 1	0.05 744	0. 00 16 4	0.62 237	0. 01 63 1	0.07 857	0. 00 13 0	508	3 0	491	1 0	488	8	0.6 1%	4 8 8	8
13 FR 52 - 10 0	5 0 2 8 2	2 2 . 2 2	0 . 2 2	0.05 889	0. 00 12 5	0.81 588	0. 01 59 4	0.10 048	0. 00 14 3	563	2 0	606	9	617	8	- 1.7 8%	6 1 7	8
M O1 5- 01	6 4 7	2 1 3 0	0 . 3 0	0.05 993	0. 00 17 3	0.07 745	0. 00 15 9	0.64 010	0. 01 69 1	601	2 6	481	1 0	502	1 0	4.3 7%	4 8 1	1 0
M O1 5- 02	2 2 8	2 4 9	0 . 9 2	0.06 350	0. 00 13 7	0.09 760	0. 00 18 5	0.85 453	0. 01 67 4	725	1 9	600	1 1	627	9	4.5 0%	6 0 0	1 1
M O1 5- 03	1 2 1	1 8 4	0 . 6 6	0.13 145	0. 00 19 6	0.38 275	0. 00 71 4	6.93 720	0. 09 47 0	211	1 6	208	3 3	210	1 3	1.3 4%	2 1 1 7	1 6
M O1 5- 04	1 1 4	3 3 9	0 . 3 4	0.05 501	0. 00 23 9	0.05 384	0. 00 13 3	0.40 839	0. 01 62 1	413	4 7	338	8	348	1 2	2.9 6%	3 3 8	8
M O1 5- 05	4 1 5	8 0 5	0 . 2	0.05 973	0. 00 34 1	0.08 700	0. 00 26 3	0.71 657	0. 03 76 2	594	6 3	538	1 6	549	2 2	2.0 4%	5 3 8	1 6
M O1 5- 06	1 2 5	3 7 0	0 . 3 4	0.06 385	0. 00 14 4	0.10 185	0. 00 19 6	0.89 669	0. 01 83 2	737	1 9	625	1 1	650	1 0	4.0 0%	6 2 5	1 1
M O1	3 9	8 6	0 .	0.06 668	0. 00	0.06 594	0. 00	0.60 627	0. 02	828	4 6	412	1 1	481	1 6	16. 75		

5-07			45		311		176		570							%		
M015-08	82	79	10	0.10834	0.00299	0.31411	0.00759	4.69211	0.00961	1772	21	1761	37	1766	21	0.62%	17	21
M015-09	72	17	08	0.05462	0.00245	0.05601	0.00140	0.42181	0.00744	3975	00	3519	93	3572	12	1.71%	35	91
M015-10	22	36	06	0.06318	0.00126	0.10154	0.00189	0.88457	0.00598	7141	18	6231	11	6439	9	3.21%	62	13
M015-11	79	12	06	0.05901	0.00249	0.08820	0.00219	0.71760	0.00790	5674	44	5451	13	5496	16	0.73%	54	13
M015-12	22	46	05	0.05384	0.00149	0.05698	0.00114	0.42301	0.00068	3642	66	3577	73	3588	8	0.28%	35	77
M015-13	23	30	07	0.05876	0.00146	0.08757	0.00171	0.70950	0.00603	5582	22	5411	10	5440	10	0.55%	54	10
M015-14	18	23	07	0.06429	0.00155	0.10967	0.00216	0.97221	0.00133	7512	11	6711	13	6901	11	2.83%	67	13
M015-15	44	36	01	0.05731	0.00154	0.07753	0.00155	0.61262	0.00498	5032	44	4819	94	4859	9	0.83%	48	91
M015-16	11	15	07	0.09553	0.00183	0.26266	0.00514	3.45945	0.00046	1539	16	1503	26	1518	14	2.40%	15	16
M015-17	10	10	04	0.05825	0.00155	0.08733	0.00174	0.70134	0.00703	5392	44	5401	10	5400	10	0.00%	54	10
M015-18	89	21	04	0.05561	0.00235	0.05502	0.00134	0.42185	0.00634	4374	45	3458	83	3572	12	3.48%	34	85
M015-19	24	26	10	0.07174	0.00152	0.13575	0.00260	1.34273	0.00569	9791	88	8211	15	8641	11	5.24%	82	15
M015-20	84	19	04	0.06264	0.00284	0.08614	0.00225	0.74398	0.00097	6964	47	5331	13	5651	88	6.00%	53	13

M O1 5- 21	3 4 8	3 8 4	0 . 9 0	0.06 131	0. 00 12 1	0.09 229	0. 00 17 0	0.78 005	0. 01 39 8	650	1 8	569	1 0	586	8	2.9 9%	5 6 9	1 0
M O1 5- 22	3 0 4	5 0 4	0 . 0 6	0.18 408	0. 00 23 5	0.51 470	0. 00 93 5	13.0 622 8	0. 15 34 8	269 0	1 5	267 7	4 0	268 4	1 1	0.4 9%	2 6 9 0	1 5
M O1 5- 23	1 2 9	2 8 3	0 . 4 6	0.05 395	0. 00 19 4	0.05 300	0. 00 11 7	0.39 421	0. 01 30 5	369	3 8	333	7	337	1 0	1.2 0%	3 3 3	7
M O1 5- 24	1 1 9	3 6 0	0 . 3 3	0.06 138	0. 00 14 4	0.10 423	0. 00 20 2	0.88 205	0. 01 87 8	653	2 0	639	1 2	642	1 0	0.4 7%	6 3 9	1 2
M O1 5- 25	1 2 2	2 5 3	0 . 4 8	0.06 045	0. 00 16 3	0.09 657	0. 00 19 6	0.80 480	0. 01 98 4	620	2 4	594	1 2	600	1 1	1.0 1%	5 9 4	1 2
M O1 5- 26	1 6 3	2 5 1	0 . 6 5	0.05 389	0. 00 20 0	0.05 467	0. 00 12 3	0.40 615	0. 01 38 1	366	3 9	343	8	346	1 0	0.8 7%	3 4 3	8
M O1 5- 27	5 6	8 5	0 . 6 5	0.10 961	0. 00 40 8	0.31 582	0. 00 93 5	4.77 225	0. 16 46 9	179 3	2 8	176 9	4 6	178 0	2 9	1.3 6%	1 7 9 3	2 8
M O1 5- 28	1 7 3	3 4 1	0 . 5 1	0.05 537	0. 00 19 3	0.05 264	0. 00 11 6	0.40 186	0. 01 28 4	427	3 5	331	7	343	9	3.6 3%	3 3 1	7
M O1 5- 29	2 2 0	4 6 2	0 . 4 8	0.05 600	0. 00 39 3	0.05 080	0. 00 17 7	0.39 223	0. 02 51 5	452	8 2	319	1 1	336	1 8	5.3 3%	3 1 9	1 1
M O1 5- 30	1 1 8	9 7 2	1 . 2 2	0.11 749	0. 00 22 2	0.25 953	0. 00 51 4	4.20 363	0. 07 13 6	183 7	5 8	147 8	2 7	163 2	2 0	24. 29 %		
M O1 5- 31	8 4	2 2 2	0 . 3 8	0.05 970	0. 00 16 5	0.07 905	0. 00 16 1	0.65 064	0. 01 63 4	593	2 5	490	1 0	509	1 0	3.8 8%	4 9 0	1 0
M O1 5- 32	1 7 0	4 5 6	0 . 3 7	0.05 202	0. 00 13 4	0.05 452	0. 00 10 5	0.39 095	0. 00 91 9	286	2 4	342	6	335	7	- 2.0 5%	3 4 2	6
M O1 5- 33	5 4	1 9 4	0 . 2 8	0.05 759	0. 00 20 2	0.08 624	0. 00 19 4	0.68 467	0. 02 19 9	514	3 5	533	1 2	530	1 3	- 0.5 6%	5 3 3	1 2
M O1	1 0	2 3	0 . .	0.05 673	0. 00	0.05 423	0. 00	0.42 407	0. 01	481	3 3	340	7	359	9	5.5 9%	3 4	7

