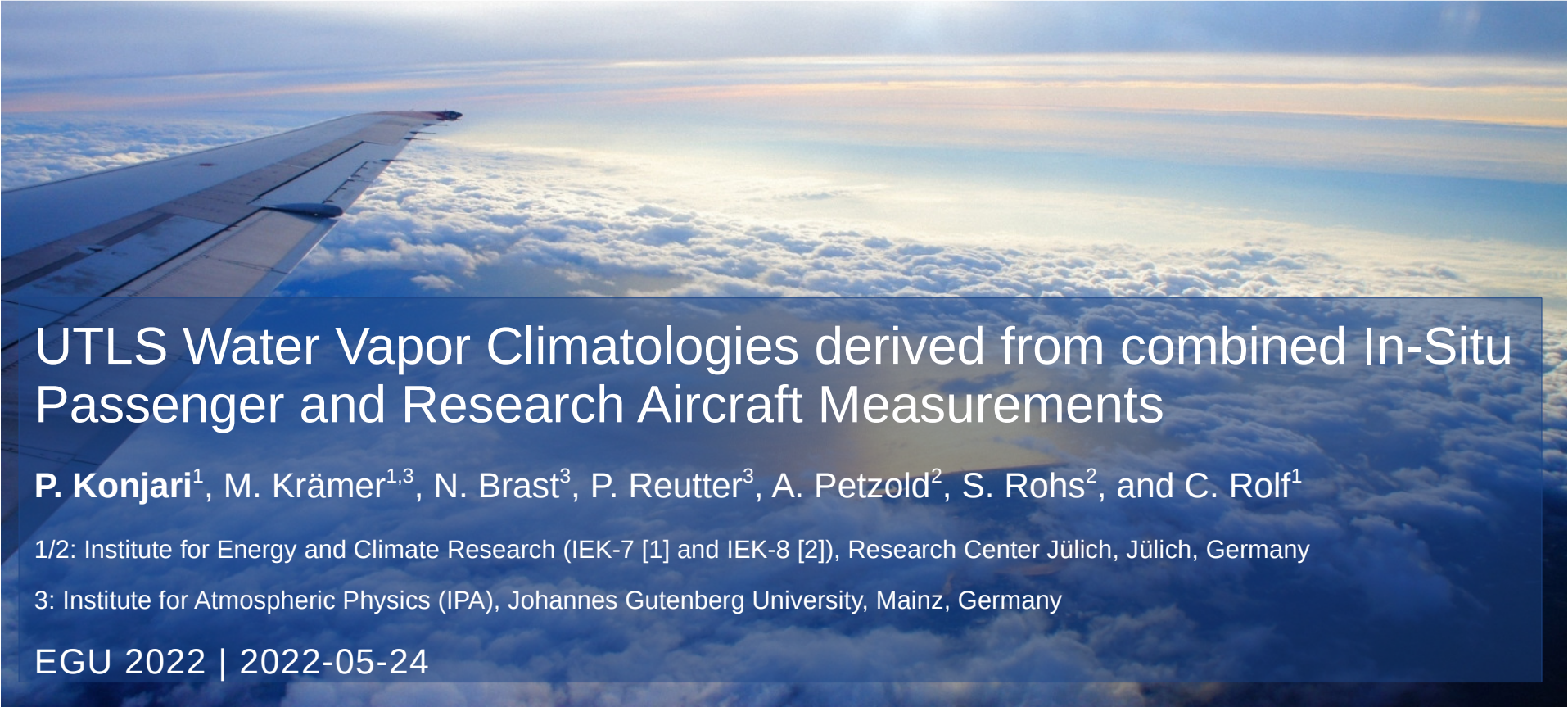




UTLS Water Vapor Climatologies derived from combined In-Situ Passenger and Research Aircraft Measurements

