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Applying the OCRA algorithm to the retrieval of the cloud fraction from EPIC/DSCOVR

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The Earth Polychromatic Imaging Camera (EPIC) on board the Deep Space Climate Observatory (DSCOVR) has 10 spectral channels covering the UV, VIS and NIR part of the spectrum. In this work we present the application of the well-established Optical Cloud Recognition Algorithm (OCRA) to estimate radiometric cloud fractions from EPIC measurements, with a special focus on the preprocessing steps required by EPIC imagery.

We show that the geolocation information of the current operational Level 1B EPIC imagery has systematic errors and to solve this issue we develop a sophisticated geolocation correction algorithm to find a transformation that aligns the EPIC images to their corresponding geolocation. The geolocation arrays are used to generate a synthetic land-ocean mask, and from this mask we detect coastline features that are matched then with the coastline features that are detectable in the real images. The pairs of wrong and correct coordinates for every feature allow to determine the proper image transformation, which consists of a radial distortion plus a movement (rotation of the Earth's disk plus shift). The geolocation correction algorithm allows for using OCRA to compute the EPIC cloud fractions by first generating monthly cloud-free reflectance maps from EPIC, on a global grid with resolution of 0.2° in longitude and 0.2° in latitude, and then deriving the radiometric cloud fractions by comparing the cloud-free map with the EPIC measurements.