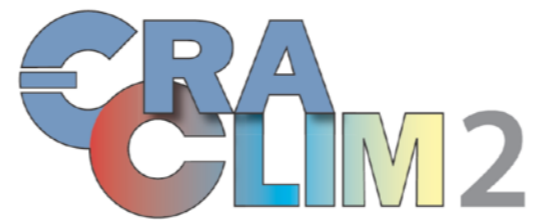




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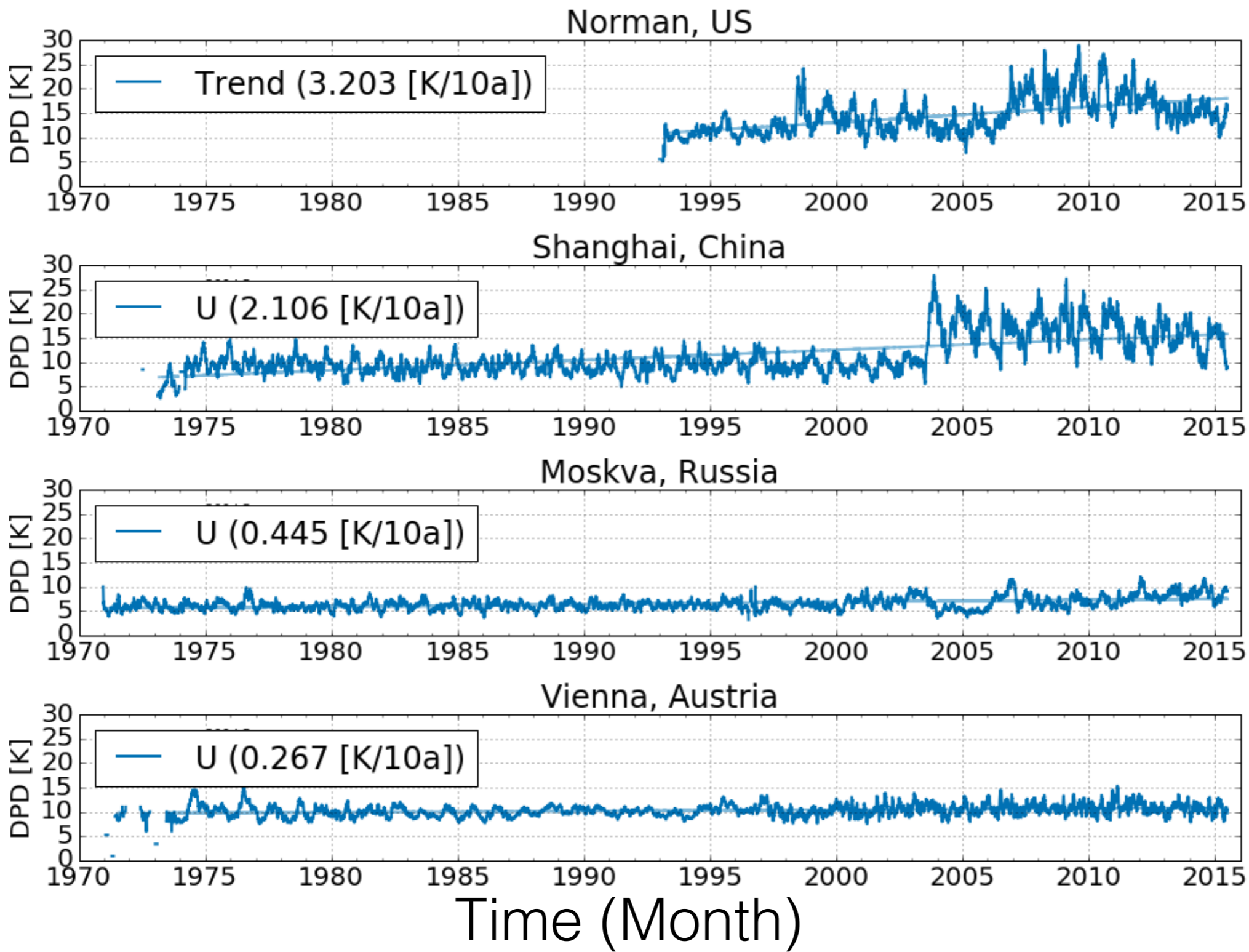
Homogenisation of Global Radiosonde Humidity Data

