

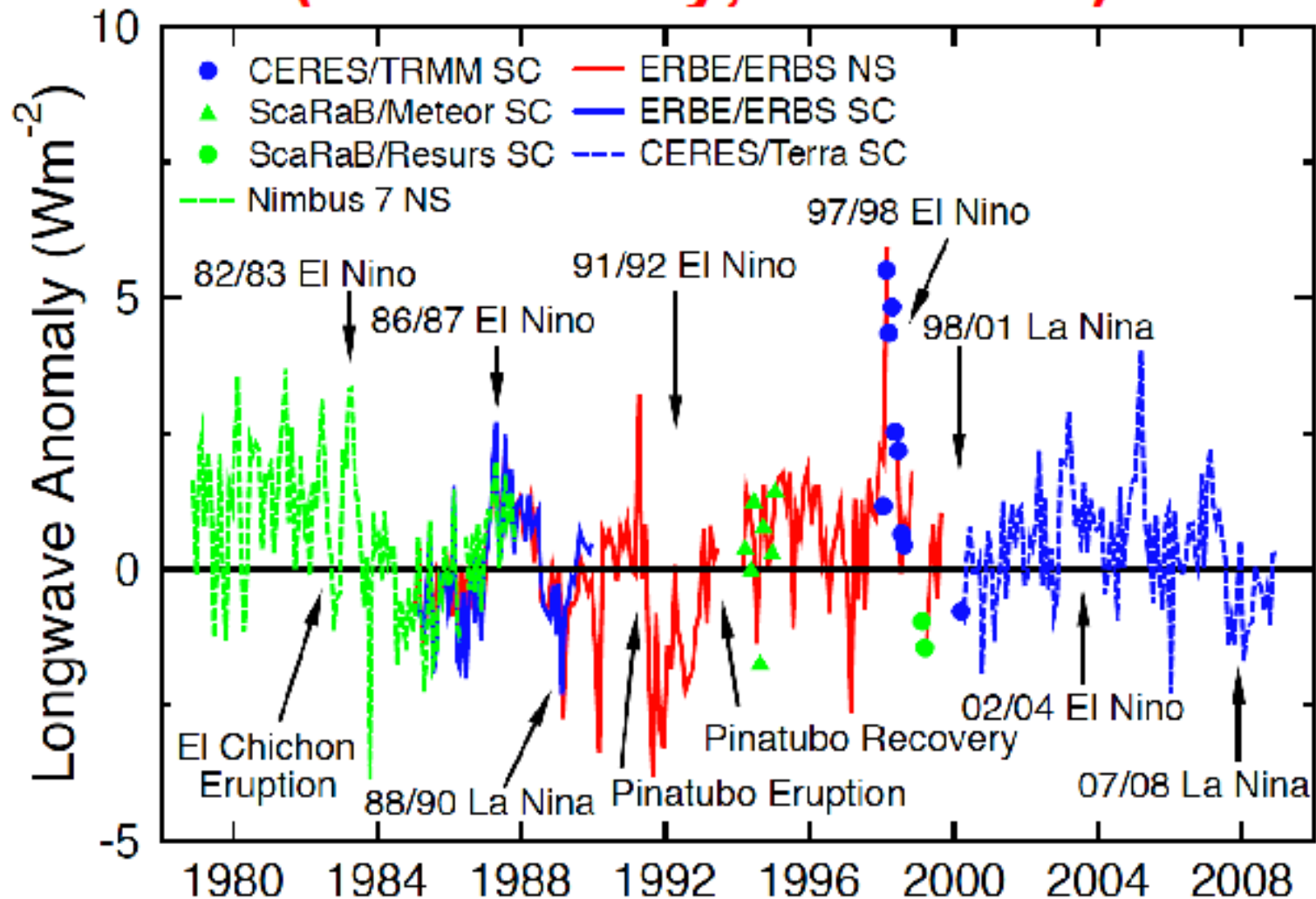
Linear regression YEAR (%/yr)



