Anonymous Referee #1

The authors thank the reviewer for the comments which have improved the paper. The reviewer's comments are shown in red and the authors response shown in black.

However, this paper's V3

data do not show very significant improvements from V2 as displayed by Figs1-2 and

Table 4.

We noted that another reviewer suggested to include difference plots for Figures 1 and 2. These have been included and do indeed show more clearly that there has been a significant change between versions, particularly the microphysical cloud properties.

New figure above, old figure below

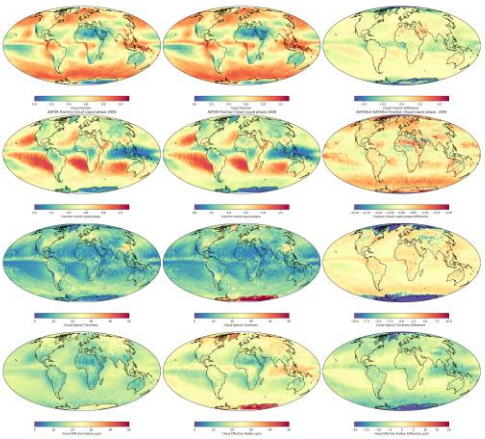


Figure 1. Examples from 2008 of Level-3C (yearly average) Cloud_cci AATSR V3 (left), V2 (middle) and difference of V3-V2 (right). From the top: cloud fraction (CFC), liquid cloud faction (CPH), cloud optical thickness (COT) and cloud effective radius (CER),

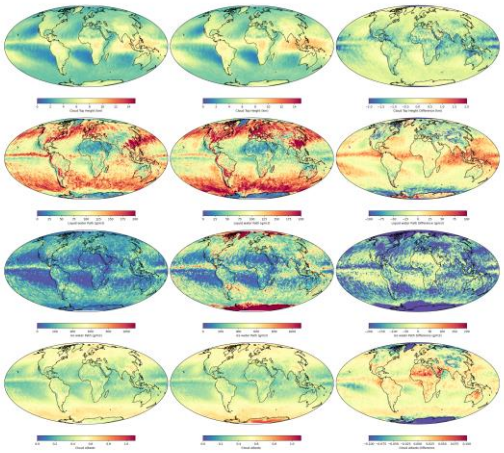


Figure 2. As Fig. 1 but for cloud top height (CTH), liquid water path (LWP), ice water path (IWP) and cloud albedo (CLA).

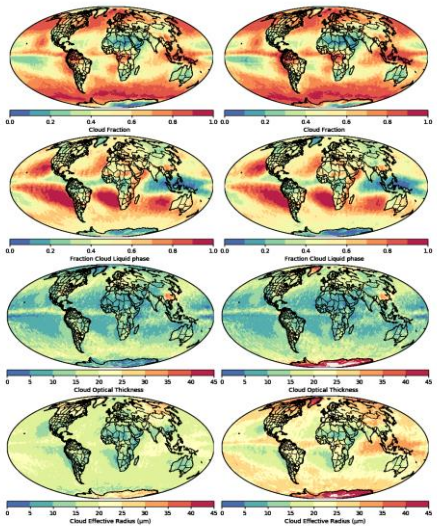


Figure 1. Examples from 2008 of Level-3C (yearly average) Cloud_cci AATSR V3 (left) and V2 (right). From the top: cloud fraction (CFC), liquid cloud faction (CPH), cloud optical thickness (COT) and cloud effective radius (CER),

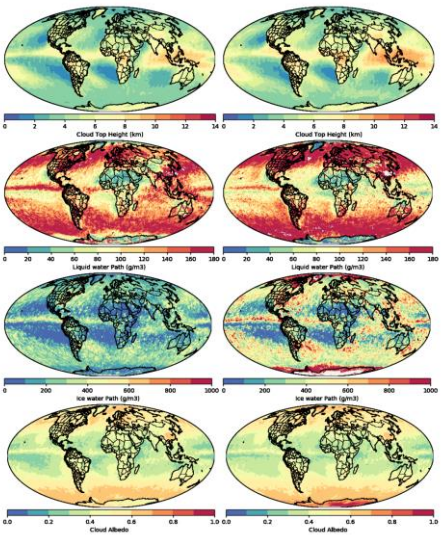


Figure 2. As Fig. 1 but for cloud top height (CTH), liquid water path (LWP), ice water path (IWP) and cloud albedo (CLA).

Also, the flux data of V3 have very big difference from CERES data as shown in Tables 6 and 7, up to ∼10%. But the authors claim their product agrees well with CERES. This must be changed.

