

# ACTIVITY REPORT:

## OCTAV-UTLS

(Observed Composition Trends And Variability in the Upper Troposphere and Lower Stratosphere)

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**28<sup>th</sup> SPARC SSG meeting**

Part II: Activity reporting

*February 2021*

OCTAV-UTLS plans to

- quantify observed trends and variability in UTLS composition using all available multi-platform observations
- identify changes in transport and mixing processes in the UTLS
- understand to what extent and how measurement characteristics (spatial and temporal coverage, resolution, etc) limit our ability to quantify trends
- identify future measurement needs to overcome these limitations

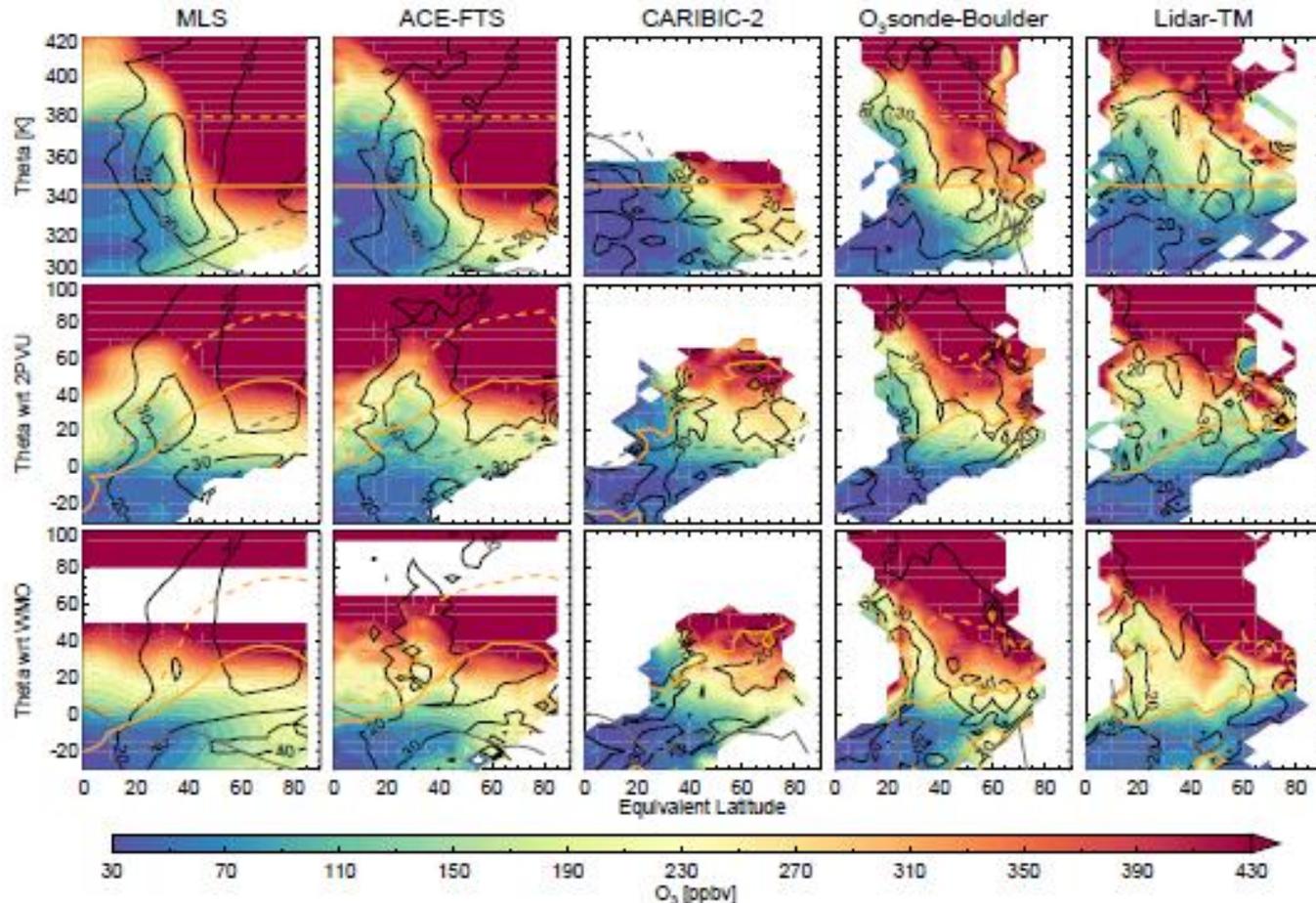
Achieving these goals requires to account for the variability of the tropopause and jets in the UTLS when analysing composition measurements (from aircraft, ground-based, balloon, satellite platforms)

