

EARTH SIMULATOR



The Earth Simulator Center

Message from Director-General



The birth of the Earth Simulator has given us two tremendous gifts in our lives.

The first gift which I consider is the new methodology of research which lacked in the 20th century science, enabling us to clarify the problems regarding the whole

evolving process with myriad of factors entwining with one another. Since Descartes and Newton in the 17th century, Science has been in a direction of breaking down the whole into pieces for more than 300 years, in order to understand nature and its processes, principles, and rules composed of basic elements.

With the Earth Simulator, we are now able to search in fields where no intellectual creation of humankind was ever possible, being able to understand the Earth with all elements entangling together simultaneously, from micro processes of how clouds or snow has been formed, to macro processes of atmospheric circulation, as just the way the Earth is.

The second gift I believe is the tool for us to predict precisely of how the global environment will be changed from now on. This directly influences our daily lives.

How will our mass consumption, such as automobiles, airplanes, electric devices and chemical products which we have created, influence the futurity of global environment? Although we have been faced with various forms of highly unpredictable events such as earthquakes or global warming phenomena, we had never a measure of how to accurately predict what is going to happen in the future.

By means of Earth Simulator, we have come to a point where we can predict the future by recreation of Earth, basing from the present to distant past.

I wish to contribute to ensure people's lives and properties from natural disasters and environmental destructions, and bring forth a harmonized relationship with our mother Earth.

