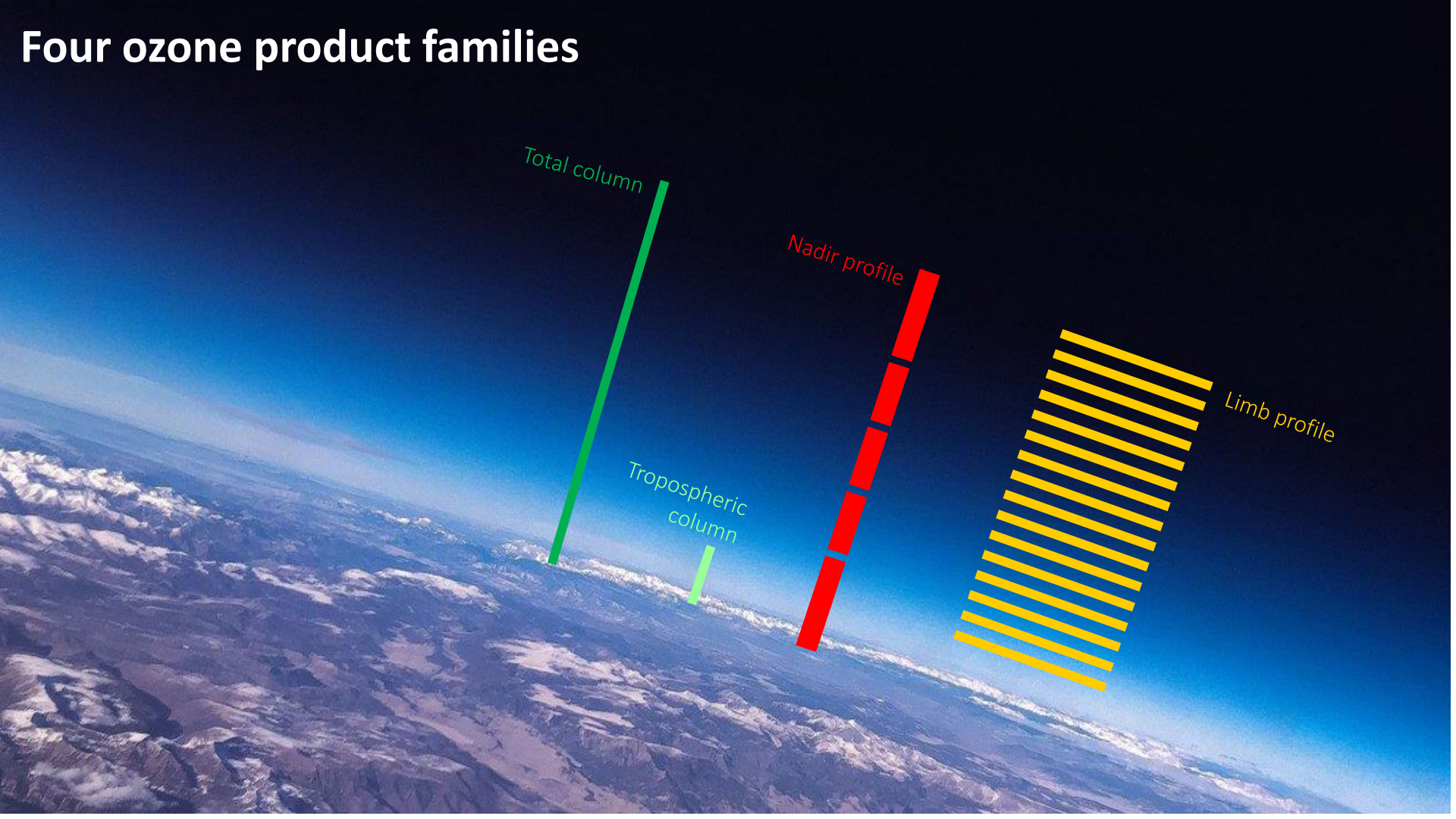
# Ozone CCI / C3S Climate Data Records

## Portfolio and recent science results


D. Hubert & A. Keppens for the CCI & C3S teams

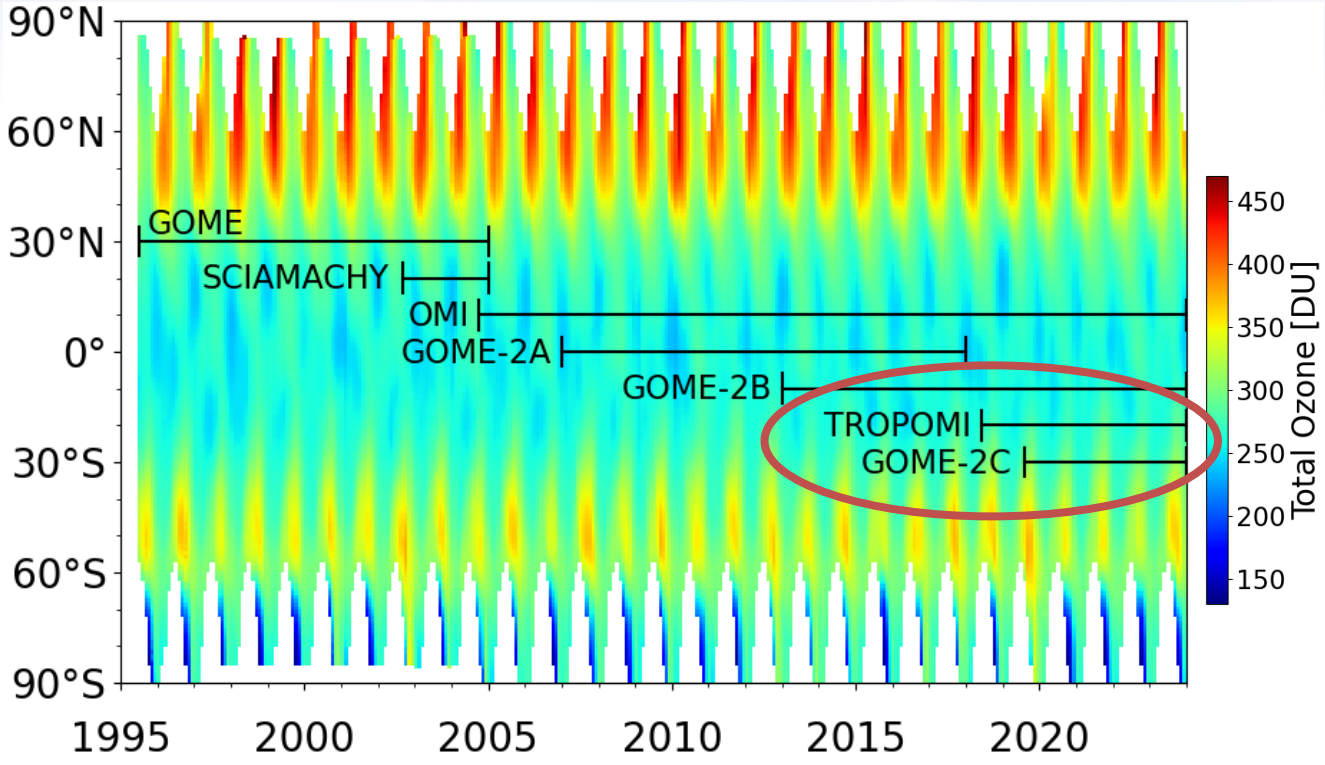
C. Arosio, D. Balis, P.-F. Coheur, M. Coldewey-Egbers, J. de Laat, K.-U. Eichmann, M. Eisinger, K. Garane, K.-P. Heue, D. Hurtmans, B. Kerridge, ML. Koukouli, J.-C. Lambert, B. Latter, D. Loyola, A. Rozanov, R. Siddans, V. Sofieva, M. Szelag, R. van der A, M. Van Roozendael, M. van Weele, T. Verhoelst, J. Vlietinck, M. Weber and C. Wespes