M O1 5- 48	1 3 8	2 6 7	0 . 5 2	0.05 720	0. 00 21 4	0.07 486	0. 00 17 2	0.59 030	0. 02 02 9		499	3 8	465	1 0	471	1 3	1.2 9%	4 6 5	1 0
M O1 5- 49	4 1 4	1 0 4	0 . 3 9	0.06 861	0. 00 29 1	0.07 342	0. 00 18 9	0.69 446	0. 02 66 2		887	4 0	457	1 1	535	1 6	17. 07 %		
M O1 5- 50	1 4 0	1 9 0	0 . 7 4	0.05 426	0. 00 23 1	0.06 067	0. 00 14 5	0.45 383	0. 01 78 6		382	4 8	380	9	380	1 2	0.0 0%	3 8 0	9
M O1 5- 51	5 7 5	7 0 8	0 . 8 1	0.05 964	0. 00 38 9	0.09 243	0. 00 31 4	0.75 991	0. 04 54 8		591	7 3	570	1 9	574	2 6	0.7 0%	5 7 0	1 9
M O1 5- 52	3 3 5	6 5 5	0 . 5 1	0.13 010	0. 00 27 4	0.37 915	0. 00 82 2	6.79 973	0. 13 23 6		209	1 7	207	3 8	208	1 7	1.3 0%	2 0 9 9	1 7
M O1 5- 53	7 7 5	1 7 5	0 . 4 4	0.06 013	0. 00 21 9	0.07 655	0. 00 17 5	0.63 453	0. 02 11 9		608	3 6	475	1 0	499	1 3	5.0 5%	4 7 5	1 0
M O1 5- 54	1 7 5	2 3 5	0 . 7 5	0.05 953	0. 00 19 9	0.09 346	0. 00 20 8	0.76 695	0. 02 34 0		587	3 2	576	1 2	578	1 3	0.3 5%	5 7 6	1 2
M O1 5- 55	5 4 0	1 4 3	0 . 3 9	0.05 964	0. 00 24 2	0.09 595	0. 00 23 6	0.78 875	0. 02 94 0		591	4 1	591	1 4	590	1 7	- 0.1 7%	5 9 1	1 4
M O1 5- 56	4 7 0	1 5 3	0 . 3 2	0.05 740	0. 00 25 9	0.07 816	0. 00 20 1	0.61 844	0. 02 56 0		507	4 8	485	1 2	489	1 6	0.8 2%	4 8 5	1 2
M O1 5- 57	5 0 6	1 7 6	0 . 2 8	0.06 743	0. 00 22 7	0.11 514	0. 00 26 5	1.07 025	0. 03 27 5		851	3 0	703	1 5	739	1 6	5.1 2%	7 0 3	1 5
M O1 5- 58	7 1 9	1 4 4	0 . 7 3	0.05 773	0. 00 35 3	0.05 601	0. 00 17 2	0.44 568	0. 02 50 8		520	7 1	351	1 0	374	1 8	6.5 5%	3 5 1	1 0
M O1 5- 59	5 5 1	1 4 3	0 . 3 9	0.05 760	0. 00 24 2	0.07 402	0. 00 17 7	0.58 771	0. 02 28 7		515	4 6	460	1 1	469	1 5	1.9 6%	4 6 0	1 1
M O1 5- 60	1 3 5	2 9 4	0 . 4 6	0.05 545	0. 00 19 6	0.05 289	0. 00 11 4	0.40 425	0. 01 32 3		430	3 7	332	7	345	1 0	3.9 2%	3 3 2	7
M O1	1 6	1 8	0 . .	0.06 105	0. 00	0.10 641	0. 00	0.89 551	0. 03		641	3 6	652	1 5	649	1 6	- 0.4	6 5	1 5

M O1 5- 75	8 5 7	2 2 7	0 . 3 7	0.05 621	0. 00 17 6	0.07 392	0. 00 15 3	0.57 269	0. 01 64 9		461 3 1	460 9 1	460 1 1	1 1 1	0.0 0%	4 6 0	9
M O1 5- 76	8 6 6	3 2 6	0 . 2 6	0.05 936	0. 00 15 2	0.09 433	0. 00 18 6	0.77 181	0. 01 80 6		580 2 3	581 1 1	581 1 0	1 0 0	0.0 0%	5 8 1	1
M O1 5- 77	2 0 6	6 5 5	0 . 3 2	0.05 686	0. 00 11 2	0.07 880	0. 00 14 4	0.61 759	0. 01 10 6		486 1 8	489 9 1	488 7 7	7 7 7	- 0.2 0%	4 8 9	9
M O1 5- 78	6 9 2	3 5 2	0 . 2 0	0.05 831	0. 00 14 9	0.07 957	0. 00 15 7	0.63 949	0. 01 49 1		541 2 3	494 9 1	502 9 9	9 9 9	1.6 2%	4 9 4	9
M O1 5- 79	1 1 1	2 9 2	0 . 3 8	0.05 552	0. 00 15 8	0.07 181	0. 00 14 6	0.54 954	0. 01 43 0		433 2 7	447 9 1	445 9 9	9 9 9	- 0.4 5%	4 4 7	9
M O1 5- 80	4 7 1	1 0 4	0 . 4 7	0.07 097	0. 00 21 1	0.14 757	0. 00 32 3	1.44 360	0. 03 91 2		957 2 5	887 1 8	907 1 6	1 6 6	2.2 5%	8 8 7	1 8
M O1 5- 81	1 0 0	2 9 8	0 . 3 3	0.05 475	0. 00 17 9	0.05 430	0. 00 11 5	0.40 975	0. 01 23 0		402 3 3	341 7 1	349 9 9	9 9 9	2.3 5%	3 4 1	7
M O1 5- 82	4 8 9	1 0 4	0 . 4 4	0.21 746	0. 00 32 5	0.55 919	0. 01 10 7	16.7 610	0. 23 66 3		296 2 5	286 3 6	292 1 4	1 4 4	3.4 6%	2 9 6	1 5
M O1 5- 83	4 6 5	8 3 5	0 . 6 6	0.07 745	0. 00 22 7	0.19 582	0. 00 43 5	2.09 040	0. 05 61 3		113 3 4	115 3 3	114 6 8	1 8 8	- 1.7 3%	1 1 3	2 4
M O1 5- 84	3 4 4	4 4 7	0 . 6 6	0.06 173	0. 00 43 2	0.08 907	0. 00 29 8	0.75 793	0. 04 93 2		665 8 3	550 1 8	573 2 8	2 8 8	4.1 8%	5 5 0	1 8
M O1 5- 85	3 7 9	2 1 1	0 . 7 7	0.05 997	0. 00 16 0	0.10 374	0. 00 20 8	0.85 747	0. 02 09 3		602 2 4	636 1 2	629 1 1	1 1 1	- 1.1 0%	6 3 6	1 2
M O1 5- 86	6 0 7	3 1 9	0 . 9 9	0.05 809	0. 00 14 8	0.07 990	0. 00 15 7	0.63 972	0. 01 48 0		533 2 3	496 9 1	502 9 9	9 9 9	1.2 1%	4 9 6	9
M O1 5- 87	1 7 7	1 8 0	0 . 9 9	0.06 085	0. 00 19 3	0.09 130	0. 00 19 6	0.76 578	0. 02 22 7		634 3 0	563 1 2	577 1 3	1 3 3	2.4 9%	5 6 3	1 2
M O1 5- 88	5 8 3	8 3 .	0 . .	0.05 523	0. 00 .	0.05 309	0. 00 .	0.40 417	0. 00 .		422 1 9	333 6 6	345 6 6	6 6 6	3.6 0%	3 3 3	6

