An application of HOMER and ACMANT for homogenising Ireland’s monthly precipitation records and exploring the influence of network density

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Abstract
Accurate climate data is an essential prerequisite for basing climate related decision making on, and quality controlled homogenised climate data are becoming integral to EU Member State efforts to deliver climate services. Ireland has a good repository of monthly precipitation data, although record lengths vary, and the extent of the contiguous intact record tends to influence the station series selected for the application of HOMER in particular. Here we report on a number of network experiments for various combinations of available precipitation series. Specifically, we analyse regional combinations of networks in tandem with an analysis of country-wide networks of varying density, and examine whether varying the networks substantially affects the frequency or location of detected breaks in both HOMER and ACMANT.

The HOMER programme was applied to a network of 198 longer station series where contiguous intact monthly records ranged from ~40 to 71 years (1941 – 2010). HOMER detected 91 breaks in total in the country-wide series analysis distributed across 63 (~32%) of the 71 year series records analysed. In a separate approach, four sub-series clusters (n = 38 – 61) for the 1950 - 2010 period were investigated in both ACMANT and HOMER based on a regionalised split of the 198 series. HOMER detected 89 breaks across the four regional series clusters in 63 (~32%) of the 61 years series records analysed. By comparison ACMANT detected a considerably higher number of breaks across the four regional series clusters, 238 distributed across 123 (~62%) of the 61 year series records analysed.

These results indicate a relatively high proportion of detected breaks in the series, a situation not generally reflected in observed later 20th century precipitation records across Europe. However, the spatial correlations between the series are high (> ~0.8), therefore it is likely that both HOMER and ACMANT are detecting small breaks in the series. As Ireland has a dense network of highly correlated station series, we anticipate continued high detection rates as the analysis is extended to a further larger and denser network of station series where contiguous intact monthly records range from ~20 to 71 years.

KEY WORDS: Ireland, precipitation, time series, networks, homogenisation, HOMER, ACMANT.