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Reconstruction and downscaling of Eastern Mediterranean OSCAR satellite surface current data using DINEOF

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During the last decade, Rixen (2005) and Alvera-Azkarate (2010) presented the DINEOF (Data Interpolating Empirical Orthogonal Functions) method, a EOF-based technique to reconstruct missing data in satellite images. The application of DINEOF method, proved to provide relative success in various experimental trials (Wang and Liu, 2013; Nikolaidis et al., 2013;2014), and tends to be an effective and computationally affordable solution, on the problem of data reconstruction, for missing data from geophysical fields, such as chlorophyll-a, sea surface temperatures or salinity and geophysical fields derived from satellite data. Implementation of this method in a GIS system will provide with a more complete, integrated approach, permitting the expansion of the applicability over various aspects. This may be especially useful in studies where various data of different kind, have to be examined. For this purpose, in this study we have implemented and present a GIS toolbox that aims to automate the usage of the algorithm, incorporating the DINEOF codes provided by GHER (GeoHydrodynamics and Environment Research Group of University of Liege) into the ArcGIS®. ArcGIS® is a well known standard on Geographical Information Systems, used over the years for various remote sensing procedures, in sea and land environment alike. A case-study of filling the missing satellite derived current data in the Eastern Mediterranean Sea area, for a monthly period is analyzed, as an example for the effectiveness and simplicity of the usage of this toolbox. The specific study focuses to OSCAR satellite data (http://www.oscar.noaa.gov/) collected by NOAA/NESDIS Operational Surface Current Processing and Data Center, from the respective products of OSCAR Project Office Earth and Space Research organization, that provides free online access to unfiltered (1/3 degree) resolution. All the 5-day mean products data coverage were successfully reconstructed.

KEY WORDS: Remote Sensing, Cyprus, Mediterranean, DINEOF, ArcGIS, data reconstruction.