

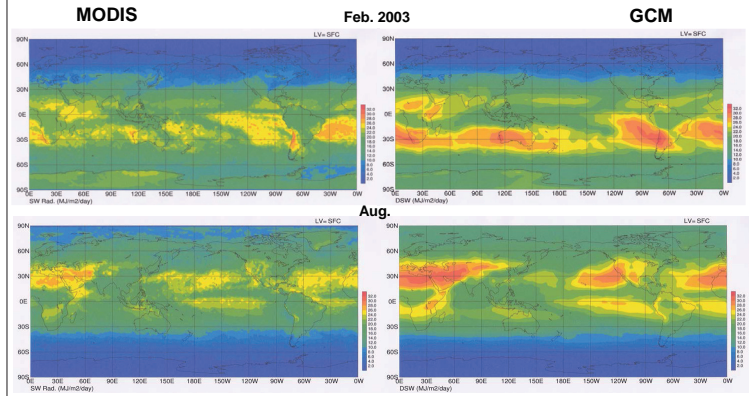
Validation of Satellite Product Estimation Algorithm using Climate Model Simulation Data

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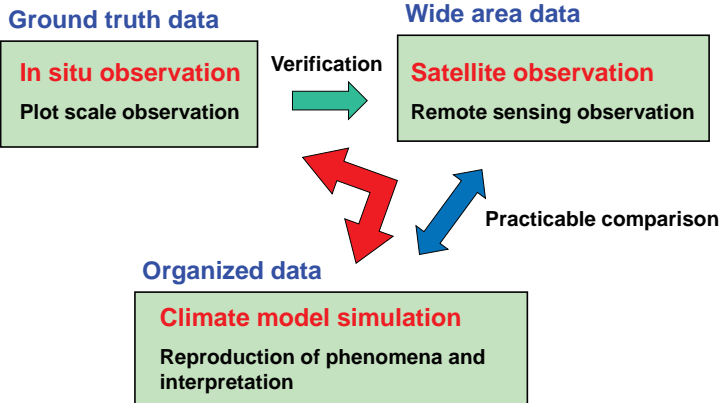
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Downward short-wave radiation

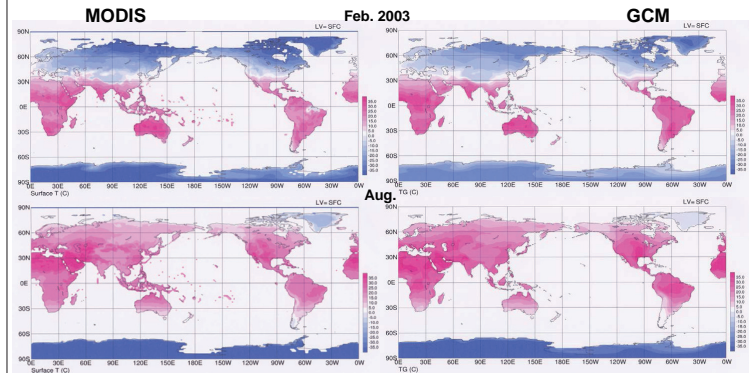


Although values by GCM are greater, the seasonal changes (and inter-annual changes) almost agree.

Characteristic and relationship of typical data



Land surface temperature



Global distributions of the seasonal changes (and inter-annual changes) almost agree.

A case study

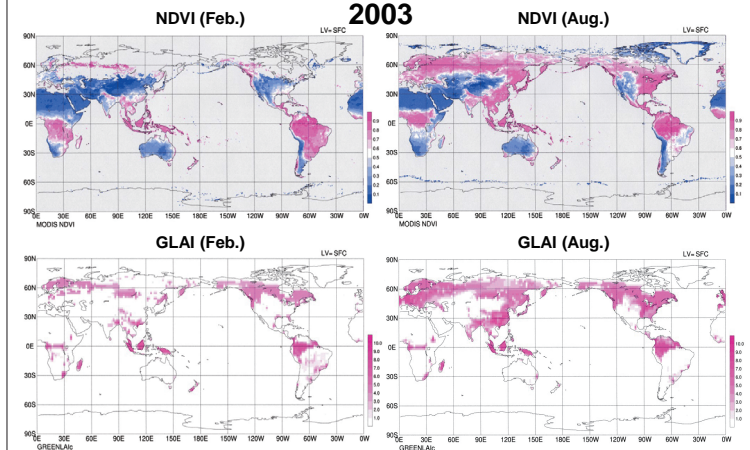
GCM simulation:

- ◆ Land surface – atmosphere full couple simulation with the global climate model.
- ◆ Sequential 48-hour integrations using the reanalysis data for each atmospheric initial condition.
- ◆ Experiment period : 2001-2005.
- ◆ Second half 24-hour results in each 48-hour calculation were adopted for the analysis.
- ◆ Calculated values of the atmospheric CO₂ concentration and those of physical and biological elements of land area were taken over during the experiment period.
- ◆ Through this simulation method, the variations of atmospheric CO₂ concentration and land area elements and the interaction between land surface and the atmospheric under the almost actual atmospheric condition can be reproduced.

