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THE CONTRIBUTION OF HUMAN ACTIVITIES TO CLIMATE CHANGES

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Summary

Some of the components of the climate system, the oceans and biosphere primarily affects the concentration of greenhouse gases in the atmosphere. Plants take CO2 from the atmosphere and convert it in the process of photosynthesis, carbohydrate. In the industrial era, human activities have contributed to increased concentrations of greenhouse gases in the atmosphere. In addition, human activities contribute to climate change by altering the concentration of aerosols and clouds cover. Greatest contribution has fossil fuel that releases CO2 into the atmosphere. Impact of human activities on the climate is much higher than that of natural processes. The purpose of this paper is to show how the main compounds resulting from human activities contribute to climate change.

Keywords: *climate change, , climate regions, greenhouse effect, global temperature, precipitation*

INTRODUCTION

Intergovernmental Panel on Climate Change - was established in 1988 by the World Meteorological Organization (WMO) and United Nations Environment Program. According AMN IPCC's role is to assess, in an objective and transparent manner, scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of climate change due to human activity induced potential effects of climate change and adaptation options and mitigation of these effects.

MATERIALS AND METHODS

Climate Change (IPCC- Intergovernmental Pannel on Climate Change) means a variation statistically significant or average state of the climate or in its variability, persisting for a longer period of time, is due to internal processes, pressure (forcing) or external changes major anthropogenic atmospheric composition and land use.

Definition is accepted United Nations Framework Convention on Climate Change: Climate change attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is added to natural climate variability observed during comparable periods.

Intergovernmental Panel on Climate Change (IPCC) released in early 2007, three Working Groups contributions to the Fourth Assessment Report Global climate change presents the results of scientific research, observations on the effects of climate change at global and projections made on the basis of using climate models.

The main conclusions of this paper are:

- warmest 15 years were registered globally in the last two decades, in 1998 and 2005 being the warmest;
- Europe-wide temperature increased by about 1 degree Celsius, rather than the overall rate of warming of 0.74 degrees Celsius;
- greenhouse gas concentrations in the atmosphere exceeds the values recorded in the last 650,000 years and projections indicate an unprecedented growth;
- by 2100, global temperature will increase by 1 to 6.3 degrees Celsius and global sea level will rise by 19 to 58 cm;
- to increased frequency and intensity of extreme weather events (storms, tornadoes, hurricanes), changed precipitation patterns and regional climate (heat waves, droughts, floods), and trends indicate a gradual increase in the coming years;

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- reduced thickness and extension of glaciers in the Arctic (by 40% in the last 30 years) and can complete their extinction by 2100;
- retreating glaciers in mountain areas (Alps, Himalayas, Andes) and the possibility disappearance of more than 70% of continental glaciers;
- development of mutations in bio - systems: Early flowering plant species, extinction of amphibian species etc..

The report recommends the need for policies and measures to reduce emissions of greenhouse gases (carbon dioxide, methane, nitrous oxide, hydro fluorocarbons, per fluorocarbons, sulphur hexafluoride - regulated by the Kyoto Protocol), as without these measures increase global temperature worryingly high. Limiting average global temperature increases, the maximum 2 ° C above the pre - industrial levels by 2100, requires the reduction of greenhouse gas emissions by 2050 by at least 50% from current levels.

RESULTS AND DISCUSSION

Factors driving climate change. Climate system evolves in time under the influence of its own internal dynamics and because of external factors affecting climate change factors called "forcing - s".

External factors include natural phenomena such as volcanic eruptions and variations in solar activity and changes induced by human activity.

Solar radiation plays the most important role. There are three basic ways that can change the radiative balance of the Earth:

- due to variations in incident solar radiation as a result of the changes which suffers orbit or solar activity itself;
- by changing the fraction of reflected solar radiation (the albedo), this spending is due to the coverage of clouds, particles suspended in the atmosphere (aerosols) or soil cover (vegetation, snow, ice);
- impaired long-wave radiation emitted to space by the Earth's surface, for example by changing the concentration of greenhouse gases.