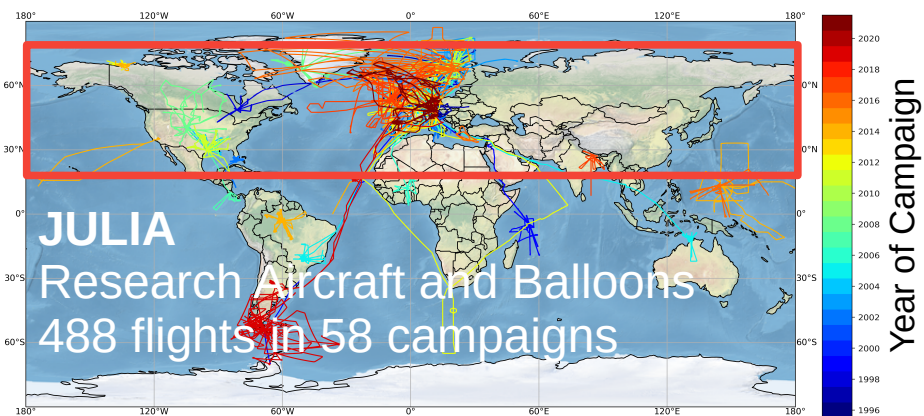
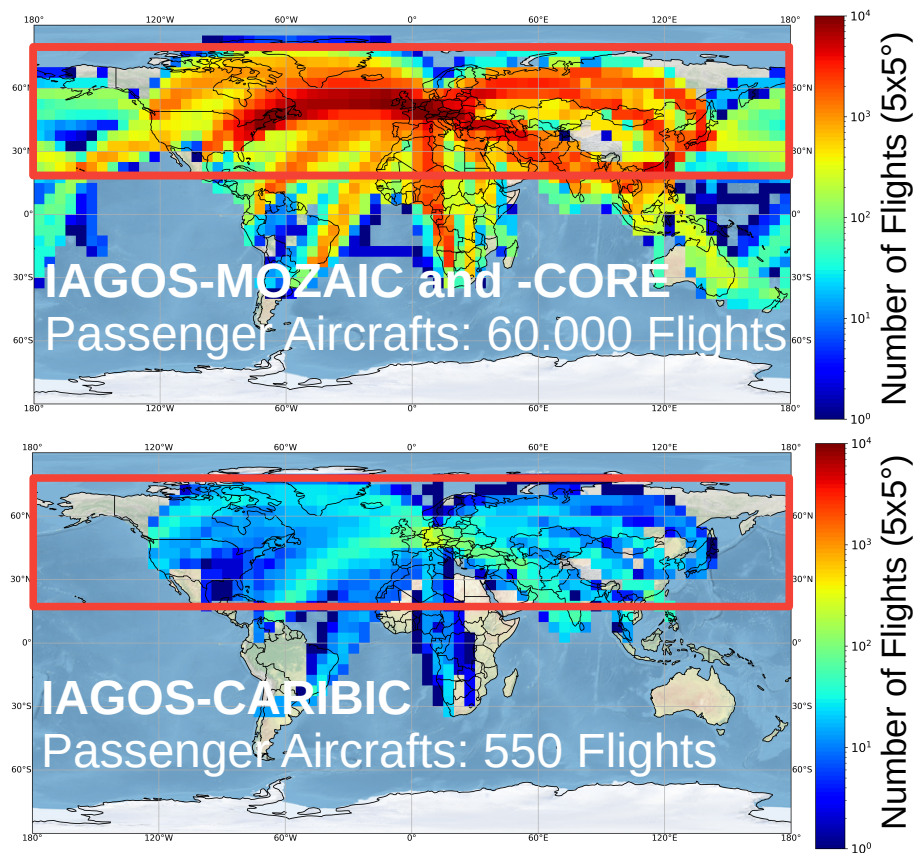
P. Konjari¹, M. Krämer^{1,3}, N. Brast³, P. Reutter³, A. Petzold², S. Rohs², and C. Rolf¹

1/2: Institute for Energy and Climate Research (IEK-7 [1] and IEK-8 [2]), Research Center Jülich, Jülich, Germany

3: Institute for Atmospheric Physics (IPA), Johannes Gutenberg University, Mainz, Germany

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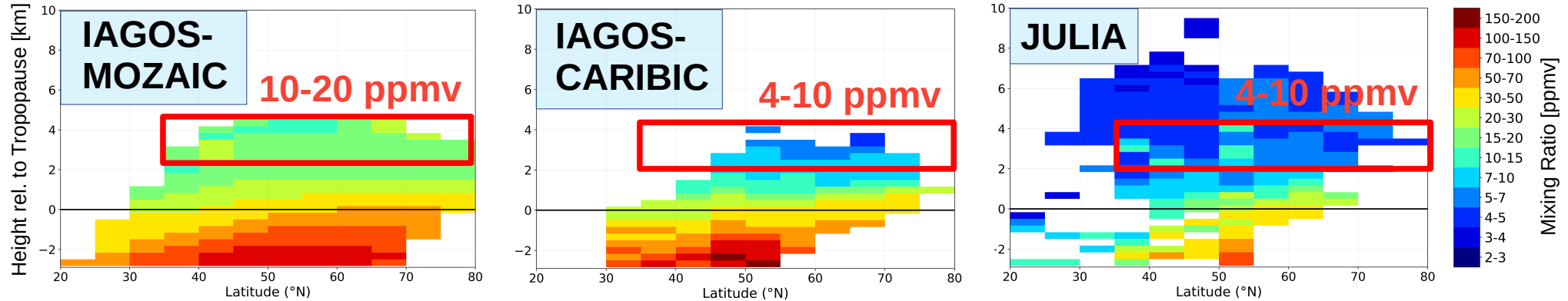
PASSENGER AND RESEARCH AIRCRAFT DATA SETS



