



Application of Multi-Angle Imaging Spectro Radiometer in Agricultural in Middle Gujarat for Wheat Crop

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ABSTRACT

The present analysis was carried out using the satellite image from the Multi-angle Imaging Spectro Radiometer (MISR) was acquired over Middle Gujarat on 9 and 18 February 2015. The MISR is one of the five instruments on board the EOS/ Terra spacecraft. The Rahman-Pinty-Verstraete inversion and Forward semi-empirical three parameters leaf reflectance shape (ρ_0), the curve convexity (k) and the dominant forward scattering (ω) model were used to simulate angular patterns of BRDF for wheat on 18 February 2015. The potential of the RPV model to represent the BRDF of leaves in the 400-1100 nm spectral range was investigated in this study. The results revealed that the variety of tests are shown in order to document and analyse software performance against simulated BRDF fields by RPV anis view model as well as against actual MISR-derived satellite BRDF was blue, green and red good match with each but mismatched with NIR and all MISR band blue, green and red and NIR for mature wheat.

Keywords: present, Analysis, Instruments, Middle Gujarat

INTRODUCTION

The multi-angle imaging Spectro Radiometer (MISR) is innovative instrument that uses simultaneous multi-angular measurements to obtain angular reflectance information for retrieval of geophysical parameters Diner *et al.* (1991). MISR provides near-concurrent multiple view of a surface at several viewing geometries with spatial resolution of 275 m and 1.1 km. Considering the satellite level evaluations of the TOA BRDF signal

data of Multi-angle Imaging SpectroRadiometer (MISR) sensor of TERRA satellite chosen to derive measured TOA BRDF. The MISR instrument consists of nine pushbroom cameras arranged in different view angles relative to the earth's surface, and the along-track angles are 0° (nadir) for the An camera, and 26.1° , 45.6° , 60.0° and 70.5° forward and backward of nadir for the Af/Aa, Bf/Ba, Cf/Ca, and Df/Da cameras, respectively for blue, green, red and NIR bands. This band central wavelength 446, 558, 672 and 886nm. Local mode radiance data of the

MISR requested to NASA for middle Gujarat region. The MISR science team has added middle Gujarat in the local mode sites of the MISR and local mode data made available since mid-November 2014. The RPV model simulates the anisotropic behaviour of the bidirectional reflectance from a surface using a three terms. The Minnear function is explain the general shape of the angular reflectance: increase with viewing angle ('bowl shaped') or decrease with viewing zenith angle ('bell shaped') and also two other terms degree of forward and backward scattering and magnitude of reflectance in the hot spot direction. In the RPV model, a Minnear function parameter k represent the degree of the reflectance function. Pinty *et al.* (2002) and Widlowski *et al.* (2001) have shown that the anisotropic reflectance pattern is effected by vegetation structure. the MISR image acquired on 9 and 18 February 2015.

MISR DATA

MISR data products provide in processing level. Level 1 data products give information calibrated instrument data. Level 2 products derived quantities such as aerosol, cloud heights and surface reflectance and Level 3 products provide

globally gridded statistical summaries of selected all level for different time (monthly, seasonal and annual). NASA Terra platform Multiangle Imaging SpectroRadiometer (MISR) instrument acquires reflectance data from Earth land surface target in four visible spectral bands, from nine different directions, in seven minutes. MISR data are downloaded from the platform at a spatial resolution of 275 m in all bands of the nadir camera and in the blue, green and red band of the off-nadir cameras, (see Diner *et al.* (1998). The MISR instrument was given information about anisotropic patterns of the spectral radiation scattered by different land covers. As shown in Diner *et al.* (2005),

MATERIALS AND METHODOLOGY

This case study focus on a portion region covered in middle Gujarat for wheat crop. MISR nine viewing angles were used to select pixel average for different wheat patches of blue, green, red and NIR band BRF values. This different MISR angles BRF value and MISR Geometric parameter (view zenith, solar zenith, view azimuth, solar azimuth) used to run RPV inversion model. The solar and viewing azimuth used to calculate a relative azimuth

