Desert dust and ancient oceans: Implications for climate and atmospheric CO2

Supervisors
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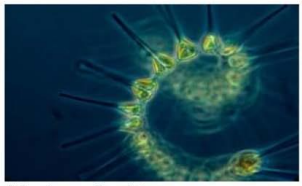
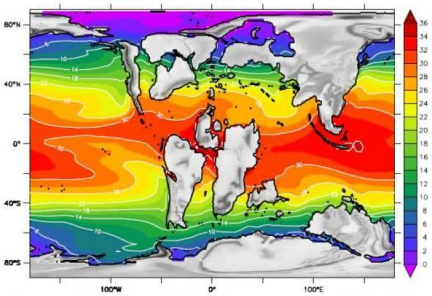
Project description:

Satellite image of Saharan dust being blown over the Atlantic Ocean



Marine plankton



Reconstruction of Cretaceous (~100 million years ago) sea surface temperatures

Desert dust is the main source of the iron which is required by living organisms in the ocean. Insufficient supply of iron limits marine life in large parts of the ocean and reduces the ability of the ocean to regulate atmospheric CO2, and therefore our climate (Jickells et al., 2005). While there is relatively good knowledge of the role of desert dust in controlling the modern ocean biological pump, it is still unclear what might happen in a warming climate. Examining the past period of the Cretaceous (145 to 65 million years ago) can help, because of its relatively warm climate, which occurred as a result of high atmospheric CO2 at that time.

The PhD will investigate the impact of desert dust on marine life and carbon cycle during the warm climate of the Cretaceous. The student will model flux of dust iron on the Cretaceous ocean using an Earth system model which includes vegetation dynamics, wind transports and ocean biogeochemistry. The PhD will ultimately estimate iron limitation on ocean productivity and atmospheric CO2 uptake in a warm climate.

The successful candidate will learn how to use and develop an Earth system model, with the statistical and modelling skills developed being highly transferable to a wide range of jobs as well as being highly in demand World-wide in academic research. The student will also develop expertise in vegetation-atmosphere-ocean interactions, iron biogeochemistry and paleoclimate.

References:

Jickells et al., 2005. Global iron connections between desert dust, ocean biogeochemistry, and climate. Science,
308, pp.67–71.