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The influence of global warming on extremes in wet-day frequency and wet/dry spell durations in Norway

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Over the last century, the amount of mean precipitation in Norway has increased. Furthermore, the frequency of moderate to strong precipitation events has increased in most parts of the country, particularly in wet regions. If the global hydrological cycle is influenced by global warming, it is expected that more heavy precipitation events will occur. Such changes in rainfall patterns may cause severe damages to the Norwegian society.

Recently, a connection between trends in extreme daily precipitation and global temperature was confirmed. However, questions related to extremes in the frequency of wet days remain to be answered, such as whether several years with a high number of wet days could occur without the influence of climate change. The number of wet days in Norway is partly affected by the natural variability in North Atlantic sea surface pressure and temperature, associated with the North Atlantic Oscillation (NAO) and the Atlantic multi-decadal oscillation (AMO).

Here, we study the year to year variation in frequency of wet days in Norway and the duration of wet spells and dry intervals between the rain events, based on precipitation measurements from various Norwegian weather stations. Then, by using ordinary and general linear multiple regression we identify the connections between the extremes in number of wet days and the duration of wet/dry spells and patterns in North Atlantic SLP/SST. For this, we apply the ESD (empirical statistical downscaling) R-package developed at the MET Norway institute, which is freely available from ftp. By identifying such connections, we may possibly conclude on whether observed extremes in number of wet days in Norway are linked to human caused global warming. We also want to shed further light on extremes in terms of wet-day frequency and the wet/dry spell durations, the latter being associated with flooding and droughts.