Surface-soil tiling strategies in JULES

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Tiling in land surface models provides a strategy to exploit land ancillary data available at higher resolutions than forcing meteorology. This is especially apparent in climate simulations, but is also applicable to operational weather forecasts. In this talk, we discuss and demonstrate a highly flexible surface-soil tiling scheme in the Joint UK Land Environment Simulator (JULES). JULES is the land surface component of the Met Office Unified Model, and therefore underpins present and future versions of the operational UM and climate model including the UK Earth System Model (UKESM).

Surface tiling has previously been demonstrated to improve model performance, with vegetated and non-vegetated tiles sharing a single soil column in each atmospheric (forcing) grid box. This tiling approach has now been extended to the sub-surface with a highly flexible surface-soil tiling scheme. The area within each atmospheric grid box is allocated using a 'fraction matrix', which states the fractional coverage of every permutation of surface and soil type. This affords the user control over how many soil columns are found in each grid box and how they are shared by the surface tiles sitting atop.

Changes to model performance, both in terms of fluxes and hydrological balance, will be explored for a range of tiling methodologies. These include tiling the soil according to the surface type (a method which is already used by some existing models) and tiling the soil according to the soil type. Examples from both single-point and gridded JULES simulations will be presented to allow examine the impacts of the new scheme in both spatial and temporal terms.