M. Blaschek and L. Haimberger
Vienna, 18.1.2017

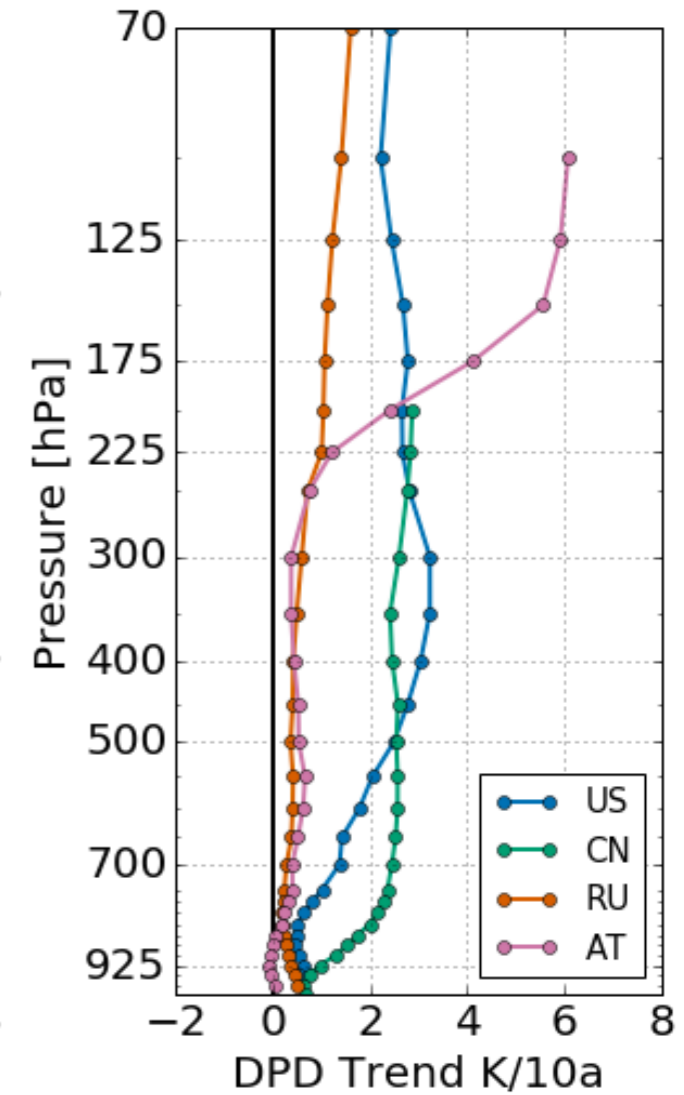
Outline

- 1. Why**
- 2. How (Update)**
- 3. Changes**
- 4. Ready**



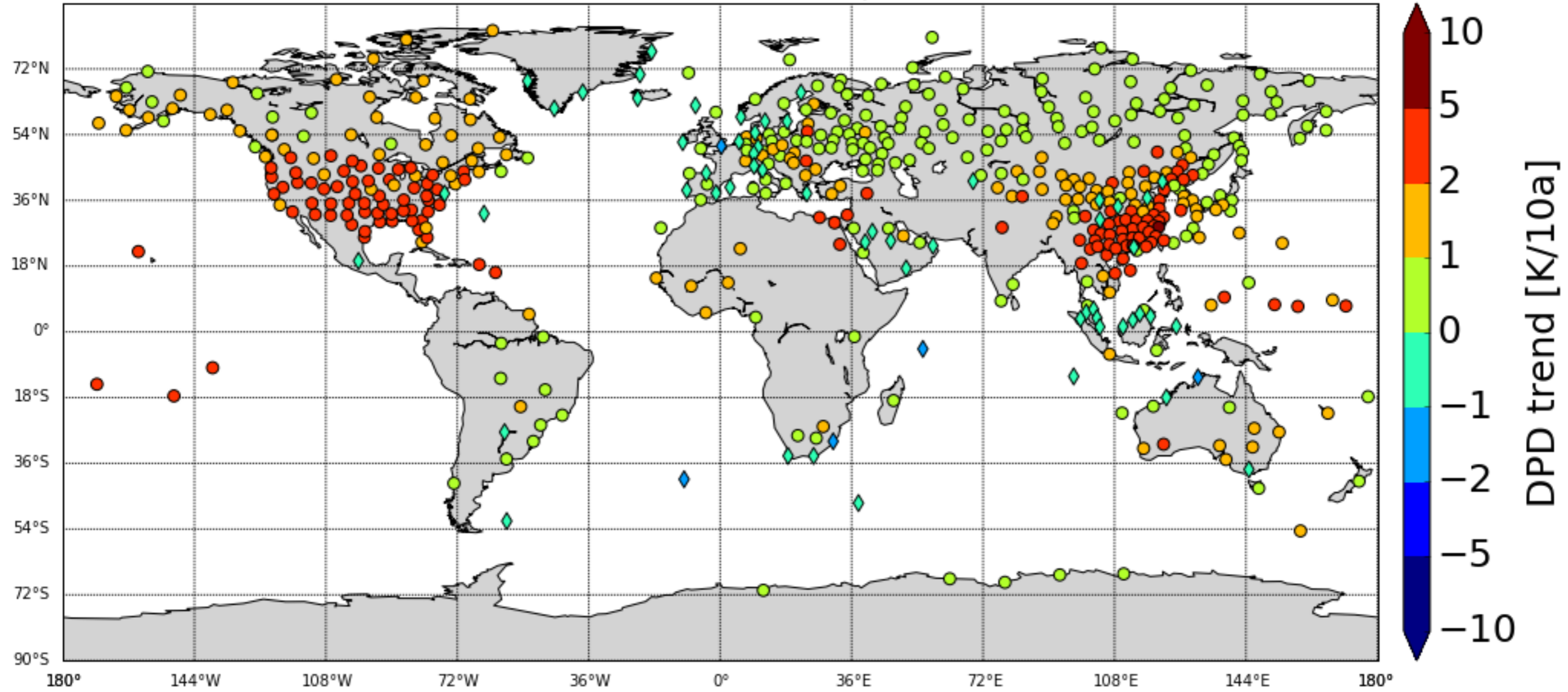


300 hPa



**WHY? - Uncorrected Radiosonde Humidity -
DPD Trends**

Global Radiosonde Trends (UCor) at 300 hPa(# 504 / 845) Cost: 2786.51



DPD trends per decade at 300 hPa

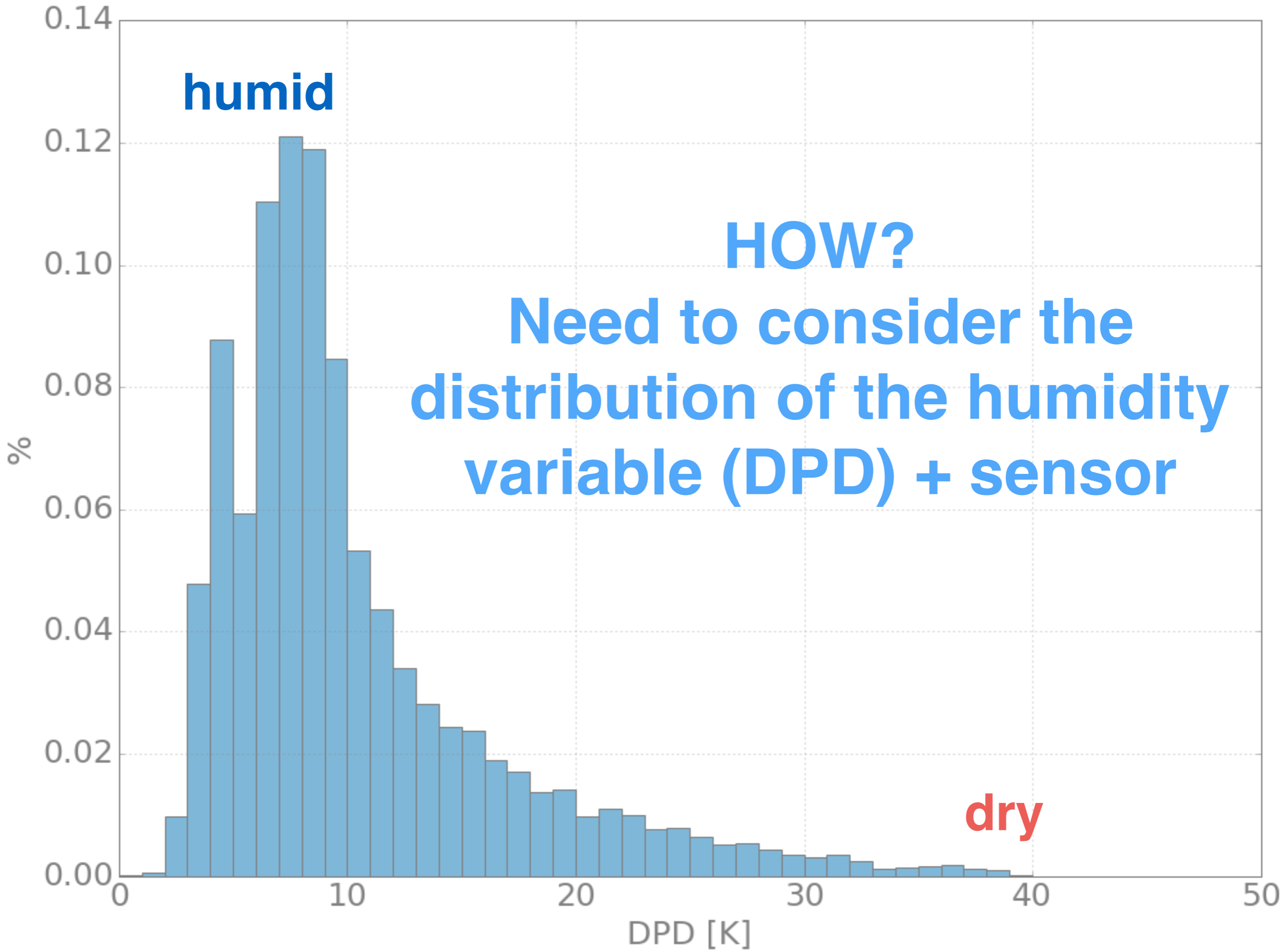
1979 - 2016, cost: ~2800

humid

HOW?

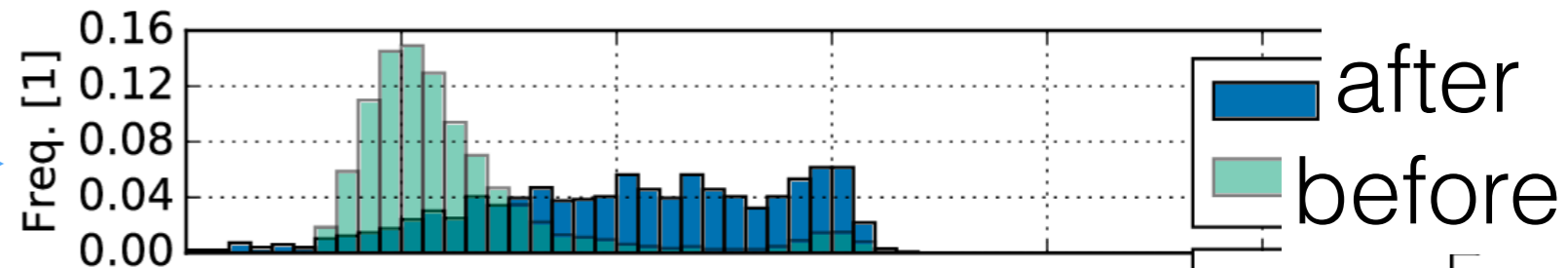
**Need to consider the
distribution of the humidity
variable (DPD) + sensor**