M O1 6- 15	1 9 8	4 7 7	0 . 4	0.05 428	0. 00 15 3	0.05 790	0. 00 12 1	0.43 339	0. 01 12 7		383	2 7	363	7	366	8	0.8 3%	3 6 3	7
M O1 6- 16	5 1 8	3 3 8	0 . 1	0.05 985	0. 00 14 5	0.08 701	0. 00 17 7	0.71 816	0. 01 60 2		598	2 2	538	1 0	550	9	2.2 3%	5 3 8	1 0
M O1 6- 17	1 0 4	2 7 8	0 . 3	0.06 073	0. 00 14 7	0.10 131	0. 00 20 5	0.84 841	0. 01 90 1		630	2 2	622	1 2	624	1 0	0.3 2%	6 2 2	1 2
M O1 6- 18	1 3 8	1 0 5	1 . 3	0.06 843	0. 00 36 8	0.10 915	0. 00 33 8	1.02 998	0. 05 07 4		882	5 4	668	2 0	719	2 5	7.6 3%	6 6 8	2 0
M O1 6- 19	9 5 2	2 5 3	0 . 8	0.08 230	0. 00 18 6	0.20 533	0. 00 43 2	2.33 038	0. 04 83 6		125 3	1 9	120 4	2 3	122 2	1 5	4.0 7%	1 2 5 3	1 9
M O1 6- 20	7 4 2	2 5 2	0 . 9	0.06 107	0. 00 19 6	0.07 425	0. 00 16 6	0.62 529	0. 01 84 0		642	3 0	462	1 0	493	1 1	6.7 1%	4 6 2	1 0
M O1 6- 21	1 7 1	2 4 4	0 . 7	0.06 012	0. 00 22 0	0.07 530	0. 00 17 7	0.62 421	0. 02 10 4		608	3 6	468	1 1	492	1 3	5.1 3%	4 6 8	1 1
M O1 6- 22	1 1 6	3 7 4	0 . 3	0.05 898	0. 00 16 2	0.07 748	0. 00 16 1	0.63 009	0. 01 59 9		566	2 5	481	1 0	496	1 0	3.1 2%	4 8 1	1 0
M O1 6- 23	3 8 4	1 2 3	0 . 1	0.05 660	0. 00 26 8	0.08 109	0. 00 21 1	0.63 282	0. 02 79 3		476	5 3	503	1 3	498	1 7	- 0.9 9%	5 0 3	1 3
M O1 6- 24	1 4 9	2 2 8	0 . 6	0.11 913	0. 00 19 0	0.33 163	0. 00 65 0	5.44 770	0. 08 03 2		194 3	1 7	184 6	3 1	189 2	1 3	5.2 5%	1 9 4 3	1 7
M O1 6- 25	1 5 6	4 1 3	0 . 7	0.05 904	0. 00 50 1	0.08 152	0. 00 28 9	0.66 368	0. 05 32 7		569	1 1 3	505	1 7	517	3 3	2.3 8%	5 0 5	1 7
M O1 6- 26	4 6 6	6 8 6	0 . 8	0.06 485	0. 00 40 2	0.09 115	0. 00 28 4	0.81 511	0. 04 69 9		769	7 0	562	1 7	605	2 6	7.6 5%	5 6 2	1 7
M O1 6- 27	6 8 5	1 6 5	0 . 4	0.05 977	0. 00 25 1	0.07 871	0. 00 19 7	0.64 865	0. 02 51 5		595	4 3	488	1 2	508	1 5	4.1 0%	4 8 8	1 2
M O1	1 3	2 5	0 . .	0.06 949	0. 00	0.15 214	0. 00	1.45 787	0. 03		913	2 2	913	1 8	913	1 4	0.0 0%	9 1	1 8

M O1 6- 42	1 1 4	7 5 4	1 . 5 1	0.06 745	0. 00 46 7	0.06 186	0. 00 21 1	0.57 530	0. 03 66 8		852 7 7	7 387 1 3	461 2 4	19. 12 %			
M O1 6- 43	1 2 3	2 4 0	0 . 5 1	0.05 518	0. 00 22 5	0.05 516	0. 00 13 1	0.41 969	0. 01 58 7		420 4 4	4 346 8 3	356 1 1	2.8 9%	3 4 6	8	
M O1 6- 44	3 4 2	2 9 1	0 . 2 2	0.15 098	0. 00 22 4	0.23 855	0. 00 45 8	4.96 558	0. 06 60 2		232 6 0	4 137 4 3	179 5 1	69. 29 %			
M O1 6- 45	5 5 6	2 2 6	0 . 2 4	0.05 834	0. 00 18 7	0.07 382	0. 00 16 3	0.59 378	0. 01 75 4		543 3 1	3 459 1 0	473 1 1	3.0 5%	4 5 9	1 0	
M O1 6- 46	1 7 4	2 9 3	0 . 5 9	0.06 077	0. 00 20 6	0.09 244	0. 00 21 4	0.77 447	0. 02 40 5		631 3 2	3 570 1 3	582 1 4	2.1 1%	5 7 0	1 3	
M O1 6- 47	2 0 4	2 5 6	0 . 8 0	0.05 971	0. 00 15 5	0.09 810	0. 00 20 3	0.80 762	0. 01 92 8		593 2 3	2 603 1 2	601 1 1	- 0.3 3%	6 0 3	1 2	
M O1 6- 48	1 1 1	1 2 9	0 . 8 6	0.10 533	0. 00 18 6	0.27 986	0. 00 55 7	4.06 427	0. 06 59 5		172 0 7	1 159 1 8	164 7 3	8.1 1%	1 7 2 0	1 7	
M O1 6- 49	0 1 0	1 4 0	0 . 3	0.06 578	0. 01 14 7	0.05 356	0. 00 31 5	0.48 575	0. 08 08 7		799 2 5 6	2 336 1 9	402 5 5	19. 64 %			
M O1 6- 50	6 9 7	9 0 7	0 . 7	0.12 530	0. 00 33 0	0.30 359	0. 00 73 9	5.24 459	0. 12 63 1		203 3 0	2 170 9 7	186 0 1	18. 96 %			
M O1 6- 51	7 0 6	7 6 9	0 . 3	0.13 393	0. 00 29 8	0.37 241	0. 00 85 2	6.87 654	0. 14 20 5		215 0 8	1 204 1 0	209 6 8	5.3 4%	2 1 5 0	1 8	
M O1 6- 52	1 4 0	2 6 2	0 . 5 3	0.05 393	0. 00 18 8	0.05 414	0. 00 12 1	0.40 249	0. 01 30 0		368 3 6	3 340 7	343 9	0.8 8%	3 4 0	7	
M O1 6- 53	1 4 1	2 4 0	0 . 0	0.06 237	0. 00 17 4	0.11 147	0. 00 23 9	0.95 846	0. 02 44 9		687 2 5	2 681 1 4	682 1 3	0.1 5%	6 8 1	1 4	
M O1 6- 54	4 4 6	1 4 6	0 . 3 0	0.14 032	0. 00 24 9	0.24 782	0. 00 50 2	4.79 411	0. 07 63 1		222 2 6	4 142 6 5	177 9 4	55. 82 %			
M O1	1 0	2 0	0 . .	0.06 238	0. 00	0.09 992	0. 00	0.85 929	0. 02		687 3 0	3 614 1 3	630 1 4	2.6 1%	6 1	1 3	