Also, why V3 flux and CERES flux have so big difference, must be unambiguously clarified. V3 or CERES problem? If flux data have 10% error, the data generally have no use for climate studies. Therefore, this reviewer recommends this paper be published after major revisions.

The authors found a bug in the code that calculated the difference between V3 and the CERES data. As the global coverage varies with season (i.e no data in the polar winters) for the AATSR data, the data is **now** only compared with CERES when both instruments report data. The data has been reprocessed and the numbers in the table have been updated accordingly. The change to the numbers between -60 and 60 latitude was negligible however the change to the value encompassing -90 to 90 has changed considerably nearly all the comparisons with CERES data have improved . The text has been modified accordingly in the section 'Comparison of radiative fluxes'. All except the LW BOA down (all sky and clearsky) agree within the CERES uncertainty estimates. The LW BOA estimates are of the order (2.8% allsky and 3.8% clearly) just outside the range of the CERES uncertainty. It is hypothesised that the assumed cloud base height is systematically biased in the AATSR data set. This will be re-evaluated in future versions.

New figure below

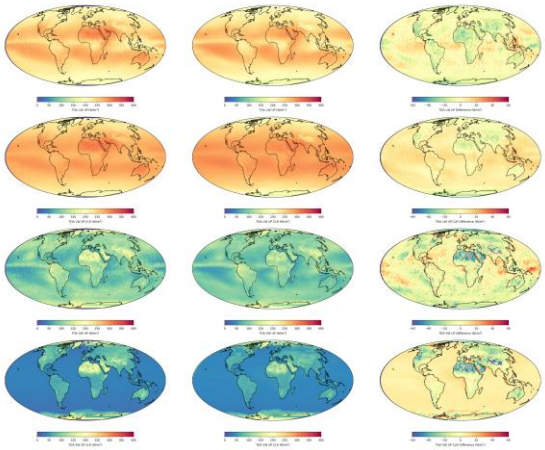


Figure 4. Examples of Level-3C (yearly average for 2008) Cloud_cci AATSR V3 (left column), CERES (middle column) and difference CERES-AATSR (right column) global maps of fluxes from top to bottom LWF^{up}_{TOA}, LWF^{up}_{TOA}clear, SWF^{up}_{TOA} and SWF^{up}_{TOA}clear

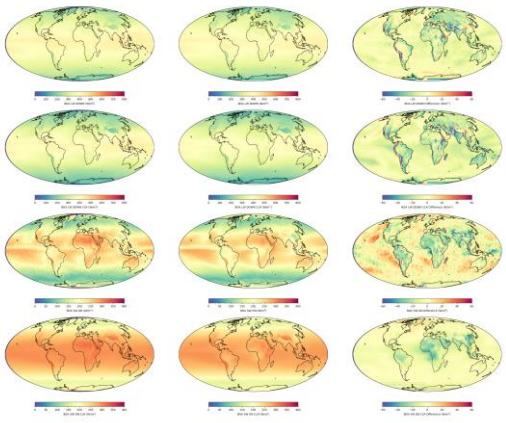
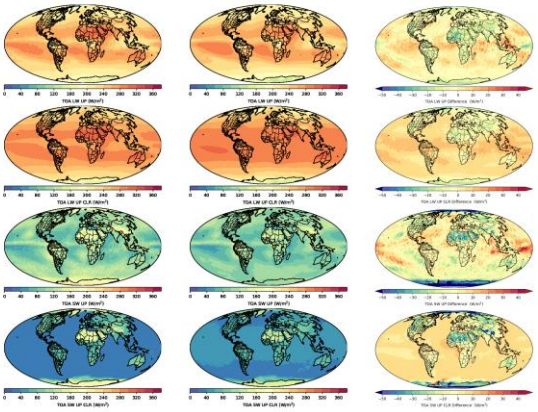


Figure 5. Examples of Level-3C (yearly average for 2008) Cloud_cci AATSR V3 (left column) and CERES (middle column) and difference CERES-AATSR in the right column global maps of forcing from the top to the bottom, LWF^{down}_{BOA}, LWF^{down}_{BOA}clear, SWF^{down}_{BOA}, SWF^{down}_{BOA}clear

Old figure for refence below



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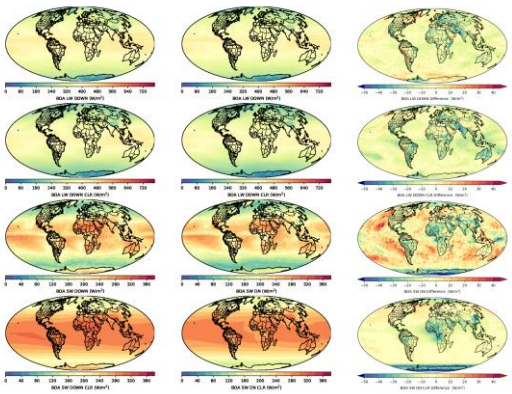