dry



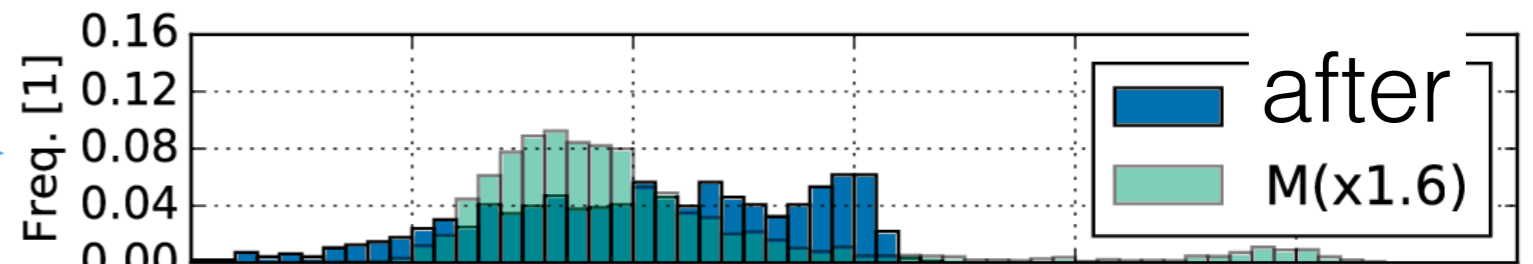
HOW? - Quantile Matching

Distributions between
Breakpoints

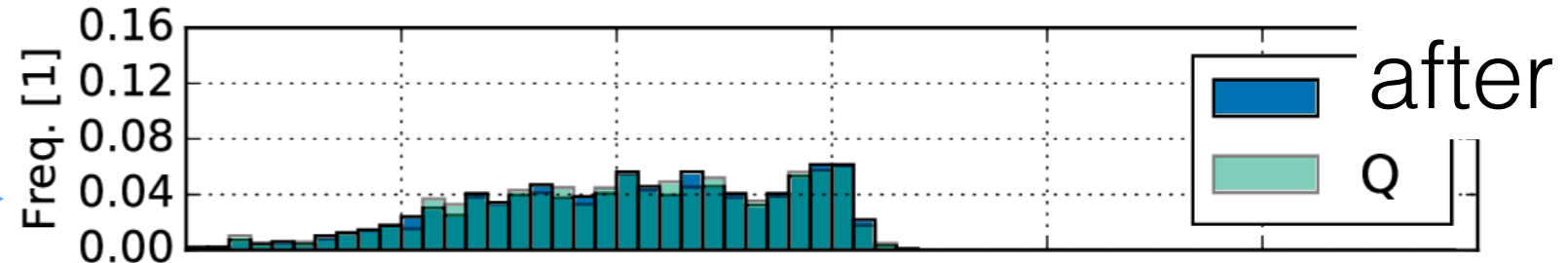


Adjustments

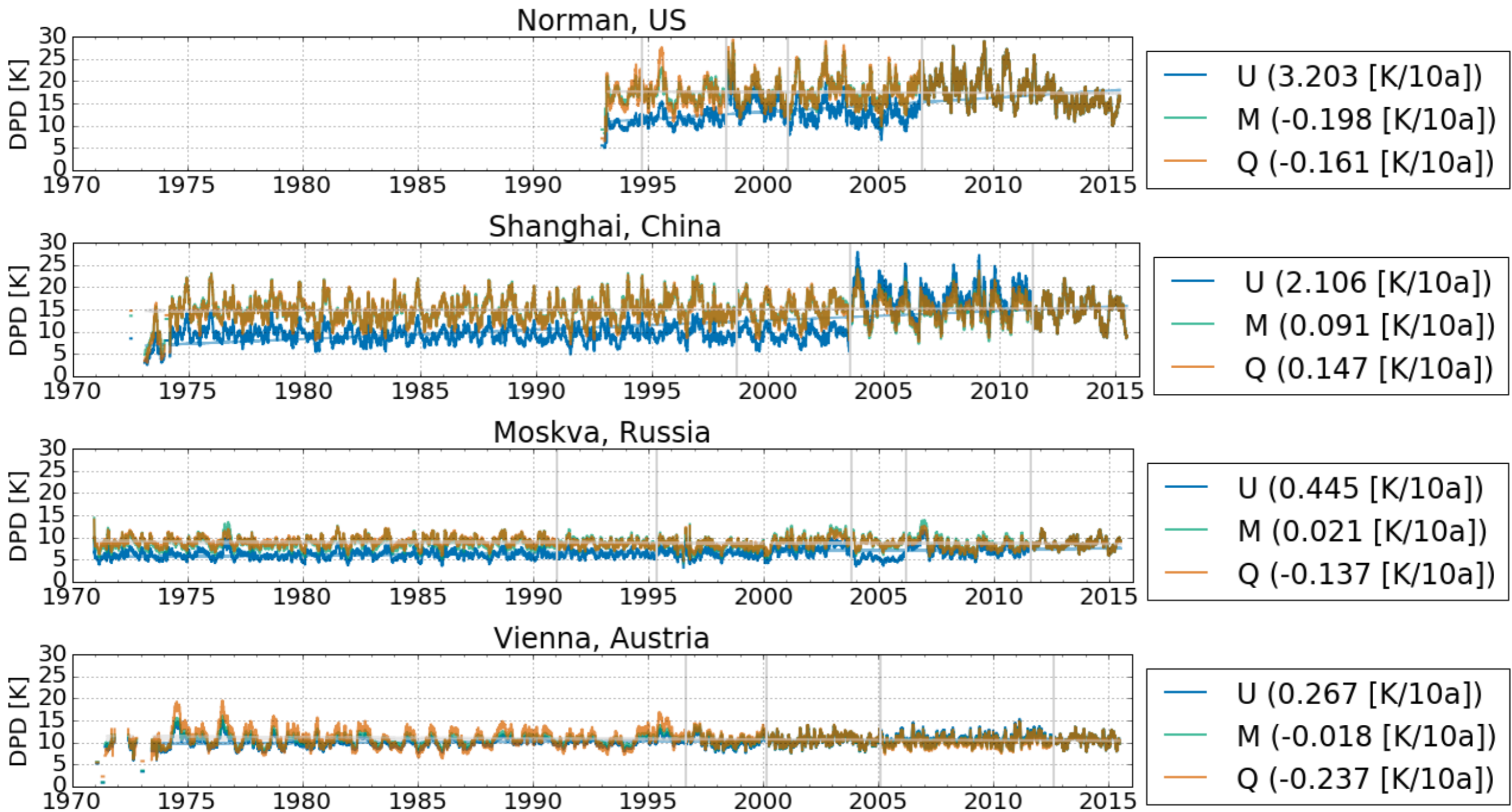
$$R = \frac{\text{Mean of Reference}}{\text{Mean of Biased Mean Adjustments}}$$



Match Quantiles

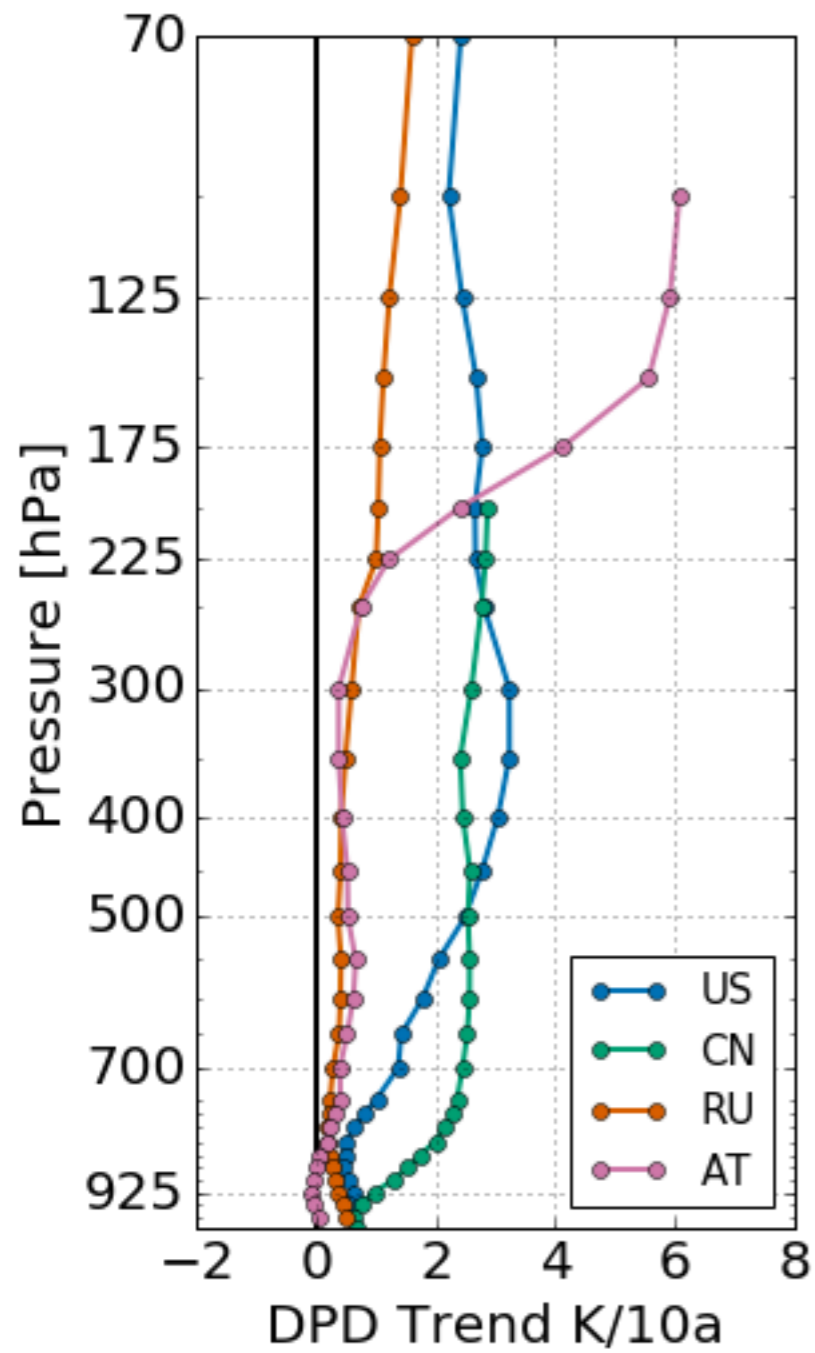


0 10 20 30 40 50 60
DPD [K]

