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***Interactive comment on* “Factors affecting the atmospheric occurrence and deposition of polychlorinated biphenyls in the Southern Ocean” by C. J. Galbán-Malagón et al.**

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General comments

The authors have submitted a well-written manuscript describing results of atmospheric PCB concentrations in the marine boundary layer of the Southern Ocean. The authors have taken separate gas and particle-phase samples on 3 different occasions in the Southern Ocean and analyzed them for PCBs. Results are presented for concentrations, gas-particle partitioning, the influence of air mass origin, temperature and fluxes of PCBs. Their results suggest that PCB fluxes from the atmosphere are dominated by

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gaseous diffusive fluxes, and that only a few % of total atmospheric deposition fluxes arrive in the sediments.

Major comments 1. There were several references that were cited, but do not seem to be listed. I noticed at least Gioia et al., 2008, 2012; Lohmann et al., 2007 as missing. There are probably more.

2. The section of gas-particle partitioning mentions that the slopes are below 1, as is often observed for PCBs in atmospheric samples not in equilibrium between the gas and particulate phase. The authors attribute this to recent emissions, among others. Yet a closer look Figure 3 indicates that K_p values for the heavier congeners are above the 1-1 partitioning line, whereas the lower MW congeners are well below the predicted equilibrium line. This would imply that sorption to particles is stronger for higher MW compounds than predicted, and much less effective for lower MW compounds than predicted.

3. For the comparison of settling fluxes of PCBs from atmosphere with those recorded in sediments, it might be interesting to just compare particle deposition fluxes. The atmospheric fallout in the early 2000s was around 0.1 ng/m²/day, or around 40 pg/cm²/yr. This compares to average decadal settling fluxes of PCBs in sediments of around 0.8 – 140 pg/cm²/yr (Zhang et al., 2013). In fact, a case can be made that particle settling fluxes from atmosphere are similar in magnitude to what is recorded in the sediments. This would imply that the gaseous fluxes contribute more towards the upper water column.

Minor comments P 18780, line 15 – calculated, not predicted P 18781 – missing citations from Dickhut's group, especially for biota P 18782 – missing citations – Henrik Kylin for atmospheric PCBs P 18785, line 21 – least not less P 18789, line 7 – emissions, not entries P 18789, line 19 – between, not from

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