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Mapping of soil moisture through a land temperature assimilation scheme under different surface conditions: an application to Central Italy

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In recent studies, assimilation of remotely sensed Land Surface Temperature (LST) maps has been successfully used to retrieve indices of soil wetness e and surface heat and moisture fluxes. In order to broaden the operational applicability of the scheme to different meteorological conditions and land cover types, two key factors have to be considered: a) the dual effect of soil and vegetation emission on the radiometric temperature observed from satellite and b) the fact that precipitation events occurring during the assimilation period modify the surface thermal dynamics. Such issues can be addressed with specific formulations of the scheme, writing the equations of the physical constraints with regard to parameters that take into account the above-mentioned effects. In this work the two formulations of the scheme for the estimation of surface evaporative fractions are presented. The formulation of the assimilation schemes presented allows to benefit from different types of satellite-based LST products, with different accuracies and temporal/spatial resolutions. The two models are applied to the territory of Tuscany region for a two-months period in 2005. Several moderate precipitation vents occurred during the study period, and the area presents a wide variety of land cover types. The results obtained with the two schemes are discussed and the relative performance for different land cover types and meteorological conditions is analyzed.