

Coordinated multi-model simulations of the quasi-biennial oscillation

Andrew BUSHELL¹, Scott OSPREY², James ANSTEY³, Neal BUTCHART⁴, Kevin HAMILTON⁵, Yoshio KAWATANI⁶, Jadwiga RICHTER⁷, and Anne SMITH⁷

¹ *Met Office, Exeter, United Kingdom*

² *NCAS, Oxford, United Kingdom*

³ *CCCma, Victoria, Canada*

⁴ *Met Office Hadley Centre, Exeter, United Kingdom*

⁵ *International Pacific Research Centre, Honolulu, USA*

⁶ *JAMSTEC, Yokohama, Japan*

⁷ *NCAR, Boulder, USA*

Two coordinated experiments of the SPARC quasi-biennial oscillation initiative (QBOi) are designed to evaluate the representation of QBOs in atmospheric general circulation models under present-day conditions (Butchart et al., 2018). The first specifies a model time window from 1 January 1979 to 28 February 2009 with contemporaneous external forcings and observed sea-surface temperature (SST) and sea-ice amounts in order to allow meaningful validation against reanalyses. The second experiment takes the same model configurations but suppresses interannual variability in external forcings such as the SST and sea-ice amounts through use of repeated annual cycle climatologies. Participating modelling groups submitted 13 datasets to the QBOi archive for the first experiment and 11 for the second.

We will present a selection of metrics that enable different aspects of QBO behaviour in models to be categorized for comparison against each other and reanalyses. For example, from analysis of the two experiments, models which have non-orographic gravity wave parametrizations with variable sources show systematically reduced QBO peak amplitudes relative to models where the sources are invariant in space and time. In addition, the variable source models respond to the increased variability in the first experiment relative to the second with lengthened QBO periods whereas responses of the fixed source models are mostly small with some periods shortened. Further intercomparison of QBOi model output will investigate the processes which contribute to sensitivities that emerge in this way.

Key words: tropical, intercomparison, QBOi, QBO,

References

Butchart, N., and Coauthors, 2018: *Geosci. Model Dev.*, **11**, 1009-1032.