



Prototype of drought monitoring and forecasting system for Tuscany region

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LaMMA Consortium and IBIMET-CNR Institute are developing an operational system for drought monitoring and medium-long time forecasts in Tuscany region (Central Italy), in order to deliver periodical, timely, affordable, geo-referenced information about areas affected by an increasing reduction of available water resources.

The coupled rainfall based and satellite derived monitoring system, consisting of a set of indices suitable for our region, allows the assessment of vegetation moisture and temperature conditions at different spatio-temporal scales. An analysis of vegetation performances related to temperature and moisture stress is made throughout Normalized Difference Vegetation Index (NDVI) anomalies and Vegetation Health Index (VHI), derived from the Terra-MODIS satellite products. These indices are selected in order to enhance the climate-based Standardized Precipitation Index (SPI) and Effective Drought Index (EDI), which provide multiple time scale drought occurrence and duration.

Data of SPI elaborated from daily E-OBS gridded precipitation dataset from the ECA&D (European Climate Assessment & Dataset) project provide the base for seasonal outlooks of drought evolution. Forecasts of the next 1-3 months follow a physically-based statistical approach based on an “adaptive multi-regressive method” that takes into account potential predictors among a list of physical atmospheric indices and Sea Surface Temperature (SST) anomalies.

Information about current condition and future evolution of a drought event is periodically delivered on the LaMMA web site and uploaded on an Open Source WebGIS platform. On-line monthly bulletins furnish a detailed description of drought evolution and an analysis of its impacts on forests and main tree crops in the last 30 days and a forecast of the next 3 months.

This comprehensive framework can represent a quasi-real time and user-friendly web access multi-purpose operational service for final users, potentially able to give “easy to read” information useful for managing drought-related emergencies as crop yields losses, forest fires and water resources reduction.