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Current status of data utilization for global ecosystem sciences

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Terrestrial ecosystem, especially the vegetation, closely relates to the carbon exchange between the atmosphere and the land surface. Because vegetation modifies the albedo and aerodynamic roughness of land surface, and causes the interception of precipitation, ecosystem is one of essential components for the climate modeling. The terrestrial ecosystem also provides us food, fuel, and log resources that are necessary for human beings, while the marine ecosystem that mainly consists of the food web from phytoplankton to fish dominates the amount and distribution of marine food resources.

To know and understand the global environment, it is crucial to monitor the spatio-temporal variability of the ecosystem and acquire the data. GEOSS 10-year implementation plan emphasized the importance of the data concerning with the ecosystem classification and its geographical distribution, leaf area index, biomass, and productivity over the land, and the ocean color, chlorophyll-a concentration, productivity, and nutrients in the ocean.

Those data of the ecosystem are created by in situ observation, remote sensing, and numerical model. In situ observation data can be used as the ground (sea) truth value for the remote sensing and the ecosystem modeling. Base on the remote sensing data, geographical distribution data of the ecosystem are generated. Furthermore, such satellite-derived ecosystem data are incorporated into ecosystem numerical models as validation and forcing data, and eventually the ecosystem in the future is predicted.

The collaboration of in situ observation study, remote sensing study, and modeling study of ecosystem brings a lot of invaluable synergic effects. The data exchange among three kinds of studies enhances respective study each other. For the collaboration, the mechanism and network to promote the exchange of ecosystem data are inevitable.

Keywords: satellite data, ecosystem model, in situ observation, vegetation