GOES-R ABI Weighting Function Lab

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And Others

GOES-R O-CONUS
PG meeting
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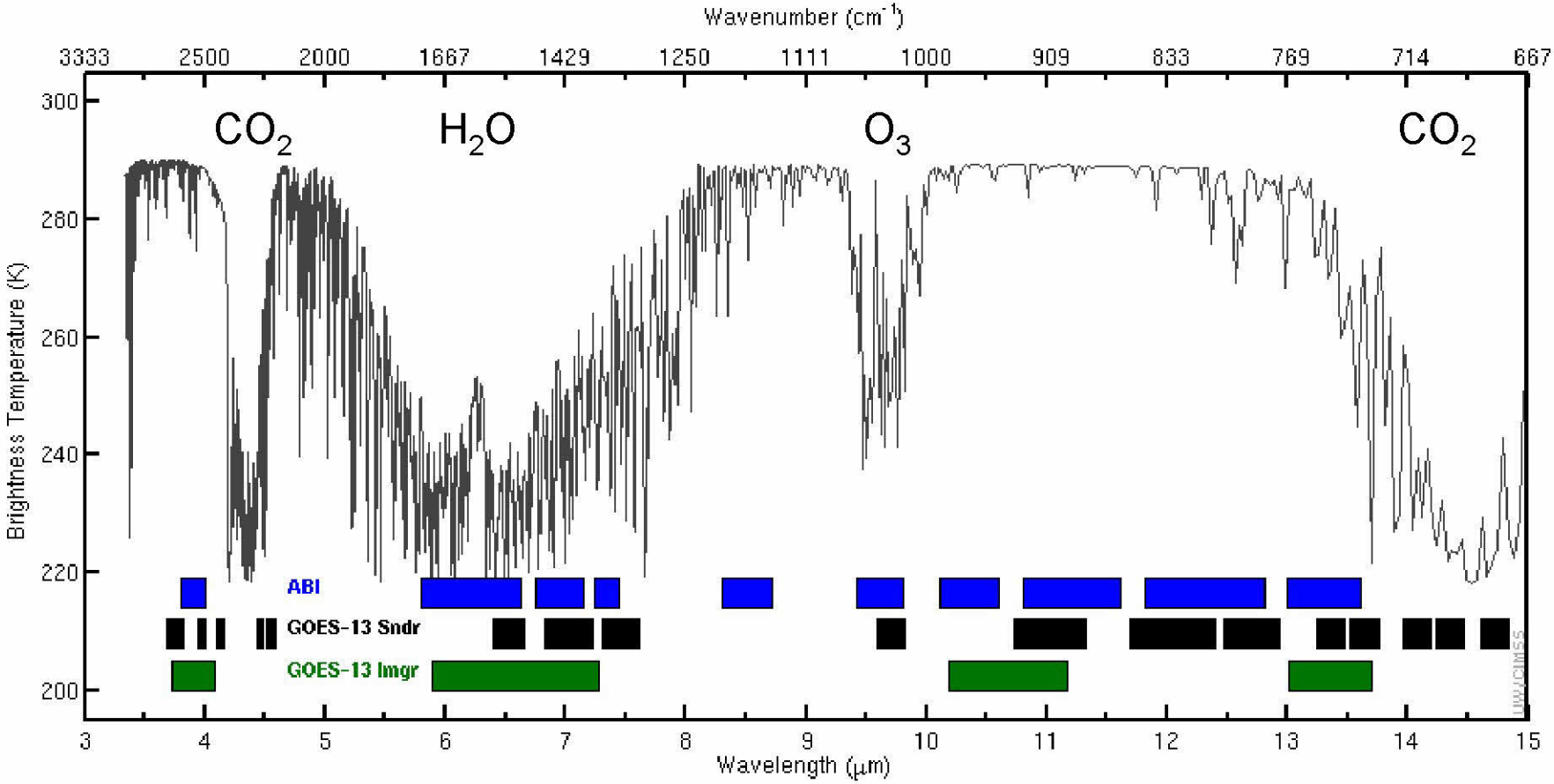
STAR Center for Satellite Applications and Research
formerly ORA — Office of Research and Applications

CIMSS
UW-Madison

ABI IR Bands

7	3.80–4.00	3.90	2	Surface and cloud, fog at night, fire, winds
8	5.77–6.6	6.19	2	High-level atmospheric water vapor, winds, rainfall
9	6.75–7.15	6.95	2	Midlevel atmospheric water vapor, winds, rainfall
10	7.24–7.44	7.34	2	Lower-level water vapor, winds, and SO_2
11	8.3–8.7	8.5	2	Total water for stability, cloud phase, dust, SO_2 rainfall
12	9.42–9.8	9.61	2	Total ozone, turbulence, and winds
13	10.1–10.6	10.35	2	Surface and cloud
14	10.8–11.6	11.2	2	Imagery, SST, clouds, rainfall
15	11.8–12.8	12.3	2	Total water, ash, and SST
16	13.0–13.6	13.3	2	Air temperature, cloud heights and amounts

