



Using an active Match approach to estimate ozone loss in January

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During the RECONCILE campaign in the Arctic winter 2009/10, an active Match experiment was performed sampling the same air masses up to three times during two consecutive flights of the high-altitude research aircraft M55-Geophysica from Kiruna (67.83 N, 20.42 E). The first flight was westbound and its flightpath designed to resample the air masses from the outbound leg during the return to Kiruna with a time difference of up to 3 hours. Another match was attempted during a second flight 72 hours later when the air masses had moved into the Geophysica's range again.

Flightplans were designed using trajectory calculations driven by ECMWF wind fields. The main objective of the first flight was to constrain the Cl₂O₂ photolysis rate. For the second flight the objectives were to test the accuracy of trajectories driven by ECMWF wind fields using tracer measurements and to estimate the ozone loss rate over the three day period.

We show that indeed the definition of "matches" based purely on the trajectory calculations does not yield satisfactory results and that tracer measurements are needed to identify corresponding air masses.

Having established robust "match pairs", ozone measurements from both flights are used to calculate ozone loss over the three day period. The ozone loss rate per sunlit hour is compared to results from balloon sonde Match campaigns and model results.