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Regional climate change from new lakes in Lusatia

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Although there are many modelling studies dedicated to land use change affecting regional climate only few attempts have been made to evaluate these effects by station measurements. Main reasons are the relatively high variability of precipitation events and sparse instrumentation on the regional scale. In this study, regional climate and water balance shifts could be quantified by precipitation observations in an area with substantial landscape alteration.

In Lusatia, east Germany, recovering groundwater and additional flooding with river water help to transform dry, sandy dump grounds of a former open cast lignite mining area to a new post-mining landscape with many lakes and wetlands. From 1984 till 2002, the observation period, about 60 km^2 new water surface has been emerged, which left a fingerprint of spatial trend pattern in the measurements of 25 rain gauges.

Principal Component Analysis was used to separate individual trends from general precipitation dynamics within the observations. A cluster of station with upward trends indicates an area of about 2000 km^2 with increasing precipitation on the lee side of the “flooding belt”.

The trend pattern also shows seasonal variations, which partly can be explained by favoured wind directions. Generally, there are higher contrasts between up- and downward zones in summer than in winter. This is in accordance with the dominance of convective rainfall during summertime which is much more subject to local surface conditions than advective precipitation. Another important outcome of the study is the water balance computation showing a remarkable part of the additional evapotranspiration remaining in the regional hydrological cycle.