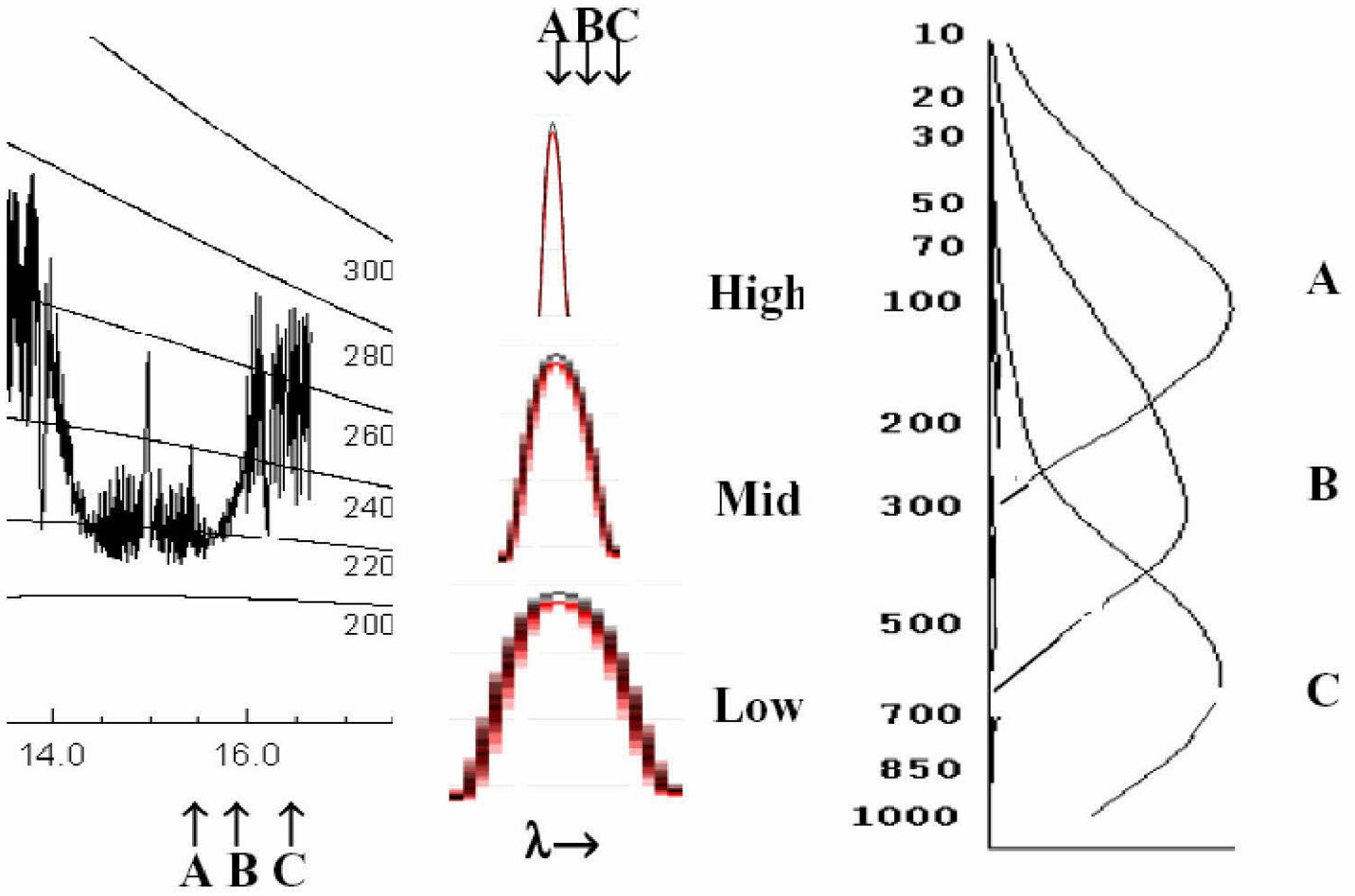
Schmit et al., 2005



ABI, GOES Sounder and GOES Imager spectral locations for the infrared bands, compared to a high-resolution earth emitted spectra.

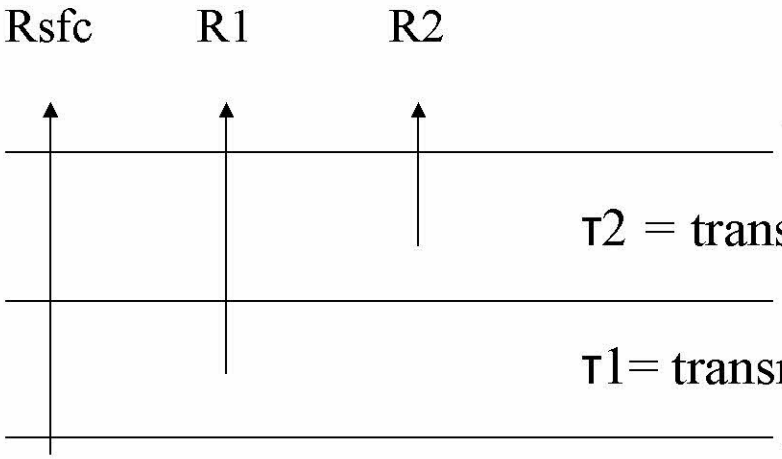
Weighting Functions

- How the transmittance varies with height
- The layer of the atmosphere observed by a given spectral band
- Depends on the band, input temperature, moisture, ozone profiles, skin temperature, surface emissivity, plus the view (zenith) angle.
- Clear-sky fast forward calculations
- A surface emissivity value of 1 is used for each band.

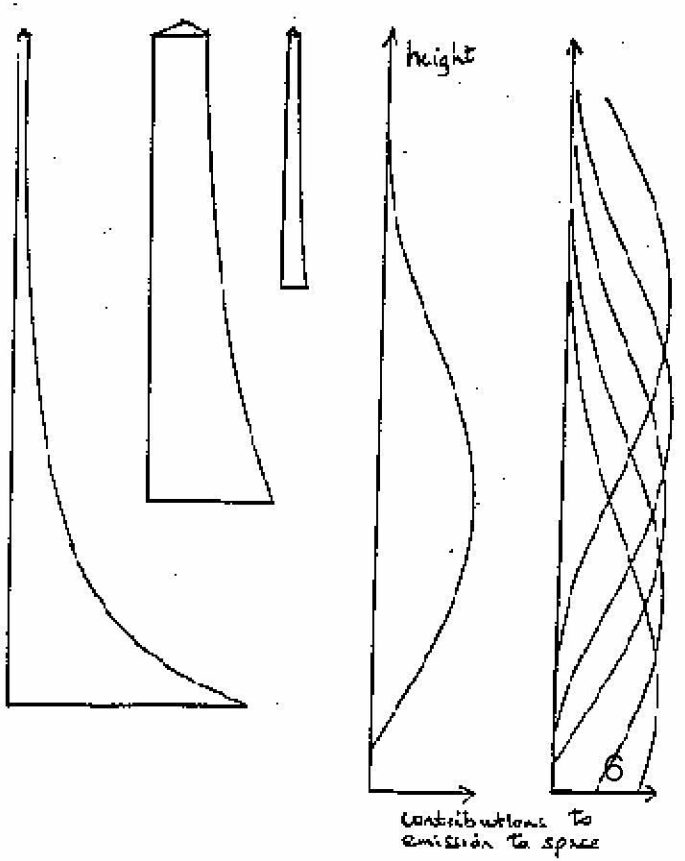


Location of three spectral bands in the CO2 absorption band at 15 um (left), pressure broadening of the absorption line from high to low in the atmosphere with the spectral band locations indicated (center), and vertical distribution of the weighting functions for the three spectral bands (right).

