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Global Sensitivity Analysis of South-East Asian Monsoon to astronomical forcing, ice volume and CO_2

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Monsoon phenomena are known to respond to astronomical forcing, CO_2 and the level of glaciation. These factors may combine non-linearly. In particular, the climate system is known to exhibit thersholds and hysteresis phenomenan. Hence, fully appreciating the combined effects of environmental factors may require a large number of experiments with climate models.

Here, we apply a strategy referred to as global sensitivity analysis, which has been developed over the past ten years. It relies on three essential steps: design and perform experiments; design, calibrate and validate a "meta-model" (also known as an "emulator"); and then visualise and quantify the individual and combined actions of the different factors on the monsoon climates. The methodology is applied on the climate simulator HadCM3.

The presentation focuses on the the response of the South-East Asian monsoon to climatic precession. The sensitivity of the response phase to variations in obliquity and the level of glaciation are quantified, and the the implication on the understanding and analysis of paleoclimate records are discussed.