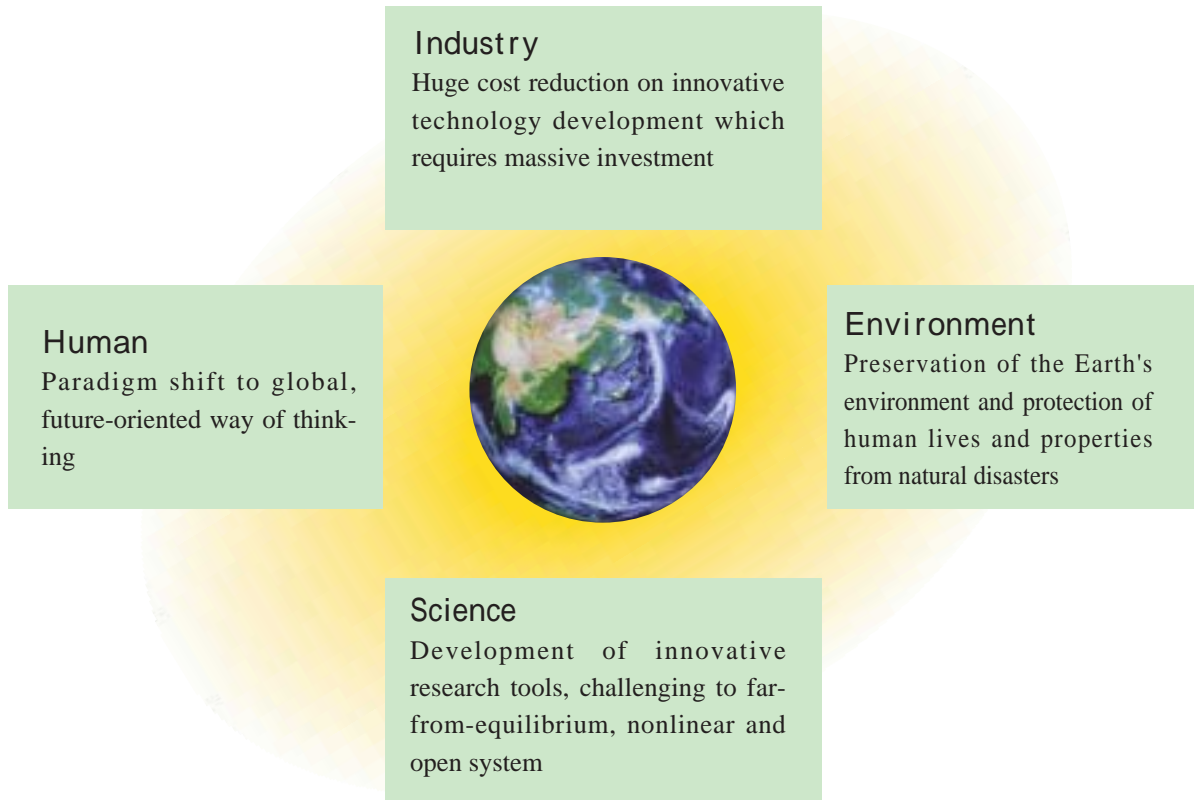


Prof. Tetsuya Sato
Director-General of the Earth Simulator Center
August 2002

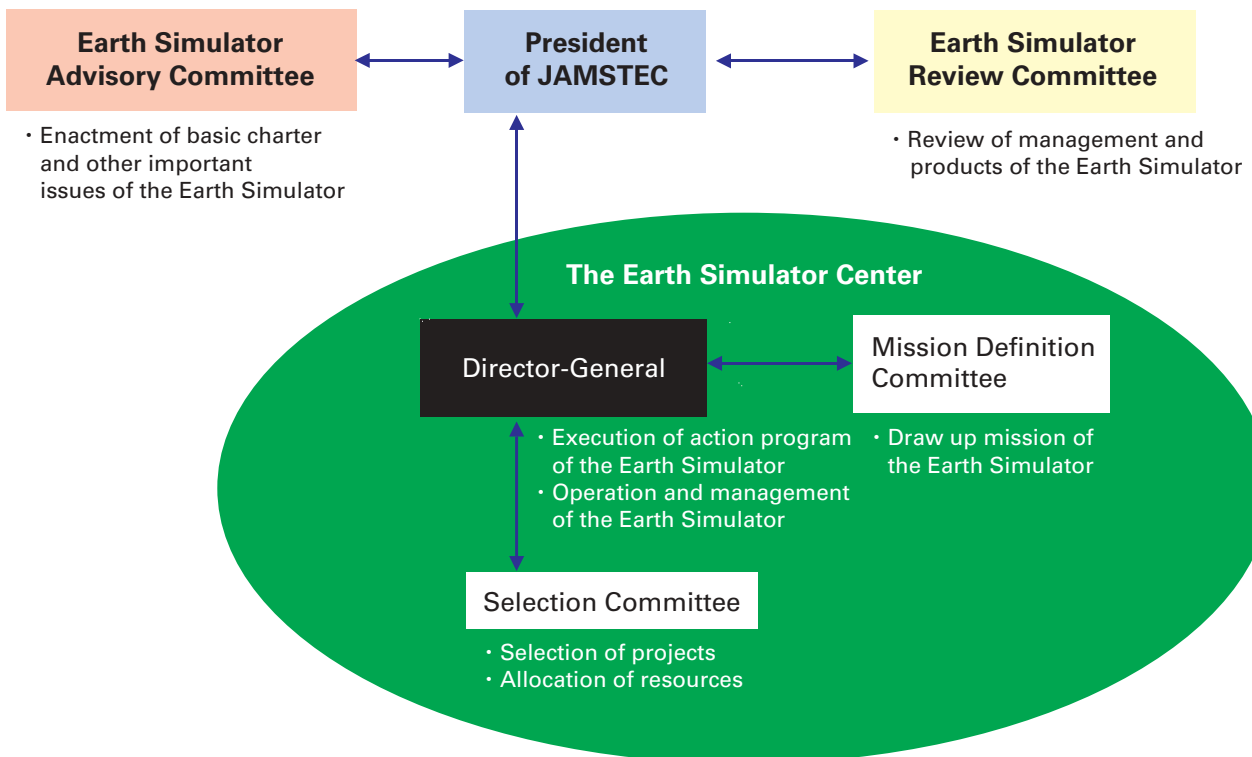
Mission of the Earth Simulator

- Quantitative prediction and assessment of variations of the atmosphere, ocean and solid earth.
- Production of reliable data to protect human lives and properties from natural disasters and environmental destructions.
- Contribution to symbiotic relationship of human activities with nature.
- Promotion of innovative and epoch-making simulation in any fields such as industry, bioscience, energy and so on.

