LAND SURFACE ALBEDO AND DOWNWELLING SHORTWAVE RADIATION FROM MSG GEOSTATIONARY SATELLITE: METHOD FOR RETRIEVAL, VALIDATION, AND IMPACT ASSESSMENT IN NWP AND LSM MODELS

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The European Meteorological Satellite Organization (EUMETSAT) maintains a number of decentralized processing centers. The Portuguese Meteorological Institute hosts the Satellite Application Facility on Land Surface Analysis (LSA-SAF) (http://landsaf.meteo.pt/). The objective of the LSA-SAF is to provide added-value products for the meteorological science communities. Since 2005 observations from METEOSAT SG / SEVIRI are routinely processed in near real time by the LSA-SAF operational system based in Lisbon to deliver in an operational mode relevant surface products amongst which albedo, temperature, down-welling radiation fluxes, and vegetation parameters. The down-welling shortwave radiation is calculated at 30 minutes interval based on a every second SEVIRI imagery. It essentially depends on solar geometry and clouds. The albedo product is delivered on a daily basis in order to capture rapid evolution such as ones caused by snowfalls. The algorithm to estimate surface albedo fully exploits the daily variability of solar geometry of illumination.

The relevance of LSA-SAF albedo product is analyzed through a weather forecast model (ALADIN) in order to account for the inter-annual spatial and temporal variability. Results clearly show a positive impact on the 12 hour forecast of 2m temperature in Mediterranean regions. The added value brought by the use LSA-SAF shortwave and long-wave products is also diagnosed through SURFEX Land Surface Models (LSM)
simulations with the surface temperature, the water content and the energy fluxes. The SAFRAN system provides a high-resolution atmospheric analysis over France in off-line mode for the category of Land Surface Models (LSM) devoted to meteorological or hydrological studies. A comparison is established between incoming solar and infrared radiation fluxes between SAFRAN and LSA-SAF products through LSM simulations. The impact on temperature, water content, and energy fluxes simulated at surface level and in the root-zone (up to 1.5 m depth) is in favor of the use of LSA-SAF satellite estimates.

References
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