



HAL
open science

Combined use of Raman lidar and DIAL measurements and MESO-NH model simulations for the characterization of complex water vapour field structures and their genesis: a case study from HyMeX-SOP 1

Paolo Di Girolamo, Marie-Noelle Bouin, Cyrille Flamant, Donato Summa,
Benedetto de Rosa

► To cite this version:

Paolo Di Girolamo, Marie-Noelle Bouin, Cyrille Flamant, Donato Summa, Benedetto de Rosa. Combined use of Raman lidar and DIAL measurements and MESO-NH model simulations for the characterization of complex water vapour field structures and their genesis: a case study from HyMeX-SOP 1. 22nd EGU General Assembly, May 2020, Online, Unknown Region. pp.16666, 10.5194/egusphere-egu2020-16666 . insu-04451761

HAL Id: insu-04451761

<https://insu.hal.science/insu-04451761>

Submitted on 3 Jun 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Combined use of Raman lidar and DIAL measurements and MESO-NH model simulations for the characterization of complex water vapour field structures and their genesis:

Water vapour mixing ratio: $\Delta T=5$ min; $\Delta z =30$ m

Paolo Di Girolamo¹, Marie-Noelle Bouin², Cyrille Flamant³, Donato Summa⁴, and Benedetto De Rosa¹

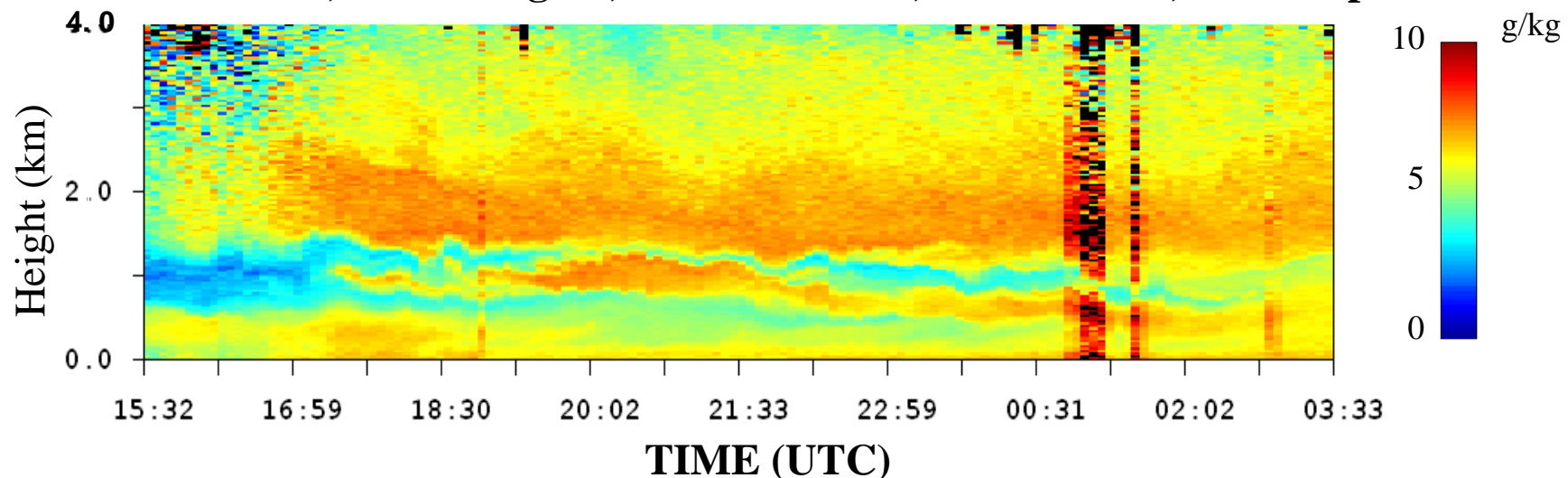
¹ *Scuola di Ingegneria, Università degli Studi della Basilicata, 85100 Potenza, Italy, digirolamo@unibas.it*

