

## Detection of Temporal Change of Fishery and Island Activities by DNB and SAR on the South China Sea

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**Abstract :** Fishery lights on the surface could be detected by the Day and Night Band (DNB) of the Visible Infrared Imaging Radiometer Suite (VIIRS) on the Suomi National Polar-orbiting Partnership (Suomi-NPP). The DNB covers the spectral range of 500 to 900 nm and realized a higher sensitivity. The DNB has a difficulty of identification of fishing lights from lunar lights reflected by clouds, which affects observations for the half of the month. Fishery lights and lights of the surface are identified from lunar lights reflected by clouds by a method using the DNB and the infrared band, where the detection limits are defined as a function of the brightness temperature with a difference from the maximum temperature for each level of DNB radiance and with the contrast of DNB radiance against the background radiance. Fishery boats or structures on islands could be detected by the Synthetic Aperture Radar (SAR) on the polar orbit satellites using the reflected microwave by the surface reflecting targets. The SAR has a difficulty of tradeoff between spatial resolution and coverage while detecting the small targets like fishery boats. A distribution of fishery boats and island activities were detected by the scan-SAR narrow mode of Radarsat-2, which covers 300 km by 300 km with various combinations of polarizations. The fishing boats were detected as a single pixel of highly scattering targets with the scan-SAR narrow mode of which spatial resolution is 30 m. As the look angle dependent scattering signals exhibits the significant differences, the standard deviations of scattered signals for each look angles were taken into account as a threshold to identify the signal from fishing boats and structures on the island from background noise. It was difficult to validate the detected targets by DNB with SAR data because of time lag of observations for 6 hours between midnight by DNB and morning or evening by SAR. The temporal changes of island activities were detected as a change of mean intensity of DNB for circular area for a certain scale of activities. The increase of DNB mean intensity was corresponding to the beginning of dredging and the change of intensity indicated the ending of reclamation and following constructions of facilities.

**Keywords :** day night band, SAR, fishery, South China Sea

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