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Atmospheric Measurement Techniques Discussions

Interactive comment on "The definition of an atmospheric database for ADM-Aeolus" *by* G. J. Marseille et al.

Anonymous Referee #2

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This paper describes the development of a database of atmospheric parameters to be used for a range of different simulation studies forESA's ADM/Aeolus mission. The database is developed using two primary sources of data: ECMWF meteorological analysis fields, and aerosol information obtained through CALIPSO backscatter measurements. The idea is to combine data from these two sources into a unified set of data in a form that is close to what will be seen by ADM. The authors to go great lengths to address - and where possible correct - the primary difficulties or deficiencies in these data: The ECMWF analysis fields have a relatively coarse temporal resolution of six hours, a variable nominal vertical resolution ranging from tens of meters in the boundary layer to kilometers in the stratosphere, and a near-constant (but inadequate) nominal horizontal resolution of 25 km. Some aspects of atmospheric variability are

underestimated in the analysis fields, partly but not only due to the limited spatial resolution. The CALIPSO orbit is higher than the ADM orbit, it has an early afternoon equatorial crossing time whereas ADM will be flying in a dawn/dusk orbit, and the respective lasers operate at different wavelengths.

As far as I can tell, the way in which these differences are addressed is sound throughout the article, although some of it by necessity is somewhat speculative; for instance there is no unique way of "adding information" to compensate for the lack of variability in the meteorological fields, something that is clearly acknowledged by the authors.

A couple of general comments:

As far as I know, the burst mode operation of the ADM laser is being reconsidered (and may already have been formally abandoned) by ESA, and the manuscript should be updated to reflect the latest information about the planned mode of operation.

While I do not dispute that this database will be very useful for simulating many aspects of the ADM algorithms, I do think the authors are overstating the application to the vertical sampling strategy for the instrument. The introductory section gives the impression that this is main reason for developing the database, and I do not think this should be the case. The vertical sampling of ADM can be changed up to eight times per orbit, a feature that can be used to accommodate atmospheric variability. However, this cannot be done on the fly but must be pre-programmed on a weekly basis. The paper is in my view missing a fundamental discussion of what one would gain by using an elaborate database such as the one developed here over simply basing the choice on robust, repeatable and predictable parameters such as known topography and the climatologicalboundary layer and tropopause heights.

A main driver for the meteorological side of the database is to capture the additional variability of the wind field down to the 3.5 km resolution of the CALIPSO dataset. This can be used to predict the performance of ADM over scenes with large along-track gradients in the wind field, and I believe that this is a far more important application

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than the vertical sampling. The horizontal spacing between individual ADM shots is 70 m (with a laser PRF of 100 Hz) while the nominal resolution of the derived wind projections is 50 km. Some additional discussion of why 3.5 km was chosen as a horizontal resolution and what is the sensitivity of the predicted ADM performance to wind variance within the 50 km shot accumulation and/or averaging distance would be welcome.

I did not attempt to correct the fairly large numbers of typographical errors encountered throughout the manuscript.

In conclusion, I think the paper deserves to be published, and while I encourage the authors to modify it as suggested above, I would not consider doing so a “major revision”.

Interactive comment on Atmos. Meas. Tech. Discuss., 3, 2165, 2010.