Satellite record is gearing up for climate monitoring

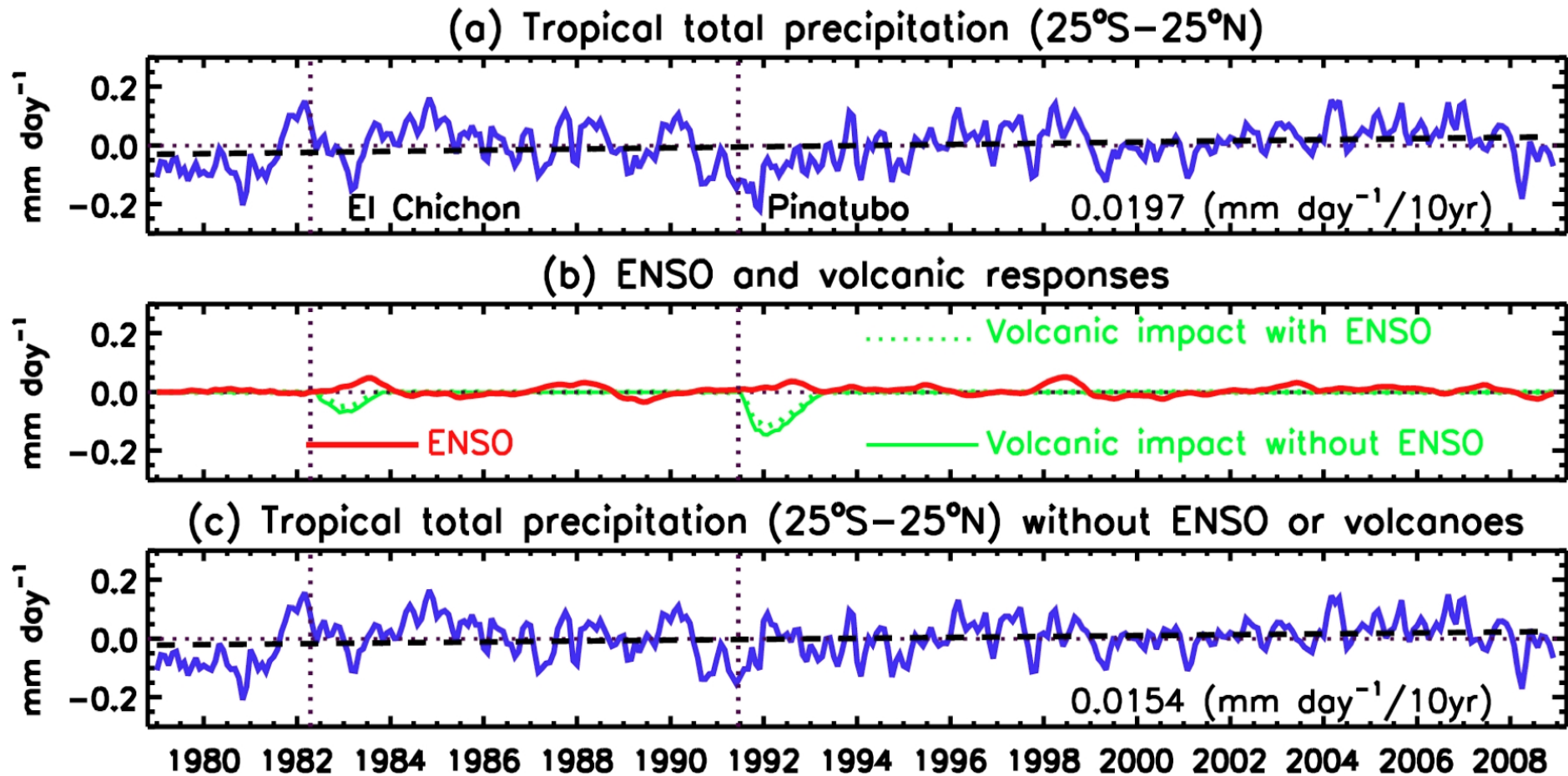
Water and energy in the tropics (1/2)

32-years of Radiation Measurements (LW Anomaly; 20°S-20°N)



