Satellite Detection of Ghost Nets and Plastic Debris in Pacific Atolls

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Since 2014, the NOAA Satellite Analysis Branch has used high resolution optical satellite imagery in an effort to detect ghost nets (derelict fishing gear) and other large plastic debris in the Pacific Ocean and its atolls in support of clean-up efforts (by the NOAA Pacific Islands Fisheries Science Center, Ocean Voyages Institute, etc.). Until recently, reliable detection has proven challenging. With the application of Worldview imagery matched to in situ information on known net locations, we have been able to extract spectral signatures of floating plastics and use these to detect and identify other instances of plastic debris. Using ENVI’s Spectral Angle Mapper (SAM) target detection method, a number of likely locations of nets/plastics in the Pearl and Hermes atoll in the Northwestern Hawaiian Islands (NWHI) were highlighted. The resulting locations of the 41 debris detections were strikingly similar to the distributions along the coast reported in surveys, and are consistent with those that would be expected due to the seasonal ocean currents. This satellite imagery analysis procedure will be repeated shortly before the next NWHI clean-up effort, which will better enable us to support the removal of ghost nets and other marine plastics, and also assess the accuracy and rapid reproducibility of the technique.