Conferencia

SANTALÓ 2019

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Atmospheric carbon and the statistical science of measuring, mapping, and uncertainty quantification

Too much carbon dioxide (CO_2) in the atmosphere is a threat to long-term sustainability of Earth's ecosystem. Atmospheric CO_2 is a leading greenhouse gas that has increased to levels not seen since the middle Pliocene (approximately 3.6 million years ago). One of the National Aeronautics and Space Administration's (NASA) remote-sensing missions is the Orbiting Carbon Observatory-2, whose principal science objective is to estimate the global geographic distribution of CO_2 sources and sinks at Earth's surface, through time. This starts with the measurement of radiances from individual soundings and moves on to retrievals of the atmospheric state, including CO_2-related variables. From a mathematical point of view, this is an ill-posed inverse problem for which regularisation is needed. From these spatio-temporal data, gap-filled and de-noised maps and their uncertainties are made. With the aid of a model of atmospheric transport, CO_2 fluxes can be estimated. Uncertainty quantification using hierarchical statistical models is critical at all stages.

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