



Trends in evaporation loss over the UK: 1962 to 2013

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Many models of hydrology assume that an increase in air temperature will result in an increase in evaporation. However, there are some processes involved in transpiration (evaporation through the vegetation) that make the relationship more complicated: in a bid to conserve water, vegetation will reduce their stomata in response to drier soils and warmer drier air which leads to lower transpiration rates despite higher evaporative demands. In addition, the vegetation responds to increases in atmospheric carbon dioxide by closing their stomata, and this further reduces the transpiration.

The JULES (Joint UK Land Environment Simulator) model, used widely in the UK to study the impacts of climate change on the environment, includes many of the processes that are likely to affect changes in water loss and its impact on large scale hydrology.

A new assessment of the UK wide water balance for the last 52 years (1961 to 2013) at a 1km grid-scale has been made using this model in a system called CHESS (Climate Hydrology and Ecology research Support System). Some data is available to check the overall water balance. For instance, river flow data can be used at an annual time scale to capture the water balance, while evaporation data from flux towers can be used at some locations around the UK for the few years that it is available to evaluate the seasonal variations of evaporation. Both of these methods provide imperfect but useful evidence.

Here we present the results of the modelling exercise and the evaluation: long term increasing evaporation loss trends are clearly present in the model output and these are discussed with respect to the different drivers of change.