Towards an optimal spatial resolution range for multi-angular observations of 3-D forest targets

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Various studies have demonstrated the potential of quasi-instantaneous multi-angular observations to unleash information about the heterogeneity of an observed surface target. In particular, the bowl and bell shaped patterns of the surface leaving radiation field may lead to the retrieval of within-pixel surface structure information. The nominal spatial resolution of any multi-directional observation scheme must, however, neither be too coarse - such as to avoid the mixing of the radiative anisotropies from structurally different surface types within the nominal field of view of the sensor - nor be too fine - such as not to be affected by the intrinsic variability between neighboring plant elements in a 3-D canopy, nor, the differences in the canopy volumes that are sampled when a sensor looks at a given target from different directions. We will use arguments based on the impact of the net horizontal radiation transport in 3-D forest canopies to identify the finer limit of a spatial resolution range that allows for the optimal exploitation of multi-angular observations in the optical domain of the solar spectrum. Such information should be of great interest to future space missions attempting to reduce the uncertainty in retrieved surface structure information.