

Foreword

The climates of the polar regions are important components of the global Earth system and have experienced dramatic changes in recent decades. These changes and their possible influences on and feedback with processes across the rest of the globe have raised great research challenges regarding the processes involved. In addition, the polar regions have been the least observed and understood regions. To improve our understanding and prediction of polar climate changes, and associated extreme events and global impacts, a number of international initiatives for polar climate research, such as Year of Polar Prediction (YOPP) and the Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAIC), have been planned and implemented.

To promote collaborations between Chinese polar scientists and scientists from other nations, a workshop on “Polar Climate Change: Driving Processes, Extreme Events, and Global Linkages” was held over 23–24 October 2017, at Hohai University, Nanjing, China. During this workshop the participants presented new research results, identified knowledge gaps and research priorities, and discussed future international collaborations related to the following three themes: (i) polar climate changes and their global linkages; (ii) polar climate and weather extremes and disastrous ice conditions; (iii) polar ocean circulation and ocean-ice-atmosphere interactions.

The workshop led to the publication of this special issue, which is seen as a lasting outcome of the meeting. This special issue brings together a selection of papers based on the presentations given during the workshop, along with several other papers that are closely related to the workshop themes. In addition to the workshop report that summarizes the recent research results presented during the workshop, another seven articles cover polar climate changes, polar extreme events, and ocean-ice-atmosphere interactions. Three articles examine processes related to polar climate changes: Atmospheric feedbacks on Arctic summer sea-ice anomalies in ensemble simulations of a coupled regional climate model; A glacial control on the eruption rate of Mt Erebus, Antarctica; Determination of Arctic melt pond fraction and sea ice roughness from Unmanned Aerial Vehicle (UAV) imagery. Two articles are related to polar extreme events: Extreme events as ecosystems drivers: Ecological consequences of anomalous Southern Hemisphere weather patterns during the 2001/2002 austral spring-summer; Trends of summer extreme temperatures in the Arctic. Two articles address issues related to ice shelf-ocean interactions: Simulated impact of Southern Hemisphere westerlies on Antarctic Continental Shelf Bottom Water temperature; The study of ice shelf-ocean interaction—techniques and recent results.

We anticipate that the outcomes of this workshop and the publication of this special issue will provide a foundation for further research on polar climate changes and extreme events. Finally, we would like to thank all the workshop participants, all the authors and reviewers of the papers for their contributions to this workshop and the production of this special issue.

Guest Editors:

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