Geophysical Research Abstracts
Vol. 16, EGU2014-7735, 2014
EGU General Assembly 2014

Evolution of the Asian monsoon from the Cretaceous to the modern – a modelling study.

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It has long been suggested that palaeogeography could have an important role in the modulation of the Asian monsoon. In particular, orogenesis associated with the Himalayas and Tibetan Plateau has been associated with the intensification of the Asian monsoon through the Neogene, a paradigm which has some support from both data and modelling studies.

Here we go further by considering the evolution of the Asian monsoon over a much longer time period than ususally considered, namely, the early Cretaceous right through to the modern day. Through a series of more than 30 climate model simulations spanning 150 million years, we investigate how changing palaeogeography (continental distribution, mountain height, and bathymetry) has affected monsoon evolution.

The palaeogeographies are provided by Getech Plc, and we use the HadCM3L climate model, developed by the UK Met Office. All simulations are run for more than 500 years from an identical initial state.

We show that a monsoon system has existed in the western Pacific and Indian Ocean since the early Cretaceous, but that intense precipitation only began to penetrate onto the east Asian continent in the late Paleogene and early Eocene.

As well as focussing on the Asian (or proto-Asian for the earliest Cretaceous) monsoon, we present the results in a global context.