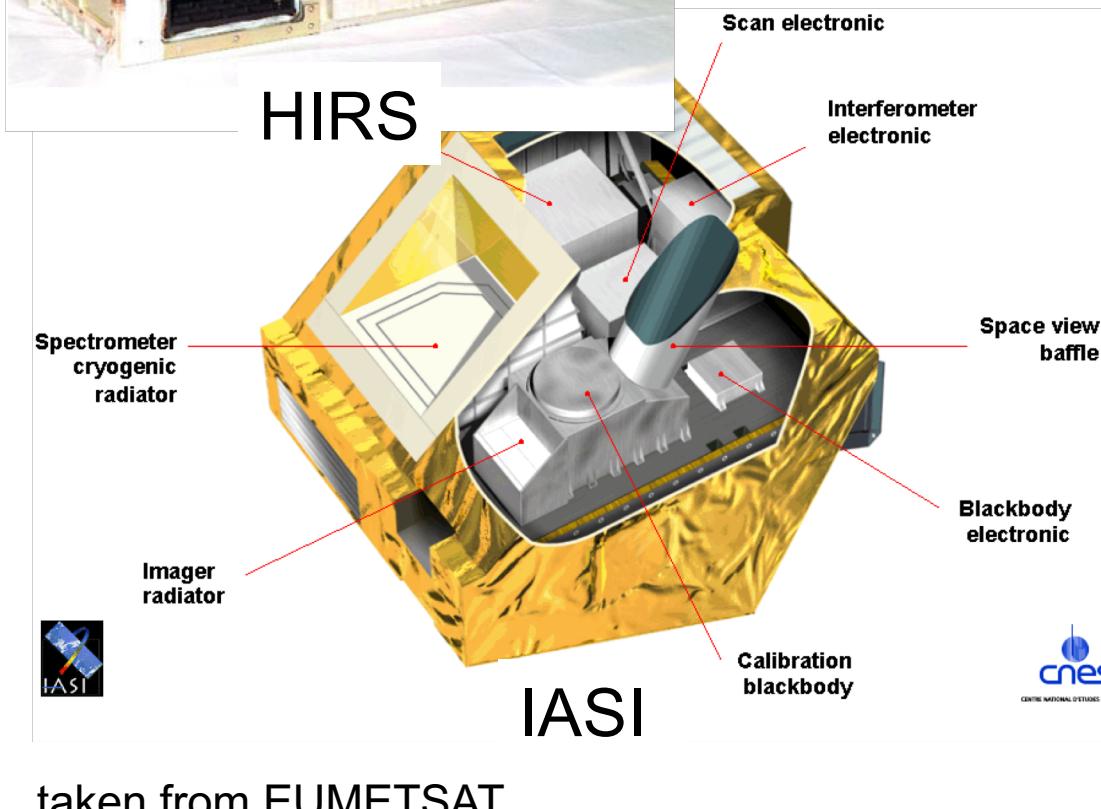
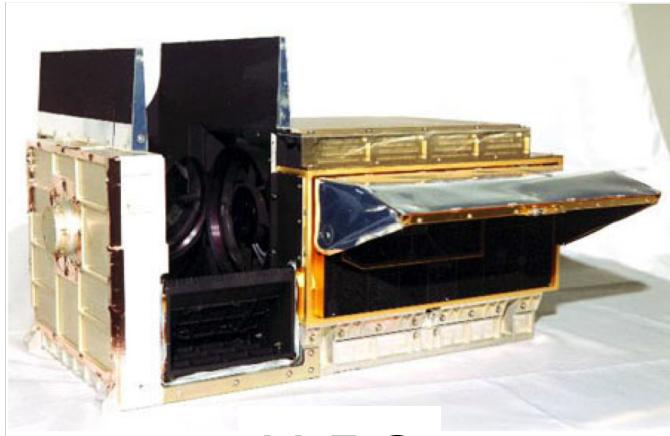


