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A new perspective on climatic changes during the past 300 years

Earth's climate is undergoing profound changes. Understanding and assessing these changes requires insights from the past. The period since 1700 is of particular relevance, as Earth's climate underwent a profound transition from the end of the so-called Little Ice Age into the modern era of anthropogenic global warming. Of particular interest in these last 300 years are several pronounced climatic excursions that occurred on interannual and decadal timescales. Up until now, the available data sets allowed only relatively vague analyses of the recent past. Today, paleoclimatology and historical climatology are changing at a rapid pace. High-resolution climate proxies from archives such as tree rings or ice cores, climate model simulations, and their combination using numerical techniques allow for a much more detailed, dynamical perspective of climatic changes of the past centuries than was possible only a decade ago. In his book "Climatic Changes since 1700," Stefan Brönnimann from the Institute of Geography and Oeschger Centre for Climate Change Research at the University of Bern, lays out this new perspective. The title pays homage to a book published 125 years ago by the same title, written by the geographer and former professor at the University of Bern, Eduard Brückner. In 1890, Brückner presented and interpreted the first global climate reconstructions. Brönnimann repeats Brückner's audacious undertaking while using new data, models, and analysis methods.

The first part of Brönnimann's book covers the new data and methods used to study climate of the past centuries. The second part summarizes the state of knowledge of the mechanisms behind interannual to multidecadal climate variability. The core of the book then provides an overview of global climate history since 1700 by examining four subperiods and presenting twenty case studies. Starting with "Late Maunder Minimum," one of the coldest epochs of the Little Ice Age, and ending with the recent hiatus in global warming, Stefan Brönnimann takes the reader on a journey through the major changes and excursions in the climate system over the past three centuries. Volcanic eruptions, glacial advances and retreats, monsoon failures, and the growth and decline of the ozone hole show how interactions between the many different components of the climate system produce a complex climatic response. The book presents new methodologies and techniques in paleoclimate research. It summarizes the state of knowledge while presenting many new findings that have emerged from the new data sets. The book is well suited for climate science students and scientists from related fields, particularly for those who want to stay up-to-date in the field of paleoclimatology.

Brönnimann, Stefan (2015) Climatic Changes Since 1700. Springer, Advances in Global Change Research, Vol. 55. xv + 357 pp., doi: 10.1007/978-3-319-19042-6

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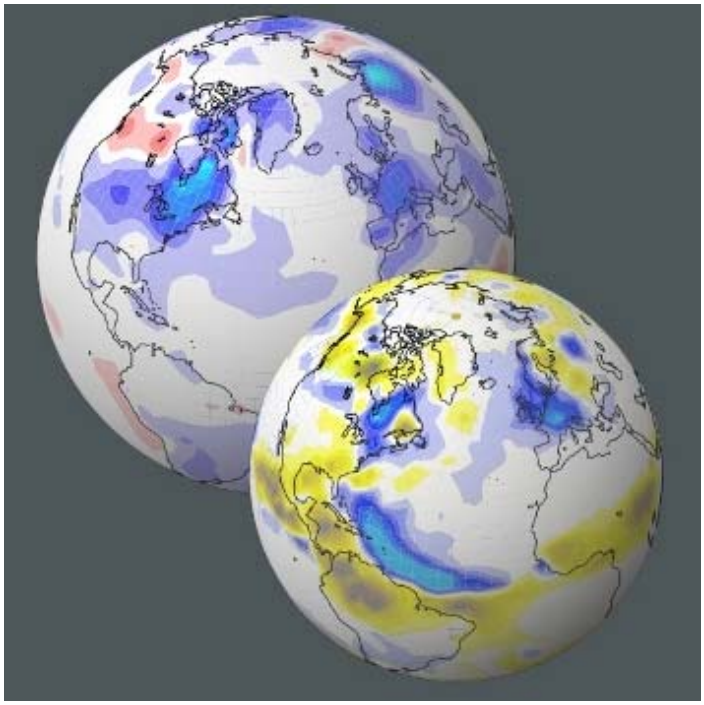

Reconstruction of global temperature and precipitation anomalies in the summer of 1816, the year following the eruption of the volcano Tambora. Based on new reconstructions and models, Brönnimann finds that the frequent rains over Switzerland were a remote effect of a weakened African monsoon, which is a direct consequence of the volcanic eruption.

Climatologist Eduard Brückner, 1862-1927, professor of geography at the University of Bern from 1888-1904. In 1890, he published the first global climate reconstructions.

Procession on the frozen Lake Constance, 1830. Climatic variations always impacted societies.