



Chemical Mechanism of the Influence of Galactic Cosmic Rays on Climate

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In connection with a problem of global warming there is extremely important an account of action of all known climatic factors. Influence of galactic cosmic rays (GCRs) on climate now are connected with formation of clouds (Carslaw at al.). In the present work the pure chemical mechanism of climatic influence GCRs has been considered. As it has been shown for the first time by the author (Larin, etc., 1977), as a result of reactions of primary ions of air with molecules of water and the subsequent recombination of the formed ionic clusters GCRs give rise to additional quantity of hydroxyl radicals OH which define atmospheric lifetimes and, accordingly, the contribution to change of radiative forcing all H-containing gas components, including methane and all ozone friendly substitutes of CFCs.

In calculations of the effect the data of balloon-born measurements of the atmosphere ionization rate by GCRs at heights 4 - 34 km obtained in May 1979 and March 1983 (J.M.Rosen and D.J.Hoffmann, 1985) have been used. In assumption, that formation of one pair ions in the air forms two hydroxyl radicals OH, and also one radical NO and two atoms of oxygen, by means of 1-D model of the middle atmosphere influence of GCRs on atmospheric lifetime of methane and some other greenhouse hydrocarbons has been calculated. It has been shown, that for conditions specified above GCRs (due to increasing OH concentration) can reduce methane atmospheric lifetime as much as 11 - 15 %. Note, that reduction of atmospheric lifetime of methane by 11-15 % is equivalent to reduction of its total emission in the atmosphere by the same value (at constant value of atmospheric lifetime). It is necessary to tell, that according to IPCC 2007 contribution of methane to change of radiative forcing for an industrial epoch was only three times less contribution of the main antropogenic greenhouse gas - 2 that testifies to importance of the account of the described factor at projecting climate change. The further investigations will allow to estimate effect more precisely.

K. S. Carslaw at al. "Cosmic Rays, Clouds, and Climate" // Science 29 November 2002:

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