M O1 6- 69	5 7	9 1	0 .	0.06 001	0. 00	0.10 071	0. 00	0.83 316	0. 04		604	6 0	619	1 7	615	2 3	- 0.6 5%	6 1 9	1 7
M O1 6- 70	2 1	3 1	0 .	0.06 078	0. 00	0.10 070	0. 00	0.84 380	0. 01		631	2 0	619	1 2	621	9	0.3 2%	6 1 9	1 2
M O1 6- 71	1 4 3	3 3 6	0 .	0.06 770	0. 00	0.14 030	0. 00	1.30 939	0. 03		859	2 4	846	1 7	850	1 5	0.4 7%	8 4 6	1 7
M O1 6- 72	1 9 9	3 3 5	0 .	0.11 556	0. 00	0.31 445	0. 00	5.00 915	0. 10		188 9	1 8	176	3 4	182	1 7	7.1 5%	1 8 8 9	1 8
M O1 6- 73	7 0	7 3	0 .	0.13 037	0. 00	0.36 174	0. 00	6.50 117	0. 18		210 3	2 2	199	4 7	204	2 5	5.6 8%	2 1 0 3	2 2
M O1 6- 74	5 9 6	9 6 6	0 .	0.19 092	0. 00	0.51 041	0. 01	13.4 334	0. 19		275 0	1 6	265	4 4	271	1 4	3.4 6%	2 7 5 0	1 6
M O1 6- 75	8 0	1 5 0	0 .	0.05 825	0. 00	0.09 242	0. 00	0.74 213	0. 03		539	5 1	570	1 4	564	1 8	- 1.0 5%	5 7 0	1 4
M O1 6- 76	5 3	9 5	0 .	0.06 960	0. 00	0.13 616	0. 00	1.30 640	0. 04		917	3 5	823	2 0	849	2 0	3.1 6%	8 2 3	2 0
M O1 6- 77	3 8	1 2 3	0 .	0.06 475	0. 00	0.10 202	0. 00	0.91 066	0. 03		766	3 8	626	1 5	657	1 8	4.9 5%	6 2 6	1 5
M O1 6- 78	1 0 7	2 0 0	0 .	0.12 710	0. 00	0.25 438	0. 00	4.45 685	0. 06		200 7	4 7	145	2 5	169	1 4	38. 03 %		
M O1 6- 79	1 1 4	3 1 0	0 .	0.05 450	0. 00	0.05 695	0. 00	0.42 786	0. 01		392	3 1	357	7	362	9	1.4 0%	3 5 7	7
M O1 6- 80	4 1 6	5 4 3	0 .	0.05 497	0. 00	0.05 563	0. 00	0.42 151	0. 00		411	2 3	349	7	357	7	2.2 9%	3 4 9	7
M O1 6- 81	2 7	2 7 6	0 .	0.12 366	0. 00	0.30 926	0. 00	5.27 170	0. 07		199 5	4 3	173	2 9	185	1 2	14. 99 %		
M O1	1 7	1 3	1 .	0.06 321	0. 00	0.09 286	0. 00	0.80 905	0. 02		715	3 6	572	1 3	602	1 6	5.2 4%	5 7	1 3

M O1 6- 96	4 3 9	1 4 9	0 . 2 9	0.05 719	0. 00 27 5	0.08 155	0. 00 21 6	0.64 289	0. 02 86 2	499	5 3	505	1 3	504	1 8	- 0.2 0%	5 0 5	1 3
M O1 6- 97	4 6 6	1 3 6	0 . 3 4	0.05 715	0. 00 33 0	0.07 306	0. 00 22 5	0.57 550	0. 03 04 4	497	6 4	455	1 4	462	2 0	1.5 4%	4 5 5	1 4
M O1 6- 98	4 9 8	2 4 8	0 . 2 0	0.12 369	0. 00 18 2	0.33 533	0. 00 63 4	5.71 698	0. 07 72 8	201 0	1 6	186 4	3 1	193 4	1 2	7.8 3%	2 0 1 0	1 6
M O1 6- 99	6 8 6	4 8 6	0 . 1 4	0.13 425	0. 00 16 9	0.36 671	0. 00 66 7	6.78 568	0. 07 82 8	215 4	1 7	201 4	3 1	208 4	1 0	6.9 5%	2 1 5 4	1 7
M O1 6- 10 0	1 5 5	1 7 4	0 . 8 9	0.06 698	0. 00 22 5	0.09 276	0. 00 21 5	0.85 635	0. 02 61 2	686	1 0 7	569	1 3	593	1 9	4.2 2%	5 6 9	1 3
M O1 7- 01	3 6 6	2 1 1 6	0 . 1 6	0.05 786	0. 00 09 8	0.07 333	0. 00 13 6	0.58 501	0. 00 91 7	524	1 8	456	8	468	6	2.6 3%	4 5 6	8
M O1 7- 02	9 1 2	3 9 2	0 . 2 3	0.18 762	0. 00 18 4	0.51 990	0. 00 92 2	13.4 482 7	0. 12 26 0	272 1	1 7	269 9	3 9	271 2	9	0.8 2%	2 7 2 1	1 7
M O1 7- 03	3 8 8	2 8 8	0 . 1 3	0.06 038	0. 00 09 0	0.07 882	0. 00 14 4	0.65 609	0. 00 89 6	617	1 9	489	9	512	5	4.7 0%	4 8 9	9
M O1 7- 04	5 5 7	5 2 0 6	1 . 0 6	0.06 203	0. 00 18 6	0.10 315	0. 00 22 3	0.88 219	0. 02 45 0	675	2 7	633	1 3	642	1 3	1.4 2%	6 3 3	1 3
M O1 7- 05	8 8 4	3 2 4	0 . 2 7	0.06 038	0. 00 12 0	0.09 313	0. 00 18 0	0.77 525	0. 01 42 1	617	1 9	574	1 1	583	8	1.5 7%	5 7 4	1 1
M O1 7- 06	1 3 7	2 5 5 2	0 . 5 2	0.07 247	0. 00 26 5	0.12 488	0. 00 28 7	1.24 773	0. 04 27 7	999	3 5	759	1 6	822	1 9	8.3 0%	7 5 9	1 6
M O1 7- 07	3 9 7	3 5 8 9	1 . 0 9	0.06 273	0. 00 08 4	0.10 360	0. 00 18 8	0.89 600	0. 01 09 9	699	1 9	635	1 1	650	6	2.3 6%	6 3 5	1 1
M O1 7- 08	6 8 1	3 4 1	0 . 2 0	0.14 083	0. 00 14 9	0.38 652	0. 00 69 3	7.50 483	0. 07 36 8	221 8	3 8	210 3	3 2	216 2	1 1	5.4 7%	2 2 1 8	3 8

