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MISTRA mechanism development: A new mechanism focused on marine environments

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The tropospheric multiphase chemistry of halogen compounds plays a key role in marine environments. Moreover, halogen compounds have an impact on the tropospheric oxidation capacity and climate. With more than two thirds of the Earth's surface covered with oceans, effects are of global importance. Various conditions are found in marine environments ranging from pristine regions to polluted regimes in the continental outflow. Furthermore, there are important sources for halogen compounds over land, such as volcanoes, salt lakes, or emissions from industrial processes.

To assess the impact of halogen chemistry with numerical models under these distinct conditions, a multiphase mechanism has been developed in the last decades and applied successfully in numerous box and 1D model studies. Contributions from these model studies helped to identify important chemical cycles affecting the composition and chemistry of the troposphere. However, several discrepancies between model results and field measurements remain. Therefore, a major revision of the chemical mechanism has been performed including an update of the kinetic data and the addition of new reaction cycles. The extended mechansims have been evaluated in several model studies with the 1D model MISTRA.

Current work focuses at the identification of the most important reaction cycles, which led to significant changes in the concentration-time profiles of several halogen species. Subsequently, the mechanism will be reduced to the most imporatant reactions, which are currently investigated. As regional and global model studies become more important to identify the importance of tropospheric halogen multiphase chemistry, the goal is to derive parameterisations for the most important halogen chemistry cycles, which can than be implemented in regional and global 3D models. In the reduction process, the extented MISTRA version will serve as a benchmark to assess the quality and accuracy of the reduced mechansim versions.