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Superseding Vegetation Index Approach by State-of-the-art Inversion Procedures.

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This contribution revisits the respective role of the red and near-infrared spectral bands and highlights the importance of some non-explicit assumptions, e.g., the 'color' of the leaves, as well as the intrinsic correlations between variable values. We addressed these questions in a context driven by most land surface applications whose vast majority requires identifying/detecting surface 'greenness' and which are
currently adopting VI approaches.

Intrinsic correlations between values of variables in the red and near-infrared bands, e.g., the soil and leaves absorbing/scattering properties, are needed to the understanding of the hidden physics supporting the VI approach. These correlations permit us to compensate for the increasing number of unknowns when combining measurements made in two or more spectral bands. As a matter of fact, inversion techniques compliant with the operational requirements, are now emerging. They allow us to control explicitly and in a rational manner the relative role and value of the uncertainties associated with the observations or the products, the radiation transfer models and the prior knowledge we have on the system. The latter concerns for instance, the most probable values of the state variables as well as an appreciation of their intrinsic correlations. These techniques constitute a new paradigm, superseding VI approaches, for the interpretation of a suite of remote sensing products derived operationally by space agencies, for a consistent analysis of product synergies as well as for the validation exercises. Such inversion techniques are robust, flexible and provides us with a framework to account for existing knowledge, e.g., expected parameter values and their correlations. The contribution of VI approaches in the upcoming years appear thus somewhat limited since inversion techniques with higher performances are already available.