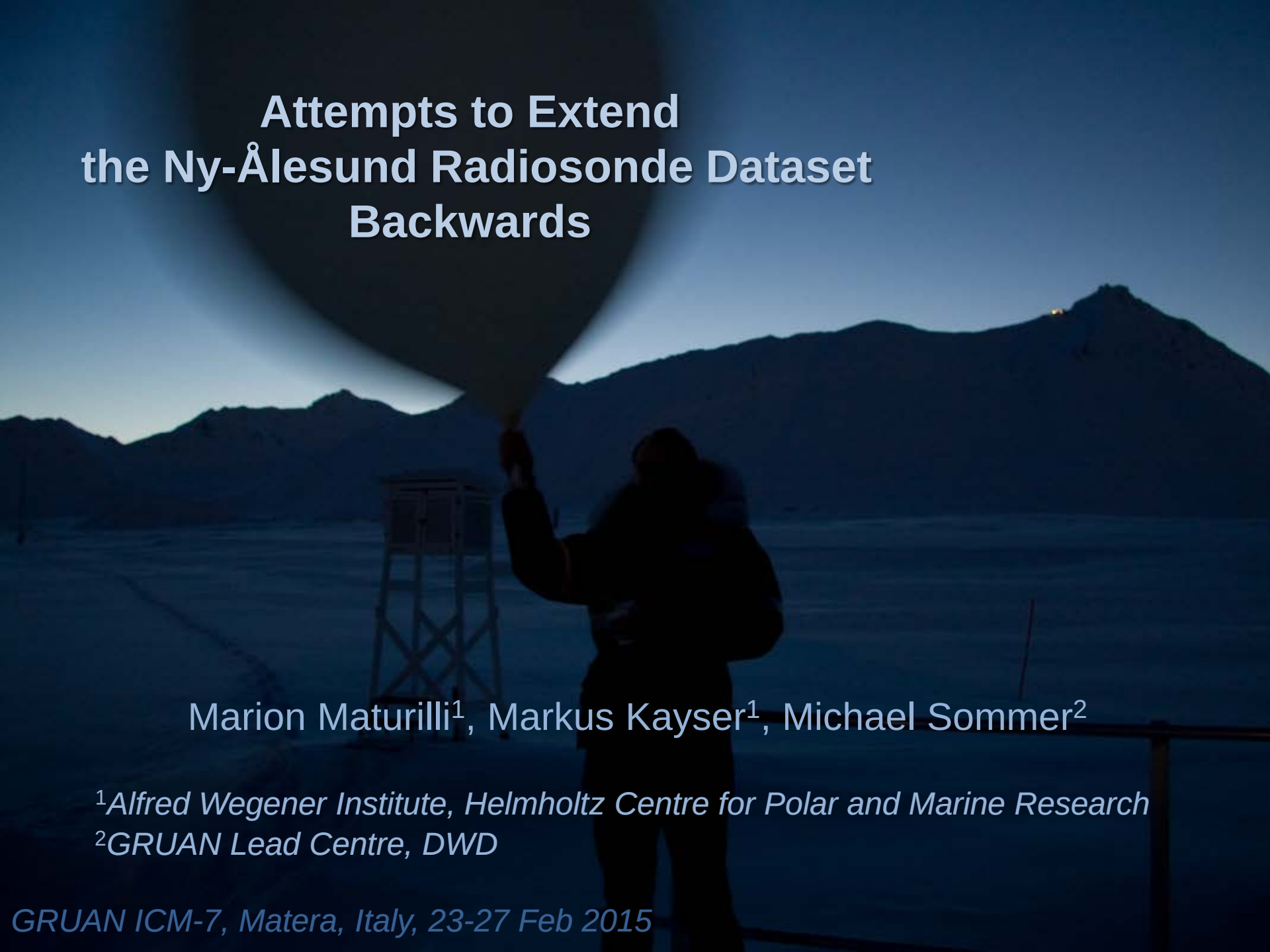


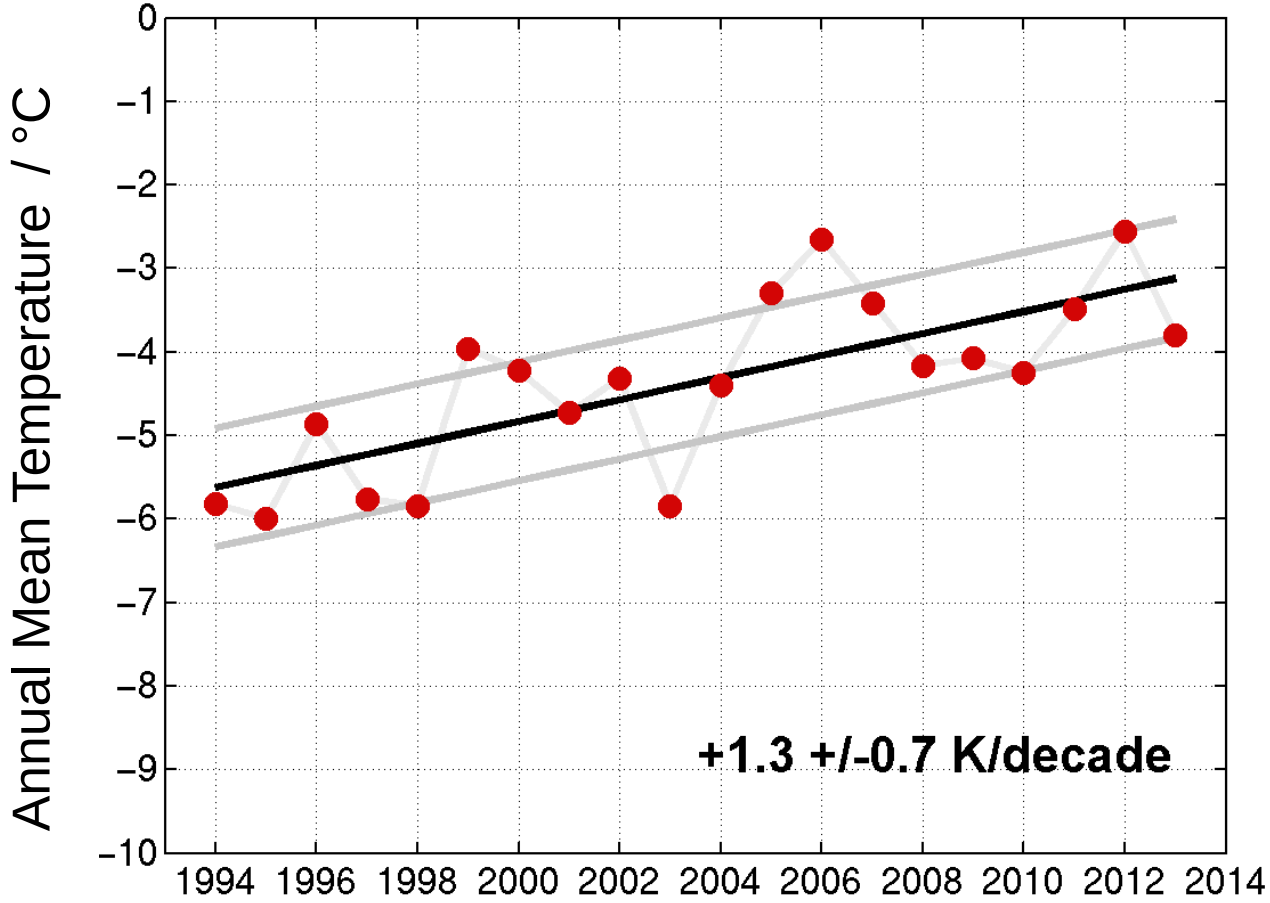
# Attempts to Extend the Ny-Ålesund Radiosonde Dataset Backwards