Satellite data:

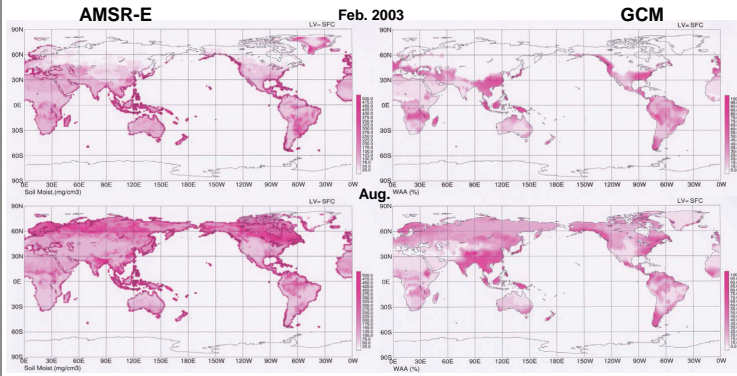
- MODIS data: Downward short-wave radiation
Land surface temperature
NDVI
- AMSR-E data: Soil moisture
Snow
- (CMAP data: Precipitation)

MODIS NDVI and Model Green LAI (GLAI)

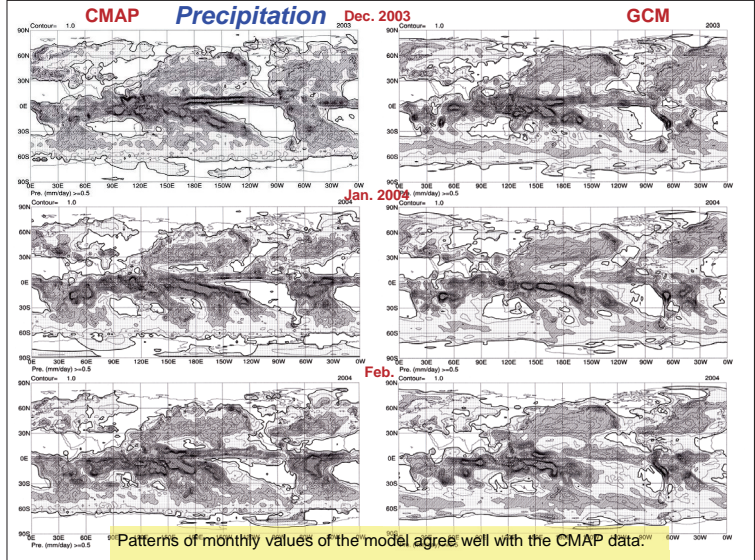


The areas where NDVI values are 0.6 or more are almost correspond with those where GLAI values are 3.0 or more. Inconsistency is seen in the southern hemisphere land area (Africa and South America).