M O1 7- 09	1 1 4	1 5 5	0 . 7 3	0.05 834	0. 00 18 1	0.09 586	0. 00 21 1	0.77 102	0. 02 21 0	543	2 9	590	1 2	580	1 3	- 1.6 9%	5 9 0	1 2
M O1 7- 10	1 6	5 0	0 . 3 2	0.05 387	0. 00 17 7	0.10 013	0. 00 20 9	0.74 361	0. 02 31 4	366	3 5	615	1 2	565	1 3	- 8.1 3%	6 1 5	1 2
M O1 7- 11	7 0	8 0	0 . 8 7	0.10 763	0. 00 13 9	0.29 890	0. 00 55 3	4.43 517	0. 05 29 1	176 0	1 7	168 6	2 7	171 9	1 0	4.3 9%	1 7 6 0	1 7
M O1 7- 12	4 3	1 5 1	0 . 2 8	0.05 861	0. 00 11 4	0.08 104	0. 00 15 4	0.65 492	0. 01 17 8	553	1 9	502	9	512	7	1.9 9%	5 0 2	9
M O1 7- 13	2 5	3 9	0 . 6 5	0.05 694	0. 00 22 7	0.07 707	0. 00 17 6	0.60 496	0. 02 27 5	489	4 5	479	1 1	480	1 4	0.2 1%	4 7 9	1 1
M O1 7- 14	2 0 5	1 9 0	1 . 0 8	0.06 213	0. 00 09 7	0.08 753	0. 00 16 2	0.74 974	0. 01 07 0	679	1 8	541	1 0	568	6	4.9 9%	5 4 1	1 0
M O1 7- 15	1 0 8	3 0 1	0 . 3 6	0.05 371	0. 00 08 8	0.05 713	0. 00 10 5	0.42 306	0. 00 63 6	359	1 9	358	6	358	5	0.0 0%	3 5 8	6
M O1 7- 16	3 4 9	4 1 7	0 . 8 4	0.06 245	0. 00 07 7	0.10 072	0. 00 18 1	0.86 729	0. 00 98 0	690	2 0	619	1 1	634	5	2.4 2%	6 1 9	1 1
M O1 7- 17	1 6 5	1 8 2	0 . 9 1	0.11 572	0. 00 12 6	0.32 403	0. 00 58 2	5.16 981	0. 05 21 4	189 1	1 8	180 9	2 8	184 8	9	4.5 3%	1 8 9 1	1 8
M O1 7- 18	2 3	3 4	0 . 6 8	0.06 141	0. 00 23 6	0.10 792	0. 00 24 6	0.91 365	0. 03 30 2	654	4 1	661	1 4	659	1 8	- 0.3 0%	6 6 1	1 4
M O1 7- 19	4 8	5 4	0 . 8 9	0.06 212	0. 00 16 2	0.10 691	0. 00 22 0	0.91 559	0. 02 21 6	678	2 3	655	1 3	660	1 2	0.7 6%	6 5 5	1 3
M O1 7- 20	4 3	2 4 2	0 . 1 8	0.12 334	0. 00 13 6	0.33 769	0. 00 60 8	5.74 215	0. 05 85 7	197 8	4 0	187 1	2 9	192 2	1 1	5.7 2%	1 9 7 8	4 0
M O1 7- 21	1 6 3	2 8 7	0 . 5 7	0.06 515	0. 00 09 2	0.10 046	0. 00 18 3	0.90 233	0. 01 17 3	779	1 9	617	1 1	653	6	5.8 3%	6 1 7	1 1
M O1	1 8	1 6	1 . .	0.05 609	0. 00	0.07 511	0. 00	0.58 085	0. 01	456	1 9	467	9	465	7	- 0.4	4 6	9

M O1 7- 36	5 2 6	1 9 6	0 . 2 7	0.05 670	0. 00 15 0	0.07 568	0. 00 15 5	0.59 161	0. 01 44 5	480	2 4	470	9	472	9	0.4 3%	4 7 0	9
M O1 7- 37	1 3 2	3 3 5	0 . 3 9	0.05 736	0. 00 09 3	0.05 655	0. 00 10 4	0.44 719	0. 00 66 6	505	1 8	355	6	375	5	5.6 3%	3 5 5	6
M O1 7- 38	1 0 2	2 5 6	0 . 4 0	0.05 816	0. 00 09 1	0.08 242	0. 00 15 1	0.66 093	0. 00 95 2	536	1 8	511	9	515	6	0.7 8%	5 1 1	9
M O1 7- 39	1 7 8	3 8 6	0 . 4 6	0.05 338	0. 00 09 0	0.05 623	0. 00 10 4	0.41 376	0. 00 64 7	345	1 9	353	6	352	5	- 0.2 8%	3 5 3	6
M O1 7- 40	5 0 6	2 1 6	0 . 2 3	0.05 547	0. 00 09 4	0.08 274	0. 00 15 3	0.63 274	0. 00 99 2	431	1 9	512	9	498	6	- 2.7 3%	5 1 2	9
M O1 7- 41	3 5 6	2 7 6	0 . 1 3	0.06 419	0. 00 12 7	0.09 185	0. 00 17 8	0.81 281	0. 01 46 8	748	1 8	566	1 1	604	8	6.7 1%	5 6 6	1
M O1 7- 42	2 2 0	4 2 0	0 . 5 2	0.05 749	0. 00 10 1	0.05 677	0. 00 10 6	0.44 999	0. 00 72 3	510	1 8	356	6	377	5	5.9 0%	3 5 6	6
M O1 7- 43	7 8 6	2 0 3	0 . 3 8	0.05 825	0. 00 11 1	0.07 236	0. 00 13 7	0.58 107	0. 01 01 8	539	1 9	450	8	465	7	3.3 3%	4 5 0	8
M O1 7- 44	2 0 6	3 7 6	0 . 5 3	0.12 361	0. 00 12 6	0.36 984	0. 00 65 5	6.30 244	0. 05 90 4	200 9	1 8	202 9	3 1	201 9	8	- 0.9 9%	2 0 9	1 8
M O1 7- 45	6 2 1	3 8 1	0 . 1 6	0.05 987	0. 00 09 2	0.07 782	0. 00 14 3	0.64 231	0. 00 90 9	533	6 2	482	8	491	8	1.8 7%	4 8 2	8
M O1 7- 46	1 0 3	2 0 0	0 . 5 2	0.05 954	0. 00 10 6	0.09 215	0. 00 17 3	0.75 636	0. 01 23 7	587	1 8	568	1 0	572	7	0.7 0%	5 6 8	1 0
M O1 7- 47	7 5 5	1 8 4	0 . 4 1	0.05 625	0. 00 12 0	0.05 625	0. 00 10 9	0.43 619	0. 00 85 3	462	2 0	353	7	368	6	4.2 5%	3 5 3	7
M O1 7- 48	1 6 0	3 0 7	0 . 5 2	0.05 533	0. 00 09 6	0.05 592	0. 00 10 4	0.42 659	0. 00 67 6	426	1 9	351	6	361	5	2.8 5%	3 5 1	6
M O1	1 6	7 2	0 . .	0.05 857	0. 00	0.07 123	0. 00	0.57 513	0. 00	551	2 0	444	8	461	4	3.8 3%	4 4	8

