

**Contribution to the National Report
(ITALY)
for the 10th WMO/UNEP Ozone Research Managers Meeting of the Parties to the
Vienna Convention, 28-31 March 2017, Geneva, Switzerland
(PARTIAL) UPDATE 2013-2016**

The contributing institutions are:

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1. Ozone and ozone-related observation systems (column, profiles, UV, etc.):

CETEMPS/UNIVAQ: The ozone total columns observed on routine basis at L'Aquila (683 m a.s.l., 43.38°N, 13.31°E) are derived from the balloon ozone-sonde profiles. The ozone profiles (balloon-sonde) have been collected since 1994. From 2004 this activity has achieved a routine pace: about 2 ozone profiles (from ground up to 10hPa altitude) per month (This activity is also part of the commitments included in a Convention between University of L'Aquila/CETEMPS -*Centre of Excellence for the integration of remote sensing techniques and modelling for the forecast of severe weather*- and Italian Government/Ministry of Environment. The Italian Ministry of Environment (*Ministero dell'Ambiente e della tutela del Territorio e del Mare*) provides the needed resources for the acquisition of the ozone-sondes, and the maintenance of the radio-sonde system, as well as, of several other instruments (i.e., sunphotometer and UV sensors). The ozone profiles database has been available for several calibration/validation campaigns. UV-A and UV-B (Yankee Environmental Systems) instruments have been operating since 2004. Continuous monitoring of the aerosol radiative properties is performed with an AERONET sunphotometer (<http://aeronet.gsfc.nasa.gov/>), and water vapor mixing ratio and aerosol backscatter and extinction vertical profiles are measured with a EARLINET Raman lidar (<https://www.earlinet.org/>)

ENEA-MET CLIM: It uses data from: NASA TOMS, NOAA (SBUV), EOS Aura (OMI, MLS), Odin (Osiris, SMR), Envisage (SCIAMACHY, GOMOS, MIPAS), GOME, and ozone-sonde profiles from WOUDC, as well as, data by aircraft measurement campaigns like those ones included in <http://clasp.engin.umich.edu/SASSarchive/>.

CNR-ISAC: The CNR performs measurements of the ozone column and surface solar UV irradiance at Ny-Ålesund (Svalbard, Arctic), Bologna (Italy) and Concordia station (Antarctic) making use of a very-narrow-band filters radiometer UV-RAD designed and built at ISAC in the frame of the Italian Antarctic polar programme to perform accurate monitoring of the solar UV irradiance in remote regions with harsh environment. UV-RAD radiometer performs measurements in 7 very narrow bands from 290 and 400 nm. The reliability of the system has been proved in a couple of intercomparison campaign, the last made in Ny Alesund (79°N) with the reference spectroradiometer QUASUME realised at PMOD (Davos). ECC ballon sounding of vertical ozone profiles were carried at S. Pietro Capofiume, WODC #297 station.

2. Data storage and availability

CETEMPS/UNIVAQ: The extended ozone profile database (1994-2016 Electrochemical Concentration Cell balloon soundings, and 1991-1999 Differential Absorption Lidar measurements) has got the quality-standards for being used in analysis concerning the possible trends of the ozone content in the different atmospheric levels. Free access to the ozone data plots in:

http://cetemps.aquila.infn.it/osservatorio/Ozone_soundings_plots/.

UV-A and UV-B data as measured with full sky calibrated pyrometer, are also available (2004-2016). The Raman lidar data are in <https://www.earlinet.org/>.

CNR-ISAC: Corresponding data sets for periods from 2008 (Ny-Ålesund), 2005 (Bologna) and 2007 (Concordia) until now are collected by ISAC-CNR and are available on request. The balloon-borne ozone profiles taken in San Pietro Capofiume (1991-1997 period) are also available.

3. Key-words of related science (it can include theory and modelling):

CETEMPS/UNIVAQ: Stratospheric and tropospheric ozone monitoring, UV monitoring, aerosol and water vapour monitoring, research and assessment studies on stratospheric ozone using a global chemistry-transport model and a chemistry-climate coupled model.

ENEA-MET CLIM: Validation of Ozone in inter-comparison projects as Chemistry Climate Model Initiative (CCMI). Model study of interactions between climate and ozone.

CNR-ISAC: Atmospheric optics, ozone and UV climatology and modelling at high and low latitudes, surface UV fluxes, erythema and DNA damage doses, ozone in Antarctica and Arctic and influence at middle latitudes, effects of solar UV irradiance on human health and biological systems, radiative transfer in the atmosphere. ozone vertical profiles, troposphere, stratosphere, ECC, balloon borne.

4. Future plans:

CETEMPS/UNIVAQ: Keep going the observational activities: ozone balloon soundings, UV, photometric and lidar experiments.

ENEA-MET CLIM: Improving the database extension for the assessment studies (i.e., including ESA-CCI).

CNR-ISAC: Maintaining of the radiometers working at the three sites and integration of the available measurement stations and instruments at Svalbard in a local network. In Antarctica, to extend the measurements on the coast at Mario Zucchelli station (MZS) comparing them with those performed at Mendel station (MS, Antarctic Peninsula) by Czech colleagues (Kamil Láška, Masaryk University, Brno). Operate to create a regional network integrating the stations placed in the East Antarctica, Concordia, MZS, MS and the instruments used by other Italian groups in cooperation with Argentina.

5. Needs and recommendations:

CETEMPS/UNIVAQ: The interaction between climate change and ozone recovery is quite evident, and its understanding needs to continue the high quality observations of ozone column and vertical profiles. In general, a more efficient coordination among the different Italian Research Institutions and Universities involved in "ozone research" is advisable. The ORM could trigger a renewed interest of the parties, if suggesting that, on national basis, research infrastructures, including the different research entities, should be founded to keep going the ozone research activities, among others.

ENEA-MET CLIM: Expecting longer high-quality data time series for trends detection.

CNR-ISAC: More frequent quality control of the instruments that are placed at the polar areas is an important task that need to be regularly performed. In this regard, the development of the instruments and formation of structures at international (European) level that could perform regular quality control will give a great contribution to the ozone and UV irradiance monitoring at these remote sites.

This report has been compiled in March 2017.

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