ADDENDUM-1

OCM NDVI and Vegetation Fraction Product Version-02 Changes Summary

Introduction

This document summarizes the changes incorporated in version v02_01 of OCM NDVI and Vegetation Fraction (VF) images as compared to the earlier version v01_02. The changes applied for the new version products are as follows

- Images generated based on maximum value compositing technique
- Improved Cloud Masking Technique
- File naming convention

1. The earlier version (v01_02) of OCM NDVI and VF images were generated on a monthly basis from single scenes falling within the window of 15th day ± 3 (4) days. In this new version (v02_01) of OCM NDVI, the VF products are generated based on maximum value composite (MVC) technique for a 15 day period.
2. In the earlier version products were cloud screened based on radiance value with thresholds B1 > 13.8, B3 > 8 and B7 > 14.5 mW/(cm^2-sr-μm) respectively. The new version products are cloud screened based on band ratio and reflectance thresholds using B1, B2, B6 and B8 (please refer to Table 1).
3. We have incorporated a change in file naming convention to reflect the compositing period (15 day). It may happen, in some cloudy seasons, when this periodicity cannot be met, then composite image will be monthly based product.

MVC Methodology

Compositing is a strategy for removing cloud contamination, atmospheric effects, and view & illumination geometry problems from a series of images over a discrete period of time. Compositing procedures are applied to time series of geometrically corrected images data in an attempt to produce a single representative data set. Semi-monthly NDVI composites are generated from cloud screened images using Maximum Value Compositing (MVC) technique. This MVC technique is developed based on Holben method widely employed for this purpose. (For further details, please refer to B.N. Holben, 1986, Characteristics of maximum value composite images from temporal AVHRR data, *Int. J. Remote Sensing*, vol.**7**, pp. 1417-1434).

The MVC algorithm assumes that

- The NDVI does not change significantly within any compositing period (say, 15 days).
- The maximum NDVI values within the compositing period correspond to the optimal measurement condition (cloud-free, near nadir-viewing, and clear atmosphere).

Presence of clouds, large off-nadir view angles, and poor atmospheric conditions attenuates spectral signals which results in reduced NDVI values from that of an unattenuated signal. Therefore the best possible pixel value for a particular location is achieved by choosing the highest pixel value from multi temporal data (say, semi-monthly).

The 15-day NDVI composites were generated using all the seven/eight scenes (OCM revisit period is two days), preserving all maximum NDVI values for the entire period. With the introduction of compositing procedure, we are able to improve the overall data quality and reduce the impact of clouds on the product.

Methodology of Cloud Screening

Cloud identification is an important step toward successful generation of clear-sky composite images. The cloud screening criteria was based on ratio and reflectance threshold using reflectance values observed in B1 (412 nm), B2 (443 nm), B6 (620 nm) and B8 (865 nm) data. . The basic approach is based on SeaWiFS cloud mask algorithm, (Vermote E.F. et. al ,2001,A SeaWiFS global monthly coarse-resolution reflectance dataset: Int. J. Remote Sensing, 2001, **22**, pp 1151-1158).The ratio and reflectance parameters were fine tuned for OCM data after many experimentations. A pixel was labelled cloudy if any of the condition listed below is satisfied and labelled clear if none of the conditions were met

Table 1: Cloud screening thresholds

Test	Pixel Cloudy if
Reflectance threshold	$\rho2 > 0.25$
Ratio1 and Reflectance	$\lvert 1- \rho6/\rho2\rvert < 0.20$ and $\rho6 > 0.15$
Ratio1 and Ratio2	$\lvert 1- \rho6/\rho2\rvert < 0.5$ and $\lvert 1- \rho6/\rho8\rvert < 0.370$
Uniformity in 2x2 array	$\max(\rho1) - \min(\rho1) > 0.07$

Cloud-contaminated pixels were assigned a specific value to differentiate them from clear-sky pixels. More than 90% of the cloud-contaminated pixels were masked before creating the MVC NDVI composites.

New File Naming Convention

The new file name format embedded the start and end dates for which the composite is generated

Examples: ocm2_vf_01to15_apr2012_v02_01.tif
and ocm2_ndvi_01to15_apr2012_v02_01.tif } For period 1-15 days of month

ocm2_vf_16to30_apr2012_v02_01.tif
and ocm2_ndvi_16to30_apr2012_v02_01.tif } For period 16-30 days of month

Advantage of Composite method

An overall improvement of 9% observed in getting these products under the clouds over the previous version. Fig1(a) shows the image generated using earlier version and Fig1(b) shows the image generated using MVC method in this version for the month of May2012, path 9_14.