Satellite(sensor) of the day

brought to you by Maximilian Schaper

Optik, Strahlung, Fernerkundung



taken from EUMETSAT

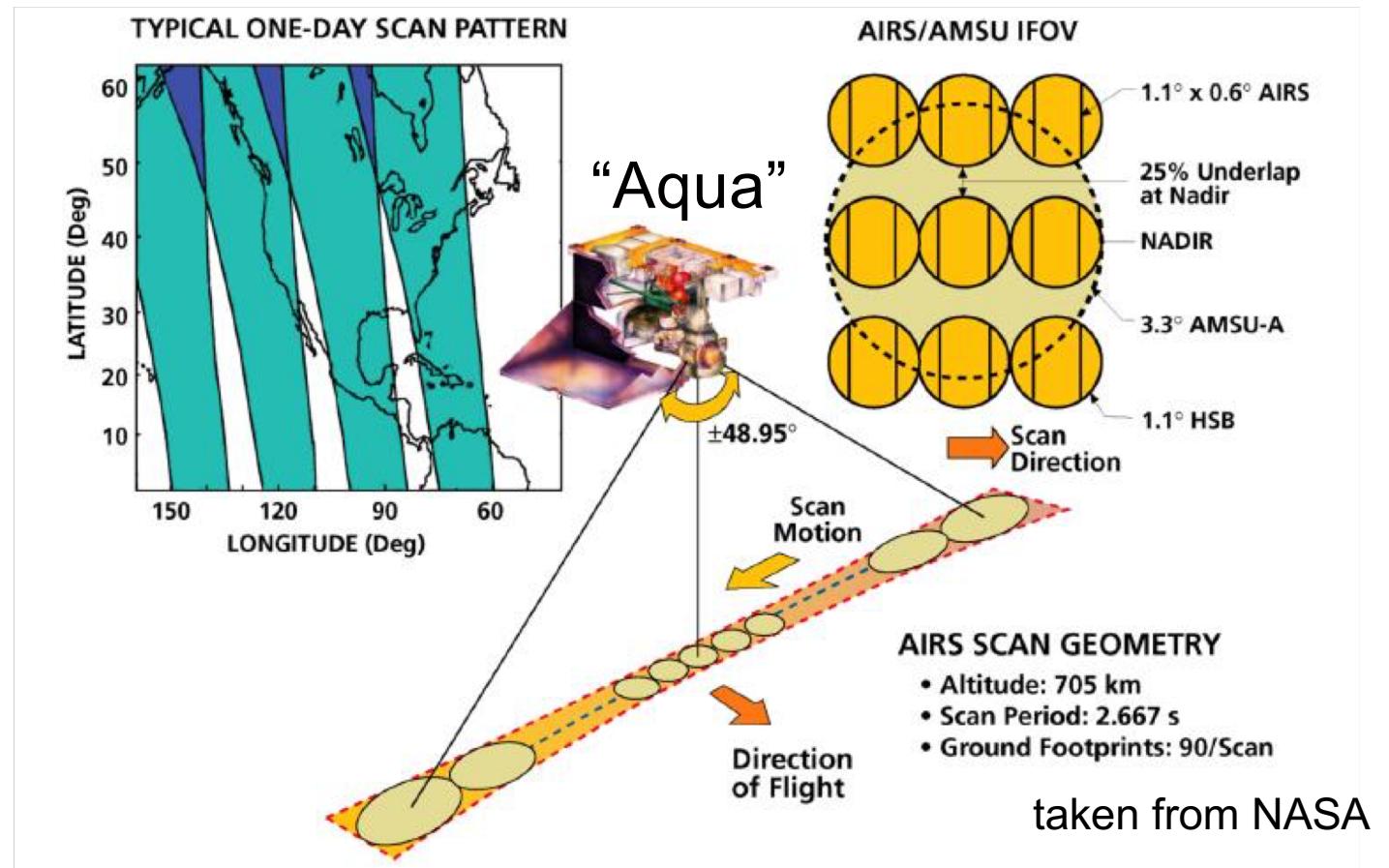
Stefan Bühler
Meteorologisches Institut
Universität Hamburg



AIRS on "Aqua"
taken from NASA

AIRS

Currently only used on “Aqua” (polar orbit)
⇒ nearly global coverage in 1-2 days



Channel:

