Evolution of the monsoon system over the past 250 million years

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The evolution of continents over the past 250 million year is remarked by the breakup of the Pangea supercontinent. The changes of continents must have important influences on regional and global monsoon systems because monsoons are primarily a result of land-sea thermal contrast.

To study how the monsoon system had been evolved with continent changes over the past 250 million years, we carried out a series of climate simulations, using the Community Earth System Model (CESM). Changes in continents, mountain building, solar radiation, and carbon dioxide (CO2) are all considered in the simulations. In the present talk, we will present our preliminary simulation results of how the mega-monsoon associated with the supercontinent Pangea evolved into the six regional monsoons at the present over the past 250 million years. We will also demonstrate ocean circulation changes with different continent distributions, such as ENSO, and its influences on regional monsoons. Monsoon impacts on land-surface processes and the associated carbon-cycle will be also presented.