



A methodology study to define pathways and heights to calculate backtrajectories at near coastal Continental Antarctica station (Belgrano)

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Within the framework of the VIOLIN (Extended Vertical Investigation of the Ozone Layer In ANtarctica) project, different atmospheric components are measured in the Antarctica station of Belgrano (77.87S, 34.62W) such as surface ozone. In order to investigate the origin of the observed chemical species, a study to identify the features and variability of air masses impacting the area has been carried out. The pathways of the air masses are determined through back trajectories calculated with the HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory) model. As a first step of this study it is necessary to define duration and heights for which the back trajectories will be obtained. The NCEP-GDAS meteorological data with a $1^{\circ} \times 1^{\circ}$ spatial resolution and 14 vertical levels from surface to 500 mb have been used as input. The years 2009 and 2010 have been used to perform this study which will be expanded in the future. To determinate the optimal duration of the back trajectories daily back trajectories starting at 12:00 UTC for starting altitudes of 500 and 1500 m, with durations of 120, 168, 240 and 360 hours. A cluster methodology has been used to group the back trajectories. An optimal cluster number between 4 and 6 has been obtained. The back trajectories corresponding to 120 and 168 hours show pathways covering half of the Antarctic continent while the ones obtained with 240 and 360 hours travel across all continent. The back trajectories lasting 168 hours have been selected as optimal. To study optimum heights and using duration of 168 hours we calculated daily back trajectories starting at 100, 500, 1000, 1500, 2000, 2500, 3000, 3500, and 4000 m. The typologies and path of air masses increase with height. The results obtained in this work identify five groups that represent the lowest 4000 m which are the back trajectories of 100, 500, 1000-1500, 2000-2500 and 3500-4000 m. As conclusion, to perform a study of air masses origin in Belgrano which will help to the interpretation of chemical species collected in this station, the back trajectories will be calculated with duration of 168 hours and five heights.