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Changes Log

Version	Date	Changes
1.0	05/10/2020	Initial version
1.1	16/10/2020	Revision by ESA and EUMETSAT

List of Changes

Version	Section	Answers to RID	Changes
1.1	All		Global revision and addition of the L2 test scene.

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1 Anomaly description

An inconsistency has been identified in OLCI data around areas of saturation. Anomalously low radiances occur in some bands for pixels at the edge of saturated areas, and they do not correspond to geophysical expectations. The issue is present over bright clouds for both OLCI-A and OLCI-B instruments. All OLCI bands can be affected but for any single scene, if the issue occurs, it is limited to a few bands. It is especially visible in band Oa16 of OLCI-A, as shown in the example below in Figure 1.



Figure 1: OLCI-A level 1 radiance for band Oa16. Left: without saturated mask. Right: with saturated mask in orange. Dark and grey pixels form a pattern of low radiance anomalous pixels that do not represent the geophysical scenario.

Impact on OLCI Level 1B products:

Anomalous pixels occur for radiances close to saturation levels, which vary as a function of band, camera and pixel. The anomaly occurs more often in OLCI-A than in OLCI-B because OLCI-A saturation levels are lower. There is no detection of anomalous pixels in the Level 1B products. The anomalous pixels are not identified as such by any flag and are passed through as valid in the OLCI Level 1 products. Users specifically looking at very bright targets in the OL1 products must be aware of this behaviour and should screen the data for such occurrences.

Impact on OLCI Level 2 core products:

So far, no impact could be identified on core Level 2 products since all detected anomalies happen for bright clouds over which no Level 2 products are defined. The Level 2 CLOUD flag has been verified on test scenes not to be impacted by the anomaly. The following Figure 2 gives an example of the Level 2 CLOUD flag covering the totality of the test scene of Figure 1 (see also Figure 6).

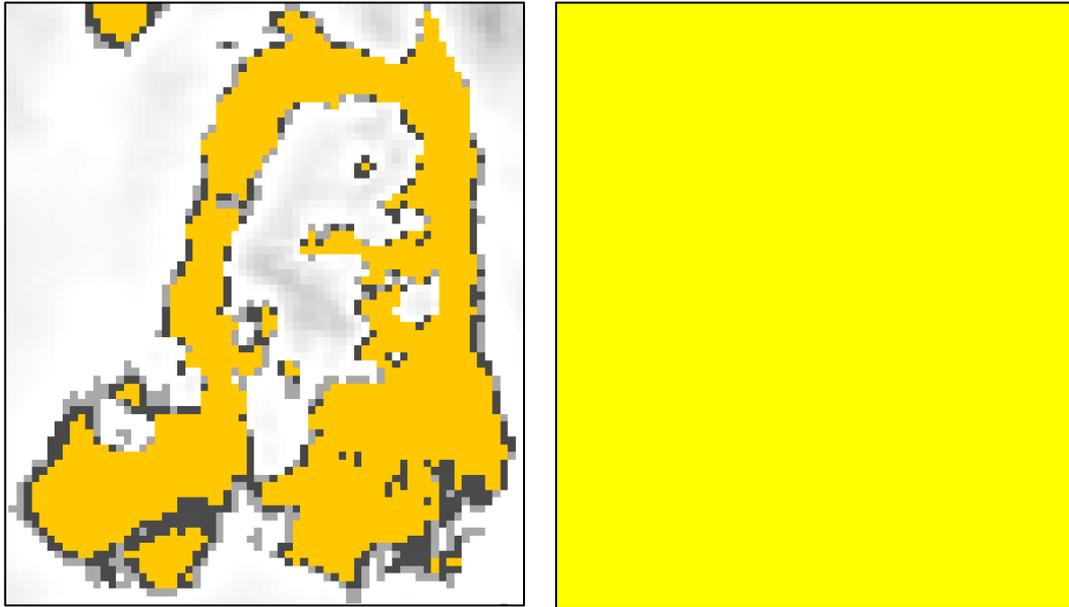


Figure 2 : Correspondence between the Level 1 and the Level 2 product of the test scene. L1 saturated flag is represented in orange on the left figure. L2 CLOUD flag is represented in yellow on the right figure, it widely covers the test scene, and it is not impacted by the L1 anomalous pixel.