From W. P. Menzel --http://cimss.ssec.wisc.edu/rss/SatelliteNotes/app_metsat_2006_color.pdf

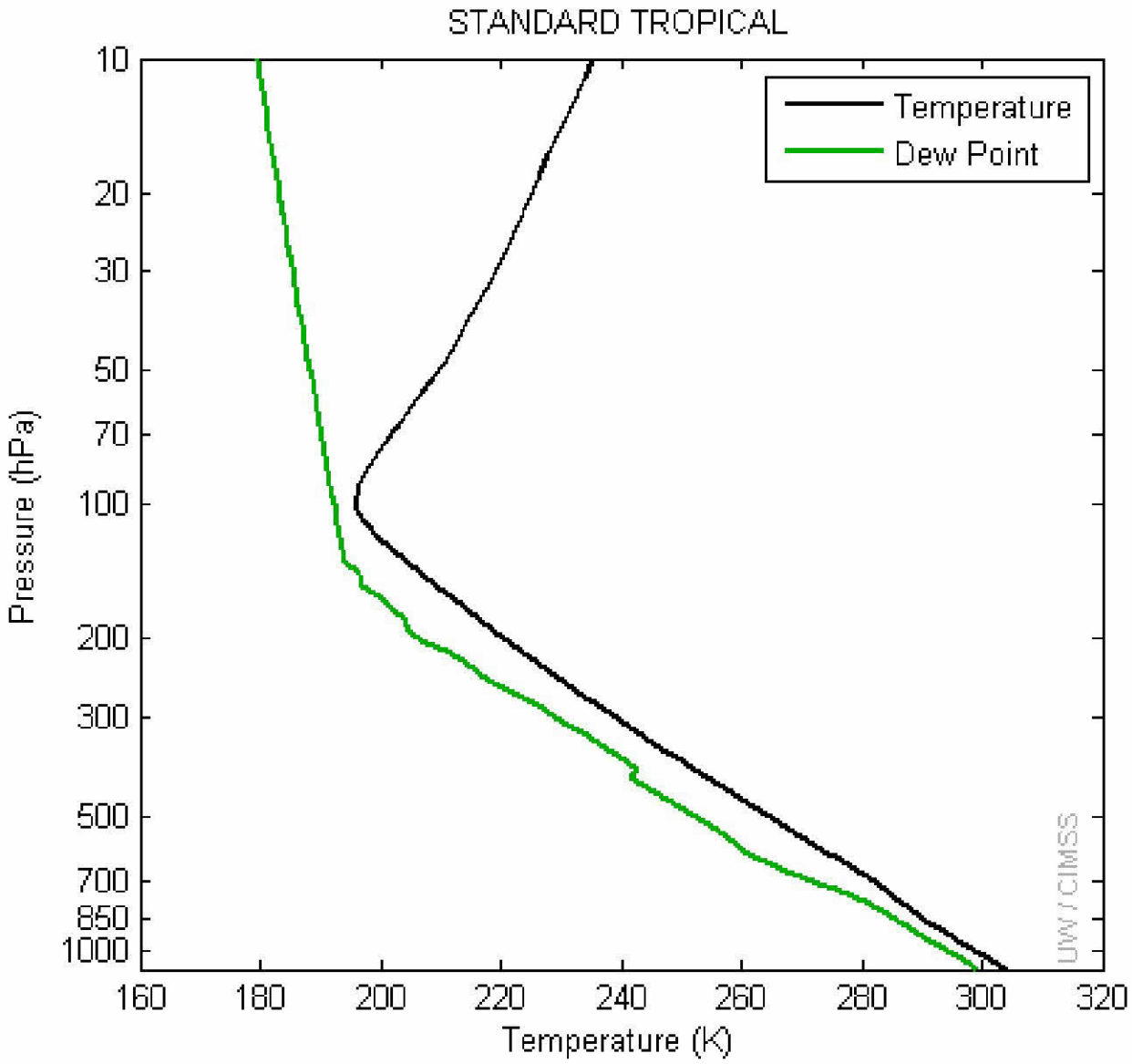


$$R_{obs} = R_{sfc}\,\tau 1\,\tau 2 + R1\,(1-\tau 1)\,\tau 2 + R2\,(1-\tau 2)$$



