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Global maps of Forel–Ule index, hue angle and Secchi disk depth derived from 21 years of monthly ESA Ocean Colour Climate Change Initiative data

Jaime Pitarch[1,2], Marco Bellacicco[3], Salvatore Marullo[1,3], and Hendrik J. van der Woerd[4]

[1]Consiglio Nazionale delle Ricerche (CNR), Istituto di Scienze Marine (ISMAR),
Via del Fosso del Cavaliere 100, 00133 Rome, Italy
[2]NIOZ Royal Netherlands Institute for Sea Research, Department of Coastal Systems, and Utrecht University,
P.O. Box 59, 1790AB Den Burg, Texel, the Netherlands
[3]Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA),
Via E. Fermi 45, 00044 Frascati, Italy
[4]Institute for Environmental Studies (IVM), Water & Climate Risk, Vrije Universiteit Amsterdam,
De Boelelaan 1111, 1081HV Amsterdam, the Netherlands

Correspondence: Jaime Pitarch (jaime.pitarchportero@artov.ismar.cnr.it)

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Abstract. We document the development and public release of a new dataset (1997–2018), consisting of global maps of the Forel–Ule index, hue angle and Secchi disk depth. Source data come from the European Space Agency (ESA) Ocean Colour (OC) Climate Change Initiative (CCI), which is providing merged multi-sensor data from the mid-resolution sensors in operation at a specific time from 1997 to the present day. Multi-sensor satellite datasets are advantageous tools for ecological studies because they increase the probabilities of cloud-free data over a given region as data from multiple satellites whose overpass times differ by a few hours are combined. Moreover, data-merging from heritage and present satellites can expand the duration of the time series indefinitely, which allows the calculation of significant trends. Additionally, data are remapped consistently and analysis-ready for scientists. Also, the products described in this article have the exclusive advantage of being linkable to in situ historic observations and thus enabling the construction of very long time series. Monthly data are presented at a spatial resolution of ~ 4 km at the Equator and are available at PANGAEA (https://doi.org/10.1594/PANGAEA.904266; Pitarch et al., 2019a). Two smaller and easier-to-handle test datasets have been produced from the former: a global dataset at 1° spatial resolution and another one for the North Atlantic at 0.25° resolution. The computer code for the generation of the Forel–Ule index, hue angle and Secchi disk depth from a given remote-sensing reflectance is also shared at https://doi.org/10.5281/zenodo.4439646 (Pitarch et al., 2021) and can be easily set in loop mode for batch calculations.

1 Introduction

Single-sensor satellite datasets are not long enough to provide significant evidence of climatic trends that become manifest over fluctuations, so the multi-sensor approach has been fostered since the last decade (IOCCG, 2007). In Europe, the European Space Agency (ESA) Climate Change Initiative (CCI) was created to address the United Nations Framework Convention on Climate Change requirements on a systematic monitoring of the global climate system. The Global Climate Observing System (GCOS) defined a number of essential climate variables (ECVs), which are physical, chemical or biological variables that critically contribute to the characterization of Earth's climate. Ocean Colour (OC) is one of the