

## **Study on the impact of SAR Soil Moisture Data on the**

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The PSU/NCAR Mesoscale Model (MM5) has been used together with acquisition performed by the Advanced Synthetic Aperture Radar (ASAR) on board ENVISAT to evaluate the impact of the ASAR retrieved soil moisture content on the weather forecast, in particular on the surface precipitation fields predicted by the model. Different case studies of either mild or severe precipitation in different Italian regions, for which ASAR data were available, were taken under consideration: the Tanaro basin (25 April 2009), Arno basin (30 November 2009), Tiber basin in Umbria (27 November 2009), and Lazio (3 October 2008). Raingage data available for these case studies have been used to validate the results. The model has been used on four nested domains, at 27 km, 9 km, 3 km, and 1 km horizontal resolution, with the Noah Land-Surface Model parameterization. For each case study, ECMWF data analysis was used to initialize the model, and the soil moisture content field from ECMWF was used for the control run. For the sensitivity studies, the ASAR retrieved soil moisture data were averaged at the MM5 inner domain horizontal resolution, merged with the ECMWF data were the ASAR data were not available, and used to initialize the model. A significant bias was found between the ASAR soil moisture content values in the inner domain and the ECMWF values. This bias was removed in the initialization of all nested domains in order to have a soil moisture content consistent with the observations. Both the use of the highly resolved ASAR soil moisture field in the inner domain and the bias found, have shown a significant impact on the ability of the model to predict both the time and the intensity of the precipitation. In most cases it has shown a better agreement of the precipitation intensity to the observed one, especially in the occurrence of intense precipitation. The results of this study and the potentials for future applications will be discussed.