

Response to Referee's Comments #1

1. In the Introduction section: It is suggested to mention potential problems of shipping for water quality (for example according to Turner et al), as the two problems are related.

Response:

- 5 Thanks a lot for your suggestion and recommendation. We surely agree with you that the impact of ship emissions on water quality is not negligible. It is worth mentioning that some emission reduction methods such as scrubbers, could cause the pollution of surface water. And adding it into the introduction section, makes a more comprehensive understanding for readers of how we should properly reduce the air pollution from ship emissions instead of shifting it to water. So we
10 summarize some relative research and revise the manuscript as shown below.

Revision in manuscript:

- Page 2, Line 23-26: These situations have constantly drawn attention on coastal air pollution and correlative emission control strategy such as scrubbers. However, recent research also presents the potential pollution of ship emissions to surface water due to some methods of treating ship
15 exhausts (Hassellöv et al., 2013; Stips et al., 2016; Turner et al., 2018; Turner et al., 2017), which reminds us to be more careful about ship emission reduction.*

2. There are some typos and language corrections needed. For example: Page 3 Line 31: observations on a roof; Page 4 line 4: what is “mismeasurements”? ; Page 7 eq 1: Difficult to
20 see what is in the equation.

Response:

- Thanks for the suggestion. We check through the manuscript and all the language and typo errors are corrected. The manuscript does have an inaccurate description “mismeasurement” which was to describe that the data like that was wrong. We have it revised as shown below. The equation
25 was a little difficult to see as it was restricted by specific format requirement that makes some parts even smaller in display. So we change the display style for the fraction and make the equation more evident as shown below.

Revision in manuscript: (eight examples)

- 1) *Page 4, Line 13-15: A small meteorological monitoring station was placed on the roof of the
30 container and obtained temperature ($^{\circ}\text{C}$), relative humidity (%), wind speed (m s^{-1}), wind direction and radiation intensity every 1 min, from 28 December 2016 to 15 January 2017.*
- 2) *Page 4, Line 15-16: Abrupt high temperature values were subtracted from results because they were obvious invalid data when instrument indicated 40°C for ambient temperature in winter.*

- 3) *Page 4, Line 24-25: Invalid values of O₃ occurred fitfully during the campaign, appearing as a sinusoid fluctuation below 10 ppb, which were subtracted from the results.*
- 4) *Page 8, eq. 1: $EF = (X/R)_{aerosol} / (X/R)_{crust}$*
- 5) *Page 8, eq. 2: $SOR = [SO_4^{2-}] / ([SO_4^{2-}] + [SO_2])$*
- 6) *Page 8, eq. 3: $NOR = [NO_3^-] / ([NO_3^-] + [NO_2])$*
- 7) *Page 9, Line 23-24: Peak levels of NO_x and SO₂ were mainly linked with ship activities since the measurement site was very close to channel and berth.*
- 8) *Page 9, Line 25-26: A clear diurnal cycle of O₃ was spotted that the concentration rises in daytime (29.18 ppb) and falls at night (16.38 ppb).*

10

Reference

Hassellöv, I.-M., R. Turner, D., Lauer, A., and Corbett, J.: Shipping contributes to ocean acidification, 2731-2736 pp., 2013.

15 Stips, A., Bolding, K., Macías, D., Bruggeman, J., and Eayrs, C.: Scoping report on the potential impact of on-board desulphurisation on the water quality in SO_x Emission Control, 2016.

Turner, D. R., Hassellöv, I.-M., Ytreberg, E., and Rutgersson, A.: Shipping and the environment: Smokestack emissions, scrubbers and unregulated oceanic consequences, 45 pp., 2017.

Turner, D. R., Edman, M., Gallego Urrea, J., Claremar, B., Hassellöv, I.-M., Omstedt, A., and Rutgersson, A.: The potential future contribution of shipping to acidification of the Baltic Sea, 2018.

20