- UTLS water vapor statistics for northern mid- to high latitudes
- Interpolated ERA5 data:
 - Thermal tropopause
 - Equivalent latitude

MOTIVATION: MOZAIC UNDERESTIMATION OF LOW WATER VAPOR CONCENTRATIONS

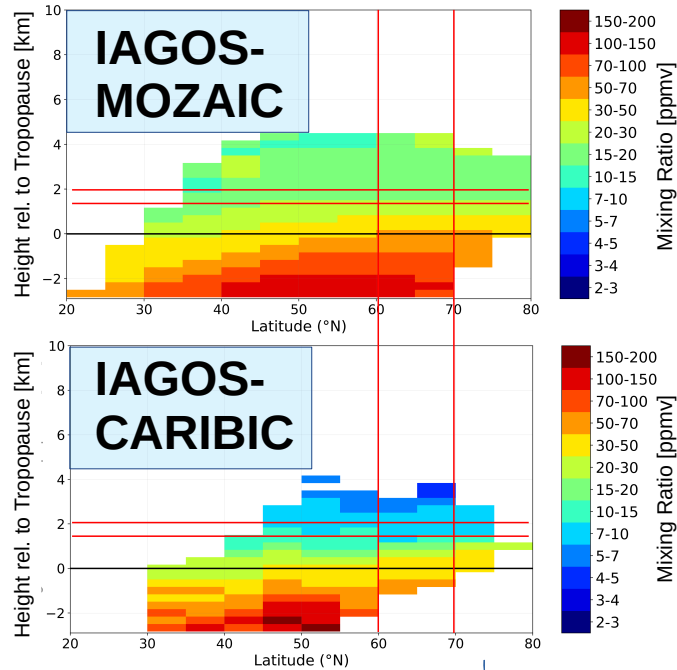
Fall equivalent latitude (5°) means of water vapor mixing ratio relative to tropopause



MOZAIC: Limitations of capacity sensor for very low relative humidity wrt. water (RHL)

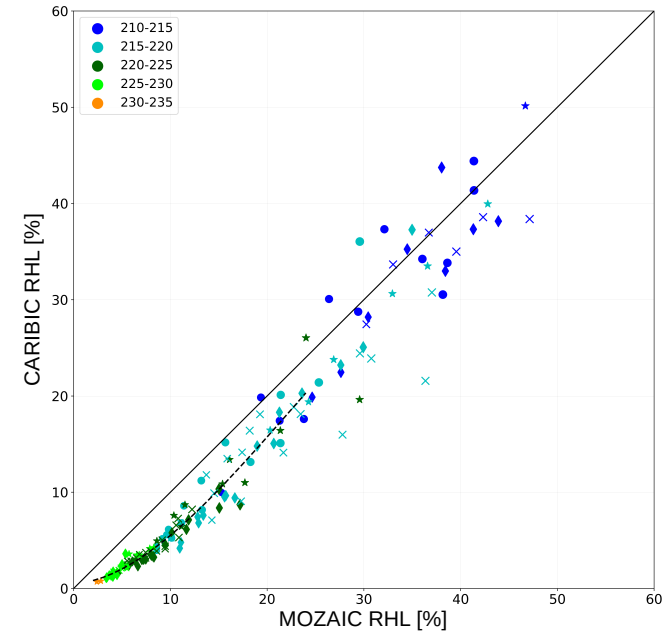
- Limitation below RHL=10 % (Neis et al., 2015): **Relative differences of ~100 %**
- Utilizing CARIBIC to correct MOZAIC RHL
- **Aim:** Enhanced quality of highly resolved UTLS water vapor data

