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# Conceptual Approach of Regional Problem of the Global Climate Change

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**Abstract**

The Earth's climate system is the consequence of a complex interplay between external solar forces and the internal interactions of atmosphere, oceans, land surface, biosphere and cryosphere. Human activity is a potential factor influencing change in the global system by altering the chemical composition of atmospheric concentrations of powerful greenhouse gases, mainly $CO_2$ and $CH_4$. How and what should be undertaken to minimize such impact? Space-based technology is, to a point, able to accurately observe and sense the whole Earthly system and to understand the processes involved in the Earth's climate. This suggests the following projects; to document and understand the interrelation between Sun and Earth as an external force acting on the Earth's climate and also to seek a better understanding of the Earth's intricately linked internal processes including those of global water, energy and carbon cycles. Together, advances in computing and information systems technologies, and modern techniques in data assimilation, diagnostic and prediction models, all provide a powerful combination of tools for understanding the Earth's system and applying knowledge and tools to the management of natural resources and mitigation of natural hazards. Cooperation can likely be developed within the framework of existing programmers. There is no doubt that contributions to climate change are on a global scale, necessitating the engagement of states and international institutions: the Global Monitoring for Environment and Security (GMES) programme - a joint initiative of the European Commission (EC) and the European Space Agency (ESA), is designed to establish a European capacity for the provision and use of operational information for global monitoring of the environment. And the United Nations Platform for Space-based Information for Disaster Management and Emergency Response – UN-SPIDER - is another opportunity for the enhancement of the above-mentioned projects for the establishment of international cooperation.

**Keywords:** Space technology, climate change, global monitoring system, GIS, data processing

## Introduction

Future applications in space promise revolutionary improvements to the quality, style and culture of our lives. A fundamental element of the National Space Society's vision is its commitment to promoting the use of space resources for the benefit of humanity. Undoubtedly, many resources will be discovered in the future on asteroids, planets and, possibly, the moons of our solar system and will be exploited. However, resources in space are not limited to mining materials and lunar soil. Space itself is a valuable resource, as a host for satellites able to see and efficiently communicate with large areas of the Earth's surface (Gérardine Meishan, 2008).

This resource has spawned many applications of space systems that, every day, improve life on Earth. Some of the space programme's greatest success stories offer even greater promise for the future. There is an important factor to keep in mind when we talk about the use of space to improve life on Earth (Rustamov et al., 2011).

Space's contributions to our day-to-day needs are sometimes referred to as "space spin-offs". This term more appropriately describes ancillary uses of technologies developed for space systems, rather than direct use of the systems themselves for their original purpose. Direct uses of space technology are more accurately called "space applications".

The fact is that selection of facilities for high accuracy and efficient information towards an understanding of the processes is very important to the achievement of the desired results. This is especially so when a wide range of data sources need to be assembled quickly and processed for due clarification of consequences occurring.

Here, the advances in space technology become useful (Ashumova et al. 2018; Okon, 2017) for studies of climate change within a regional framework.

## Results and discussion

### *Approach Area*

It following options should be taken into consideration:

Space applications are a perfect tool for the development of a methodology to monitor the processes of climate change;

Excellence of outcome, with high accuracy and relatively immediate feedback;

The integration of different countries' capacities would be much improved on matters relating to: natural resources, investigations, natural disasters, climate change and security and many other vitally important problems.

It is important to establish and communicate how to implement the projects proposed for the achievement of best results. It may be suggested that there is clearly a great need for the collection of appropriate processed data and the main issue is to share the data with the communities who need it.

A further step could be to invite input from different countries, taking on the necessity of integration within the Black and Caspian Seas region as a testing ground for the identification of global climate changes. There is no doubt that the involvement of Central Asia countries would be highly desirable for a comprehensive understanding of climate change problems and global impacts, thus including a broad area of Earth and opening up a unique opportunity for data collection and processing, with excellent outcomes for the aims and targets proposed.

To adopt the approach suggested, engagement with the countries of the Black Sea and Caspian Sea region (Fig. 1) would be desirable.


**Fig. 1. Black and Caspian Seas Region (BCSR) Partnership Countries**

From these objectives:

An important issue of the global climate change investigation is to:

Identify causes of impacts on climate change and their consequences.

Therefore: the necessity to collect and process appropriate data from space and field investigations and integrate it into a coordinated system of geographical information that is easily accessible for future needs.

Building a huge range of sources, particularly within the regional framework indicated, with valuable consequences for climate change.

The region has a wide range of industrial sectors, water pools, land use/land cover capacity, environmental impacts and many other aspects to make the BCSR a region of great interest for such a project.

Consideration should be given to the principal impacts of climate change. The region's oil and gas infrastructure is one of these aspects impacting on natural processes. Fig. 2 reflects this infrastructure within the region.