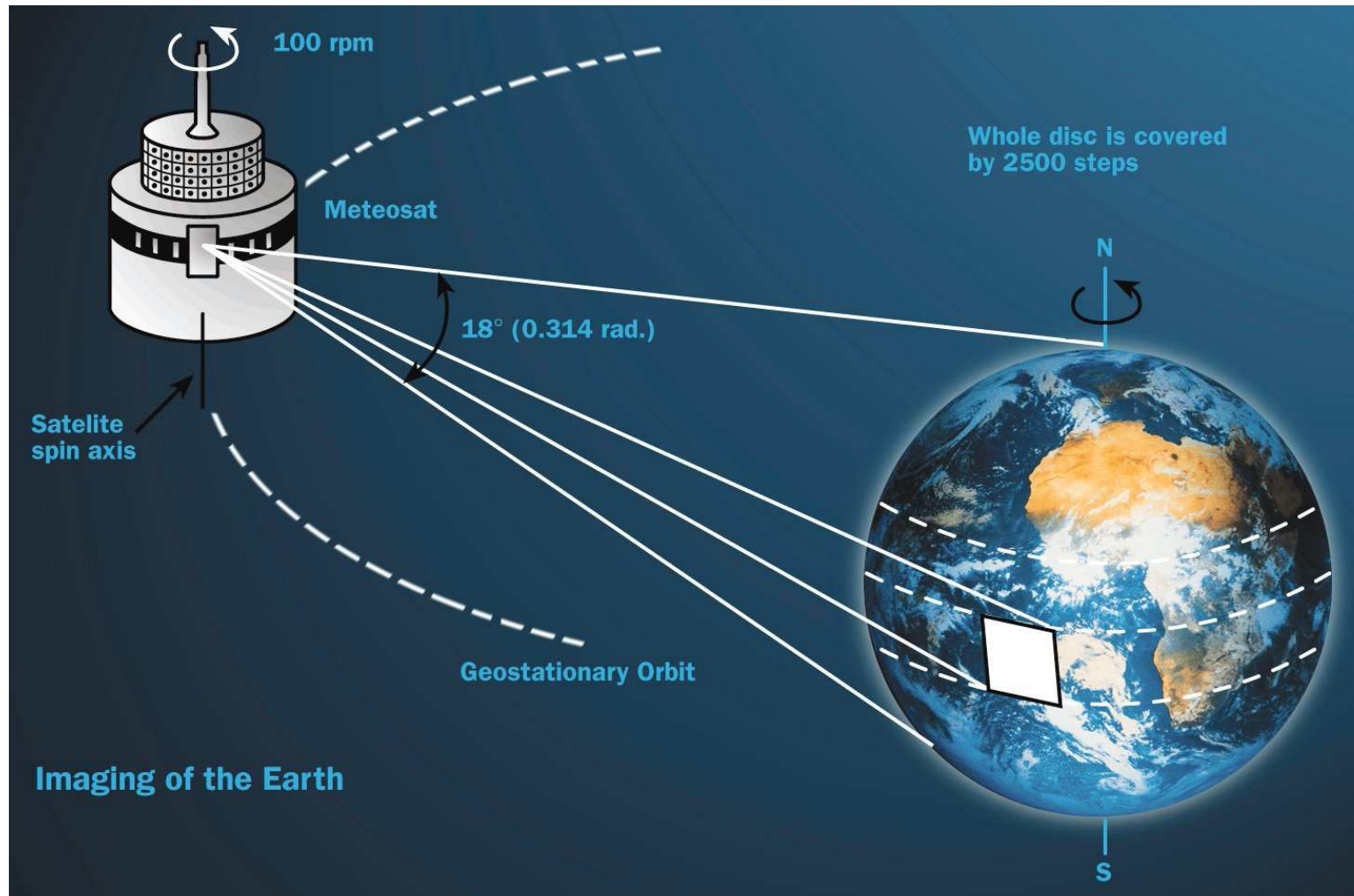
Satellite record is gearing up for climate monitoring

Water and energy in the tropics (2/2)



Satellite record is gearing up for climate monitoring

The METEOSAT record for the WAM (1/2)

