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1 Triassic tectonics of the Southern margin of the South China Block

2

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13

14 **ABSTRACT**

15 Middle Triassic orogens are widespread around and inside the South China Block
16 (SCB). The southern peripheral belts that develop from NW to SE, namely Jinshajiang,
17 Ailaoshan, NW Vietnam, NE Vietnam, Yunkai and Hainan exhibit striking similarities, with
18 Permian-Early Triassic magmatic arc, ophiolitic mélange, NE to N-directed synmetamorphic
19 ductile nappes, and fold-and-thrust belt. These collisional belts result from oceanic, then
20 continental subduction of the SCB below Indochina. Eastward of Hainan Island, a Triassic
21 suture is hypothesized offshore of the SCB. Within the SCB, the Xuefengshan is a Middle
22 Triassic intracontinental orogen with NW-directed folds and thrusts, and an intracrustal
23 ductile decollement. This orogen accommodated the Middle Triassic continental subduction
24 of the Western part of the SCB below the Eastern part. At variance to the generally accepted

25 models, the inter- and intra-continental Triassic orogens of the SCB are interpreted here as the
26 result of South-directed subductions of the SCB.

27

28 Key words:

29 Triassic tectonics, Continental collision, Intracontinental subduction, South China Block,
30 Indochina Block

31

32

33 **1. Introduction**

34 It is well acknowledged that the architecture of Asia results of the amalgamation of
35 large continents such as Siberia, N. China, S. China, Tarim, Indochina, India, and several
36 microcontinents: Lhasa, Qiangtang, Qaidam, etc... (e.g. Metcalfe, 2013; Fig. 1). The South
37 China Block (SCB) is one of the most complex as it underwent a long Phanerozoic evolution
38 after its Neoproterozoic formation before 850 Ma during a collisional event that welded the
39 Yangtze and Cathaysia Blocks (e.g. Charvet et al., 1996; Li et al., 2007a; Fig 2). During the
40 Early Paleozoic, the SCB was welded to the N. China block along the Qinling-Dabie belt (e.g.
41 Mattauer et al., 1985; Li et al., 2007b; Faure et al., 2008; Dong et al., 2011; Liu et al., 2013).
42 Between Late Ordovician and Early Silurian, the closure of a **Neoproterozoic Nanhua** rift was
43 responsible for the building of an intracontinental belt (e.g. **Wang and Li, 2003**; Faure et al.,
44 2009; Charvet et al., 2010; Wang et al. 2013). From Devonian to Early Triassic, during ca 170
45 my, the SCB behaved as a stable continent covered by a carbonate platform. However, in the
46 Late Permian, the SW part of SCB, in Yunnan and Guangxi, experienced a huge intraplate
47 magmatism coeval with rifting, known as the Emeishan Large Igneous Province (Ali et al.,
48 2005; Fig. 2).

49 The Triassic appears as the most important period for the tectonic development of the
50 SCB. Since the recognition of a Norian unconformity and the definition of "Indosinian"
51 movements in Central Vietnam (Deprat, 1915; Fromaget, 1941), the term Indosinian has been
52 ascribed to all Triassic tectonic and magmatic events throughout Asia, even if these features
53 were geodynamically unrelated to Vietnamese ones. As numerous dates are now available, the
54 Middle Triassic stratigraphic age will be preferred to "Indosinian".

55 Triassic events are widespread all around the SCB (Fig. 2). South of the Early
56 Paleozoic Qinling belt, Triassic top-to-the-S ductile shearing, HP and UHP metamorphism,
57 and plutonism are documented (e.g. Hacker et al., 1998; Lin et al., 2000; Ratschbascher et al.
58 2003; Li et al. 2007b; Faure et al., 2008; Liu et al., 2013). To the NW, in spite of an intense
59 Cenozoic reworking, a SE-directed Triassic thrusting is recognized in the Longmenshan belt
60 (e.g. Burchfiel et al., 1995; Roger et al. 2008; Robert et al., 2010). The Jinshajiang,
61 Ailaoshan, and N. Vietnam belts represent the Western and Southwestern boundaries of the
62 SCB. Furthermore, Middle Triassic events are responsible for the development of the
63 Xuefengshan belt in the internal part of the SCB (Chu et al., 2012a,b; Wang et al., 2013; Fig.
64 2). The architecture and geodynamic evolution of these belts are still controversial, but it is
65 widely accepted that the SCB belonged to the upper plate above a north (NE or NW)-dipping
66 subduction zone (e.g. Wang et al., 2013; Li and Li, 2007).

67 The aim of this paper is to synthesize the Triassic tectonic features that develop along
68 the southern margin of the SCB, and in its interior as well. Then a possible geodynamic
69 interpretation, at variance to the present paradigm, will be discussed. The Triassic events of
70 the northern part of the SCB, and the Jurassic and Cretaceous ones of the interior of SCB will
71 not be addressed here.

72

73 **2. Triassic orogens of N. Vietnam**

74 It is sometimes proposed that the Red River Fault (RRF) is the boundary between SCB
75 and Indochina. The RRF is a polyphase fault with Miocene sinistral ductile strike-slip (also
76 referred to as the Ailaoshan-Red River shear zone), and a Plio-Quaternary dextral motion.
77 The left-lateral ductile displacement developed in response to the Indian collision was
78 variously estimated from a few tens to several hundred of km (e.g. Tapponnier et al., 1986;
79 Leloup et al., 1995, 2006; Searle, 2006). The strike-slip faulting accounts for the Cenozoic
80 tectonics, but when dealing with the Triassic events, the RRF cannot be considered as a plate
81 boundary as ophiolites, subduction complexes, or HP metamorphic rocks are lacking. In
82 contrast, two ophiolitic belts are recognized in NW and NE Vietnam on both sides of the
83 RRF, along the Song Chay and Song Ma faults (Fig. 2; Lepvrier et al., 1997, 2008, 2011;
84 Faure et al., 2014).

