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Extratropical teleconnections of the stratospheric quasi-biennial oscillation (QBO): observations, models, and predictability

James Anstey
Canadian Centre for Climate Modelling and Analysis (CCCma/ECCC)

With a typical period of 28 months, the quasi-biennial oscillation (QBO) of tropical stratospheric winds is probably the most predictable atmospheric phenomenon that can be explained solely by the internal dynamics of the atmosphere. Any influence of the QBO on other regions of the atmosphere, such as the extratropics, could provide a valuable additional source of predictability on seasonal and decadal timescales, provided that the atmospheric general circulation models (AGCMs) used to make such predictions can adequately represent the QBO and its teleconnections. Yet although the QBO was discovered more than fifty years ago, most state-of-the-art AGCMs do not exhibit a QBO, or have significant biases with respect to observations. Even the fidelity of many of the best "QBO-resolving" AGCMs has recently been called into question by the apparently unanimous failure of existing seasonal prediction systems to predict the dramatic QBO disruption that occurred during the 2015/16 Northern Hemisphere winter. And while QBO teleconnections to other atmospheric regions are the subject of an extensive literature of modelling and observational studies, it remains an open question as to how robust these teleconnections really are. The uncertainties arise not only from the limited length of the observational record, during which the QBO co-exists with numerous other sources of low-frequency variability, but also from open questions about the mechanism(s) by which the QBO influences other regions of the atmosphere. This talk will offer an overview of previous work on QBO teleconnections and will present some first results from experiments designed by the QBO initiative (QBOi), an ongoing model intercomparison project aiming to improve our understanding of the QBO, its representation in atmospheric models, and the strength and scope of its teleconnections to regions outside the tropical stratosphere.