M O1 7- 63	5 7	1 4 2	0 . 4 0	0.05 303	0. 00 18 3	0.05 227	0. 00 11 1	0.38 215	0. 01 23 8		330	3 8	328	7	329	9	0.3 0%	3 2 8	7
M O1 7- 64	4 0	6 6 1	0 . 0 6	0.05 942	0. 00 10 1	0.05 499	0. 00 10 2	0.45 049	0. 00 69 8		583	1 8	345	6	378	5	9.5 7%	3 4 5	6
M O1 7- 65	7 4	2 6 1	0 . 2 8	0.06 008	0. 00 09 4	0.07 574	0. 00 13 9	0.62 734	0. 00 90 2		606	1 8	471	8	494	6	4.8 8%	4 7 1	8
M O1 7- 66	6 2	4 6 6	0 . 1 3	0.07 621	0. 00 09 2	0.11 261	0. 00 20 1	1.18 309	0. 01 29 9		843	5 3	680	1 2	719	9	5.7 4%	6 8 0	1 2
M O1 7- 67	4 9	1 2 7	0 . 3 9	0.05 334	0. 00 15 1	0.05 579	0. 00 11 3	0.41 024	0. 01 08 0		343	2 8	350	7	349	8	- 0.2 9%	3 5 0	7
M O1 7- 68	5 4	1 3 7	0 . 3 9	0.05 866	0. 00 13 2	0.07 631	0. 00 14 8	0.61 708	0. 01 29 4		555	2 0	474	9	488	8	2.9 5%	4 7 4	9
M O1 7- 69	9 0	2 8 3	0 . 3 2	0.05 829	0. 00 47 7	0.06 531	0. 00 18 7	0.52 477	0. 04 14 8		541	1 2 3	408	1 1	428	2 8	4.9 0%	4 0 8	1 1
M O1 7- 70	1 7	2 2 7	0 . 7 9	0.06 276	0. 00 41 0	0.10 231	0. 00 28 8	0.88 515	0. 05 52 5		700	8 5	628	1 7	644	3 0	2.5 5%	6 2 8	1 7
M O1 7- 71	1 8	1 2 5	1 . 4 4	0.06 167	0. 00 15 1	0.09 248	0. 00 18 6	0.78 616	0. 01 77 2		663	2 2	570	1 1	589	1 0	3.3 3%	5 7 0	1 1
M O1 7- 72	6 4	9 1 7	0 . 7 0	0.05 964	0. 00 14 4	0.09 697	0. 00 19 2	0.79 726	0. 01 78 9		591	2 2	597	1 1	595	1 0	- 0.3 4%	5 9 7	1 1
M O1 7- 73	1 0	1 4 6	0 . 7 5	0.06 208	0. 00 10 3	0.10 220	0. 00 19 0	0.87 458	0. 01 33 8		677	1 8	627	1 1	638	7	1.7 5%	6 2 7	1 1
M O1 7- 74	1 8	3 5 5	0 . 5 1	0.05 610	0. 00 34 0	0.07 344	0. 00 21 4	0.56 793	0. 03 23 2		456	7 5	457	1 3	457	2 1	0.0 0%	4 5 7	1 3
M O1 7- 75	4 3	4 5 9	0 . 9 6	0.13 067	0. 00 18 8	0.37 661	0. 00 72 2	6.78 416	0. 09 02 7		210 7	1 7	206 0	3 4	208 4	1 2	2.2 8%	2 1 0 7	1 7
M O1	4 9	1 1 .	0 . .	0.18 588	0. 00	0.50 302	0. 00	12.8 903	0. 12		270 6	1 7	262 7	3 9	267 2	9	3.0 1%	2 7 7	1 7

M O1 7- 90	1 0 0	2 1 3	0 . 4	0.18 429	0. 00	0.50 057	0. 00	12.7 174	0. 12		269 2	1 7	261 6	3 8	265 9	9	2.9 1%	2 6	1 7
M O1 7- 91	4 3	1 4	0 . 2	0.05 826	0. 00	0.07 970	0. 00	0.64 019	0. 01		540 0	2 0	494 9	9 502	8	1.6 2%	4 9	4 4	
M O1 7- 92	1 4 7	2 6 8	0 . 5	0.05 273	0. 00	0.05 551	0. 00	0.40 351	0. 00		317 0	2 0	348 6	6 344	6	- 1.1 5%	3 4	6 8	
M O1 7- 93	4 1	4 5	0 . 0	0.05 752	0. 00	0.08 076	0. 00	0.64 041	0. 00		512 9	1 9	501 9	9 503	5	0.4 0%	5 0	9 1	
M O1 7- 94	8 9	9 0	0 . 9	0.05 707	0. 00	0.09 502	0. 00	0.74 760	0. 02		494 8	2 8	585 1	2 567	1 2	- 3.0 8%	5 8	1 2	
M O1 7- 95	3 8	3 2	0 . 1	0.05 634	0. 00	0.07 378	0. 00	0.57 301	0. 00		466 8	1 8	459 8	8 460	6	0.2 2%	4 5	8 9	
M O1 7- 96	5 2	1 8	0 . 2	0.05 771	0. 00	0.07 750	0. 00	0.61 655	0. 00		519 8	1 8	481 9	9 488	6	1.4 6%	4 8	9 1	
M O1 7- 97	6 5	2 1	0 . 3	0.05 875	0. 00	0.09 446	0. 00	0.76 510	0. 01		558 9	1 9	582 1	0 577	6	- 0.8 6%	5 8	1 0	
M O1 7- 98	6 1	1 5	0 . 3	0.05 598	0. 00	0.08 888	0. 00	0.68 590	0. 01		452 9	1 9	549 1	0 530	7	- 3.4 6%	5 4	1 0	
M O1 7- 99	4 7	1 6	0 . 2	0.06 149	0. 00	0.11 732	0. 00	0.99 441	0. 01		656 8	1 8	715 1	3 701	9	- 1.9 6%	7 1	1 3	
M O1 7- 10 0	1 9	2 4	0 . 7	0.05 537	0. 00	0.08 074	0. 00	0.61 629	0. 04		427 8	1 0	501 3	1 488	2 7	- 2.5 9%	5 0	1 3	
M O2 6- 01	1 4 3	1 6 0	0 . 9	0.18 803	0. 00	12.5 928	0. 08	0.48 569	0. 00		272 5	1 0	265 0	6 255	2 4	6.7 8%	2 7	1 0	
M O2 6- 02	2 2 6	5 4 9	0 . 4	0.05 985	0. 00	0.62 440	0. 00	0.07 566	0. 00		598 1	1 1	493 3	3 470	5	4.8 9%	4 7	5 0	