85

86 2.1. The NW Vietnam (Song Ma) belt

87 From SW to NE, several litho-tectonic zones are recognized (Figs. 2, 3A). 1)
88 Permian-Early Triassic volcanic and sedimentary rocks of the *Sam Nua zone*, overlying an
89 Early Paleozoic series, are interpreted as a magmatic arc (Tran et al., 2008a; Liu et al., 2012).
90 2) The *Song Ma zone* formed by ultramafic, mafic rocks and deep marine sediments
91 represents an ophiolitic suture. 3) The *Nam Co metamorphic rocks*, developed at the expense
92 of Neoproterozoic terrigenous series, and Paleozoic limestone and sandstone, correspond to
93 the sedimentary cover of a continental basement ductilely deformed during the NE-ward
94 thrusting of the Song Ma ophiolites. 4) Farther North, folded unmetamorphosed successions
95 of Devonian to Carboniferous limestone, Permian volcanics, Early Triassic clastics, and
96 Middle Triassic carbonates represent the outer zone (*Son La-Lai Chau zone*) of this belt.
97 There, Late Permian alkaline basalts and volcanoclastites form the Song Da rift. Although
98 sometimes considered as ophiolites, these rocks, emplaced in an intraplate setting, belong to

99 the Emeishan Large Igneous Province (Ali et al., 2005; Tran et al., 2008b; Tran and Vu,
100 2011). The Permian Tule acidic rocks are also relevant to this bimodal magmatism (Tran and
101 Vu, 2011). 5) Lastly, the Proterozoic basement, stratigraphically overlain by a Paleozoic
102 sedimentary cover, is called the *Posen-Hoabinh zone* that forms the deepest part of the NW
103 Vietnam belt.

104 The NW Vietnam belt exhibits a structural and metamorphic polarity decreasing from
105 SW to NE. Late Triassic sandstone and conglomerate unconformably cover deformed rocks.
106 Biotite and muscovite $^{40}\text{Ar}/^{39}\text{Ar}$, zircon U/Pb, and monazite chemical U/Th/Pb ages around
107 245-230 Ma argue for a Middle Triassic age for the nappe architecture of the NW Vietnam
108 belt (Lepvrier et al., 1997, 2008, Nakano et al., 2008, 2011).

109

110 2.2. The NE Vietnam (Song Chay) belt

111 NE of the RRF, another Triassic belt develops with the following SW to NE zonation
112 (Lepvrier et al. 2011; Faure et al. 2014; Figs. 2, 3A). 1) The *Dai Nuy Con Voi* is a NW-SE
113 striking Cenozoic HT antiform developed from grauwacke and pelite hosting granodiorite,
114 diorite and gabbro plutons of Permian-Triassic age (Gilley et al., 2003; Zelazniewicz et al.
115 2013). This zone is interpreted as a magmatic arc. 2) The *Song Chay ophiolitic mélange* is
116 composed of serpentinites, mafic rocks, limestone, and chert blocks included in a terrigenous
117 matrix of Triassic age. 3) The *NE Vietnam nappe* consists of Cambrian-Ordovician
118 terrigenous rocks, and Devonian to Permian carbonates. Ordovician porphyritic granites (e.g.
119 the Song Chay massif) are now changed into augengneiss. N- to NE-verging folds and thrusts
120 deform the entire lithological succession. Biotite-garnet-staurolite micaschist yields a
121 monazite U-Th-Pb age at 246 ± 10 Ma (Faure et al., 2014). 4) The *outer zone* is a Paleozoic
122 lithological succession similar to that of the NE Vietnam nappe covered by a thick Middle
123 Triassic turbidite series with acidic lava flows and ashes. This formation includes olistoliths

124 of alkaline basalt, gabbro and limestone. Similar mafic rocks crop out in China where they
125 intrude the late Paleozoic limestone platform. They have been ascribed to the "Babu
126 ophiolites" (Fig. 2, Zhong 2000; Cai and Zhang, 2009), but their geological setting and
127 geochemistry show that they are intraplate basalts corresponding to remote parts of the
128 Emeishan Large Igneous Province (e.g. Zhou et al. 2006, see discussion in Faure et al., 2014).
129 The NE Vietnam belt extends in China between Kunming and Nanning, the flat lying Late
130 Paleozoic limestone platform is involved in N-directed folds and thrusts upon the Middle
131 Triassic turbidite (Fig. 4C).

132 In summary, both the NW and SE Vietnam belts are collisional orogens formed by a
133 SW-ward subduction of oceanic, then continental lithosphere. Due to their lithological,
134 structural, and chronological similarities, the two belts have been interpreted as the result of a
135 duplication of a single Triassic orogen by the Cenozoic left-lateral strike-slip shearing of the
136 **Ailaoshan-Red River shear zone** (Faure et al., 2014).

137

138 **3. The western extension of the N. Vietnam orogens**

139 *3.1. The Ailaoshan Belt*

140 This NW-SE 500km-long belt (Fig. 2) is subdivided into several narrow stripes by
141 belt-parallel strike-slip faults. In spite of the intense Cenozoic shearing (e.g. Leloup et al.,
142 1995), the Ailaoshan is commonly acknowledged as a Triassic suture zone between the SCB
143 and Indochina-Simao block but structural details and subduction polarity are disputed (e.g.
144 Zhong 2000; Jian et al., 2009a,b; Fan et al., 2010; Lai et al., 2013a,b; Wang et al., 2013).
145 From SW to NE, four litho-tectonic zones ascribed to the Triassic orogen are recognized (Fig.
146 2). 1) The *Western Ailaoshan*, characterized by volcanic and sedimentary rocks, is
147 unconformably overlain by Late Triassic red conglomerate and sandstone. Basalt and
148 andesite, dated between 287 and 265 Ma, were originated in a magmatic arc installed upon a

149 Silurian-Devonian terrigenous series (Jian et al., 2009a; Fan et al., 2010). 2) The *Central*
150 *Ailaoshan* contains serpentinite, gabbro, dolerite, plagiogranite, basalt, chert, and limestone
151 blocks enclosed into a terrigenous matrix (Lai et al., 2014b). Zircon from plagiogranite yields
152 U-Pb ages at 383-376 Ma, 365 Ma, and 328 Ma interpreted crystallization age of ophiolitic
153 protoliths (Jian et al., 2009b; Lai et al., 2014b). This domain represents an ophiolitic mélange
154 but the age of the matrix is unknown. 3) The *Eastern Ailaoshan* consists of gneiss, micachists,
155 amphibolites, marbles, and migmatites that form a Paleoproterozoic basement, partly
156 reworked during the Cenozoic (Lin et al., 2012). Middle Triassic carbonate covers the
157 crystalline basement. 4) The *Jinping area* exposes Late Permian mafic lava, pillow breccia,
158 agglomerate, and volcanoclastites (Wang et al., 2007). Furthermore, felsic volcanites dated at
159 ca 246 Ma result of syn- to late-collisional crustal melting (Lai et al., 2014a).