Marion Maturilli[1], Markus Kayser[1], Michael Sommer[2]

[1]*Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research*
[2]*GRUAN Lead Centre, DWD*

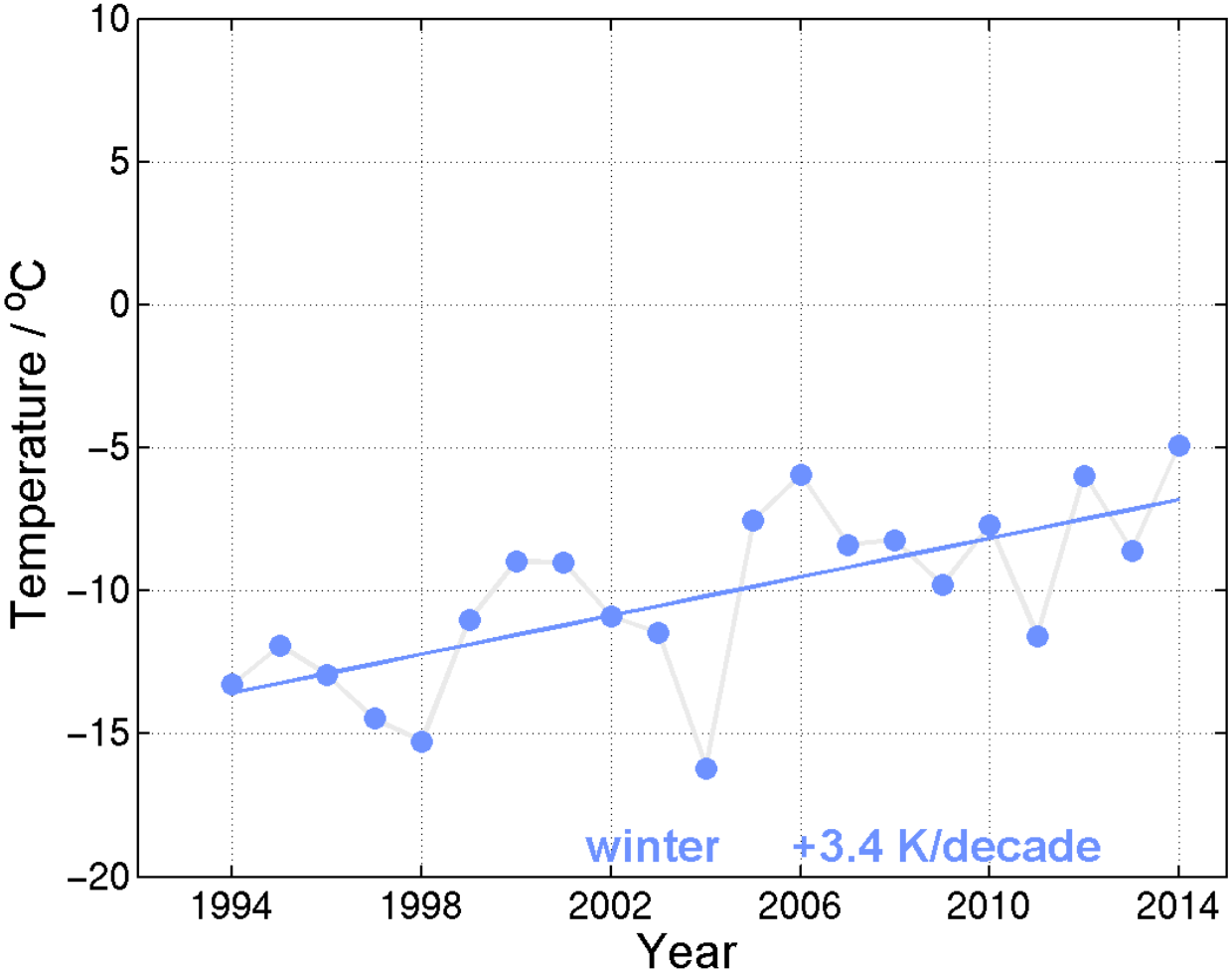
*GRUAN ICM-7, Matera, Italy, 23-27 Feb 2015*