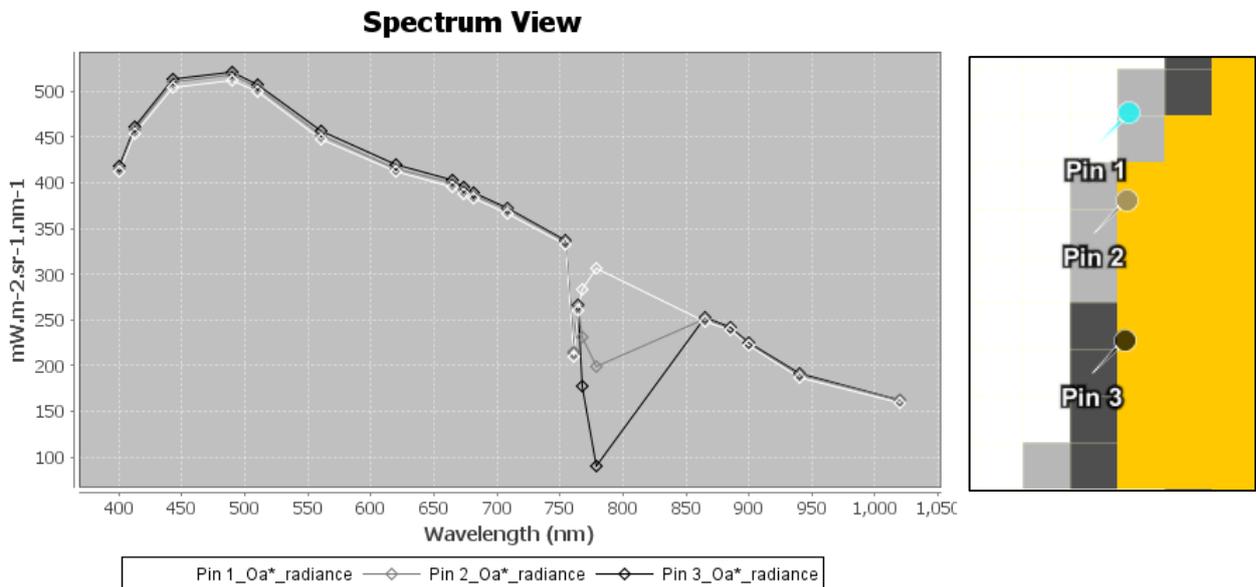


Figure 3: Left: spectra of anomalous pixels (pin 2 and 3) compared to the spectrum of a pixel (pin1) approaching saturation. Right: Zoom from Figure 1-right on pin location.

Spectra comparisons between nearby pixels further highlight the issue. In the example of Figure 3, three very similar spectra are displayed. However, only that of Pin 1 (white line) is geophysically realistic, while spectra of pin 2 and 3 (grey and black lines, resp.) clearly show anomalously low values in bands Oa15 (767.5 nm) and Oa16 (778.75 nm), see Figure 4 for detailed information.

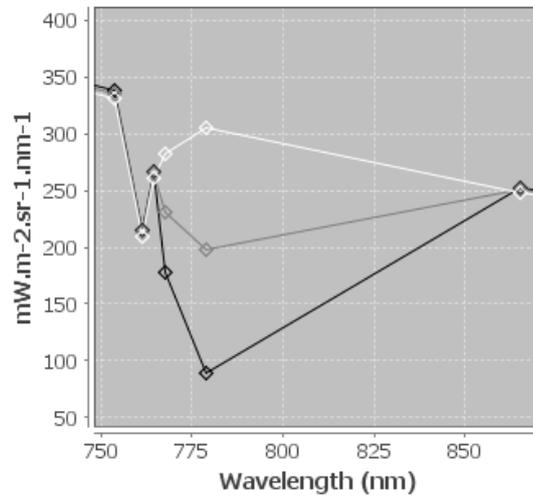


Figure 4 : Zoom on anomalous spectra, from band Oa12 (753.75 nm) to band Oa17 (865 nm).

Looking at Figure 3 and Figure 4, the general behaviour of these spectra for non-affected bands follows an increasing radiance level from Pin 1 to Pin 3, together with increasing impact on affected channels from Pin 2 to Pin 3. This observation, together with the proximity of saturated areas, suggests that the phenomenon is linked to saturation.

Analysis of the root cause is being carried out in order to find the origin of these anomalous pixels. Means to detect the anomaly are also under investigation. Examples for OLCI-A and OLCI-B are presented in the following sections of the document.