# Four ozone product families



# Total ozone : GTO-ECV

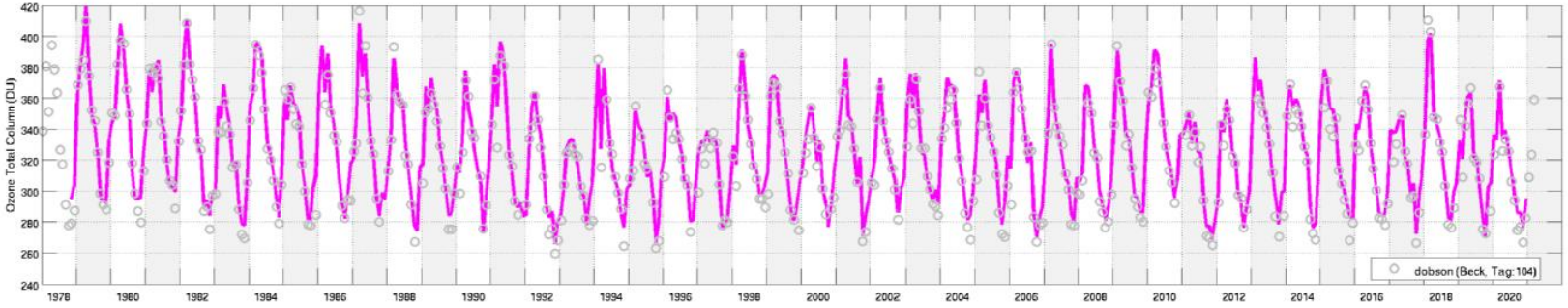
(1° x 1° x month, since 1995, daytime)

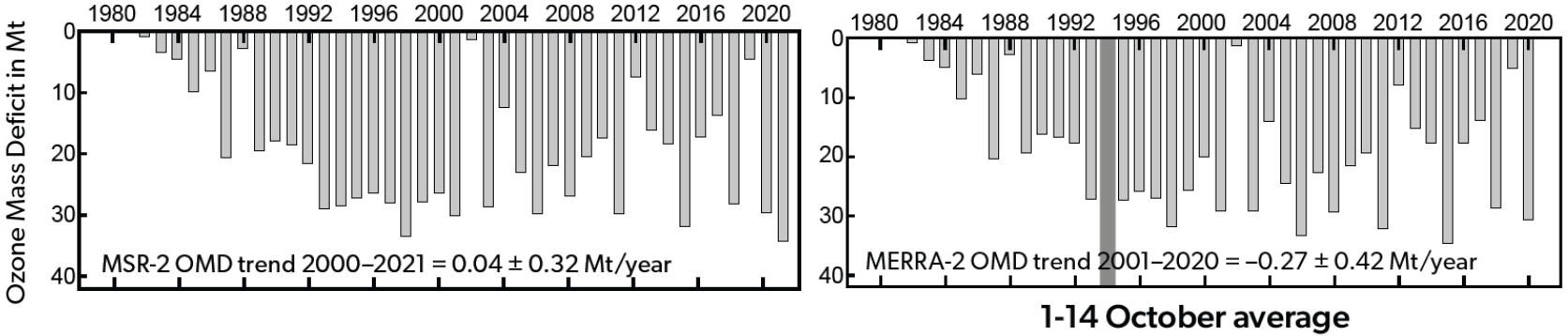



More details and applications: Coldewey-Egbers et al. (2014, 2015, 2020, 2022), Loyola et al. (2009), Loyola and Coldewey-Egbers (2012), Chiou et al. (2014), Lerot et al. (2014), Koukouli et al. (2015), Weber et al. (2018, 2022), Chipperfield et al. (2018), Garane et al. (2018), Eleftheratos et al. (2019), Dameris et al. (2021), WMO/UNEP (2018, 2022)

# Total ozone : MSR-2

(0.5° x 0.5° x month, since 1960)



