Geophysical Research Abstracts
Vol. 18, EGU2016-10260, 2016
EGU General Assembly 2016

Seasonal and inter-annual eutrophication dynamics in a hypereutrophic shallow coastal lagoon from ten years of satellite observations and in-situ data

Jaime Pitarch (1), Antonio Ruiz-Verdú (2), Juan M. Soria (2), and Rosalia Santoleri (1)

(1) Italian National Institute of Atmospheric and Climate Sciences (ISAC-CNR), Rome , Italy, (2) Image Processing Group, University of Valencia, Burjassot, Spain

The Albufera de Valencia (39.33 N, 0.37 W) is a hypereutrophic shallow coastal lagoon, having a near round shape of $\sim$ 5 km diameter and $\sim$ 1 m average depth. At the west side, the lake is separated from the sea by a narrow land strip, but three artificial channels allow connection to the sea, regulated by gates. The rest of the lake is surrounded by rice fields that were made by gaining surface from the lake around a century ago. Nowadays, the ecological state of the lake is very degraded. Freshwater inflow is insufficient and residence time is too high. Despite some improvements in waste water treatment, high loads of sediment-stored nutrients are often resuspended due to habitual strong winds and made available for primary production. The previously abundant bottom vegetation disappeared decades ago and secchi depth does not reach more than few tens of centimeters. The lake suffers from cyanobacterial blooms and massive fish deaths. Despite its vital importance as a coastal wetland in the western Mediterranean region, its water quality is not routinely monitored, so its seasonality and eventual blooming events have not been sistematically studied. In this study, we aim at filling this gap using satellite data. Medium-resolution satellite-borne sensors constitute an appropriate tool for this sake due to the lake's medium size and little cloud cover time over the region. In particular, the European MERIS sensor (2002-2012) is specially well suited due to its unique spectral bands configuration for cyanobacterial detection. Apart from the utility of the results themselves, study of this sensor provides a strong baseline for operational utilization of its successor, the new-coming European Sentinel 3-OLCI sensor. We have processed the full archived MERIS archived data. By adequate choice of band ratios and posterior calibration to in-situ samples, the time series of chlorophyll concentration is derived. Derived seasonality reveals a pattern that is determined by the rice cultivation steps. In periods of stagnation, chlorophyll concentration increases, while washing events provoke rapid cell decay. Finally, the interannual time series display significant year-to-year differences. For instance, autumn 2005 and late summer 2008 showed extreme blooming events, while other year displayed lower productivity. The relationship between these features and possible forcing factors is still ongoing.