2 OLCI-A example 2018/06/25

Figure 5 and Figure 6 show an example of a deep convective cloud above North Pacific, from 25th June 2018, respectively with and without the saturated mask. Anomalous patterns of low radiance pixels are clearly visible inside the cloudy area.

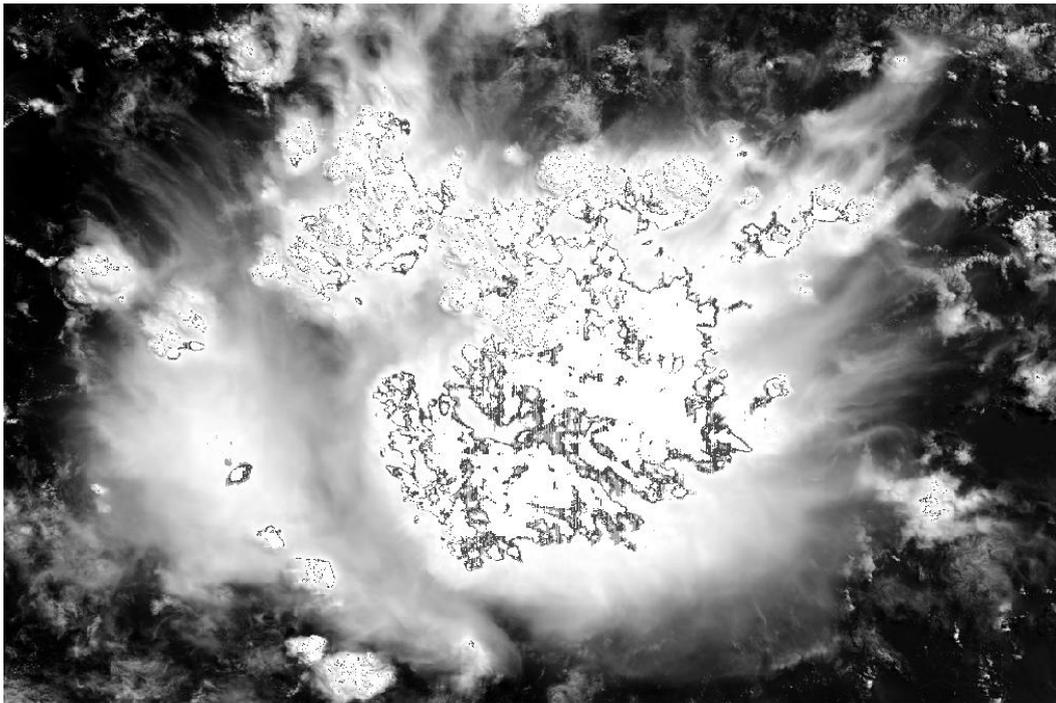


Figure 5: OLCI-A L1 radiance of band Oa16, without saturated mask.