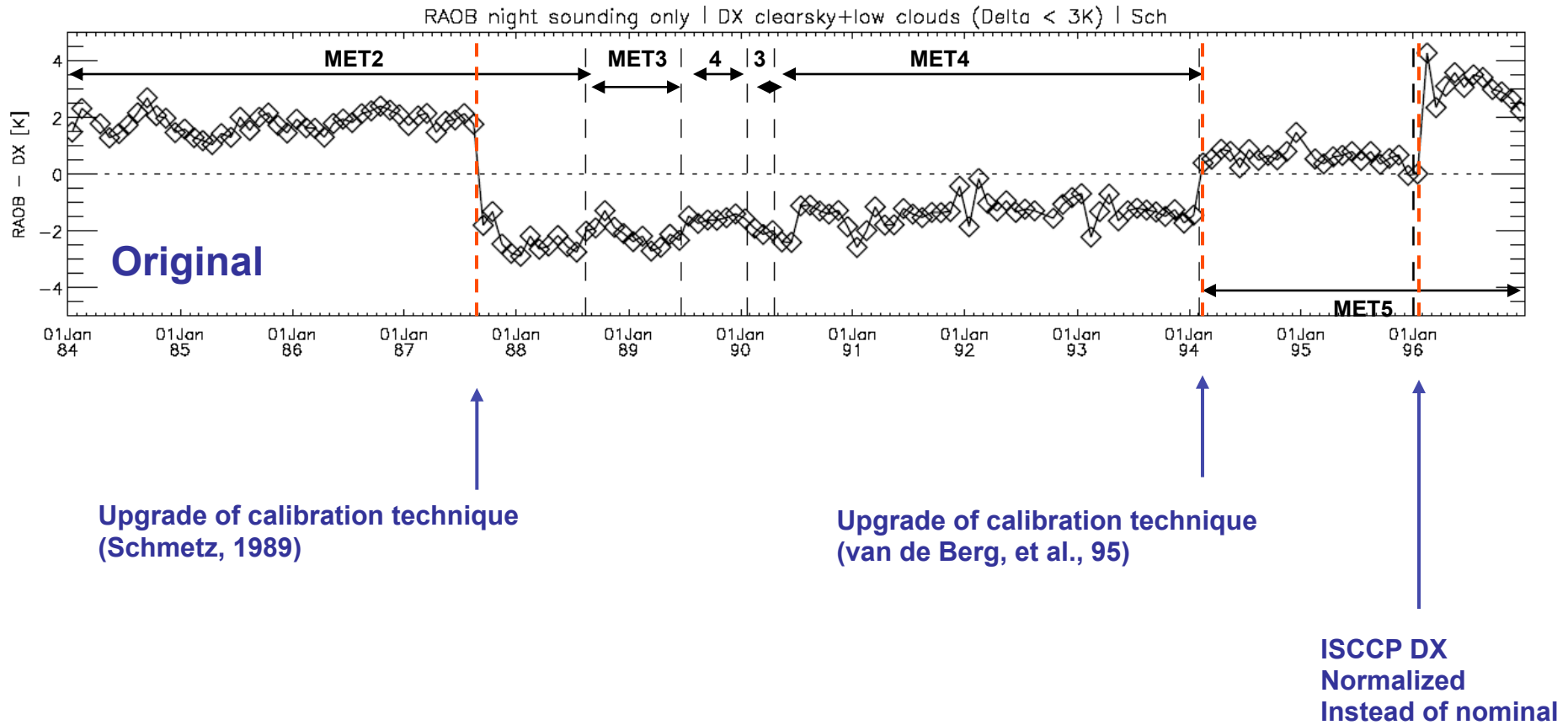


5km/30 minutes VIS,IR and WV channels since 1977 !

Satellite record is gearing up for climate monitoring

The METEOSAT record for the WAM (2/2)

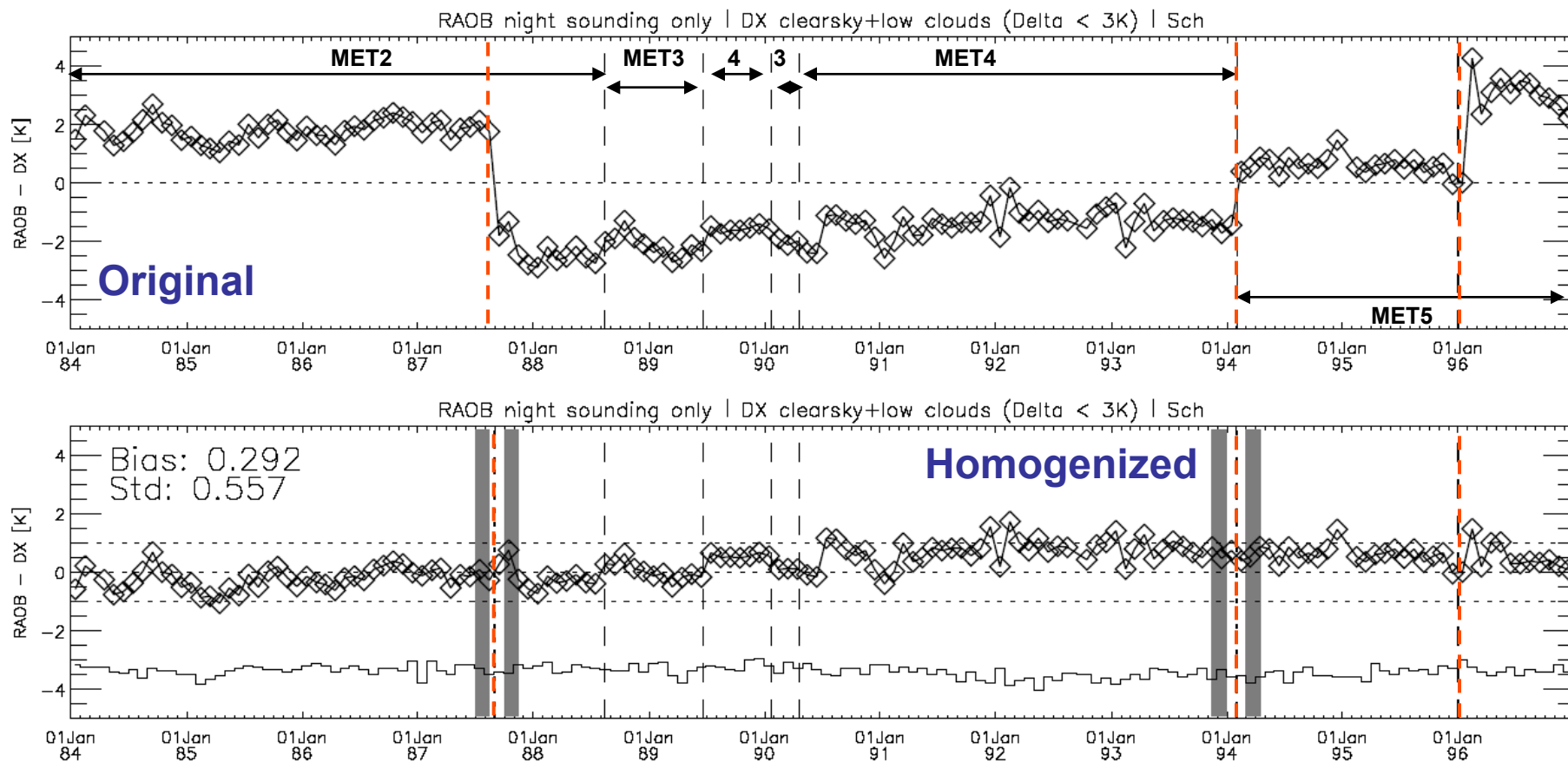
Difficulty to deal with a climate record from multiple operational satellites



