QBO and ENSO relationships in climate models. Implications for teleconnection patterns and predictability.

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Recently, it has been demonstrated that the predictability of the Quasi-Biennial Oscillation (QBO) extends over a few years, well beyond the timescales associated with internal atmospheric variability and processes, even if skilful prediction of QBO does not guarantee predictability of extratropical teleconnections because of difficulties in models to reproduce the observed teleconnection patterns (Scaife et al., 2014). The El Nino Southern Oscillation (ENSO) is robustly recognized as a source of predictability at seasonal to decadal timescales for the Tropical regions and in the Northern Hemisphere through its Pacific North-American teleconnections, and more recently also for extratropical teleconnections, through the confirmed link between ENSO and the the North-Atlantic regions that involve also stratospheric variability. In the last years, it has been shown that the QBO amplitude and phase propagation are influenced by the ENSO phase (Taguchi, 2010). Moreover, a recent study (Christiansen et al., 2016) reported an alignment of the phase of the QBO in the years after strong warm ENSO events. This was found both in observations and in an ensemble of AMIP type model experiments with EC-Earth (v3). In this study we analyze a set of AMIP type and coupled climate model simulations from both multi-realizations from a single model at different resolutions as well as multi-models to evaluate both the ENSO effect for the QBO amplitude and phase speed as well as the QBO phase/ENSO alignment. We discuss our results also in terms of extratropical QBO teleconnection patterns. Those teleconnection patterns may indeed be a key factor for explaining the signal-to-noise paradox, by which the predictable component in seasonal and multi-year forecast of the NH mid-latitude temperature and pressure appears to be lower in models than in observations (Eade et al., 2014).

Key words: ENSO influence on QBO · tropical-extratropical teleconnection patterns, implications for predictability

References

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