Laboratoire de Glaciologie et Géophysique de l'Environnement

Séminaire

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Salle L. Lliboutry, LGGE

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Reconciling predictions of Antarctic ice sheet change with model emulation and calibration

Until very recently, predictions of the Antarctic contribution to sea level rise have been widely different but at the same time rarely had uncertainty estimates, so it was difficult to interpret their differences. Now a handful of studies have been published with uncertainties using ensembles of numerical model simulations and, in some cases, formal statistical inference such as Bayesian calibration with satellite data. Several have 95th percentiles of 30-40cm sea level rise from Antarctica by 2100; a very recent prediction evaluating an ensemble with palaeodata (reconstructed sea levels from the distant past) has a mean of more than a metre. Are these consistent? If not, why not? Do palaeodata constraints lead to systematically higher predictions than recent observations?

I will evaluate these results and show preliminary work using "emulation" — statistical modelling of numerical simulators — to quantify their sensitivity to ensemble design, data and assumptions, using results from three different ice sheet models (two highly parameterised, and a third high resolution regional model). For example, recent predictions prove to be sensitive to the factorial design of the ensemble and the highly uncertain palaeodata with which it is evaluated, while in general predictions with highly parameterised models are dominated by prior assumptions about maximum possible discharge. On the other hand the high resolution model appears to be both less sensitive to poorly-known model inputs and well-described by emulation, indicating a promising way forward for quantifying and reducing uncertainty in predictions of the future of Antarctica.