



A Mediterranean atmospheric observatory in Corsica within the framework of HyMEx, ChArMEx and MERMEEx

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Corsica is an island, located in the remote western Mediterranean Sea, regularly affected by intense meteorological events: windstorms, heavy precipitation, waves and coastal erosion, drought, forest fire, and lightning as a result of its topography. All these events are crucial for the economic activity of Corsica, which is mainly based on tourism, nautical activities, agriculture and farming.

In spite of recent improvements in operational forecasting, numerical weather predictions regularly fail to reproduce the intensity and distribution of precipitation of heavy rainstorms at the mesoscale. Local weather forecasters still have difficulties in predicting such precipitation events, particularly over the sea close to complex topography.

Corsica is also relevant for the study of most of intense precipitation cases affecting continental south eastern France and northern Italy, which are generally characterized by low level warm and wet fluxes from the south channelled not only by the continental orography but also by the Corsica-Sardinia island ridges. An upstream following of such heavy rainfall further south in the Mediterranean basin should allow a preconditioning phase study. Its geographical situation would allow Corsica to play the as yet unexploited role of a "sentry" for these events. In addition, Corsica is located near the most cyclogenetic area of the western Mediterranean basin.

In addition and due to the presence of various aerosol types over the Mediterranean region, such as mineral dust particles (mostly transported from the Saharan-Libyan deserts), anthropogenic aerosols (due to urban and industrial activities along the Mediterranean coast), but also biomass burning from forest fires and marine aerosols, atmospheric particles are likely to have a significant impact on the regional climate and on the hydrological cycle over the Med. basin. In parallel and due to high deposition fluxes of desert dust and anthropogenic aerosols (which sources are close and numerous), atmospheric inputs impact marine cycles of several chemical elements in the Mediterranean environment and could impact the regional ecosystem. Contrary to coastal stations, the Corsica Island (and more specifically the site of Ersa, Cap Corse) is a remote site, which is not impacted by local and regional anthropogenic inputs.

Furthermore, in spite of high level of ozone and aerosols concentration during the summer period, permanent observations of gas and aerosols in the background troposphere are sparse in both space and time over the western Mediterranean basin. In that sense, a Mediterranean observatory in Corsica should present a great interest for investigating different scientific questions related to aerosols and gases over the Mediterranean basin.

We propose to bring together initiatives concerning measurements in Corsica to create a Mediterranean observatory that would give the scientific community facilities for setting up a multiparametric observation platform in a region with little instrumentation at present.

In the framework of HyMEx, ChArMEx and MERMEEx (<http://www.dt.insu.cnrs.fr/c-med/programmes.php>), several initiatives around measurements in Corsica have emerged:

- Suggestions to improve the existing data network with ground-based conventional weather stations, radiosounding station (profiles of temperature, humidity, wind speed and direction, and O₃ measurement), radars, etc.);

- Deployment of a wind profiler network around the western Mediterranean basin and in the island area;
- Thunderstorm and lightning activity studies;
- Observation of Transient Luminous Events associated with thunderstorms;
- Deployment of a Lightning Mapping Area;
- Forest fire studies;
- Numerical studies of heavy precipitation events.
- Establish a climatology of the low troposphere composition (O₃ and precursors)
- Characterization of the aerosol microphysical and optical properties & vertical profiles;
- Studies of the aerosol mixing;
- Determination of the aerosol direct radiative impact and climate over the Mediterranean;
- Impact of long-range transport on the gaseous and particulate air quality;
- Deposition fluxes of desert dust and anthropogenic aerosols and their input of soluble elements (Fe, P, N, Hg...) impacting the marine trophic chain.

This Corsican observatory would operate for all HyMEx, ChArMEx and MERMEx Long Observation Period, Enhanced Observation Period and Special Observation Periods. In addition to that, this observatory will be also supported by the MOOSE network (Mediterranean Ocean Observing System on Environment) to maintain a long term atmospheric observation of key parameters in this site. All atmospheric (and oceanographic) measurement initiatives in Corsica are welcome to join the project.