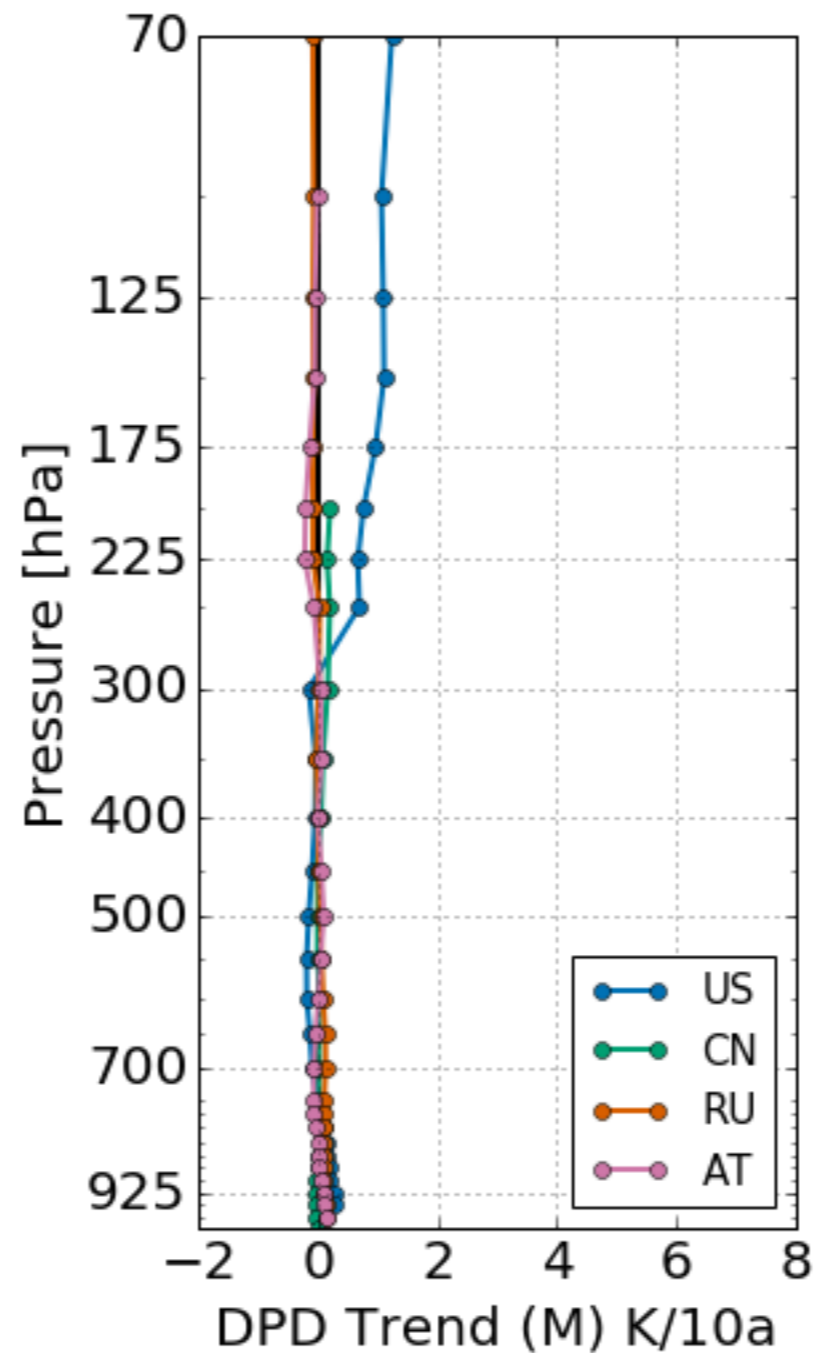


Adjusted radiosonde humidity

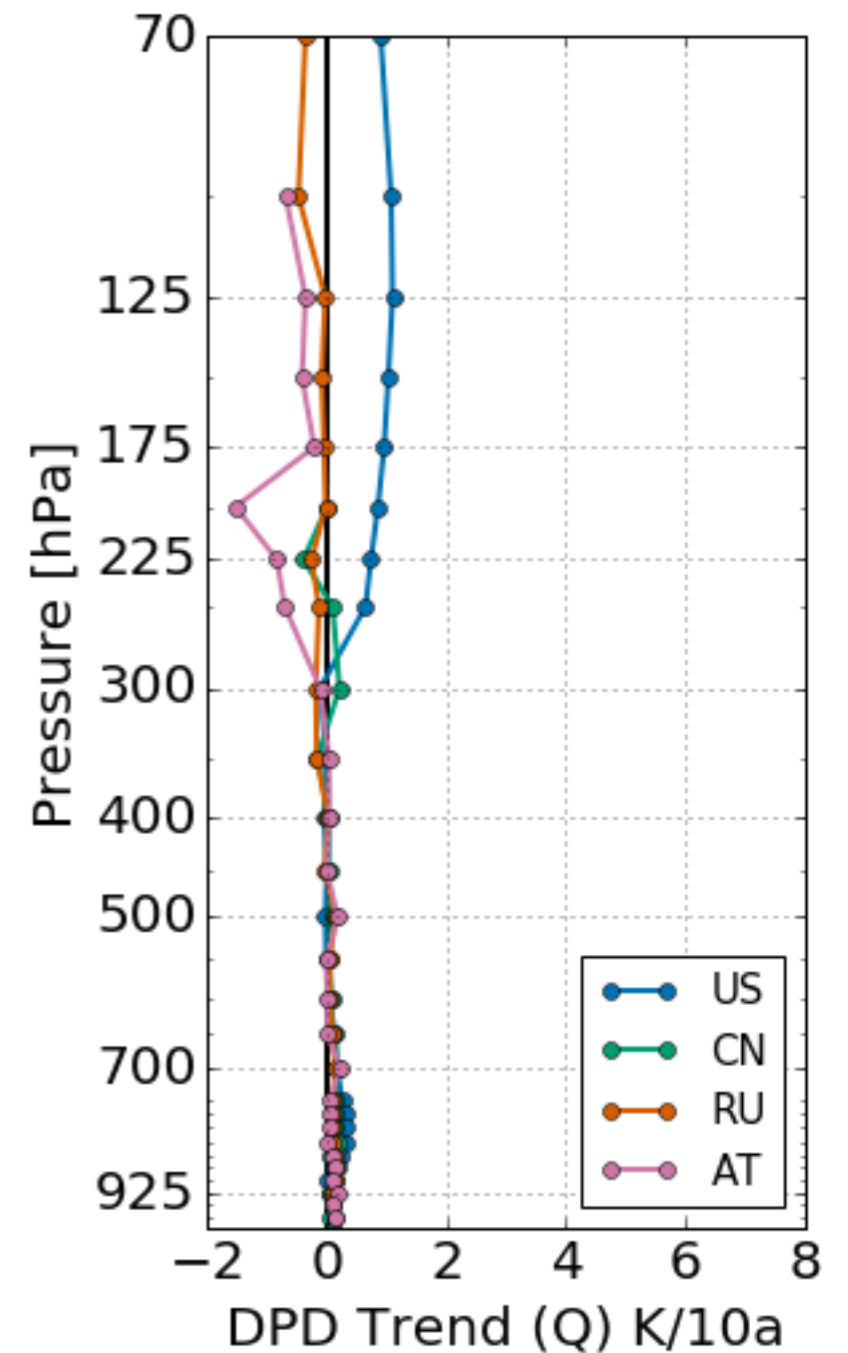
U



M



QM



DPD Trends

300 hPa
1979-2016

M

~300

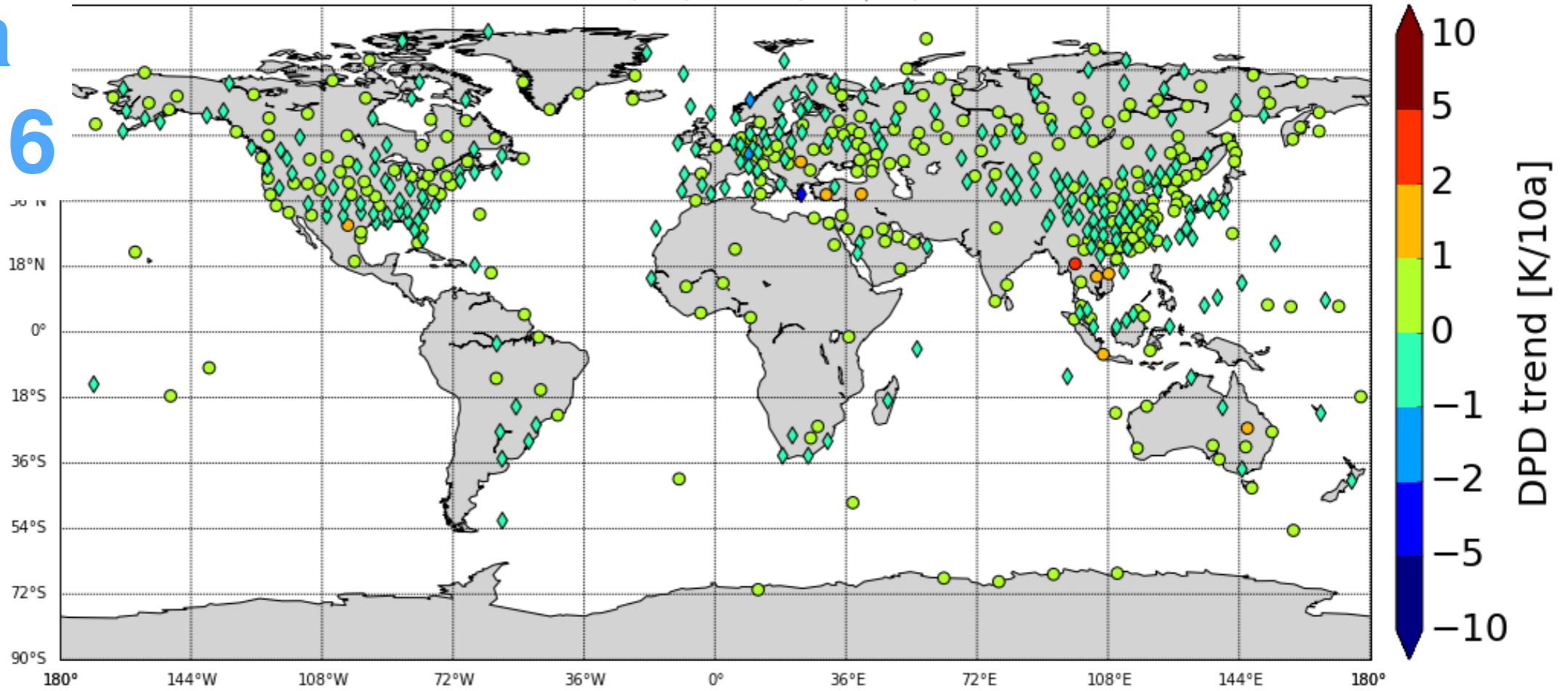
