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Influence of paleogeographies on Late Eocene Asian climate: a modelling perspective using the IPSL-CM5A2-VLR model

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The middle to late Eocene period, representing the transition between the Paleocene/early Eocene warm and ice-free «greenhouse» and the colder and dryer Oligocene «icehouse», can be referred to as a « doubthouse » in many ways. To better understand the climate changes at that period, climate modelling has been largely used over the past two decades in complement to paleoclimatic indicators. Indeed, if the greenhouse and icehouse respective paleogeographies are rather consensual, the doubthouse however was the scene of many paleogeographic scenarios.

As paleogeography is a crucial driver of climate, the sensitivity of climate to these changes could allow us to propose coherent paleoclimate reconstructions and to contribute to answer to the questions raised by field work. For example, recent studies suggest that the Paratethys retreat and the uplift of the Tibetan Plateau probably played a part in the marked continental aridification and the spreading of conifers observed in the Xining Basin at that time (Dupont-Nivet et al., 2007, Hoorn et al., 2012). Moreover, if the influence of some of these events on climate has been studied in many ways by climate modellers, they sometimes used modern, unrealistic or oversimplified paleogeographies, coarse resolution and/or non-fully coupled model.

To better decipher the role of paleogeography on the late Eocene climate in Asia, we use an IPCC-like Earth System Model (IPSL-CM5A2-VLR) to perform fully coupled simulations forced with different 40 Ma paleogeography reconstructions based on the main ongoing theories (position and extent of the Tibetan Plateau, land-sea distribution in Asia). The results will be confronted to paleoclimatic indicators.