Earth Simulator's Impact on Society



Managing System of the Earth Simulator



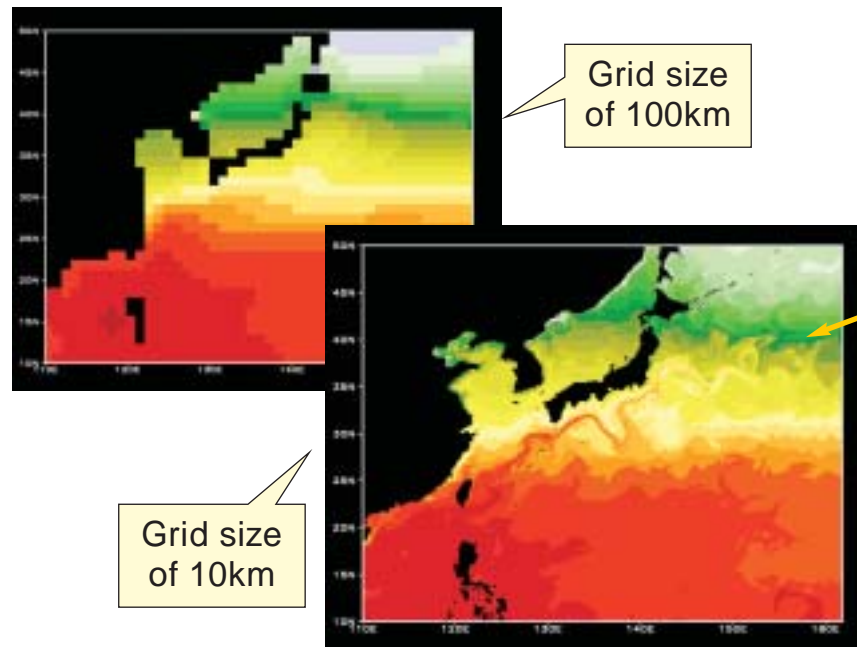
Starting Up the Earth Simulator

Operation of the Earth Simulator began in March 2002.

The Earth Simulator has already produced promising results through the ocean and atmospheric global simulations with an extremely high resolution of 10 km horizontal distance, which would place our hopes on reliable prediction of climate changes.

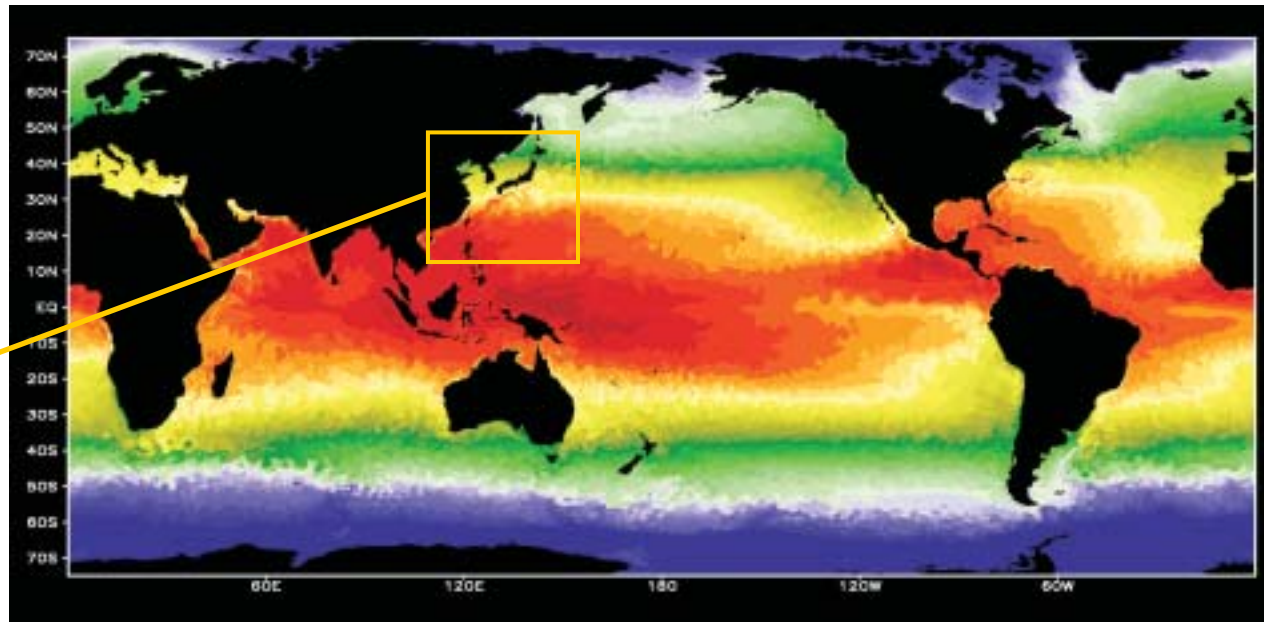
Comparison between Two Simulation Results of Low (100km) and High (10km) Resolution Grid Size.

