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Improvements of Surface Reflectance Model for Aerosol Retrieval

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Estimation of surface reflectance is essential for accurate measurements of aerosol optical thickness (AOT) by satellite remote sensing approach. Due to the variability of surface reflectance over land surfaces, a surface model is required to take into account the crucial factor controlling this variability. In the present study, we attempted to simulate surface reflectance in the short-wave channels with two methods, namely the land cover type dependent method and a two-source linear model. In the two-source linear model, we assumed that the spectral property can be described by a mixture of vegetated and non-vegetated area, and both the normalized difference vegetation index (NDVI), and the vegetation continuous field (VCF) was applied to summarize this surface characteristic. By comparing our estimation with surface reflectance data derived from Moderate Resolution Imaging Spectroradiometer (MODIS), it indicated that the land cover type approach did not provide a better estimation because of inhomogeneous land cover pattern and the mixing pixel property. For the two-source linear method, the study suggested that a channel-dependent scaling factor may be introduced into our model, due to the averaging characteristics in our linear combination process. This improvement of surface reflectance simulation may enhance our capability for better retrieval of AOT in our current Bremen AErosol Retrieval (BAER) model.