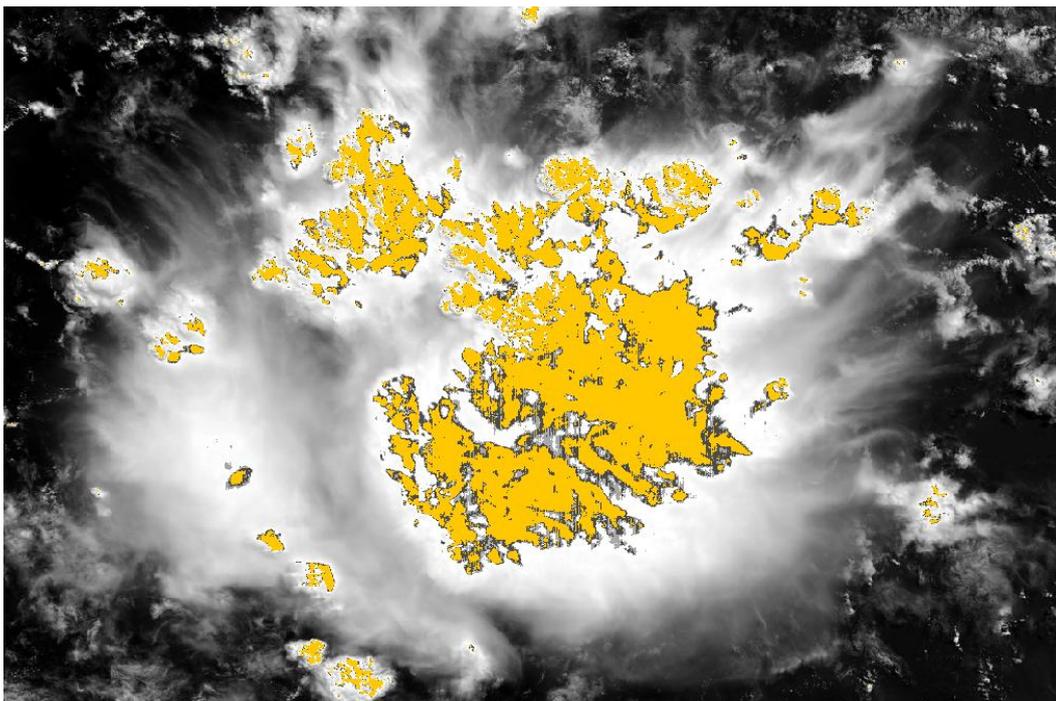


Figure 6: OLCI-A L1 radiance of band Oa16, with the saturated mask in orange.

Figure 7 presents the corresponding Level 2 reflectance of the same scene as Figure 5 and Figure 6. The L2 CLOUD flag is represented in yellow and covers a larger area than the anomaly on Level 1 product.



Figure 7 : OLCI-A L2 reflectance of band Oa16. The CLOUD flag is represented in yellow, it widely covers the anomalous region seen on the L1 product.

3 OLCI-A example 2018/07/09

Figure 8 and Figure 9 show an example of deep convective clouds above the Bay of Bengal, from 9th July 2018, respectively with and without the saturated mask.

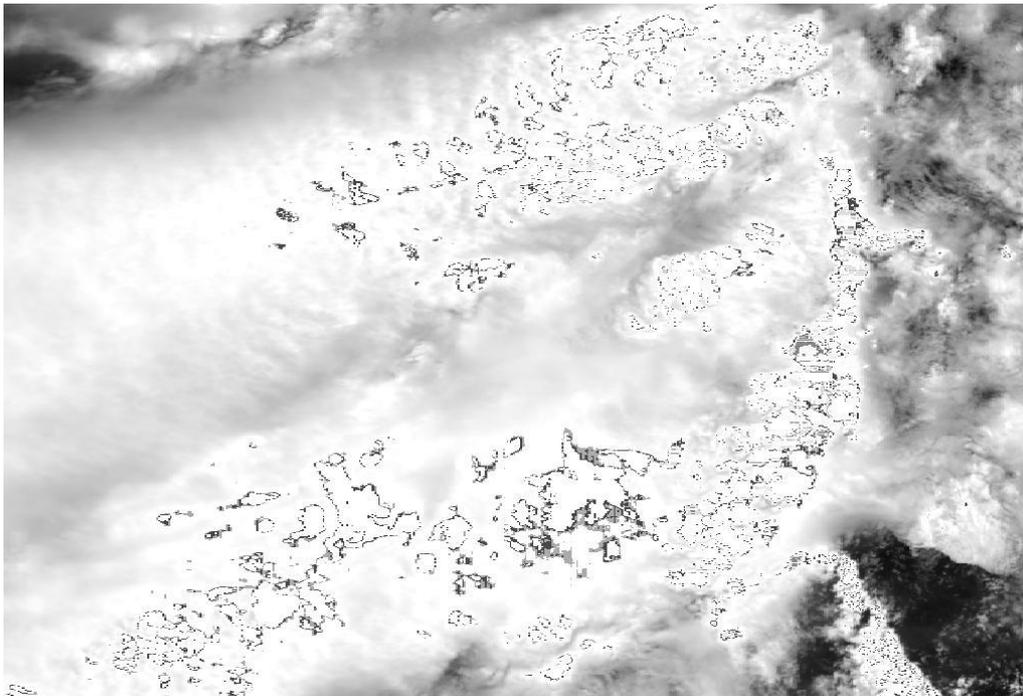


Figure 8: OLCI-A L1 radiance of band Oa16, without saturated mask.