U

~2800

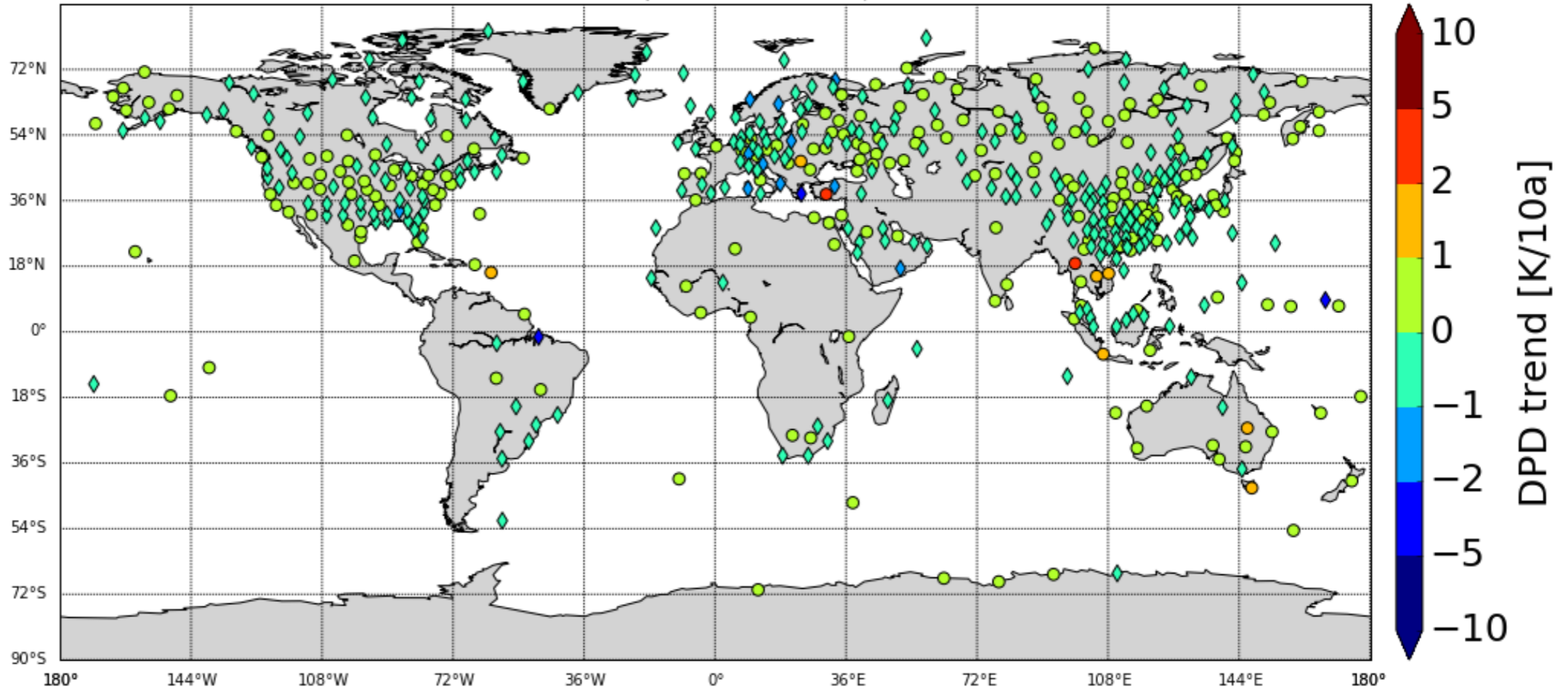
QM

~450

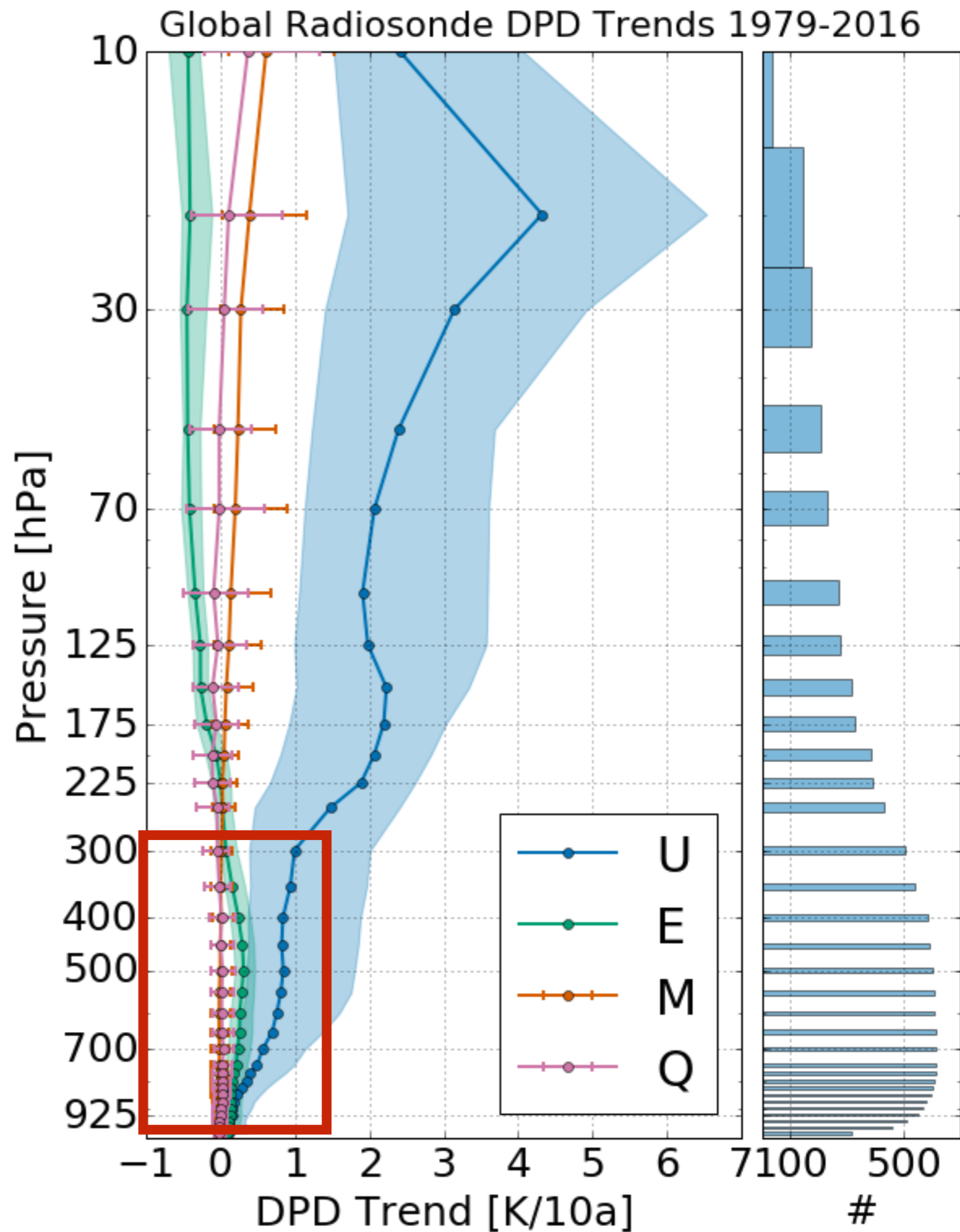
Global Radiosonde Trends (MCor) at 300 hPa(# 494 / 845) Cost: 285.75



