(MODIS Coccolith Concentration, continued)

MODIS Coccolith Concentration Summary

Coverage: Global ocean surface, clear-sky only

Spatial/Temporal Characteristics: 1 km/daily (Level 2); 4.6 km, 36 km, 1°/daily, 8-day, monthly, yearly (Level 3)

Key Science Applications: Input to global biogeochemical cycle models

Key Geophysical Parameters: Coccolith and calcite concentration, pigment concentration in coccolithophore blooms

Processing Level: 2, 3

Product Type: Standard, at-launch

Maximum File Size: 102 MB (Level 2); 640 MB binned, 134 MB mapped (Level 3)

File Frequency: 144/day (Daily Level 2); 3/day (Daily Level 3), 3/8-day (8-day Level 3), 3/month (Monthly Level 3), 3/year (Yearly Level 3)

Primary Data Format: HDF-EOS

Browse Available: 36 km sample imagery available at the Goddard DAAC (Level 3 only)

Additional Product Information: http://modis-ocean.gsfc.nasa.gov/dataprod.html

DAAC: NASA Goddard Space Flight Center

Science Team Contacts: H.R. Gordon, W.B. Balch

MODIS Ocean Primary Productivity (MOD 27)

Product Description

This Level 4 product provides an estimate of the Ocean Primary Productivity on an 8-day and an annual basis at spatial resolutions of 4.6 km and 36 km.

Research and Applications

The objective of the product is to quantify the magnitude and interannual variability (for decadal trends) in the oceanic primary productivity and phytoplankton carbon fixation. Primary productivity is the time rate of change of phytoplankton biomass, and, with allowance for excreted soluble carbon compounds, reflects the daily integrated photosynthesis within the water column. The integral of the values over the year is the annual primary productivity. The annual productivity product will be used for global- and regional-scale studies of interannual variability of ocean productivity, for comparisons with annual summations of short-term analytic estimates, and for comparison with global biogeochemical models.

Data Set Evolution

Ocean primary-productivity algorithms fall into two general classes, termed empirical and analytic algorithms. The empirical approach is based on simple correlation between time-averaged *in situ* estimates of productivity and satellite-derived estimates of surface chlorophyll concentration. The analytic approach is based on models of the general photosynthetic response of the algal biomass as a function of major environmental variables such as light, temperature, and nutrient concentration. The overall methodologies differ significantly in the way various parameters are estimated and in the way they are assigned spatially and temporally across ocean basins. The approach taken for the MODIS algorithm is to begin implementation of an annual, global, empirical algorithm for at-launch product generation, while pursuing a vigorous research program within the SeaWiFS Science Team, to develop a consensus analytic algorithm for short-term (daily to weekly) global productivity. Cloudiness prevents deriving chlorophyll *a* concentrations over about 60% of the ocean on daily basis, excluding that already lost due to high sun glint. Chlorophyll *a* concentrations derived from all available sensors, including the Terra and Aqua MODIS instruments, will be used to increase sampling fre-

quency since these plankton processes vary rapidly over time and space.

Suggested Reading

Eppley, R.W. *et al.*, 1985.

Esaias, W.E. *et al.*, 1999.

Fitzwater, S.E. *et al.*, 1982.

Iverson, R.L. *et al.*, 2000.

Morel, A., and J.M. Andre, 1991.

Platt, T.C. *et al.*, 1991.

MODIS Ocean Primary Productivity Summary

Coverage: Global ocean surface, clear-sky only

Spatial/Temporal Characteristics: 4.6 km and 36 km/8-day and a running annual average

Key Science Applications: Ocean productivity, biogeochemical models

Key Geophysical Parameters: Annual and weekly ocean productivity

Processing Level: 4

Product Type: Standard, at-launch

Maximum File Size: 1200 MB binned (8-day), 1360 MB binned (Yearly); 32 MB mapped (8-day and Yearly)

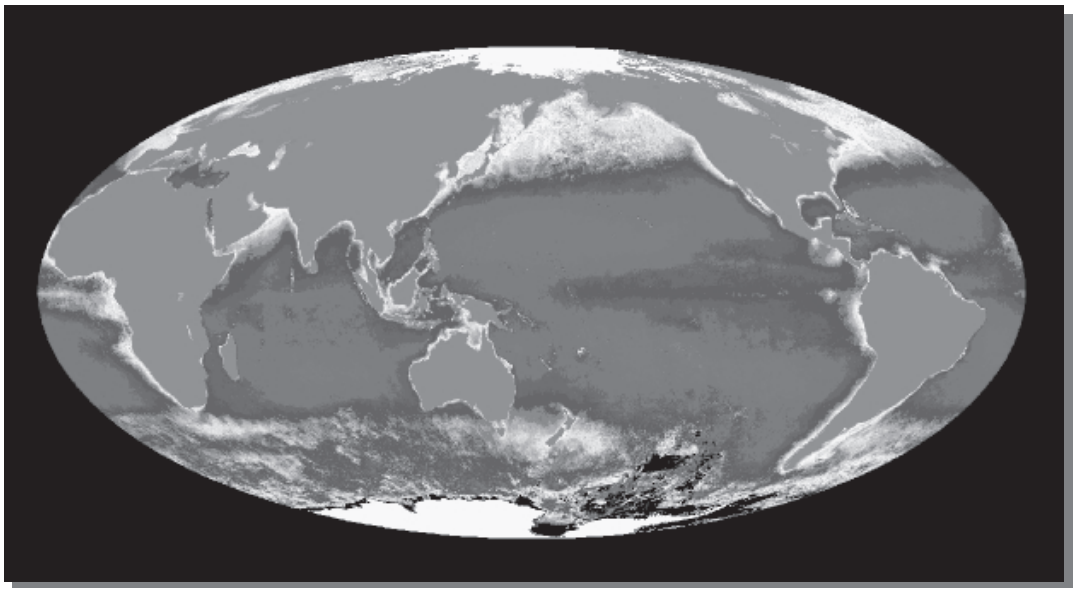
File Frequency: 4/8-day

Primary Data Format: HDF-EOS

Additional Product Information: http://modis-ocean.gsfc.nasa.gov/dataprod.html

DAAC: NASA Goddard Space Flight Center

Science Team Contact: W. Esaias



Global Ocean Phytoplankton Biomass. A pre-MODIS, global ocean-color product from the Coastal Zone Color Scanner shows the algal pigment concentrations within the upper layers of the ocean and indicates the biomass and productivity distribution within the oceans. While this is an annual product, MODIS will provide comparable global coverage on a weekly-to-monthly basis to enable scientists to study large-scale changes in marine ecosystems over weeks to decades. (From NASA GSFC.)