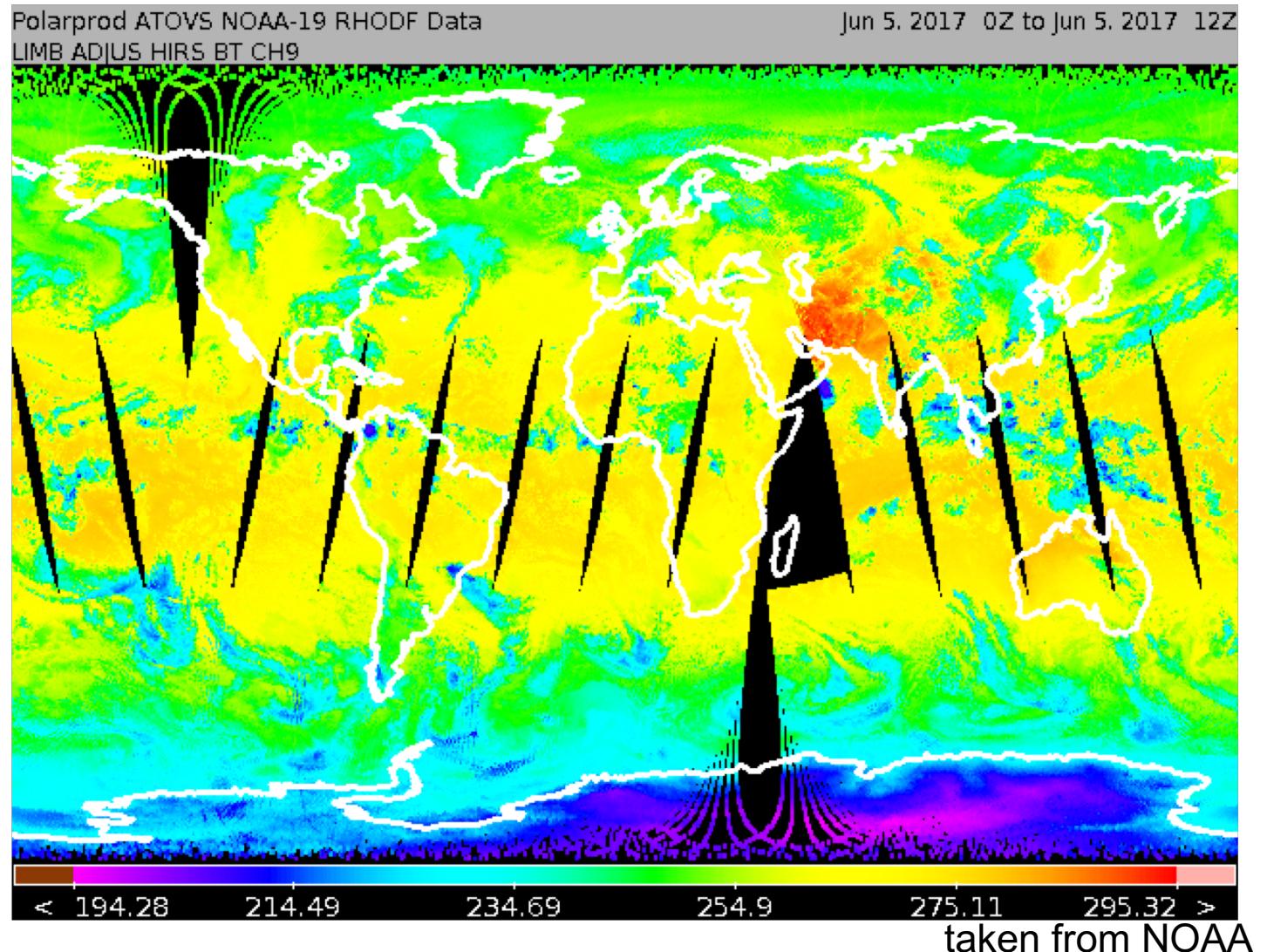
- 2378 IR ($3.7 - 15.4 \mu\text{m}$)
- 4 VIS/NIR ($410 - 940 \text{ nm}$)

swath-size: ~1650 km
resolution (nadir): (IR) 13 km
(VIS) 2.3 km

HIRS

Currently used on:

- NOAA-15 (polar)
 - NOAA-18 (polar)
 - NOAA-19 (polar)
 - METOP-A (polar)
 - METOP-B (polar)
- ⇒ nearly global coverage 4 times a day



