

Time-Slice Experiments

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In the time-slice method, an atmosphere model is forced by the greenhouse gas concentration corresponding to a certain time in the future, e. g. normally at the time of CO₂-doubling, while the sea-surface temperature (SST) and sea-ice distribution are taken from a coarse grid transient simulation. This method has the advantage that the model can be integrated with high resolution over several decades at the time of interest, thus creating a large statistical sample of the changed climate, similarly to equilibrium experiments with a mixed layer model. The simulated pattern depends strongly on the SST and sea-ice distribution of the coarse grid model, which is used as a boundary condition.

A comparison of time slice experiments run with three different resolutions (T21, T42, T106) clearly shows better simulations for southern Europe of the observed pattern with the higher resolution models. If applied for climate change studies, the features simulated by the higher resolution model appear to be more realistic. The overall trends are independent of the resolution, but not their amplitude, which seems to increase with resolution. This is particularly apparent in the daily temperature range. The time-slice method creates basically regional data for the whole globe. The available experiments have so far only been evaluated for a few selected regions and selected variables. Furthermore, this method generates high-resolution datasets, which are used to drive high-resolution regional models. At present, however, only a limited set of these experiments exists due to their high demand on the computing resources.