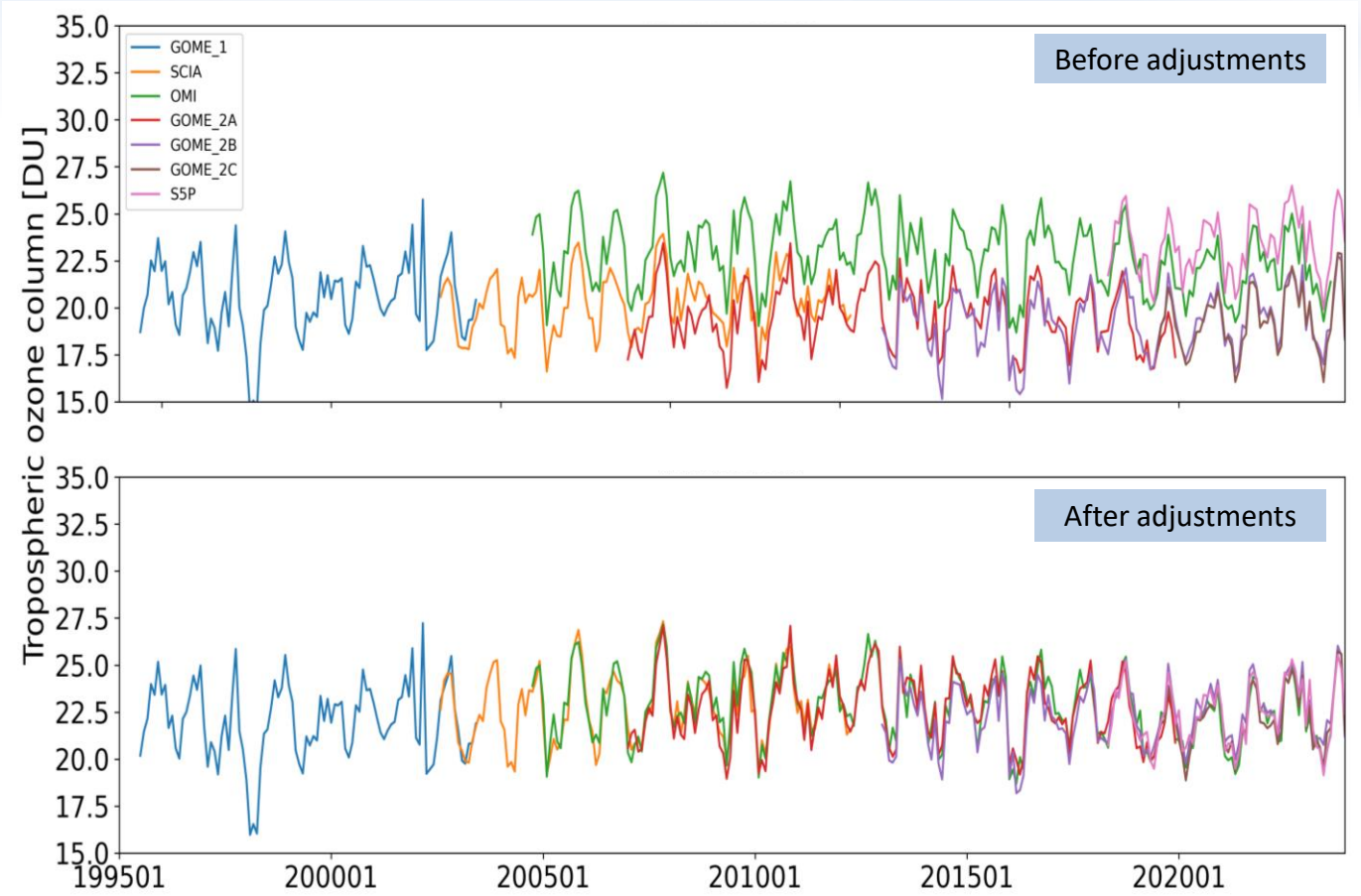




van der A et al (2015), WMO/UNEP (2022), de Laat et al (in prep)

# Tropospheric ozone – CCD : GTTO-ECV

(1° x 1° x month, since 1995)

*NEW*

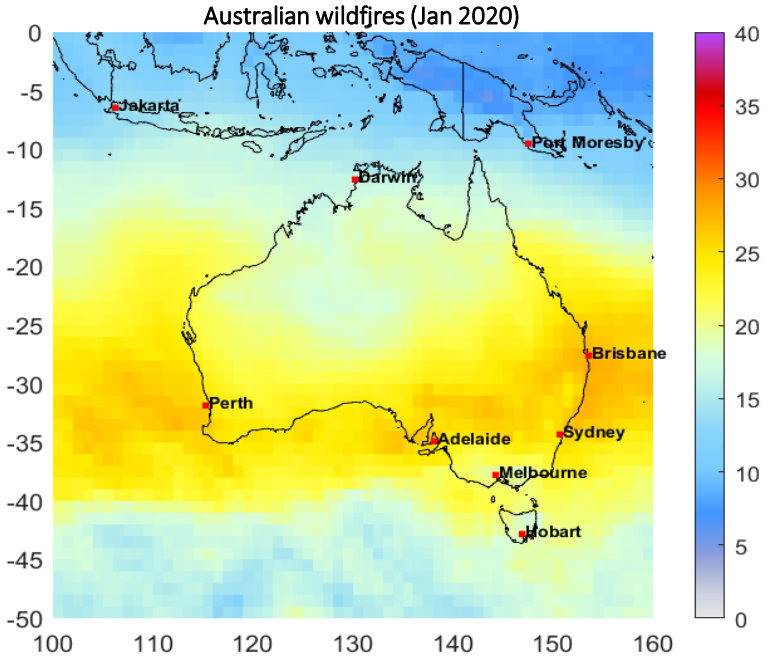


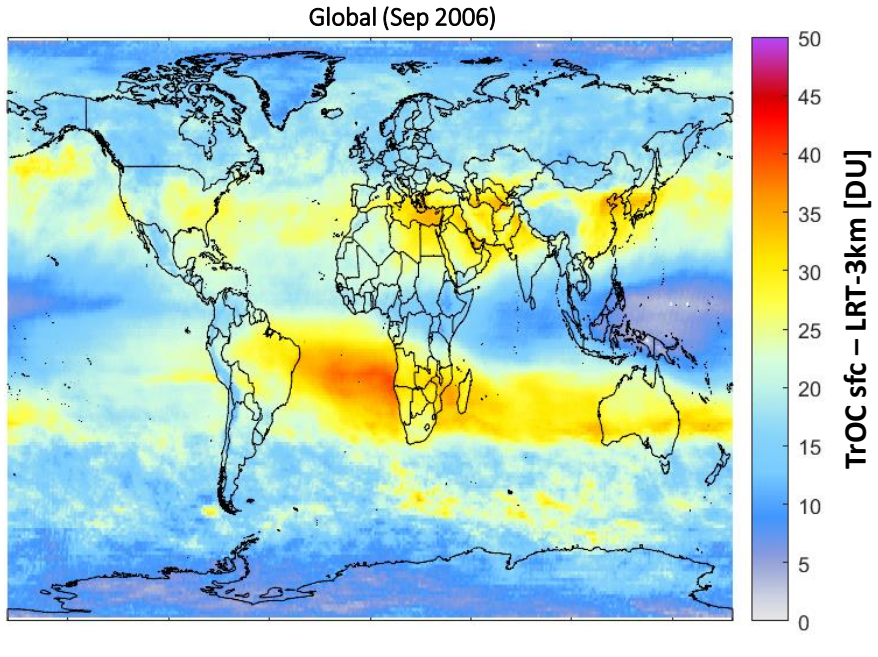

Poster 5.4 by
**K.-P. Heue**

Heue et al (2016)

