



Shortwave and Longwave Hyperspectral Satellite Instrument Simulations With Models of Varying Climate Sensitivity and Applications to Existing and Planned Measurement Systems

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Global climate models continue to exhibit a range of equilibrium climate sensitivity of 2 to 4.6 K/2xCO₂ and shortwave cloud feedbacks continue to contribute substantially to this range [Andrews et al, 2012]. This paper evaluates the observational signals associated with low-, medium-, and high-sensitivity simulations in the CMIP5 archive with an Observing System Simulation Experiment (OSSE). The OSSE creates hyperspectral infrared radiance (spanning 5 to 50 μ m) and UV/VIS/NIR reflectance (spanning 300 to 2500 nm) using PCRTM that are relevant to a range of current instruments such as AIRS, IASI, and SCIAMACHY and planned instruments such as CLARREO. We evaluate the data record length and measurement uncertainty required to differentiate the high and low sensitivity models in the CMIP5 archive based on hyperspectral and conventional broadband measurements and consider the relevance to decadal length record analysis.