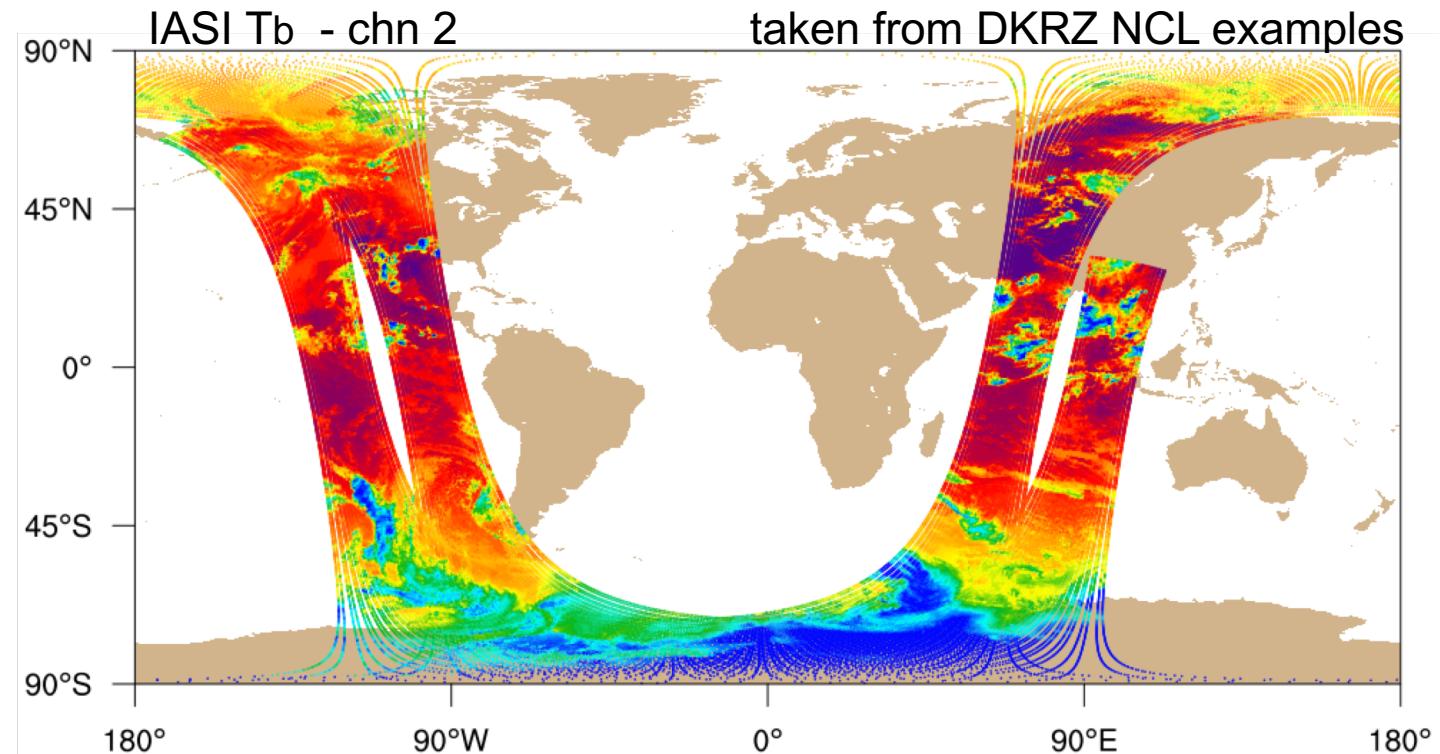
Channel:

- 19 IR ($3.8 - 15 \mu\text{m}$)
- 1 VIS ($580 - 680 \text{ nm}$)

swath-size: ~2160 km
resolution (nadir): 10 km

IASI

Currently used on:
- METOP-A (polar)
- METOP-B (polar)
⇒ nearly global
coverage 2
times a day



Channel:

- 8461 IR (3.6 – 15.5 μm)

swath-size:

~2132 km

resolution (nadir):

