Plinius Conference Abstracts
Vol. 15, Plinius15-54, 2016
15th Plinius Conference on Mediterranean Risks

Performance of the H-SAF rainfall products on the Mediterranean basin: a quality-controlled validation with radar and rain gauges

Marco Petracca (1,2,3), Silvia Puca (1), Gianfranco Vulpiani (1), Daniele Casella (2), Stefano Dietrich (2), Anna Cinzia Marra (2), Giulia Panegrossi (2), Paolo Sanò (2), and Federico Porcù (4)

(1) Department of Civil Protection (DPC), Presidency of the Council of Ministers, 00189 Rome, Italy (Marco.Petracca@protezionecivile.it), (2) Institute of Atmospheric Sciences and Climate (ISAC) - National Research Council (CNR), 00133 Rome, Italy, (3) Department of Physics and Earth Science, University of Ferrara, 40122 Ferrara, Italy, (4) Department of Physics and Astronomy, University of Bologna, 40127 Bologna, Italy

The Satellite Application Facility on support to Operational Hydrology and Water Management (H-SAF) was established by the EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites) to improve capabilities in hydrological remote sensing science and techniques for assimilating hydrological observations into prediction models, particularly satellite retrieval observations.

The H-SAF generates products (precipitation, soil moisture, and snow cover) for operational hydrological applications starting from the acquisition and processing of data from Earth observation satellites in geostationary and polar orbits operated both by EUMETSAT and other satellite organization.

The retrieval of precipitation products uses data from microwave (MW) and infrared (IR) instruments and aims at reaching the best possible accuracy. The need to overcome the low temporal sampling of the polar satellites, and the need to have precipitation estimates in near real time (NRT) and at high spatial resolution, has led to the development of rainfall estimation techniques based on the combined use of IR radiances from geostationary images and passive microwave (PMW) precipitation retrievals. However, their accuracy critically depends on the quality of the PMW precipitation retrievals, on the availability of frequent PMW overpasses over the region of interest, and on the consistency among precipitation products derived from the different PMW radiometers.

Within the H-SAF portfolio, two rainfall products have been specifically developed for hydrological purposes and NRT applications for extreme event monitoring, both derived by the combination of IR and MW passive observations: PR-OBS-3 and PR-OBS-5.

The present work is aimed at showing the results of the validation activity carried out on the Mediterranean basin using the available ground reference data (radar, rain gauge and integrated data). The adopted validation methodology can be summarized by the following few steps: (1) ground data (radar and rain gauge) quality control; (2) spatial interpolation of rain gauge measurements; (3) up-scaling of radar data to satellite native grid; (4) temporal comparison of satellite and ground-based precipitation products; and (5) production and evaluation of continuous and multi-categorical statistical scores.

As expected, the analysis outlined a remarkable improvement of the H-SAF rainfall algorithms performance if the quality of the benchmark was used to constraint the comparison. Regarding the comparison with radar rainfall estimates, it was found an average impact higher than 20%, up to 50% for some specific cases, whereas the best scores were obtained using the rain gauge data as reference. Good results were obtained for high rainfall regimes. Finally, promising results have been obtained in case the reference rainfall field is obtained by merging the gauge and radar observations.