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Distinction between small scale deterministic disturbance and stochastic noise within a complex quality control system

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Different working groups are concerned with data quality control and data assimilation. In the highly complex terrain like the Alpine area it is necessary to develop innovative methodologies for reasonable and sensible control of meteorological observational data.

Meteorological observations are afflicted with different kinds of errors. Some measurements are afflicted with gross errors, some with smaller errors. Errors could be systematic or stochastic. It is even possible that in the atmosphere disturbances may appear as an error but could be identified – after a closer look – as a physically explicable phenomenon. In an analysis of the atmospheric condition such phenomena should remain in the observed data set and therefore should not be corrected or eliminated by a quality control system.

The proposed poster presents a methodology differentiating small scale deterministic disturbances and stochastic noise within a complex quality control scheme. Within the scheme, high resolution patterns are used to filter small stochastic noise within the data. A minimization of first and second order derivatives of a cost function reduction is smoothing the noisy and large scale part of an observational value. The aim of the quality control mechanism is to preserve small scale physically explicable deterministic disturbances within data and to remove stochastic noise of observational values.

The quality controlled observational surface station data will be used for the Vienna Enhanced Resolution Analysis (VERA) Scheme which interpolates and downscales the irregularly distributed data to a regular grid with a horizontal resolution of 1 km.

In the presented Poster the performance of the method in comparison to the complex quality control operationally running and the improvements will be discussed. The limits and opportunities of the application will be explained.