

Climate Change and Global Warming

February 27-28, 2019
Prague, Czech Republic

Expert Opin Environ Biol 2019, Volume: 8
DOI: 10.4172/2325-9655-C1-045

ULTRAVIOLET POLARIMETRY METHOD TO MONITOR CHANGES IN THE OZONE LAYER AND THE EARTH'S CLIMATE

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Changes in the Earth's climate are mainly caused by disturbances in the energy balance of the sun-earth system. The cumulative effect of natural changes and the impact of anthropogenic factors have led to decrease in the ozone layer and global warming on the earth. Study of these factors causes and the determination of their relative contribution is an urgent problem today. Ultraviolet spectrometry from space vehicles is one of the most informative methods in study of the ozone layer. But it does not take into account the effect of polarization in the Earth's atmosphere. It is necessary to obtain data on the physical characteristics of aerosol particles to properly model and predict the processes of changing the concentration of stratospheric ozone. Our experience in studying aerosol components in the atmospheres of the planets of the solar system shows that polarimetry is the most effective tool for modeling and predicting the causes of aerosol variations in the stratosphere of the earth. Ukraine Academy of Sciences is planning a space experiment to collect polarization data in ultraviolet range of spectrum ($\lambda < 300$ nm) from the space vehicle. It will be possible to clarify the mechanisms and rates of formation and destruction of ozone molecules, appearance and disappearance of ozone holes and to develop and adopt more reasonable measures to prevent this phenomenon. The authors' team created a working model of a small-sized ultraviolet polarimeter in the spectral range of wavelengths < 300 nm, which shows the feasibility of this space experiment. Compared with other similar experiments, the proposed method of remote aerosol research from space makes it possible to cut off the influence of the tropospheric component of the atmosphere and the Earth's surface and to isolate the polarization component of the stratospheric aerosol in its pure form for investigation.

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