Supplementary Online Material

Interpreting elevated space-borne HCHO columns over the Mediterranean Sea using the OMI sensor

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Sample HCHO profiles used for AMF calculations

We use HCHO profiles from GEOS-Chem simulations to calculate "shape factors" (i.e. HCHO normalized profiles) in the AMF formulation adopted here (Palmer et al., 2001). In Figure S1 we show two such profiles as representative of the main differences between a Mediterranean and a continental environment. The timeseries of the daily simulated profiles averaged at OMI/Aura satellite overpass times (12-14 local time) are extracted at two locations in the middle of Western Mediterranean (38°N, 8°E) and over France (44°N, 3°E). In the figure we display the mean profile and the 16^{th} – 84^{th} percentiles interval in order to include the variability given by the data within 1 standard deviation of the mean (assuming a normal distribution). In the boundary layer, continental HCHO mixing ratios are roughly three times higher than oversea values, and also the variability is enhanced. Above 3 km height, HCHO abundance is similar for the two environments, denoting a much more uniform HCHO distribution in the free troposphere. Indeed, there is a much steeper decrease of HCHO with height in the PBL over the continent than over the Mediterranean.

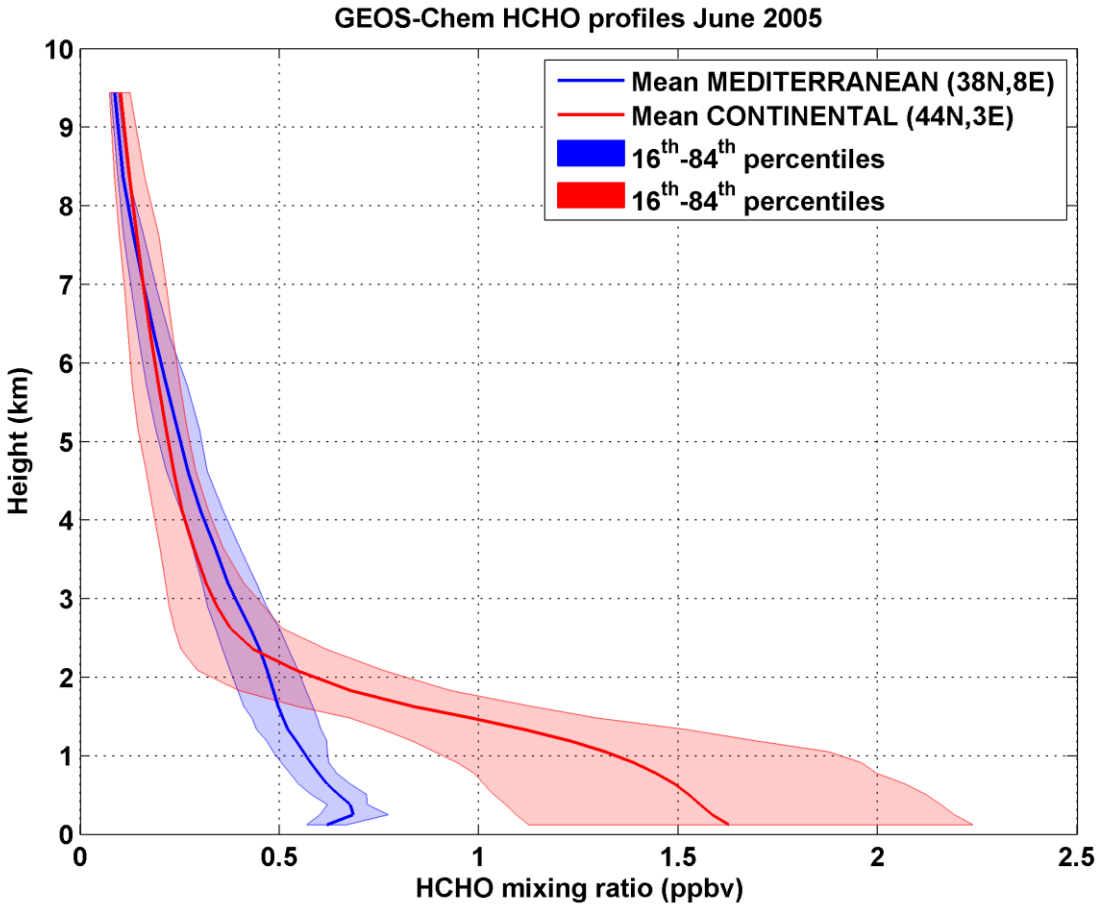

Figure S1. Formaldehyde vertical profiles simulated with GEOS-Chem model in June 2005. Thick lines denote the mean of daily profiles sampled at OMI overpass times (12-14 local time), while the shadings contain the 16th and 84th percentiles.