Need for consistent use of reanalysis data and metrics for coordinate mapping (-> JETPAC)

- *The 3<sup>rd</sup> OCTAV-UTLS workshop was held in March 2020 at TMF (mixed online and physical presence)*
- Milestones: data mapping of ozone and water vapour in dynamical coordinates (according to agreements of previous workshop) and preliminary trend estimates
- Reduction of ozone variability using dynamical coordinates or STJ-latitude (e.g. lidar, IAGOS, MLS)
- Assessment of differences of (missing) reduction of variability in multiple datasets
- Findings: Differences between coordinate mapping for water vapour and ozone apparent in both satellite (ACE-FTS) and airborne data sets (IAGOS-CARIBIC, HALO)

- Findings: Differences between coordinates based on different interpolation tools and methods: Highly derived products requiring many interpolation steps (e.g. PV, eq.lat) introduce large spread to comparisons
- News: An ISSI proposal was submitted (Understanding satellite, aircraft, balloon, and ground-based composition trends: using dynamical coordinates for consistent analysis of UTLS composition) and selected. The first meeting is scheduled for April 2021, pandemic permitting.

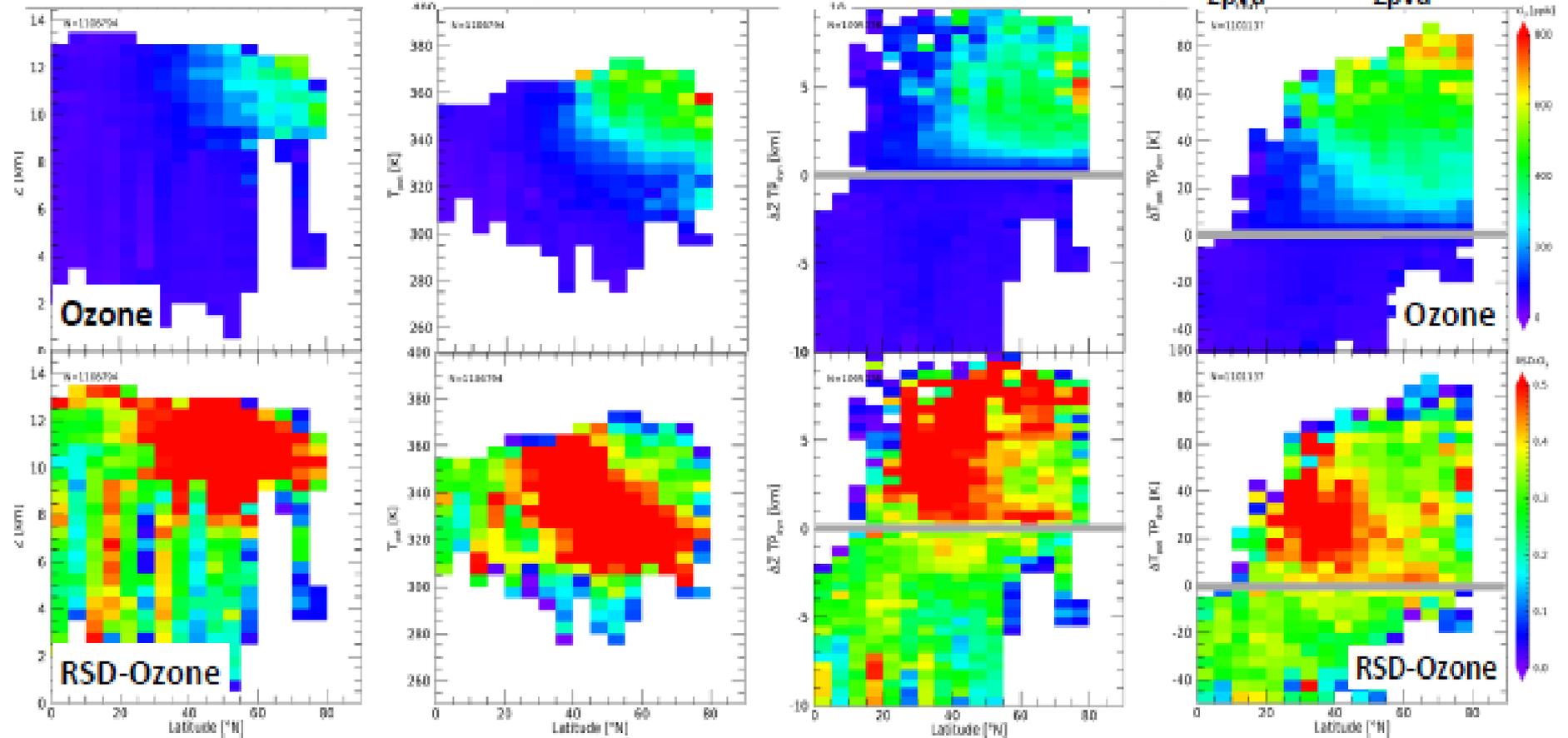
## Equivalent latitude / potential temperature coordinates



