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Diagnosing model errors associated with convective schemes through a super-model approach

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The purpose of this research is to use the super-model strategy to diagnose biases associated with convective schemes, with the aim of developing an improved convection scheme. In particular, we coupled two versions of the ECHAM5 atmospheric GCMs (General Circulation Models) with one ocean. The two ECHAM5 versions differed only in the convective schemes: one used the Nordeng and Tiedtke convective schemes. Optimally weighting the surface fluxes received by the ocean model leads to an improved representation of tropical Pacific climate. Both AGCMs see the identical sea surface temperature (SST). Monthly anomalies of near surface meteorological variables from the two schemes were analysed in a 50 year simulation. Point-wise correlation was performed between the anomalies of SST and near surface meteorological variables, such as shortwave radiation, zonal wind stress, 10m wind speed, relative humidity, cloud cover and rainfall. In this preliminary analysis, gross feature in both convective schemes was nearly similar. However, correlation center shifted toward the east over the western Pacific. For example, correlation center in Nordeng was near 160 degrees E, while it was near the 180 degrees E in Tiedtke for near surface meteorological variables mentioned above. This eastward shift in Tiedtke is probably related with the large entrainment at lower atmosphere and this need to be further examined. The relationship of SST with near surface meteorological variables is discussed.