Satellite record is gearing up for climate monitoring

The METEOSAT record for the WAM (2/2)

Difficulty to deal with a climate record from multiple operational satellites



The climate record from METEOSAT from ~1980 – today and growing : > 25 years

The METEOSAT climate record for the WAM

Two examples of products

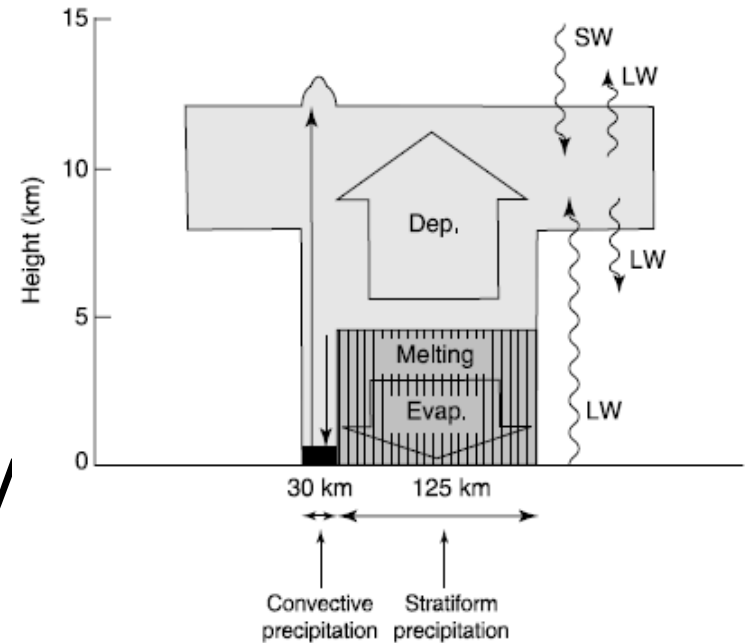
- Mesoscale Convective Systems from « IR »
- Free Tropospheric humidity from « WV »

$$\ln\left(\frac{FTH \cdot p_0}{\cos\theta}\right) = a \cdot BT_{6.3\mu m} + b$$

- Precipitation over the WAM

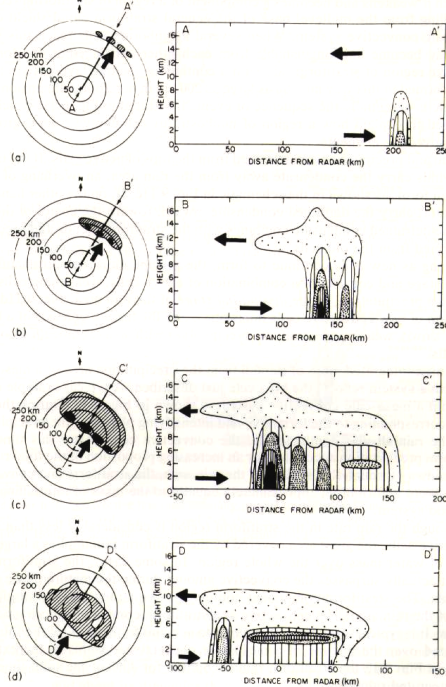
TAMSAT climate record from METEOSAT « IR »

see **Poster by Ross Maidment et al**

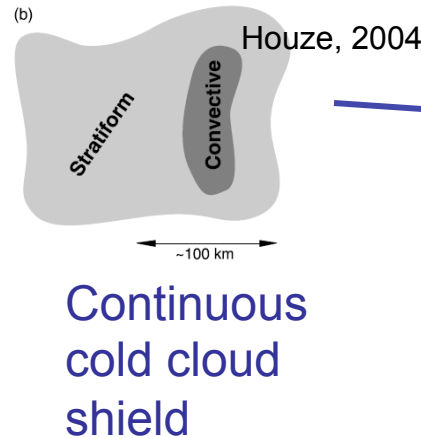


Mesoscale Convective Systems

Life cycle



(Leary & Houze 1979)