² *Météo-France /CNRM, 29280 Plouzané, France*

³ *LATMOS/IPSL, UPMC Univ. Paris 06 Sorbonne Universit'es, UVSQ, CNRS, Paris, France*

⁴ *IMAA-CNR, 85050 Tito Scalo (Pz), Italy*

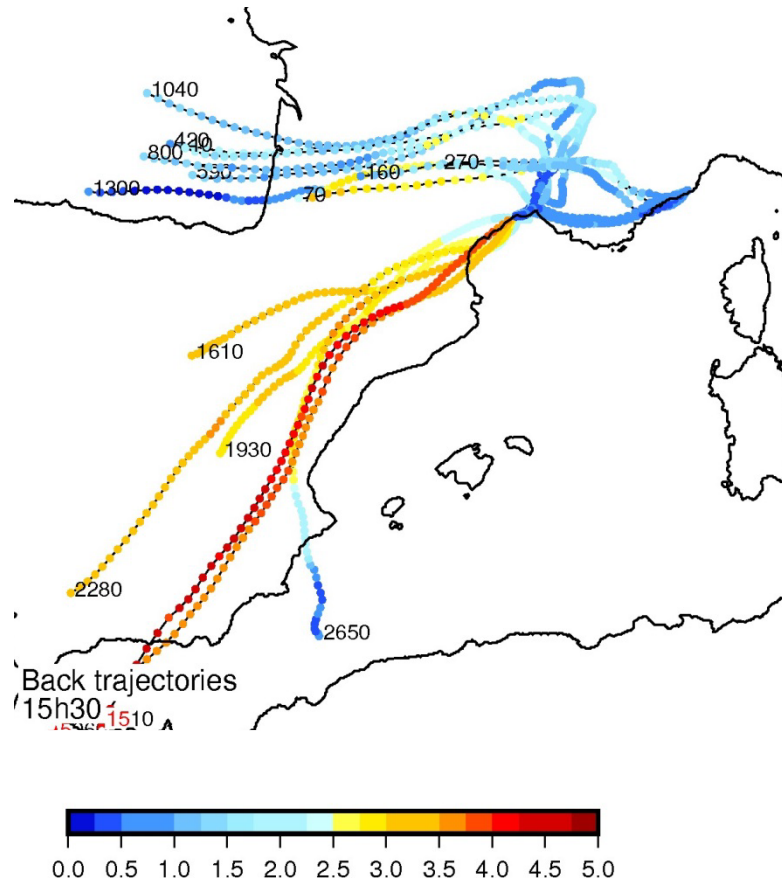
IOP 8 - BASIL, Candillargues, 43°36'40.10"N ; 4° 4'15.80"E, 28-29 September 2012



Measurements carried out by BASIL on 28 September 2012 reveal a **water vapour field** characterized by a **quite complex vertical structure**.

Goal: Assess the **origin** and **transport path** of the **different humidity filaments** observed by BASIL on this day based on the comparison with data from **MESO-NH model**.

