Remote Sensing using Spectral Indices

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For decades, remote sensing scientists have used spectral indices to help them predict, model, or infer surface process. These indices have been developed to assess in the monitoring of several different land change processes like Vegetation Health and Status, classification and differentiation of land, clouds and water bodies to aid the interpretation of remotely sensed imagery. Initially intrinsic indices were developed from simple band ratios, which highlighted the spectral properties of the earth's surface at different stages. Secondly indices were produced to compensate for background effects such as that caused in areas in which the soil response dominates over the vegetation. Thirdly indices were developed to compensate for the effects of atmospheric distortion. Finally, recent years has seen the development of new spectral indices in variety of applications other than vegetation health. These include indices of water quality, water transparency and air quality. The criterion for such spectral index lies in maximizing the sensitivity of certain surface (e.g. plant biophysical) properties. And then normalizing or reducing the effects due to sun angle, viewing angle, the atmosphere, topography, instrument noise, etc, to allow consistent spatial and temporal comparisons. Many such normalised spectral indices namely normalised difference vegetation index (NDVI), soil adjusted vegetation index (SAVI), atmospherically resistant vegetation index (ARVI), global environment monitoring index (GEMI), normalised difference dust index (NDDI), normalised difference water index (NDWI) and snow index (SI) have been studied and evaluated using MODIS measured radiances from visible to shortwave infrared (SWIR) region. Some entirely new spectral indices like Cloud index (CI), marine chlorophyll index (MCI) and suspended sediments index (SSI) have been developed and demonstrated. MAI and SSI indices can be correlated to their concentrations and based on these indices an inversion algorithm can be developed. Results of all these indices along with their seperatibility test have been presented in this paper.

To be presented at AOGS 2010 (Asia Oceania Geosciences Society) - 7th Annual General Meeting, 5-9 July, 2010, Hyderabad International Convention Centre, India. * Corresponding Author

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