From W. P. Menzel

Temperature and moisture profiles



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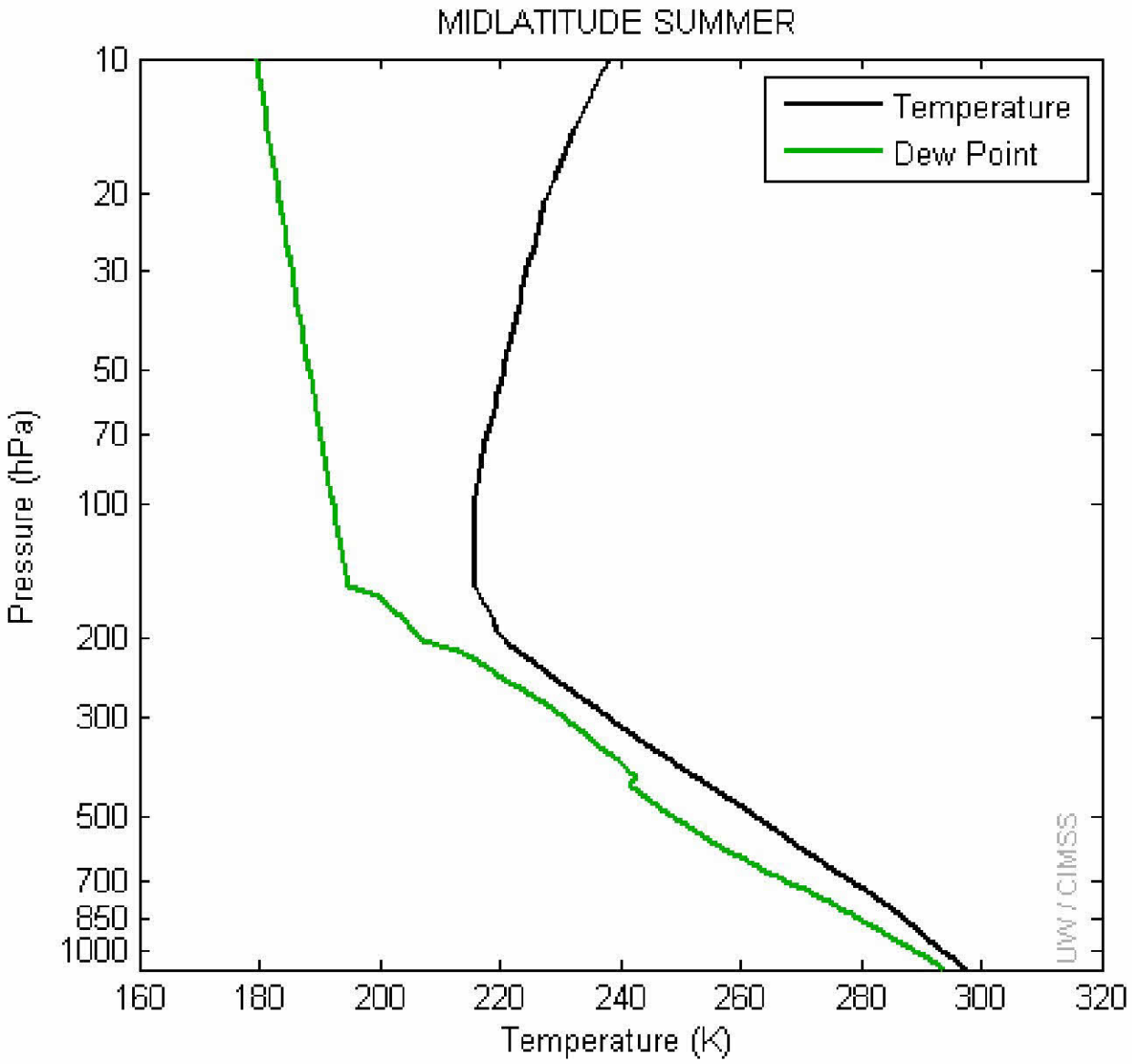
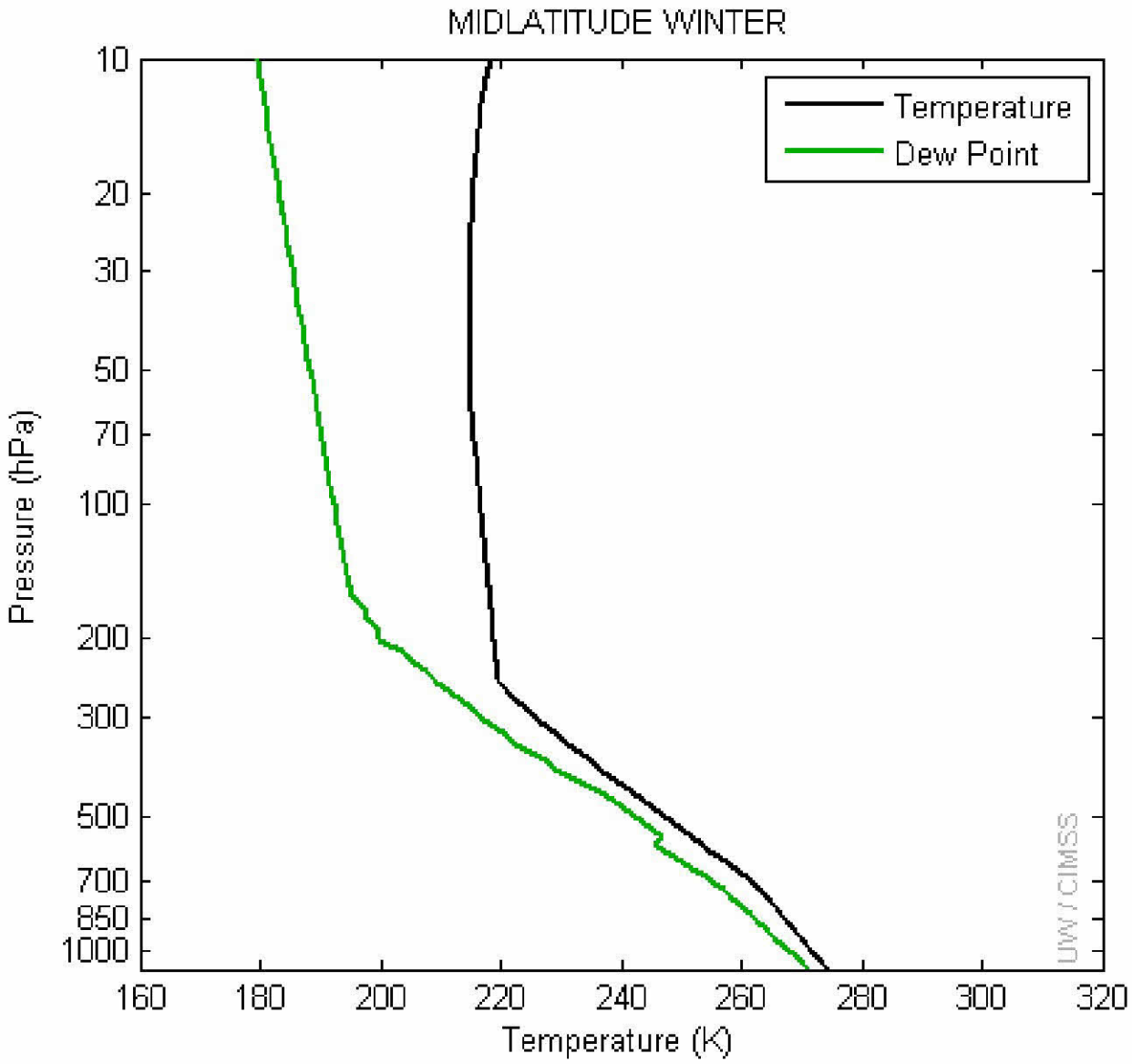