Close-up snapshot of sea surface temperature near Japan.

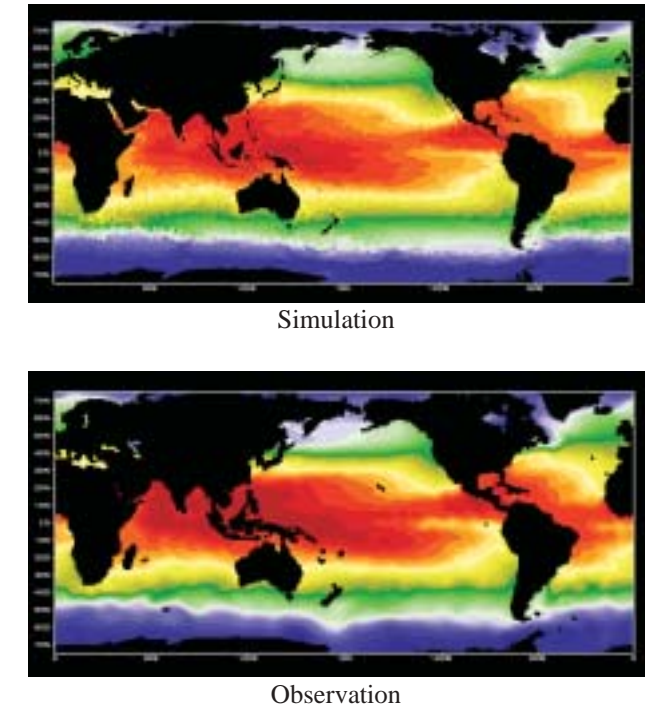


Oceanic Global Simulation

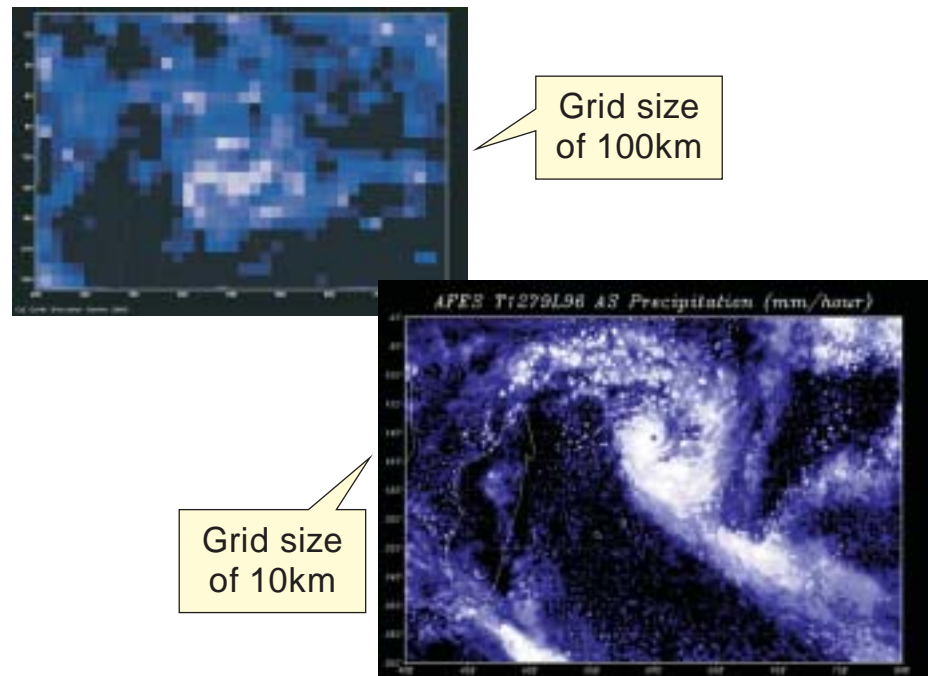
A result of the oceanic global simulation. Colored snapshot of sea surface temperature on a summer day. Higher temperature is shown in red, and lower temperature in purple.