Comparison of cross-platform analysis using eq.lat and Theta relative to WMO-TP (Millán, Manney)

## Absolute ( $z$ & $\Theta$ )

## Relative ( $\Delta z_{2p\text{vU}}$ & $\Delta\Theta_{2p\text{vU}}$ )



Ozone distribution (top) and relative standard deviation in different coordinates derived from JETPAC using 2005-2016 IAGOS-CARIBIC aircraft measurements (Bönisch, Zahn, KIT)

- *To which other SPARC or WCRP activities does your activity connect?*
- OCTAV-UTLS has strong links to several other SPARC activities including the
  - LOTUS activity focusing on stratospheric ozone trends
  - TUNER activity, focusing on technical issues concerning the compatibility of observations
  - AMAC activity focusing on transport by the Asian monsoon into the UTLS
  - SSiRC activity focusing on the distribution of stratospheric sulfur, where OCTAV can provide UTLS referenced coordinates for aerosol particle measurements
  - OCTAV-UTLS is linked to WMO GAW and NDACC programs, which guarantees consistent ground-based and sounding observations.

- OCTAV-UTLS activity proposal submitted and won a 2-year support from the International Space Science Institute (ISSI).
- Objective: Direct co-working to facilitate application of methods and differences in trends and composition despite same metric in physical collaborative work at ISSI
- The first ISSI meeting is currently planned for April 2021. The team will work on the first OCTAV-UTLS publication. This publication will explore which meteorological coordinate systems best reduce natural UTLS ozone variability
- The first publication of OCTAV-UTLS is planned for mid 2021.
- The 4th OCTAV-UTLS meeting will take place probably at KIT in Karlsruhe (Germany) in late 2021. A hybrid style meeting with online and in-person attendance will be considered.

- OCTAV activity requires access to reanalysis fields, satellite, ground based, and aircraft observations. Access to these datasets was guaranteed by the members of the steering group and the activity leads. However, a (password protected) repository for such datasets, as well as the JETPAC outputs are urgently needed. Currently estimates suggest that 100 GB will be required.

# Additional slide