Temperature and moisture profiles



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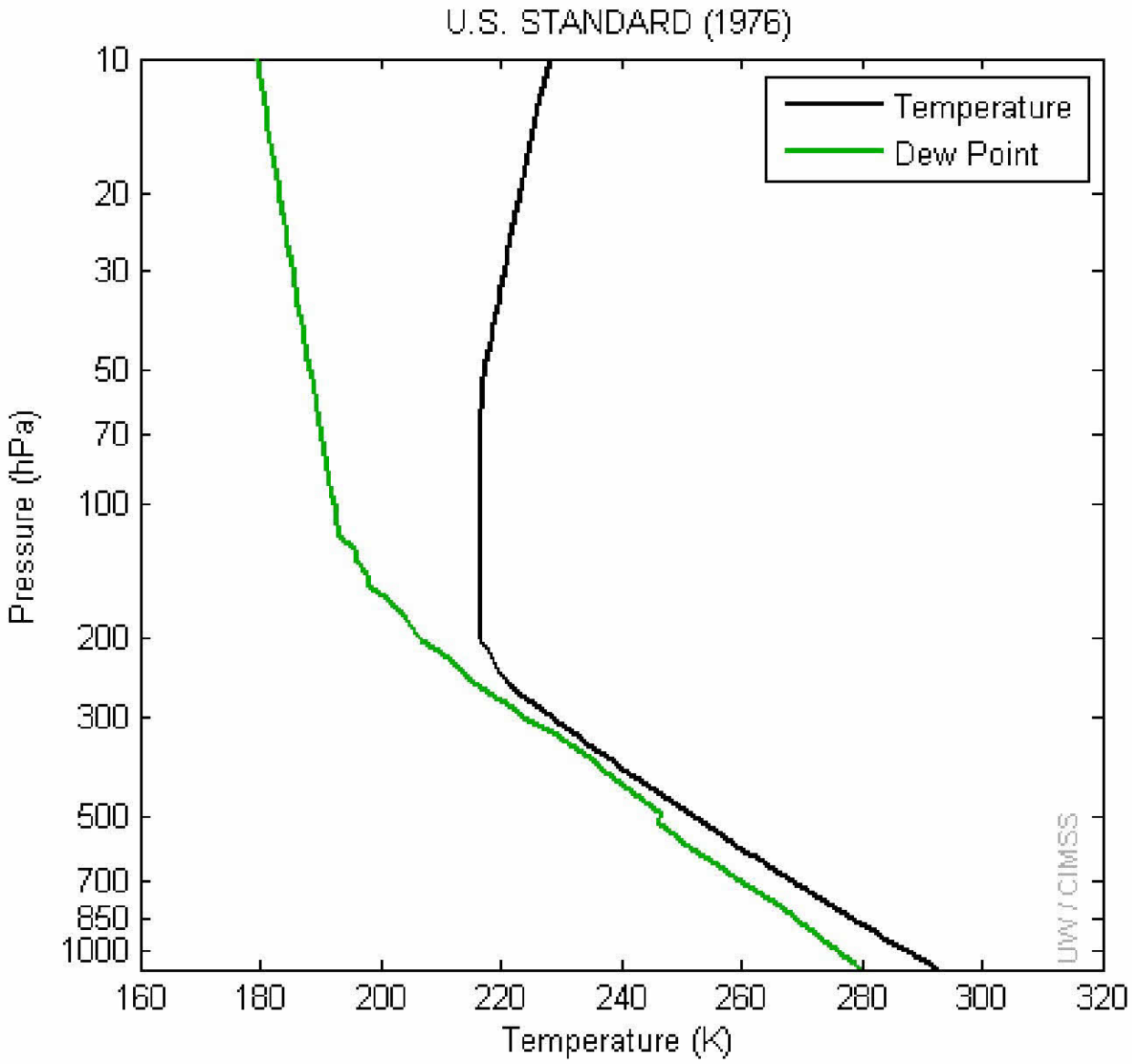
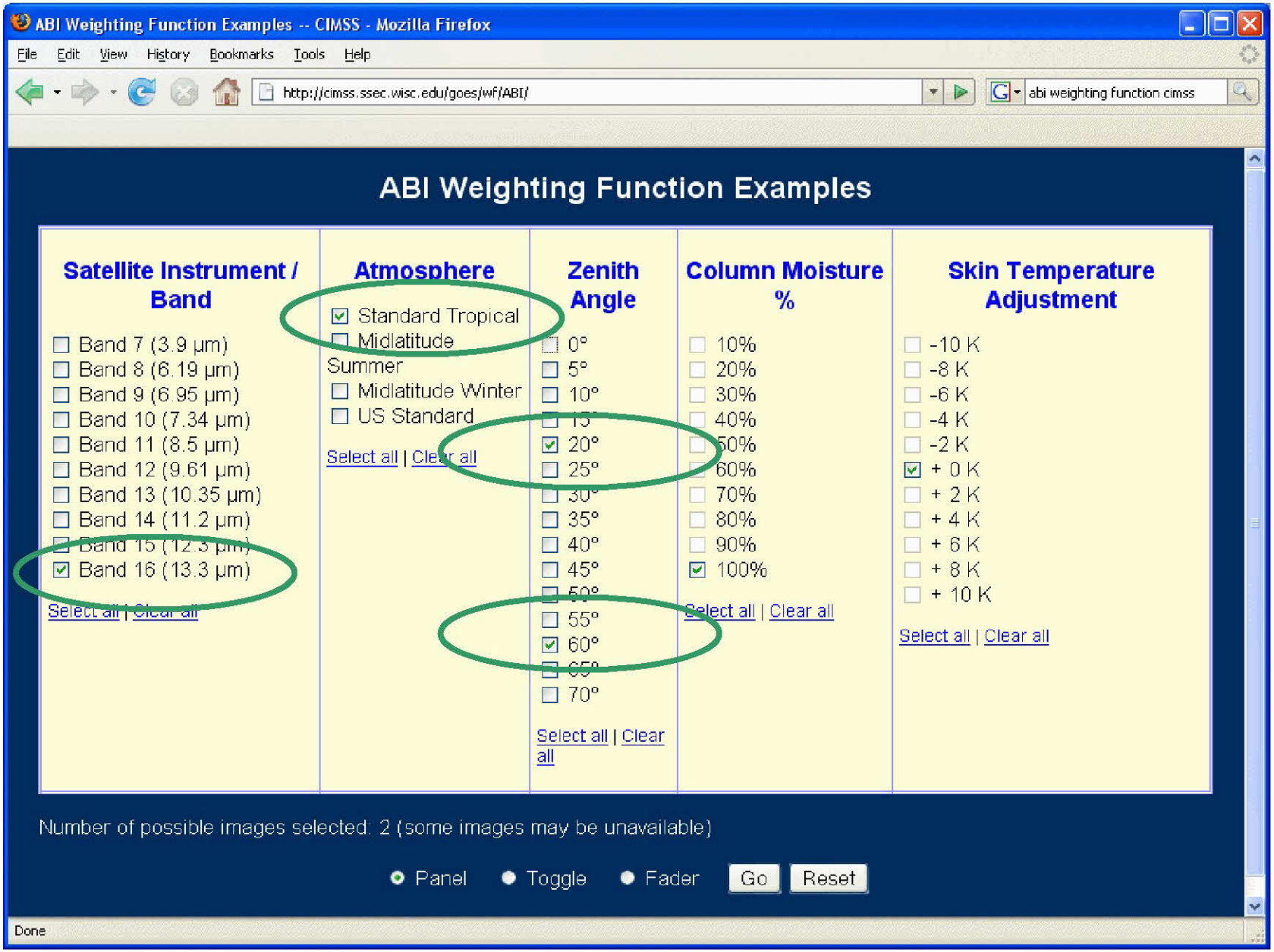
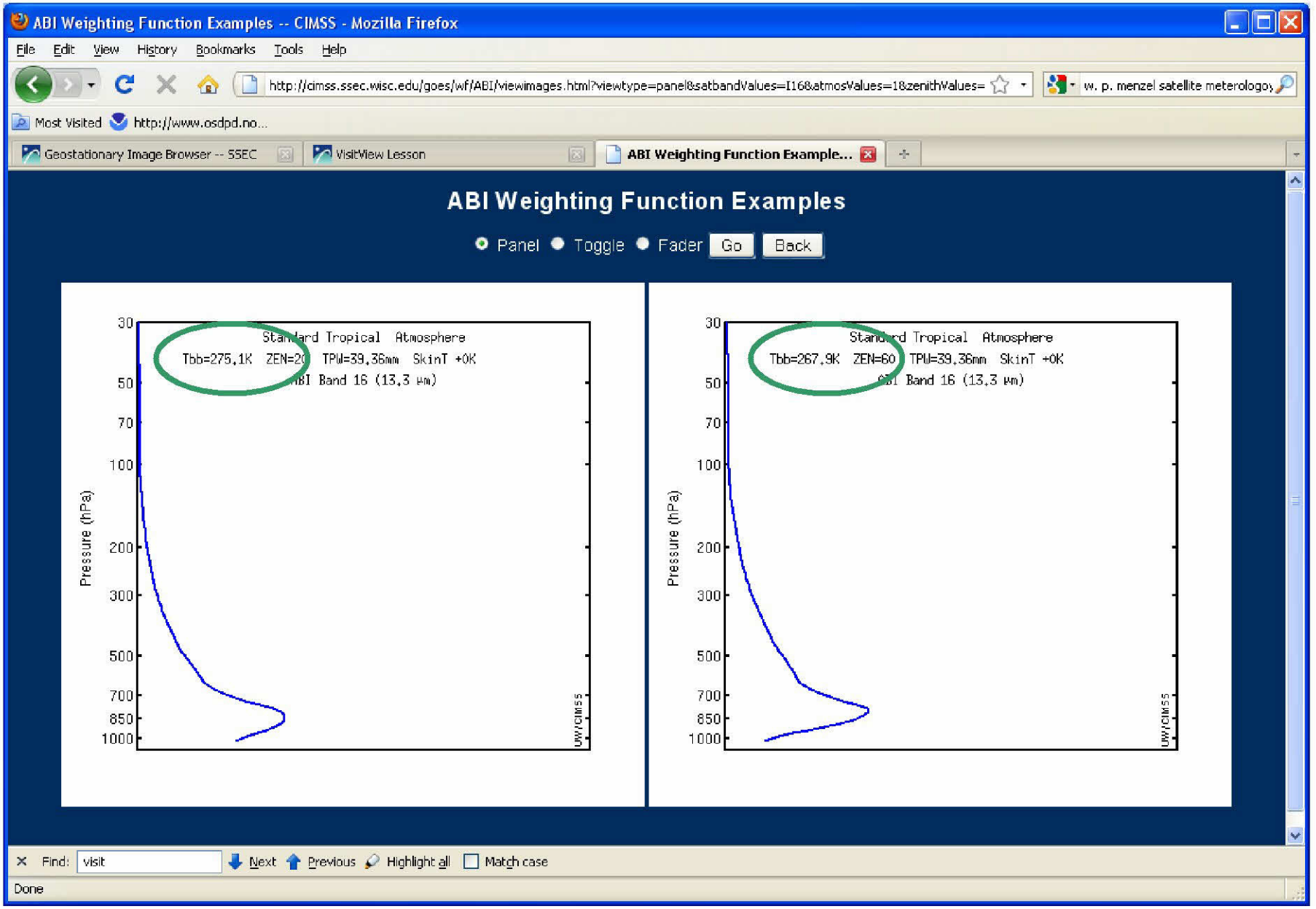