# Temperature Increase in Ny-Ålesund



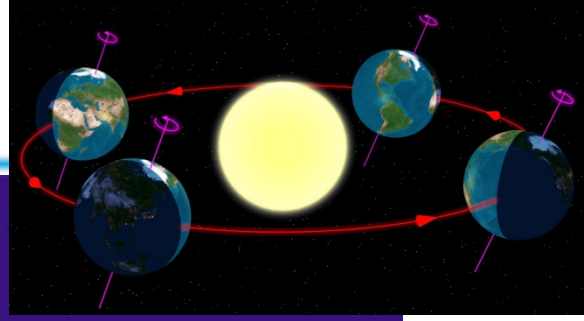

*update of Maturilli et al., ESSD 2013*

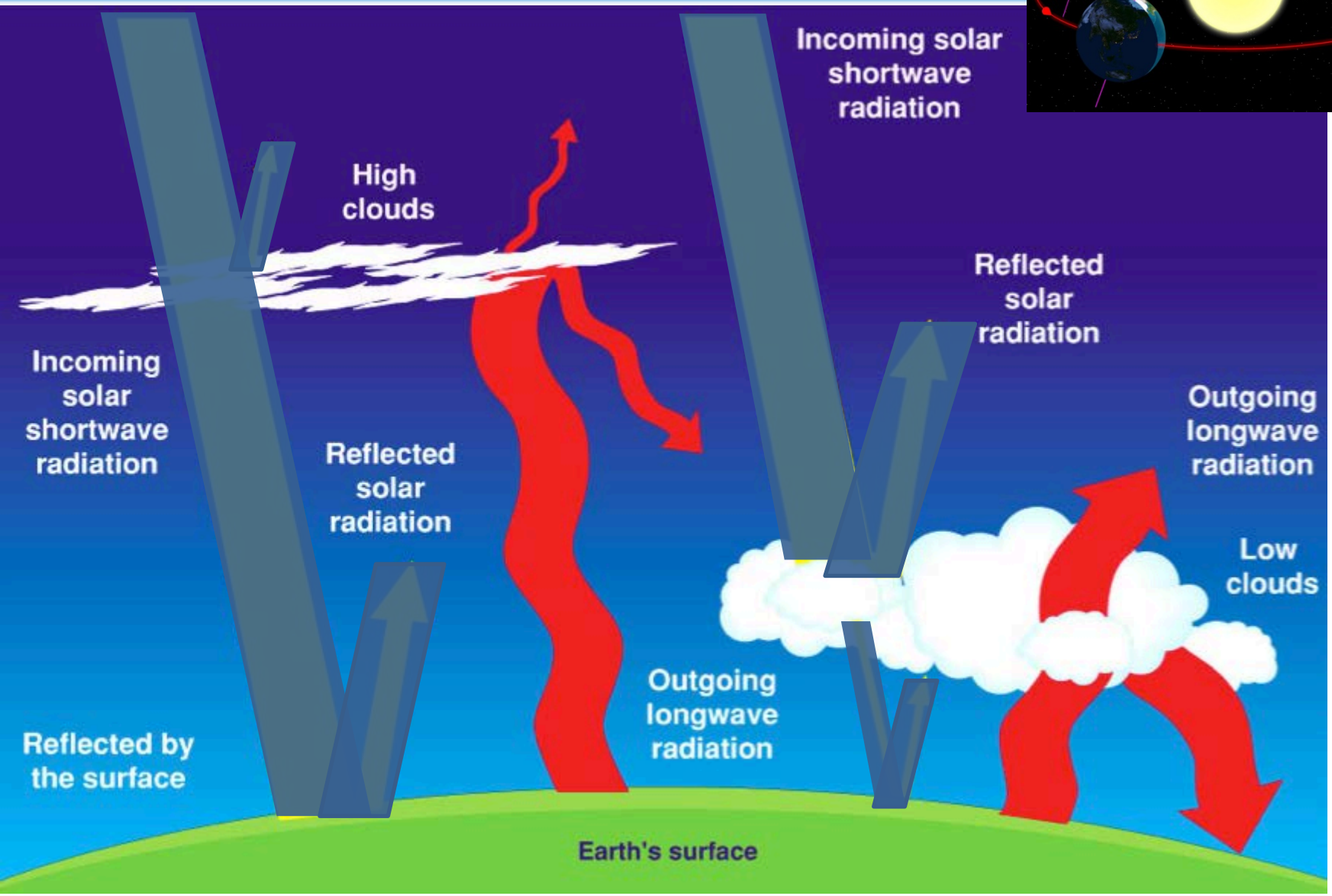
# Seasonality of Temperature Increase




update of *Maturilli et al., Theor.Appl.Climatol. 2014*

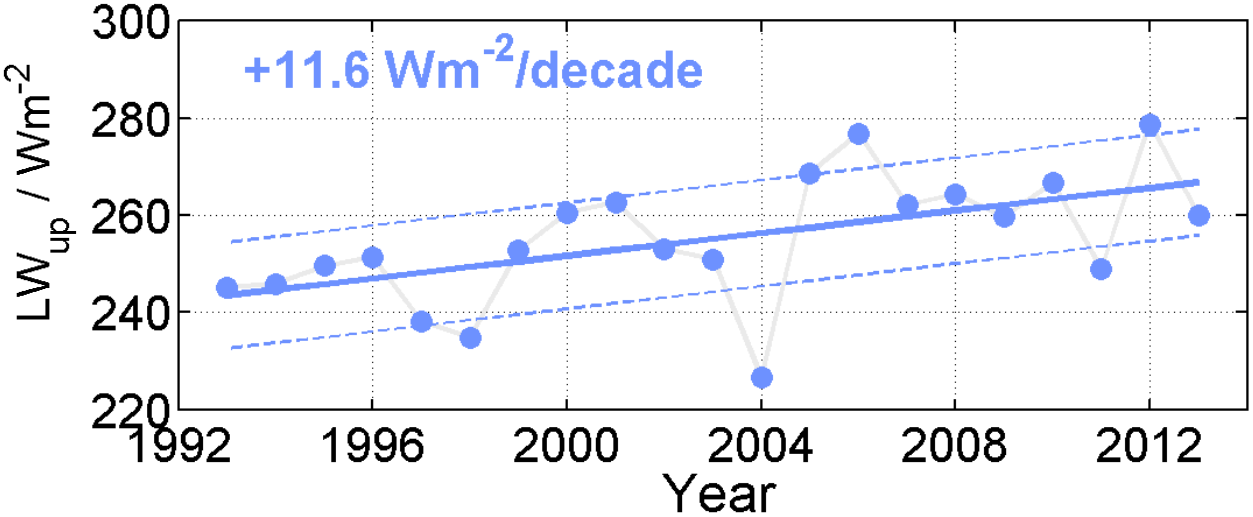
# Winter: Polar Night Conditions



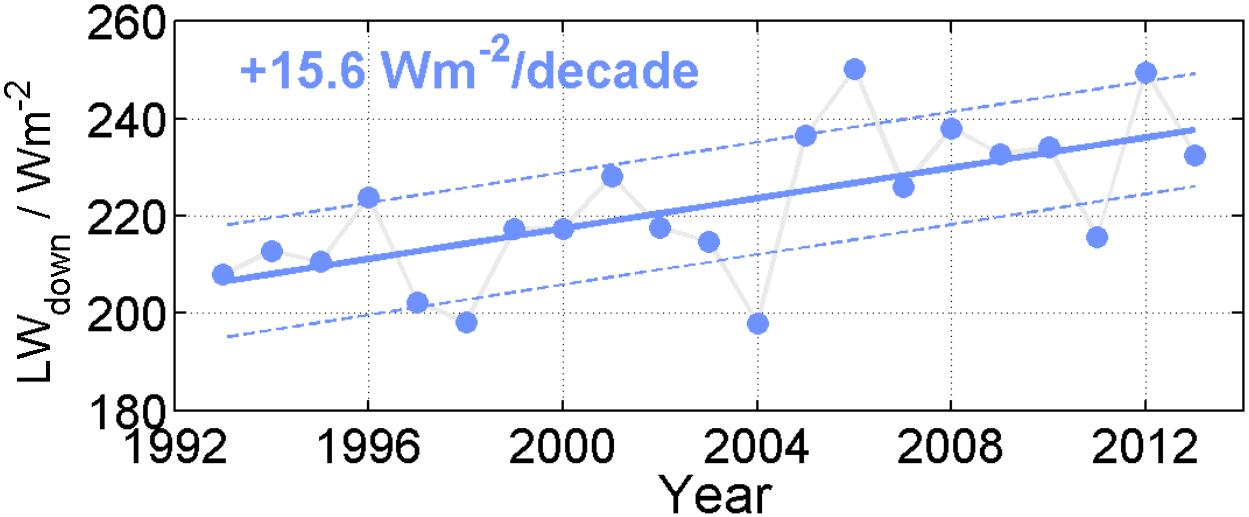


# Increase in Winter Thermal Radiation

**$LW_{up}$**

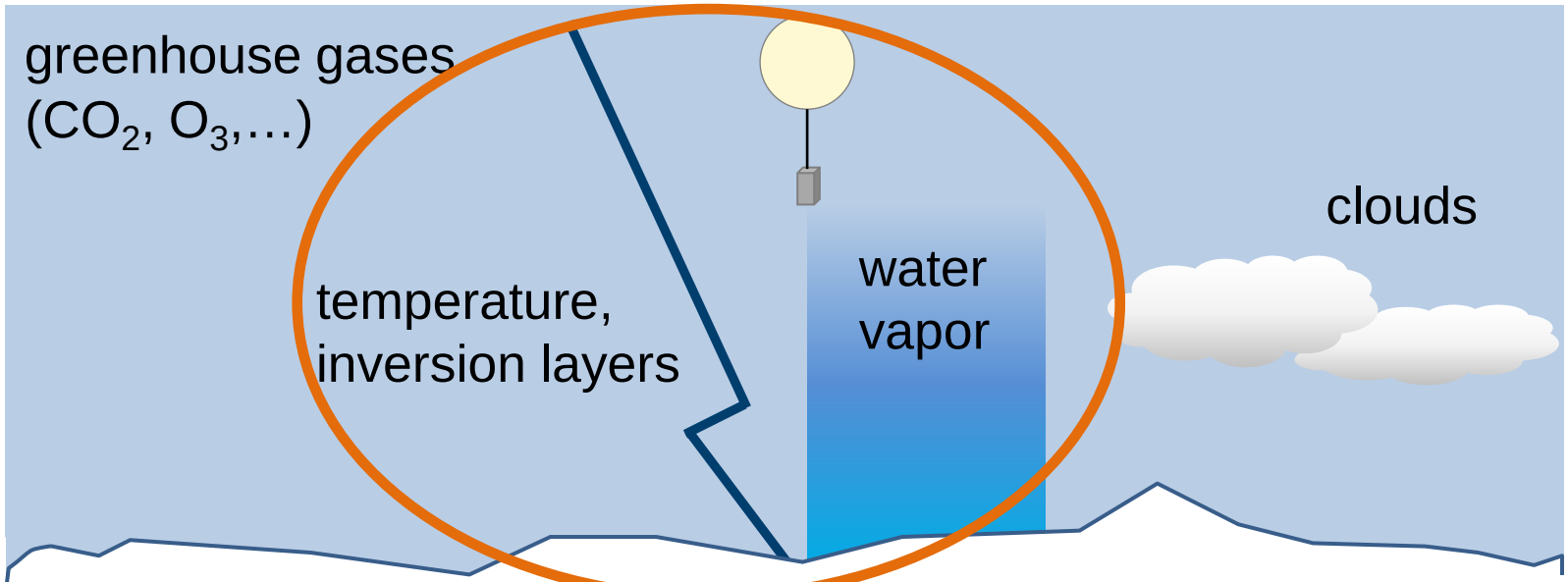



