
Preface

Compared with the hardships encountered by the pioneering polar explorers of the nineteenth and early twentieth centuries, contemporary expeditions to polar regions are considerably more comfortable and safe. Despite the increasing human acquaintance with the frozen worlds, deep-drilling campaigns in Antarctica and Greenland are still today far from being ordinary events. Such drilling campaigns have become indispensable for our understanding of the dynamics of polar ice sheets and the climate records stored within the ice. However, every drilling site has its peculiarities and demands specific solutions. Ice drilling technology is still in a maturing stage, and so are also the scientific methods applied to analyse ice cores on the field. Both activities (drilling and scientific research) repeatedly impose new technical and logistic challenges.

The purpose of this book is to offer an informal, descriptive introduction to the main product of deep ice-core drilling: the ice core itself. We accomplish this in a pragmatic manner by considering a particular deep-drilling project, the *European Project for Ice Coring in Antarctica* (EPICA) at *Dronning Maud Land* (DML), which retrieved the EPICA-DML (a.k.a. EDML) Deep Ice Core, a 2774 m deep ice core from an ice ridge in the Atlantic Sector of Antarctica. We review the history and main features of this project, and then embark on a visual analysis of the multiscale structure of the Antarctic Ice Sheet at the EDML site.

Seeing that there is still no general agreement about the terminology to describe the physical properties of polar ice, we introduce in Chap. 1 a glossary of useful terms. Chapters 2 and 3 of Part I summarize the history of EPICA and the main characteristics of the drilling site at Dronning Maud Land. Scientific instruments and techniques used to produce the images presented in this book are described in Chap. 4 together with a description of the physical properties of the EDML Deep Ice Core. Finally, Chap. 5 explains how to interpret the complete collection of visual stratigraphy images of the EDML Deep Ice Core, which are presented in Part II.

It is evident from its structure and style that this text does not emphasize technicalities. Rather, following the spur to multidisciplinary (Faria 2009), this book aims at presenting a tour d’horizon to a larger audience, which includes engineers, geoscientists, physicists, mathematicians, and any other non-specialist in glaciology interested in deep ice cores. We hope that this broad general approach may help the reader to develop a basic intuition about some complex concepts of ice structure, ice sheet flow, paleoclimate records, and climate change, which shall eventually be integrated into a single holistic view.

There is excellent specialized literature dealing in depth with the quantitative analysis of the physical properties of polar ice cores, and bibliographic information about it is provided in suitable places through the text. Therefore, even though this book is primarily intended for non-specialists, we hope that it may be valuable also for glaciologists interested in more specialized texts and their relation to the “big picture”.

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A Visual Record

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