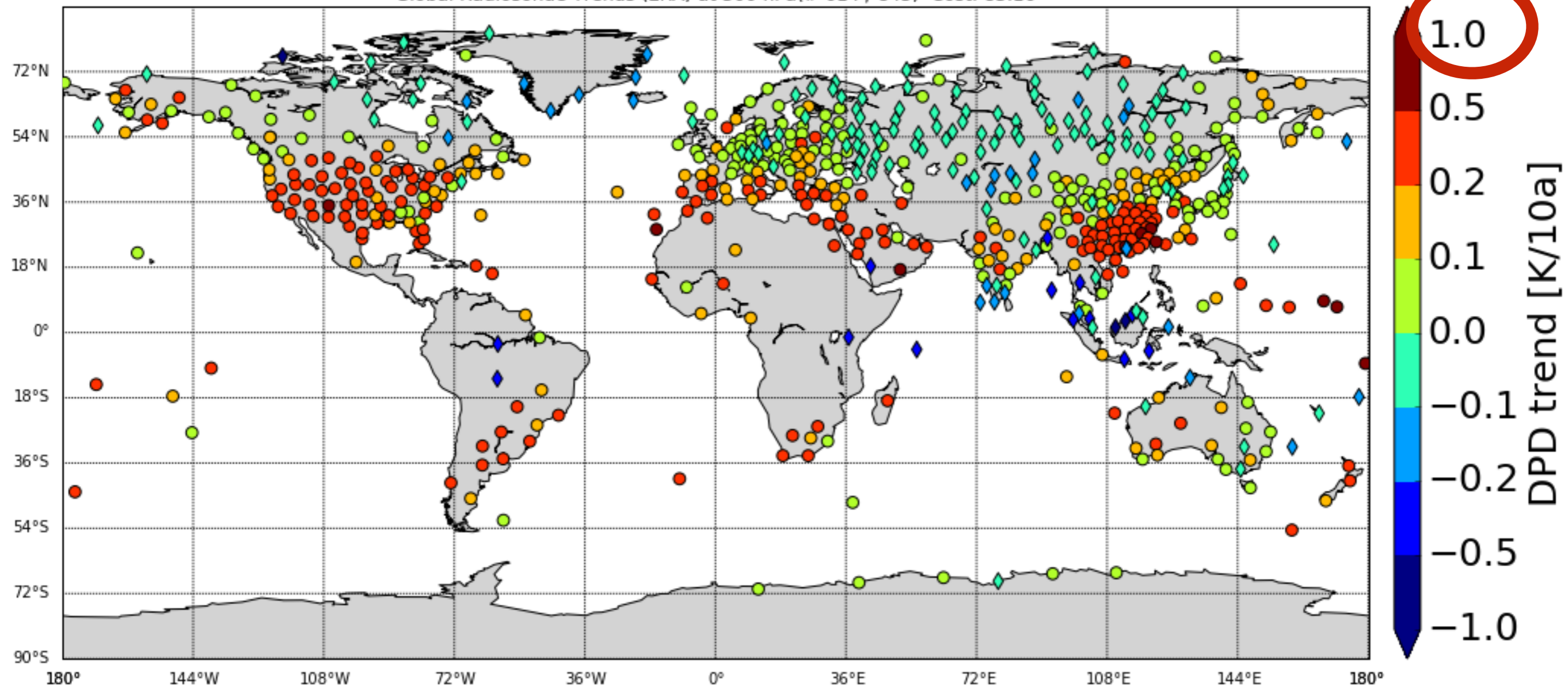
Global Radiosonde Trends (QCor) at 300 hPa(# 494 / 845) Cost: 456.21



Global Radiosonde DPD Trends

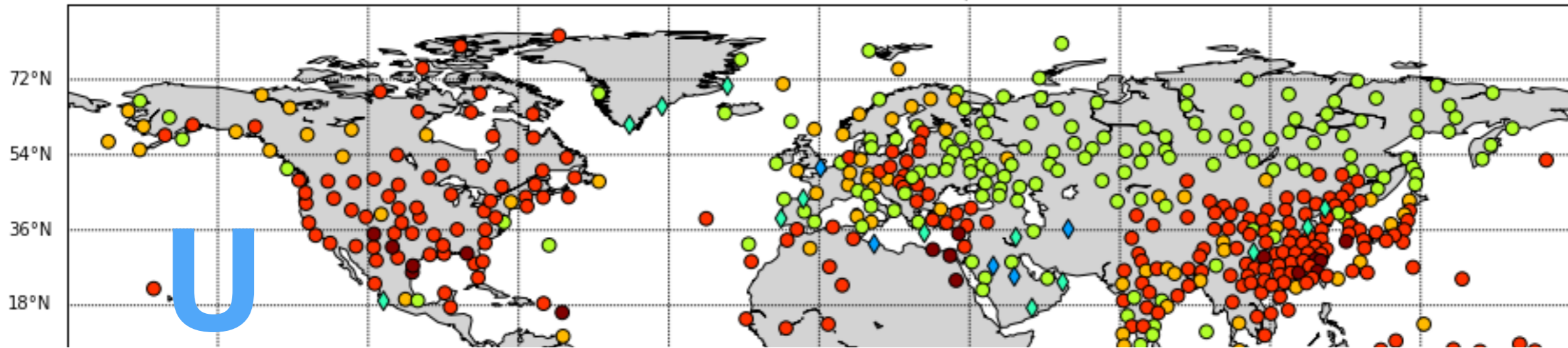


Global Radiosonde Trends (ERA) at 300 hPa(# 614 / 845) Cost: 83.16

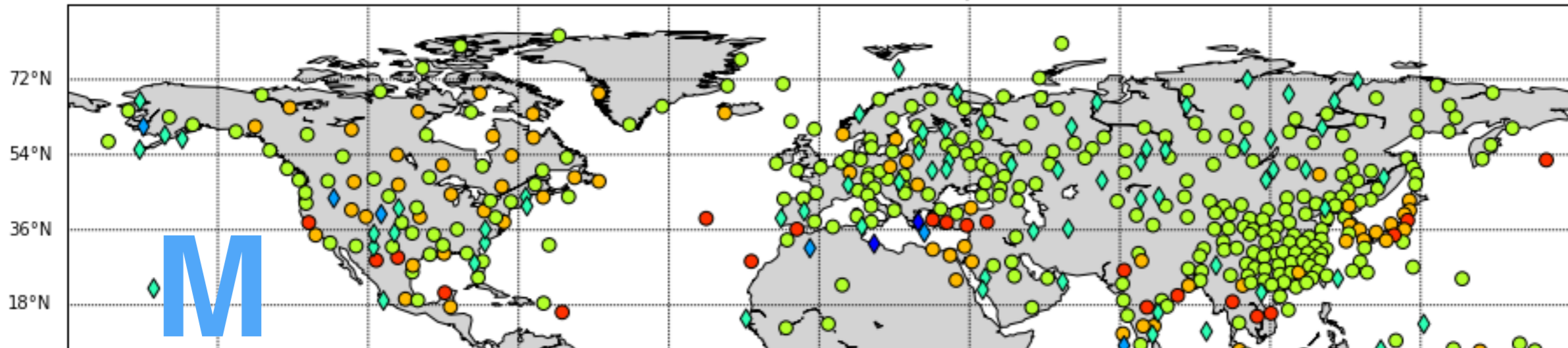


ERA Interim Trends 1979-2016, 300 hPa

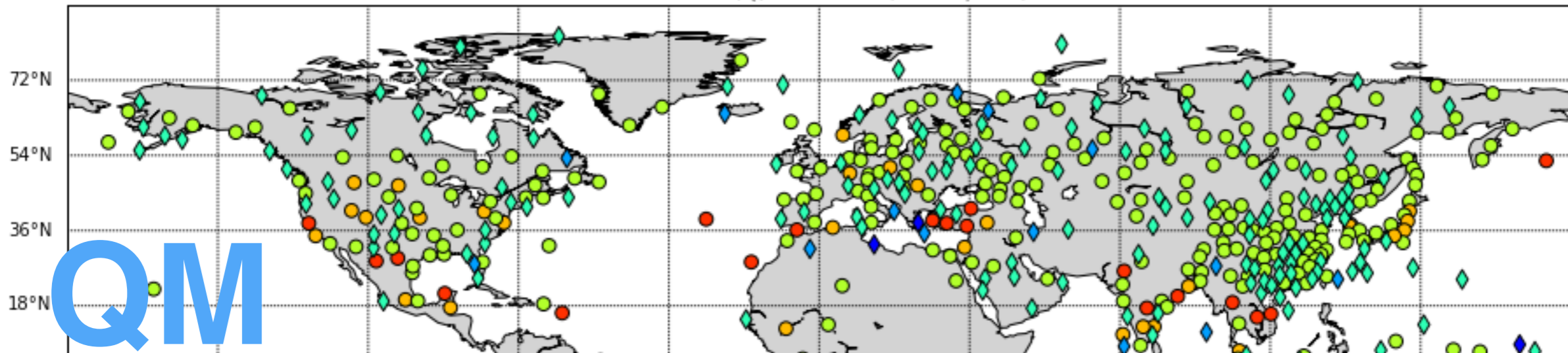
Global Radiosonde Trends (U) at 300 hPa(# 567 / 845) Cost: 5913.53



Global Radiosonde Trends (M) at 300 hPa(# 519 / 845) Cost: 1920.38



Global Radiosonde Trends (Q) at 300 hPa(# 519 / 845) Cost: 2359.67



Q75 DPD Trends K/10a

75 % Quantile Trends, 1979-2016

Ready?

