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Assimilation of MERIS FAPAR into a terrestrial vegetation model and mission design

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This contribution reports from an on-going study for the European Space Agency (see http://rs.ccdas.org) in which the MERIS FAPAR product is assimilated into a terrestrial biosphere model within the global Carbon Cycle Data Assimilation System (see http://CCDAS.org). Using a variational approach, CCDAS relies on first and second derivatives of the underlying model for estimating process parameters with uncertainty ranges. We quantify how MERIS data improve the accuracy of the current and future carbon flux estimates for a range of selected sites spanning the major biomes of the globe. Remarkably, the constraint on the net flux (NEP) is much stronger than on the net productivity (NPP). We present an application of CCDAS for mission design, in which the system evaluates two hypothetical sensors, in terms of their constraint on carbon fluxes.