

Use of water vapor isotopic measurements to constrain moistening role of convection in the upper troposphere

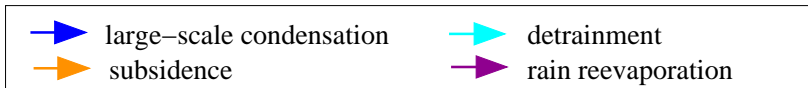
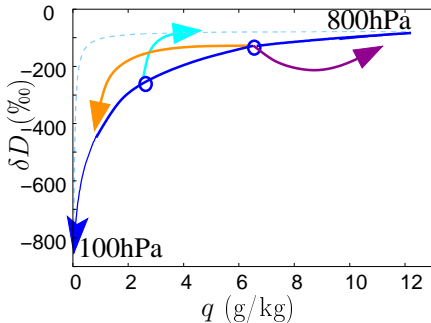
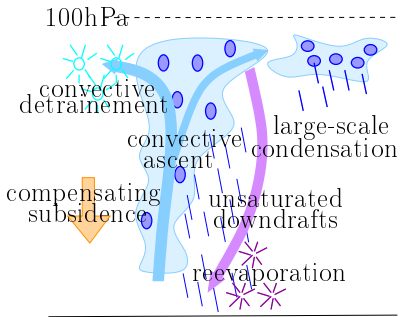
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16 November 2015: GEWEX UTCC PROES meeting

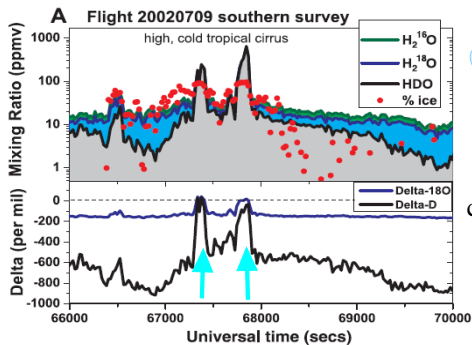
Water vapor isotopes

- ▶ δD can be measured from space (TES, IASI, MIPAS, ACE)
- ▶ Theoretical framework to infer moistening and dehydrating processes (Worden et al 2007)

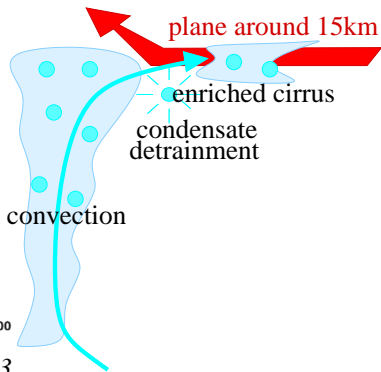


Isotopes in the upper troposphere

- papers from *Moyer, Kuang, Dessler, Sherwood, Sayres, Hanisco...*

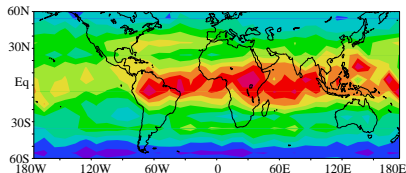


Webster & Heymsfield 2003

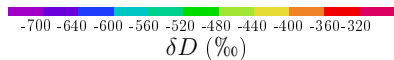
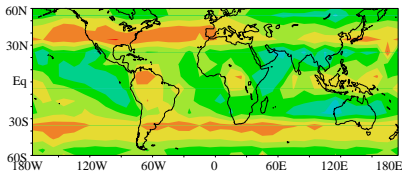


Convective detrainment in upper troposphere

MIPAS data at 200hPa, annual

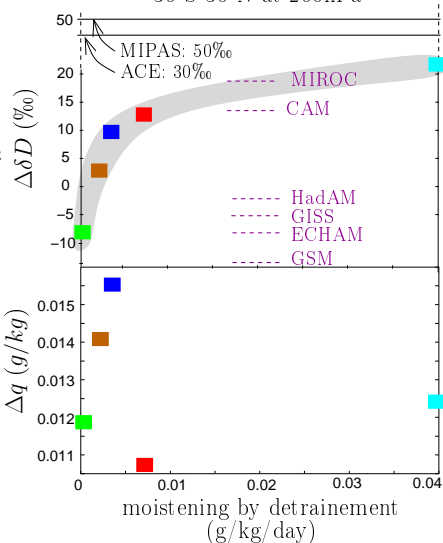


LMDZ control



- control
- vertical advection more diffusive
- stronger condensate detrainment
- less large-scale condensation
- less large-scale precipitation

Difference 15°S-15°N minus 30°S-30°N at 200hPa



Preliminary test in LMDZ

$$\epsilon_p^{max,eff} = \epsilon_p^{max} - coef \cdot \sqrt{CAPE}$$

