THEORY AND OBSERVATION OF CHEMICAL LOSS OF ARCTIC OZONE DURING THE WINTER OF 1999-2000

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Proper understanding of the timing and extent of chemical depletion of ozone is a prerequisite for developing a reliable prognostic capability for the future course of Arctic ozone. The suite of observations obtained during SOLVE/THESEO 2000 provide an unprecedented opportunity to define the measured chemical loss of ozone and to define the temporal and spatial evolution of reactive chlorine (ClO_x=ClO+2$\times Cl_2O_2$). The measured chemical loss rates for ozone during the winter of 1999/2000 are defined based on the temporal evolution of the O_3 vs N_2O relation. The modeled chemical loss rate is calculated along 10 day backtrajectories originating along the ER-2 flight track, with the model constrained by measured relations of ClO_x vs N_2O. The model is shown to provide an accurate simulation of the observed variations of ClO and Cl_2O_2 with solar zenith angle. At the time of abstract submission, the measured ozone loss rate is found to be considerably (e.g., 50%) faster than the modeled loss rate. We will update this comparison based on final data for ClO_x and other species, will discuss the sensitivity of model loss rates to the controlling parameters, and will evaluate measurements of ClO_x in the context of the total budget of inorganic halogens.