Atmospheric Chemistry and Physics Discussions

Interactive comment on "Evaluation of various observing systems for the global monitoring of CO_2 surface fluxes" *by* K. Hungershoefer et al.

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We would like to thank the referee for the encouraging review. Our response follows:

1. It would be nice to get a better idea of the geographical placement of the hypothetical surface networks. Is it possible to construct a plot showing this? Reply: Two plots showing the geographical location of the hypothetical surface networks were added to Figure 2.

2. I was left wondering how the MODIS cloud field was used for the A-SCOPE simulation. The active systems have very small footprints (ca. 100 by 100 meter), but need some averaging to get enough signal-to-noise for a good retrieval. This means that in clear skies you would get an effective field-of-view of say 100 meter by 50 km. In

partially cloudy skies there are less clear footprints and therefore the effective field-of-view would be extended to say 100 meter by 100 km. Is this taken into account, both the change in effective field-of-view and the capability to still provide a measurement in partial cloudy fields? Reply: We used the MODIS cloud product because it is the only dataset that provides daily cloud cover at 1 km resolution. We agree with the reviewer that A-Scope like mission would have a higher spatial resolution than the MODIS pixel and that it would require some temporal/spatial averaging. The way we account for the cloud cover is admittedly not perfect, but it does account for the reduction in observation coverage due to clouds. Our procedure also limits the number of observations to one per model grid-box, which implicitly accounts for the lidar averaging

3. What is the rationale for using a different error model for GOSAT with respect to OCO and SCIA? For a study like this, it might not be the best choice to purely rely on the estimate given by the satellite mission teams. Reply: The spectral resolution and the signal to noise ratio of GOSAT are different than those of OCO and SCIA, which justify the use of different errors. The differences in spatial resolution imply different dominant error sources. We nevertheless agree that there are many assumptions in our study, but these are clearly stated.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 18561, 2010.
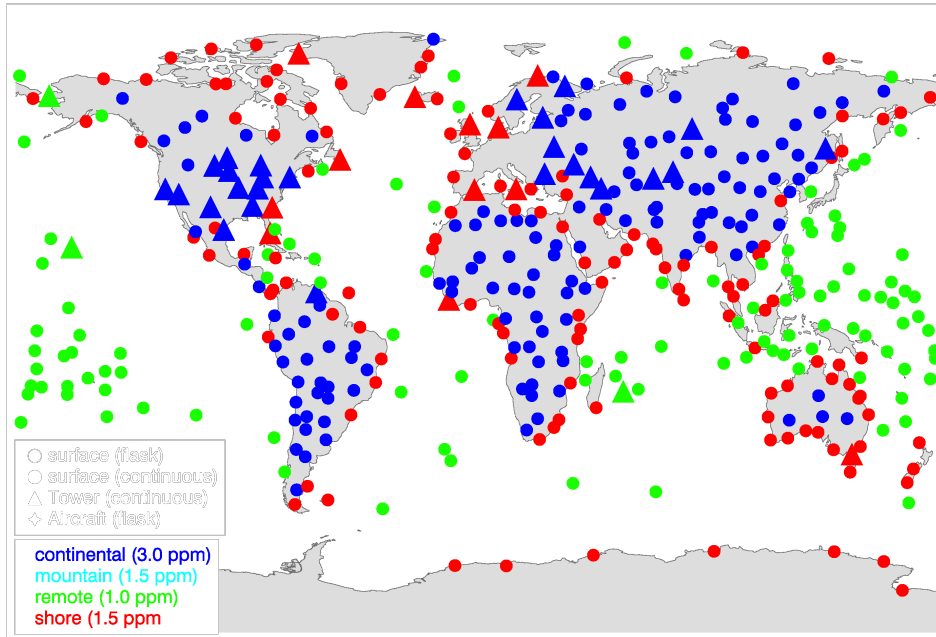
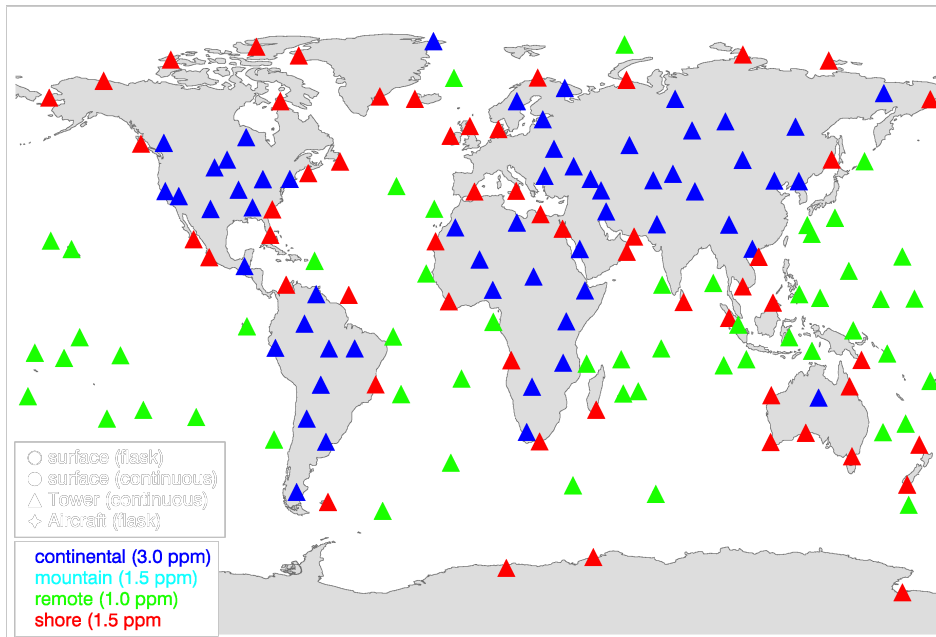**Fig. 1.** Geographical location of the hypothetical network A stations (to be added to Figure 2 of the manuscript)

Fig. 2. Geographical location of the hypothetical network B stations (to be added to Figure 2 of the manuscript)