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Atmospheric Chemistry and Physics Discussions

Interactive comment on "A combined observational and modeling approach to study modern dust transport from the Patagonia desert to East Antarctica" *by* S. Gassó et al.

Anonymous Referee #1

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General Comments

The authors present a detailed analysis of two dust events originating in the Patagonia desert and subsequent dust transport to Antarctica using a suit of satellite and surface observations as well as a trajectory model. The paper is well written and referenced. The dust sources of South America have not received much attention in comparison to the large volume of studies focusing on North African and Asian dust regions. This can be traced back to a) the (to our current knowledge!) lower magnitudes of dust that is emitted from South American sources on a global scale, and b) the relatively frequent cloudy conditions found in the Southern Hemisphere (SH) which make remotely

sensed dust detection difficult. I am glad to see this very detailed analysis of two dust events which is a first step towards the characterisation of dust sources and temporal characteristics of emissions in South America. Overall, an excellent paper. I have only some minor comments.

Specific Comments

Section 2.2.3, first paragraph: This paragraph includes a description of visibility measurements. Although, visibility measurements have been used as a proxy for dust in the study of source distributions and temporal evolution of atmospheric dust occurrences, it should be noted that visibility is estimated horizontally at eye-level by the operator. It is based on the operator's ability to see objects of known distance. It is therefore a measure of dust occurrence close to the surface and must not necessarily correspond to satellite derived measures of atmospheric dust (measured vertically). On a similar line, dust at higher levels of the atmosphere may not be 'detected' by horizontal visibility measurements.

Page 13302, line 25-28: A rather complex dust transport path from Patagonia to Antarctica is described here. The paper would benefit from a brief description of the synoptic meteorology that accompanied (or generated) the dust episodes. It may allow for an explanation of the dust transport paths as seen in the model trajectories.

One fact which becomes very obvious from the paper is the impact of clouds on the of remote sensing of dust in the SH. Are we able to quantify this impact on dust climatologies such as the ones derived from OMI or the older Nimbus 7 TOMS AI? If not, it should be included in the conclusions as a goal for future studies.

Technical Corrections

Page 13296, line 13: Delete space before comma.

Page 13302, line 3: Delete space before comma.

Page 13302, line 9: Delete 'is' at the end of the line.

Page 13303, line 16: 'wind' instead of 'winds'.

Page 13304, line 8: Fix 'c an'.

Page 13306, line 8: Fix 'Figure 7 the show'.

Page 13312, line 4-5: It is IMPORTANT to correct this sentence: '... the unconstrained model runs compared better with satellite data than the unconstrained runs.'.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 13287, 2010.