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Connection between circulation classifications and daily precipitation types. Respecting the different scales with a hierarchical precipitation classification method.

Jean-Marie Lepioufle (1), Kolbjørn Engeland (2), Sølvi Amland (3), Cristian Lussana (1), and Ole Einar Tveito (1)

(1) MET Norway, (2) NVE Norrway, (3) UiO Norway

Our study is based on daily precipitation field measured by a manual-gages network over Norway during the period 1971-2011 and the circulation classifications got from the project COST733.

Many studies have been done on connecting precipitation rates or intermittency measured by rain gages with circulation classifications in order to find the circulation classification that best describes daily precipitation.

Nonetheless given the punctual support of the measures, the area of measures and the period of the measures, the precipitation field describes phenomena of large scales, regional scales and local scales.
Our method deals with filtering the different scales of the precipitation field.

First, a precipitation type classification based on SOM (Kohonen) has been established in order to describe daily large scale precipitation pattern over Norway. Connection between Circulation type classifications and daily precipitation types has been established by analyzing the Mutual Information (MI, related to Shannon entropy) between the two times series. The criterion of minimal redundancy and maximal relevance (mRMR) enables i-to get the circulation classification that best connects the daily precipitation types, ii-to know the number of precipitation types that best describe large scale precipitation.

In a second step, SOM kohonen classification has been established to spatially cluster precipitation field into small areas. Same method (MI) and criterion (mRMR) have been used. In that case, MI has been used as a bottom-up hierarchical clustering method by comparing similarity within spatial classes and between spatial classes.

First applications have been done using daily precipitation types in the spatial precipitation interpolation over Norway. The entire hierarchical classification for free stochastic precipitation simulation over Norway.