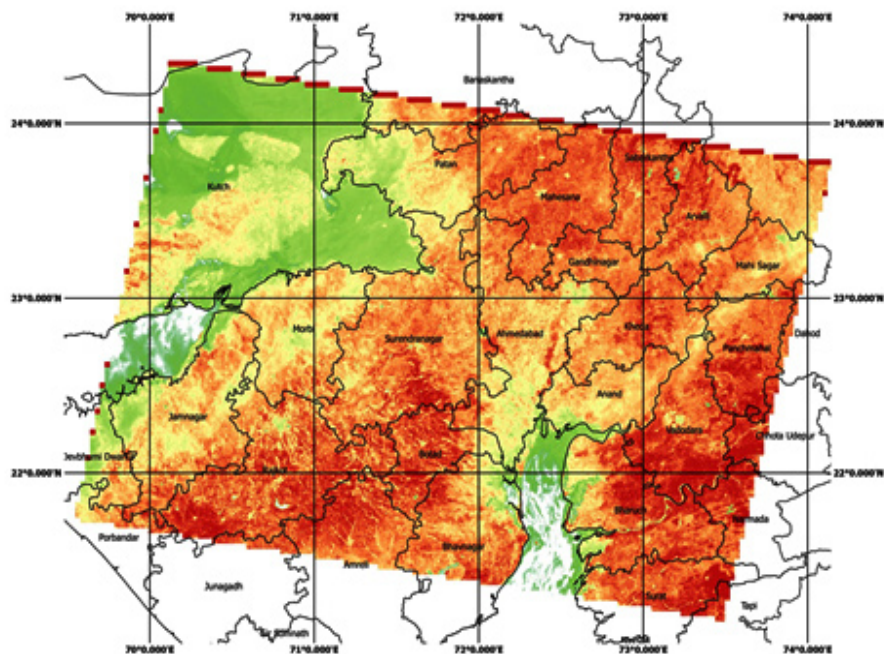


Fig. 1

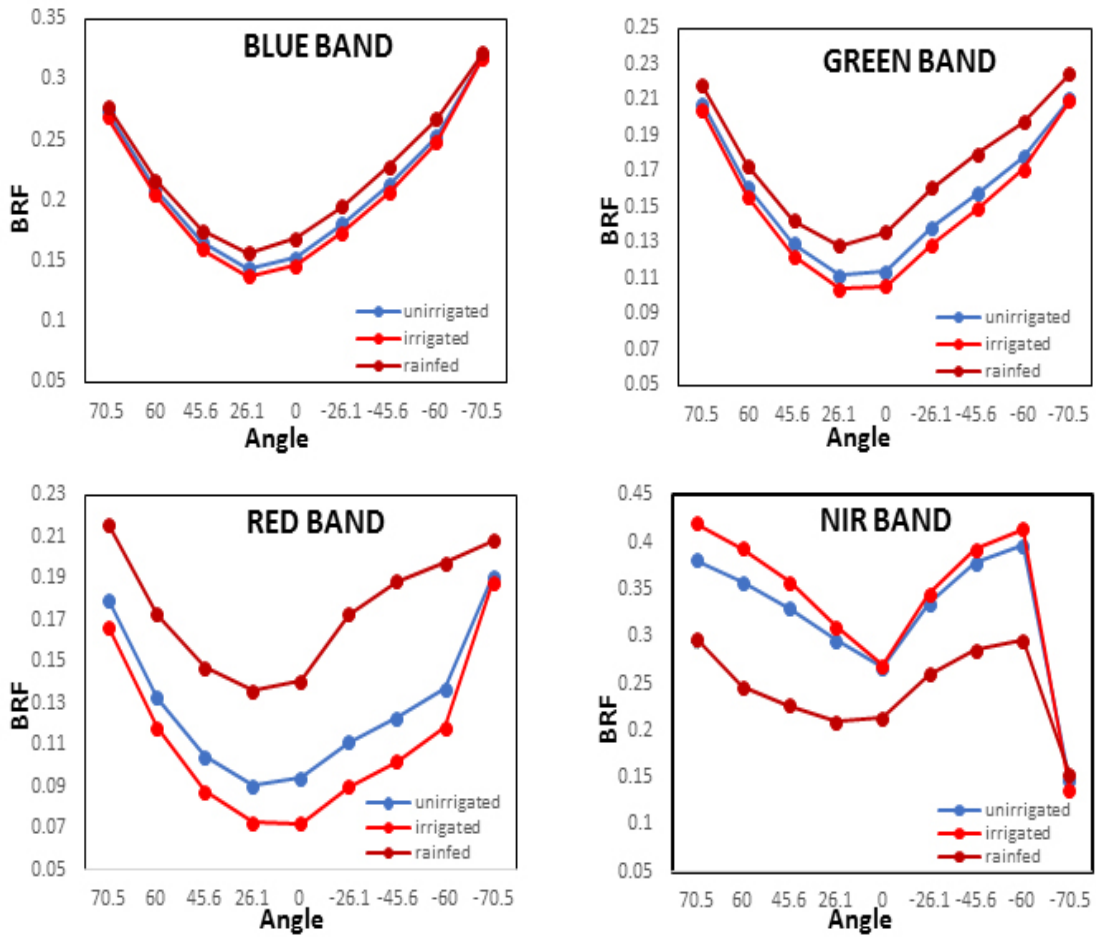


Fig. 2

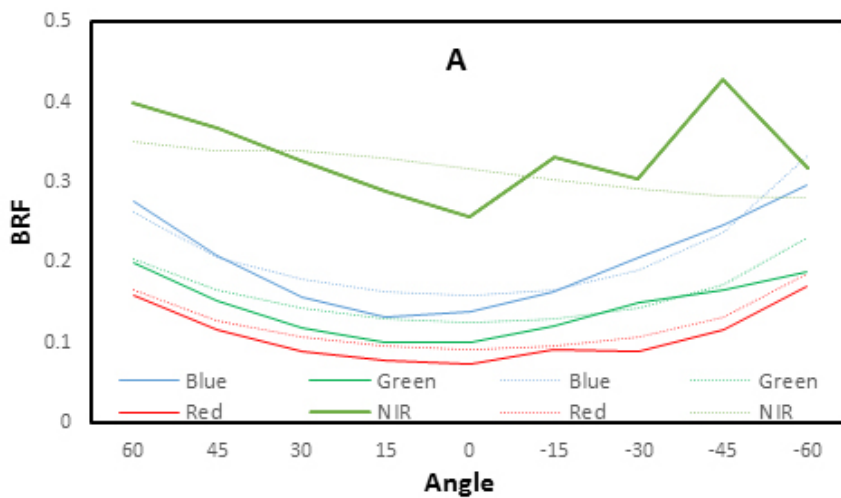


Fig. 3

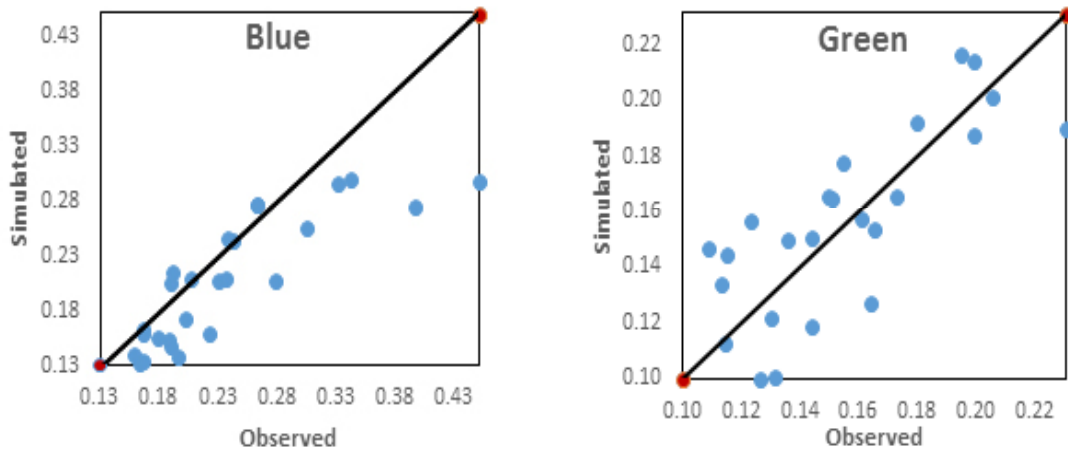


Fig. 4

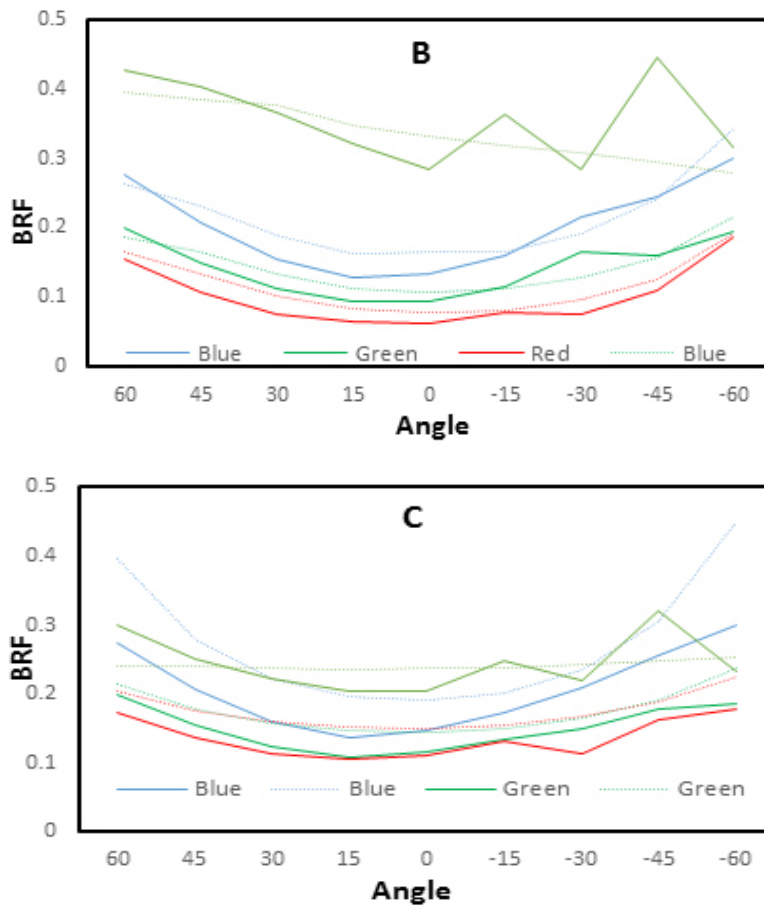


Fig. 5

for RPV inversion model. The RPV inversion three co-efficient (ρ_0 , k , $\tilde{\epsilon}$) and also MISR geometric parameter for all MISR angles of different wheat patches in RPV forward model simulate single BRF value of all MISR angles.

RESULT AND DISCUSSION

The MISR sensor observed BRF along a single azimuth plane for different wheat field is depicted in Fig. 1 (a, b & c). The RPV model simulations of Blue, Green, Red bands BRFs of wheat canopy were close to the observed as compared to NIR band. Less anisotropy in reflectance of NIR was due to multiple scattering of the radiation in the band within wheat crop canopy. In rainfed wheat