

## ***Interactive comment on “Level 1 algorithms for TANSO on GOSAT: processing and on-orbit calibrations” by A. Kuze et al.***

**Anonymous Referee #1**

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The paper by Kuze et al outlines the level 1 processing and on-orbit calibration/characterisation of TANSO data products. The TANSO sensor - reliably operating since 2009 - must be regarded as a historic milestone for the study of GHGs from space, attracting a growing community of data users. The paper fits well within the scope of AMT, and I recommend publication. By its nature, a documentation of the level 1 data processing for a complex operational spaceborne sensor is a rather detailed technical treatise which does not leave much room for controversial discussion. As in case of other sensors, additional minor refinements of the level 1 processing scheme will likely be implemented in the future in response to continuing calibration efforts and resulting from the usage of TANSO data products by various groups around the globe.

My main critics on the manuscript is that the English is not very good. In some sections, this fact - unfortunately - makes it difficult to understand the description of the applied procedures. I would like to encourage the authors involving a native speaker with some technical background for rephrasing some of the passages. Especially sections 2 and 3, which contain a lot of technical detail would benefit from such a handling.

List of comments / suggested corrections:

Abstract: page 2960, line 12 "...not mentioned, here in this paper" -> "...not discussed in this paper" or "not subject of this paper"

Overview, page 2961, line 15: introduce acronym: Kongsberg Satellite Services (KSAT)

Overview, page 2961, line 24: "the camera was ... installed to check alignment on board." This is rather diffuse. - Alignment of what?

GOSAT operation, page 2963, line 6: "In addition to the official GOSAT level2 product provided by NIES, several working groups have derived XCO2 and XCH4 from TANSO level 1 data using own processors (refs...)."

GOSAT operation, page 2963, line 9: "... has been measured from space for the first time ..."

GOSAT operation, page 2963, line 21: "to avoid the performance degradation" omit "the"

Section 2.1: It would be useful for the reader to closer associate the list of steps S / T with Fig. 3. I find it difficult to bring the listed step sequence in correspondence with the data processing flow shown in Fig. 3.

Section 2.1, page 2966, line 6 "correction of spike noise detection..." line 16 "correction of spike noises" perhaps one should say "correction of spike noise events..."

Section 2.2.1 line 16: "Even though there have been no cosmic rays detected since

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the launch, the high energy particles also create spikes." - sorry, I am not sure to understand what you want to express.

Section 2.2.2, page 2968, line 2 omit "a later"

Section 2.2.2, page 2968, line 4 omit "the"

Section 2.2.2, page 2968, line 24 "In the former version of V130.130 an ADC non-linearity correction was implemented. However, .... the resulting level 1b products suffered from large artefacts."

Section 2.2.2, page 2968, line 26: "... have the possible small bias"? Do you mean "...show a low bias"?

Section 2.2.3: Correction of the two micro-vibrations. It seems remarkable to me that these modulations are so pure that the correction works as described. Any minor variation of scan speed during the recording of the ifg would distort the local phase of these oscillations. Perhaps the correction method via the out of band artefact spectra is mainly sensitive for the speed instability near the IFG centerburst?

Section 2.2.4, page 2969, line 26 "The interferogram sampling interval has to be smaller than ...."

Section 2.2.5, page 2971, line 5 "the actual on-orbit interval ... decreases by 25 nm from ZPD to maximum OPD"

Section 2.2.6, page 2971, line 18 "Apart from the high gain Band 1 all bands use Butterworth filters ..."

Section 2.2.7, page 2972, line 8 "using a 2nd order polynomial"

Section 2.2.7, page 2972, line 11 "under stable conditions"

Section 2.2.7, page 2972, line 24 "modelled as function of time"

Section 2.3.1, page 2973, line 11 "when the input scene flux and radiation are bal-

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anced" ??

Section 2.3.1, page 2974, line 1 + 3 "a quality (warning) flag", "with an assumption" -> "assuming"

Section 2.3.2, page 2974, line 10 ff: I understand what you mean, but the following sentences should be reworded.

Comment: It is known that for a reliable phase reconstruction one has to use a low res IFG. But in addition to this, a numerical apodisation should be applied on the low-res IFG. Please detail which apodisation function is used.

Section 2.3.2, page 2974, line 17 "the complex radiometric calibration and the phase correction is performed simultaneously."

Section 2.5 , page 2975: have the acronyms DS, BB been introduced?

Section 3.3.3, page 2985, line 9 "have a common wave number shift" or "have the same wave number shift" (Comment: I would expect the same spectral abscissa calibration factor for all bands, not the same shift?)

Section 3.4, page 2986, line 10 "...and an example is shown..."

Section 4.1.1, page 2990, line 9: "...dark level is a function of..."

Section 4.1.2, page 2990, line 15 "the integrating sphere has angular distribution..." I assume you intend to state "uneven angular distribution" or "deviates from the Lambertian emitter"

The ordinate title of Fig. 6 b seems corrupted

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Interactive comment on Atmos. Meas. Tech. Discuss., 5, 2959, 2012.

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