

## MODIS Cloud Mask (MOD 35)

### Product Description

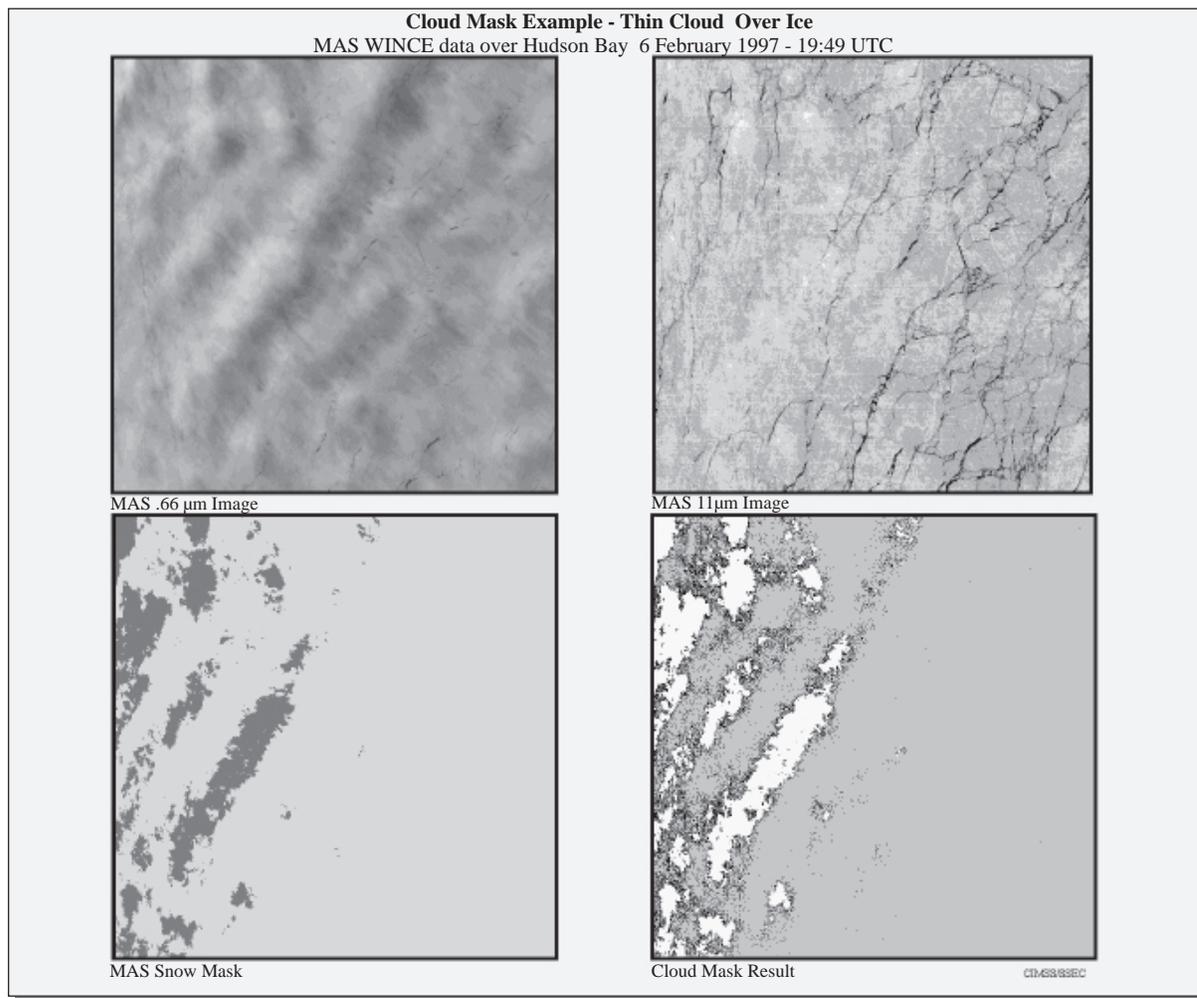
The MODIS Cloud Mask product (MOD 35) is a daily, global Level 2 product generated at 1-km and 250-m (at nadir) spatial resolutions. The algorithm employs a series of visible and infrared threshold and consistency tests to specify confidence that an unobstructed view of the Earth's surface is observed. An indication of shadows affecting the scene is also provided. The 250-m cloud-mask flags are based on the visible channel data only. Radiometrically accurate radiances are required, so holes in the Cloud Mask will appear wherever the input radiances are incomplete or of poor quality.