CORRECTION OF MOZAIC WATER VAPOR DATA



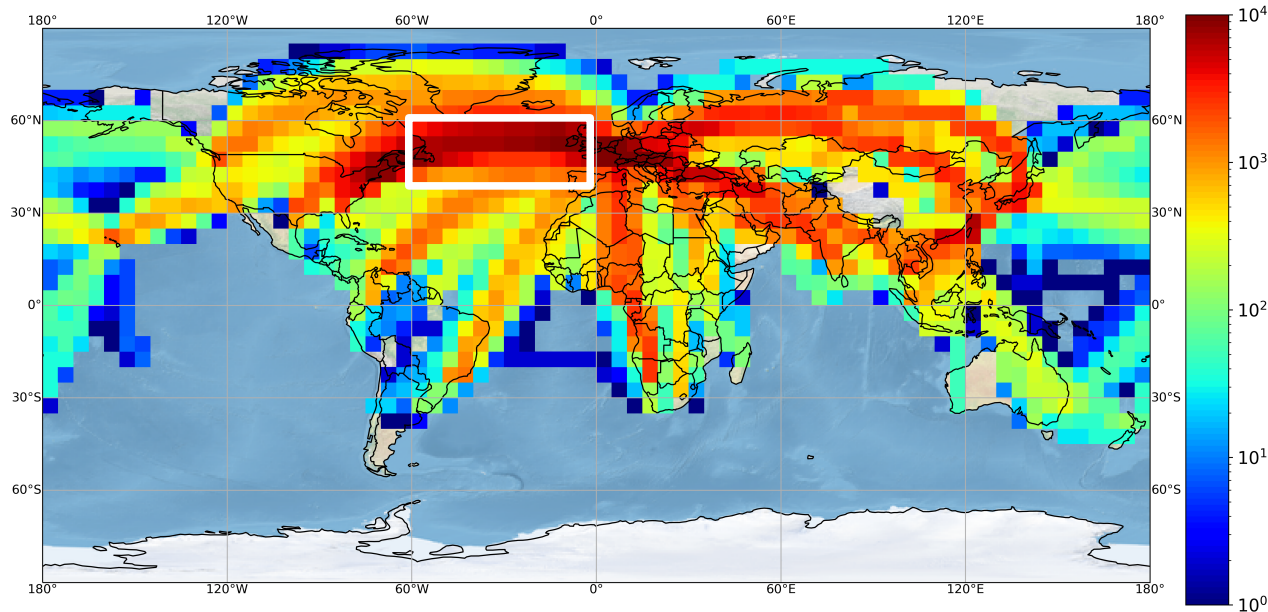
Method: Comparison from a statistical point of view

- Relative to tropopause (TP) (dz=0.33km) → above TP only
- 10° equivalent latitude
- Seasonal averages
- Function of temperature



$$\overline{\text{RHL}} = \overline{\text{RHL}}(\text{dz}, \text{dlat}, \text{season}, \text{dT})$$