12 km

Comparison between AIRS and HIRS

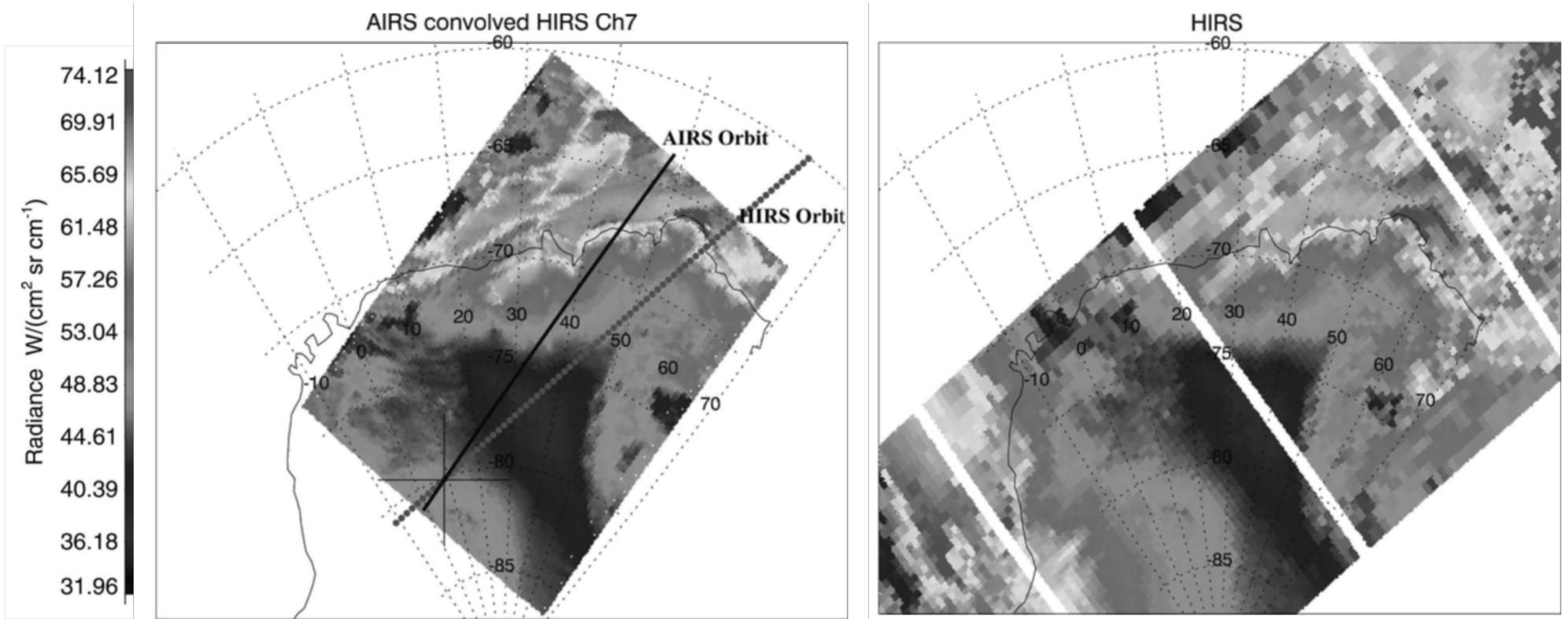


FIG. 1. An example illustrating the HIRS radiance observations and AIRS-convolved HIRS radiances for channel 7 during a SNO event on 13 Nov 2004. *Aqua* and *NOAA-16* met at their orbital intersection ($80^{\circ}05'52''\text{S}$, $8^{\circ}34'04''\text{E}$) at 2116:51 UTC.

Taken from:

Wang, L. 2007: **Assessing NOAA-16 HIRS Radiance Accuracy Using Simultaneous Nadir Overpass Observations from AIRS**, JOURNAL OF ATMOSPHERIC AND OCEANIC TECHNOLOGY, volume 24, p. 1550