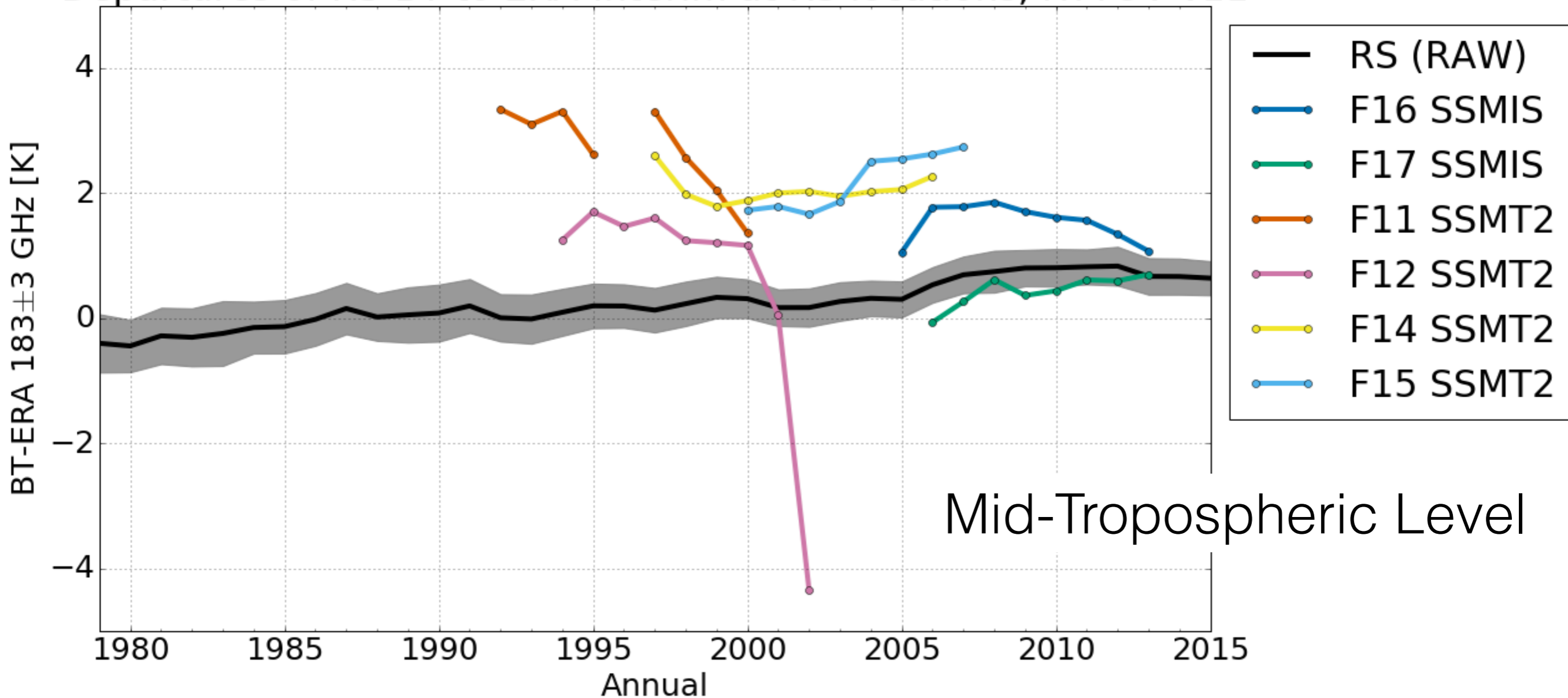
- Almost. Paper in preparation.
- Additional comparison with satellite data is in progress, but is limited by quality of the satellite data (SSMIS, SSM/T-2)
- Comparison with GPS-RO (recent times). Choice of a reference period.
- Problems >>

problems

- Breakpoint detection whilst large data gaps exist
- Satellite data quality in comparison with RASO
- Radiosonde DPD is reported as integer above 5K. (B. Ingleby (~BAMS 2016) TEMP specifications. Most centres still use TEMP.
- Incomplete time series. e.g. US (even in IGRA).

