



Semi-automatic handling of meteorological ground measurements using WeatherProg: prospects and practical implications

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WeatherProg is a computer program for the semi-automatic handling of data measured at ground stations within a climatic network. The program performs a set of tasks ranging from gathering raw point-based sensors measurements to the production of digital climatic maps. Originally the program was developed as the base-line asynchronous engine for the weather records management within the SOILCONSWEB Project (LIFE08 ENV/IT/000408), in which daily and hourly data were used to run water balance in the soil-plant-atmosphere continuum or pest simulation models. WeatherProg can be configured to automatically perform the following main operations:

- 1) data retrieval;
- 2) data decoding and ingestion into a database (e.g. SQL based);
- 3) data checking to recognize missing and anomalous values (using a set of differently combined checks including logical, climatological, spatial, temporal and persistence checks);
- 4) infilling of data flagged as missing or anomalous (deterministic or statistical methods);
- 5) spatial interpolation based on alternative/comparative methods such as inverse distance weighting, iterative regression kriging, and a weighted least squares regression (based on physiography), using an approach similar to PRISM.
- 6) data ingestion into a geodatabase (e.g. PostgreSQL+PostGIS or rasdaman).

There is an increasing demand for digital climatic maps both for research and development (there is a gap between the major of scientific modelling approaches that requires digital climate maps and the gauged measurements) and for practical applications (e.g. the need to improve the management of weather records which in turn raises the support provided to farmers). The demand is particularly burdensome considering the requirement to handle climatic data at the daily (e.g. in the soil hydrological modelling) or even at the hourly time step (e.g. risk modelling in phytopathology). The key advantage of WeatherProg is the ability to perform all the required operations and calculations in an automatic fashion, except the need of a human interaction upon specific issues (such as the decision whether a measurement is an anomaly or not according to the detected temporal and spatial variations with contiguous points).

The presented computer program runs from command line and shows peculiar characteristics in the cascade modelling within different contexts belonging to agriculture, phytopathology and environment. In particular, it can be a powerful tool to set up cutting-edge regional web services based on weather information. Indeed, it can support territorial agencies in charge of meteorological and phytopathological bulletins.