# Tropospheric ozone – LNM : OMI/GTO-LIMB (1° x 1° x month, since 2004)

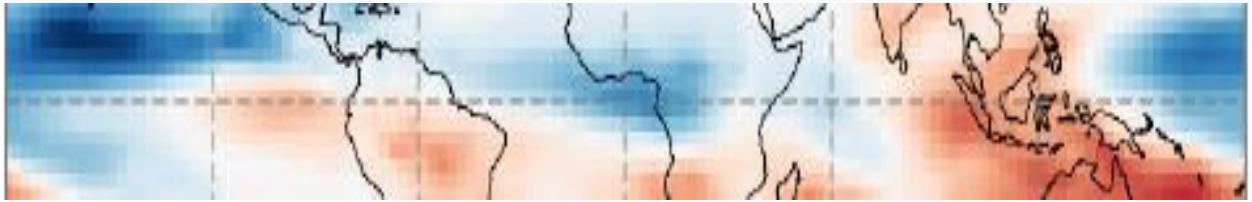
*NEW*



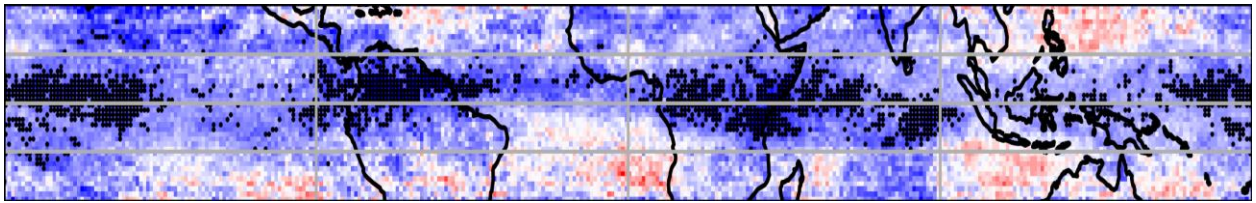




Sofieva et al (2022)

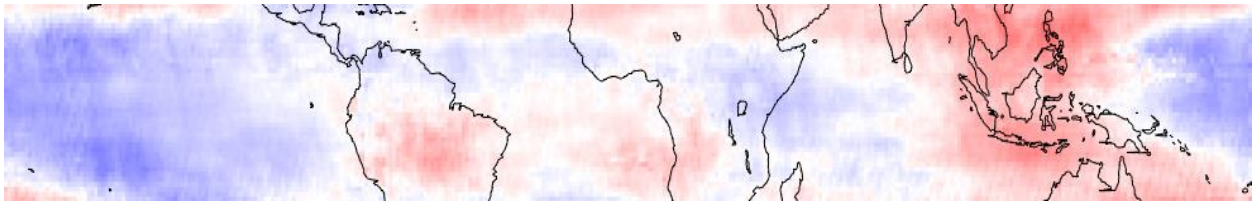
# Tropospheric ozone : simulated vs. observed trend 2008-2019



EMAC RD1SD
sfc – 200 hPa



GTTO-ECV
sfc – 200 hPa

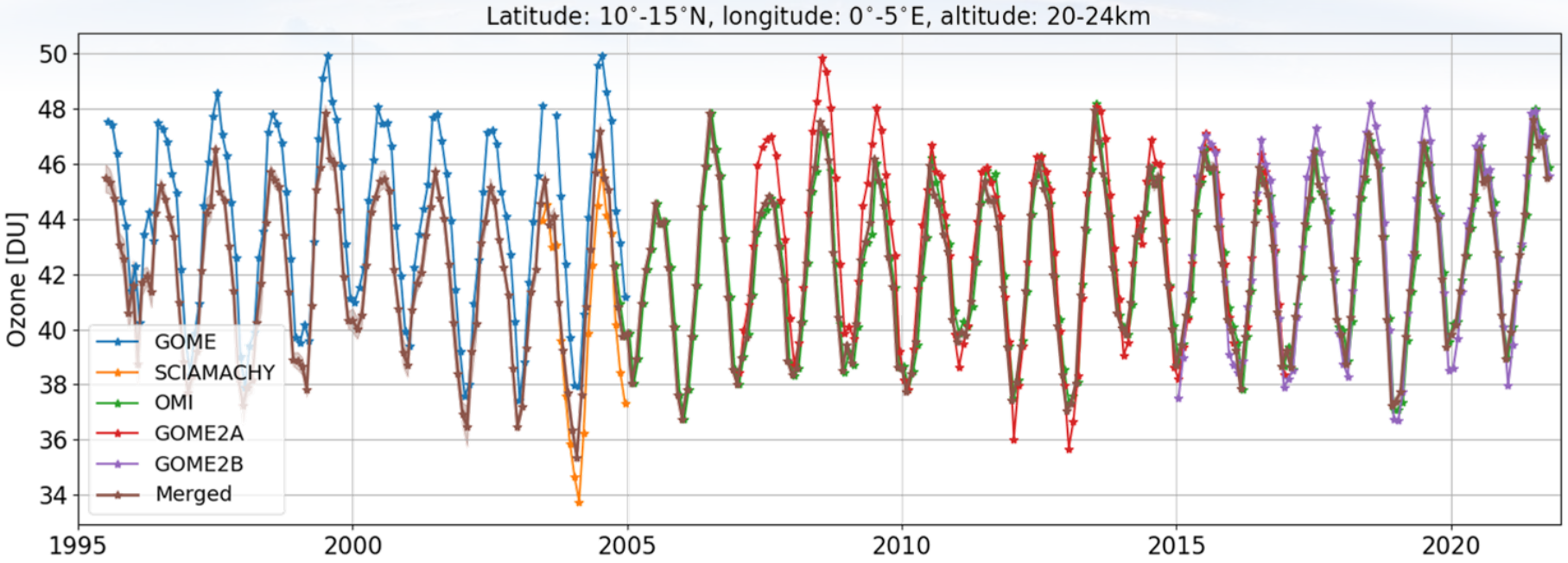


OMI-LIMB
sfc – LRT-3km

Dameris et al (in prep)

# Ozone profile – nadir : GOP-ECV

(5° x 5° x month, since 1995, day)




