Session: B7 Oral presentation

Evaluation of the carbon cycle component of CMIP5 ESMs

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The most advanced Earth System Models now have an interactive land and ocean carbon cycle embedded in their physical model. Such models have been used to perform most of the simulations requested in the CMIP5 protocol. Of particular interest, the historical (1850-2005) simulation allow evaluating the realism of the simulated carbon cycle. Depending on the type of simulation, ESMs are forced with atmospheric CO2 concentration or anthropogenic emissions of CO2. In the first case, the models do calculate the land and ocean carbon fluxes and pools. Diagnosed net land and ocean carbon fluxes can be use to estimate the anthropogenic emissions compatible with the prescribed CO2 concentration change. These can be compared with our best estimate of the historical anthropogenic emissions. Furthermore, as some ESMs also account for change in land cover (e.g. deforestation), land use changes CO2 emissions and fossil fuel CO2 emissions can be diagnosed separately to allow better comparison with the observation-based emissions. ESMs driven by anthropogenic emissions can also be evaluated by confronting their simulated atmospheric CO2 with the observed one. In addition, simulated quantities such as for example gross primary production or leaf area index over land; dissolved inorganic carbon or chlorophyll content in the ocean can also be confronted to available in-situ or remotely sensed observations. Modelled carbon cycles can be evaluated on several time scales: seasonal, interannnual and on the long-term trends. However, it should be noted that our ability to evaluate the models is still limited by our lack of understanding of the mechanisms driving the changes in the global carbon cycle.