

**SESSION: (A1) Mechanisms of S2S predictability**

**(A1-04)**

**Characteristics of the QBO-Stratospheric Polar Vortex Connection on Multi-decadal Time Scales**

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The strength of the relationship between the quasi-biennial oscillation (QBO) and the Northern Hemisphere stratospheric polar vortex, or Holton-Tan (H-T) relationship, on multi-decadal timescales is investigated using a 10-member ensemble of historical simulations for the period 1957-2015. The experiments were conducted with the higher-top Community Atmosphere Model Version 5 (CAM5) that is capable of internally generating the QBO. Consistent with reanalysis, the model ensemble-mean shows a strengthening (weakening) of the polar vortex with westerly (easterly) phase of the QBO. However, substantial variations across individual ensembles with respect to the strength of the H-T relationship and subsequent tropospheric impacts on ~60-year timescales are found that are closely linked to variations in the frequency of occurrence of major stratospheric sudden warmings in the QBO east phase. It is shown that this sensitivity is consistent with the QBO's modulation of the zero-wind line in the lower stratosphere affecting planetary wave propagation. Implications for evaluating the H-T relationship in atmospheric circulation model and QBO's role as source of predictive skill on subseasonal to seasonal timescales are discussed.