

## ***Interactive comment on “IASI temperature and water vapor retrievals – error assessment and validation” by N. Pougatchev et al.***

### **Anonymous Referee #1**

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This paper describes the validation methodology for soundings retrieved with IASI using radiosondes. The technique described in Sect. 2 and used later in Sect. 3 for IASI retrieval validation has been published by the same author previously as referenced. It presents a relatively sophisticated validation model used to validate retrieval products using radiosondes; the averaging kernels are used to reduce radiosonde vertical, but not in horizontal, structure (horizontal is not possible; the error contributed with a different horizontal resolution is not accounted for – the authors might want to mention this). Validation is important for satellite retrieval products and this type of work is suitable for publication. It is my hope that the authors will address the concerns I present below since I believe the corrected paper will represent an important contribution to the hyperspectral remote sensing community.

(1) Last para. of Sect. 2, “33 sondes, selection...” also in Sect. 3.1 (page 7980, line 17), it is not clear why the retrievals were rejected when the repeatability std between 700-50 mb exceeded 1.8 K or 2.5 K between 980-700 mb over a 100x100 km area (overpass) where retrievals have no indication of clouds. This is critical to the result/conclusion of the paper. The authors need to give a more clear explanation so the readers will not have the impression that “less accurate retrievals” were not used in this error analysis.

(2) In Sect. 3.1 (pg. 7980, line 15), “The IASI temperature and water vapor profile retrievals are v. 4.3.1 EUMETSAT Level 2 products (Schlüssel et al., 2005; Calbet et al., 2006).” It is important to mention whether or not the retrieval algorithm employs a bias correction, if so, then, is it based on ECMWF model analysis or is it based on radiosonde measurements? Is there any connection to the radiosonde measurements in general in the retrieval? This might have been documented somewhere else already, but it is worth mentioning in this paper as part of the credibility for this validation.

(3) In Sect. 4 (conclusion, page 7982, line 15), “the conclusion about the agreement between the expected and actual error can be considered globally, whereas the absolute numbers characterizing the errors are pertinent to the conditions similar to the ones during the validation campaign.” This sentence is confusing and needs to be revised. I believe that the conclusion on the retrieval accuracy is based on limited-localized sounding analysis; therefore, the conclusion cannot be representing IASI global sounding retrieval accuracy.

(4) Other IASI validation works relevant to this paper should be referenced to give a general perspective on IASI measurements accuracy; suggested references from the same ACP issue (online already) are: Larar, A. M, W. L. Smith, D. K. Zhou, X. Liu, H. Revercomb, J. P. Taylor, S. M. Newman, and P. Schlüssel (2009), IASI spectral radiance performance validation: case study assessment from the JAIVEx field campaign, Atmos. Chem. Phys. Discuss., 9, 10193-10234; Liu, X., D. K. Zhou, A. M. Larar, W. L. Smith, P. Schlüssel, S. M. Newman, J. P. Taylor, and W. Wu (2009), Retrieval of

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Atmospheric Profiles and Cloud Properties from IASI Spectra Using Super-Channels, Atmos. Chem. Phys. Discuss., 9, 8683-8736; and Zhou, D. K., W. L. Smith, A. M. Larar, X. Liu, J. P. Taylor, P. Schlüssel, L. L. Strow, and S. A. Mango (2009), All weather IASI single field-of-view retrievals: case study - validation with JAIVEx data, Atmos. Chem. Phys., 9, 2241–2255.

Other minor (grammatical) suggestions for authors' consideration:

- (1) Pg. 7972, In. 11: change “temperature temperatures” to “temperatures”
- (2) Pg. 7972, In. 19: change “...must be validated, in the sense...” to “...must be validated in the sense...”
- (3) Pg. 7973, In. 14: change “...based on independent...” to “...based on an independent...”
- (4) Pg. 7974, In. 16: change “...provided by linear statistical...” to “...provided by the linear statistical...”
- (5) Pg. 7978, In. 10: change “Consider satellite making...” to “Consider the satellite making...”
- (6) Pg. 7977, In. 2: change “...error into the comparison...” to “...error in the comparison...”
- (7) Pg. 7977, In. 11: change “Thus Eq. (4). . .” to “Thus, Eq. (4). . .”
- (8) Pg. 7977, In. 22-23: change “...out of total 92).” to “...out of a total of 92).”
- (9) Pg. 7979, In. 5 (also on pg. 7982 In. 10 & 11): “the non-coincidence error” may be “the non-coincidental error” (?)
- (10) Pg. 7979, In. 7: change “...to estimate...” to “...for estimating...”
- (11) Pg. 7979, In. 11: change “... in the Fig. 2...” to “... in Fig. 2...”
- (12) Pg. 7979, In. 13: change “...radiosondes launches, what corresponds to...” to

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“...radiosondes launches corresponding to...”

(13) Pg. 7979, In. 14: change “For the adopted...” to “The adopted...”

(14) Pg. 7979, In. 15: change “...retrievals from radiosonde...” to “...retrievals from the radiosonde...”

(15) Pg. 7979, In. 15-16: change “On the Fig. 3 we present...” to “In Fig. 3, we present...”

(16) Pg. 7979, In. 18: change “...of the retrievals, therefore some words...” to “...of the retrievals; therefore, some words...”

(17) Pg. 7979, In. 21: change “...with different number of data...” to “...with different numbers of data...”

(18) Pg. 7979, In. 23: change “Due to relatively small...” to “Due to the relatively small...”

(19) Pg. 7979, In. 25: change “...involve matrix inversion...” to “...involving matrix inversion...”

(20) Pg. 7980, In. 1: change “...during campaign...” to “...during the campaign...”

(21) Pg. 7980, In. 3: change “That may result in...” to “These errors may result in...”

(22) Pg. 7980, In. 13-14: change “...0.14 K for temperature below 100 mb...” to “...0.14 K for any temperature below 100 mb...”

(23) Pg. 7980, In.17-22: please consider re-wording...

(24) Pg. 7981, In. 9: change “which is accounts both for...” to “which accounts for both...”

(25) Pg. 7981, In. 10: change “...and its relation to smoothing...” to “...and its relationship to smoothing...”

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(26) Pg. 7983, In. 29: change that reference to “Smith, W. L. Sr., Zhou, D. K., Larar, A. M., Mango, S. A., Howell, H. B., Knuteson, R. O., Revercomb, H. E., and Smith Jr., W. L.: The NOESS Sounding Testbed Interferometer – Remotely Sensed surface and atmospheric conditions during CLAMS, J. Atmos. Sci., 62, 1118–1134, 2005.”

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7971, 2009.

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