Variability of the Asian summer monsoon in the Unified Model

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Examination of the climatology and variability of the Asian summer monsoon in different climate versions of the Met Office's Unified Model, as part of the SHIVA and PROMISE projects, has highlighted sensitivity to the model's vertical resolution and physical parametrisations. Analysis of an ensemble of runs carried out using a new semi-Lagrangian, non-hydrostatic version of the Unified Model (HadGAM1), which includes new boundary layer and convection parametrisations as well as improved vertical resolution, shows that HadGAM1 is dominated by internal variability, and that a significant response to SST forcing is only seen when that forcing is strong, e.g. in ENSO years. In contrast, analysis of the AMIP-II ensemble of the previous model version (HadAM3) indicates that that model responds too strongly to both local and remote SST forcing, such that its teleconnections with SST are also unrealistic. Examination of both models' responses to the Indian Ocean SST dipole in 1994 shows that the local response of the models is in the correct sense but they fail to reproduce the associated changes in convergence over India. This raises the question of whether atmosphere-only models can be expected to produce reasonable monsoon simulations in such situations where feedback between atmosphere and ocean is thought to be paramount. The monsoon simulation and its teleconnections with SST are therefore examined in coupled versions of both models (HadCM3 and HadGEM). Results will be discussed at the meeting.

Tuesday IV (Talk)