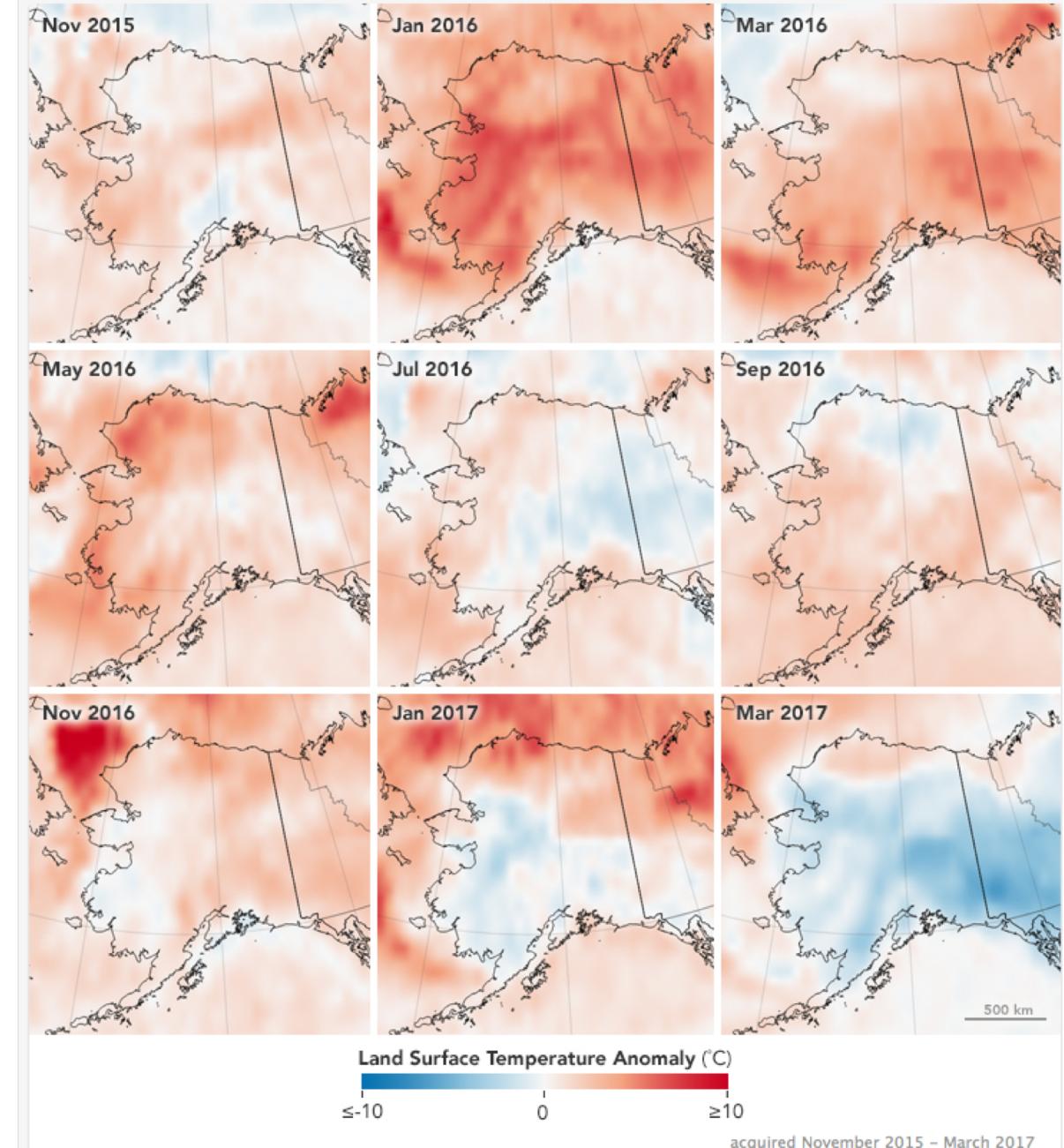
Sensor products

- ▶ Temperature profiles (all sensors)
 - ▶ IASI with 1 km vertical resolution and max. 1 K error
- ▶ Water vapor profiles (all sensors)
 - ▶ IASI with 1-2 km vertical res. and accuracy of 10%
- ▶ Tracer gases
 - ▶ O₃ all sensors
 - Accuracy with IASI 5% and horizontal res. 25 km
 - ▶ CO, CH₄, N₂O,... only IASI and AIRS
 - total column integral IASI accuracy 10% and 100 km horizontal resolution

AIRS high level product

taken from NASA

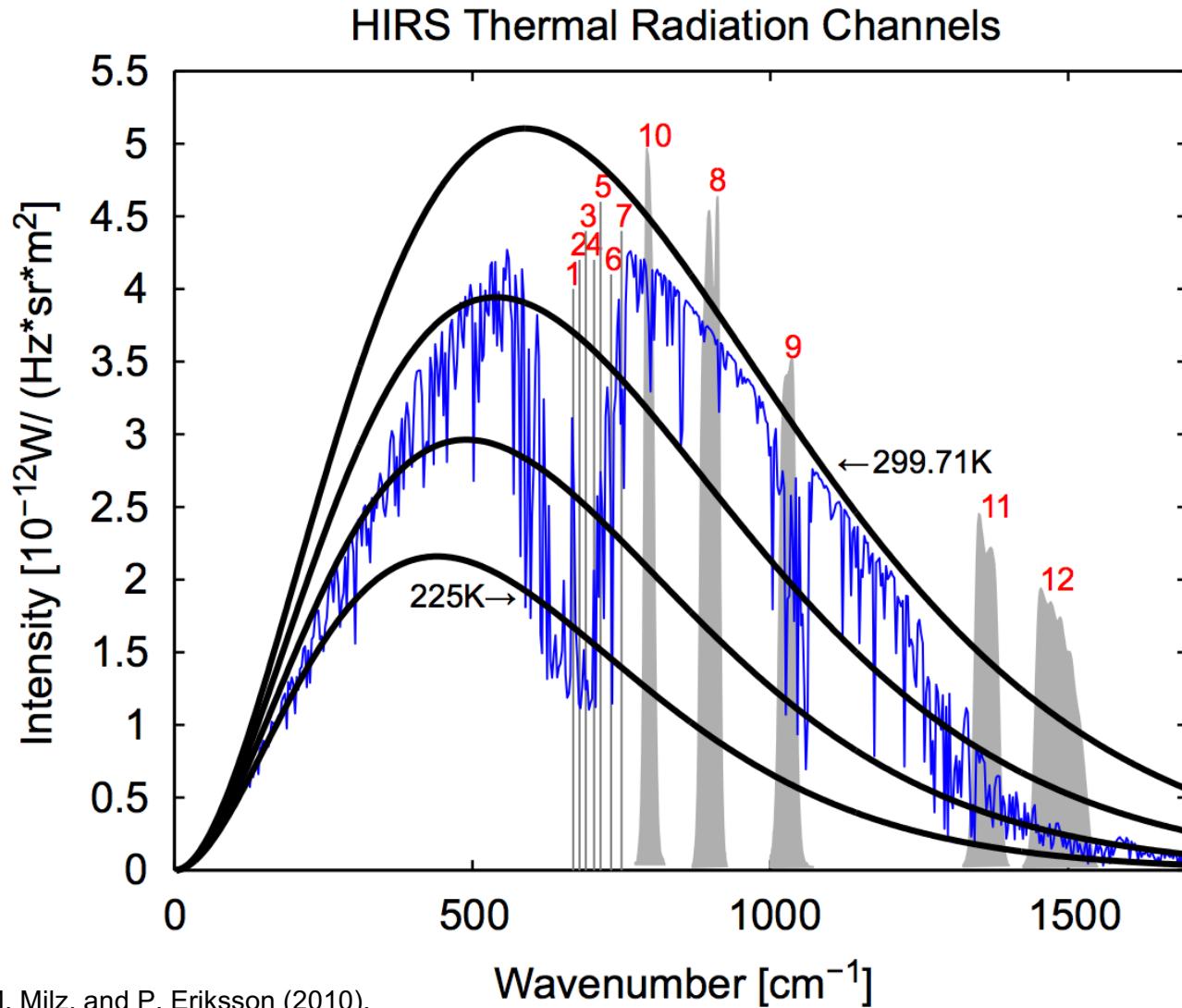
- ▶ land surface temperature (LST)
- ▶ temp. of 1mm skin of the land surface
- ▶ anomaly to 2002-2016 average
- ▶ mainly influenced by direct sunlight