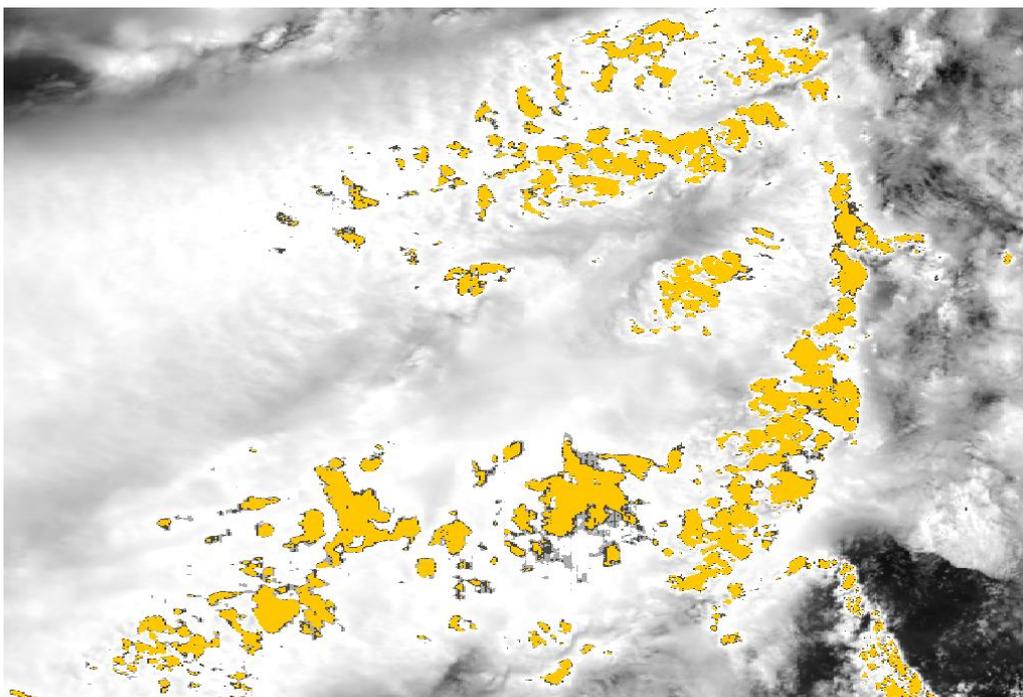


Figure 9: OLCI-A L1 radiance of band Oa16, with saturated mask in orange.

4 OLCI-B example 2018/06/25

As mentioned before the anomalous pixels are directly linked to saturated areas. OLCI-B radiometric gains were adjusted in the commissioning phase to limit the saturation. Since OLCI-B does not saturate as much as OLCI-A, it is less impacted by this anomaly. The issue is still present but not at the same frequency of occurrence as for OLCI-A.

Figure 10 presents the radiances for 2 bands of OLCI-B, Oa04 and Oa12, with anomalous pixels surrounding the saturated mask. This scene is from the tandem phase and matches the one from Figure 5 and Figure 6, above North Pacific.

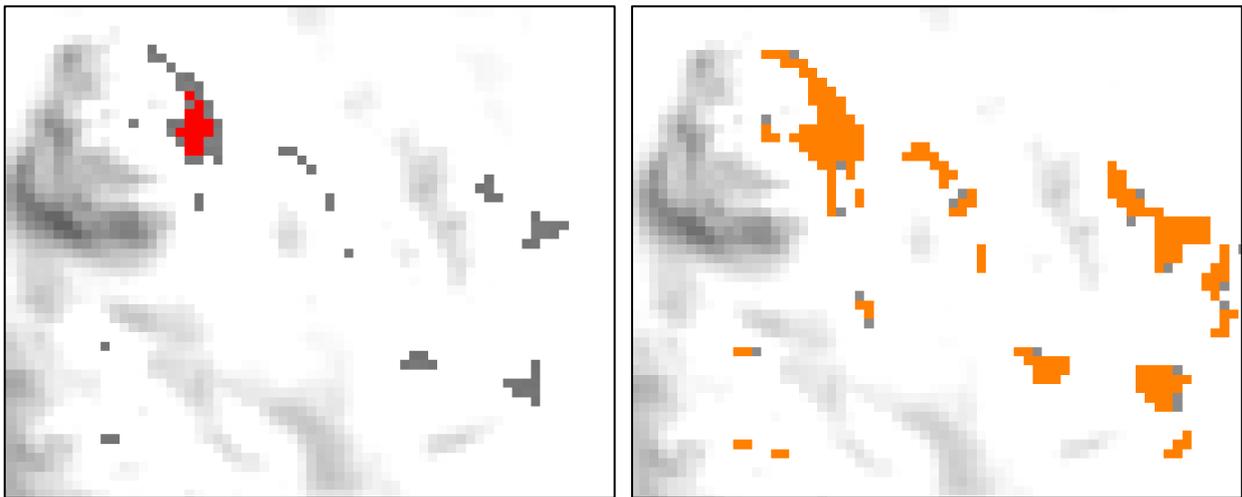


Figure 10 : OLCI-B L1 radiances for bands Oa04 (left) and Oa12 (right). Saturated masks are respectively represented in red and orange.