*NEW* Oral 5.1.2 by **M. Coldewey-Egbers**

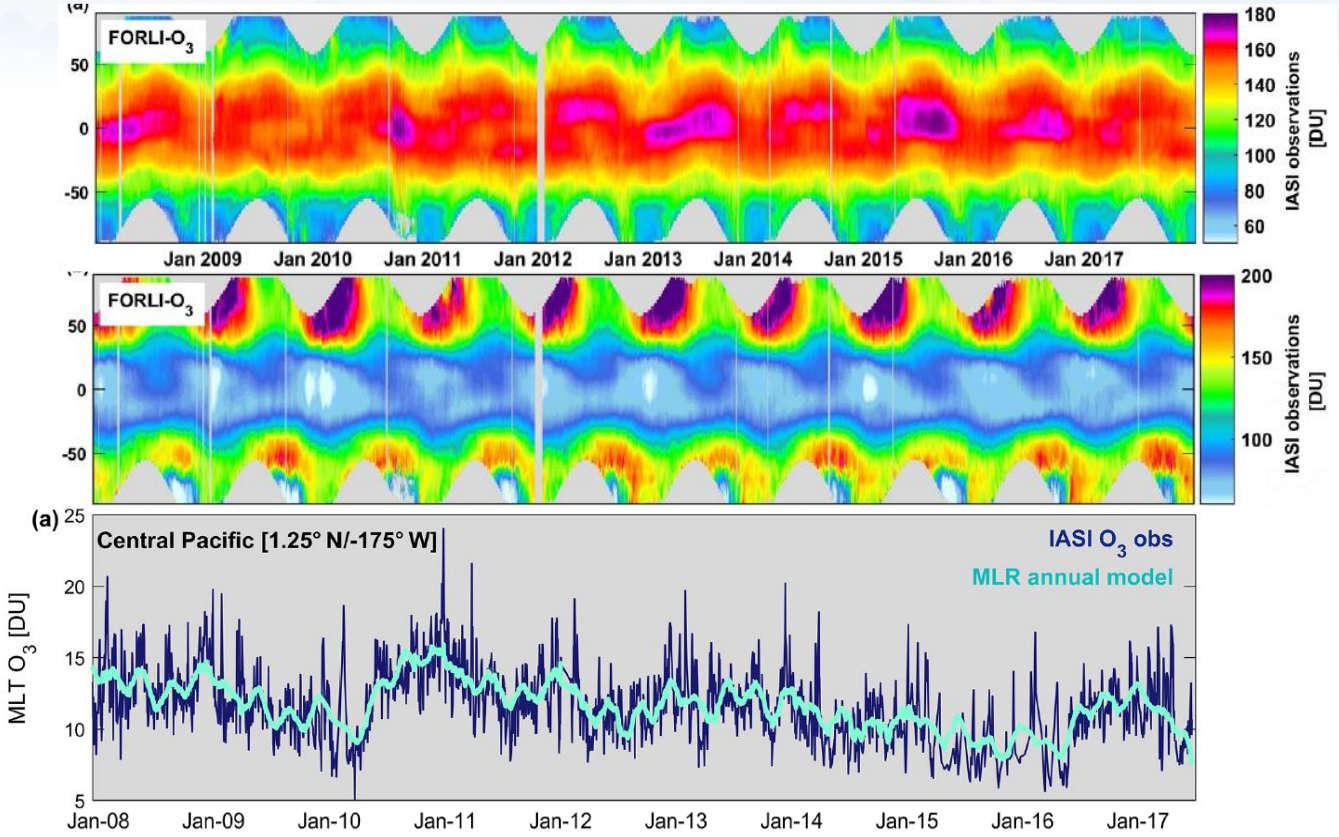
# Ozone profile – nadir : merged IASI (1° x 1° x day, since 2008, day+night)