### Research and Applications

A determination of the presence of global cloudiness is essential to the MODIS mission for two reasons. First, clouds play a critical role in the radiative balance of the Earth and must be accurately described to assess climate and potential climate change. Second, the presence of cloudiness must be accurately determined to retrieve properly many atmospheric and surface parameters. For many of these retrieval algorithms even thin cirrus represents contamination.

### Data Set Evolution

The MODIS cloud-mask algorithm employs a battery of spectral tests, which use methodology applied for the AVHRR Processing scheme Over cLoud Land



MODIS Cloud Mask for a difficult winter scene. The top two panels are MODIS Airborne Simulator (MAS) visible (0.66  $\mu\text{m}$ ) and infrared (11  $\mu\text{m}$ ) observations collected over Hudson Bay during the WInter Cloud Experiment (WINCE) on 6 February 1997. The cloud is very thin, nearly invisible in the infrared. Ice leads can be seen on the surface. The bottom left panel represents the results of a simple snow-mask algorithm that is applied as part of the cloud mask and aids in the final cloud-mask determination. The final product for this scene is shown in the bottom right panel, in which the lighter gray depicts clear conditions, white depicts clouds, and dark gray represents undecided conditions.

and Ocean (APOLLO), International Satellite Cloud Climatology Project (ISCCP), CLOUD Advanced Very high resolution Radiometer (CLAVR), and Support of Environmental Requirements for Cloud Analysis and Archive (SERCAA) to identify cloudy FOVs. From these a clear-sky confidence level (high confident clear, probably clear, undecided, cloudy) is assigned to each FOV. For inconclusive results, spatial- and temporal-variability tests are applied. The spectral tests rely on radiance (temperature) thresholds in the infrared and reflectance thresholds in the visible and near-infrared. Thresholds vary with surface type, atmospheric conditions (moisture, aerosol, etc.), and viewing geometry. Along with MOD 02 calibrated radiances, a 1-km land/water mask, DEM, ecosystem analysis, snow/ice cover map, NCEP analysis of surface temperature and wind speed, and an estimate of precipitable water will be required as inputs.

Cloud-mask validation will be conducted using MAS data from several field campaigns, all-sky cameras, and comparison with NOAA operational instruments and, possibly, Terra instruments such as ASTER (see Volume 1).

The related MODIS Cloud Mask ATBD, *Discriminating Clear Sky from Cloud with MODIS*, can be found in PDF format at <http://eospsso.gsfc.nasa.gov/atbd/modistables.html>.

## Suggested Reading

Ackerman, S.A. *et al.*, 1998.

Gao, B.C. *et al.*, 1993a.

Gustafson, G.B. *et al.*, 1994.

King, M.D. *et al.*, 1992.

King, M.D. *et al.*, 1998.

Rossow, W.B., and L.C. Garder, 1993.

Saunders, R.W., and K.T. Kriebel, 1988.

Stowe, L.L. *et al.*, 1991.

## MODIS Cloud Mask Summary

*Coverage:* Global

*Spatial/Temporal Characteristics:* 250 m and 1 km/daily

*Key Science Applications:* Cloud determination and screening, climate modeling, climate monitoring, increasing accuracy of other MODIS retrievals

*Key Geophysical Parameters:* Presence of cloud or shadow

*Processing Level:* 2

*Product Type:* Standard, at-launch

*Maximum File Size:* 48 MB

*File Frequency:* 288/day

*Primary Data Format:* HDF-EOS

*Additional Product Information:*  
[http://modis-atmos.gsfc.nasa.gov/MOD35\\_L2/index.html](http://modis-atmos.gsfc.nasa.gov/MOD35_L2/index.html)

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