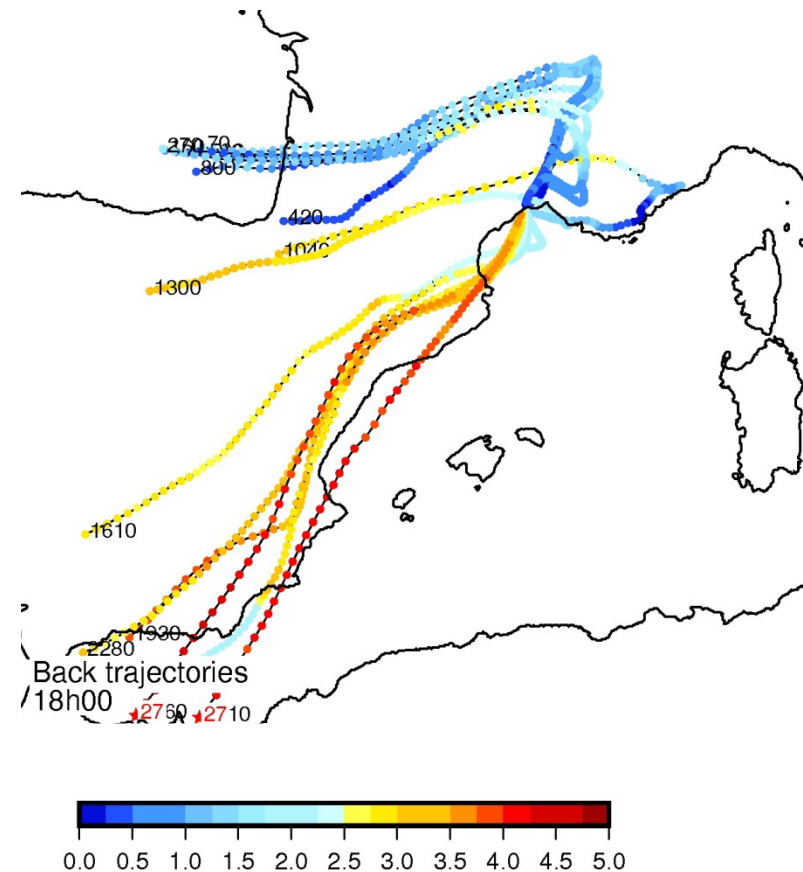




Air masses within the lower of the two upper layers are found to overpass Southern Spain and Morocco, descending from an elevation of 2-3.5 km, while air masses within the uppermost layer (up to 4 km) are not tracked by MESO-NH.