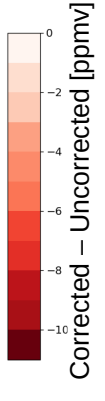
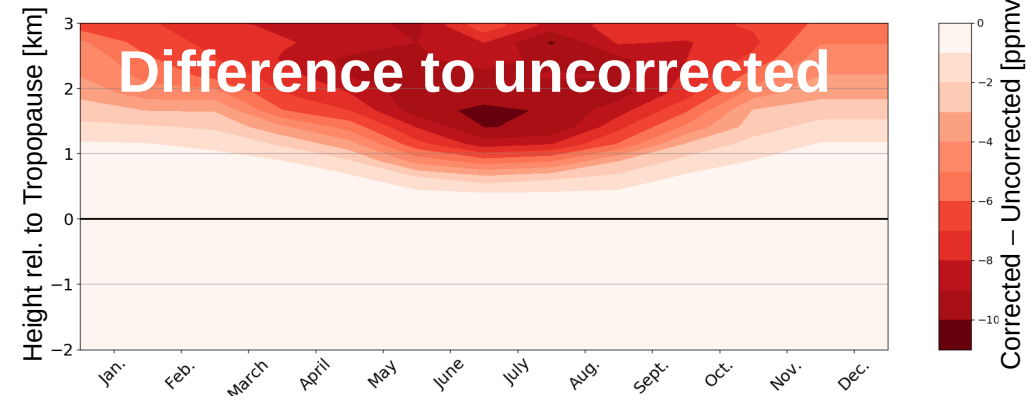
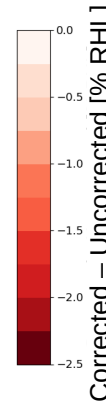
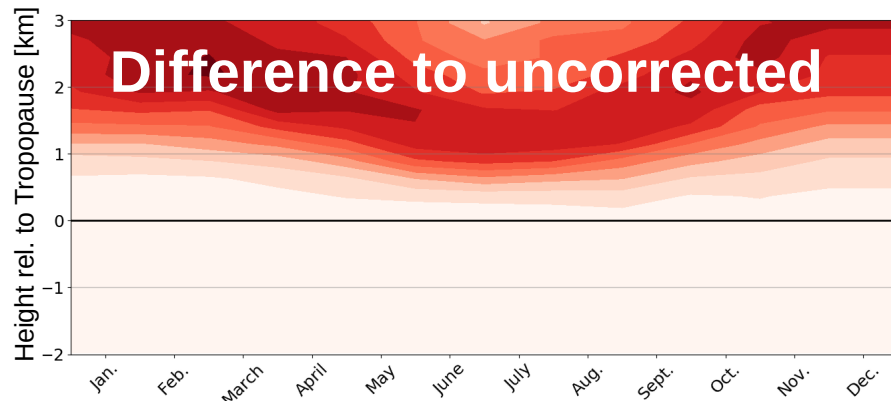
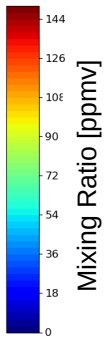
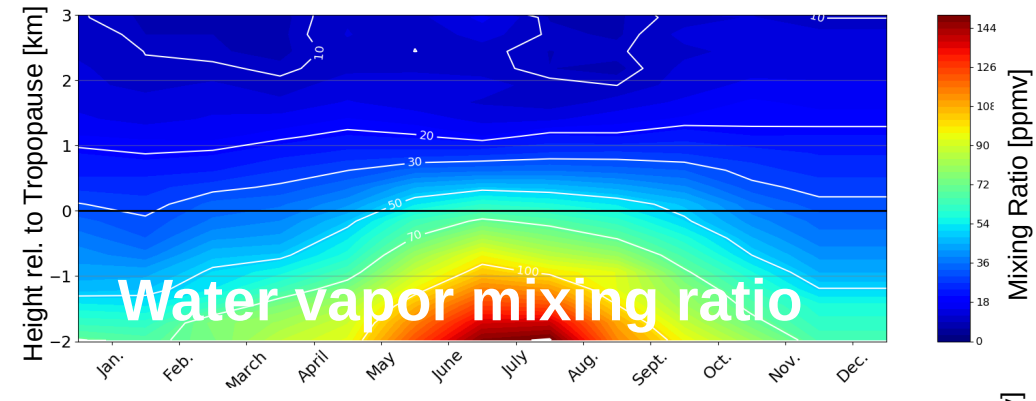
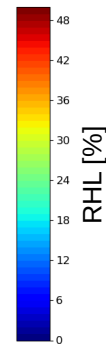
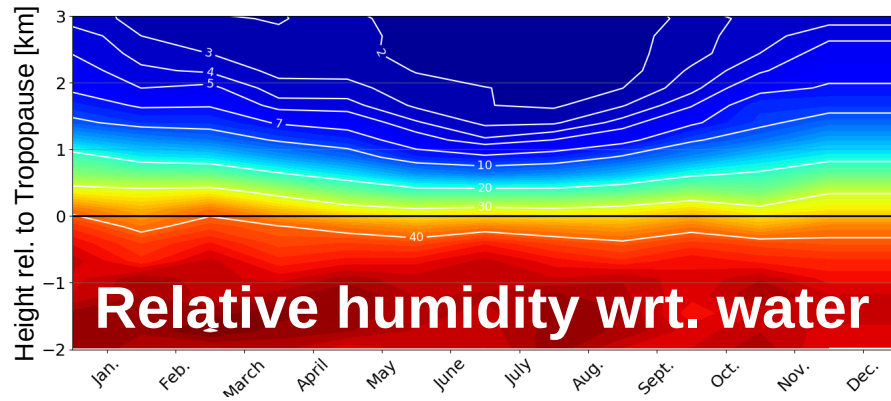
CORRECTED UTLS WATER VAPOR CLIMATOLOGIES



Highly resolved water vapor statistics

- Corrected MOZAIC data
- N. Atlantic: 40-60°N, 60-0°W
- Monthly means
- 0.25 km around TP

CORRECTED UTLS WATER VAPOR CLIMATOLOGIES



SUMMARY AND OUTLOOK

- Corrected MOZAIC and CORE data:
 - **High quality UTLS water vapor data with a high spatial and temporal resolution**
- Outlook: Investment of UTLS transport and mixing processes
 - Based on backward trajectories (by CLaMS Model)