of Bhal region (Figure 1 c) BRF of NIR also shows prominent variation with zenith angles while model failed to simulate the same. This might be because of less multiple scattering of NIR in canopy structure of durum wheat (grown in Bhal region). More anisotropic behaviour in canopy reflectance was observed in backscatter direction than in forward scattering direction in all the wheat fields. Overall, RPV model simulation performance is depicted in Figure 2. It revealed

that green band BRF simulations were close to the measured values compared to the other band. In blue, the model found failed to simulate higher BRF values. Simulation performance for Red and NIR bands was found poor to average. The RPV model inversion package (3 parameters version) was applied to block 72, 73 (path 148,149) of MISR level 2 surface-derived BRFs (terrain-projected) showing contrasted surface conditions.

The MISR instrument thus samples the information related to the anisotropic patterns of the spectral radiation scattered by various types of land surfaces. As shown in Diner *et al.* 2005, these angular signatures can be used to obtain unique information about the geometric and physical properties of the environment. Specifically, under favorable conditions of illumination and background brightness, the BRF field in the red spectral domain can assume a bell-shape pattern. When this occurs, the k parameter of the RPV model takes on values larger than unity, and this has been interpreted as indicating the presence of dark vertical structures such as trees over a relatively bright background at the MISR subpixel scale also use Nolin, 2004., Pinty *et al.*, 2002., Widlowski *et al.*, 2004.

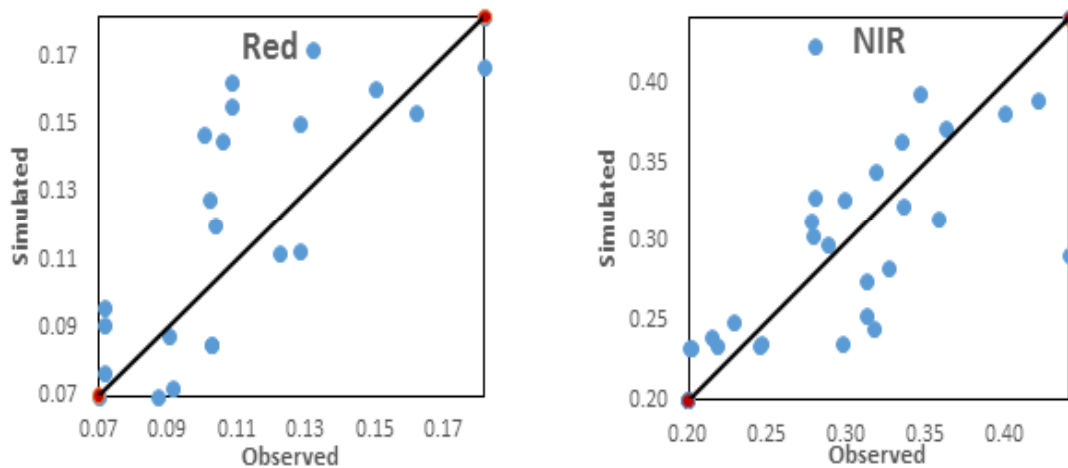


Fig. 6

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