Comparison between Earth Simulator's Result (upper) and Observation (lower)



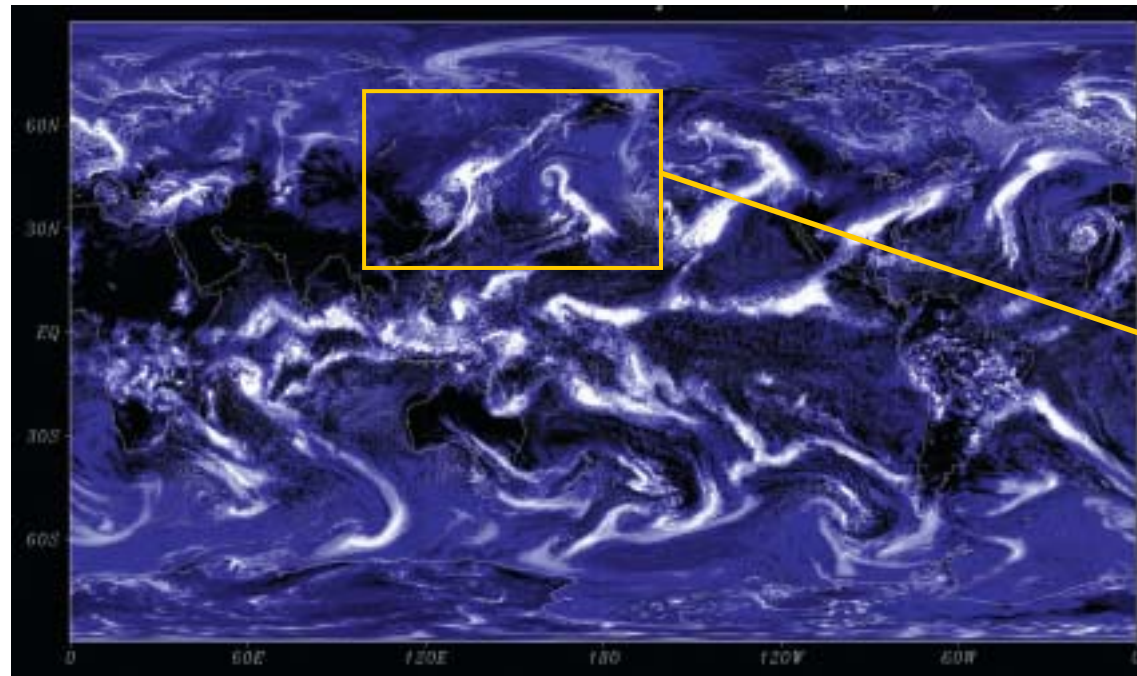
Close-up of Cyclone near Madagascar



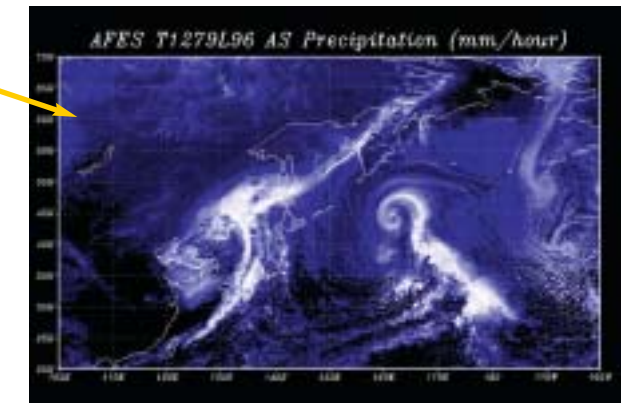
Atmospheric Global Simulation

Snapshot of the atmospheric global simulation in winter.