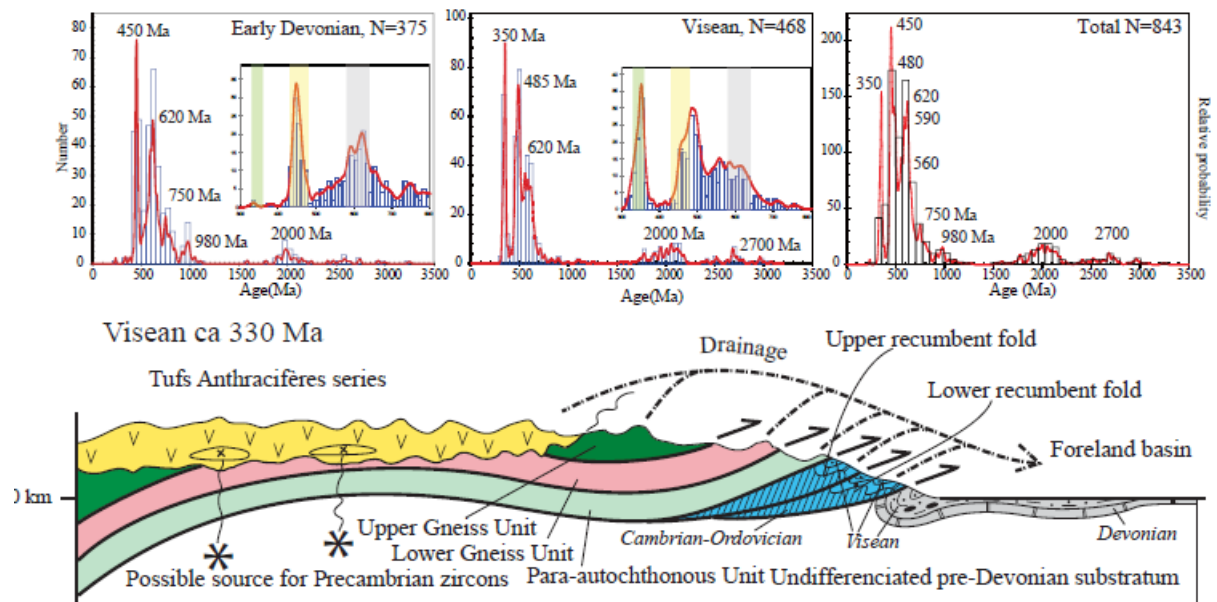
M O2 6- 03	4 7	1 0 2 2	0 . 0 5	0.17 896	0. 00 09 5	10.2 238 5	0. 05 64 9	0.41 432	0. 00 43 9	264 3	1 0	245 5	5 5	223 5 0	2 0	18. 26 %		
M O2 6- 04	1 4	8 0 6 2	0 . 0 2	0.05 562	0. 00 04 7	0.51 164	0. 41 7	0.06 672	0. 07 3	437	1 2	420	3 416	4	0.9 6%	4 1 6	4	
M O2 6- 05	5 1	5 6 0 9	0 . 0 9	0.16 104	0. 00 08 9	8.32 408	0. 04 76 4	0.37 488	0. 00 40 0	246 7	1 0	226 7	5 205	1 9	20. 22 %			
M O2 6- 06	1 1 3	2 0 8	0 . 5 4	0.05 603	0. 00 07 5	0.43 589	0. 55 0	0.05 642	0. 06 7	454	1 3	367	4 354	4	3.6 7%	3 5 4	4	
M O2 6- 07	2 0	3 0 6 7	0 . 6 7	0.07 823	0. 00 18 6	1.07 548	0. 02 30 1	0.09 971	0. 00 15 9	115 3	2 0	741	1 1	613 9	20. 88 %			
M O2 6- 08	5 9	3 5 6 8	1 . 6 8	0.12 294	0. 00 16 9	5.86 086	0. 07 53 2	0.34 574	0. 00 47 6	199 9	1 1	195 5	1 1 191	2 3 4	4.4 4%	1 9 9 9	1	
M O2 6- 09	4 3 0	5 0 9 8 5	0 . 8 5	0.05 708	0. 00 05 6	0.44 116	0. 00 41 5	0.05 605	0. 00 06 3	495	1 1	371	3 352	4	5.4 0%	3 5 2	4	
M O2 6- 10	2 1 9	5 6 8 3 9	0 . 3 9	0.11 633	0. 00 18 4	3.65 526	0. 04 10 7	0.22 789	0. 00 25 3	190 1	2 9	156 2	9 132	1 3	43. 69 %			
M O2 6- 11	2 7 6	5 2 4 5 3	0 . 5 0	0.10 794	0. 00 07 0	3.75 312	0. 02 43 7	0.25 217	0. 00 27 4	176 5	1 1	158 3	5 145	1 4	21. 72 %			
M O2 6- 12	4 0 1	5 7 3 7 0	0 . 7 0	0.06 174	0. 00 05 0	0.89 951	0. 00 71 1	0.10 566	0. 00 11 6	665	1 1	651	4 647	7	0.6 2%	6 4 7	7	
M O2 6- 13	9 5	2 9 6 3 2	0 . 3 2	0.05 768	0. 00 06 3	0.66 180	0. 00 68 7	0.08 321	0. 00 09 5	518	1 1	516	4 515	6	0.1 9%	5 1 5	6	
M O2 6- 14	2 3 1	4 0 8 5 7	0 . 5 6	0.05 871	0. 00 06 6	0.46 021	0. 00 48 6	0.05 685	0. 06 5	556	1 1	384	3 356	4	7.8 7%	3 5 6	4	
M O2 6- 15	6 3	5 9 0 7	1 . 0 7	0.12 664	0. 00 12 6	6.17 930	0. 05 83 9	0.35 387	0. 00 42 9	205 2	1 0	200 2	8 195	2 0	5.0 7%	2 0 5 2	1 0	
M O2	6 7	9 3	0 . .	0.06 357	0. 00	0.88 911	0. 01	0.10 143	0. 00	727	1 2	646	6 623	7	3.6 9%	6 2	7	

M O2 6- 30	6 9 3	1 8 3	0 . 3 8	0.11 913	0. 00 08 3	5.33 682	0. 03 67 1	0.32 491	0. 00 35 8		194 3	1 0	187 5	6 4	181 4	1 7	7.1 1%	1 9 4 3	1 0
M O2 6- 31	7 9 1	2 0 1	0 . 3 9	0.06 451	0. 00 07 3	0.79 743	0. 00 84 5	0.08 966	0. 00 10 4		758	1 1	595	5	554	6	7.4 0%	5 5 4	6
M O2 6- 32	3 7 4	2 2 1	0 . 1 6	0.12 291	0. 00 07 8	5.99 219	0. 03 82 6	0.35 357	0. 00 38 4		199 9	1 1	197 5	6	195 2	1 8	2.4 1%	1 9 9 9	1 1
M O2 6- 33	1 4 2	1 7 5	0 . 8 1	0.05 759	0. 00 07 8	0.61 487	0. 00 77 7	0.07 743	0. 00 09 3		514	1 2	487	5	481	6	1.2 5%	4 8 1	6
M O2 6- 34	1 5 9	4 3 6	0 . 3 7	0.17 675	0. 00 09 8	12.0 560 0	0. 06 90 7	0.49 470	0. 00 52 9		262 3	1 0	260 9	5	259 1	2 3	1.2 4%	2 6 2 3	1 0
M O2 6- 35	1 9 4	2 7 7	0 . 7 0	0.06 370	0. 00 05 8	0.94 168	0. 00 81 6	0.10 722	0. 00 11 9		732	1 1	674	4	657	7	2.5 9%	6 5 7	7
M O2 6- 36	2 6 0	4 6 7	0 . 5 6	0.05 500	0. 00 15 1	0.42 849	0. 01 06 6	0.05 650	0. 00 06 6		412	6 3	362	8	354	4	2.2 6%	3 5 4	4
M O2 6- 37	2 0 6	3 8 7	0 . 5 2	0.05 782	0. 00 06 4	0.44 763	0. 00 46 5	0.05 614	0. 00 06 4		523	1 1	376	3	352	4	6.8 2%	3 5 2	4
M O2 6- 38	4 8 7	6 5 3	0 . 7 3	0.19 613	0. 00 13 9	14.7 264 0	0. 10 43 0	0.54 457	0. 00 62 0		279 4	1 0	279 8	7	280 3	2 6	- 0.3 2%	2 7 9 4	1 0
M O2 6- 39	5 6 6	8 3 3	0 . 6 8	0.10 748	0. 00 24 2	3.99 429	0. 07 52 7	0.26 953	0. 00 33 3		175 7	4 2	163 3	1 5	153 8	1 7	14. 24 %		
M O2 6- 40	5 2 6	8 5 1	0 . 6 1	0.11 910	0. 00 08 9	5.27 158	0. 03 85 6	0.32 102	0. 00 35 9		194 3	1 0	186 4	6	179 5	1 8	8.2 5%	1 9 4 3	1 0
M O2 6- 41	1 9 1	3 1 0	0 . 6 2	0.06 121	0. 00 05 9	0.85 247	0. 00 78 4	0.10 101	0. 00 11 3		647	1 1	626	4	620	7	0.9 7%	6 2 0	7
M O2 6- 42	1 2 1	1 0 2	1 . 1 7	0.05 290	0. 00 22 2	0.37 755	0. 01 51 2	0.05 177	0. 00 06 4		324	9 8	325 1	1	325	4	0.0 0%	3 2 5	4
M O2	2 3	4 1	0 . .	0.06 178	0. 00	0.83 868	0. 00	0.09 846	0. 00		667	1 1	618	4	605	6	2.1 5%	6 0	6

