

## Floating Ocean Macro Plastic Detection using an Innovative Index Developed for Sentinel 2 Acolite and Sen2Cor Images

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The detection of plastic using remote sensing images is a current research demand due to piling heaps of plastic in the ocean. Plastic is ubiquitous and exerts a negative influence on marine biota and humans. The plastic cycle consists of emissions, transportation, weathering, and accumulation. Plastic processing algorithms are expected to understand these various stages which are critical in eliminating them. This study introduced a novel index to identify floating macro plastic in Sentinel 2 satellite images. The atmospherically corrected images using Acolite and Sen2Cor algorithms were used in testing this index. The index protected the plastic information and maximized the separation from surrounding objects. A convolution high pass filter (3x3) was applied after the index to enhance the plastic objects. The categorization of plastic and nonplastic information was done by using the scatter plots. These scatter plots were made by placing the Index applied convolution high pass filtered Acolite/ Sen2Cor image as the “X” axis and Sentinel 2 bands 5,8, and 9 as the “Y” axis. The index and the scatter plot analysis identified plastic pixels with more than or equal to 14% plastic bottle percentage. The other plastic types, such as fishing nets and plastic bags, required pixel percentages above 50% to be detected. The pixels with high plastic percentage and 100% coverage were located as a separate cluster in the scatter plot analysis. Therefore, the pixel plastic percentage and the pixel plastic coverage are important contributors to the accurate detection of plastic. The plastic detection was not successful for the dates with aerosol, clouds, and smooth sea surface conditions. The Acolite and Sen2Cor images are not suitable for plastic detection when the plastic signal is weak.

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