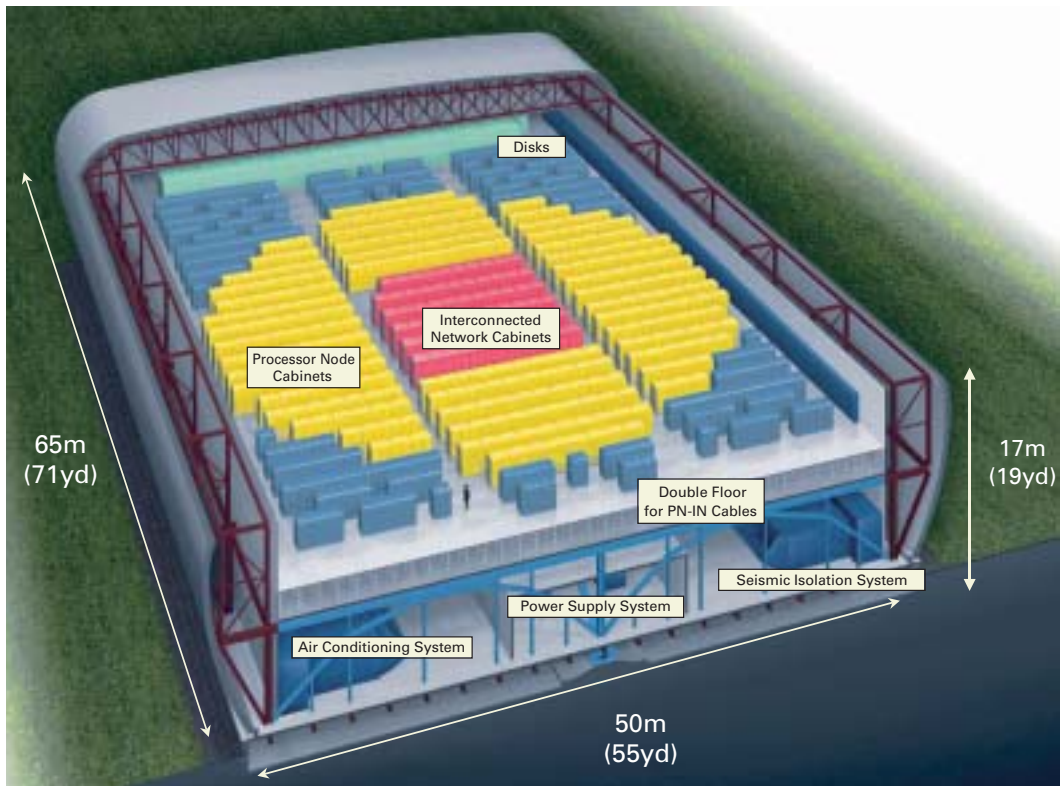
Higher precipitation is shown in white.



