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Interactive comment on "What can we learn about ship emission inventories from measurements of air pollutants over the Mediterranean Sea?" *by* E. Marmer et al.

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Answer to comment of Dr. A. Richter

Thank you for your helpful and justified comments. Following your suggestion we have improved our referencing to the previous work on evaluating ship emission estimate with satellite observations which were indeed not well enough emphasized.

1) In the manuscript "What can we learn about ship emission inventories from measurements of air pollutants over the Mediterranean Sea?", Marmer et al. report on an interesting study evaluating the consistency of different inventories of shipping emissions with a range of measurement data over the Mediterranean. These data include

OMI satellite measurements of NO2 and in the paper it is stated, that "observations obtained from the OMI satellite over this area are for the first time used to constrain ship emissions". While this statement is correct, I'm still surprised that no reference is made to the fact that satellite measurements from GOME, SCIAMACHY and OMI have been used to constrain shipping emissions in previous publications over other regions. In these papers, there can also be found more discussion on the uncertainties involved in the satellite products which in my opinion is treated rather superficially in this manuscript. I hope that this can be improved for the final version of this paper.

Relpy: Text added: "Beirle et al. (2004) have quantified shipping emissions of NOx over the shipping route connecting Sri Lanka to Indonesia using data from the Global Ozone Monitoring Experiment (GOME) remote sensing instrument. Data from SCIAMACY, a remote sensing instrument with finer resolution, was used to verify ship emission estimates over the Red Sea by Richter et al. (2004). Franke et al. (2008) combine data from both instruments to verify all published NO2 emission estimates from ships in the Indian Ocean and found the best agreement with the higher estimates".

In section 4.2 we discuss our best estimate of the error on a single OMI tropospheric vertical column which amounts to 1.0 10ˆ15 molecules cmˆ-2 from spectral fitting. However, this uncertainty is strongly reduced by temporal and spatial averaging. For a 3-month average at 1×1 degree (and over the complete Mediterranean region as in Figure 12), each grid contains on the order of 500-1000 cloud-free OMI observations, so that the random error is small.

Text added: "Here we focus on summertime observations, when cloud free conditions prevail. Each grid cell contains 500 to 1000 cloud-free OMI pixels and the random error is significantly reduced by the spatial averaging".

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 7155, 2009.