5 OLCI-B example 2018/09/10

Figure 11 presents the radiances of OLCI-B from 10th September 2018, for the 2 bands Oa04 and Oa16 above South Atlantic. Low radiance values are clearly visible around the saturated areas, represented with red and orange masks, respectively.

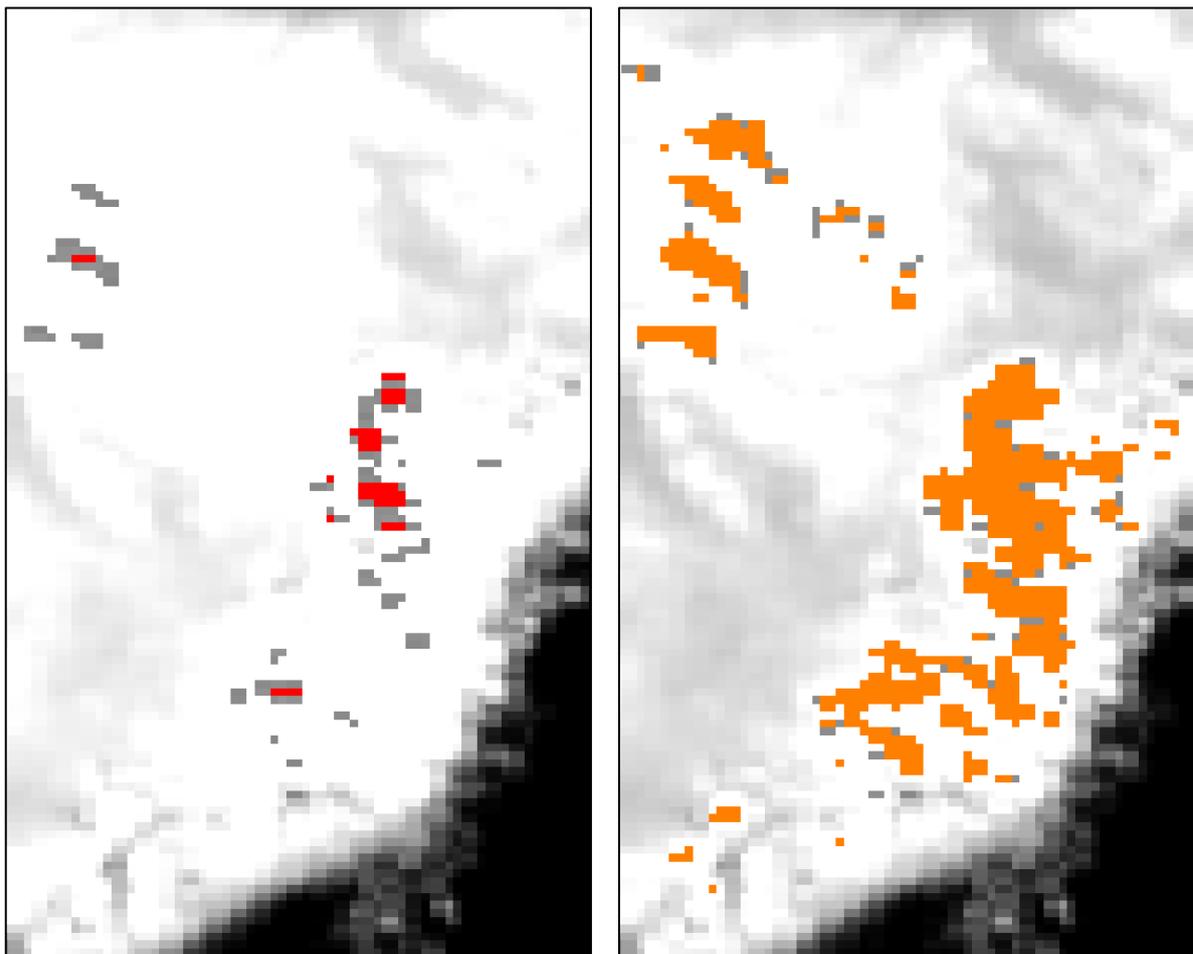


Figure 11: OLCI-B L1 radiances for bands Oa04 (left) and Oa12 (right). Saturated masks are represented in red and orange, respectively.

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