**Fig. 2. Map of the Oil and Gas infrastructure in the Black and Caspian Seas Region**

The collection of appropriate data on a regional scale may be divided into two stages of country engagement. The first stage of the project's implementation may be undertaken within the following countries: Turkey, Romania, Bulgaria, Ukraine, Georgia, Moldova, Azerbaijan, Kazakhstan, Uzbekistan, Kyrgyzstan, Tajikistan, Turkmenistan, Russia and Iran.

The second stage could embrace the following countries: Bosnia, Slovakia, Hungary, Greece, Croatia, Slovenia, Serbia, Belarus, Macedonia and others.

How to manage the process. Fig. 3 proposes a preliminary structure for project implementation.

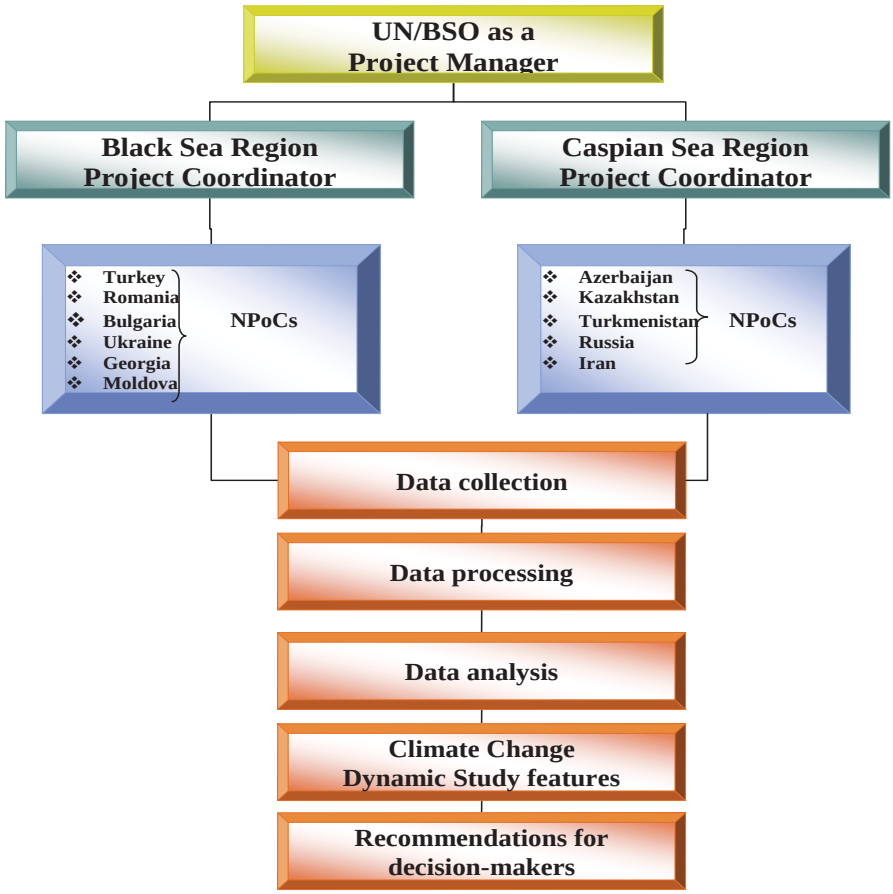


**Figure 3. Organizational Chart and Process proposed for the project**

**Project Implementation:**

The following approach to project implementation may be considered:

Needs and opportunities in the development of global and regional reviews and research into global climate change: the creation of alliances between institutions to improve their effectiveness and coverage of urgent issues; the facilitation of

collaborative national research networks; stimulation to create new centres and networks where necessary; mobilization and coordination of resources.

Note that the eight Millennium Development Goals (MDG) were adopted by the international community as a framework for the development work of over 190 countries divided into ten regions. They are: eradicate extreme poverty and hunger, achieve universal primary education, promote gender equality and empower woman, reduce child mortality, improve maternal health, combat HIV/AIDS, malaria and other diseases, ensure environmental sustainability and develop a global partnership for development. The targets for implementation of each of these goals are reflected in the Millennium developments.

The Millennium goals and targets are sources for the successful investigations of problems relating to global climate change. We must strengthen global cooperation and redouble our efforts to reach the MDGs and advance the agenda for broader development. In the meantime, the use of existing international communities involved in global monitoring of the Earth and atmosphere studies, with applications of recent advances in space technologies and methods, may provide and develop extensive opportunities for study and exploration of the impacts of climate change.

## Conclusion

It is evident that global phenomena demand the use and application of the tools available to contribute significantly to any solution. The problem of global climate change is one with a large scale of impact on human society and needs to be investigated with tools to collect and process the appropriate data. Thus, the use and application of space technology, particularly Remote Sensing methods and GIS technology needs to be applied to this purpose. Taking into account the seriousness of the problem it is my vision that success in these developments depends how well integrated and engaged are the countries in the various regions in data collection, processing and sharing between participants.

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