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Interactive comment on "Atmospheric occurrence, transport and deposition of polychlorinated biphenyls and hexachlorobenzene in the Mediterranean and Black Seas" *by* N. Berrojalbiz et al.

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We appreciate the positive appreciation from Reviewer 1 about our work and the contribution that is does on the knowledge of POP pollution for the Mediterranean basin. We respond below the comments raised by reviewer.

- Concerning the comment on the Thresholds cruises, the objectives of these cruises funded by the Spanish Government included, indeed, the assessment of air-water-phytoplankton interactions, but also other objectives such as covering a gap of the

current knowledge of the processes affecting the occurrence in the atmosphere and seawater of a number of organic pollutants at the basin level. Previous efforts were limited to local/regional studies. In our previous work (Berrojalbiz et al. 2011) we evaluated the occurrence and processes driving the concentrations in water, seawater particles and phytoplankton. However, in the present work we evaluate the atmospheric occurrence and processes affecting it for PCBs and HCB (not only the water side of the story). We do evaluate the role of the air-water exchange on the atmospheric occurrence. Because the Mediterranean Sea is oligotrophic, there is a small influence of phytoplankton uptake lowering the surface water concentrations of POPs, thus leading to air and water concentrations close to equilibrium conditions for most sampling events, as already discussed in the text.

- Concerning the sampling of gas and aerosol phase with the high volume sampler operating at a flow rate of 40 m3 hour-1, we should say that this was the programmed flow rate, but the real ranged between 30 and 40 m3 hour-1. The details of the breakthrough for the gas phase compounds have been discussed as a response to Reviewer 2 and the details included in the supplementary material of the manuscript. Concerning the potential breakthrough of particles from the QMA filters, we did not check this during the thresholds campaigns. The reason is that the aerosol phase concentrations of PCBs and HCB are very low for the marine atmosphere, and our experience is that in the marine/oceanic atmosphere it is not possible to detect most organic compounds in a second filter. However, there are indications that there is no significant breakthrough of small particles because for example, when the samples were analyzed for PAHs (Castro-Jiménez et al. 2012), there were no measurable amounts of high MW PAHs retained in the PUF (used for measuring the gas phase).

- The residence times (R) estimated in this study correspond to the residence times of PCBs and HCB during their transport over the Mediterranean Sea. However, these are not the half-lives of PCBs in the environment comprising all the compartments (air, water, soil, vegetation, PCB reservoirs in primary sources). All half-lives are not equal.

PCBs are semivolatile compounds, and only a small fraction of them can be found in the atmosphere (less than 0.1%), most of the PCBs reservoirs are in soils, vegetation, waters, and sediments. A rapid change of PCB concentrations in the atmosphere in the scale of days, do not imply that their concentrations in the environment decrease in a time period of one or two decades. The apparent lack of decline of atmospheric concentrations over time is not contradictory with the short atmospheric residence times. It implies that there are large primary and secondary sources of PCBs, probably in land, that continuously supply PCBs to the Mediterranean atmosphere. We have improved the explanation on these processes in the new version.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 9747, 2014.