

A Search for Clues to Onset of Asian Desertification and Tibetan Plateau Uplift

PROJECT DESCRIPTION

"Timing of the initiation of Asian desertification is a contentious topic in paleoclimatology because it enables us to decipher both global and regional environmental changes. Late Cenozoic wind-blown red clay sequences on the Chinese Loess Plateau, which possess abundant paleoclimatic and paleoenvironmental information, can be regarded as an excellent indicator of inland Asia desertification. It is calmed that typical eolian red clay appears as early as 25 Ma. This extends the lower limit of the red clay on the Chinese Loess Plateau from the previously thought early Miocene back into the late Oligocene. These sequences provide a unique high-resolution geological record for understanding the inland Asia desertification process since the late Oligocene. At the same time, our group recent study indicates that the accelerating uplift of the Tibetan Plateau influences the paleoclimatic response of the climate proxy variables as well as the orbital forcing. We suggest that using both cyclostratigraphy along with magnetostratigraphy gives us the effective and valid outcome for dating red clay sequences and it also implies that many presently published age models for the red clay should be re-evaluated. Magnetostratigraphy studies polarity change registered in the geological sections and drilling cores. Geomagnetic polarity change is a global phenomenon which occurs simultaneously all over the world. The normal / reverse polarity sequence is well known for the Cenozoic Era and can be used for dating of sediments and geological events. Cyclostratigraphy is the study of astronomically forced climate cycles within sedimentary successions and can be used as another independent dating tool. Our approach uses both methods and becomes instrumental to improve our understanding of the Asian monsoon system as an important part of the global climate model. During the project execution the student will measure red clay samples from China and analyze the data for sedimentary sequence dating using both techniques, magnetostratigraphy and cyclostratigraphy.

The student will perform measurements of the red clay sediments from China in the paleomagnetic laboratory of the University of Alberta under my supervision. After completing thermal and alternating field demagnetization experiments, the data will be processed and analyzed. Normal and reverse polarity intervals will be identified in order to build a magnetostratigraphic section and age model of the red clay section. Magnetic susceptibility measurements will be also performed. The measurements will be used to model the climate variations in the past in order to build a cyclostratigraphic model of the study section. Student will learn both laboratory measurements and data analysis while working in Alberta."

FACULTY-DEPARTMENT

Science – Physics

Contact: Brendan Cavanagh, Internship Coordinator (Inbound)
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DESIRED FIELD OF (STUDENT) STUDY

Geophysics, geology, earth sciences, physics

INTERNSHIP LOCATION

University of Alberta Main Campus - Edmonton

NUMBER OF INTERNSHIP POSITIONS

1

INTERNSHIP START DATE

July 20

INTERNSHIP END DATE

October 20

ARE THE DATES FLEXIBLE?

Yes, I am flexible regarding the internship dates. Selected students can contact me to request a date change.