



Using earth observation data to assess and improve the accuracy of terrestrial carbon models

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A major drive in carbon cycle science is to improve the accuracy and credibility of carbon flux calculations by exploiting the information carried jointly by the many relevant data sets and biogeochemical models (a process often known as model-data fusion). Earth Observation data would appear to be of major significance in this drive because of their global, repetitive acquisition of quantities, such as land cover, photosynthesis, etc., apparently relevant to the models. In practice there are major difficulties in exploiting these data, arising from data properties (loss of information due to cloud cover, the need for long time-series, etc.), uncertainties in interpretation of the recovered quantities in terms of model variables, model structure and representation of processes in the models. This talk will survey these issues, but will then go on to describe a range of areas where significant progress has been made, especially in providing appropriate interfaces between the models and data that ensure compatibility of the two types of information. A major question we will address is: under what conditions can EO data falsify the calculations of a biospheric model (or how can we tell that a model and an EO observation are different?) This is a fundamental precursor to any attempt at data assimilation, and we will illustrate an approach to answering this question using AVHRR data and the Sheffield Dynamic Global Vegetation Model. We will also provide examples of how EO data can be used to calibrate carbon flux models, and the associated uncertainty in terms of data and model.