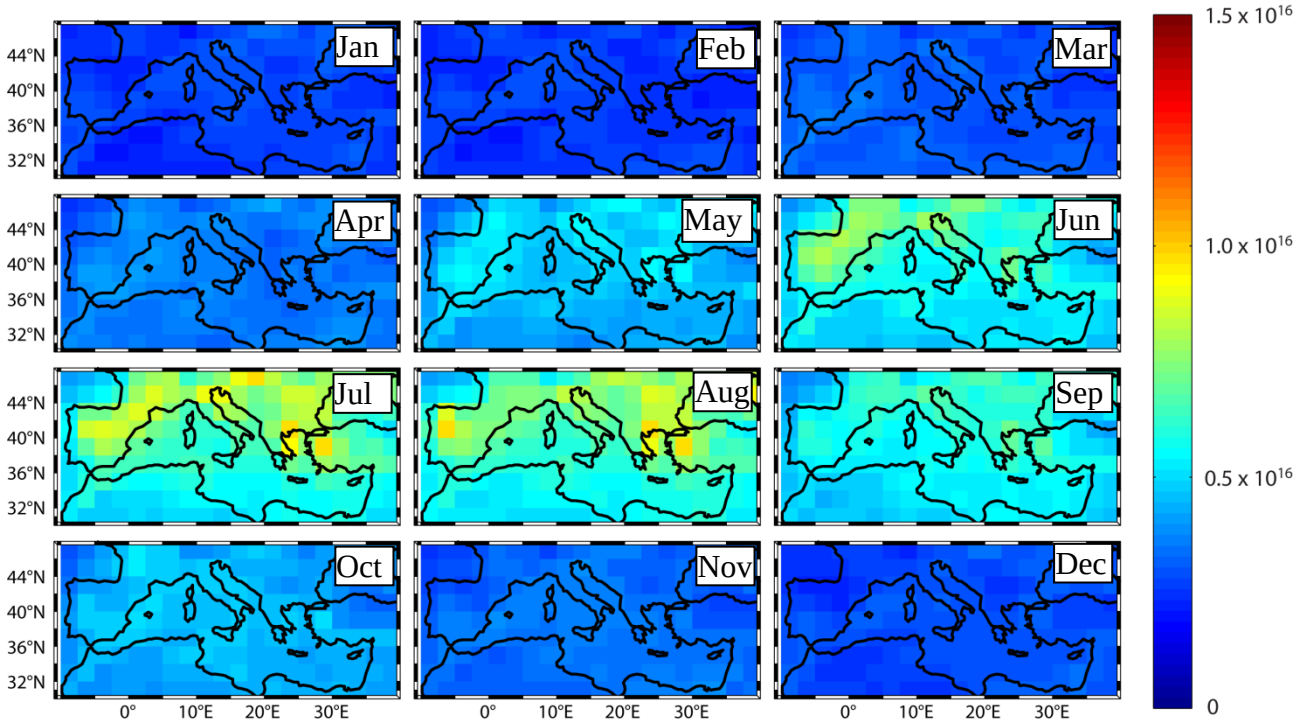

Figure S2. Monthly averages of HCHO columns simulated with the GEOS-Chem model in 2005.

References

Palmer, P. I., Jacob, D. J., Chance, K., Martin, R. V., Spurr, R. J. D., Kurosu, T. P., Bey, I., Yantosca, R., Fiore, A., and Li, Q.: Air mass factor formulation for spectroscopic measurements from satellites: Application to formaldehyde retrievals from the Global Ozone Monitoring Experiment, J. Geophys. Res., 106(D13), 14539–14550, 2001.