M O2 6- 57	1 1 3 3	3 3 9 4	0 . 3 4	0.05 475 05 6	0. 00 882 40 8	0.41 00 882 40 8	0. 00 40 8	0.05 548 00 06 2	0. 00 06 2	402	1 1	355	3	348	4	2.0 1%	3 4 8	4
M O2 6- 58	1 2 4 5	4 4 1 8	0 . 2 8	0.07 512 17 8	0. 00 637 22 0	1.54 03 637 22 0	0. 03 22 0	0.14 929 17 1	0. 00 17 1	107 2	4 9	949	1 3	897	1 0	5.8 0%	8 9 7	1 0
M O2 6- 59	3 2 5 1	5 5 . 5 8	0 . 5 8	0.06 185 04 7	0. 00 309 65 8	0.88 00 309 65 8	0. 00 65 8	0.10 355 00 11 2	0. 00 11 2	669	1 1	643	4	635	7	1.2 6%	6 3 5	7
M O2 6- 60	1 5 6 6	4 9 0 3 2	0 . 3 2	0.07 912 05 2	0. 00 083 02 1	1.58 01 083 02 1	0. 01 02 1	0.14 491 15 6	0. 00 15 6	117 5	1 2	963	4	872	9	10. 44 %		
M O2 6- 61	2 0 3 6 5	3 1 . 5 6	0 . 6 5	0.12 772 07 3	0. 00 542 10 2	5.35 03 542 10 2	0. 03 10 2	0.30 412 32 5	0. 00 32 5	206 7	1 1	187 8	5	171 2	1 6	20. 74 %		
M O2 6- 62	1 3 7 1 0	2 7 . 4 9	0 . 4 9	0.06 320 06 1	0. 00 723 72 2	0.78 00 723 72 2	0. 00 72 2	0.09 034 10 1	0. 00 10 1	715	1 1	590	4	558	6	5.7 3%	5 5 8	6
M O2 6- 63	3 0 8 8 1	2 1 . 8 4 1	0 . 8 4 1	0.06 280 05 8	0. 00 702 73 1	0.83 00 702 73 1	0. 00 73 1	0.09 667 10 8	0. 00 10 8	701	1 1	617	4	595	6	3.7 0%	5 9 5	6
M O2 6- 64	4 5 7 7 3	7 7 . 5 9	0 . 5 9	0.05 625 04 2	0. 00 381 31 8	0.43 00 381 31 8	0. 00 31 8	0.05 593 06 0	0. 00 06 0	462	1 2	366	2	351	4	4.2 7%	3 5 1	4
M O2 6- 65	2 3 8 4 8	4 8 . 4 8	0 . 4 8	0.12 182 12 5	0. 00 734 63 7	4.80 04 734 63 7	0. 04 63 7	0.28 622 34 7	0. 00 34 7	198 3	1 0	178 6	8	162 3	1 7	22. 18 %		
M O2 6- 66	2 3 8 1 2 6	3 8 . 6 0	0 . 6 0	0.05 990 04 8	0. 00 158 60 7	0.78 00 158 60 7	0. 00 60 7	0.09 464 10 3	0. 00 10 3	600	1 1	586	3	583	6	0.5 1%	5 8 3	6
M O2 6- 67	2 5 2 6 4 1	8 2 . 3 1	0 . 3 1	0.05 845 04 0	0. 00 272 38 4	0.56 00 272 38 4	0. 00 38 4	0.06 983 07 5	0. 00 07 5	547	1 2	453	2	435	5	4.1 4%	4 3 5	5
M O2 6- 68	7 0 8 3 9 8	7 2 . 9 8	0 . 9 8	0.06 454 04 9	0. 00 889 59 7	0.80 00 889 59 7	0. 00 59 7	0.09 091 09 9	0. 00 09 9	759	1 2	602	3	561	6	7.3 1%	5 6 1	6
M O2 6- 69	7 3 8 4 9 7	1 8 . 3 9	0 . 3 9	0.06 188 03 9	0. 00 287 38 9	0.62 00 287 38 9	0. 00 38 9	0.07 301 07 8	0. 00 07 8	670	1 3	492	2	454	5	8.3 7%	4 5 4	5
M O2 6- 70	1 6 8 . 963	1 8 . 963	0 . 963	0.05 963 00 332	0. 00 332 00 527	0.78 00 332 00 527	0. 00 527 00 527	0.09 527 00 527	0. 00 527 00 527	590	1 1	587	4	587	6	0.0 0%	5 8	6

M O2 6- 84	1 1 1	2 4 9	0 . 4 5	0.05 649	0. 00 05 6	0.61 555	0. 00 58 2	0.07 903	0. 00 08 9	472	1 1	487	4	490	5	- 0.6 1%	4 9 0	5
M O2 6- 85	4 8 8	2 6 8	0 . 1 8	0.12 717	0. 00 09 2	6.05 203	0. 04 27 6	0.34 516	0. 00 38 4	205 9	1 0	198 3	6	191 1	1 8	7.7 4%	2 0 5 9	1 0
M O2 6- 86	2 0 1	4 2 6	0 . 4 7	0.05 445	0. 00 05 1	0.40 660	0. 00 36 4	0.05 416	0. 00 06 0	390	1 1	346	3	340	4	1.7 6%	3 4 0	4
M O2 6- 88	2 6 4	2 9 4	0 . 9 0	0.05 883	0. 00 05 5	0.74 037	0. 00 65 9	0.09 127	0. 00 10 1	561	1 1	563	4	563	6	0.0 0%	5 6 3	6
M O2 6- 89	1 6 6	2 7 4	0 . 6 1	0.06 061	0. 00 07 2	0.78 952	0. 00 88 4	0.09 448	0. 00 11 0	625	1 1	591	5	582	6	1.5 5%	5 8 2	6
M O2 6- 90	9 0 2	7 0 9	1 . 2 9	0.12 580	0. 00 10 3	6.44 358	0. 05 12 3	0.37 149	0. 00 42 7	204 0	1 0	203 8	7	203 6	2 0	0.2 0%	2 0 4 0	1 0
M O2 6- 91	5 5 6	2 7 2	0 . 2 0	0.16 575	0. 00 21 3	10.0 307	0. 07 05 7	0.43 892	0. 00 47 1	251 5	2 2	243 8	6	234 6	2 1	7.2 0%	2 5 1 5	2 2
M O2 6- 92	5 8 0	6 0 1	0 . 0 0	0.06 886	0. 00 04 3	1.12 881	0. 00 71 0	0.11 889	0. 00 12 7	895	1 2	767	3	724	7	5.9 4%	7 2 4	7
M O2 6- 93	5 0 5	8 1 9	0 . 6 2	0.06 245	0. 00 04 2	0.86 075	0. 00 56 6	0.09 996	0. 00 10 7	690	1 2	631	3	614	6	2.7 7%	6 1 4	6
M O2 6- 94	1 3 4	1 0 1	1 . 3 3	0.12 633	0. 00 08 3	6.16 925	0. 03 03 3	0.35 417	0. 00 38 7	204 8	1 0	200 0	6	195 4	1 8	4.8 1%	2 0 4 8	1 0
M O2 6- 95	1 1 9	2 4 7	0 . 4 8	0.12 748	0. 00 07 7	6.16 356	0. 03 72 4	0.35 065	0. 00 37 7	206 4	1 1	199 9	5	193 8	1 8	6.5 0%	2 0 6 4	1 1
M O2 6- 96	3 3 0	9 8 1	0 . 3 4	0.05 514	0. 00 03 8	0.46 639	0. 00 31 8	0.06 135	0. 00 06 6	418	1 3	389	2	384	4	1.3 0%	3 8 4	4
M O2 6- 97	2 7 6	5 2 5	0 . 1 1	0.15 649	0. 00 11 6	9.15 768	0. 06 62 8	0.42 443	0. 00 48 1	241 8	1 0	235 4	7	228 1	2 2	6.0 1%	2 4 1 8	1 0
M O2	1 3	1 9	0 . .	0.06 311	0. 00	1.02 176	0. 00	0.11 743	0. 00	712	1 1	715	5	716	8	- 0.1	7 1	8

Graphical abstract



Schematic topographic reconstruction of the French Massif Central during the Visean and the possible sources for the detrital zircons of the Foreland basin with the cumulative probability plots of detrital zircon U-Pb ages.

Highlights

Variscan Southern Massif Central Foreland basin helps to decipher tectonic events

Early Devonian and Carboniferous detrital zircon provenance is investigated

11 samples yielded U-Pb age spectra ranging from Neoproterozoic to Late Paleozoic

Rifting, volcanic, and plutonic events with a multi-recycling history are suggested