

Can the potential predictability associated with sudden stratospheric warmings can be realized?

John Scinocca[†]; Michael Sigmond; Slava Kharin

[†] CCCma, Environment Canada, Canada

Leading author: john.scinocca@ec.gc.ca

A number of studies have identified the potential for enhanced skill in seasonal forecasts of the Northern Hemisphere wintertime troposphere arising from the influence of sudden stratospheric warmings as first illustrated by Baldwin and Dunkerton. However, it remains to be determined whether this potential can be realized in operational seasonal forecast efforts. In this study we investigate this question in two-tier hindcasts employing companion high-top and low-top versions of the Canadian Middle Atmosphere Model (CMAM) in support of the Stratospheric Historical Forecast Project as part of the WCRP CLIVAR Working Group on Seasonal to Interannual Prediction. A central result of this study is that, while the Baldwin and Dunkerton mechanism is operable in the hindcast simulations, much of its potential for enhanced skill goes unrealized. The reason is found to be due to an inability to predict sudden warming events beyond the time scale of roughly one week. The skill enhancement that goes unrealized in the hindcasts is quantified by additional hindcast cycles in which the stratosphere is constrained to follow observations by a relaxational procedure (i.e. hindcasts with perfect prediction of sudden warmings). The results of this study have implications for the interpretation and analysis of the upcoming Stratospheric Historical Forecast Project.