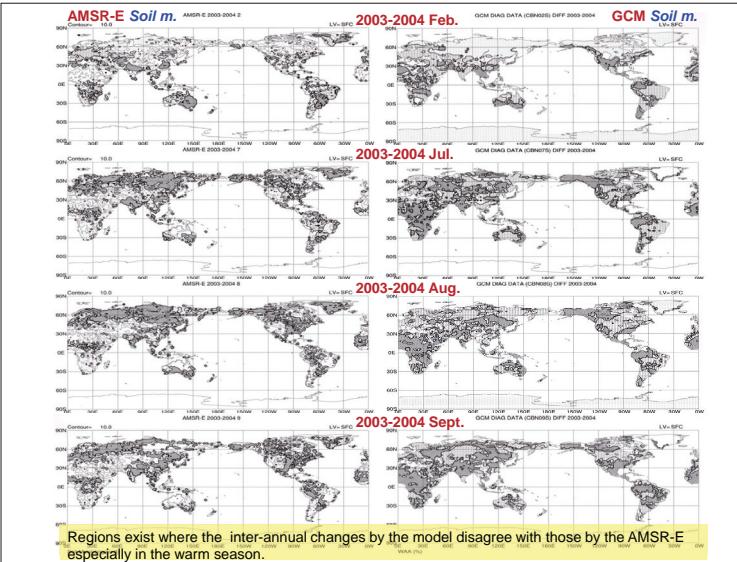
Soil moisture



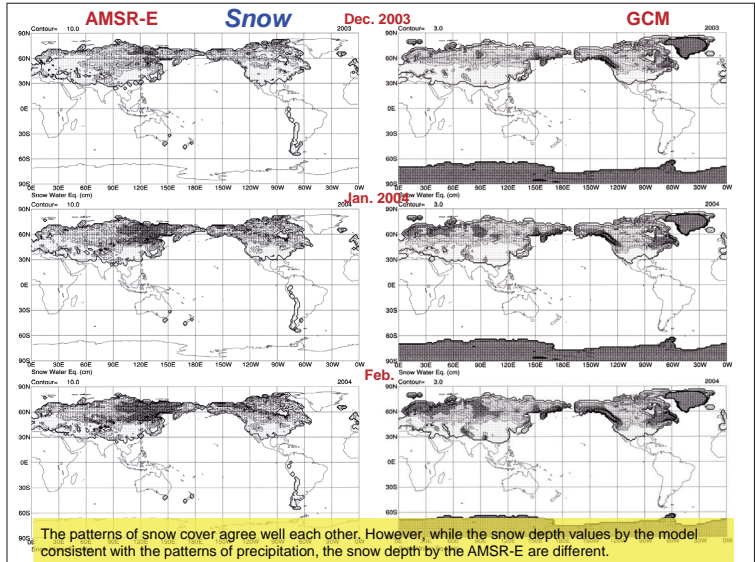
Global distributions of the seasonal changes by the model almost agree with those by the satellite data.



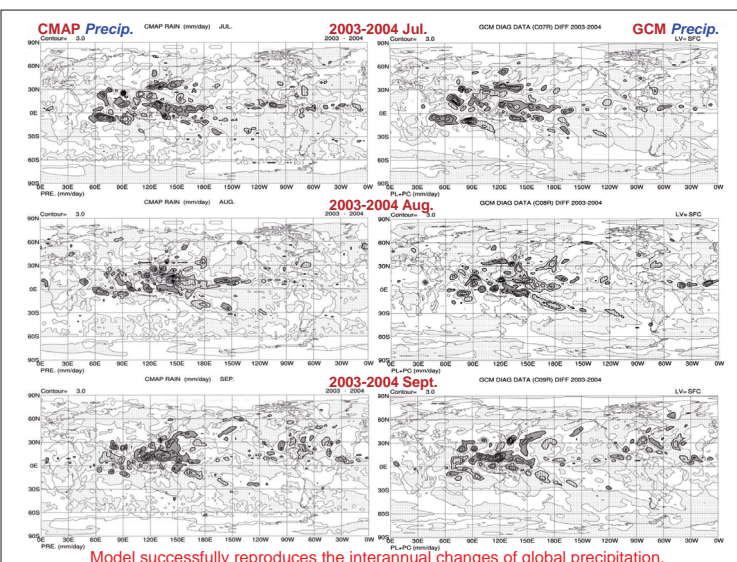
Patterns of monthly values of the model agree well with the CMAP data.



Regions exist where the inter-annual changes by the model disagree with those by the AMSR-E especially in the warm season.



The patterns of snow cover agree well each other. However, while the snow depth values by the model consistent with the patterns of precipitation, the snow depth by the AMSR-E are different.



Model successfully reproduces the interannual changes of global precipitation.

Concluding remarks :

- ◆ The possibility of mutual verification between satellite products and climate model simulation results was examined.
- ◆ Satellite data is very useful for the verification of model results. On the other hand, the values of elements calculated by the model are physically and biologically consistent in the model. Therefore, the model results are useful as the relative information for the validation of the global scale or regional scale products of satellite estimated separately by each algorithm.
- ◆ By comparing satellite data with model data, utilizing the elements whose spatial and temporal characteristics correspond, the mutual verification between satellite data and model data and the investigation of each change mechanism can be achieved. The physical-biological relationship of biosphere change also can be investigated
- ◆ We have completed new numerical simulations in this fiscal year. We will indicate the capability of mutual verification of satellite data and model data and the earth system understanding method using that synthetically.