



Cyclonic precipitation

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Experience from traditional empirical-statistical suggest that local rainfall on daily time scales is difficult to reproduce with realistic characteristics. A crude model for precipitation falling in Norway can be formulated as a function with two input parameters representing the physical conditions associated with cyclonic influence (a) and local convective processes (b): $P=f(a,b)$. Here the local convective rainfall contribution is regarded as 'noise' and we search for a systematic statistical pattern associated with the presence and characteristics of cyclones. We search for significant differences in the rainfall characteristics for the cases when cyclones are present and not. The cyclone data based on ERA40 has been derived using a technique referred to as CCI (Benestad & Chen, 2006). The null-hypothesis is that there is no cyclonic influence, and that the precipitation is a result of random convective processes. Then we investigate whether there is a relationship between the amount of precipitation and the distance to the cyclone centre, its sector (angle), cyclone intensity, and whether this is significant. We also explore different seasons and locations, as convective activity is expected to be more active during summer and in south-eastern Norway, and compare with results from a more traditional analog model. Furthermore, a strong connection between the precipitation pattern and the cyclone location/strength can be used to validate the CCI results. We also explore the possibility of predicting the changes to the rainfall pdfs and use these predictions in conjunction with analog/CCI results and local quantile transformations to improve the projection of 24-hour precipitation.