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Comparison of near-infrared spectral-based cloud-screening algorithms with application to GOSAT

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Several existing and proposed remote sensing instruments can measure concentrations of trace gases such as carbon dioxide and methane using spectra of reflected sunlight in well-chosen gas absorption bands. Most retrieval methods require that processed scenes be generally free of cloud and aerosol contamination, thus requiring a robust cloud and aerosol screening algorithm. In this work we quantify the efficacy of several different cloud screening algorithms as compared against simultaneous observations of cloud imager data, such as MODIS. Cloud-screening effectiveness is expressed in terms of the fraction of clear sky scenes passing the screen, as well as the fraction of scenes passing the screen that are actually not clear. Using data from the TANSO-FTS instrument aboard the GOSAT satellite, we quantify the cloud-screening effectiveness of several individual screening algorithms. The usefulness of combining multiple such algorithms into a single screening criterion is also explored.