**$LW_{down}$**

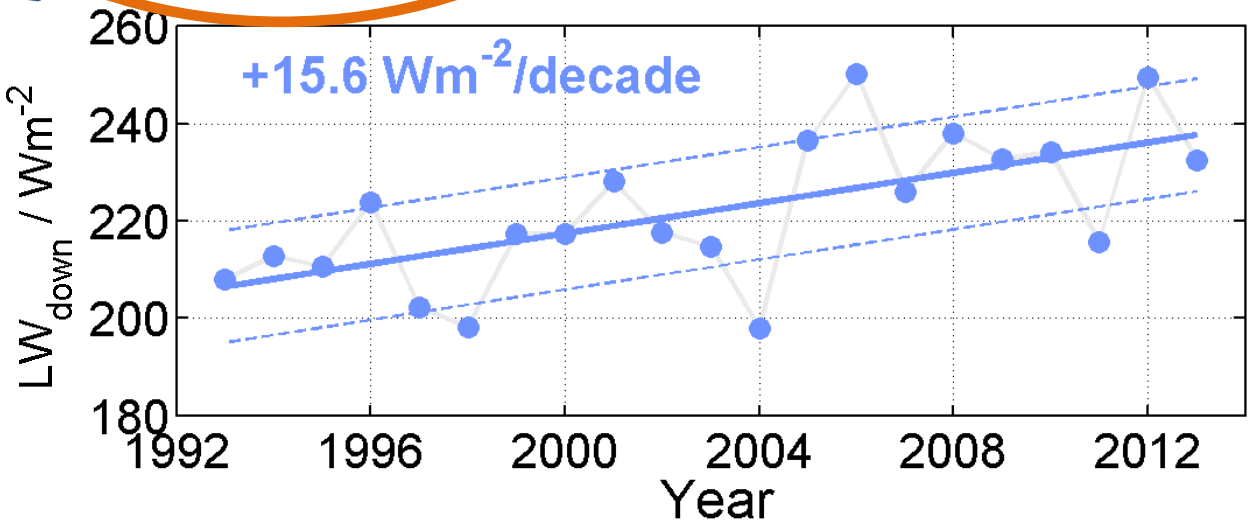



from *Maturilli et al., Theor.Appl.Climatol. 2014*

# Increase in Winter Thermal Radiation




**$LW_{down}$**




from *Maturilli et al., Theor.Appl.Climatol. 2014*

# Ny-Ålesund Radiosondes 1993 - 2014

1993 — 2002 — 2006 — 2014


RS80-A

RS90

RS92

time lag correction
[Miloshevich et al., 2004]

- contamination
- T dependence error

[Wang et al., 2002]

radiation dry bias
[Kivi et al., 2010]

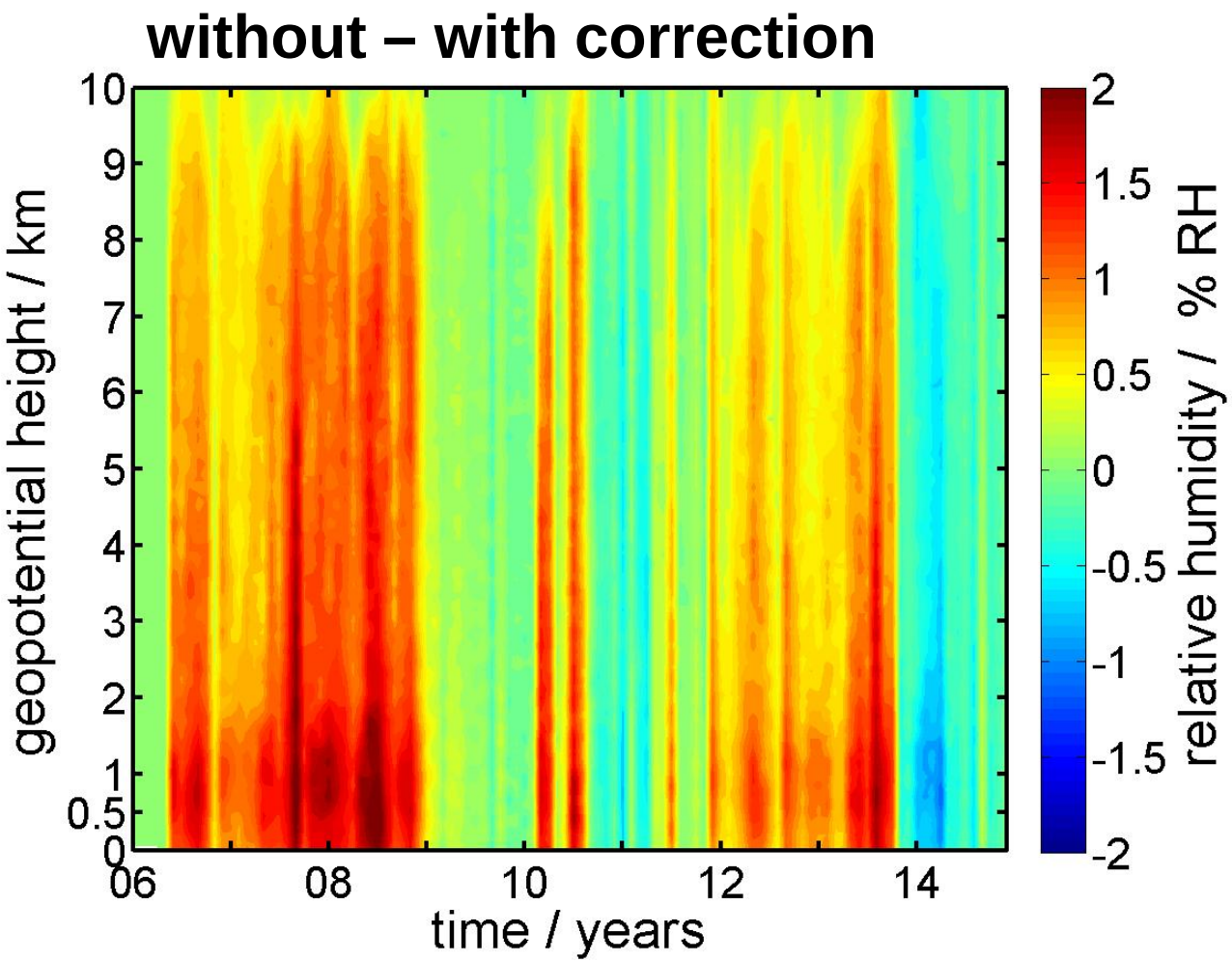
GRUAN
[Dirksen et al., 2014]

