Hyperspectral Remote Sensing of Vegetation:
Knowledge Gain and Knowledge Gap after 40 years of research

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ABSTRACT:

This presentation summarizes the advances made over 40+ years in understanding, modeling, and mapping terrestrial vegetation as reported in the new book on "Hyperspectral Remote Sensing of Vegetation" (Publisher:Taylor and Francis inc.). The advent of spaceborne hyperspectral sensors or imaging spectroscopy (e.g., NASA's Hyperion, ESA's PROBA, and upcoming Italy's ASI's Prisma, Germany's DLR's EnMAP, Japanese HIUSI, NASA's HyspIRI) as well as the advances made in processing when handling large volumes of hyperspectral data have generated tremendous interest in advancing the hyperspectral applications' knowledge base to large areas.

Advances made in using hyperspectral data, relative to broadband data, include: (a) significantly improved characterization and modeling of a wide array of biophysical and biochemical properties of vegetation, (b) ability to discriminate plant species and vegetation types with high degree of accuracy, (c) reducing uncertainties in determining net primary productivity or carbon assessments from terrestrial vegetation, (d) improved crop productivity and water productivity models, (e) ability to assess stress resulting from causes such as management practices, pests and disease, water deficit or water excess, and (f) establishing more sensitive wavebands and indices to study vegetation characteristics.

The presentation will discuss topics such as: (1) hyperspectral sensors and their characteristics, (2) methods of overcoming the Hughes phenomenon, (3) characterizing biophysical and biochemical properties, (4) advances made in using hyperspectral data in modeling evapotranspiration or actual water use by plants, (5) study of phenology, light use efficiency, and gross primary productivity, (5) improved accuracies in species identification and land cover classifications, and (6) applications in precision farming.