ABI Clear-sky Weighting Functions

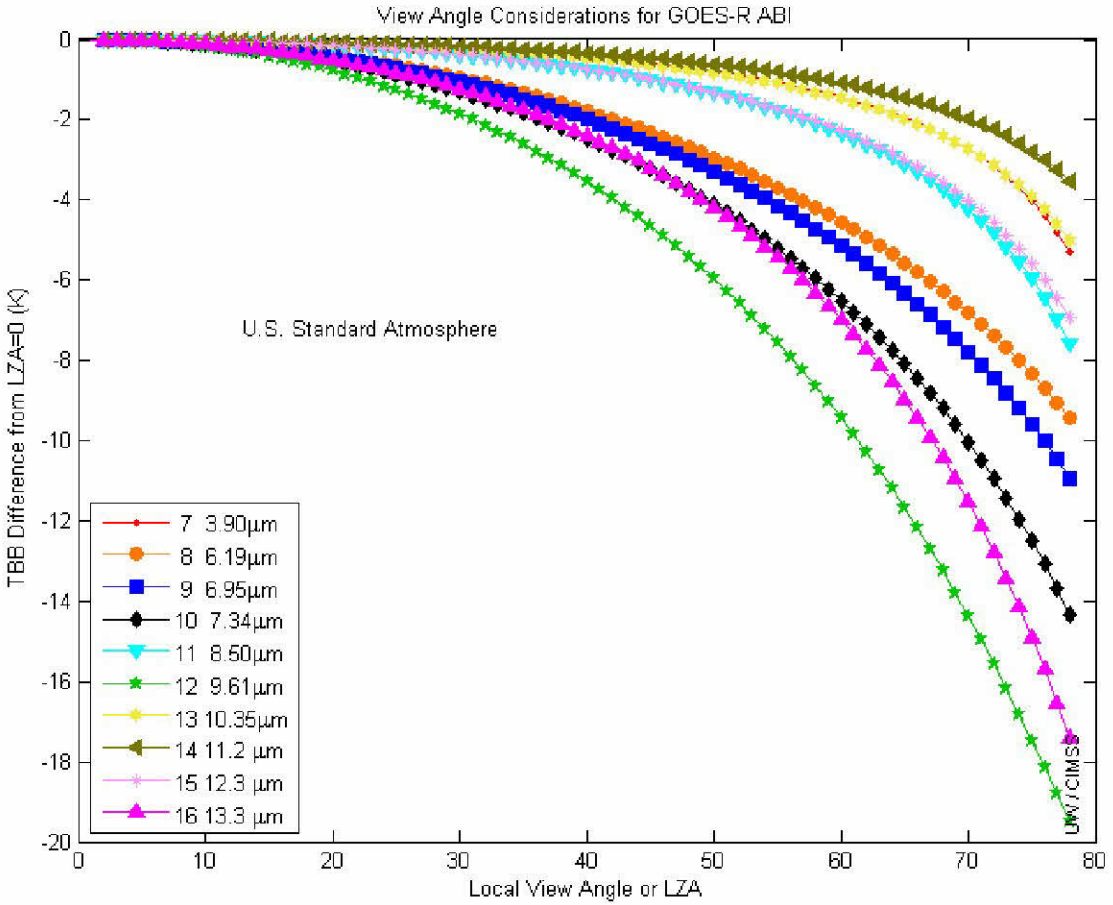


http://cimss.ssec.wisc.edu/goes/wf/ABI/



ABI Weighting Functions

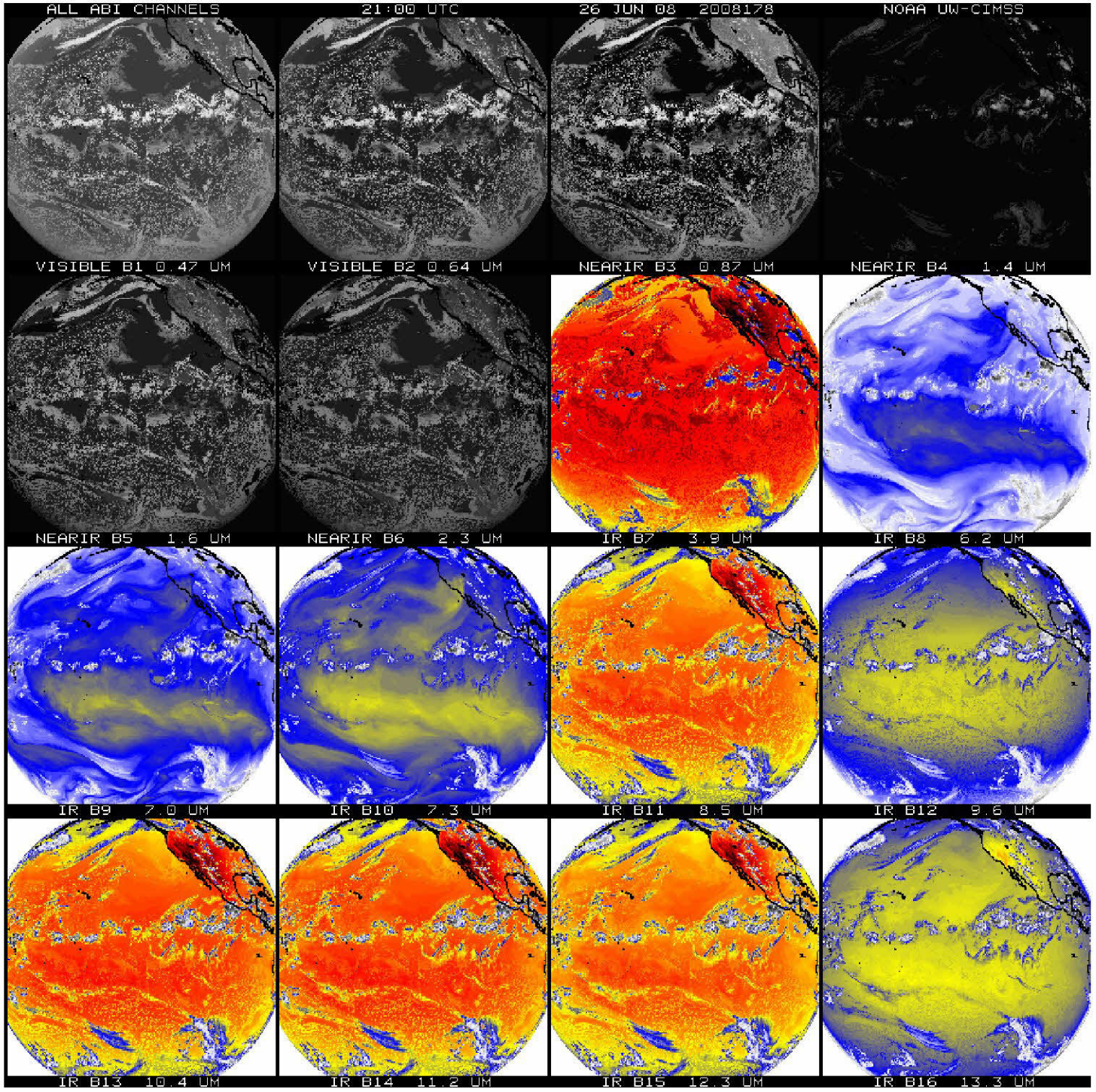
- As a function of….
  - View angle



Software

- **Use Firefox (or other) browser**
  - **http://cimss.ssec.wisc.edu/goes/wf/ABI/**
  - **http://cimss.ssec.wisc.edu/goes/wf/GOES13/**

