

***Interactive comment on* “Seasonal impact of natural and anthropogenic emissions on the highest glacier of the Eastern European Alps” by J. Gabrieli et al.**

Anonymous Referee #2

Received and published: 19 April 2011

General Comments:

The present study is focused on the seasonal impact of natural and anthropogenic emissions to the 3830 m high glacier Alto dell’Ortles on Mt. Ortles located in the Eastern part of the Alps. Therefore several trace elements and ionic compounds were analyzed in snow samples from a 4.5 m snow pit and compared to meteorological and atmospheric data. The pit was dated using NH_4^+ concentrations, $\delta^{18}\text{O}$ ratios and stratigraphic observations and covered a period from summer 2009 back to summer 2007. Trace element concentrations and fluxes were lower as reported from Colle Gnifetti, whereas the ionic fluxes were comparable. Crustal enrichment factors were

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calculated to evaluate the trace element contribution from different sources. Seasonal pattern was detected for anthropogenic ions, trace elements and stable oxygen isotopes. Air mass trajectories analyses and meteorological data were used to evaluate potential source regions and the seasonal signal. The seasonal changes were more related to the boundary layer height in winter and summer, which have a big influence of exchange processes between lower and higher level.

Overall, the study contributes to the understanding of seasonal trace elements variations in fresh fallen snow from the Eastern European Alps. However, I agree to reviewer #1, that some of the results of the study (e.g. influence of a stable boundary layer) are not unknown and some results were part of the recent publication by Gabrielli et al. (2010). So, please point out more clearly the new insights of this study in comparison to previous publications.

Technical Comments:

page 6495, L. 10: please add the meaning of abbreviation “EFc” page 6507, L. 11: missing space between “.” “Solid” page 6528, Fig 5: please add the meaning of DJF, MAM, JJA and SON to the caption

Please check references:

page 6496, L. 19 and 21: Van de Velde et al. 1999 and Van de Velde et al. 2000 are missing in the references. Van de Velde et al. 1998 appears in the references, but not in the text.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 6493, 2011.

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