Toward a sound and sustainab

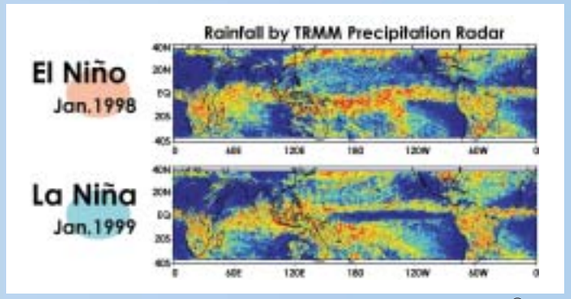
Program for integrated observation of the global water cycle

Comprehensive, coordinated, and sustained global observation

The water cycle varies globally as well as locally. It also varies over time in both the short term and the long term. These variations have significant effects on a wide range of phenomena that operate on spatial and temporal scales. Comprehensive and long-term systems for monitoring the water cycle in the atmosphere, on land, and in the ocean should be established by integrating local and satellite observations with systems that collect data on socio-economic water-related issues. This will require international coordination, cooperation between research communities and operational organizations, and enhanced capacity for sustained observation and effective use of data.

Data integration is the key to improved understanding and modeling

To effectively use the enormous amount and variety of water cycle data that will be collected, we must develop advanced data integration systems that have state-of-the-art database and mining functions as well as data assimilation functions for filling in gaps in the data. To maximize the social benefits of the data, the systems should be able to convert unrefined data into usable information that can be shared worldwide. Such systems will combine advanced geographical information systems with data integration systems and be able to merge natural scientific information with socio-economic metrics.



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For Sound Decision Making & Societal Benefits

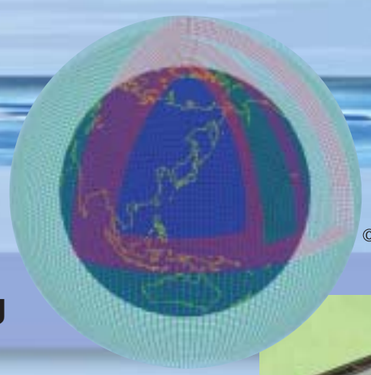
Natural Scientific Information	Data to Information	Socio-economic Information
• In-situ Observations • Satellite Observations • Model Outputs	• Integration • Interpretation • Interface	• Population/ Food • Water Use/ Land Use • Hazard Map

Program for integrated observation of the global water cycle

This program promotes systematic observation activities (satellite observations, marine observations, land surveys and monitoring, etc.) and develops a global system of water cycle observations that enable mutual use of observational data. It also promotes the accumulation of data, etc., in the monsoon areas of Asia.

Overall g the Global W Research I (GWC

The GWCRI provides scientific logical foundation for establis methods that can avert or mi of changes in the supply, dema ter, and for achieving sustaina future. Based on this knowl has developed optimum wa ods for the Asian region. I goals, the GWCRI has fo grams that are integra Global water cycle



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Program for water cycle modeling

Using modeling to improve the precision of quantitative prediction

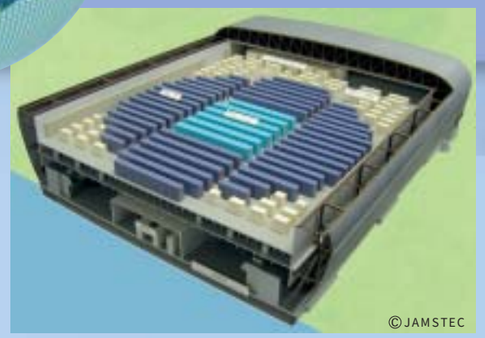
This program facilitates super-computer based numerical modeling for quantitatively predicting variability in the global water cycle, with emphasis on models for precipitation, evapotranspiration, and river flow. Variability in water use by human activities must also be considered.

From short-term to long-term, and from local to global scale

Short-term forecasts, ranging from a few hours to tens of days, are needed to mitigate floods and other water related disasters, while long-term predictions, ranging from a few years to decades, are needed to effectively utilize water resources. An important part of the measures against floods or droughts are long-term predictions of average values and year-to-year amplitudes. Models are needed for predicting detailed changes of precipitation and evapotranspiration at regional scales and the effects of human activities, such as dam building, irrigation, and land use. Large-scale models are needed for projecting global climate changes.

Predicting various aspects of the Asian water cycle

The water cycle and the water usage pattern in Japan and other parts of Asia have several unique characteristics, including monsoons and rice paddies. These vary by region and river basin, and extend from the rainforests in Southeast Asia to the dry areas in Northeast Asia. Thus, both numerical modeling and forecasting of the water cycle must be region-specific.



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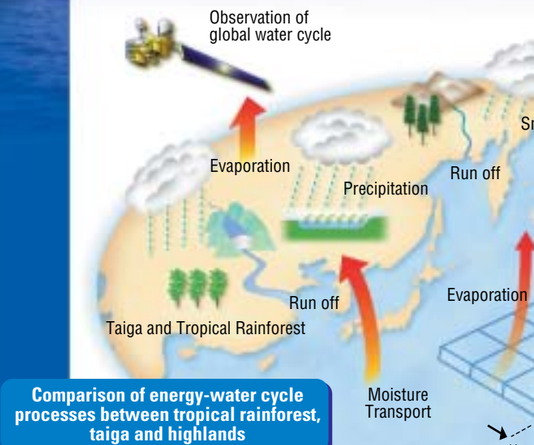
Program for water cycle modeling

This program develops a model for projecting water cycle changes associated with fluctuations in the supply and demand of water and with climate changes. It also creates a scenario for analyzing the trends of human activities that affect water circulation so as to form the basis for a model capable of projecting water cycle changes and accompanying environmental changes.

Advanced observations through data assimilation

Data assimilation integrates observations into a numerical model. It includes remote sensing measurements by satellites as well as other types of observations from around the world. Data assimilation produces valuable information for understanding the water cycle.



Comparison of energy-water cycle processes between tropical rainforest, taiga and highlands