Ice cores, Small States and Global Climate Change: The rise of a new scientific discipline

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Half a century ago, two physicists from small countries revolutionised a minor research field and transformed it into one of the most powerful disciplines within climate science. With their research on ice cores, Willi Dansgaard (1922-2011) from Copenhagen University and Hans Oeschger (1927-1998) from the University of Bern fundamentally changed the understanding of climate and its global changes. Together they set the basis for a new discipline to investigate ice that is hundreds of thousands of years old in order to reconstruct past climates: ice core paleoclimatology. The study of ice cores has since become one of the major pillars of modern climate science. At the same time, with their seminal research, Dansgaard and Oeschger paved the way for their two small countries, Denmark and Switzerland, to emerge as scientific superpowers in this research field. The two scientists have since been recognised as the pioneers of ice core science as part of modern climate sciences.

But their accomplishments like the discovery of the "Dansgaard-Oeschger events", such the hypothesis of this project, did not root in scientific ingenuity alone. They also required the skills to make a hardly known discipline visible, the possibility to muster considerable financial and social resources and the engagement in disciplinary collaboration, competition, scientific diplomacy and research politics in order to gain international support and scientific authority. Subsequently, they established ice core research as a sub-discipline of climate research in competition with, on the one hand, highly funded domains of big science such as satellite observation and computer-based climate modelling, and, on the other hand, a large number of equally ambitious research endeavours in scientific great powers such as the USA, the Soviet Union, the UK, Germany, and France. How can such a hardly visible research domain gain attention, resources, authority and power? How do research environments in small states restrict or support the establishing of powerful and influential research projects? The work of Willi Dansgaard and Hans Oeschger and the rise of ice core paleoclimatology provide an eminent case for investigating these questions. This project therefore sets out to *(1) investigate the rise of ice core research and its revolutionary implications for paleoclimatology and climate science in the formative period between the 1950s and 1980s; (2) explore the collaborative skills, networks, diplomatic manoeuvres, and political strategies of Dansgaard and Oeschger to pursue their research and build an internationally powerful, technology- and capital-intensive scientific discipline; and (3) analyse the scientific, political and cultural conditions that allowed a Danish and a Swiss physicist to blaze the trail for Denmark and Switzerland becoming "global players" and international leaders in paleoclimate research.*

Based on archival research, this project will reveal how small research fields can master disciplinary competition and gain epistemic authority, and how research conditions in small countries influence the building of large-scale research endeavours. Furthermore, it will pioneer the not yet explored history of paleoclimatology and provide a foundation for further studies in the field. In doing so, it will contribute to a better understanding of the fundamental changes climatology underwent in the twentieth century and offer a basis for an informed debate on the validity and significance of current global climate change knowledge.