

The Global Warming Research Initiative was set up to answer such questions as shown in the right box. The Initiative's primary objective is to determine what scenarios of greenhouse gas emissions should be set to minimize increases in the concentration of greenhouse gases in the atmosphere that harm both humans and the global ecosystem, with a hierarchical structure of a series of questions. Refinement of the hierarchy of key questions resulted in establishing programs for Monitoring and Process Study; Projection Modeling and Climate Change Study; Impact and Risk Assessment; Response Policy; Greenhouse Gas Fixation and Sequestration; and Anthropogenic Greenhouse Gas Emissions Reduction.

Global Warming Research Initiative

Global warming is one of the most serious global environmental issues facing humankind. There are still many questions for science and technology to respond to.

Is the Earth really warming?

How CO₂ emissions and carbon cycle control global warming?

Will global warming worsen and cause irrecoverable damage?

If so, how can such problems be avoided?

What preventive measures can be taken?

Climate Change Research Area and Its Four Programs

The research fields were integrated into two categories to efficiently promote the initiative. The first category, Climate Change Research Area (CCRA), consists of four programs: the Monitoring and Process Study; Projection Modeling and Climate Change Study; Impact and Risk Assessment; and

Response Policy. The second category, the Mitigation Technology Development Area, consists of two programs. Hereafter, we introduce only the Climate Change Research Area as the two areas are independent, but with close collaboration between them.

Program for Monitoring and Process Study

The goal is to establish an integrated monitoring system of global warming focused primarily on the Asia-Pacific region and data archives and delivery networks. Several ministries have promoted various land, ocean and atmospheric monitoring projects, including AsiaFlux, by using satellite, aircraft, ground stations, and ocean platforms. Further efforts are necessary to establish a structure responsible for archiving data from more expanded and improved monitoring, and to enhance the system for managing quality assurance and accuracy of the observation data.

Program for Projection Modeling and Climate Change Study

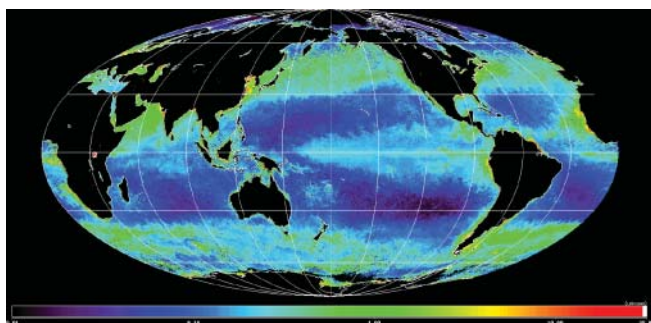
The goal is to project climate changes due to global warming with higher precision by clarifying the mechanism of the global environment change and elaborating projection models for future greenhouse gas concentration and for climate changes. The ministries relevant to the Program are then required to promote the development of their original climate models with their own specialized bases and/or in coordination with each other, and implement their projections.

Program for Impact and Risk Assessment

The goal is to assess the overall influence of global warming and to propose appropriate measures to avoid risks. The program promotes and implements joint research to assess the impacts of climate change on the ecosystem, disaster prevention/land conservation, water resources, food, forests, industry/energy, and health/civil life, based on the knowledge obtained from the two programs listed above. These efforts will clarify vulnerable sectors and regions with greater risks of global warming. The final goal of this program is to explore the optimal comprehensive strategy for adaptation and mitigation of global warming.

Program for Response Policy

The goal is to propose a counter scenario to prevent global warming. The program also includes the development of a standard methods for evaluating the effectiveness of global warming mitigation technologies, estimation of future socioeconomic tendencies and the effects of relevant measures to be taken, clarification of the adaptation and mitigation strategies, depending on the climate scenario, and establishment of international consensus-building techniques.



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Fig. 2. Variation of surface chlorophyll concentration in the global ocean (Japan Aerospace Exploration Agency (JAXA) and National Aeronautics and Space Administration (NASA)).



Fig. 3. Earth Simulator, a supercomputer system developed by JAXA, Japan Atomic Energy Research Institute, and Japan Marine Science and Technology Center, provides the highest performance in the world for climate modeling.