



## **How robust is the Holton-Tan relationship?**

Peter Braesicke and Tobias Kerzenmacher

KIT, IMK-ASF, Meteorology, Leopoldshafen, Germany (peter.braesicke@kit.edu)

The Holton-Tan relationship explains a possible link between tropical and extratropical variability (foremost in the northern hemisphere). The idea can be rationalised using simple linear wave theory. The quasi-biennial oscillation in the tropical lower stratosphere can be regarded as a kind of switch that influences the propagation of planetary waves. In a westerly phase of the QBO planetary waves in the stratosphere can propagate more equatorward and the polar vortex remains strong and undisturbed. In an easterly phase of the QBO the propagation is more poleward and the polar vortex is weaker and more disturbed. However, the robustness of this relationship depends on the precise definition of the QBO phase and the criteria used to define the polar vortex strength. Here, we will revisit the basic Holton-Tan relationship and will explore how other factors (including the state of the El Niño-Southern Oscillation) modify the relationship. Using reanalysis data and idealised model experiments a possible range for robust manifestations of the Holton-Tan relationship is determined, thus providing an improved framework for a better understanding of teleconnections between tropical and polar latitudes.