



Poleward spread of water vapor at 100 hPa: An effect of the extratropical pump?

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Water vapor entering the lower stratosphere rises with the Brewer-Dobson circulation in the tropics, producing the so-called tape-recorder effect. In the subtropics, water vapor mixed into the UT/LS (upper troposphere/lower stratosphere) mid-latitudes is subject to extratropical pumping and tends to move poleward. Here we investigate this poleward transport effect with the H₂O measurement acquired during 2004-2005 by MLS (Microwave Limb Sounder) on Aura. Since the sources of UT/LS H₂O reside mostly in the tropical UT and vertical transport is weak at mid-latitudes, the poleward spread of H₂O is expected to be confined to a narrow height range. The observed seasonal variation in MLS H₂O suggests a gradual poleward transport at 100 hPa in both hemispheres with a slight asymmetry about the equator. Summertime mid-latitude anticyclones in the UT/LS play a key role in mixing H₂O across the subtropical barrier during June-September. This mixing is clearly evident in some weekly maps where anticyclones bring high H₂O to mid-high latitudes and high O₃ from high latitudes to the tropics.