A GLIDING WINDOW APPROACH FOR THE REGULARIZATION OF THE ILL-POSED INVERSE PROBLEM

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ABSTRACT:

The robust and accurate retrieval of vegetation biophysical variables using radiative transfer models (RTM) is seriously hampered by the ill-posedness of the inverse problem. With this research we further refine our previously published (object-based) inversion approach [RSE 93 (2004): 53-67]. The object-based RTM inversion takes advantage of the geostatistical fact that the biophysical characteristics of nearby pixel are generally more similar than those at a larger distance. A gliding window approach for the inversion of the widely used PROSAIL radiative transfer model is presented that can be easily implemented and adapted to other radiative transfer models. The approach optimizes a common value of the average leaf angle (ALA) for all pixels within the gliding window and thus takes the spectral signatures of neighboring pixel into account. Using a large set of leaf area index (LAI) measurements (n = 58) acquired over six different crops of the Barrax test site (Spain), we demonstrate that the proposed regularization yields in most cases more accurate and spatially consistent results compared to the traditional (pixel-based) inversion. Pros and cons of the approach are discussed and possible future extensions presented.

TOPIC: Physical modeling and signatures
ALTERNATIVE TOPIC: Multi-spectral and hyperspectral remote sensing