METEO FRANCE

EUMETSAT

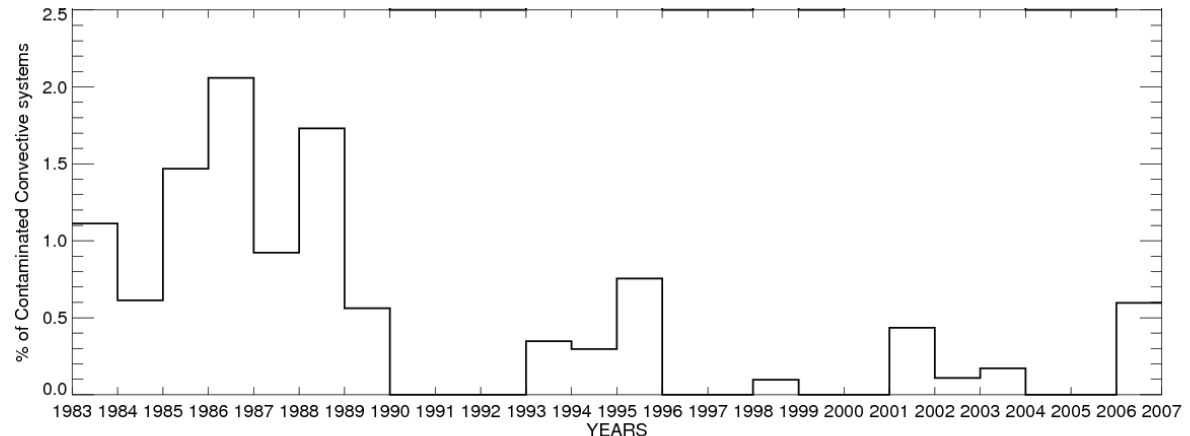
Extracting the information on MCS from satellite imagery

What your brain and eyes are doing easily (spotting a blob, and tracking it along the time) Needs to be done objectively and automatically.

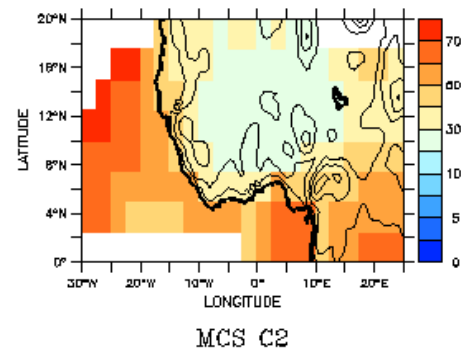
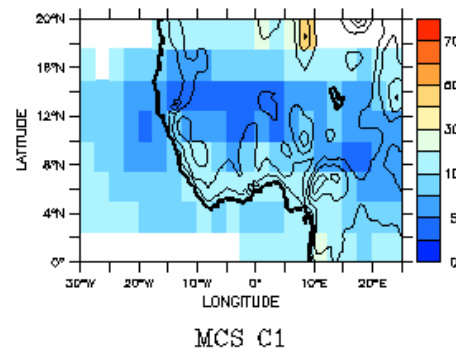
Use of IR thresholds to segment the image and tracking Algorithm (patterns recognition)

Mesoscale Convective Systems

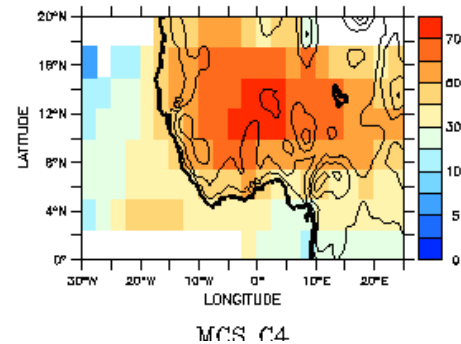
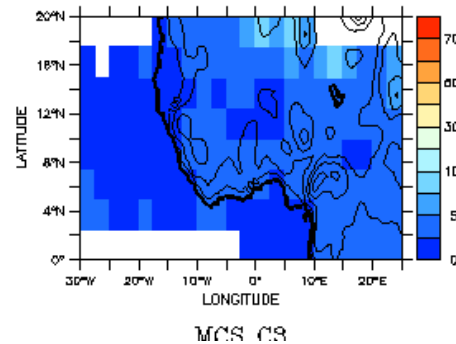
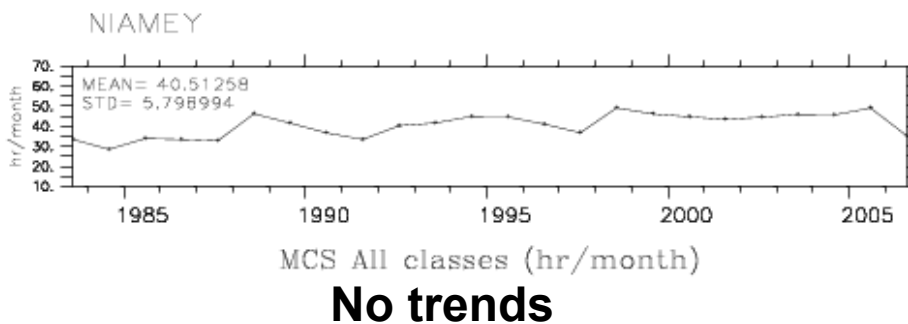
Joint work between LMD, CNRM and LTHE