160 A steeply dipping foliation and a subhorizontal lineation are the main ductile
161 structures developed during the Cenozoic shearing as they involve the Late Triassic rocks.
162 Nevertheless, a steeply dipping stretching lineation with top-to-the NE sense of shear and NE
163 verging folds are also observed (Fig 4B). These structures, incompatible with the strike-slip
164 event, and not observed in the Late Triassic or younger rocks, are of Middle Triassic in age.

165 Thus in spite of the Tertiary overprint, the Ailaoshan belt is comparable with the N.
166 Vietnam belts. Namely, the Western, Central, and Eastern Ailaoshan zones are equivalent to
167 the Sam Nua, Song Ma, Posen-Hoabinh zones, respectively. The Sonla-Laichau zone pinches
168 out in the Ailaoshan, except in the Jinping area where magmatic rocks are similar to the Song
169 Da rift.

170

171 3.2. *The termination of the NE Vietnam Belt*

172 The NE Vietnam Belt abruptly ends in China (Fig. 2). The Dai Nuy Con Voi
173 metamorphics are surrounded by Permian-Early Triassic volcanites and grauwackes

174 corresponding to the magmatic arc, but ophiolites are not exposed. Folded and thrustured
175 Paleozoic rocks are equivalent to the NE Vietnam nappe. To the north, Middle Triassic
176 turbidites of the Youjiang basin involved in N-verging folds correlate with the outer zone of
177 NE Vietnam.

178

179 *3.3. The Jinshajiang Belt*

180 At the edge of the Tibet plateau, the Triassic Jinshajiang orogen is documented by the
181 Late Triassic unconformity overlying a folded Middle Triassic ophiolitic mélange with basalt,
182 chert, and limestone blocks (Fig. 4A, Zhong 2000; Wang and Metcalfe, 2000). This mélange
183 overthrusts to the East the Late Paleozoic-Triassic carbonate platform of the SCB. To the
184 West, a Permian-Early Triassic magmatic arc argues for a west-directed subduction. The
185 bimodal magmatism at 245-237 Ma is interpreted as syn- to post-collisional (Zi et al., 2012).
186 The Jianshajiang Belt exhibits lithological and structural features similar to those of the
187 Ailaoshan and N Vietnam orogens.

188

189 **4. The eastern extension of the N. Vietnam orogens**

190 *4.1. The Yunkai Massif*

191 In Guangxi, the Late Triassic-Jurassic red sandstone of the Shiwandashan basin (**SB in**
192 Fig. 2) is a post-orogenic molasse with respect to the Triassic orogeny (e.g. Hu et al., 2014).
193 The Yunkai massif consists of Early Paleozoic HT metamorphics, migmatites, and Triassic
194 granites tectonically surrounded by weakly metamorphosed Devonian-Carboniferous
195 sedimentary rocks (e.g. Wang et al., 2007; Lin et al., 2008). The metamorphic rocks belong
196 to the Early Paleozoic orogen of SE China but were intensely reworked by the Triassic events.
197 The flat-lying foliation and NE-SW stretching lineation, associated with a top-to-the-NE
198 ductile shearing developed at ca 250-240 Ma. During this event, the Early Paleozoic granites

199 were changed to orthogneiss (Fig. 4D). The Yunkai massif is a 100km-scale basement nappe
200 that overthrusts northward onto the Late Paleozoic sedimentary rocks of the SCB (Figs. 3C,
201 4E). As ophiolites are lacking there, the eastward extension of the Song Chay suture should
202 be searched more to the South in Hainan Island (Fig.2).

203

204 *4.2. Triassic tectonics in Hainan Island*

205 The tectonic evolution of Hainan Island remains controversial. The Cretaceous and
206 younger extensional events are not considered here. Late Triassic plutons seal the **main**
207 **ductile** deformation (Fig. 3B). N-verging folds and thrusts deform the Early Paleozoic series
208 and the underlying Proterozoic basement. Granodiorites and biotite granite **with calcalkaline**
209 **geochemical signatures, and yielding** zircons **SHRIMP U-Pb** ages **at 267±3Ma Ma and 263±3**
210 **Ma by SHRIMP method**, are interpreted as the **"Wuzishan magmatic arc"** (Li et al., 2006).
211 North of this arc, a Late Permian-Early Triassic terrigenous series including Carboniferous
212 gabbro, basalt, siliceous rocks and limestone is interpreted as a mélangé (Fig. 4F; Li et al.,
213 2002). This formation is ductilely deformed with top-to-the-N kinematics dated at ca 250-240
214 Ma by $^{40}\text{Ar}/^{39}\text{Ar}$ method **on micas** (Zhang et al., 2011). In spite of a still limited knowledge,
215 the Hainan Island appears as a suitable site for the eastern extension of the Song Chay suture.

216

217 **5. Triassic intracontinental tectonics in East SCB**

218 *5.1. The Xuefengshan Belt*

219 Middle Triassic tectonics is not limited to the SCB margins. In central SCB (E. Hunan
220 and Guangxi), the Xuefengshan Belt is a NNE-SSW striking 700 km long belt dominated by
221 NW-directed thrusts and folds. SE-verging folds are interpreted as secondary back-folds (Chu
222 et al., 2012a; **Fig. 5**). A ductile decollement layer, intruded by Late Triassic plutons dated at
223 225-215 Ma **by SIMS U-Pb method on zircon** (Chu et al., 2012c), exhibits a NW-SE striking

224 stretching lineation, and top-to-the-NW sense of shear (Chu et al., 2012b). This 500 km wide
225 fold-and-thrust belt involves the entire Neoproterozoic to Early Triassic sedimentary pile to
226 the west of the Chenzhou-Linwu fault (CLF in fig. 2). This fault, devoid of ophiolites and
227 subduction mélange, is not a suture zone, but an intracontinental "scar". In order to balance
228 the ca 300 km of shortening experienced by the sedimentary rocks overlying the decollement
229 layer, a SE-ward continental subduction of the same amount must have taken place in the
230 crystalline basement of the western part of SCB (Chu et al., 2012a).

