

INFLUENCE of the HALOGEN ACTIVATION on the OZONE LAYER in XXIst CENTURY

Igor Larin (1), rtash Aloyan (2), and Alexandr Yermakov (1)

(1) IEPCP RAS, Chemical Physics of the Atmosphere, Moscow, Russian Federation , (2) Institute of Numerical Mathematics of the Russian Academy of Sciences

The aim of the work is to evaluate a possible effect of heterophase chemical reactions (HCR) with participation of reservoir gases (ClONO_2 , HCl) and sulfate particles of the Junge layer on the ozone layer at mid-latitudes in the XXI century, which could be relevant for more accurate predicting a recovery of the ozone layer, taking into account that just these processes were the main cause of the ozone depletion at the end of XXth century. Required for calculating the dynamics of GHR data on the specific volume/surface of the sulfate aerosols in the lower stratosphere were taken from the data of field experiments. Their physico-chemical properties (chemical composition, density, water activity and free protons activity et al.) have been obtained with help of thermodynamic calculations (Atmospheric Inorganic Model, AIM). Altitude concentration profiles of individual gas components, as well as temperature and relative humidity (RH) at a given geographic location and season have been calculated using a two-dimensional model SOCRATES. The calculations have been made for the conditions of June 1995, 2040 and 2080 at 15 km altitude and 50° N latitude. It has been shown that the rate of ozone depletion as a result of processes involving halogen activation for the given conditions in 2040, 2080 is about 35% lower than a corresponding value in 1995 (a year of maximum effect of halogen activation). From this we can conclude that in the XXI century, despite the natural decline of ozone-depleting chlorofluorocarbons, processes of halogen activation of the ozone depletion with participation of sulfate aerosols should be taken into account in the calculations of the recovery of the ozone layer at mid-latitudes.