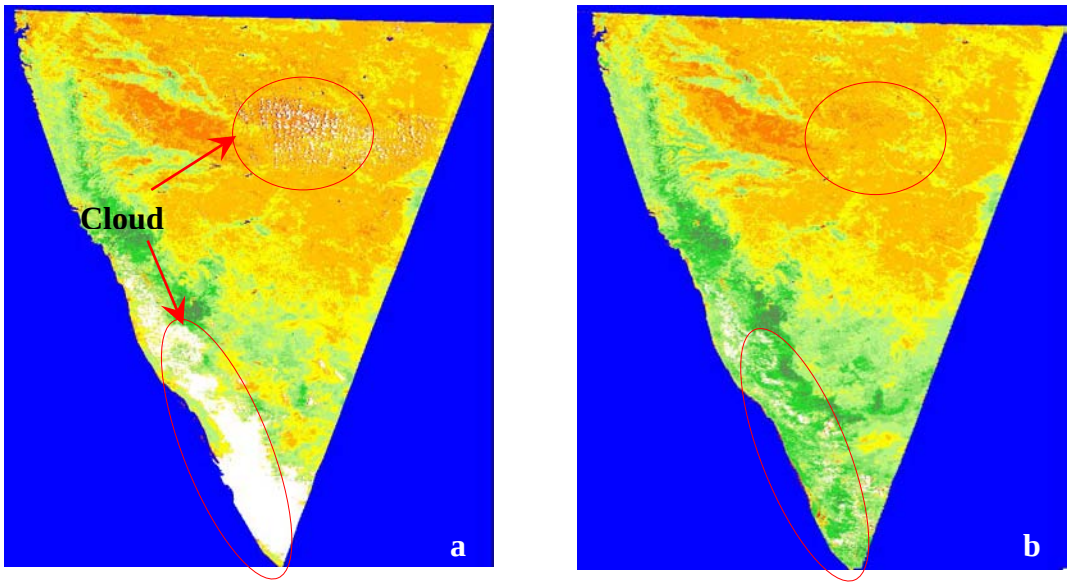

Figure 1. Comparative analysis of images generated using earlier method and MVC method

Cross-validation

The new version products were validated using MODIS images for the corresponding period. A 97.8% correlation was observed with MODIS NDVI composite as shown in Fig2.

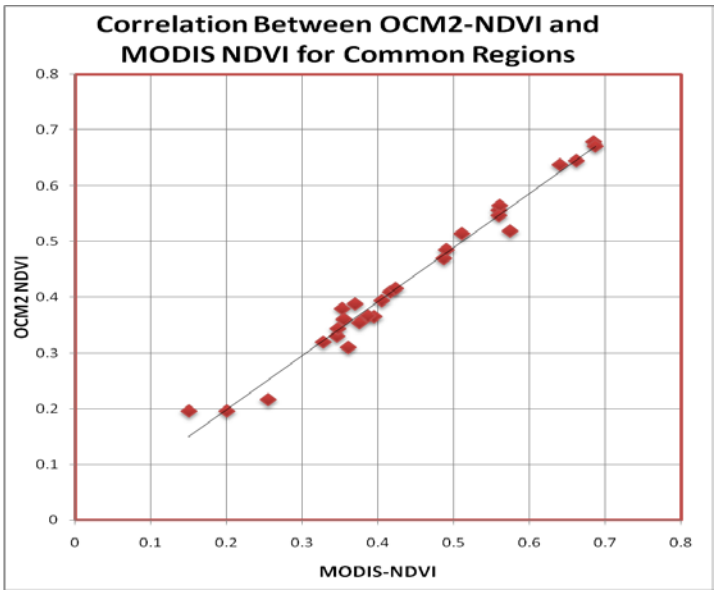

Figure 2 Comparative analysis from common regions of OCM2 NDVI and MODIS NDVI products.

Snapshot of the NDVI product

The NDVI, VF images are downloaded as grayscale images from the web. A snapshot of NDVI image is shown in Fig 3.

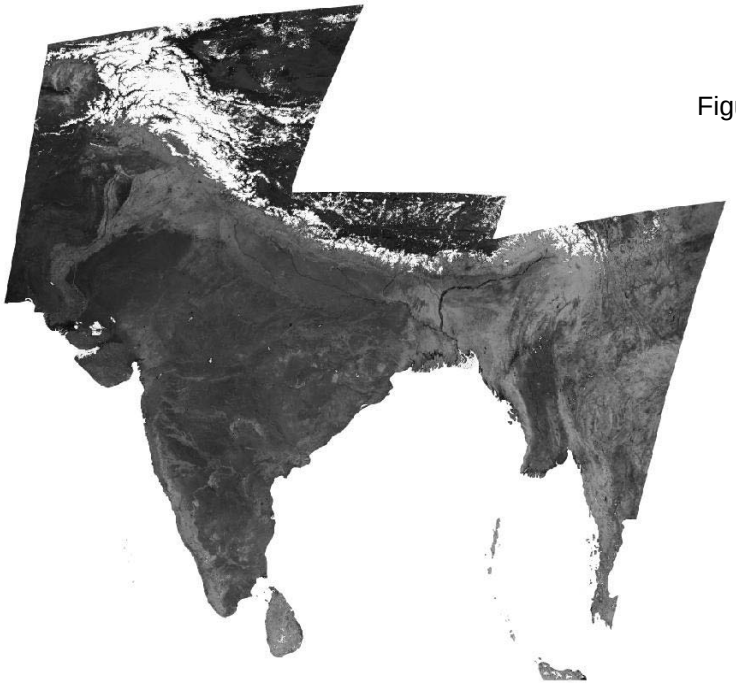

Figure 3.NDVI image in grayscale

The grayscale image can be viewed in pseudo color mode in the browse in NOEDA. A snapshot of NDVI pseudo color image is shown in Fig 4.

Figure 4.NDVI image in pseudo color and the color map