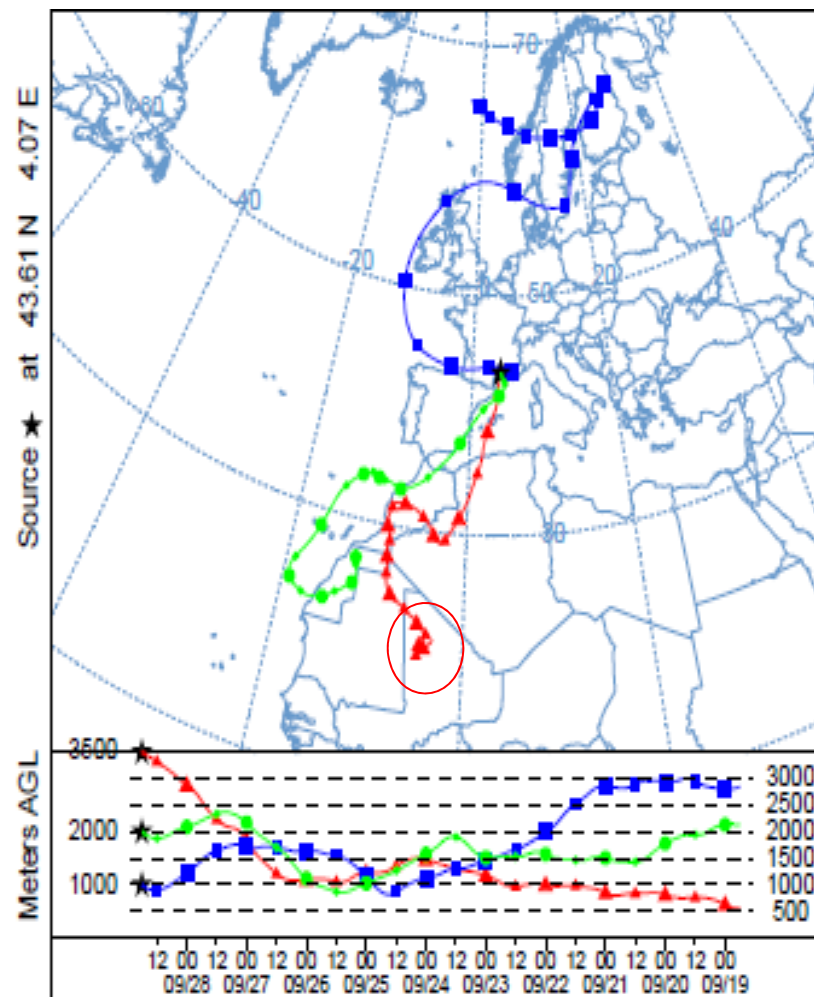
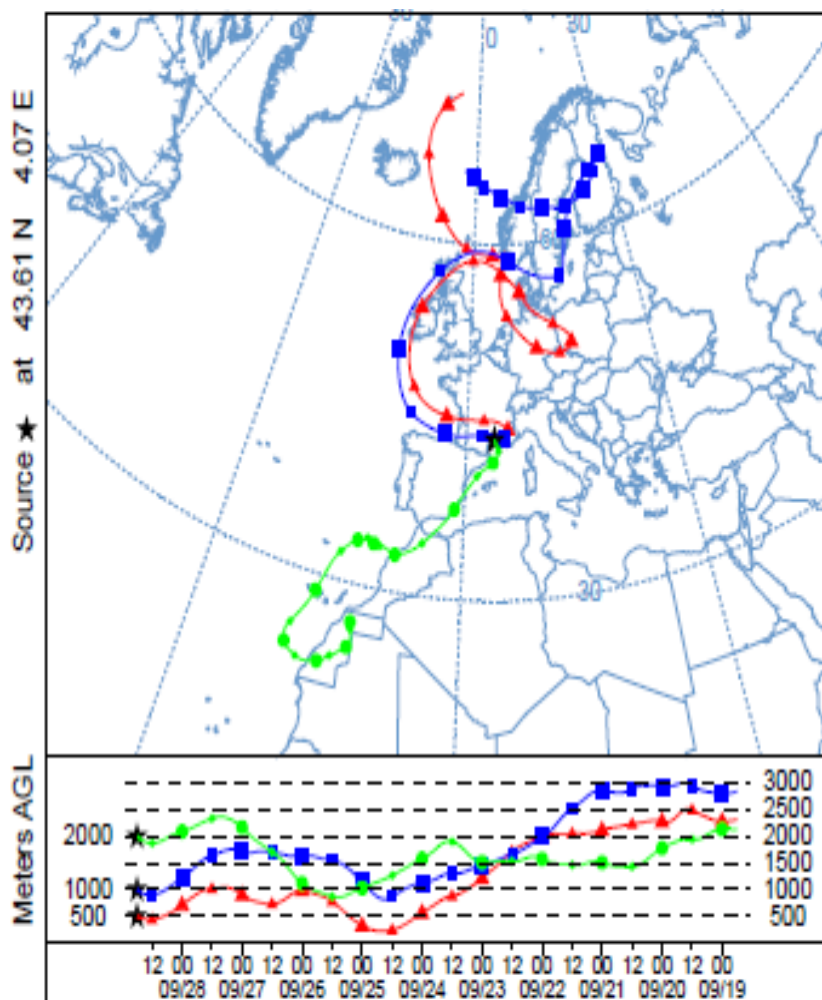
MESO-NH back-trajectory analysis reveals that:

- air masses within the surface humidity layer originated over the Atlantic Ocean,
- air masses within the elevated filamentary humidity layer also originated over the Atlantic Ocean, overpassing the sea stretch North of Spain and Southern France at an altitude of ~1 km.



Back-trajectory analysis from HYSPLIT extended further back in time (10 days)

Back-traject. analysis from HYSPLIT ending in Candillargues at the altitudes of the observed humidity layers : 18:00 UTC on 28 Sept. 2012 and starting 240 hours (10 days) earlier (18 Sept. 2012).



The back-trajectory extended back in time by 240 hours (10 days) reveals that air masses in the:

- the surface layer and the filamentary elevated structure originated over the North Atlantic;
- the lower of the two upper layers originated in tropical Atlantic area;
- uppermost humid layer, overpassed Algeria, originated over Central Africa (Mali).