231

232 *5.2. Coastal and eastern SE China*

233 E-W striking folds develop south of the Jiangshan-Shaoxing Fault (Fig. 2). The Late
234 Triassic regional unconformity argues for a Middle Triassic event (Shu et al., 2008). As
235 documented in the Jiuling area (Chu and Lin, 2014), upright folds are lateral ramps related to
236 the Xuefengshan belt. The E-W elongated Wugongshan dome located immediately south of
237 the Jiangshan-Shaoxing fault (Fig. 2; Faure et al., 1996) might be also developed during the
238 reactivation of this Neoproterozoic suture. The Triassic ductile deformation is probably
239 underestimated in the eastern part of SCB (Wang et al. 2014).

240 In the coastal area of SE China, widespread Jurassic and Cretaceous granites and
241 volcanites hide older formations. West of Fuzhou, Middle Triassic rocks deformed by N-
242 verging recumbent folds and covered by a Late Triassic unconformity indicate that the SE
243 China coastal area also experienced a Middle Triassic deformation (Zhu et al., 1996).

244

245 **6. Discussion of the Triassic orogens**

246 A N-directed Triassic oceanic subduction, below the SCB, is often suggested (e.g.
247 Zhou and Li, 2000; Li and Li, 2007). This view is based on the assumption that the active
248 continental margin of SCB existed since the Middle Permian (Li et al., 2006, 2012). Indeed,

249 an active margin setting has been documented for the Cretaceous, but the geochemistry of the
250 Jurassic magmatism supports rather an intraplate setting (Chen et al., 2008). As in Vietnam, in
251 Hainan, the relative positions of the mélangé and arc argue for a South-directed subduction. In
252 SE China, most of the Late Triassic plutons are S-type due to the melting of Proterozoic
253 sediments, and a small amount of A-type plutons also exists (e.g. Li et al., 2006; Chen et al.,
254 2011; Sun et al., 2011; Zhao et al., 2012; Wang et al. 2013). The tectonic setting of these
255 plutons is not documented. Furthermore, their emplacement ages do not clearly show a NW-
256 to-SE polarity that might be related to a N-directed subduction.

257 Therefore, an alternative interpretation is tentatively proposed here. The NW-directed
258 shearing and 300 km shortening recorded by the sedimentary series of the Xuefengshan Belt
259 are balanced by the same amount of continental subduction. This means that during the
260 Triassic, the SE China lithosphere was underlain by a slab corresponding to the SE-ward
261 subducted lithosphere of the Western part of SCB (Figs. 6,7).

262 Along the SE China coast, evidence for a Triassic subduction is not documented.
263 Assuming an eastward extension of the Jinshajiang-Ailaoshan-N Vietnam-Hainan belt would
264 imply that the SCB represents the lower plate. Such a polarity may account for the thrusting
265 sense observed in Yunkai, Hainan, and SE China. The Triassic peraluminous plutons (e.g.
266 Darongshan granite, DS in Fig. 2) emplaced in the footwall of the major thrust zones during
267 deep-seated thrusting coeval with melting. Moreover, Permian arc magmatism is documented
268 in Mindoro Island of W. Philippines (Fig. 1; Knittel et al., 2010). Considering the Cenozoic
269 opening of the S. China sea, this arc represents the eastern extension of the Wuzishan arc of
270 Hainan. Triassic ophiolites and tectonics are unknown in the Philippines, but the Tailuko belt
271 of Taiwan that exposes the deepest rocks of the island yields garnet-chloritoid-kyanite-
272 staurolite micaschist with metamorphic zircon dated at 200 ± 22 Ma (Yui et al., 2009; Fig.
273 2). Furthermore, HP metamorphic rocks crop out in the S. Ryukyu Islands (Fig.2). In these

274 mafic schists, phengite and barroisite are dated at 225 ± 5 Ma and 237 ± 6 Ma, respectively
275 (Faure et al., 1988). One possibility is to relate these features to the Triassic orogeny of SCB.

276 In conclusion, the Triassic belts that wrap around the SCB southern margin from SW
277 to SE exhibit lithostratigraphic, structural and chronological resemblances that allow us to
278 infer that a single belt developed in response to the subduction and collision of the SCB below
279 the Qiangtang-Indochina block. Such a S-directed subduction was coeval with the intra-
280 continental subduction responsible for the development of the structures in SE China. Work in
281 progress aims at testing this new interpretation.

282

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- 580
- 581
- 582 Figure Captions
- 583
- 584 Fig. 1. Schematic map of Central-Eastern Asia showing the main continental blocks,
585 ophiolitic sutures and faults. SCB: South China Block, D: Dabieshan, XFS: Xuefengshan,
586 RRF: Red River Fault, LMS: Longmenshan. Pink lines denote the Triassic belts discussed in
587 this paper. Diamond in Mindoro Island locates the Permian magmatic arc.
- 588

589 Fig. 2. Tectonic map of the South China Block with emphasis of the Triassic events. **The light**
 590 **pink area represents the Xuefengshan belt.** RRF: Red River Fault, SCS: Song Chay suture,
 591 SMS: Song Ma suture, CLF: Chenzhou-Linwu fault, MXT: Main Xuefeng Thrust, JSF:
 592 Jiangshan-Shaoxing fault, DBF: Dien Bien Fu fault. NEV: NE Vietnam belt, DNCV: Day Nui
 593 Con Voi Triassic arc, DS: Darongshan pluton, SB: Shiwandashan Mesozoic basin. **The cross**
 594 **sections (Fig. 2A, B, C) are located.**

595

596 Fig. 3. Crustal scale cross sections of the Triassic belts

597 A: NW Vietnam-S China profile (simplified from Faure et al., 2014). B: Hainan profile. C:
 598 Yunkai profile.

599

600 Fig. 4. Field pictures of the Triassic belts. A: Late Triassic red beds unconformably overlying
 601 subvertical Middle Triassic turbidite (Jinshajiang, E. of Dexing).

