

## Reply To Anonymous Referee #2

### Specific comments:

- It is noted that American spelling is being used throughout the manuscript (e.g., 'center', 'color', 'favored').
- While generally well structured and clearly written, the abstract is perhaps rather technical in one or two places, e.g. referring to details of analysis commands such as "GT:PV:2". The extended sentence in the first paragraph should also be split to improve readability.

We have rewritten the abstract to improve readability (see also reply to comment 1 from referee 1). However, we kept some technical aspects to indicate some flavor of "how Lagranto works".

- In the introductory discussion around eqn(1), the text suggests that all trajectory models operate in a pressure vertical coordinate, but this is not necessarily the case (height based coordinates might also be used). Suggestion to either make the text less specific here (e.g. remove the word 'pressure' on l.13) or to add a qualifier that LAGRANTO adopts a pressure-based formulation for x and u.

We follow the suggestion and remove 'pressure' on L13. Indeed, LAGRANTO itself relies on different vertical coordinates: In the ECMWF version pressure is used as vertical coordinate for the trajectories, in the COSMO version on the other hand it is height (in m). However, at this place of the manuscript we don't want to go into details and only show the basic principle of trajectory calculations, irrespective of the subtleties of the underlying coordinate systems.

- I read the last sentence of the same paragraph (l. 19 – 20) to imply that LAGRANTO is the only trajectory tool of those listed that has the ability to select trajectories based on objective criteria. If this is not correct, the phrase "in contrast" should be removed from that sentence.

To the best of our knowledge, Lagranto is the only trajectory tool where the iterative selection with objective criteria is a central element of the tool itself. Of course with other tools, it is also possible to do this as part of the post-processing with self-written code, but not as an integral part of the tool itself. We therefore did not change our formulation.

- On page 1902, l.15 states that OMEGA is expected in hPa/s (but it is more usual for OMEGA to be in units of Pa/s in NWP model outputs?)

Indeed, we have the vertical wind in Pa/s on our netCDF file. Hence, the 'default unit' expected by LAGRANTO is Pa/s. However, LAGRANTO checks for the unit of the vertical wind and introduces, if needed, a scaling factor. We now explicitly mention this in the text: "If the unit of the vertical wind is in hPa/s instead of Pa/s, a scaling factor of 100 is automatically applied."

- The use of arrow notation for vectors in Figure 3 makes the schematic look rather cluttered. Perhaps just use bold font instead (as is done in the figure caption).

We have redrawn Fig. 3 and now use bold font vectors.

### Technical corrections:

- 1898 / 1.3 Consistency in use of ° symbol when referring to geographical coordinates, e.g., 30° N to 80° N (and similarly elsewhere in the paper, e.g., on p.1911).

done

- 1901 / 1.13 "northward" (i.e., missing 'h')

done

- 1904 / 1.6 "only makes" (i.e., reverse order)

done

- 1905 / 1.23 "... is anyway critical" (do you mean "not critical"?)

done; we adjusted the text to 'not critical' as proposed. The wording is indeed a little 'ambiguous': If you consider the air flow in the PBL to be rather turbulent and hence kinematic trajectories to be imprecise anyway, you can argue that **the type of solution** we apply to be **not critical** because the validity of trajectories must be taken with care. Or you argue that the **validity of trajectories** cannot be trusted in the PBL and therefore trajectories in this realm to be **critical**... Anyway, we now adopted the first interpretation and argue that the type of correction is not really critical.

- 1906 / 1.13 First entry should be T:-100 km (i.e. '-' not '+')

done

- 1913 / 1.15 "which has been used for more than a decade"

done

- 1916 / 1.9 "versatility"

done

- 1916 / 1.16 Figure 5a shows the trajectory blocking. Could also add correct reference to Figure 5b in discussion on the following page.

done

- 1919 / 1.20 "The forecast trajectories help predict ... or originate from ..."

done

- 1923 / 1.14 "trajectory" (i.e. missing 'r')

done

- 1923 / 1. 21 "have already been mentioned"

done

- 1924 / 1. 4 "losing"

done

- 1925 / 1. 26 Use of the phrase "partly Python"? The authors could be slightly more specific here, e.g., on the version of Python and/or any required libraries.

We have removed 'partly' from the text. It was misleading! With respect to the Python version (2.7.5) and the libraries needed (numpy, matplotlib) we would prefer not to mention these pieces of information in the text because they are rather standard Python packages. However, we agree with the reviewer that it can be important for the installation to have some very specific comments. Therefore, we intend to add a FAQ part on the new LAGRANTO web page ([www.lagranto.ethz.ch](http://www.lagranto.ethz.ch)). There, a section could deal with installation issues, e.g., with specific Python libraries and versions needed.

- 1926 / 1. 3 "described" (i.e. missing 's')

done

- 1926 / 1.6 "since" should be "for"

done

- 1927 / 1.1 “trias” should be “triad”

done

- Table 2 caption: third entry in table should be “maximum” (typo).

done

- Figure 6 caption: “panles” should be “panels”, and “1500 m” should be “3000 m”

Fig.6 is now removed from the manuscript; one of the two panels is included in the new Fig. 7.