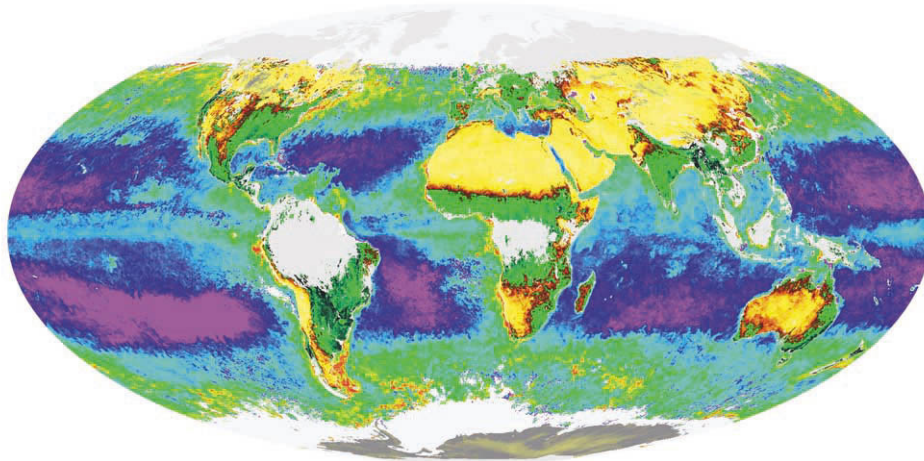


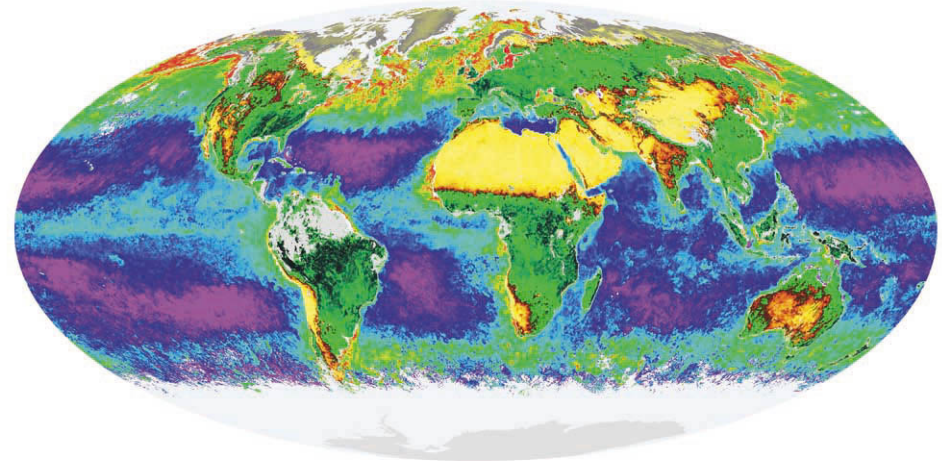
Monitoring of Global Biosphere



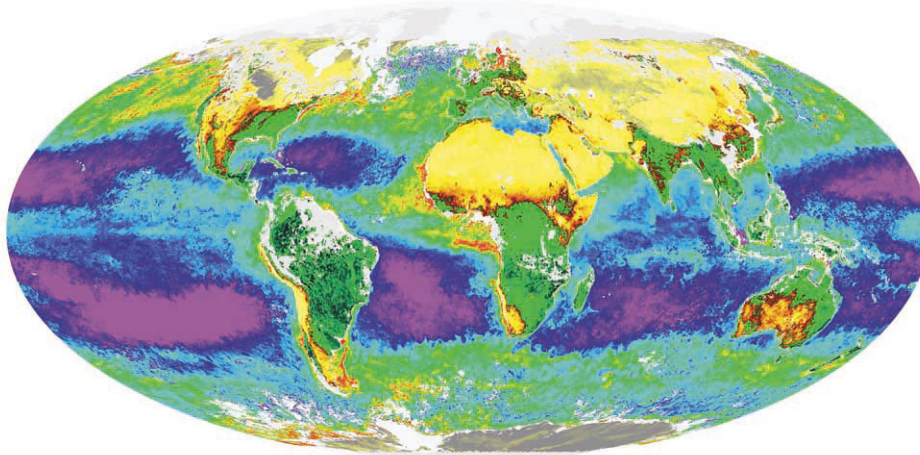
November 1996



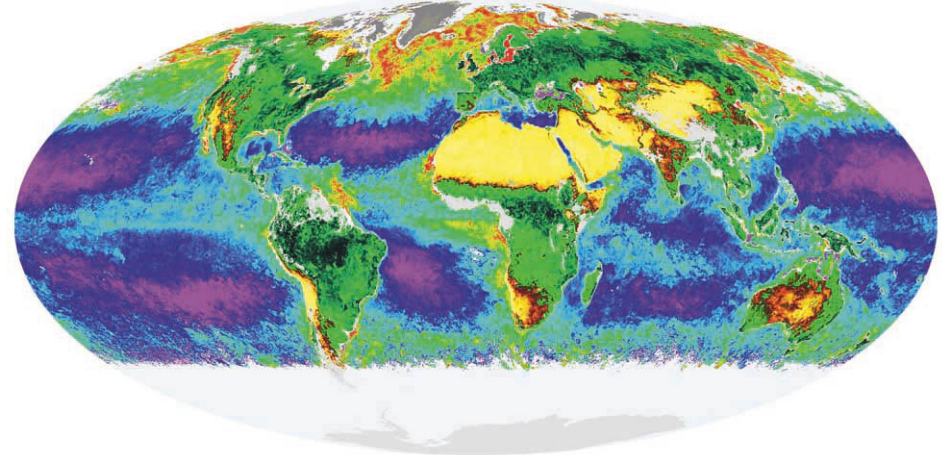
May 1997



February 1997



June 1997



Chlorophyll content 0.03 6 mg/m³
Vegetation index -0.05 0.9

POLDER global merged pigment concentration and vegetation index maps

Provided by NASDA/CNES
Processed by LOA/CESBIO/LSCE

Monitoring of Global Biosphere

Monitoring the global biosphere is of key importance regarding the global change issue. With polarization (*1) and directionality, POLDER provides unique observation of both the marine and continental biosphere. Chlorophyll pigment concentration maps derived over ocean allow calculation of the oceanic primary production (CO₂ uptake by phytoplankton) as well as monitoring the marine ecosystems on a medium scale.

POLDER is well-suited to studies on the open sea, whose color depends solely on chlorophyll pigment concentration. Its very wide field of view grants it an extensive coverage, resulting in a considerable advantage in monitoring changes in marine ecosystems or studying very cloudy areas. This quality is consolidated by the multiple viewing angles available, making it possible to avoid sunglitter without tilting the imaging system such as to cause blind areas.

