

Manuscript title: Local air pollution from oil rig emissions observed during the airborne DACCIWA campaign by Brocchi et al.

RESPONSES TO ANONYMOUS REFEREE #2

We thank the reviewer for this relevant comment.

The authors have done a very nice job revising the manuscript after the initial reviewer comments. I still feel more discussion should be given as to the non-flaring combustion as a source of NO_x from the rig. I am still not totally convinced that only flaring emissions would be seen at an altitude of 300m so perhaps the authors could go in to some more detail about the likely magnitude of non-flaring NO_x emissions?

A paragraph is added in the page 8 lines 16:

« Emissions from oil and gas production vary depending on the operating conditions of the platforms making them variable and hard to analyse (Law et al., 2017). Considering this, it is possible to have sources of NO_x (and SO₂ if present) from non-flaring combustion processes like the power generation for the facility (Villasenor et al., 2003). No review can be found in the literature to estimate the magnitude of those emissions. As a comparison, during the ACCESS aircraft campaign (Tuccella et al., 2017) in the Arctic, the maximum NO_x mixing ratio associated to oil and gas platforms is about 10 ppbv (Fig. 5 in Tuccella et al (2017)). For the ACCESS campaign, it is known that the facilities were operating under normal conditions and the flight altitude ranges from 120-250 m. The comparison of the FPSO in the Gulf of Guinea with the platforms in Arctic shows that the NO₂ measured during DACCIWA campaign is in the range of a normal functioning mode. As mentioned in Zhang et al (2019), the sources associated to non-flaring combustion are not always negligible, depending on the operating conditions. Thus, we cannot exclude a contribution from another NO_x source overestimating the results, but this contribution is not important when gas flaring activity is in normal mode (Zhang et al., 2019). »