*NEW*

Mid-Upper Strato
25 hPa - TOA

Lower Strato
150-25 hPa

Mid-Lower Tropo
sfc-300 hPa

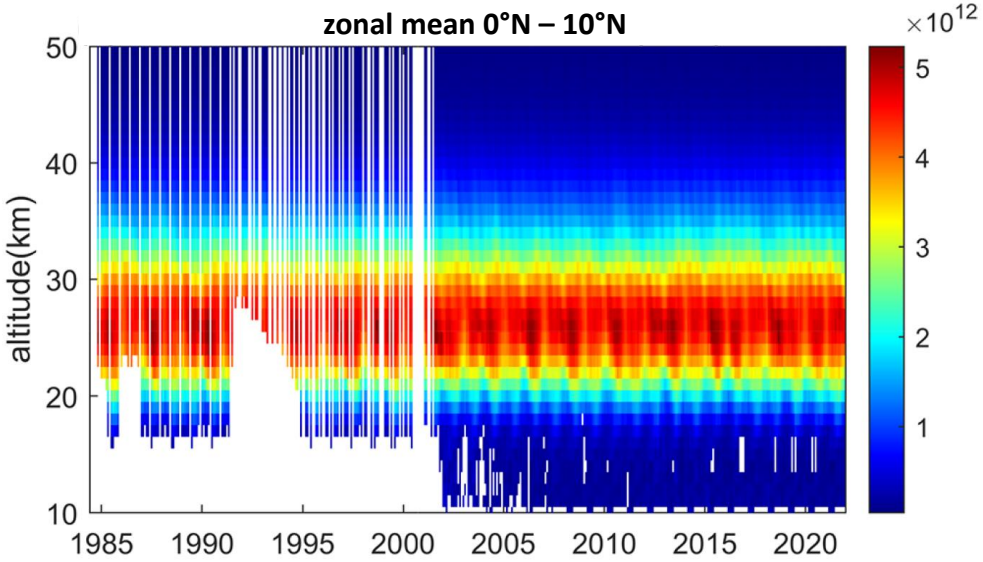


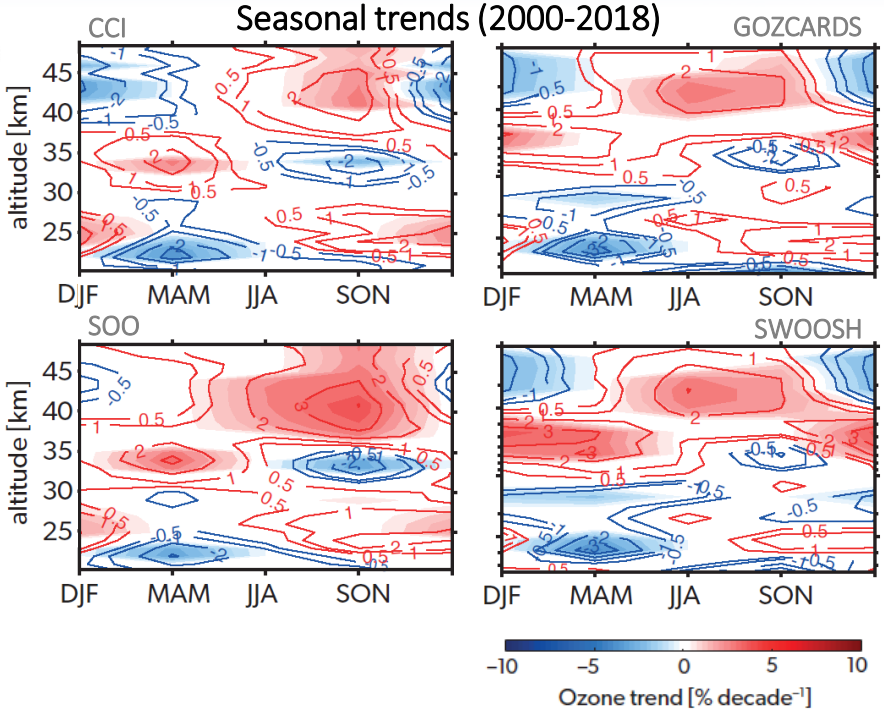

Wespes et al (2018, 2019)

# Ozone profile – limb : SAGE-CCI-OMPS+ (10° x month, since 1984)

obs4MIPs
Observations for Model Intercomparisons Project

Oral 5.1.6 by **V. Sofieva**



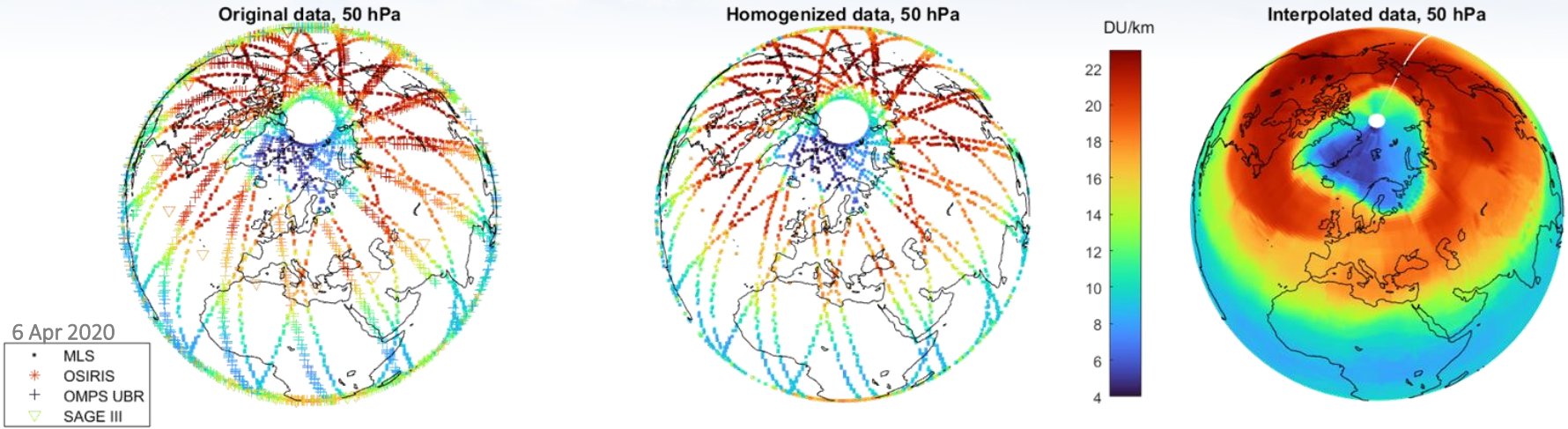




Sofieva et al (2017, 2023), Szelag et al (2020), Godin-Beekmann et al (2022), WMO/UNEP (2018, 2022)

esa
opernicus
Europe's eyes on Earth

# Ozone profile – limb : HIRES

(1° x 1° x day, since 2001)



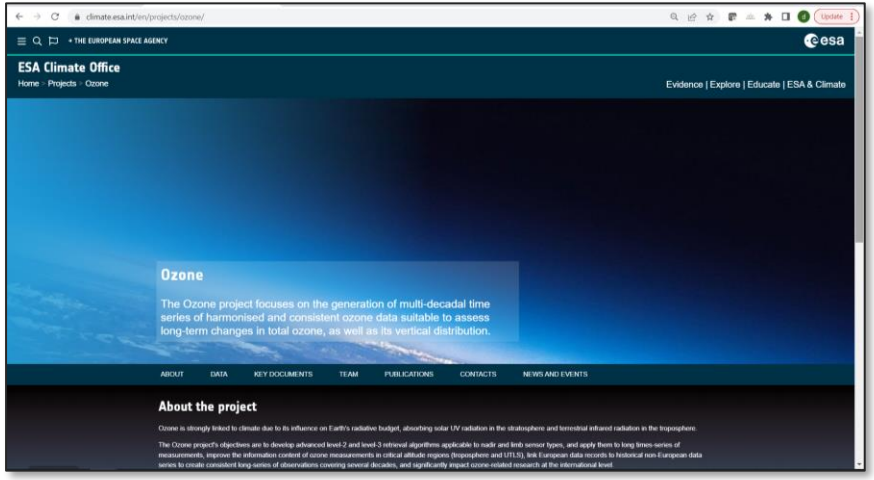

*NEW* Oral 5.1.6 by **V. Sofieva**

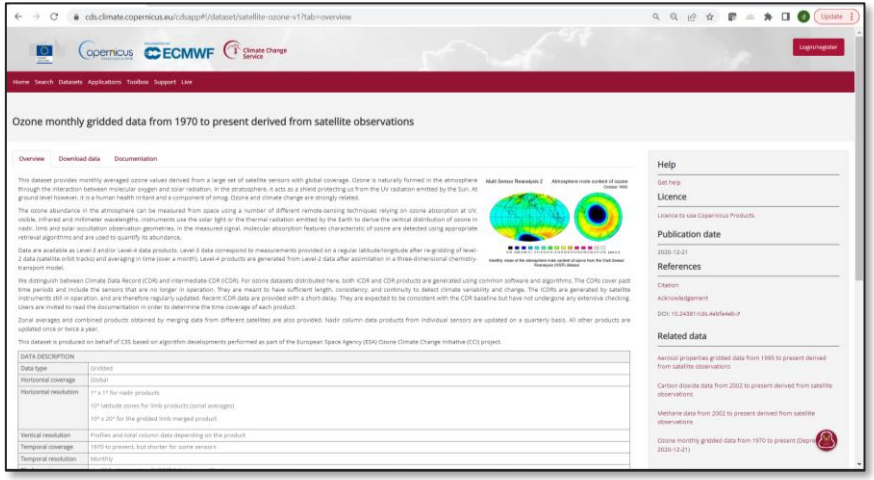
Sofieva et al (2022)

