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Evaporation from the atmospheric water balance during the 2003 European heat wave

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Evapotranspiration fluxes (hereafter ET) or fluxes of latent heat are difficult to quantify. In situ methods generally have a fine temporal resolution, but a limited resolution and extent in space. In contrast, ET estimates from remote sensing have a fine spatial resolution, but the estimates are non-continuous. On larger (annual) timescales, ET can be estimated at the catchment scale through closure of the water balance. Here, we investigate ET estimates based on the atmospheric water balance. Such estimates can be derived only for larger regions (10^5–10^6 km^2) due to uncertainty in atmospheric water vapour, but the estimates are continuous in time.

ET dynamics are studied for western continental Europe during the 2003 heat wave, during which the accompanying drought likely resulted in strongly reduced ET in comparison to other years. Atmospheric moisture convergence and changes in total column water vapour are derived from the ECMWF operational analysis, and daily precipitation comes from the CRU dataset.

Preliminary results show that ET estimates are noisy at the daily timescale, but that this noise is removed once ET is averaged over a period of 1–2 weeks. During the later stages of the heat wave, the results show significant reduction in ET in comparison to other years, indicating an enhanched depletion of soil moisture. Our atmospheric water balance estimates of ET will be evaluated against FLUXNET observations.