- MET-2 MET-7 full resolution IR channel
- 1983-2006 included
- No intercalibration
- Single 235K threshold +Overlap technique (from the 1980's, split/merge etc..)
- A lot of dedicated control quality

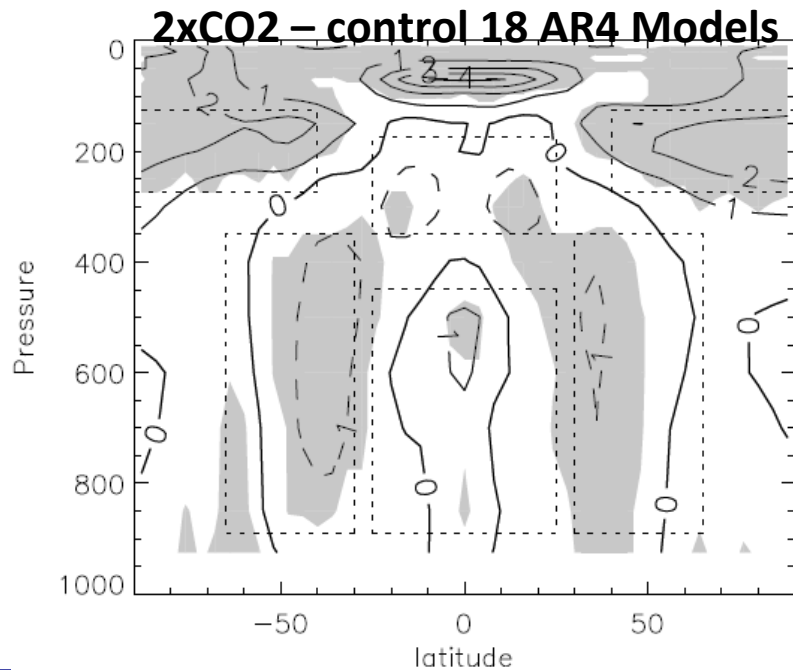
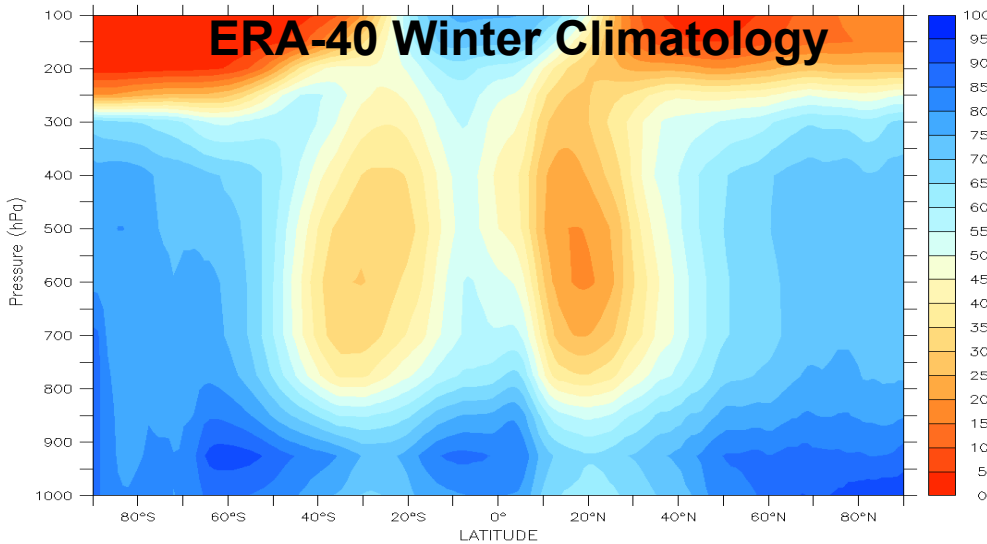


