ユーラシア北方林におけるMODIS MCD64A1焼失面積の検証
Validation of MODIS MCD64A1 burned area in boreal Eurasia

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Biomass burning plays an important role in affecting vegetation dynamics, biogeochemical cycle of carbon, nitrogen and other elements, atmospheric chemistry and the climate. Boreal Eurasia is one of the most important regions where large areas are burned every year. Numerous particles and greenhouse gases are emitted from these fires. These pollutants could be transported to the industrialized region in East Asia, the western North Pacific and the Arctic. Atmospheric transport of fire-emitted pollutants to the Arctic and the consequential deposition is believed to accelerate the arctic warming. To better understand the effect of fires in boreal Eurasia on the arctic, an accurate assessment of burned area from the boreal Eurasia is necessary.
The Moderate Resolution Imaging Spectroradiometer (MODIS) Collection 5.1 direct broadcast monthly burned area product MCD64A1 is widely used for global burned area mapping. MCD64A1 data was also used for the estimation of global fire emissions such as Global Fire Emissions Database, Version 4 (GFED4). However, uncertainties in burned area estimations could be introduced due to the “moderate resolution” character of MCD64A1 (~500m). Therefore, a comparison of the burned areas of MCD64A1 with those generated from higher resolution satellite products could provide basic and crucial information for its accuracy assessment and further applications. However, there are few studies on the validation of MCD64A1, especially in the boreal Eurasia.
In this work, we used Landsat 7 surface reflectance, along with a few commercial satellite scenes from WorldView, GeoEye and RapidEye as the reference scenes to derive the burned areas in a burning season in 2012 (mostly July to September). A wide range of ecotypes over wide geographic regions spanning from the western Russia/Kazakhstan to the eastern Siberia were covered. Each of these burned areas was compared with the corresponding region of MCD64A1 for the same periods. Our preliminary results indicated that MCD64A1 could well capture the large fires, while those less than 100 ha are prone to be undetected. We also found that MCD64A1 tends to underestimate the burned area in general. Based on the error statistics, we suggested the accuracy levels and precautions for applications in each ecotype.