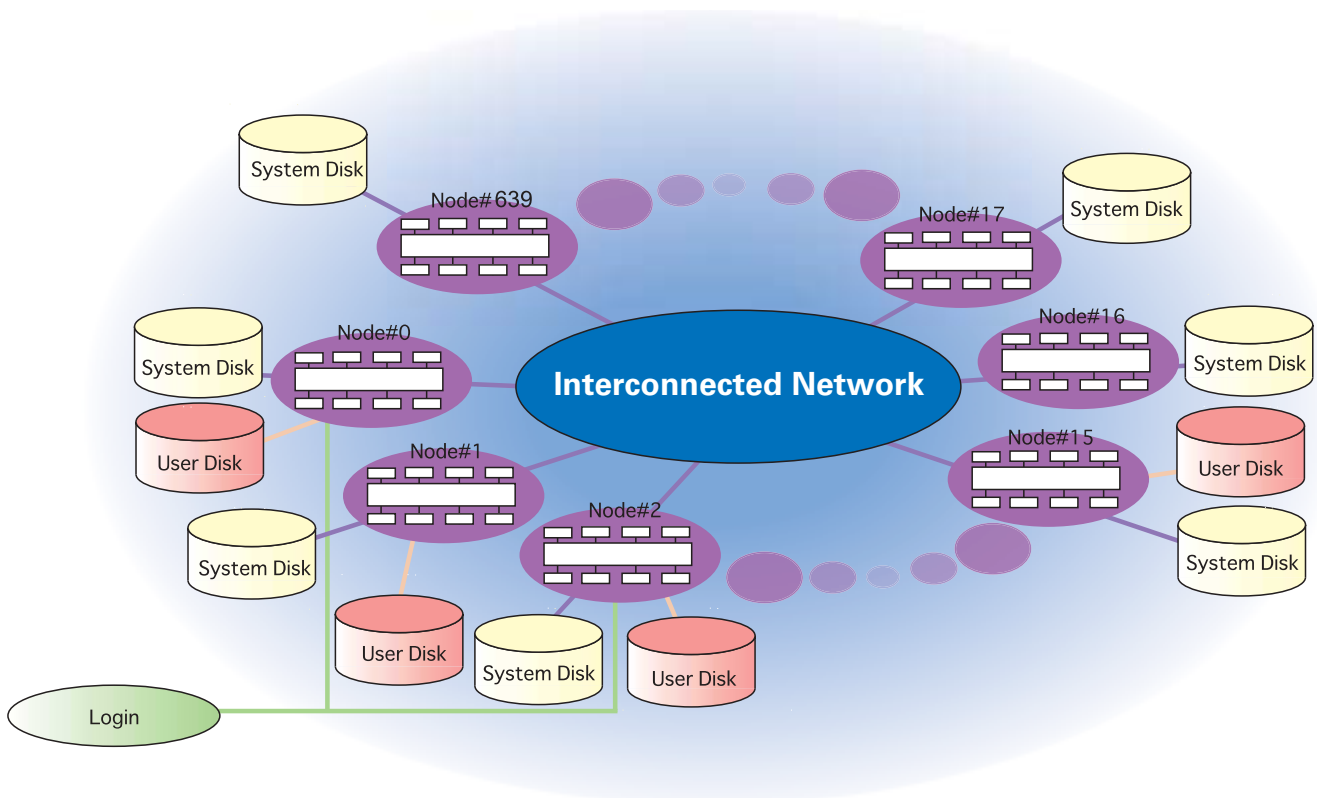
Close-up of Precipitation near Japan



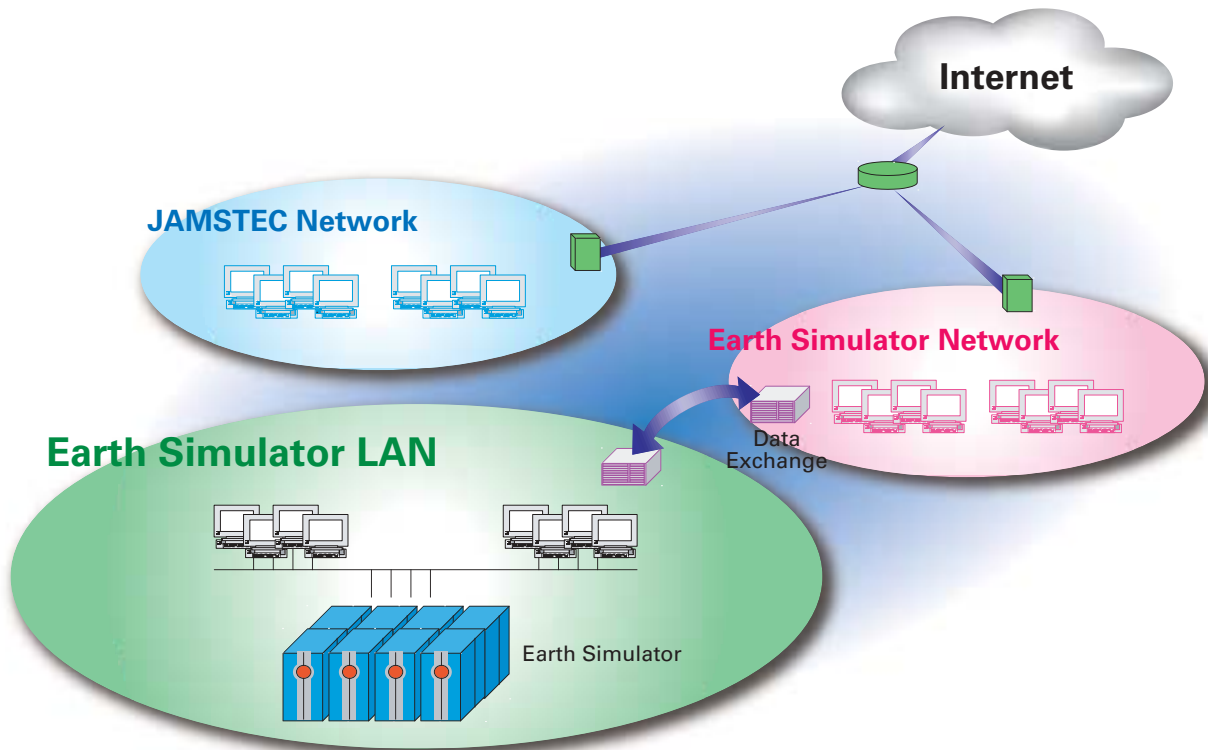
Artist's Representation of the Earth Simulator



