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A one-layer satellite-based surface energy balance for estimating evapotranspiration of the semi-arid catania plain area (italy)

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In the study, daily evapotranspiration fluxes over the semi-arid Catania Plain area (extension of about 20 000 ha) were evaluated using remotely sensed data from Landsat Thematic Mapper TM5 images. A one-source parameterization of the surface sensible heat flux exchange using satellite surface temperature has been used. The transfer of sensible and latent heat is described by an aerodynamic resistance and a surface resistance. Required model inputs are brightness temperature, fractional vegetation cover or leaf area index, albedo, crop height, roughness lengths, net radiation, air temperature and wind speed. The aerodynamic resistance (r_{ah}) is formulated on the basis of the Monin-Obukhov surface layer similarity theory and the surface resistance (r_s) is evaluated from the energy balance equation using remote sensed data of surface temperature. The instantaneous values of surface fluxes were converted into evaporative fraction (EF) and available energy (AE) over the heterogeneous land surface to derive daily values of evapotranspiration.

The surface flux data obtained from the approach were validated with the data collected from the Surface Renewal-Energy Balance station located in the area of experiment. The expected variability associated with ET flux measurements suggests that the approach-derived surface fluxes were in acceptable agreement with the observation.