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# Small Fire Detection Algorithm Development using VIIRS 375m Imagery: Application to Agricultural Fires in Eastern China

Tianran Zhang (1) and Martin Wooster (1,2)

(1) Department of Geography, King's College London, London, UK (tianran.zhang@kcl.ac.uk), (2) NERC National Centre for Earth Observation (NCEO), UK

Until recently, crop residues have been the second largest industrial waste product produced in China and field-based burning of crop residues is considered to remain extremely widespread, with impacts on air quality and potential negative effects on health, public transportation. However, due to the small size and perhaps short-lived nature of the individual burns, the extent of the activity and its spatial variability remains somewhat unclear. Satellite EO data has been used to gauge the timing and magnitude of Chinese crop burning, but current approaches very likely miss significant amounts of the activity because the individual burned areas are either too small to detect with frequently acquired moderate spatial resolution data such as MODIS. The Visible Infrared Imaging Radiometer Suite (VIIRS) on-board Suomi-NPP (National Polar-orbiting Partnership) satellite launched on October, 2011 has one set of multi-spectral channels providing full global coverage at 375 m nadir spatial resolutions. It is expected that the 375 m spatial resolution "I-band" imagery provided by VIIRS will allow active fires to be detected that are $\sim 10\times$ smaller than those that can be detected by MODIS. In this study the new small fire detection algorithm is built based on VIIRS-I band global fire detection algorithm and hot spot detection algorithm for the BIRD satellite mission. VIIRS-I band imagery data will be used to identify agricultural fire activity across Eastern China. A 30 m spatial resolution global land cover data map is used for false alarm masking. The ground-based validation is performed using images taken from UAV. The fire detection result is been compared with active fire product from the long-standing MODIS sensor onboard the TERRA and AQUA satellites, which shows small fires missed from traditional MODIS fire product may count for over 1/3 of total fire energy in Eastern China.