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Simulating cross-polar pollution transport during POLARCAT-GRACE

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The POLARCAT-GRACE campaign was targeted at aircraft and satellite-remote sensing observations of biomass burning emission transport into the Arctic. During two episodes (2-5 July and 7-10 July) extended smoke plumes originating from large Siberian forest fires were advected directly across the North Pole and into the European Arctic.

The focus of this work is on the ability of models to correctly simulate cross-polar pollution transport. Close to the pole, depending on the underlying horizontal grid in a model, numerical artifacts can be created, which potentially lead to considerable latitudinal displacements and structural distortion of pollution features.

Here we compare transport simulations of total column carbon monoxide (CO) for the FLEXPART model (with and without polar stereographic projection) and the TOMCAT model with retrievals of total column CO from the IASI passive infrared sensor onboard the MetOp-A satellite. The multi-model approach allows to separate the influences of meteorological fields, model realisation, and grid type on the plume structure. First results indicate very good agreement between simulated and observed total column CO fields.