Climate responds to these changes in turn either directly or indirectly through a variety of mechanisms to feed - back.

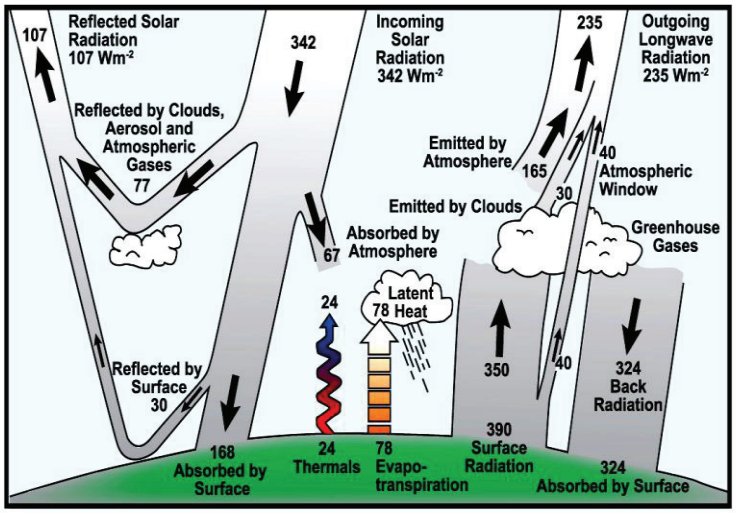
The amount of solar energy reaching the upper atmosphere every second surface of 1 m2 during the day is about 1370 watts and the amount of energy per square meter per second, averaged over the globe, is about ¼ of the (342 W/m2). About 30% of solar radiation is reflected back into space (Fig.1). Approximately two thirds of this reflectivity is due to clouds and aerosols. The rest is reflected by surfaces covered with snow, ice, and desert. Dramatic change of reflectivity aerosols occurs when major volcanic eruptions occur. They influence the climate a year or two before being driven to the ground by rainfall. Some aerosols resulting from human activities also reflect solar radiation.

The energy that is not reflected is absorbed by Earth's atmosphere and Earth's surface (about 240 W/m2). Earth radiates to turn about the same amount in space (long-wave radiation, permanently). To issue this energy emitting body temperature, in this case Earth, should on average - 19 ° C, much less than is actually Earth (about 14 ° C). Why the Earth's surface "appears" much warmer is the presence of greenhouse gases (natural greenhouse effect). Clouds, on the other hand, exerts a similar effect to that of greenhouse gases. However, this effect is offset by their reflectivity so that, on average, clouds tend to have a cooling effect on the climate, although locally may be perceived as warming effect. Human activities such as burning fossil fuels, deforestation, and so on, leading to increased greenhouse effect.

Contribution of human activities to climate change Some of the components of the climate system, the oceans and biosphere primarily affect the concentration of greenhouse gases in the

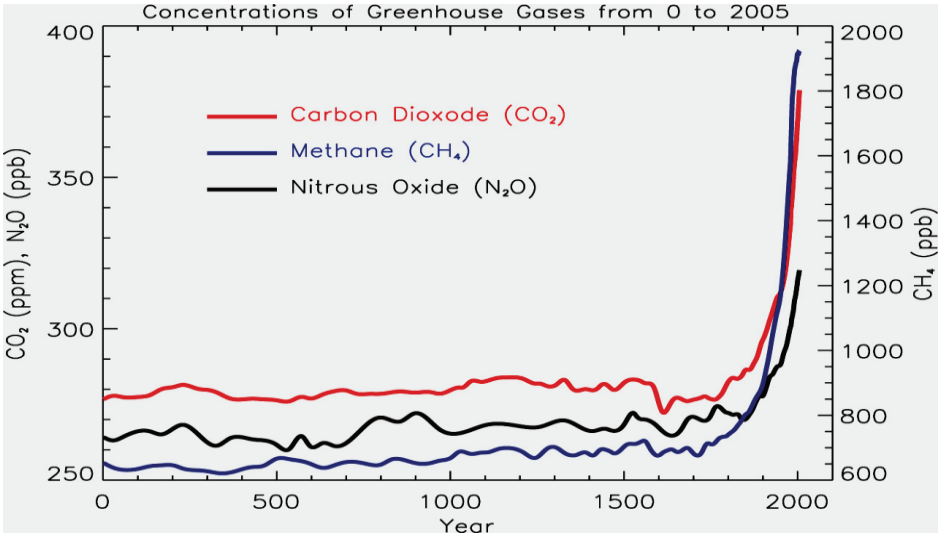
atmosphere. For example, plants take CO2 from the atmosphere and convert it in the process of photosynthesis, carbohydrate.

