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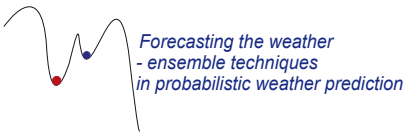

Modulation of the Stratosphere-Troposphere Coupling in the Southern Hemisphere by Solar and Ozone Effects

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In this study we analyze the relative influences of solar decadal variability and ozone change on Southern Hemisphere (SH) interannual variability and the stratosphere-troposphere coupling in three simulations with the EMAC-FUB chemistry climate model under varying forcings for the 20th and 21st centuries. The relative role of both terms for the Southern Annular Mode (SAM) is assessed by decomposing the geopotential height anomalies fields into the respective contributions and applying an EOF-analysis (after Baldwin and Thompson, 2009).
Both the solar and ozone signals in the SH stratospheric geopotential height field Z show an annular-mode-like character. In the troposphere (700 hPa) the spatial distribution of the SAM signatures is more complex, but with a characteristic maximum of negative Z-anomalies over the polar cap in both cases, with greater impact of solar irradiance on tropospheric geopotential anomalies. The temporal modulation of the propagation of the geopotential anomalies through the solar effect takes place on longer time-scales, with visible anomalies in the troposphere after about 120 days, while the propagation of ozone-induced anomalies proceeds faster.