HIRS (High-resolution Infrared Radiation Sounder)

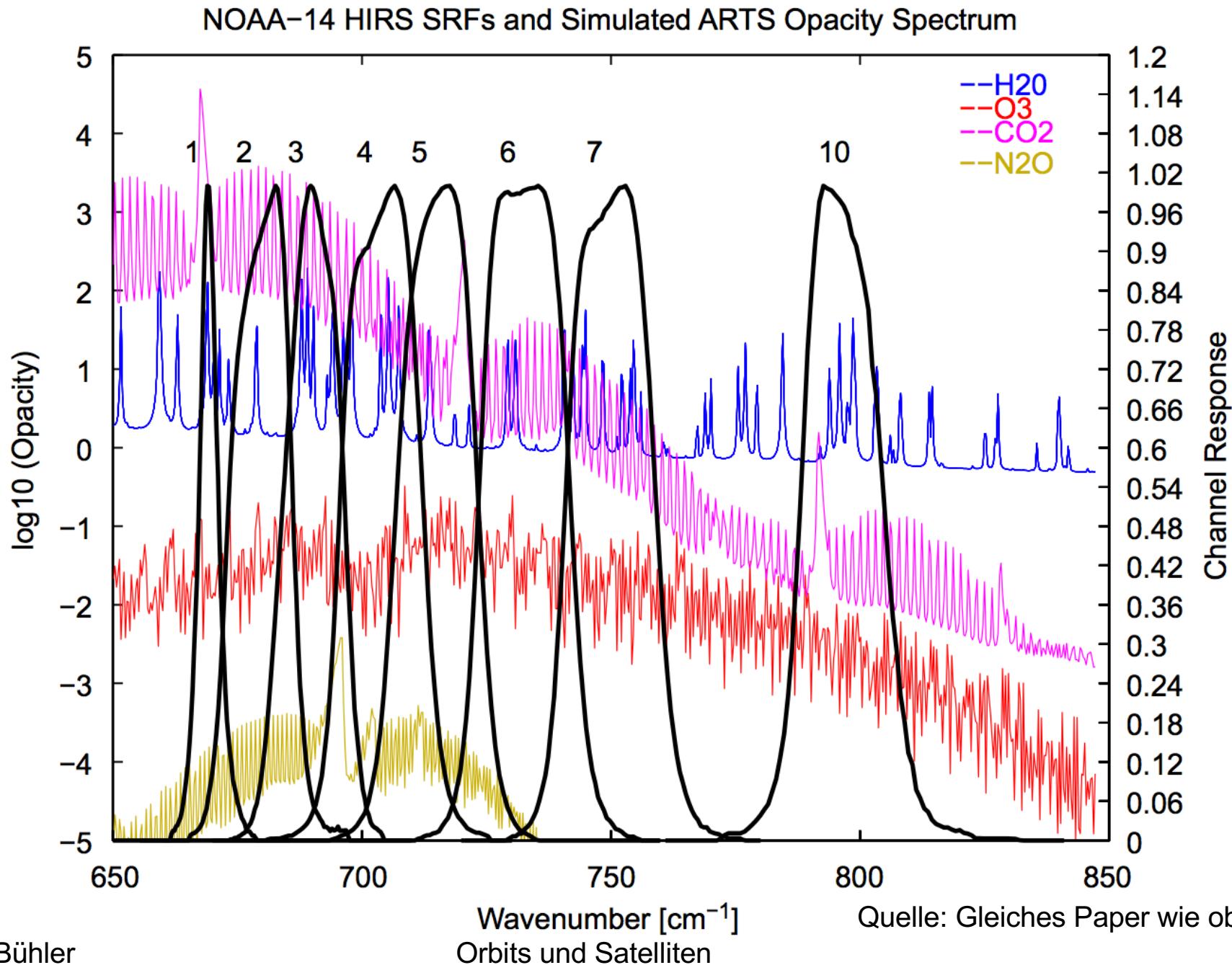
Niedrige
horizontale
und spektrale
Auflösung