By measuring the reflectance directional properties of targets (so called Bidirectional Reflectance Distribution Function (BRDF)), POLDER has the ability to retrieve the vegetation parameters with improved accuracy. Indeed the BRDF measurement is crucial to correct the temporal series of satellite measurements of unwanted directional effects so as to monitor plant phenology and obtain an accurate measurement of surface albedo (*2), which is a key parameter in surface/atmosphere energy exchanges and thus in general atmospheric circulation. The directional dimension of the signal complements its spectral dimension and is also useful for both land cover classifications and for characterizing biophysical parameters of plant cover such as the leaf area index (*3) or the fraction of photosynthetic radiation absorbed by the vegetation. The latter values are then input into large-scale vegetation functioning models and models describing major biogeochemical cycles such as the carbon cycle.

Vegetation indices and vegetation biophysical parameters to be derived in the near future give access to a critical term of the global carbon budget, namely the vegetation net primary production. They are also fundamental inputs for assessing and understanding land cover changes at regional and global scales.

*1 Polarization: The state of an electromagnetic wave when transverse oscillations take place in some regular manner, for examples, all in one plane, in a circle, in an ellipse, or in some other definitive curve.

*2 Surface albedo: A ratio of the reflected light flux to the incident solar radiation flux falling on the Earth's surface.

*3 Leaf area index (LAI): Total area of leaf per unit ground surface. It is used as an index for measuring the amount of active vegetation.