

Climate variability, forcings, feedbacks and responses: The long-term perspective

8th International NCCR Climate Summer School – with participation of IGBP PAGES
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The 8th International NCCR Climate Summer School was held in collaboration with PAGES and brought together 74 PhD and post-doctoral students from 16 different countries, mainly from Europe but also Japan, Australia, Chile, Russia, Canada and the USA, as well as 18 keynote speakers and workshop leaders. The meeting was held in Grindelwald, a small alpine village located in the Jungfrau region of the Swiss Alps. Participants gathered together to learn about various aspects of paleoclimate science, including proxy reconstructions and modeling, to understand the nature of feedbacks, forcings and their impact on the climate system. The agenda of the meeting, included keynote lectures that were followed by lively discussions, poster sessions, workshops, excursions and group presentations by the participants.

The keynote lectures were structured around four topics that focused on: (1) long-term perspective of climate variability; (2) use of climate models, data assimilation, and reconstruction techniques to simulate present, past and future climates; (3) the climate system responses to forcings and feedbacks, and (4) the impacts of climate change on the hydrological cycle, on ecological responses to changes in soil moisture, and on the economy, specifically on global food security. Most of the lectures were focused on areas of research that remain open to discussion and on future directions to follow. Among the recurring topics were the forcing mechanisms responsible for the Medieval Climate Anomaly-Little Ice Age climate shift, future sea level rise, the role of clouds, aerosols and soil-vegetation feedbacks on climate variability and sensitivity, and the existence of tipping points in the climate system (Fig. 1).

Poster sessions took place every day during coffee breaks, thus allowing for informal discussions between participants as well as with lecturers. These sessions started with short individual oral presentations, providing an overview of the research presented in each poster, to help identify potential interlocutors. Each participant had prepared a poster about his/her specific topic and used the time

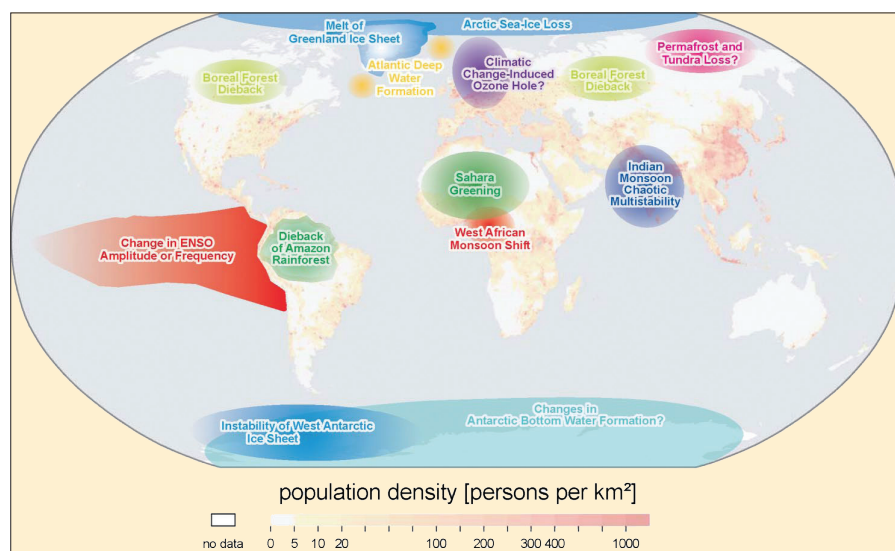


Figure 1: Map of potential policy-relevant tipping elements in the climate system, overlain on global population density. Subsystems indicated may pass a critical threshold this century at which a tiny perturbation can alter the state or development of the system (from Lenton et al., 2008).

allotted to get useful feedback and to discover or question details of others' work. The broad range of time and spatial scales covered by all posters and the variety of issues addressed, processes analyzed and methods presented made it easy for everyone to always find constructive discussion partners.

In addition to the interesting lectures and engaging poster sessions, students were given the opportunity to participate in two out of four hands-on workshops: (1) relevance of tree-ring detrending for long-term climate reconstructions; (2) Kalman filtering and data assimilation; (3) climate reconstructions using annual and non-annual sedimentary archives; (4) assessing risks of natural catastrophes in a changing climate.

Another exciting activity was the students' participation in one of three different fieldtrips: (1) to discover the geology and glaciology of the area; (2) to practice dendrochronological sampling techniques in a forest gradient; (3) to explore some valley features through a guided iPhone excursion. These excursions allowed the students to get a better understanding of the spectacular landscape, history and ecology of the Swiss Alps.

The summer school ended with group presentations prepared by the participants over the week. Five topics covering various aspects of the science of climate

were presented: Extreme events, model uncertainties, the anthropocene, internal variability vs. external forcings, and climate reconstructions. The diverse topics favored the grouping of participants with similar research interests, thereby allowing more specific discussions. By incorporating examples from the keynote lectures, these presentations also served as a review of the most important issues raised during the week.

Thanks to the review of current climate research as well as its interdisciplinary nature, the 8th International NCCR Climate Summer School was a great success for its organizers and participants. The faculty, keynote lectures and workshop topics were very well selected, and the location in particular made it a unique experience.

Acknowledgements

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References

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