# CCI / C3S Ozone Data Distribution

Level-2 and some Level-3 ozone data products generated within CCI are freely accessible from the ozone CCI web page (ftp site) https://climate.esa.int/en/projects/ozone

Most Level-3 ozone data products are distributed via the Copernicus Climate Data Store (CDS) https://cds.climate.copernicus.eu/



# Final thoughts

- The CCI/C3S ozone team reaches out to help you work with the CCI / C3S data products.
  Don't hesitate to contact daan.hubert@aeronomie.be

- New / improved ozone CCI CDRs will be released in Fall 2024.
  Not all CCI/C3S ozone Climate Data Records were presented here

- ESA's Climate-Space program continues. Next ozone CCI phase will start in Fall 2024.

# Ozone CCI/C3S assessment of ATMOS 2021 recommendations

2021-R5 Community activities on tropospheric ozone: Substantial team contributions to IGAC Tropospheric Ozone Assessment Report II and to CEOS VC-20-01 harmonisation of tropospheric ozone constellation.

2021-R36 Support for ground-based Cal/Val observations: Ongoing efforts to harmonize reference data and uncertainties across networks (FRM…) are helpful. However, ground-based ozone monitoring is under pressure, at key stations and even for entire networks (SAOZ) ⇨ we are gradually losing essential validation capabilities for $O_3$ CDR compliance with GCOS requirements, Brewer-Dobson Circulation…

2021-R42 Limb sounding capability: ALTIUS is greatly appreciated as a gap filler for $O_3$ and a few other species. The EE-11 CAIRT limb mission (in Phase A) remains highly recommended to measure all other $O_3$ relevant species (sources, reservoirs, Montreal Protocol…), to better understand (changes in) circulation and waves and their impacts on ozone and climate, and to understand the tension between observations and CCM simulations in the lower stratosphere.

# Backup

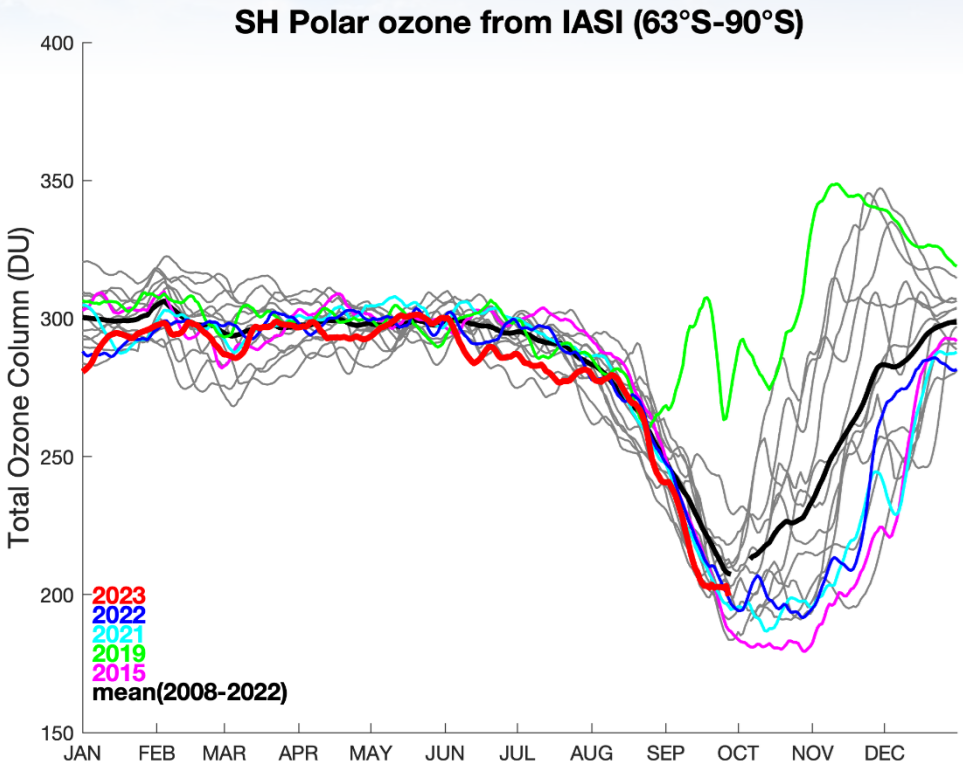
# ESA'S CLIMATE CHANGE INITIATIVE

GCOS defined **55** Essential Climate Variables | **36** benefit from space observations | **27** generated by ESA Climate Change Initiative