100% rel.hum. calibration

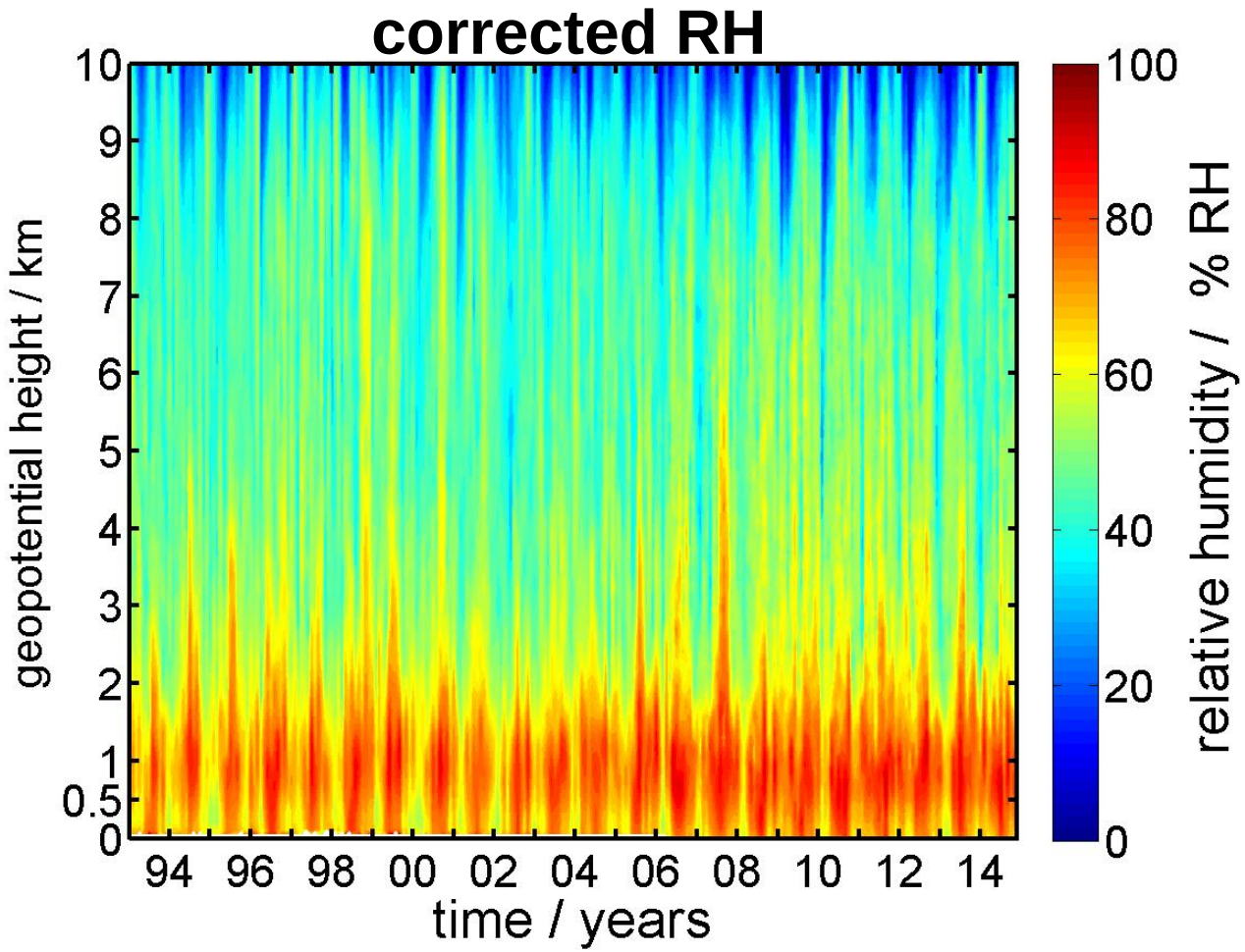
⇩ ⇩ ⇩

1993 Ny-Ålesund homogenized radiosonde data set 2014

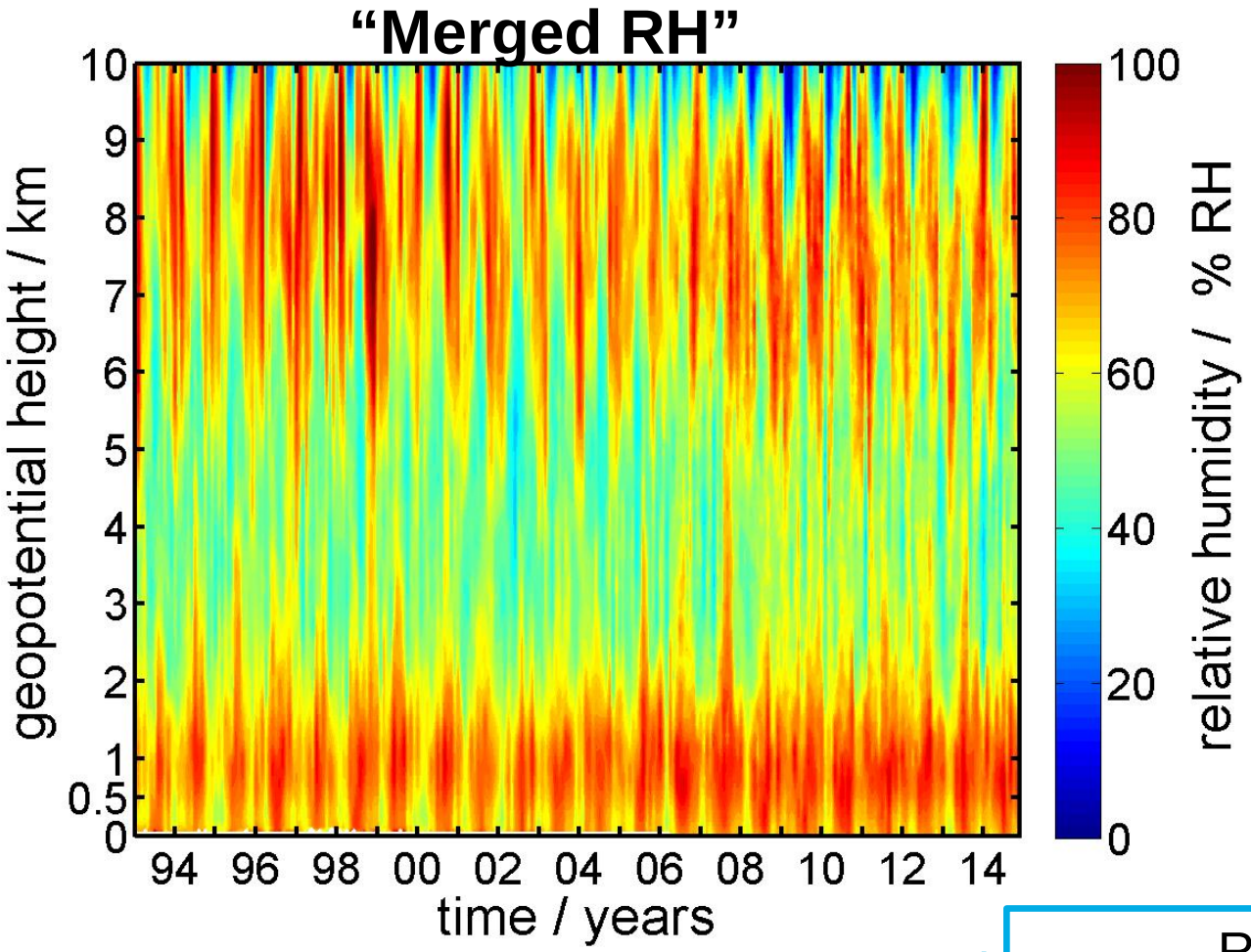
# Difference due to 100% RH Correction



# Homogenized Ny-Ålesund Radiosonde Dataset

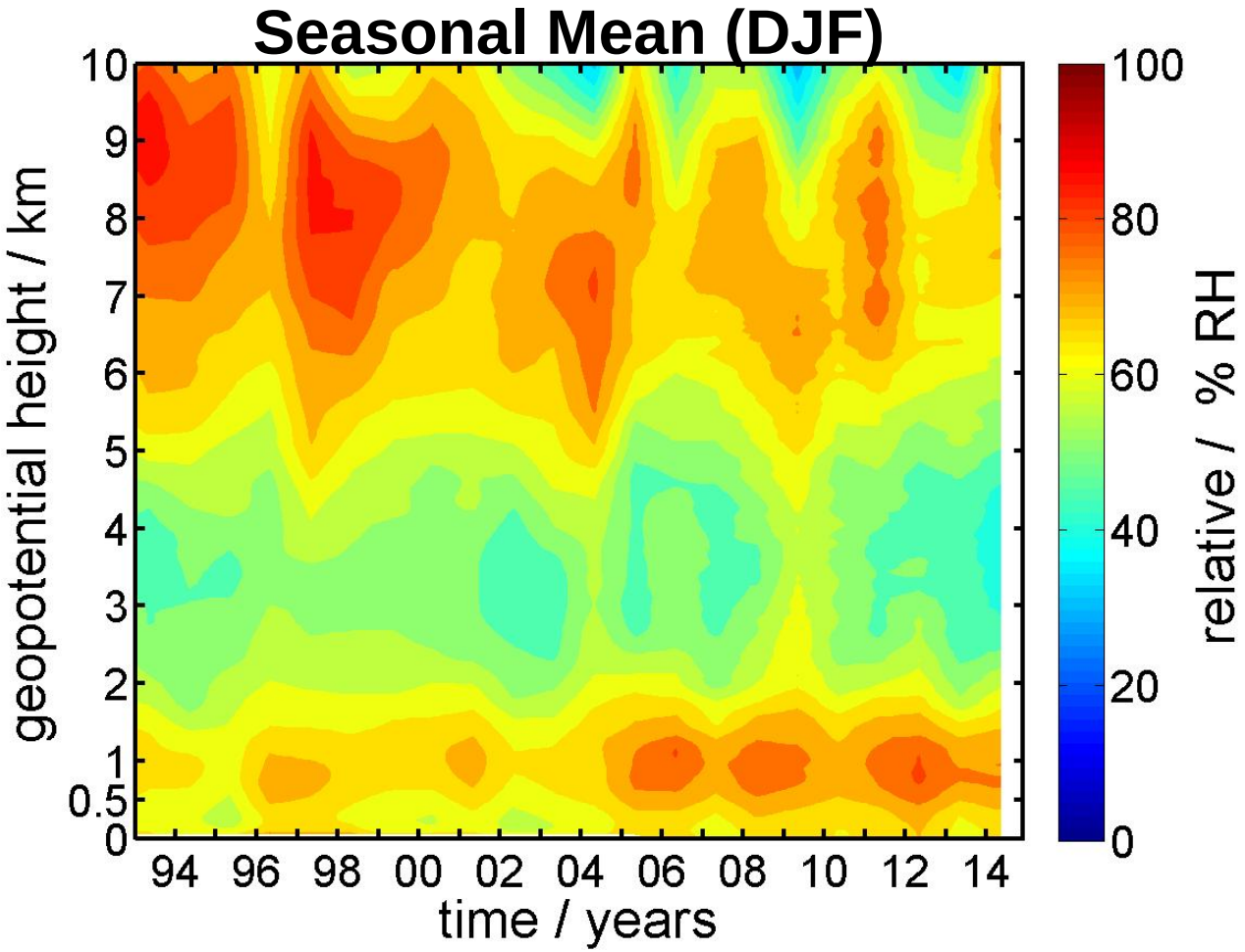


# Homogenized Ny-Ålesund Radiosonde Dataset



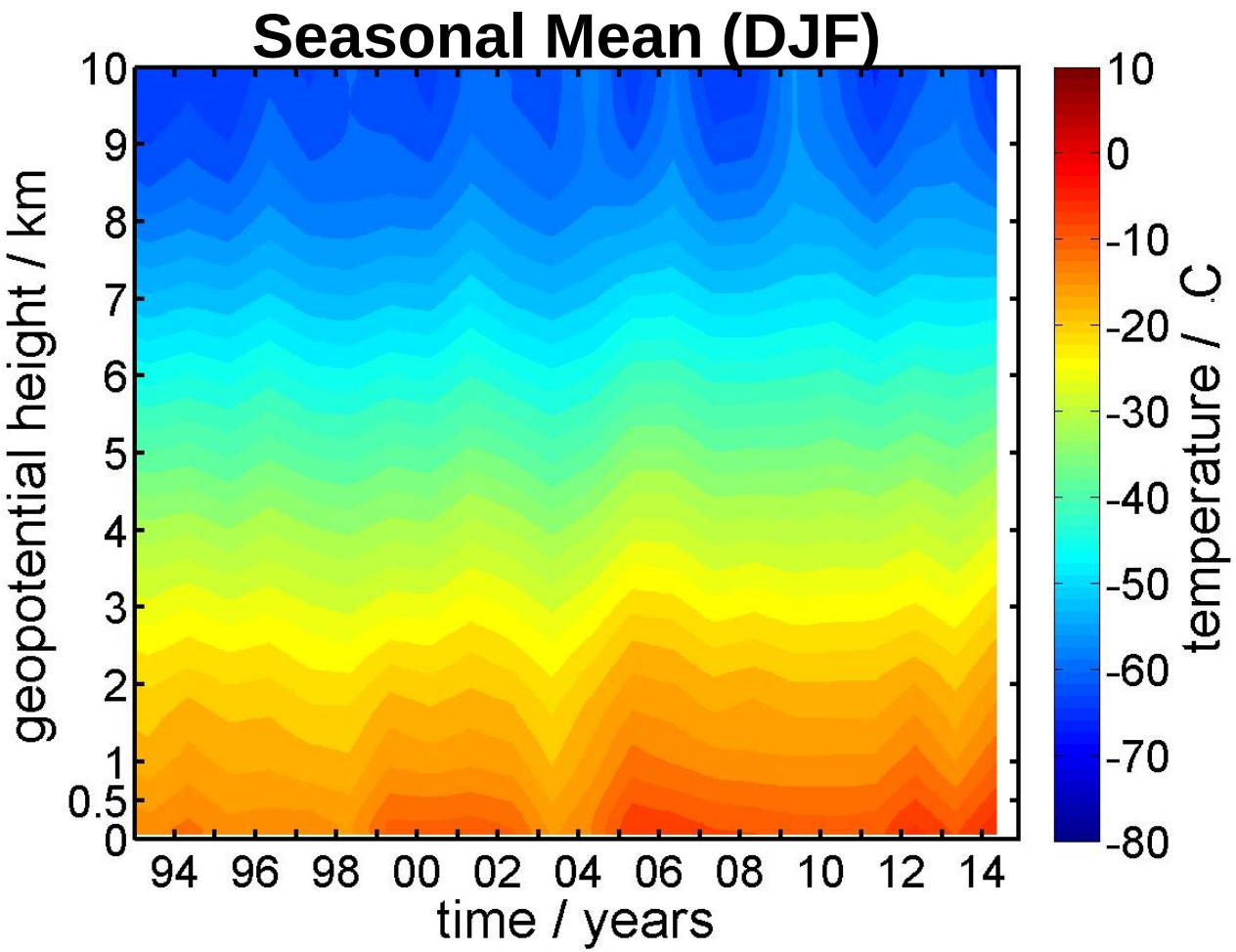

merged: RH wrt water
< -35°C RH wrt ice

# Relative Humidity - Winter Season

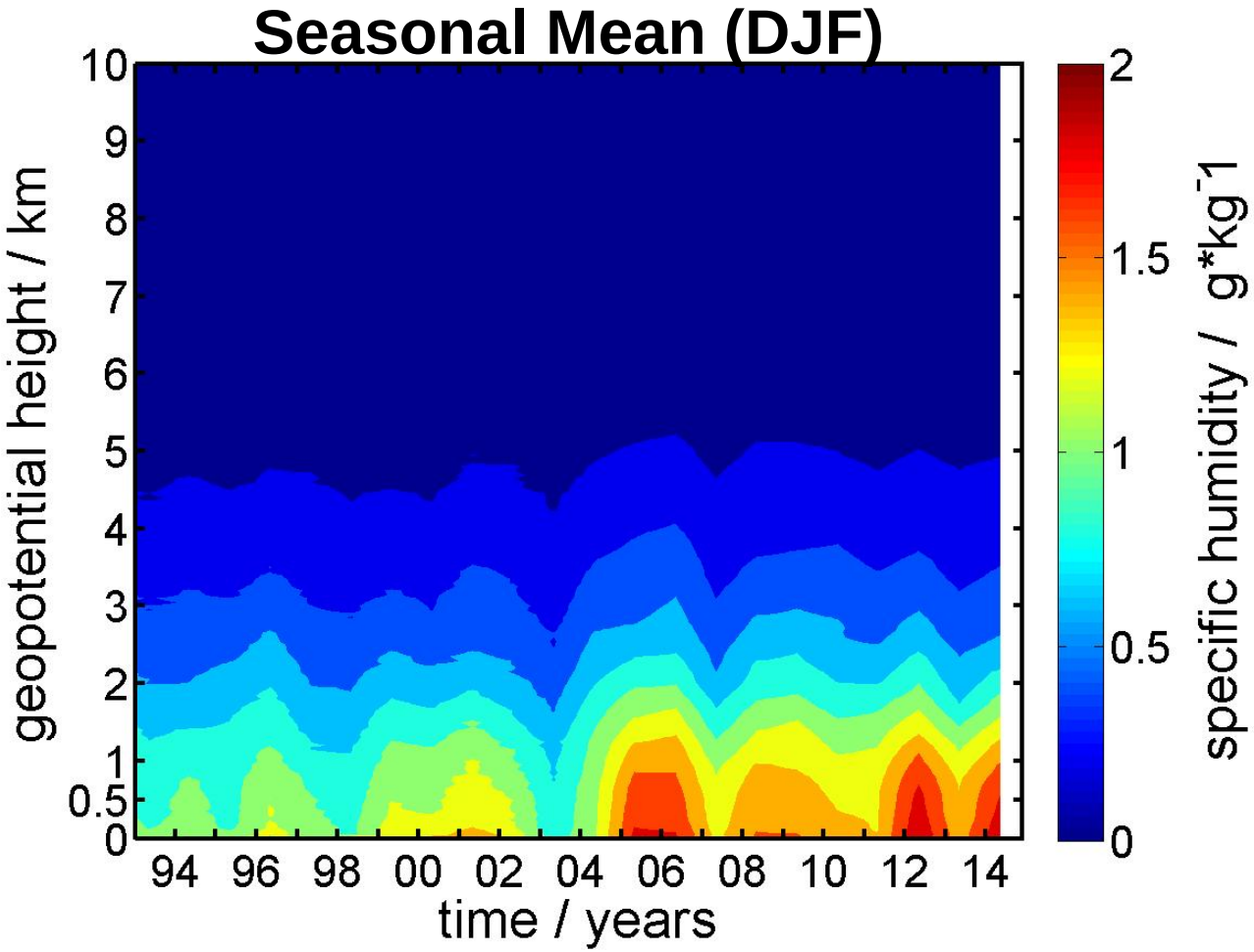



