Response to Referee #3

General comment:

I am not sure which version of the paper the referee is referring to. My guess is that the referee is still basing his/her comments on the original version of the paper and not on the actual discussion paper. In fact, following the original comment of the reviewer (before the discussion paper was published), I have substantially changed the layout of the manuscript and broken down the longest sections into sub-sections to improve the readability and the clarity of the paper. I do now believe that all the comments related to the "monolithic" nature of the paper do no longer apply to the discussion paper.

Introduction:

I will change the text as suggested by the reviewer.

The RTTOV model:

In the discussion paper this statement is supported by a reference. This corroborates my hypothesis that the comments of the reviewer refer to the original version of the paper.

The line-by-line models:

The Rizzi et al. (2001) citation is properly referenced in the discussion paper.

I dot agree with the reviewer that the sentence "These channels………" is very confusing. What matters is not the dynamic range of the optical depths but the absolute magnitude of the optical depths. In addition, I do not agree at all with the use of *off-line* and *on-line* to denote channels placed between, and on top of spectral lines.

In the discussion paper the statement on the CO_2 line mixing is properly referenced at the end of the sentence.

The reference to the MT_CKD model is Tobin et al. (1999) at the beginning of the sentence. I agree that this might cause some confusion and will reword the text accordingly.

GENLN2_v4:

The CKD_2.1 and CKD_2.4 are different versions of the basic CKD model referenced in "**The line-by-line models"** section. Since there are no proper references for these versions of the CKD model, I will change the text from "includes the water vapour continuum model CKD_2.1" to "includes version 2.1 of the CKD water vapour continuum model".

I will break up the paragraph into two parts.

kCARTA_v1.11

The correct version is 1.11. I will change the text accordingly.

As for the CKD model, the MT_CKD_1.0 model is a different version of the basic MT_CKD model. I will change the text along the same line proposed fore the CKD model.

LBLRTM_v11.1

I do not see anything wrong with the citation "Niro et al. (2005)" in the discussion paper.

I agree with the referee that the subsequent paragraphs in this section should have an own section. I will incorporate them in the section: "**The database of line-by-line transmittances**".

I agree with the reviewer and will replace *envisaged* with *created*.

There is a proper reference to Matricardi in the discussion paper.

 I do not agree with the reviewer that *envisaged* should be replaced by *used*. I believe the use of *envisaged* is perfectly fine in the context of the sentence.

I do not agree with the referee that a separate plot should be introduced to emphasize the differences. A look at figure 1 on the discussion paper shows that in the 10 micron region the green line that denotes the CKD_2.4 continuum is clearly below the lines that denote the other continuum models.

Here *larger* refers to any other larger wave number. I agree that this statement can be misinterpreted and will change the text accordingly.

The monitoring experiments

I will clarify the meaning of cycle 33R1 and IFS.

I will state the water vapour stdev amounts in terms of percentage.

The citation for Kara et al. is properly referenced in the discussion paper.

I agree with the reviewer on the comments related to the use of GENLN2 and LBLRTM to denote the experiments. I will change the text accordingly.

Discussion of the results

It is difficult to replay to the comments made by the reviewer since it is apparent that these comments refer to the original version of the paper and not to the discussion paper. As discussed earlier, I have heavily edited this section following the guidelines originally suggested by the reviewer. Consequently, most of the reviewer's comments do not apply to the discussion paper. I can only reply to a few isolated comments that still apply to the discussion paper.

IASI band 1:

I maintain that the kink in the GENLN2 spectrum is a noticeable feature of the spectrum.

An explanation of ISEM (and a reference) is given in section 2.

I agree with the reviewer on the comment related to use of the word *channels* in the sentence. I will reword the text accordingly.

For the GENLN2 spectrum I refer to figure 5. I will correct the text.

I will replace *argument* with *argue*.

IASI band 2:

I will address the use of the word *articulate* and change the text along the line suggested by the reviewer.

kKARTA_LBL is defined in the text of the discussion paper.

Conclusions

I will break the *Conculsions* section into sub-paragraphs.

Tables

I will change the title of Table 1 to: "The LBL datasets used for the training of RTTOV" and replace *Coefficients* in the table header with *LBL model*.

Figures:

In the discussion paper the latitude bands are explained in the text.