602 B: Bedding (S0) and cleavage (S1) relationships in Middle Triassic limestone indicate a NE-
 603 verging fold. A down-dip stretching lineation is observed in the S1 surface (Ailaoshan). C:

604 Permian limestone overthrusting Middle Triassic turbidite (S. Guangxi). D: Early Paleozoic
 605 porphyritic granite deformed as orthogneiss with top-to-the-N shearing (Yunkai massif). E:

606 N-verging fold in Devonian sandstone, in the footwall of the Yunkai thrust (Luoding). F:

607 Carboniferous limestone olistolith in a Permian-Triassic siltite matrix (Hainan).

608

609 Fig. 5. Crustal scale cross section of the intracontinental Xuefengshan belt (modified from

610 Chu et al. 2012a). Folding and shearing, pre-dated by the emplacement of Late Triassic

611 plutons accommodated the SE-ward underthrusting of the Western part of the SCB below its

612 Eastern part. S1, S2, S3 are the cleavage planes related to the Triassic deformation phases (cf

613 Chu et al., 2012a for detail).

614

615 Fig. 6. Lithosphere scale interpretative cross section from the Xuefengshan to the SE coast of
616 SCB depicting the Triassic deformation. The Early Paleozoic and Cretaceous events have
617 been omitted for clarity. The Triassic geodynamics of the S. part of the SCB are interpreted as
618 the consequence of intracontinental subduction in the Xuefengshan and collision of the SCB
619 with a continental block equivalent to Indochina presently hidden below the S. China Sea.
620 Evidence for a magmatic arc is documented in Hainan Island and in W. Philippines.

621

622 Fig. 7. Schematic map showing the main Triassic tectonic features of the South margin of the
623 SCB. At variance with the previous interpretations, this cartoon emphasizes the southward
624 continental subduction of the SCB below the Indochina Block and its eastward extension in
625 W. Philippines that was located South of the SCB before the opening of the South China Sea.
626 Collision was preceded by oceanic subduction that gave rise to several magmatic arcs,
627 namely: W. Ailaoshan, Sam Nua, Dai Nuy Con Voi, Wuzishan, Mindoro. JSJ: Jinshajiang
628 suture, AS: Ailaoshan suture, SMS: Song Ma suture, SCS: Song Chay suture, HS: Hainan
629 suture. Terrigenous deposits of the Shiwandashan basin (SB) unconformably cover the folds
630 and thrusts of the Middle Triassic Youjiang basin. The intracontinental Xuefengshan Belt
631 developed in response to the SE-ward continental subduction of the basement of the SCB.
632 MXT: Main Xuefengshan Thrust. Dotted lines represent the fold axes. The Triassic E-W to
633 NE-SW striking folding developed in the Neoproterozoic Jiuling Massif corresponds to a
634 dextral ramp of the Xuefengshan belt. The Triassic plutons have been omitted for clarity.

Figure 1
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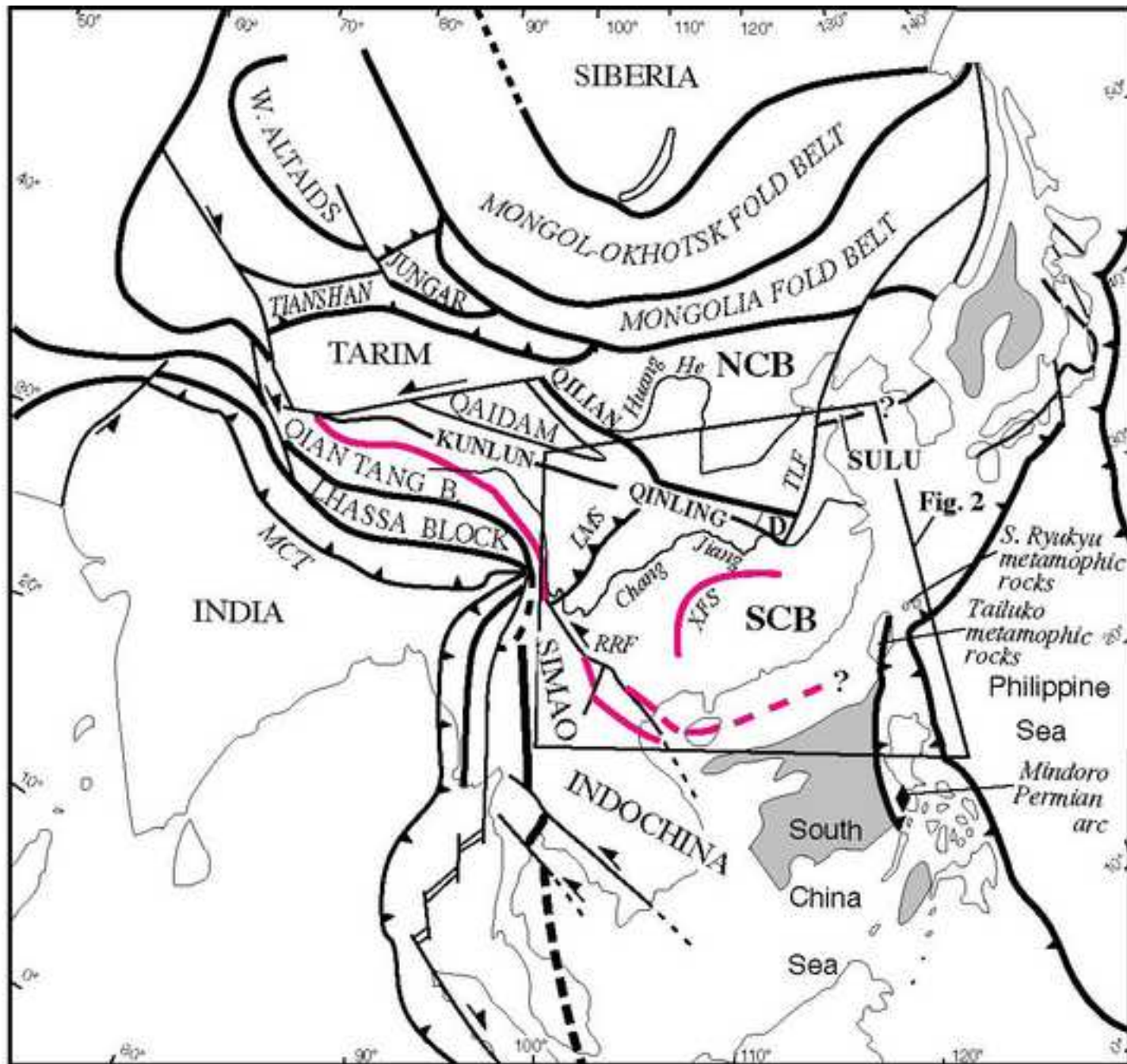


Fig. 1

Figure 2
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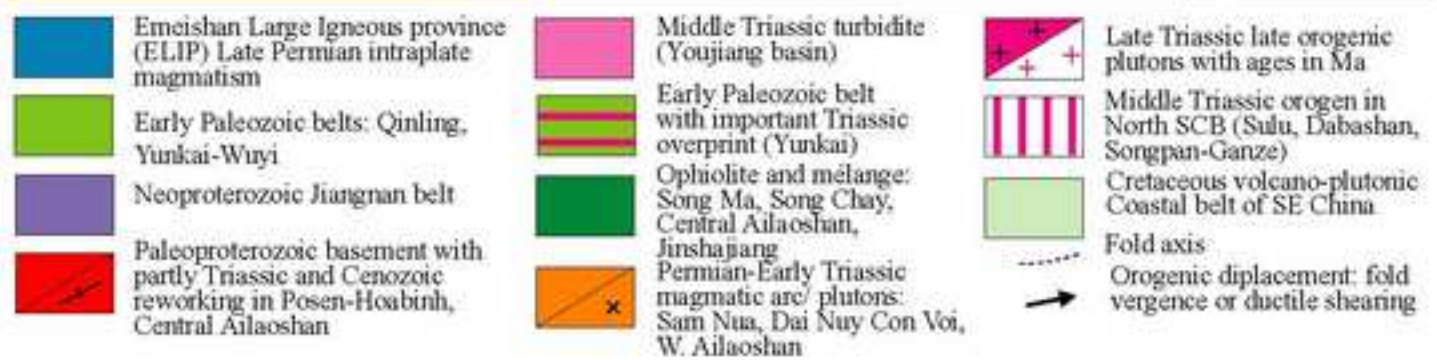
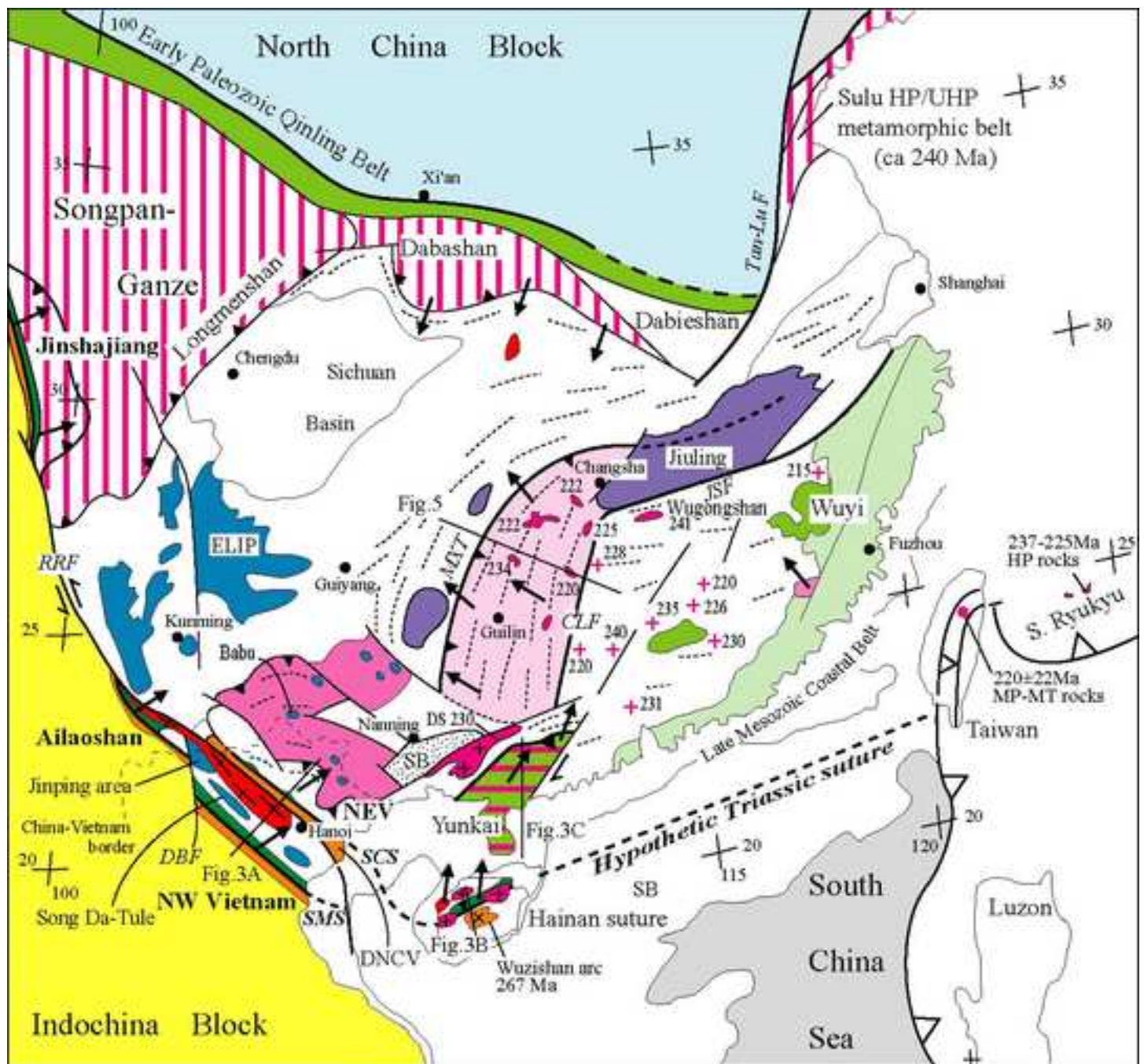