with 100% RH correction

# Temperature - Winter Season

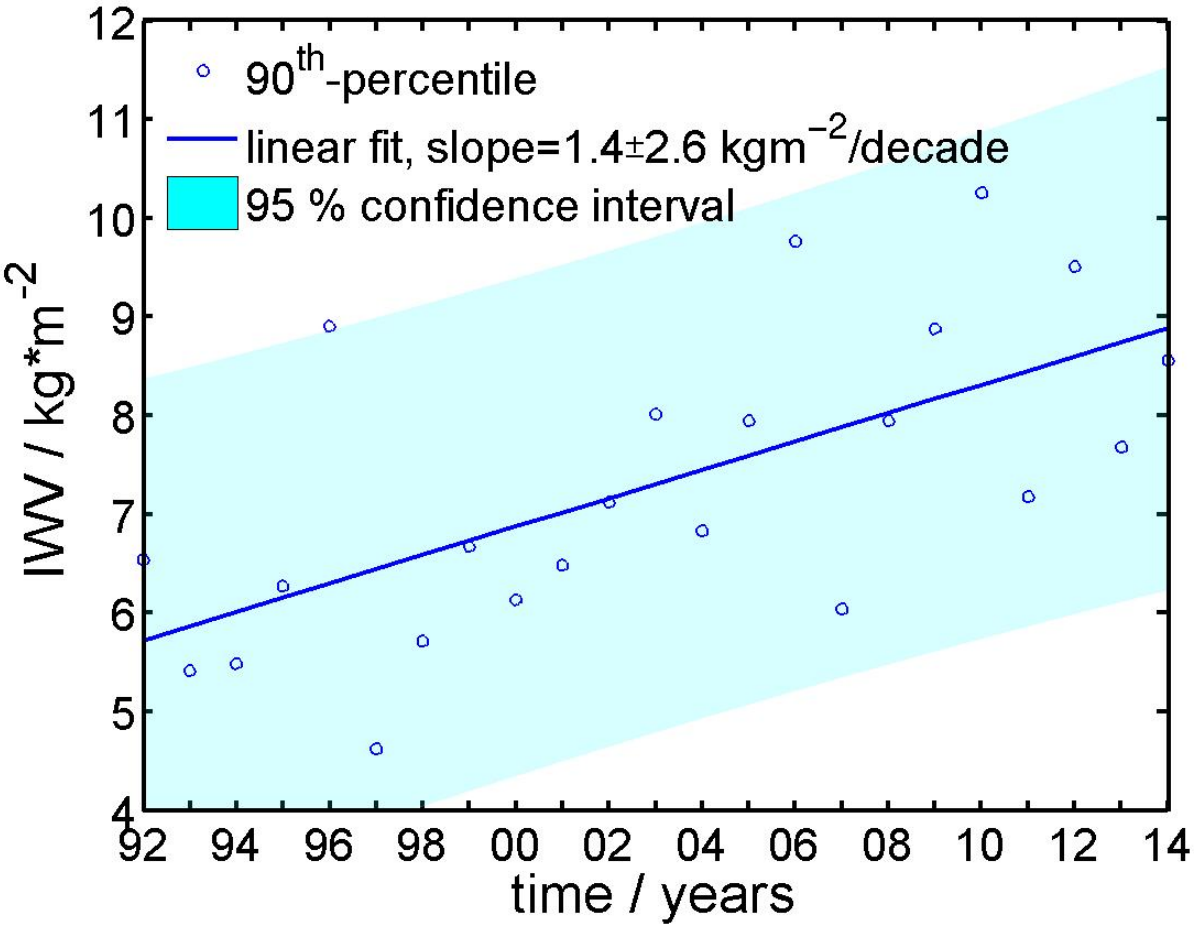


# Specific Humidity - Winter Season



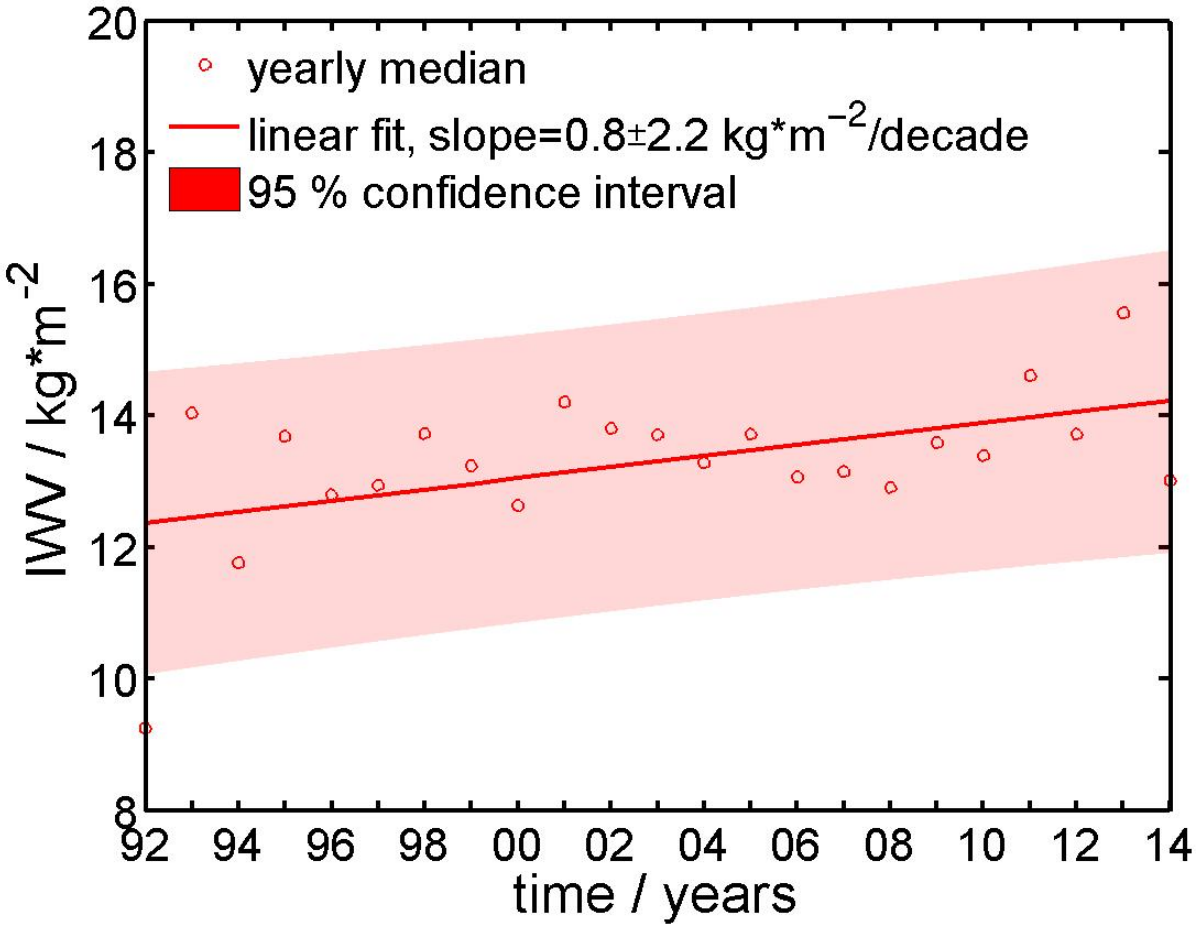

with 100% RH correction

# Integrated Water Vapor, Seasonal Mean (DJF)




with 100% RH correction

# Integrated Water Vapor, Annual Mean

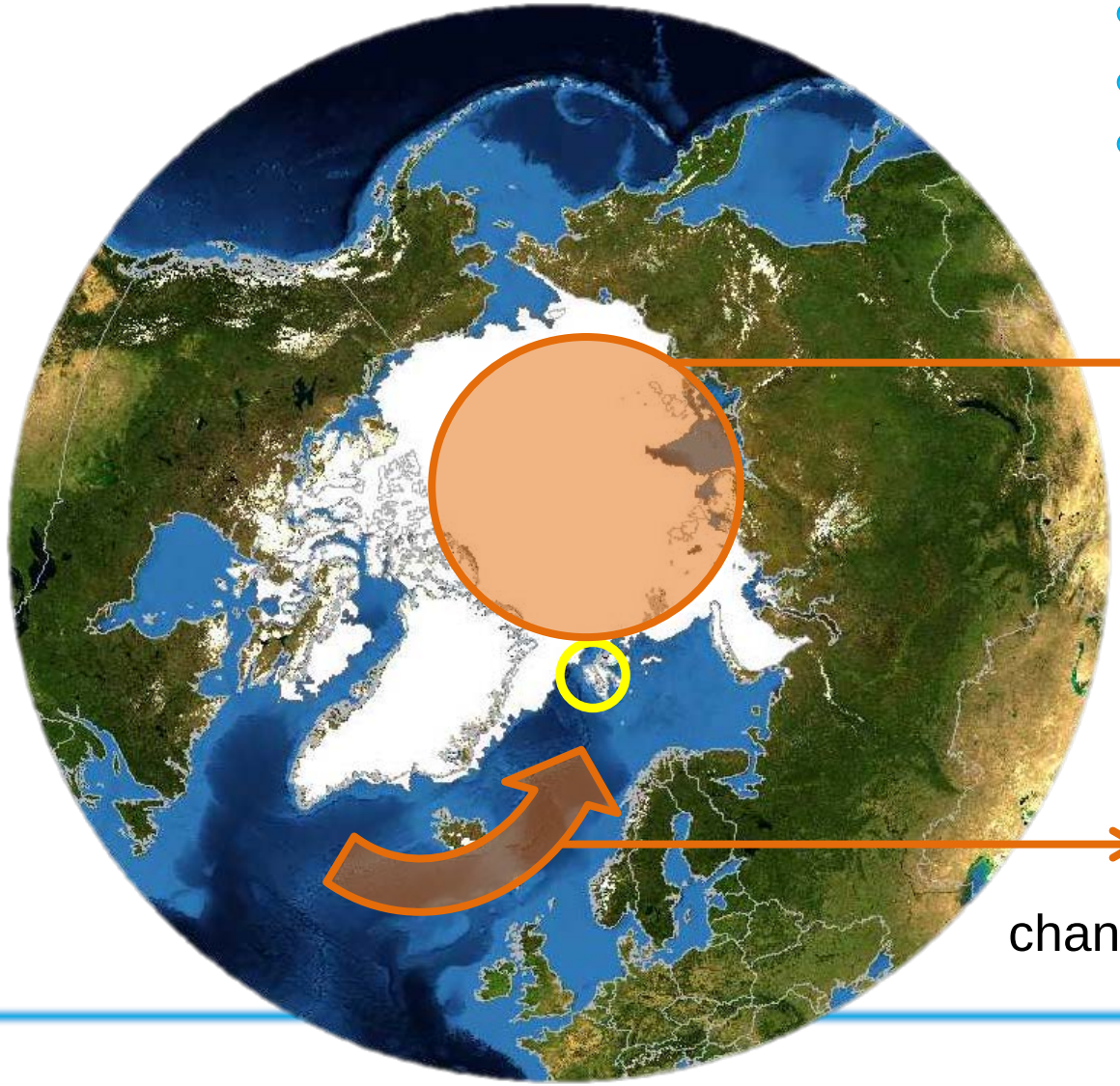



with 100% RH correction

# Increase in Atmospheric Moisture

Ny-Ålesund, winter season: increase in

- surface temperature
- surface LW radiation
- column temperature
- column water vapor



"local effect"

Arctic sea ice retreat

more open water

latent heat exchange

transport

change in atmospheric circulation

# Summary

- Observation of climate change in the Arctic motivates the assembly of a homogenized Ny-Ålesund radiosonde dataset

- RS80-A data are corrected for time lag, contamination, temperature calibration error, sensor icing etc.
  [applying Wang et al., 2002; Miloshevich et al., 2004]

- RS90 data are corrected for time lag and radiation error
  [applying Miloshevich et al., 2004; Kivi et al., 2009]

- RS92 data are GRUAN-processed [applying Dirksen et al., 2014]; 100% relative humidity correction applied

It is planned to publish the homogenized 1993-2014 radiosonde data with 50m height resolution (100m in stratosphere) as doi-referenced supplementary dataset to a scientfic paper.