- **Note: not all combinations have been pre-computed (and hence may be grayed out)**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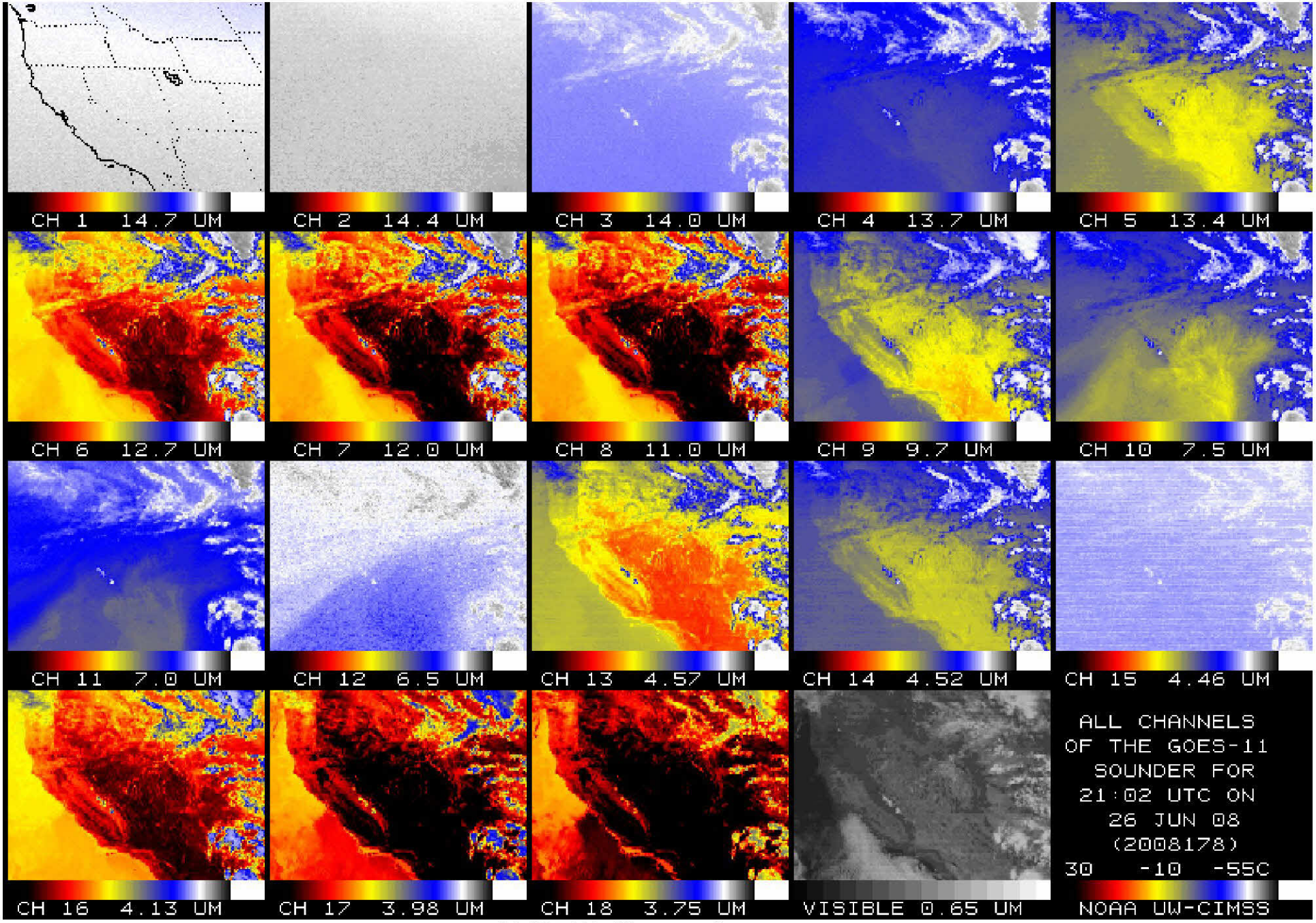
21:00 UTC
26 JUN 08 2008178
NOAA UW-CIMSS
VISIBLE B1 0.47 UM
VISIBLE B2 0.64 UM
NEARIR B3 0.87 UM
NEARIR B4 1.4 UM
NEARIR B5 1.6 UM
NEARIR B6 2.3 UM
IR B7 3.9 UM
IR B8 6.2 UM
IR B9 7.0 UM
IR B10 7.3 UM
IR B11 8.5 UM
IR B12 9.6 UM
IR B13 10.4 UM
IR B14 11.2 UM
IR B15 12.3 UM
IR B16 13.3 UM

ABI



GOES Sounder