Fig. 2

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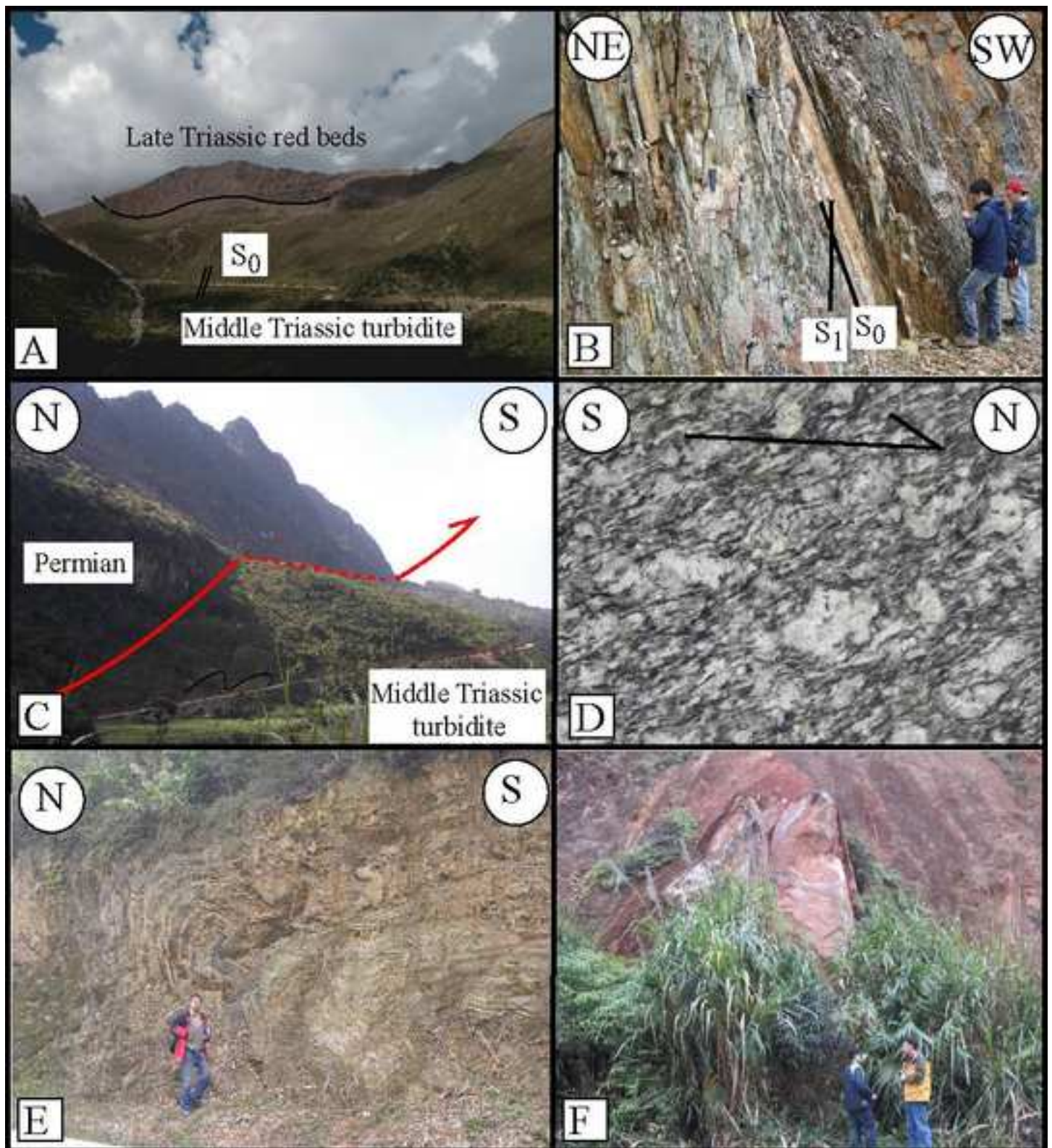


Fig. 4

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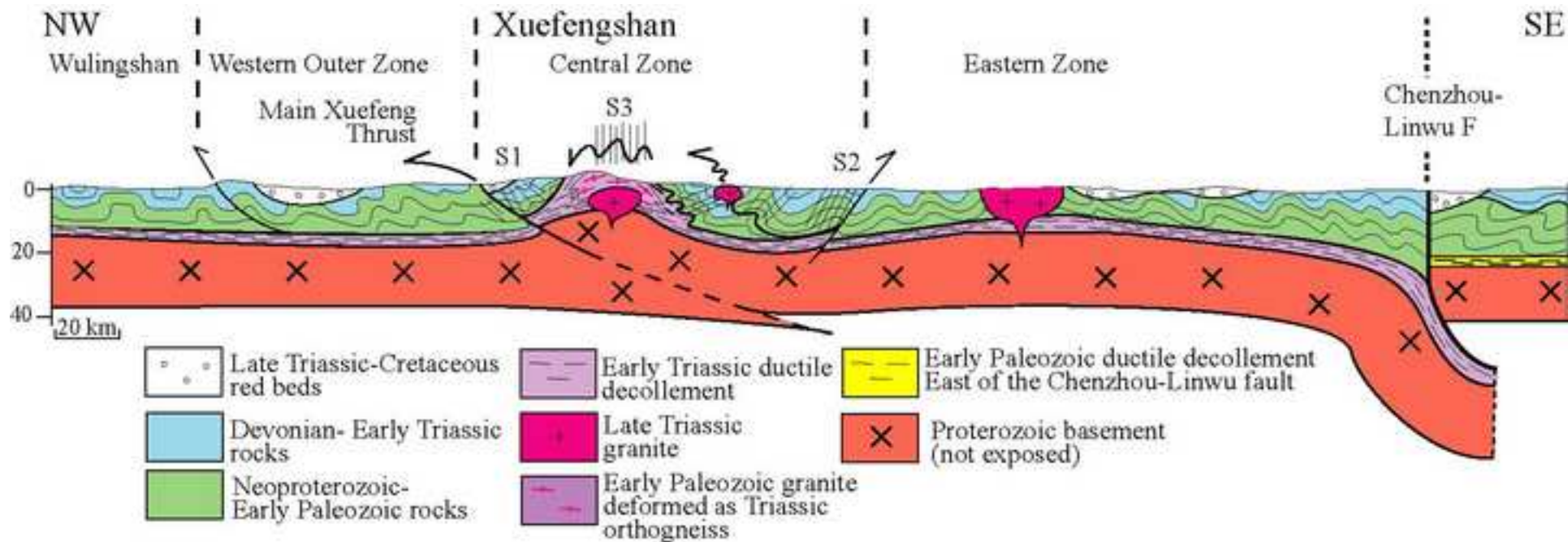


