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INVESTIGATION OF THE CHEMISTRY OF REACTIVE HALOGENS USING A ONE DIMENSIONAL CHEMICAL MODEL

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The present study investigated the chemistry of reactive halogen species (RHS) in the lower boundary layer using the University of Alabama Huntsville one-dimensional chemical (UAH_1d) model. The above model allows the input of a wide variety of chemical reactions and mechanisms occurring in the gaseous phase and is especially useful in identification those reactions mainly responsible for RHS production and loss. The model takes into account the vertical dispersion effects, photochemical dissociations and dry deposition of the chemical species, on a temporal basis and within a vertical grid. The model input data was available from six research campaigns performed at various sites along the Dead Sea during 2001-2003. The purpose of the model simulations was to attempt to identify the sources and mechanisms responsible for RHS formation, the role-played by the terminal and reservoir species, the possibility of an upper limiting BrO level and the importance of heterogenic (gas/solid) reactions on RHS formation. Attention was paid to the role of reactive halogen species in the ozone destruction process. The results indicate the importance of nitrogen oxides and the resulting heterorganic photochemical destruction of the reservoir BrONO2 species on the ozone destruction process and the diurnal BrO formation profile. Additionally, it is possible that heterogenic aerosol/gas reactions, especially those occurring on the sulfate aerosol surface, may play an important role in understanding the reaction mechanism.