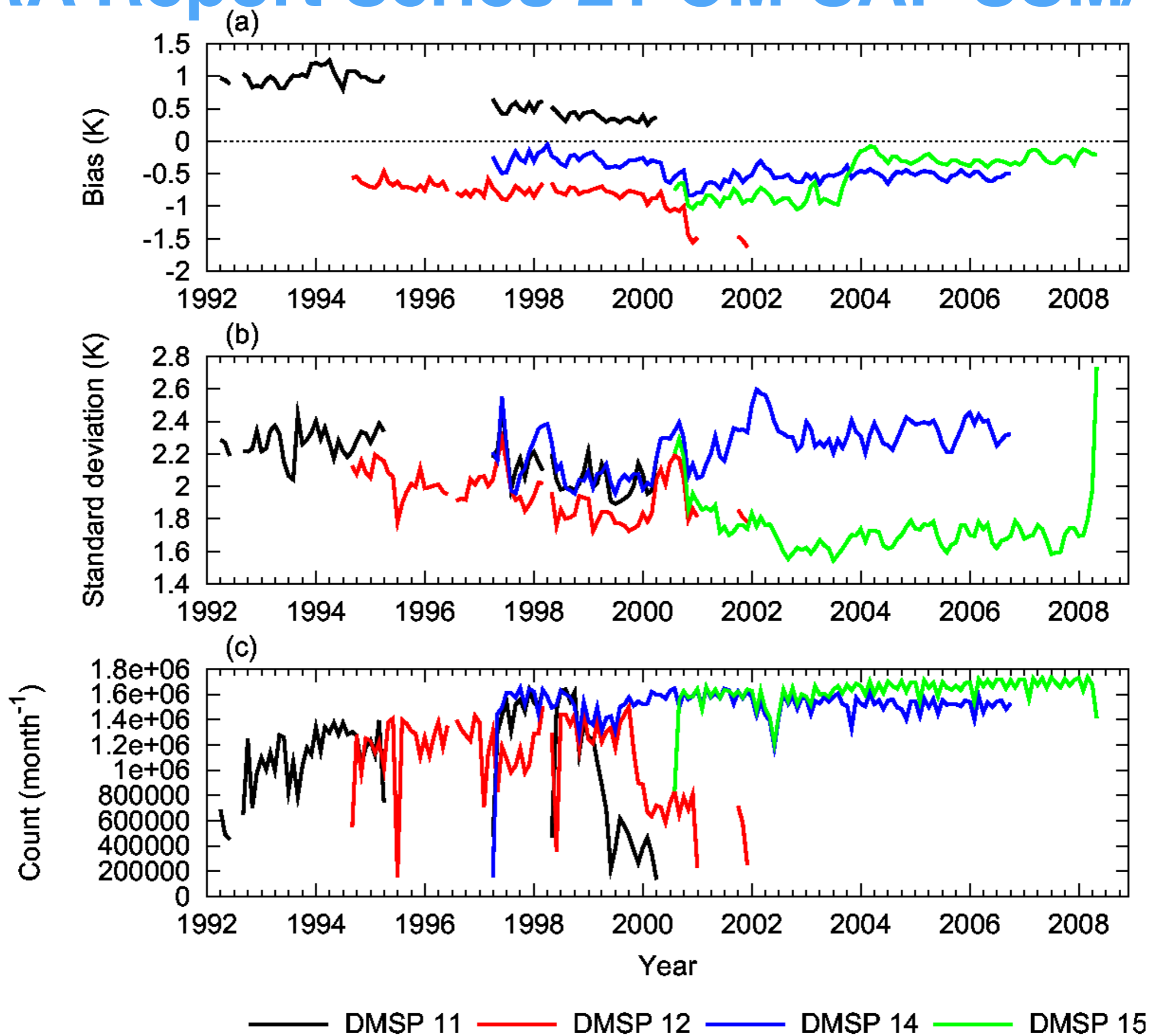
Departures of RASO BT to ERA-Interim BT

Departures of RS-BT to ERA-Interim at RS locations, RTTOV v11

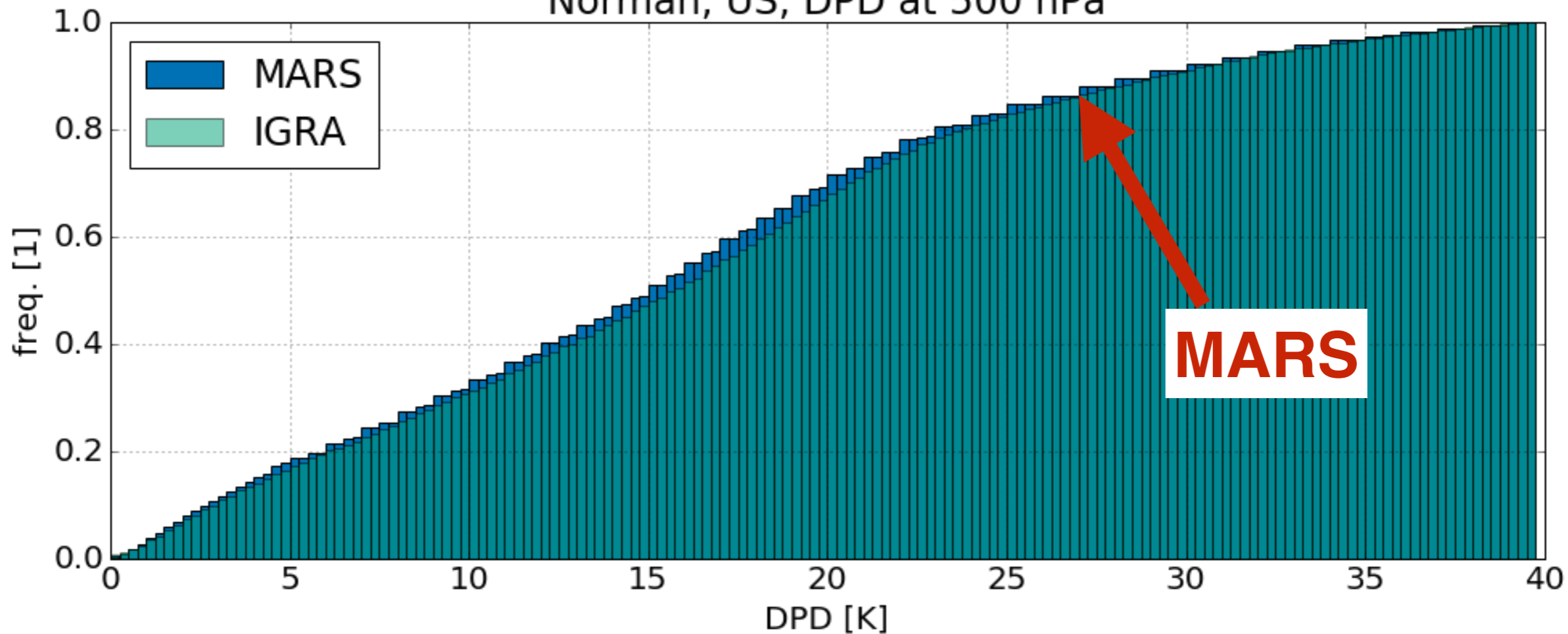


source: EUMETSAT/ CM-SAF, SSMIS (FCDR) swath data
EUMETSAT/ ECMWF MARS ODB, SSM/T-2

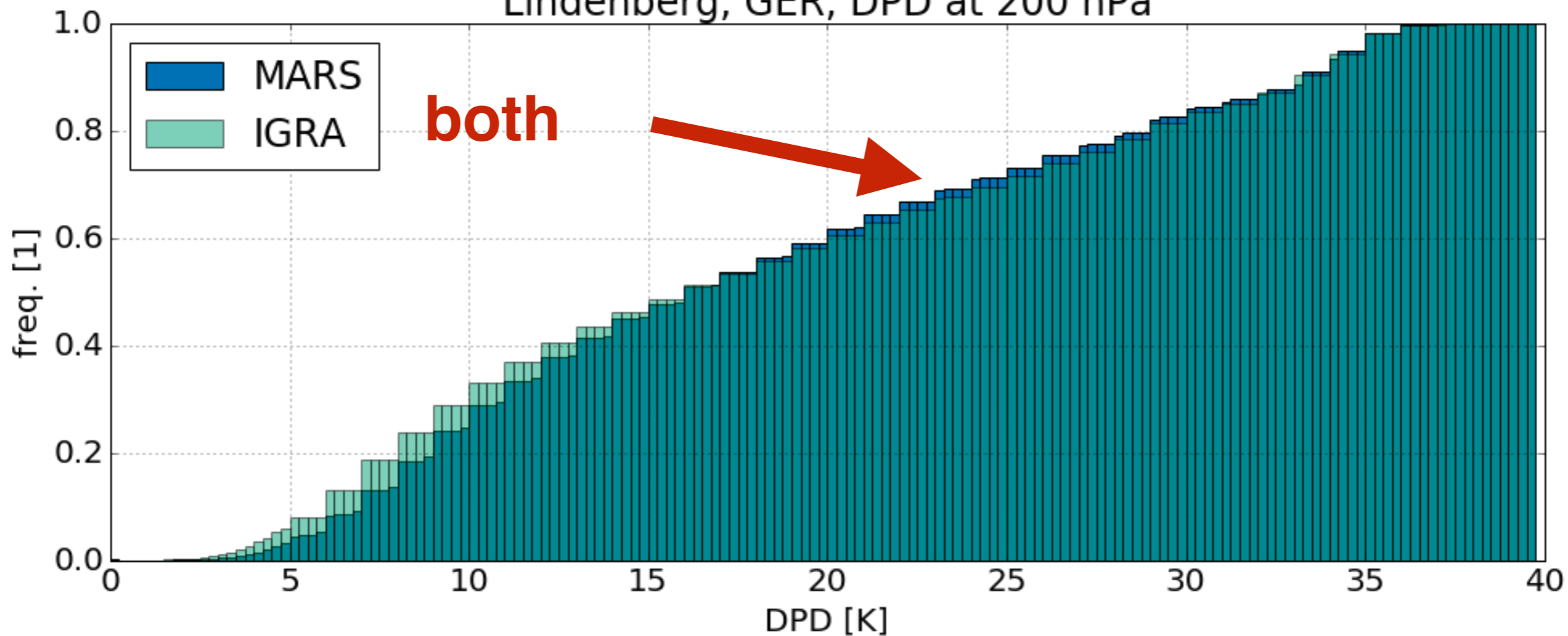
ERA Report Series 21 CM-SAF SSM/T2



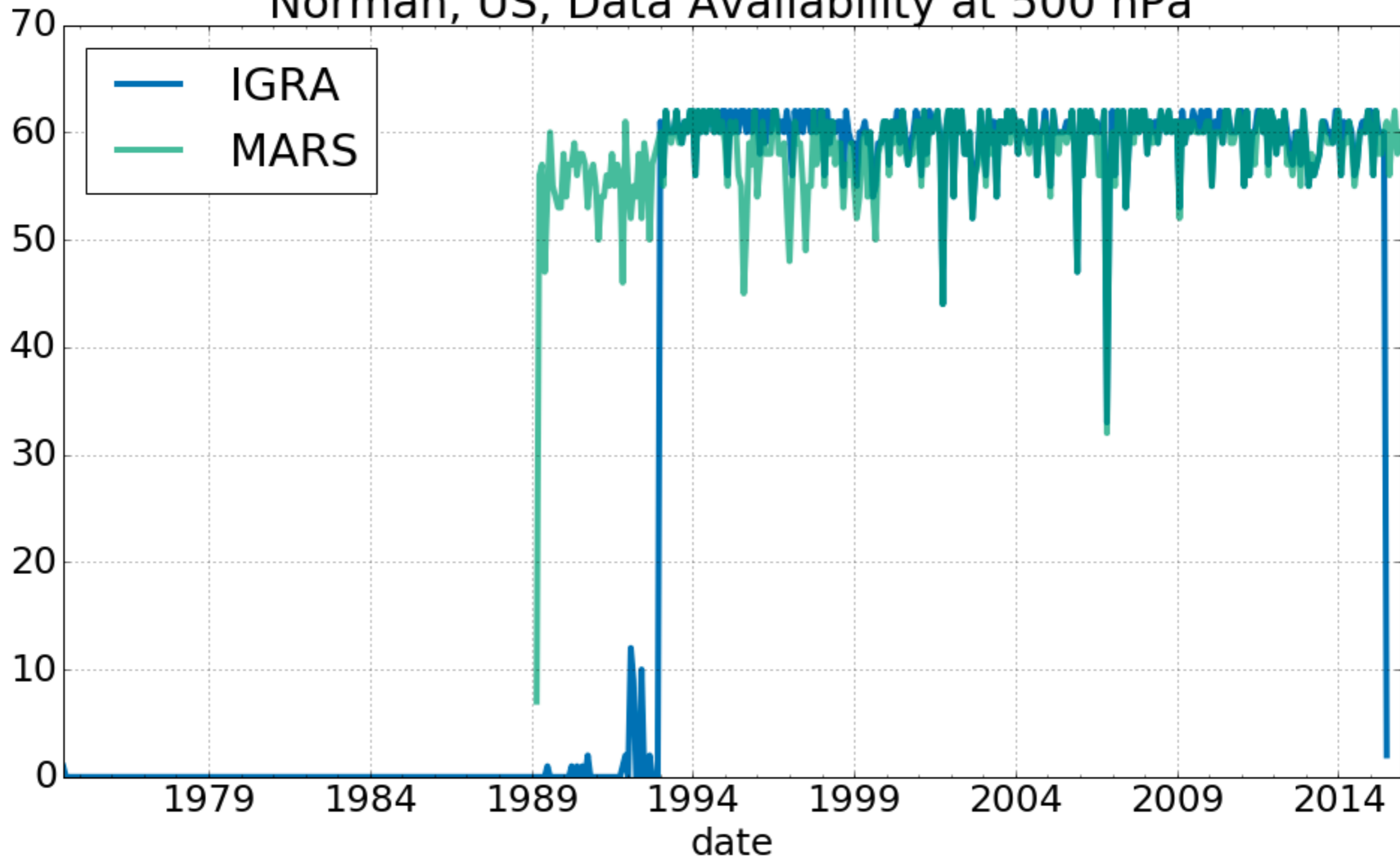
Norman, US, DPD at 500 hPa



Lindenberg, GER, DPD at 200 hPa



Norman, US, Data Availability at 500 hPa





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Thanks