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Long-term changes in stratospheric water vapour and its implications for climate

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Water vapour is the most important natural greenhouse gas in the atmosphere and provides a positive feedback to the climate forcing from carbon dioxide. Water vapour is also the source of hydroxyl (OH) which controls the lifetime of shorter-lived pollutants and long-lived greenhouse gases. Despite the importance of water vapour to chemistry and the radiative balance of the atmosphere, its observed long-term changes in the stratosphere are not well understood, and may even conflict with the theoretical understanding of its drivers.

I here present a new climate data record of stratospheric water vapour developed within the ESA Water Vapour Climate Change Initiative and discuss recent changes in stratospheric water vapour concentrations in the light of earlier observational studies, modelling results from the SPARC Chemistry-Climate Model Initiative, and our theoretical understanding of its drivers. In addition, the radiative forcing of surface climate and inferred changes in the Brewer-Dobson Circulation will be highlighted.