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Quantitative network design for biosphere model process parameters

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There is a great deal of uncertainty about the current and future behaviour of the terrestrial carbon cycle. This has stimulated the research community to build observing systems for the terrestrial carbon cycle. Quantitative network design, based on inverse modelling systems aims to optimize these networks to reduce uncertainty cost effectively.

In the framework of the European project IMECC (Infrastructure for Measurement of the European Carbon Cycle), this approach was applied to the global carbon cycle, using the CCDAS (Carbon Cycle Data Assimilation System). The system, consists of the terrestrial biosphere model BETHY (Biosphere Energy Transfer Hydrology), coupled with several atmospheric transport models. The objective is to design candidates of networks that better constrain the process parameters of BETHY. The impact of various measurement locations on the uncertainty of process parameters and concomitant uncertainty of calculated fluxes will be demonstrated, along with a tool for assessing the quality of candidate networks.