RAMI4PILPS: Assessing Shortwave Radiation Fluxes in Land Surface Schemes

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Abstract:

Remotely sensed information about crucial surface properties—such as albedo, leaf area index and the fraction of photosynthetically active radiation—is now available operationally and can be used in assimilation mode by Land Surface Schemes (LSS) of climate and/or numerical weather prediction models. It is thus more pertinent than ever to assess the accuracy and consistency of the absorbed, reflected and transmitted shortwave radiation fluxes in LSS. The RAMI4PILPS experiment suite aims to achieve this by comparing current radiative transfer formulations, look-up table approaches, and parametric solutions of the shortwave radiation transfer within and beneath

vegetation canopies against reference solutions obtained from credible 3-D radiative transfer models identified during the third phase of the RAMI benchmarking exercise. Within the RAMI4PILPS, two different sets of test cases are proposed: (1) structurally homogeneous environments that are reminiscent of grasslands and closed forest canopies, where participants are required to deliver three radiative surface fluxes (albedo, absorption and transmission) on the basis of detailed spectral and structural canopy descriptions; and (2) structurally heterogeneous environments that are reminiscent of shrublands and open forest canopies, where participants are provided with detailed canopy descriptions and the surface reflectance (often available in real application from remote sensing observations) and are requested to deliver their model's estimate of the partitioning of the remaining energy into Absorption and Transmission. Participation in RAMI4PILPS will help: 1) to quantify the typical errors associated with different modes of estimating the radiative surface fluxes in LSS; 2) to identify the impact that structural and spectral sub-grid variability may have on these flux estimates; and 3) to verify the conservation of energy at the level of the surface, as well as inconsistencies arising from the derivation of flux quantities from different sources with different levels of assumptions/simplifications.

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