From Fiolleau et al., 2011



Roca et al., 4th AMMA Conference, Toulouse, France, July 2012

Relative humidity in the free troposphere

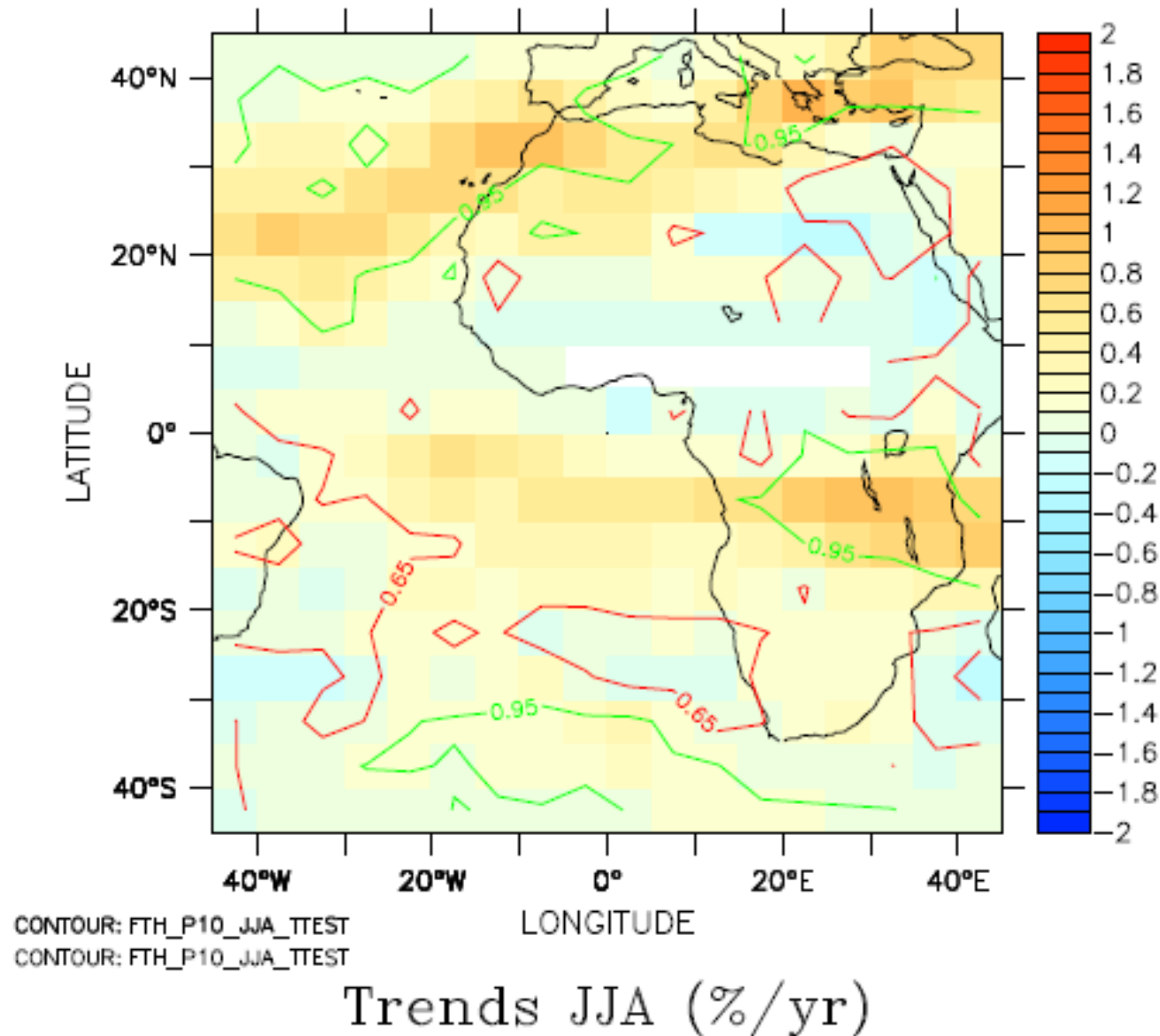


Poleward shift of Hadley cells edge
Widening of the subtropics
Drying of the RH minimum

Are such trends seen in the recent climate?

Free tropospheric humidity

Linear trend analysis 1983:2008



**Trends in the
Frequency of
Occurrence of
very dry FTH
(FTH<10%)**

Summary and conclusions

- METEOSAT provides a unique climate record of more than 25 years of data for the WAM
 - Precipitation (TAMSAT see poster R Maidment)
 - MCS : no trends
 - FTH: more frequent very dry troposphere
 - + also various cloud products (ISCCP)
- Various data bases available on AMMASAT and AMMAEU database
- Climate Monitoring SAF of EUMETSAT