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Climate Change and The Latest Scientific Efforts to Understand It

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ABSTRACT

Climate change affects natural landscapes and is being studied based on various scenarios and models. This article examines the impact of climate change on natural landscape complexes of the Republic of Uzbekistan, particularly in the Fergana Depression. It also highlights the measures being taken to mitigate the negative effects of climate change.

Keywords: *climate change, mitigation measures, landscape complexes, scenarios, models, greenhouse effect, aerosol gases*

1. INTRODUCTION

In recent years, climate change has affected all countries. With regard to climate change mitigation, a lot of practical work is being done in many countries to adapt to it and mitigate the effects of climate change. Large-scale work is also underway in our republic to implement the national Green Space project on global climate change and its mitigation, mitigation of the effects of climate change while ensuring food security, prevention of droughts, and degradation of fertile lands.[2,4] Climate change solutions being developed- It is adopted by countries, international organizations and scientific communities to reduce the negative effects of climate change, improve the ecological balance, make more efficient use of natural resources and preserve the purity of nature for the future, as well as the rational use of natural resources. The adoption of a huge number of resolutions and conventions between the countries of the world on climate change and its mitigation, aimed at protecting the atmosphere, hydrosphere, biosphere and lithosphere from various negative consequences that may occur in the future.[3,4]

1. Model of the SSSM-Canadian Climate Center;
2. UKMO is a model of the United Kingdom Meteorological Office;
3. GFDL model of the Laboratory of Geophysical Fluid Dynamics of the USA;
4. Giss is a model of the United States Goddard Institute for Space Research.

The SSSM — Canadian Climate Center model (SSSM — Canadian Climate Center model) is a scientific model used to analyze and predict climate change in Canada. This model is of great importance for determining the state of climate and weather, as well as for predicting future climate changes. By studying the concentration of greenhouse gases in the atmosphere, the SSSM explores their impact on the climate. It also takes into account the dynamics of the oceans, the atmosphere and their interactions.

The model is used to simulate ongoing climate change based on many climate scenarios. For example, computer models are used to assess the effects of global warming, precipitation, temperature, and winter season distribution.Climate change forecasting is carried out with the aim of rational use of biological, energy, and water resources and their protection.[5,6] The SSSM was developed to study climate change in large-scale geographic regions, including Canada and surrounding regions, with a model based on various climate change situations predicting what changes could occur over the course of 100 years.[1,3]

The UKMO – United Kingdom Meteorological Office Model is a climate model developed by the Bureau of Meteorology that is widely used internationally to analyze climate change, global warming, and atmosphere-ocean processes. This model is used to study the influence of the mutual exchange of substances and energy between the atmosphere and the ocean on the process of climate change. The main function of this model is to study the circulation of precipitation in the atmosphere-ocean-lithosphere.In this action, SO2 gases, aerosols, cloud cover, and the effect of solar radiation are mainly studied. This model is modeled by climate change over 100 years. This model predicts climate change in the short and long term, taking into account human activity and natural factors.[2,3]

GFDL is a model of the Laboratory of Geophysical Fluid Dynamics in the USA (English: Laboratory of Geophysical Hydrodynamics – GFDL) - It is an integrated complex climate model used to model the global climate, taking into account the atmosphere, ocean, Earth's surface, glaciers and their interactions.This model simulates atmospheric circulation, sea currents, cloud levels and moisture circulation in the trophosphere, greenhouse gases and aerosols, and the effects of solar radiation.The difference between this model and other models is the tilt of the globe, glaciers in polar and high-altitude areas are also studied taking into account the penetration and spread of solar radiation caused by the bubble of the globe.[9,10]

The GFDL model is predicted based on motion and heat transfer from the upper atmosphere to the ocean floor. This model estimates global increases in air temperature in natural areas, the expansion or reduction of forests, water resources, and possible natural disasters.[1,10] Giss model of the United States Goddard Institute for Space Research (English: GISS - NASA Goddard Institute for Space Studies Climate Model) is a climate model developed by the Godward Institute for Space Studies at NASA (United States Aeronautics and Space Agency). It is designed to detect, model, and predict long-term changes in the Earth's atmosphere, oceans, glaciers, and cloud structures. This is achieved by using a model in NASA's global Climate Analysis and by analyzing IPCC (Intergovernmental Panel on Climate Change – Intergovernmental Panel on Climate Change) reports and climate change forecasting. This model examines global studies of climate change, changes in the Earth's atmosphere under the influence of natural and anthropogenic factors, the amount of greenhouse gases and aerosols, the greenhouse effect and factors affecting the ozone layer. Within the framework of ocean-atmospheric exchange, moisture, earth's surface temperature, precipitation, glacier spread and melting, greenhouse gases and aerosols are studied and predicted. In this model, the results of the analysis are published by comparing and contrasting with a specific and historical database compiled from space observations. [7,8,9]

Table 1 Climate change models

Model name	State / Institution	Full Name	House functions	Advantages	Application sectors
GISS	USA (NASA Goddard Institute)	Goddard Institute for Space Studies climate model	Atmosphere , ocean , clouds , glaciers And aerosols difficult in a way models	High reliability , NASA data With integration	Global forecasts, IPCC, NASA research
UKMO	Big United Kingdom (Meteorological Office)	The UK Met Office Hadley Centre Model (HadGEM)	Atmosphere-ocean relations , oiliness And temperature changes accuracy With models	High accuracy , regional level in forecasts effective	Europe , Africa, Central Asia research
CCCM (CCCMa)	Canada (CCCma – Environment Canada)	Canadian Climate Centre for Modelling and Analysis (CGCM)	Greenhouse gases And Earth surface heat balance good does it matter	Cold regions For transparent forecasts , canada And Arctic in accordance with strong	Arctic , North America , IPCC
GFDL	USA (NOAA - Princeton University)	Geophysical Fluid Dynamics Laboratory Climate Model	Atmosphere , ocean currents And liquids dynamics deep studies	Water resources , sea level And ocean temperatures in accordance with strong model	Water balances , sea level change

Based on the developed models, it is necessary to develop for areas with arid climates. Because the impact of climate change on the terrain, the impact of mountain landscapes, as well as on the climate of countries located in the interior of the continent, it would be advisable if they were considered on models.[3]

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