

Palaeoenvironmental change studies based on ice core drilling in Antarctica & Himalayas

Thamban Meloth*, A. Rajakumar, S. Naik
 National Centre for Antarctic and Ocean Research
 Headland Sada, Goa 403 804 INDIA
 R. Ravindra, A. Chaturvedi
 Geological Survey of India, Antarctic Division, Faridabad, INDIA
 J. Gergan
 Wadia Institute of Himalayan Geology, Dehradun, INDIA

Concerns about the global climatic variations and resultant warming during the 21st century awakened the lawmakers and scientists to think beyond the existing paradigms and available data. Since the key to unfold the climatic mysteries lies in the long-term natural records, various natural climatic archives are being studied in detail. Glaciers and ice sheets provide the unique opportunity to understand the present and past environmental changes in detail as well as providing information on the origin and transport pathways of major volcanic (natural) and nuclear (anthropogenic) events. Since the ice cores provide the least contaminated and high-resolution climatic archive, there have been several international efforts to retrieve, analyze and interpret the proxy records from both polar and tropical ice sheets.

The proposed study envisages a focused, multi-institutional, multi-national scientific campaign to retrieve shallow (<200 m) ice cores from both the coastal Antarctic as well as tropical Himalayan ice sheets. Such a combination of polar and tropical, low and high altitude, high and low precipitation, southern and northern hemisphere, low and high polluted realm will greatly contribute to the understanding of forcing mechanisms of global / regional climatic perturbations as well as inter-hemispheric teleconnections. So far most of the shallow drilling attempts in Antarctica had been restricted to the local variability as a precursor to deep drilling programs. We propose to undertake shallow ice core drilling along transect representing different geographic (coastal to high altitude) and precipitation (low to high) domains. The analyses of these cores will not only provide vital clues on the moisture transport and elemental source variability in different domains of Antarctic continent but also will provide necessary input to the paleo-environmental modeling. In Himalayas, strategy will be to identify and drill glaciers with high accumulation rates. These tropical ice core records can provide a wealth of data on the high-frequency oscillations in the Asian monsoons and long-term impact of coupled systems like the El Nino- Southern Oscillations (ENSO) on the monsoon systems.

Work plan

- GPR studies to identify and locate suitable ice sheets.
- Drilling ice cores from Antarctica & Himalayas.
- Archival & processing of ice cores at NCAOR, Goa, India.
- Analysis of ice cores for stable isotope, ions, elemental, etc. variations.
- Documentation and interpretation of the data.

Collaboration

The proposed work requires massive logistical support and will be completed in collaborations with the leading national and international laboratories. Some of the Indian laboratories that will be involved in the program are: Geological Survey of India (GSI- Antarctic Division), Wadia Institute of Himalayan Geology (WIHG), Physical Research Laboratory (PRL) and Birbal Sahni Institute of Paleobotany (BSIP). Internationally, collaborations will be made between major organizations like Alfred Wegener Institute, Germany and other institutions from Europe, America and Asia.

*Contact E-mail: meloth@rediffmail.com