

ABI and GOES-13 Weighting Function Lab Questions

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Use these web pages to investigate clear-sky forward model calculations:

<http://cimss.ssec.wisc.edu/goes/wf/ABI/> and <http://cimss.ssec.wisc.edu/goes/wf/GOES13/>

Q1: What is the equivalent clear-sky brightness temperature for the ABI Imager band 14 infrared window (11.2 μm) when looking at nadir for the standard tropical atmosphere?

A1: _____

Q2: For the US standard atmosphere, is the ABI Imager band 15 (e.g., 12.3 μm) colder or warmer than the IR window band 14 (11.2 μm)? By how much? Why?

A2: _____

Q3: For the US standard atmosphere, at a view angle of 45 degrees, how similar are the GOES-13 Imager (band 4 at 10.7 μm) and ABI (band 14 at 11.2 μm) infrared window? [Note, open the GOES-13 page in another tab of your browser.] How about for the Standard Tropical atmosphere?

A3: _____

Q4: For the US standard atmosphere (at nadir), which ABI IR band is the coldest? Why?

A4: _____

Q5: How many ABI IR bands are there? On the legacy GOES imager?

A5: _____

Q6: If you change the skin temperature by 10K when nadir-viewing, how much does the ABI “water vapor” band 8 (6.19 μm) change? Why?

A6: _____

Q7: For the mid-latitude summer atmosphere (when nadir-viewing), which ABI band has the largest sensitivity to an increase of 10K for the skin temperature? (Note that all the surface emissivities are assumed to be 1.)

A7: _____

Q8: Which ABI “water vapor” band, 8 (6.19 μm), 9 (6.95 μm), or 10 (7.34 μm), is coldest due to H₂O absorption? Infer this from the weighting functions.

A8: _____

Q9: When the zenith angle is increased, do the ABI bands tend to cool? Why?

A9: _____

Q10: When decreasing the amount of moisture in the (standard tropical) atmosphere for a nadir view, would you expect the IR window (band 14 at 11.2 μm) to cool or warm? By approximately how much?

A10: _____

Q11: Why does one band have a greater temperature range than another? (For example, compare the 11.2 μm IR window to a water vapor band such as the 6.19 μm).

A11: _____

Q12: Is the ozone band (12 at 9.61 μm) warmer or colder than the IR window (band 14 at 11.2 μm)? Why?

A12: _____

Q13: How might the brightness temperatures change for the IR window in the presence of thin or thick clouds compared to these clear-sky calculations?

A13: _____

Q14: In general, how much warmer is the ABI band 8 (6.19 μm) than the GOES-13 Imager ‘water vapor’ band 3 (6.5 μm)?

A14: _____

Q15: To the first approximation, how much of a difference is there between the ABI band 13 (10.35 μm) than the GOES-13 Imager IR window band 4 (10.7 μm)?

A15: _____

Q16: How many water vapor bands in the water vapor absorption region are on the ABI and GOES Sounder, respectively? How many on the legacy Imager?

A16: _____

Q17: Given the legacy imager, sounder and ABI all have a band centered near 13.3 or 13.4 μm , how similar are they? Explain any differences.

A17: _____

Q18: Which ABI longwave window is most similar to the GOES Imager band 4 (10.7 μm)?

A18: _____

Q19: In general, which ABI band has the warmest brightness temperature?

A19: _____

Q20: In general, what might three “mid-level” water vapor band images add, over having just one band?

A20: _____