Chapter 4
Instrument Web Resource for Accumulation and Visualization of Satellite Data on Total Content of CO2 and CH4

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ABSTRACT

Over the past 200 years, anthropogenic activity has resulted in an increase in the concentra-tion of greenhouse gases in the atmosphere of our planet. Many modern scientists are studying and trying to solve the problem of the greenhouse effect - an excessive increase in the tempera-ture of the Earth's surface due to the accumulation of greenhouse gases in the lower layers of the atmosphere. A moderate concentration of the so-called greenhouse gases is necessary because they freely transmit sunlight, but retain a significant part of the thermal radiation, thereby provid-ing heat for the existence of all biological species. But their excessive concentration has become a global problem since the end of the 20th century, since it affects the amount of long-wave radia-tion flowing into space and, as a result, negatively affects the state of the climate of our planet, the state of the habitat of living organisms. The main greenhouse gases - according to the order of the assessed impact on the thermal balance of the planet - experts consider water vapor, methane, carbon dioxide and ozone.

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INTRODUCTION

Over the past 200 years, anthropogenic activity has resulted in an increase in the concentration of greenhouse gases in the atmosphere of our planet. Many modern scientists are studying and trying to solve the problem of the greenhouse effect - an excessive increase in the temperature of the Earth's surface due to the accumulation of greenhouse gases in the lower layers of the atmosphere. A moderate concentration of the so-called greenhouse gases is necessary because they freely transmit sunlight, but retain a significant part of the thermal radiation, thereby providing heat for the existence of all biological species. But their excessive concentration has become a global problem since the end of the 20th century, since it affects the amount of long-wave radiation flowing into space and, as a result, negatively affects the state of the climate of our planet, the state of the habitat of living organisms. The main greenhouse gases - according to the order of the assessed impact on the thermal balance of the planet - experts consider water vapor, methane, carbon dioxide and ozone. Methane (lat. Methanum) - under normal conditions, it is a colorless gas, the simplest hydrocarbon, odorless with chemical formula — CH_4.

It is practically insoluble in water, lighter than air. Its level in the atmosphere is significantly higher than other organic compounds. Experts noted: in the 60s and 70s of the 20th century, the level of methane in the atmosphere increased at a rate of 1% per year. Such growth can be explained by human economic activity. As a result of the increase in methane in the atmosphere, the greenhouse effect increases, since methane absorbs the thermal radiation of the planet at a wavelength of 7.66 microns in the infrared region of the spectrum. With the rapid increase in methane levels, chemical changes occur in the atmosphere, which can cause a deterioration in the environmental situation on the planet.

Methane is not formed chemically in the atmosphere, since a lot of energy is required to synthesize its complex molecules. In this regard, it must be noted that the appearance of methane in the atmosphere occurs due to processes in the lithosphere and biosphere. Experts note that the contribution of methane to the greenhouse process is approximately 9 times less than the contribution of carbon dioxide. But methane is quite dangerous, since a 1% increase in methane concentration has a contribution that is approximately 25 times higher than a 1% increase in carbon dioxide concentration. Methane does not have a significant impact on the planet's climate, but it is an undeniable fact that methane affects the increase in the temperature of the surface waters of the world's oceans. And this, in turn, increases the frequency and strength of hurricanes. Scientists have found that an increase in the temperature of surface ocean waters by 0.5 degrees leads to an increase in the frequency of hurricanes by 40%. Therefore, even a slight increase in temperature can lead to significant meteorological consequences. The situation can only be stabilized by influencing the concentration of greenhouse gases. Scientists see the conversion of methane into carbon dioxide by burning as one of the ways to reduce the environmental burden on the ecosystem (Baker, Bosch, Doney, O'Brien, & Schimel, 2010; Global Carbon Project, 2017).

Degree of Development of the Problem

Researchers have developed various methods and techniques for monitoring. Ground and space systems are used to obtain characteristics of the gas composition. As a result of research in this area, scientists have obtained large volumes of data on the total contents and vertical profiles of the content of ozone, water vapor, carbon dioxide and other components of the planet's gas shell. These developments for solving the problems of interpolation and visualization of satellite information are well described in scientific and specialized literature. However, it must be noted that their application is implemented