Fig 5

Figure 6
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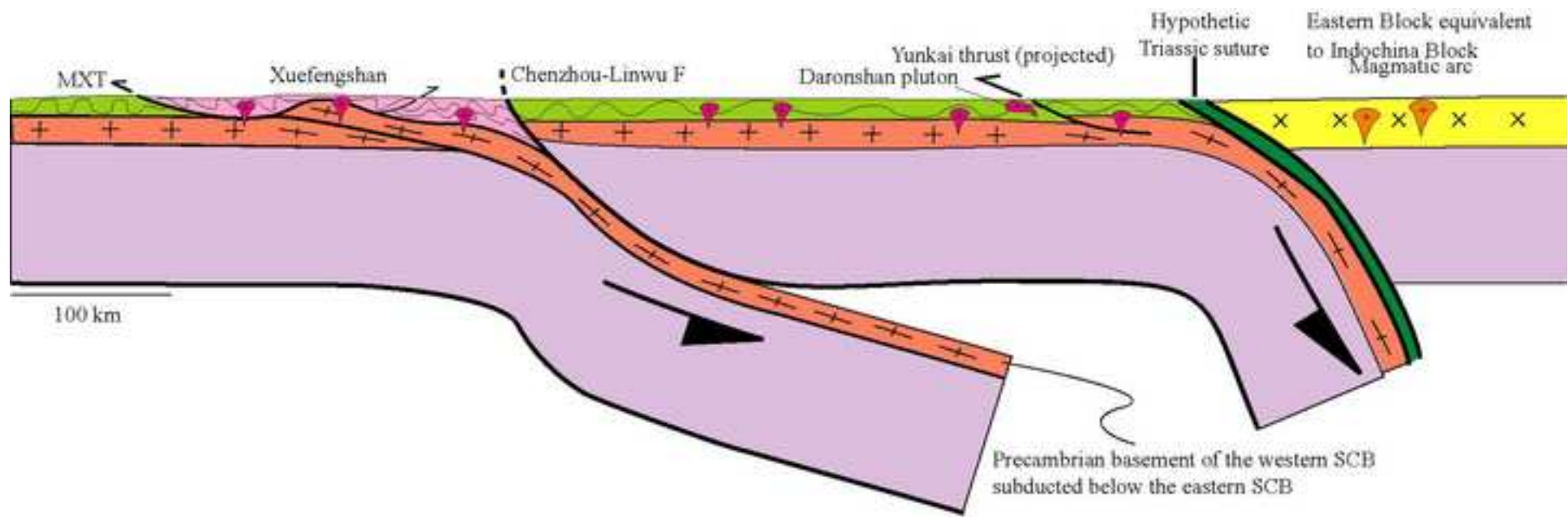


Fig. 6

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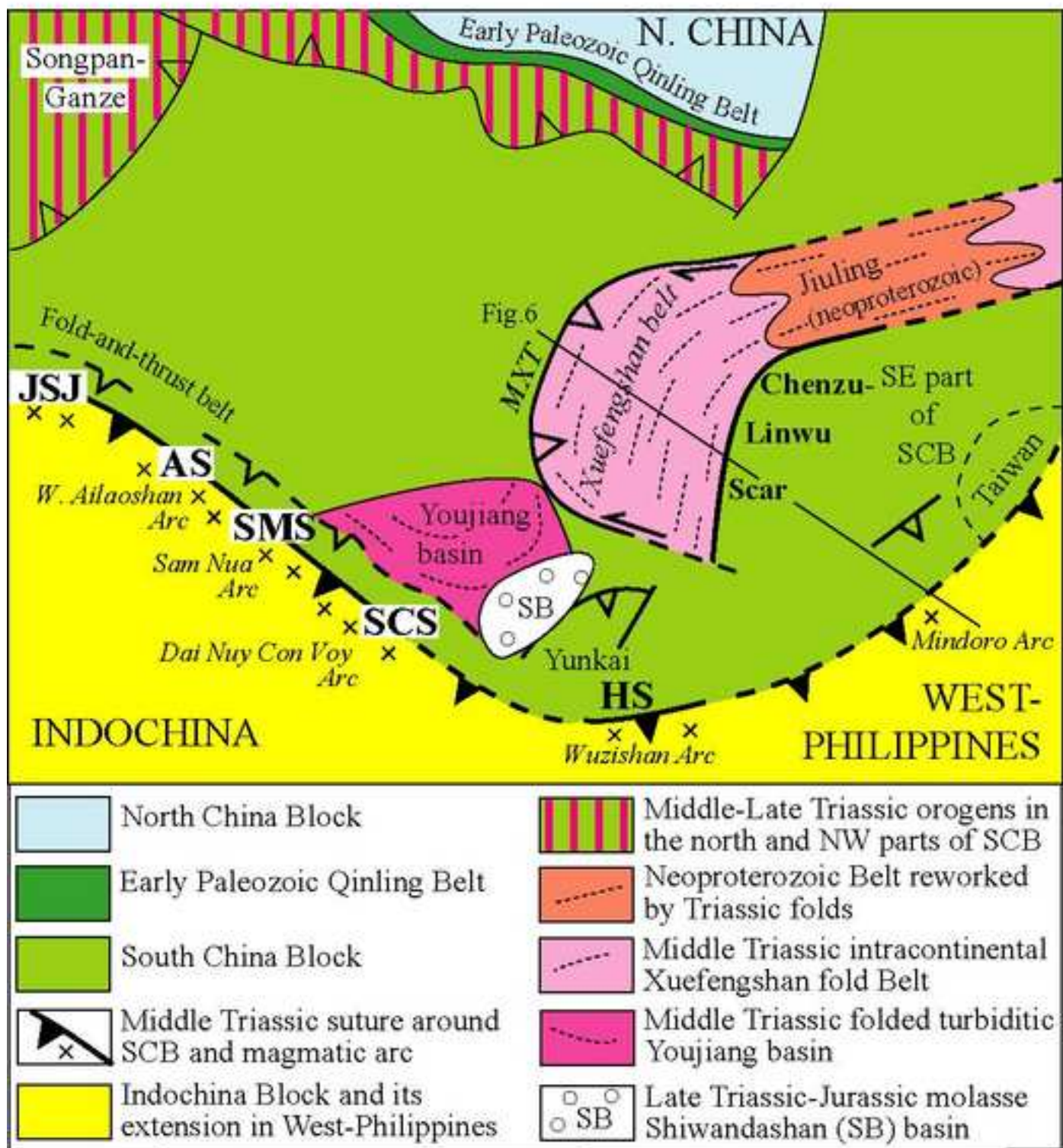


Fig.7