Validation and exploitation of the FORUM mission products using the PANACEA infrastructure of PANGEA Observatory

V. Amiridis1, D. Balis2, V. Daskalopoulou1, A. Georgiou1, E. Gerasopoulos2, V. Daskalopoulou3, A. Gialitaki3, A. Gkikas1, M. Kanakis1, S. Kazadzis3, C. Kontoes2, E. Marinou1, N. Mihalopoulos3, A. Papayannis1, E. Proestakis5, E. Sojolos1, E. Tsokri1, A. Tsekeri1, C. Zerefos5

1National Observatory of Athens, Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing (IAASARS), Athens, Greece
2Aristotle University of Thessaloniki, Physics Department, Laboratory of Atmospheric Physics Thessaloniki, Greece
3National Observatory of Athens, Institute for Environmental Research and Sustainable Development (IERSD), Athens, Greece
4Environmental Chemical Processes Laboratory, Department of Chemistry, University of Crete, Voutes, Heraklion, Greece
5Department of Physics, National Technical University of Athens, Athens, Greece.

Contact authors: Vassilis Amiridis (amiridis@noa.gr) and Christos Zerefos (zerefos@polytec.noa.gr)

Abstract

PANGEA (PANhellenic GEOphysical observatory of Antikythera) is a large-scale scientific facility for climate, energy and weather research installed at the remote island of Antikythera, situated in the southwestern parts of Greece, and consists of a representative background station for the E. Mediterranean, a region well-known for its complex atmospheric environment. This environment is characterized by interactions of Saharan dust transport and complex synoptic cloud conditions, suitable for validating cloud products by the FORUM mission. In this site, a variety of monitoring activities are implemented via the deployment of ground-based active and passive remote sensing systems, cloud radar, microwave radiometer, in-situ and trace gases instruments, which contribute to global and European networks (i.e., AERONET, EARLINET). Recently, PANGEA has been established by EEA as a cal/val center of the Aeolus and EarthCARE satellites, underpinning the expansion to other forthcoming Earth Observing (EO) missions such as FORUM. Moreover, the PANGEA supersite is a core station of the PANhellenic infrastructure for Atmospheric Composition and climate change (PANACEA). PANACEA, with active participation in ACTRIS/ESFRI and evolving collaboration with ICOS/ERIC, is the Hellenic network for atmospheric monitoring through merging, upgrading and coordinating all existing Greek ground-based stations and networks under a single integrated Research Infrastructure (RI). PANACEA will coordinate dedicated validation campaigns of the FORUM mission at the PANGEA Observatory. The acquisition of radiances at the far-infrared by the FORUM mission, for the first time, offers a unique opportunity to evaluate the performance of the Radiative Transfer Models (RTMs) in this less familiar range of the electromagnetic spectrum under complex synoptic cloud and aerosol conditions particularly those that prevail in the Eastern Mediterranean.

PANACEA RI

Radiation measurements

PANCAE, with active participation in ACTRIS/ESFRI and evolving collaboration with ICOS/ERIC, is the Hellenic network for atmospheric monitoring and climate change at a nationwide spatial coverage. This is achieved through merging, upgrading and coordinating all existing Greek ground-based stations and networks under a single integrated Research Infrastructure (RI). PANACEA consists of stations equipped with an ensemble of advanced atmospheric probing instrumentation for aerosols, greenhouse and trace gases, radiation and clouds, operating according to international standards and existing European network protocols. PANACEA will coordinate dedicated validation campaigns of the FORUM mission at the PANGEA Observatory.

Validation

- Atmospheric humidity and temperature profiles.
- Geometrical features (i.e. cloud top height), microphysical properties (i.e. ice water path, effective particle size) and optical properties (i.e. optical depth) of cirrus clouds.

Exploitation

- Simulations of FIR radiances based on Radiative Transfer Models (RTMs) initialized with quality-assured measurements obtained at the PANGEA Observatory.
- Evaluation of RTMs’ outputs against FIR radiances acquired from the FORUM mission.
- Assessment of RTMs deficiencies and consideration of potential upgrades.