(„High“ kann
man
heutzutage
ironisch
deuten.)

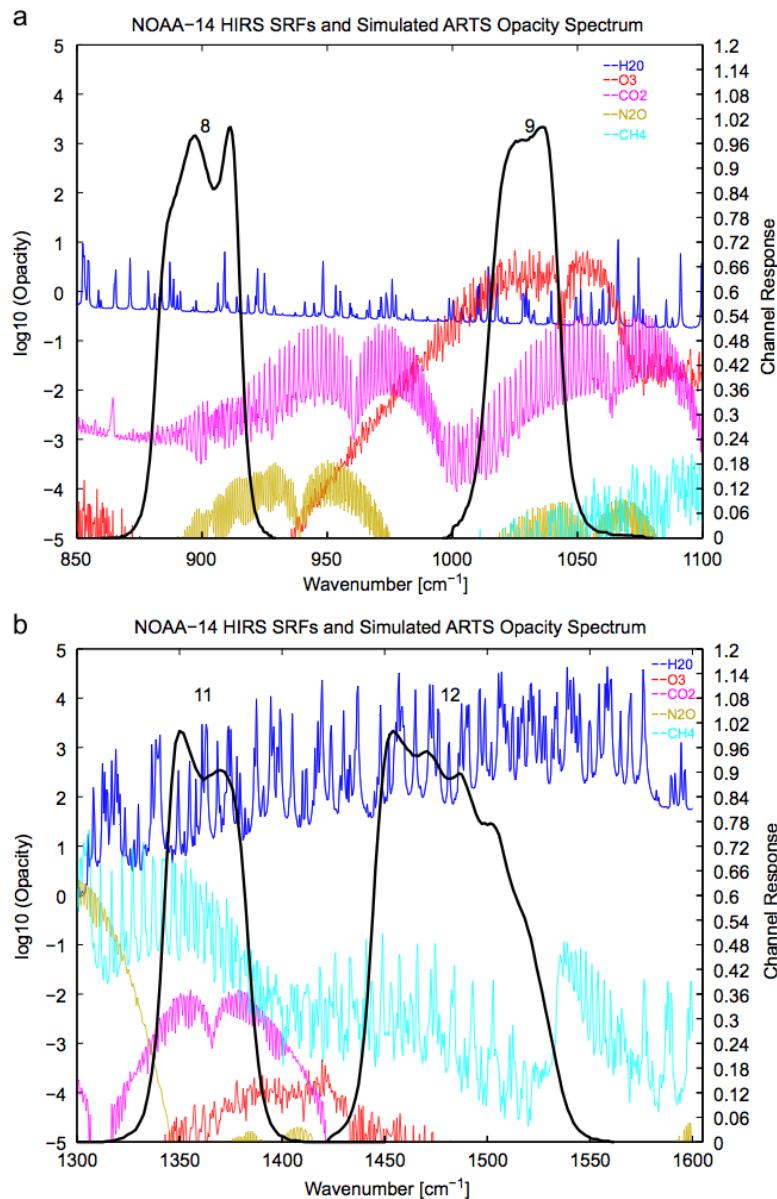


Buehler, S. A., V. O. John, A. Kottayil, M. Milz, and P. Eriksson (2010),
**Efficient Radiative Transfer Simulations for a Broadband Infrared
Radiometer — Combining a Weighted Mean of Representative
Frequencies Approach with Frequency Selection by Simulated
Annealing**, *J. Quant. Spectrosc. Radiat. Transfer*, **111**(4), 602–615,
doi:[10.1016/j.jqsrt.2009.10.018](https://doi.org/10.1016/j.jqsrt.2009.10.018).

HIRS – Was kann es messen?



HIRS – Was kann es messen?



- ▶ Im Infrarot sind die Kanäle breit (relativ zur Breite der Spektrallinien)
- ▶ Direkte Modellierung ist teuer
- ▶ Bei ARTS sind effiziente Parametrisierungen für HIRS (und AVHRR) dabei.

Quelle: Gleches Paper wie oben