

## Reply to Reviewer 3

We thank the reviewer for his review and his detailed comments.

Below you will find the reviewer's comments in bold and our replies.

### **General comments:**

**I recommend to add “velocity” after each occurrence of “Doppler” to increase readability of the text. Also make sure that whenever you draw a conclusion that is based on Eq. 1, state that in the appropriate spot of the description of Doppler velocity correction method 1-4.**

We will add what you suggested.

**Also, in terms of structure of manuscript, consider removing the numbering of subsections 3.1.1. and 3.2.1 as there are no further subsections (3.1.2 and 3.2.2).**

We will remove them in the revised version.

### **Minor comments:**

**Line 2: congratulations to making it to the next phase – replace “four” by “two” candidates for ESA’s Earth Explorer 11 mission**

Thank you. We will replace “four” by “two” in the revised version.

**Line 4: add “Doppler” in front of “velocities”**

We will add it.

**Line 19: define acronym ALADIN**

We will add its definition in the revised version.

**Line 20: define acronym NWP**

We will add its definition in the revised version.

**Line 26 – 27: Rephrase this convoluted sentence, e.g. as “With clouds covering roughly 30% of the tropospheric volume, Doppler cloud radars have the potential to complement wind observations by Doppler lidar in clear-sky and thin cloud conditions”.**

We will rephrase that sentence as you suggested.

**Line 32: be more precise about the “large spacecraft velocity”: add velocity range in brackets**

Typically, in LEO, the orbital velocity of the satellite is of the order of 7.6km/s, we will specify it in the text.

**Line 42: “sources” (not source)**

Corrected.

**Line 59: after “Doppler mispointing error” add “ in Doppler velocity  $\delta v_{\text{mis}}$ ”**

We will add it.

**Line 67 – 69: Expand this short paragraph by stating which technique is applicable to azimuth- or elevation mispointing or both or alternatively mention this fact at the subheadings of each technique (e.g. in line 70: ...“elevation mispointing correction of Doppler velocities”)**

We will expand it specifying what technique is applicable to what mispointing type.

**Line 75: define acronym AOCS**

Done.

**Line 103-104: Add “According to Eq. 1” in front of “the last three solutions...”**

Added.

**Line 127 – 128: Clarify what you mean by “surface Doppler at all heights”.**

We mean “surface Doppler velocity at all range gates / height bins”. We will clarify it in the text.

**Line 138: Do you mean “corrected” instead of “achieved”?**

We mean “of the uncertainty in the velocity error correction that can be achieved with this methodology”. We will clarify it in the text.

**Line 163: Replace “looks” with “views”**

Done.

**Line 223: To increase readability, rephrase to “...the closer the overpass is to ARC, the lower is the uncertainty in the azimuthal mispointing determination”**

Rephased as you suggested.

**Line 259: Add “this” in front of “case”**

Done.

**Comments on Figures:**

**Fig 5: Where are the thin dotted black lines?**

The thin dotted black lines are the isodops lines. We will modify their style in order to increase the readability of those lines.

**Fig 7: What do solid and dashed lines refer to?**

Solid and dashed lines are referred to forward pointing (azimuthal angle = 0 degrees) and side pointing (azimuthal angle = +/-90 degrees) cases, respectively. We will add this description in the caption of the figure.

**Fig 10 + 11: increase font size of axes and labels**

We will increase the font size of axes and labels in the revised version.

**Fig 11: right panel: captions says theta = 560 microrad, legend (and text) state theta = 480 microrad.**

Theta = 480 microrad is the correct value. We will correct the captions.

**Fig. 12 and Table 2: replace “passes” with “overpasses”**

We will replace it in the revised version.