



Cluster analysis of air-mass circulation at the Nepal Climate Observatory at Pyramid (5079 m a.s.l., Nepal)

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Continuous measurements of trace gases, chemical, physical and optical properties of aerosol have been carried out at the Nepal Climate Observatory at Pyramid (NCO-P, 5079 m a.s.l., Nepal) since March 2006. The aim of this activity, conducted in the framework of Ev-K2-CNR-“SHARE ASIA” and UNEP-“ABC” projects, is to characterize the atmospheric background composition at high Himalayan altitudes and the possible influence of polluted air mass transports. The seasonal and short-term variations of the monitored atmospheric compounds is strongly influenced by the meso- and synoptic-scale circulation at the NCO-P, and is investigated with backward trajectories driven by ERA-40 winds and calculated with the Lagrangian Analysis Tool LAGRANTO. In addition to the 5-day backward trajectory started at the NCO-P’s position, twenty-one back-trajectories are calculated every 6 hours with endpoints shifted by $\pm 1^\circ$ in latitude/longitude and lying on slightly different pressure levels. This allows to take into account for possible uncertainties in trajectory calculations, as well as the effect of strongly deformative flow situations. Due to the large amount of information provided by the trajectory ensembles, it is paramount to cluster the trajectories for easier interpretation of the atmospheric compound variation recorded at the measurement site. To this aim, two clustering analysis algorithms were developed and applied. In this work, we present and compare the seasonal behavior of atmospheric trajectory pattern at the NCO-P as deduced by applying these algorithms.