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Rescuing the Winds: Up-to-date Open Access to the Historic QBO Time Series

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The Quasi-Biennial Oscillation (QBO), a recurring reversal of equatorial stratospheric zonal winds with a roughly 28-month cycle, exerts significant influence on global weather patterns, general climate variability, and even ozone layer dynamics. For over seven decades, a unique and invaluable long-term dataset of zonal wind measurements, meticulously collected from radiosonde stations strategically located across the equatorial belt—Canton Island, Gan (Maldives), and Singapore—has served as a cornerstone for QBO research. However, the original data processing and dissemination pipeline at Freie Universität Berlin (FUB), the custodians of this historical record, faced the risk of discontinuation, threatening the accessibility to this critical climate data record.

Recognizing the profound scientific value of this continuously updated historical dataset, a collaborative rescue and migration initiative was undertaken by FUB and the Karlsruhe Institute of Technology (KIT). This effort successfully transitioned the entire QBO data processing and dissemination pipeline, including the historical data, to a sustainable and openly accessible infrastructure. Adhering to open data principles and ensuring FAIR (Findable, Accessible, Interoperable, and Reusable) compliance, the QBO dataset was seamlessly integrated into the ATMO Hub, a data platform at KIT dedicated to atmospheric sciences. To maximize its utility for a diverse user community, the dataset, accompanied by standardized and comprehensive metadata and documentation, is now openly disseminated through widely used platforms such as Zenodo and earth-data.de. The data is provided in user-friendly and interoperable formats, including the network Common Data Form (netCDF) and simple (traditional) text files.

This successful rescue operation underscores the critical importance of proactive data stewardship and highlights data rescue as a fundamental pillar of effective Open Data policy. By bridging historical observational records with contemporary analytical techniques, the QBO dataset continues to fuel a wide range of modern applications, from improving the accuracy of climate reanalysis products and enhancing our understanding of long-term climate trends to serving as a valuable resource for the development and validation of cutting-edge AI-based climate modeling efforts.

We will share practical insights from the migration process, including challenges in adapting legacy software, harmonizing metadata, and engaging users. By openly documenting our methodology and lessons learned, we aim to encourage similar initiatives in atmospheric sciences. This project

exemplifies the power of Open Data to preserve and provide essential climate information—safeguarding our climate monitoring memory for future generations of researchers and decision-makers.