

## **7.21 PERFORMANCES OF GROUND RADAR AND INFRARED SATELLITE NEW COMBINED ALGORITHM FOR THE ITALIAN PENINSULA**

**LEO PIO DADDERIO<sup>1</sup>, GIANFRANCO VULPIANI<sup>2</sup>, SILVIA PUCA<sup>2</sup>, GIULIA PANEGROSSI<sup>1</sup>, PAOLO SANO<sup>1</sup>, ANNA CINZIA MARRA<sup>1</sup>, STEFANO DIETRICH<sup>1</sup>**

<sup>1</sup> Institute of Atmospheric Sciences and Climate, National Research Council, Rome, Italy

<sup>2</sup>Department of Civil Protection, Presidency of the Council of Ministers, Rome, Italy

lepio.dadderio@artov.isac.cnr.it

The Italian radar network is currently composed by 20 C-band and 2 X-band systems, managed by 11 administrations, able to cover most of the country. The product generation at national level is carried out by the Department of Civil Protection (DPC) that currently manages 7 C-band and 2 X-band systems, all with dual-polarization capability. The national mosaic provides an estimation of the precipitation intensity with a ten minutes time resolution over a equally-spaced 1 km grid. A Quality Index (QI) map is associated to the rainfall rate map, taking into account the radar artifacts, the partial beam blockage, the height of measurements with respect to the freezing layer, the beam broadening and the rain path attenuation.

The geostationary Meteosat Second Generation (MSG) Spinning Enhanced Visible and Infrared Imager (SEVIRI) provides high-quality measurements across twelve visible (VIS) and infrared spectral (IR) bands. Several techniques have been developed exploiting VIS or IR observations (individually or in a combined way) to relate the cloud features to the surface precipitation. One of them is the blending Rapid Update (RU) technique combining IR observations with precipitation estimates obtained from spaceborne passive microwave radiometers, and used operationally within the EUMETSAT H SAF program.

Within the collaborative agreement between DPC and the Institute of Atmospheric Sciences and Climate (ISAC) of the National Research Council (CNR) a new blended algorithm has been developed that combines the ground radar precipitation estimates and the IR observations from SEVIRI to provide a precipitation map over the whole Italian territory with SEVIRI spatial-temporal resolution. The satellite-based product can integrate the low QI ground radar measurements. The algorithm estimates the rain intensity (R) from the SEVIRI brightness temperature (TB) measurements on the basis of regression curves built from a training dataset from coincident IR and high QI radar observations. At the same time, a map of the probability of precipitation (POP) is generated. The two maps are combined to give the final product. The preliminary results show a greater reliability of both R-TB and POP-TB relationships during warm months (mainly characterized by convective precipitation) with respect to cold months. Furthermore, the results also show that the blended algorithm can help to individuate and remove radar-based false alarm due to interferences, radar malfunction, etc.

The assessment of the quality of the algorithm is carried out through a comparative study with the Italian rain gauge network, analyzing seasonal behavior over different geographical areas.

---