

# ACTIVITY REPORT:

## Atmospheric Temperature Changes and their Drivers

Activity leads:

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

February 2021

## Major milestone – community paper Steiner et al. 2020

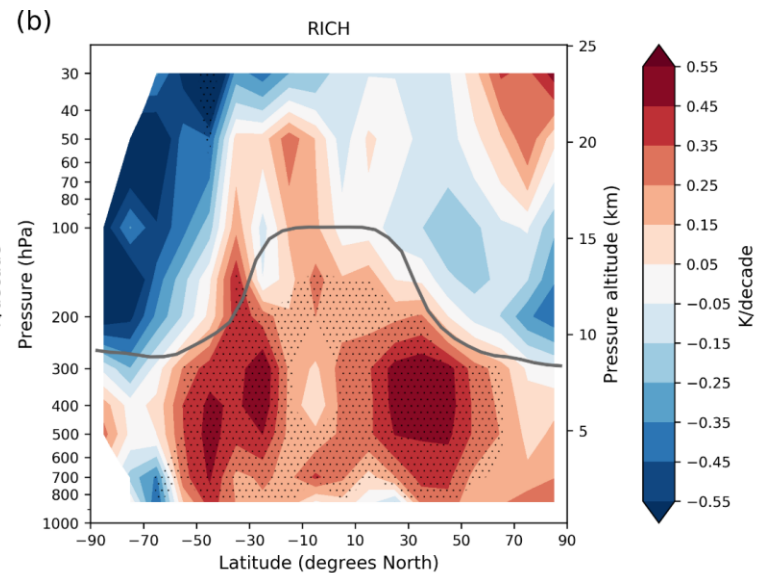
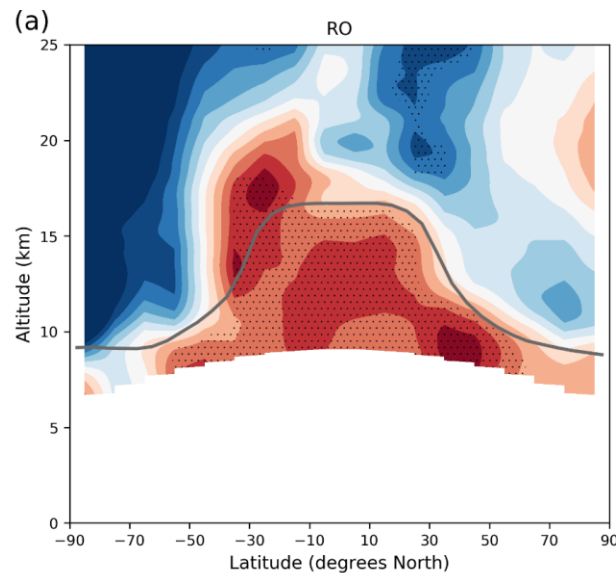


### Observed Temperature Changes in the Troposphere and Stratosphere from 1979 to 2018

A. K. Steiner ✉; F. Ladstädter; W. J. Randel; A. C. Maycock; Q. Fu; C. Claud; H. Gleisner; L. Haimberger; S.-P. Ho; P. Keckhut; T. Leblanc; C. Mears; L. M. Polvani; B. D. Santer; T. Schmidt; V. Sofieva; R. Wing; C.-Z. Zou

*J. Climate* (2020) 33 (19): 8165–8194.

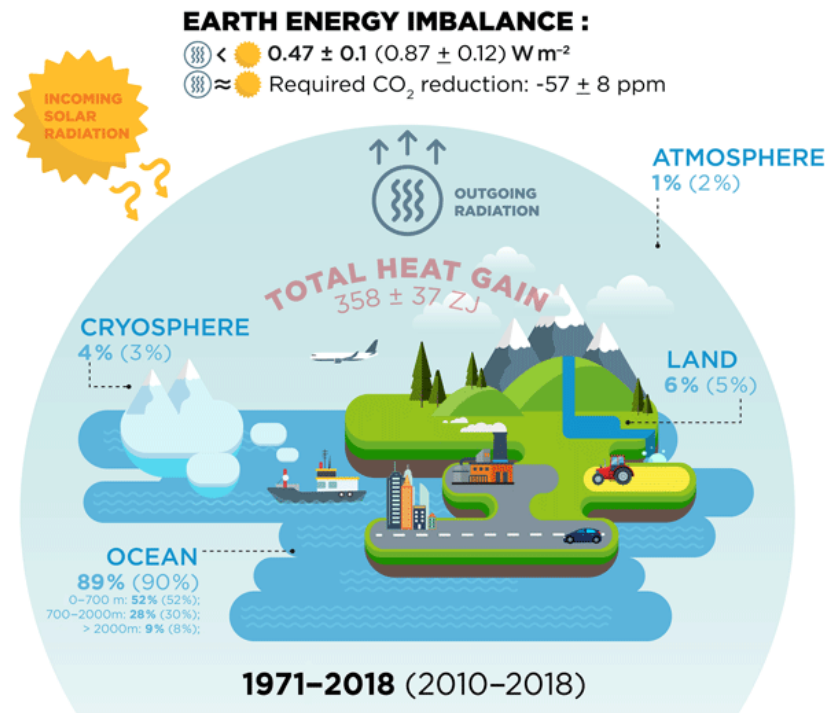
<https://doi.org/10.1175/JCLI-D-19-0998.1> Article history



## Highlight – joint publication CLIVAR, GEWEX, CliC, SPARC von Schuckmann et al. 2020

### Heat stored in the Earth system: where does the energy go?

- Earth energy imbalance  $0.47 \pm 0.1 \text{ W m}^{-2}$  (since the 1970s)
- 89% of heat in oceans, 6% land, 4% cryosphere melting, 1% atmosphere warming



- Further achievements
  - ATC contributions to the IPCC AR6 WG I Chapter 2 on the changing state of the climate system. WG I Chapter 7 on Earth's energy budget
  - Mitchell et al. (2020): Analysis of tropical temperature trends in the CMIP6 models.
  - Santer et al. (in review): Comparison of tropospheric warming trends in CMIP6 models with satellite datasets.
  - Steiner et al. (2020): RO community paper on consistency and structural uncertainty of multi-mission GPS RO records
  - RO review papers (Ho et al. 2020; Scherllin-Pirscher et al. 2021)
  - Invited presentation held at the virtual 5th International Conference on GPS Radio Occultation ICGPSRO 2020  
<https://w3.nspo.narl.org.tw/ICGPSRO2020/download/presentation/ICGPSRO2020-presentation-AB008.pdf>

- We are planning an ATC meeting later in 2021, which may well be a virtual meeting (TBD)
- Contributions to the ISSI Teams to be continued in 2021
- Engagement of ATC co-chairs in SPARC Science Task Team (A. Maycock lead) and as WCRP Regional Focus Point (A. Steiner)
- Continue work on ATC focus topics
  - climate data records and comparison with CMIP6 models
  - reprocessed middle atmosphere records
  - attribution topics
  - next community paper (TBD)

- Any issues requiring the immediate attention of the SPARC SSG, e.g.
  - Potential workshop support request