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New tables shown here

Table 6. Multi-annual (2003-2012), zonal averaged broadband shortwave and longwave fluxes (SWF, LWF) at the top-of-atmosphere (TOA) inferred from the Cloud_cci AATSR V3 dataset. Two latitude ranges, -60° to 60° (top) and -90° to 90° (bottom), are presented. The values are compared with the equivalent values from the Clouds and Earth Radiation Energy System (CERES) Energy Balanced and Filled (EBAF) fluxes. All values are given in Wm^{-2}. The differences and relative differences are also reported.

TOA flux comparison with CERES				
	LWF^{up}_{TOA}	SWF^{up}_{TOA}	Clear LWF^{up}_{TOA}	Clear SWF^{up}_{TOA}
Cloud_cci ATSR-2/AATSRv3	245.8	104.4	268.7	47.5
CERES EBAF Ed 4.1	244.1	98.70	273.9	48.8
Difference	-1.7	-5.7	5.2	1.3
Rel. difference	0.7%	5.7%	1.9%	2.7%
Cloud_cci ATSR-2/AATSRv3	235.7	113.7	235.7	61.7
CERES EBAF Ed 4.1	233.4	108.8	233.4	63.3
Difference	-2.3	-4.9	-2.3	1.6
Rel. difference	1.0%	4.5%	1%	2.5%

Table 7. As for Table. 6 but for the bottom-of-atmosphere (BOA).

BOA flux comparison with CERES				
	LWF_{BOA}^{down}	SWF_{BOA}^{down}	$clearLWF_{BOA}^{down}$	$clearSWF_{BOA}^{down}$
Cloud_cci ATSR-2/AATSRv3	364.5	191.8	335.7	255.5
CERES EBAF Ed 4.1	354.4	190.0	323.9	250.4
Difference	-10.1	1.8	-11.2	-5.1
Rel. Difference	2.9%	.9%	3.5%	2.0%
Cloud_cci ATSR-2/AATSRv3	335.7	180.2	303.2	240.7
CERES EBAF Ed 4.1	326.5	179.0	292.2	237.6
Difference	-9.2	-1.2	-11.0	-3.1
Rel. Difference	2.7%	.7%	3.8%	1.3%

Old tables for reference

Table 6. Multi-annual (2003-2012), zonal averaged broadband shortwave and longwave fluxes (SWF, LWF) at the top-of-atmosphere (TOA) inferred from the Cloud_cci AATSR V3 dataset. Two latitude ranges, -60° to 60° (top) and -90° to 90° (bottom), are presented. The values are compared with the equivalent values from the Clouds and Earth Radiation Energy System (CERES) Energy Balanced and Filled (EBAF) fluxes. All values are given in Wm^{-2}. The differences and relative differences are also reported.

TOA flux comparison with CERES				
	LWF_{TOA}^{up}	SWF_{TOA}^{up}	Clear LWF_{TOA}^{up}	Clear SWF_{TOA}^{up}
Cloud_cci ATSR-2/AATSRv3	246.3	104.4	268.7	61.9
CERES EBAF Ed 4.1	244.2	98.70	273.9	63.6
Difference	-1.9	-5.7	5.2	1.63
Rel. difference	0.8%	5.7%	1.9%	2.6%
Cloud_cci ATSR-2/AATSRv3	234.9	114.0	255.1	47.5
CERES EBAF Ed 4.1	225.1	104.2	248.9	48.7
Difference	-9.9	-9.8	-6.2	1.2
Rel. difference	4.4%	9.4%	2.4%	2.7%

Table 7. As for Table. 6 but for the bottom-of-atmosphere (BOA).

BOA flux comparison with CERES				
	LWF_{BOA}^{down}	SWF_{BOA}^{down}	$clearLWF_{BOA}^{down}$	$clearSWF_{BOA}^{down}$
Cloud_cci ATSR-2/AATSRv3	364.6	192.2	335.3	255.7
CERES EBAF Ed 4.1	354.4	190.4	323.9	250.3
Difference	-10.26	1.9	-11.4	-5.4
Rel. Difference	2.9%	.97%	3.5%	2.1%
Cloud_cci ATSR-2/AATSRv3	334.1	181.3	301.7	241.3
CERES EBAF Ed 4.1	306.8	176.0	272.7	232.6
Difference	-28.4	-5.3	-29.1	-8.7
Rel. Difference	9.2%	3.0%	10%	3.8%

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