Earth Simulator System



Earth Simulator Network



Performance of the Earth Simulator

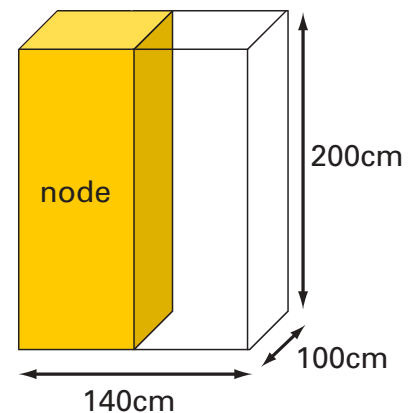
- **Linpack Benchmark Test**
 - World Rank, No.1
 - Sustained performance : **35.86 Tflops**
 - Sustained efficiency : **87.5%**
- Interconnected network : Single-Stage Crossbar Network

#Processors	5,120
Processor nodes	640
Processors per node	8

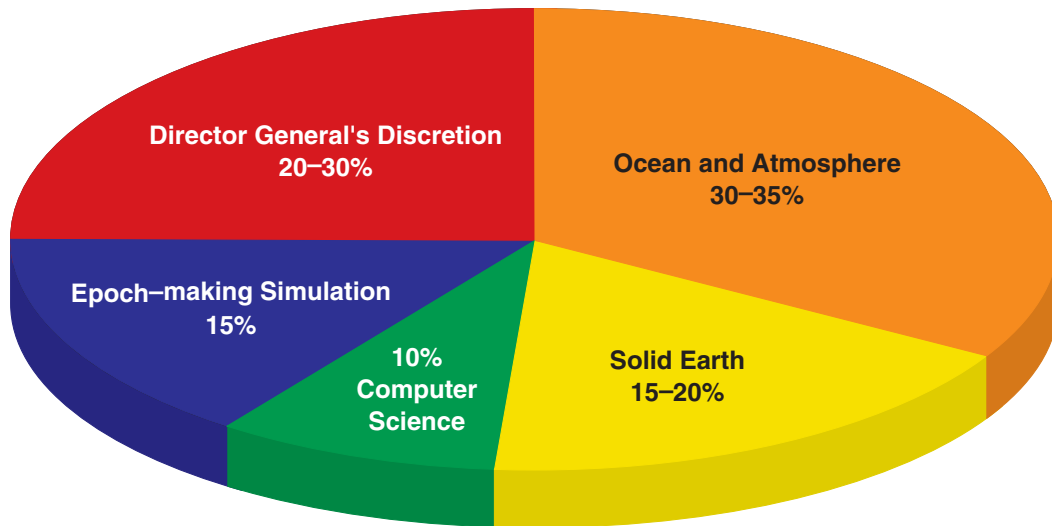
Peak Performance	40 Tflops
Per node	64 Gflops
Per processor	8 Gflops
Main Memory	10 TB
Per node	16 GB



1 cabinet (2nodes included)



Allocation of Computer Resources in Year 2002



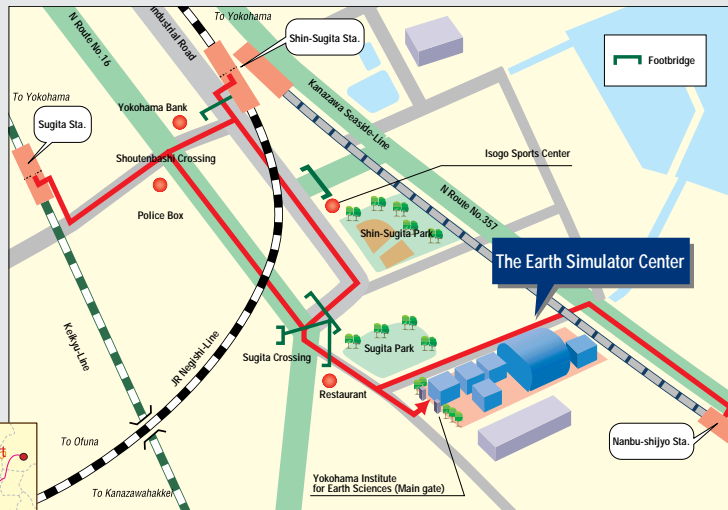
Selected Projects in 2002 : 28

Ocean and Atmosphere	15
Solid Earth	8
Computer Science	3
Epoch-making Simulation	2

Access Map

Access

JR Negishi-Line Shin-Sugita Sta.
West Way Out 10 Minutes
Keikyu-Line Sugita Sta.
East Way Out 12 Minutes



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