Figure 1. Radiative balance at the Earth's surface



In the industrial era, human activities have contributed to increased concentrations of greenhouse gases in the atmosphere (Fig.2). In addition, human activities contribute to climate change by altering the concentration of aerosols and clouds cover.

Figure.2 The atmospheric concentration of major greenhouse gases with high life time in the last 2000 years



Greatest contribution has fossil fuel that releases CO2 into the atmosphere. Impact of human activities on the climate is much higher than that of natural processes.

Principal components as a result of human activity, which plays an important role for climate change:

- Carbon dioxide (CO2), resulting from the combustion of fossil fuels for transport, heating, cement production, deforestation, etc.. , Is also released natural processes;
- Methane (CH4) - a result of agricultural activities, natural gas distribution, waste disposal, and natural processes occur, especially in areas where there are swamps;

- Nitrogen oxides (N2O) - are emitted as a result of nitrogen fertilization and burning of fossil fuels and natural processes in the soil there and oceans issues (N2O);
- Halocarbon (combinations of fluorine, bromine, chlorine, carbon and hydrogen) exist naturally in very small quantities, the main product of human activity CFC11 and CFC12 are (used as coolants and other industrial processes), their concentration declined in recent years as a result of international conventions on the protection of the ozone layer;
- Ozone (O3) - generates and continuously destroys the atmosphere as a result of chemical reactions under the action of UV radiation, in the troposphere, human activities have increased the amount of O3 by releasing CO, N2O and other substances that react chemically and produce O3;
- Water vapour - considered the most abundant and important 'gas' greenhouse, human activities have only a small direct impact on the amount of water vapour in the atmosphere, indirectly, people have the potential to substantially affect the amount of water vapour by climate change: a warmer atmosphere contains more water vapour;
- Aerosols - some are emitted directly into the atmosphere while others are formed of various other compounds, human activities responsible for the presence of aerosols in the atmosphere are:
    - fossil fuel and biomass burning (which made to increase the concentration of sulphur compounds, those organic and carbon black)
    - surface mining and
    - other industrial processes;

Natural sources of aerosols are dust from the surface, breaking waves, biogenic emissions, and volcanic eruptions.

CONCLUSIONS

Some aspects of current climate change are unlike the previous periods. At the same time, the concentration of CO2 in the atmosphere has reached a record high relative to the last half million years and this was an exceptional rate. Current global average temperatures are higher than they were during at least the last centuries, perhaps even more than a millennium. If warming continues in this way, changes may be unusual in terms of geological time. Another unusual aspect of current climate change is that, if past changes have natural causes warming of the last 50 years is mainly attributable to human activity.

When comparing the current climate of past ages, to consider three aspects:

- choice of variables for comparison: greenhouse gas concentration, temperature and other climatic parameter (absolute value or growth rate);
- local changes will not be confused with global, sometimes can be much higher than global;
- should be made distinctions between time scales: climate change over millions of years can be much higher and may have different causes (eg moving continents) than climate change at the scale of hundreds of years.

Finally, in the 21st century warming can only be explained by natural climate variability.

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