

Page 3, Lines 27-28: I would recommend changing "in a warmer world there will be an increase in water vapour due to its positive feedback" to something like "Because the relative humidity is expected to remain constant, the water vapor mixing ratio will increase in a warmer world."

We agree with the suggested change, page 3, lines 26-27

Page 8, Line 28: Citing Loeb et al. (2003) for the ADMs is fine, but I would recommend also citing Loeb et al. (2005), since it describes the ADMs used for the CERES instruments on Terra and Aqua.

We have added this reference and Clerbaux et al. (2003), page 8, line 28

Page 11, Lines 6-7: CERES footprints are not generally referred to as pixels in order to differentiate CERES footprints from MODIS pixels. In any case, the footprints are not circular (even at nadir), closer to an extended hexagon (see Fig. 3 of Smith 1994).

We have amended the text and removed the words pixel and circular, page 12, lines 15-16

Page 12, Lines 1-2: Although flux and radiance are proportional for a given scene, anisotropy varies significantly between different scene types. This is especially true for nadir-viewing scenes such as those in this study.

Agreed, the quantity we are comparing is the broadband LW radiance from CERES, for which uncertainty estimates are not provided, only for the flux quantity which includes errors from the radiance-to-flux conversion. Hence are uncertainty estimate has an upper bound of 1.5% (the flux uncertainty) and will likely be below this. We have rewritten the text to reflect this, page 13, lines 3-12

Page 13, Lines 20-22: It is good to point out that the radiosonde data used for the correlation analysis is based on tropical and mid-latitude soundings, but the sentence (as written) seems to imply that if the algorithm works for polar latitudes (where it isn't "supposed" to work), it will surely work for middle and low latitudes as well. Please rewrite.

We have removed this sentence entirely as it is confusing. We have given more information on the locations of the radiosondes in the methodology (page 10, line 26 to page 11, line 15) which are between 30S to 60N. The algorithm is robust at different latitudes.

Various places in Section 3: Differences between IASI and CERES are expressed as CERES minus IASI. Since CERES (with its measurement of

broadband LW radiance) is treated as the truth in this comparison, I would suggest changing to IASI minus CERES.

We agree that CERES is taken to be more truthful in this context, however, for the sake of retaining a positive quantity for the duration of the study, we prefer to express it as stated.

Section 4.2: The increased proportion of Far-IR energy for cloudy scenes is interesting. Much of this is due to the shift to a lower emitting temperatures (and hence, lower peak wavenumbers according to Planck's Law) for cloudy scenes, as noted earlier in the manuscript. Is there a way to quantify the departures from the expected shift with temperature?

The reason that the proportion of FIR energy increases relative to that in the clear sky case is because that the cloud effect (reduction of thermal emission to space) is stronger in the other part of the spectrum, especially in the atmospheric window. This distribution of total LW energy to a certain band, e.g., FIR, depends on the given atmospheric composition and the knowledge of molecular spectroscopic properties and the cloud optical properties, all as functions of the frequency. Quantification of this is possible, but assumptions of cloud optical properties will play a major role. It can be expected that it will be different for the near opaque water clouds and for the more transparent cirrus clouds. The algorithm provided here will enable us to use IASI observations for such evaluation and quantification.

Page 20, Lines 6-10: As noted earlier, the isotropic assumption is not particularly good, especially at nadir. However, it could be noted that the error estimate resulting from this assumption is likely high, since the anisotropic factor at nadir is greater than 1.0 for almost all scene types (the coldest nighttime scenes in Antarctica being an exception). Please be more specific with the statement that these flux differences are "comparable in magnitude to those presented in previous studies.."

We agree that the equivalence between flux and radiance is not straightforward, and have removed this sentence from the text. The comparison with radiance is the most direct comparison. We have added a paragraph in the introduction that clarifies the distinction, page 8, line 20 to page 9, line 9.

Technical Comments Page 4, Lines 12-13: Not sure what is meant by "clear to cloudy instantaneous conditions."

The instantaneous refers to a single measurement, rather than globally or time averaged. It has been removed from the text

Page 6, Line 3: With Pluto's demotion to dwarf planet status, you can remove the "and Pluto" from the text.

Page 7, Line 16: Should be "principal component analysis".

Figure 9: The "Locations" in the figure panels give two latitudes. I assume that the number followed by S should be followed by an E instead?

Page 17 and Figure 10: "Peak wavelength" is given in terms of wavenumber.

Page 19, Line 7: Change "Interesting" to "Interestingly".

These amendments have all been made and we thank the reviewer for alerting us to these errors.