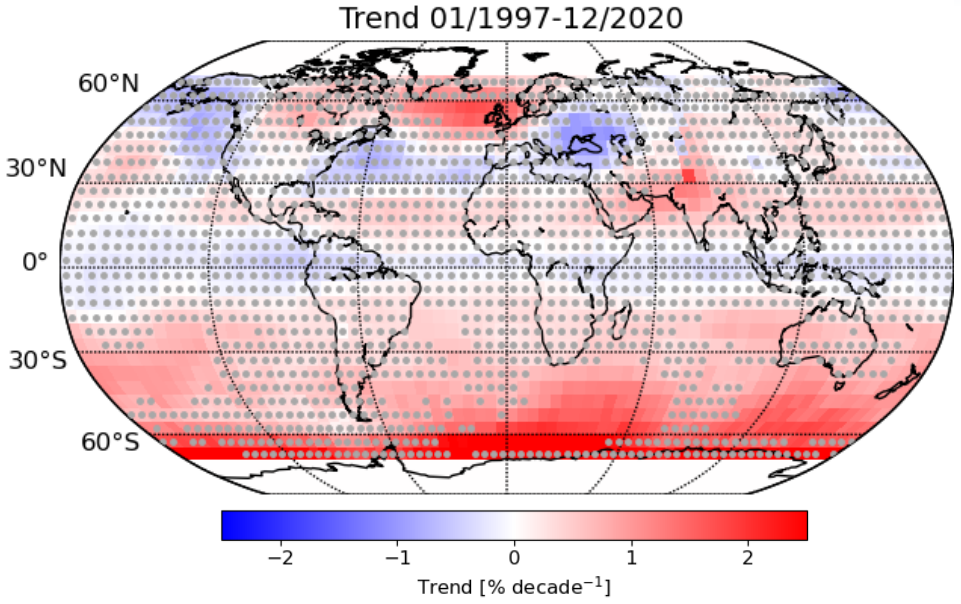

Courtesy S. Mecklenburg

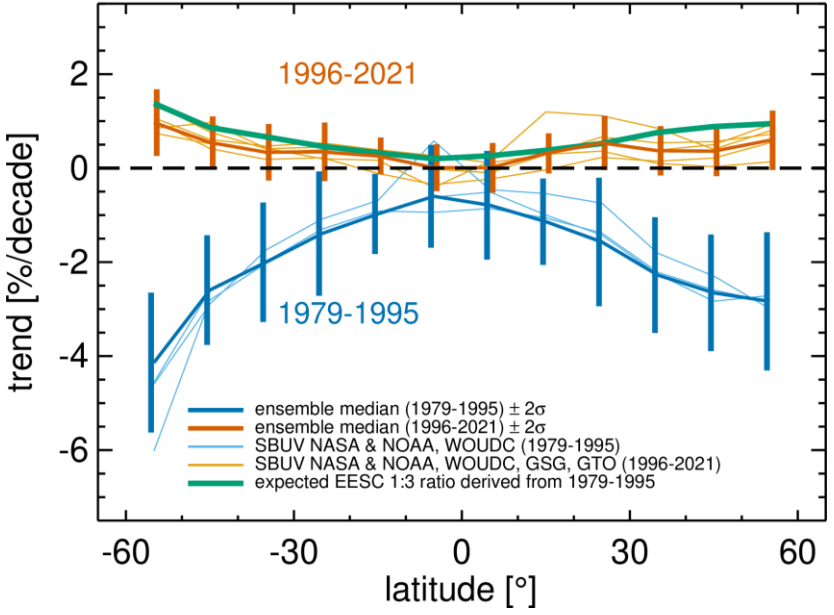
# Total ozone : IASI

(1° x 1° x day/month, since 2008, day+night)



# Total ozone trends

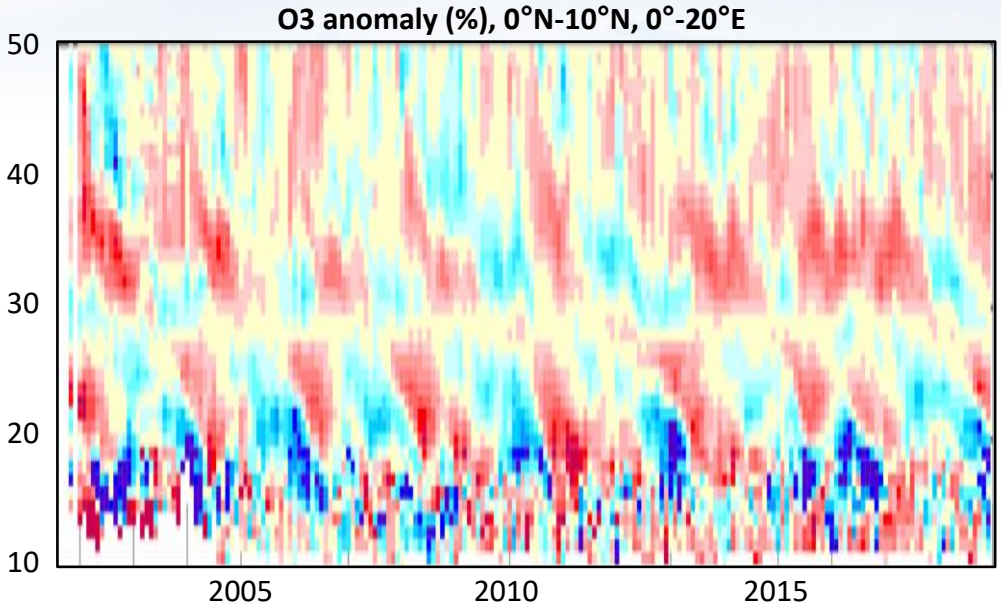


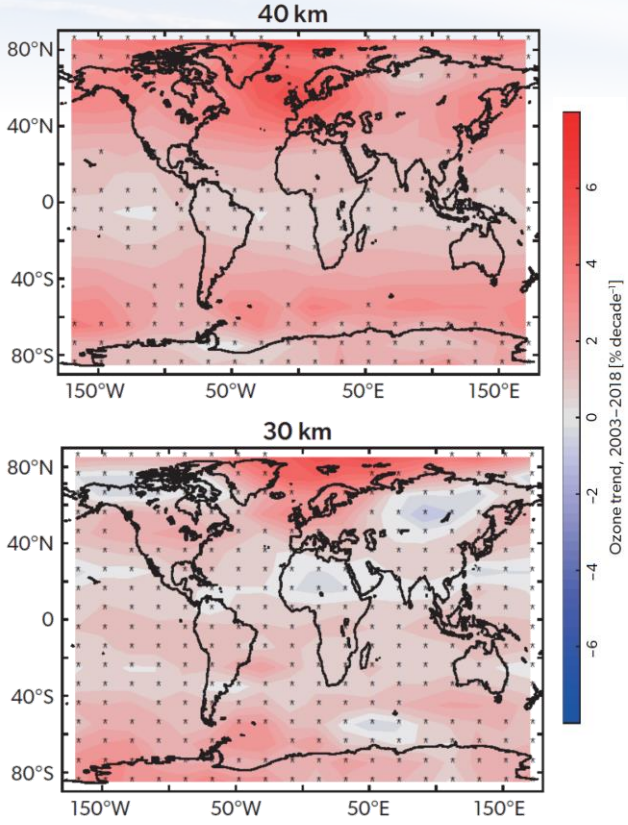




More details and applications: Coldewey-Egbers et al. (2014, 2015, 2020, 2022), Loyola et al. (2009), Loyola and Coldewey-Egbers (2012), Chiou et al. (2014), Lerot et al. (2014), Koukouli et al. (2015), Weber et al. (2018, 2022), Chipperfield et al. (2018), Garane et al. (2018), Eleftheratos et al. (2019), Dameris et al. (2021), WMO/UNEP (2018, 2022)

# Ozone profile – limb : MEGRIDOP

(10° x 20° x month, since 2001)

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