

Interactive comment on “Characterization of MIPAS elevation pointing” by M. Kiefer et al.

Anonymous Referee #1

Received and published: 26 January 2007

Review of M. Kiefer et al. "Characterization of MIPAS elevation pointing"

***** GENERAL COMMENTS *****

The authors use pointing information retrieved from observations by the MIPAS instrument aboard the Envisat satellite to characterise the accuracy of the engineering pointing information delivered in the operational ESA data product. They have performed an extended analysis covering error patterns in single orbits, successive orbits and several years. The results are consistent with previous studies and provide additional information and insight into the pointing knowledge product of MIPAS and other instruments aboard Envisat. In particular, the authors present for the first time a systematic characterisation of the orbital variation of the mispointing and they are able to attribute a major part of it to an unaccounted roll angle of the satellite or instrument.

The accuracy of pointing information is essential for the accuracy of atmospheric com-

position retrievals from the limb viewing instruments MIPAS and, arguable even more so, SCIAMACHY aboard Envisat. Therefore, I recommend to publish the manuscript in ACP.

The presented data and conclusions seem to be obtained with sound scientific methods. However the text contains several sloppy formulations, and it is difficult to follow for a reader who is not familiar with the details of the MIPAS instrument and its data analysis. I recommend to update the entire text very carefully with the broader readership in mind. The required changes range from including a paragraph introducing the MIPAS instrument to a more comprehensive list of references and a more self-contained description of the methodology, see below for my detailed suggestions. It should also be made explicit which results are valid solely for MIPAS and what applies to the Envisat satellite and its other instruments as well.

*** SPECIFIC COMMENTS ***

ABSTRACT

- * Envisat is not mentioned. You should do this to facilitate future title/abstract searches to find your manuscript.
- * You might want to highlight your main conclusion in the first sentence.
- * I.9-13: Similar values have been published before. It is good that you can confirm them. Please clarify.
- * I.12 "change in the satellite attitude": Does the actual satellite attitude change or is it just the engineering satellite attitude product or just the product's error?
- * I.24, "platform attitude information": Do you mean "engineering attitude information"?
- * You include the results for the period before Dec 2003. A summary of how the situation has changed since then would be appropriate too.
- * Which of the results are specific to MIPAS and which are valid for all Envisat instru-

ments?

1 INTRODUCTION

1.1 MOTIVATION

* You state correctly that "any error in the assumptions on the [...] tangent altitudes, map directly onto the retrieved state variables. Please state how significant the mapping is for the accuracy of retrieved state variable. Has the associated error been quantified in sensitivity studies? Please give at least one reference. I understand that the MIPAS atmospheric composition products are derived on a pressure grid. Please clarify why wrong attitude information is an error source for such a product.

1.2 MIPAS SETUP

* Please introduce MIPAS in a brief paragraph instead of just giving a reference in the previous section: FTS, Envisat, spectral coverage, mission objectives, ... You may want to re-arrange sections 1.1 and 1.2.

1.3 RETRIEVAL METHOD

* You need to be more explicite here: What are the retrieved state parameters? What assumptions and anillary data go into the retrieval?

* I.14 "sufficient": What is your criterion for sufficiency? And why is the criterion applicable?

1.4 SCOPE OF THIS WORK

2 ALTITUDE DEPENDENCE

3 TIME DEPENDENCE

* p.13082, I.1-2 "update procedure for the onboard parameters of the platform's attitude": Do you mean an update procedure for the engineering attitude information, which is being calculated onboard Envisat? Please clarify. It would probably be a good

idea to include a description of how the engineering information is generated in section 1, Introduction.

* p.13082, l.18: An earlier case study found a trend in Δh of 180 m/orbit. You should state the discrepancy. Is it explicable? This may be done in section 5.3. (see J.W. Kaiser, C. von Savigny, K.-U. Eichmann, S. Noel, H. Bovensmann, and J.P. Burrows "Satellite-pointing retrieval from atmospheric limb-scattering of solar UV-B radiation" Can. J. Phys. 82:1041-1052 (2004), doi: 10.1139/P04-071)

3.1 ONE ORBIT

3.2 SUCCESSIVE ORBITS

* You should clarify here or in the introduction that Envisat's descending orbit is on the day-side of Earth and the ascending on its night-side.

3.3 CORRELATION OF LOS AZIMUTH AND ΔH

* p.13085, l.19-23: Please calculate the two mentioned correlations and state them.

* equation (2): Can you motivate or derive this relationship more explicitly?

3.4 LONG TERM BEHAVIOUR

* p.13087, l.16-18: Your thoughts on possible causes for the different behaviour during the two time periods would be interesting, even if it were only speculation.

4 MIPAS OPERATIONAL POINTING CHARACTERISATION

* p.13089, l.8-14: I understand this in the following way: The LOS calibration is made available in so-called ADF files. It is subsequently used "during the computation of the engineering tangent altitudes." Is this correct? If so, then I would expect that the LOS calibration tangent altitudes equal the engineering ones. However, you show in Fig. 12 that they differ. How is this inconsistency explained?

* p.13090, l.1: The "restituted attitude information from the Envisat star trackers" is

mentioned for the first time. Is it the engineering attitude information or something else?

5 RESULTS OF OTHER INSTRUMENTS OR CHARACTERISATION METHODS

5.1 MIPAS

5.2 GOMOS

* I.25: Please state that the value of 1.4km agrees with your findings.

5.3 SCIAMACHY

* p.13092, I.3-4: I have never heard of "O3 radiation" before. According to my understanding, you might start the sentence with "A specific feature of the tangent height profile of UV radiation is employed".

6 SUMMARY AND CONCLUSIONS

Each of the pointing knowledge errors shown in your paper seem to be observed with either GOMOS or SCIAMACHY, too. Can it be conclude that all errors affect all instruments, e.g. is SCIAMACHY affected by the constant roll?

FIGURES

* Fig.10: The plot covers about 8000 orbits. However, there seem to be much less data points. You say that you plot only days with at least 500 processed geolocations. Which percentage of the days satisfies this criterion?

*** TECHNICAL CORRECTIONS ***

** p.13079 * I.20 "which": replace with "that"

** p.13080 * I.4 "6[...]68": I can guess what you mean, but I was not aware of this nomenclatura before. Please be more explicit.

** p.13081 * I.18: N_tang has not been defined. Its meaning is obvious. Nevertheless,

please define in the text.

** p.13083 * l.12-13: correct text wrap

** p.13087 * l.2: "at at" -> "at"

** p.13088 * l.27: What is D1 and D2?

** p.13091 * l.19: "This in" -> "This is in"

* Figs.3,10,11,12,13: Please also specify the year on the x-axis.

* Fig.6, x-axis labels: Using "variation" instead of "variance" would be less ambiguous.

* Figs.10-11: Y-axis labels are illegible.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 13075, 2006.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper