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OBSERVING OCEAN SURFACE CURRENTS FROM A GEOSTATIONARY SATELLITE

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ABSTRACT:

A time series of satellite-derived thermal or optical image data of a feature may convey an impression of its surface movement. Attempts to automatically estimate surface current velocities from such data have often struggled with the data occlusion due to cloud cover, the complex evolution of features and the degradation of their surface signature through atmospheric effects. The multi-year record of hourly high-resolution optical images from the Geostationary Ocean Color Instrument (GOCI, aboard the Korean Communication, Ocean, and Meteorological Satellite) provides a chance to reappraise such techniques. The European Space Agency project GlobCurrent (http://www.globcurrent.org) is investigating the potential of satellite data to provide operational surface current estimates. Here we present the results of applying the Maximum Cross Correlation (MCC) technique to GOCI data. MCC is an image processing technique that matches a template image against a master image, using the maximum correlation between the two to derive the position of best match. Using the 2012 data archive we examine the robustness of i) the approach to time intervals ranging from 1 to 7 hours, and ii) using different satellite products such as water-leaving radiance or derived parameters such as chlorophyll concentration. These estimates of surface currents are evaluated using in situ High Frequency (HF) radar systems located in the Tsushima Strait between Korea and Japan. The performance of the MCC approach varies through the year, according to the degree of cloud cover and the presence or absence of strong optical contrasts between water masses. It is expected that such MCC-derived surface current velocities could contribute, in certain regions, to the European Space Agency GlobCurrent synthesis product which will be derived from multiple model and Earth observation surface current datasets.

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