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Influence of the North Atlantic Oscillation on air pollution transport
T. Christoudias1, A. Pozzer1,2, and J. Lelieveld1,2,3

This is a very cleanly designed and well written manuscript that diagnoses the impact of North American (NA) and European (EU) pollution sources on the surface in Europe, dividing the patterns of transport into positive and negative phases of the NAO. It is a valuable contribution to the community and fits the mandate of ACP. There are some weaknesses that can and should be fixed before publication.

1) The HTAP assessment (see below) did extensive multi-model evaluations of NA and EU sources of pollution (actually, they did the full O3 calculation, which is only minimally approximated here as tagged CO tracer). They also discussed the NAO's impact (see quote below). This paper must reference that document and the suitable references in it (even though it is 'grey literature').

2) The use of tagged tracers is always suspect when dealing with active tropospheric chemistry as they can/should influence the chemistry of themselves and other pollutants. The use of monthly mean OH values, as used here, would be suspect except that the problem of equating CO (with lifetime of 2-4 months) with O3 (2-4 weeks) is a bigger approximation. Given the CO lifetime, the fixed OH is probably OK, unless we are looking are some numerical derivatives of the chemistry. In fact, the use of CO is interesting as can be seen in the Figs 7&8, the NA and EU lat-alt patterns are almost the same because the CO has gone around the world several times, and what we are seeing is the shift on the north-south latitudinal gradient with the NAO, not really the short-term pollution transport.

3) (page 3) I cannot understand the "simplification OH <= => HO2" – or the nudging since OH is fixed? Explain better.

4) (page 4) On the vertically integrated transport it is important to know the time scale of the integration. If the authors use monthly means for these transports, then they then I do not believe the fluxes can be correct since they would miss the big events. I presume that these are integrated hourly and this should be stated.

5) Fig 6 – I am having trouble with the units here. Mole fraction is the abundance of CO, but the fluxes should have units of mass per interval (kg/m/s?)

6) For the aerosols, the correlation maps are misleading if the absolute abundance of aerosols is so small as to be trivial. The free-trop abundances are trivial (see HTAP results), especially at 200 hPa, so the plots in Fig 7&8 give a mistaken impression.

HTAP 2010 is the first comprehensive assessment of the state of the science with respect to the intercontinental transport of air pollutants in the Northern Hemisphere. Information on the development and evolution of the assessment can be found on the HTAP wiki at http://htap.icg.fz-juelich.de/data/Assess2010

The final assessment consists of 5 separate documents, which are available here electronically as PDFs:
Part A. Ozone and Particulate Matter (304 pages)
http://www.htap.org/activities/2010_Final_Report/HTAP%202010%20Part%20A%20110407.pdf

"In the northern mid-latitudes, source-receptor relationships are modulated by the NAO, with increased transport of North American emissions to northwest Europe, and increased transport of European emissions to the Arctic during the positive phase of the NAO. Positive values of Arctic Oscillation and NAO are associated with increased transport of U.S. emissions to Europe [Hess and Lamarque, 2007; Li et al., 2002], and increased transport of European emissions to the Arctic and northern North America respectively, in winter [Duncan and Bey, 2004; Eckhardt et al., 2003]."