EMS Annual Meeting Abstracts
Vol. 16, EMS2019-946, 2019

Automatic spatial quality control of meteorological in-situ observations

Line Båserud, Cristian Lussana, Lousie Oram, Ketil Tunheim, Thomas N. Nipen, Ivar A. Seierstad, and Ole Einar Tveito

Norwegian Meteorological Institute, Oslo, Norway (cristianl@met.no, lineb@met.no)

The quality control has always been a crucial task for any climatological, meteorological and hydrological application using observed data. The rapid increase in the number of in-situ observations, the pressure to provide real-time products at hourly -or sub-hourly- time rate and the diversification of the observing systems pose new challenges to the developer of quality control tools.

A viable solution is to exploit the expected spatial consistency and continuity of the meteorological fields to detect suspect observations. In fact, spatial data quality control allows us to develop reliable routines that can be used in operational chains.
TITAN is such a quality control (QC) tool applied operationally within the Norwegian Meteorological Institute (MET) where the in-situ observations of essential climate variables are used not only to provide high quality time series data and observational gridded datasets but also to post-process weather forecasts available to the general public on the widely used service Yr.no. TITAN has been designed following the concepts: (i) all the available observations need to be quality controlled, from professional weather stations managed by expert staff at MET to amateur stations; (ii) the procedure must be quick and robust enough to serve real-time applications. By using all the available information we accept to use stations that may have a very short time-series available, such as some of the amateur stations, though being aware that a higher level of uncertainty must be associated to the quality of their observations.

TITAN tests all the observations referring to the same observation time simultaneously and it has been tested for surface variables: air temperature and total precipitation, at daily and hourly time steps. Available checks are (applied sequentially as in this list, though the actual application and configuration of each test is variable-dependent): Plausibility check; Climatological check (predefined range for each month); Buddy-check; Isolated event test both over and under multiple thresholds; Check against a deterministic first-guess field, such as a numerical model output or remote sensing-derived gridded field; Check against an ensemble of first-guess fields; Spatial Consistency Test (SCT); Check elevations against digital elevation model; Detect isolated observations. The system is configured such that is possible to have observation black-lists.

TITAN was originally developed for weather forecast post-processing purposes, in this contribution we present how the method is further developed and implemented for assuring climate data series. The inclusion of tests taking into account time series is a possible improvement of TITAN that will be discussed in this contribution.

TITAN is continuously under development at MET and it is linked to several projects. The code is open-source and available online at https://github.com/metno/TITAN.