BONUS — SCIENCE FOR A BETTER FUTURE OF THE BALTIC SEA REGION
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INFORM
EOMORES

Upscaling the ecological processes in the Curonian Lagoon with satellite remote sensing support

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istituto per il rilevamento elettromagnetico dell'ambiente

INTRODUCTION

The Curonian Lagoon - naturally eutrophicated water body (Gasiūnaitė et al., 2008; Olenina, 1998).

Phytoplankton community undergo seasonal transition (Fig. 1) with recurring **spring diatom dominance** followed by **summer cyanobacteria blooms** (Schmidt-Ries, 1940; Ūselytė, 1959; Olenina, 1998).

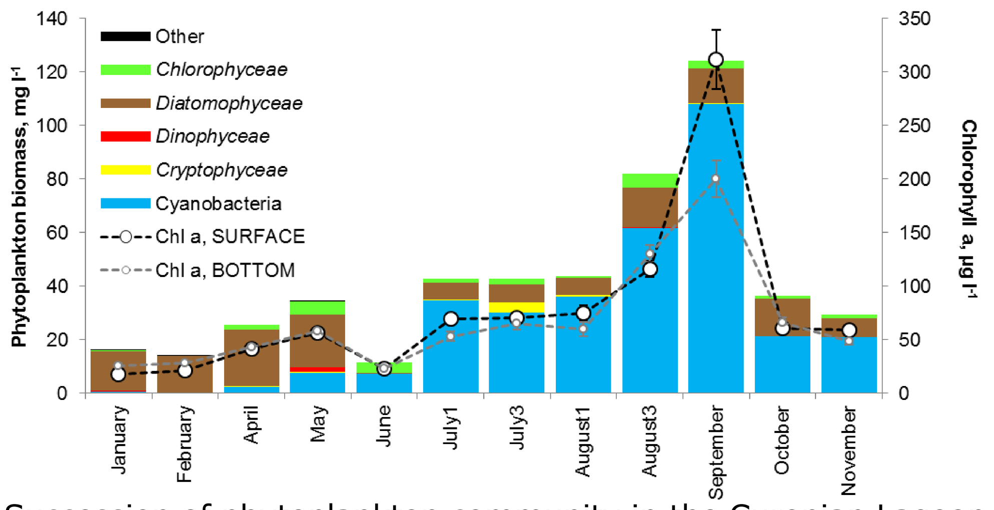
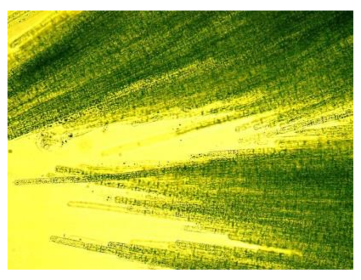


Fig. 1. Succession of phytoplankton community in the Curonian Lagoon during 2015



A dominant component of algal blooms – N-fixing cyanobacteria ***Aphanizomenon flos-aquae*** (Fig. 2).

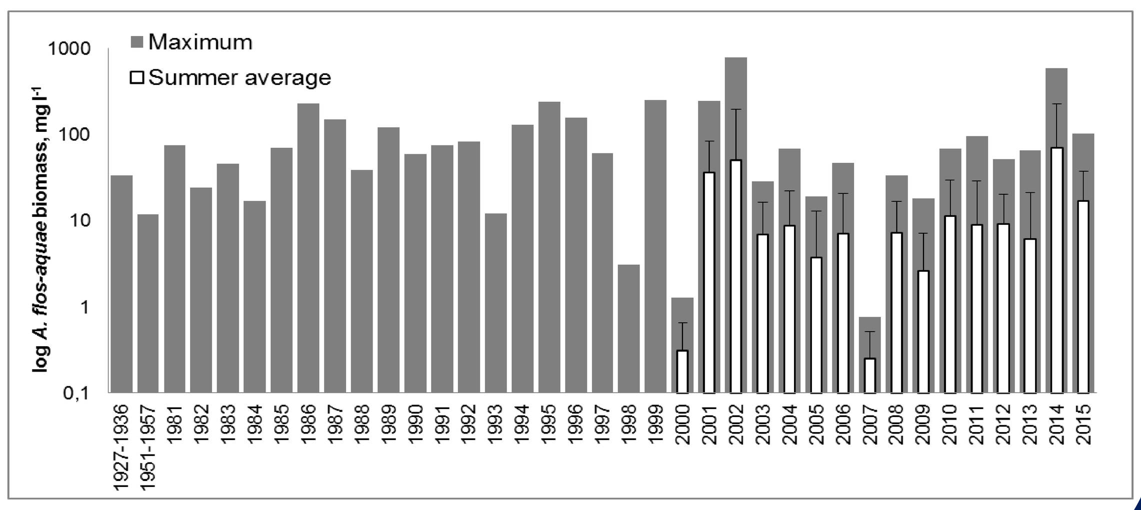
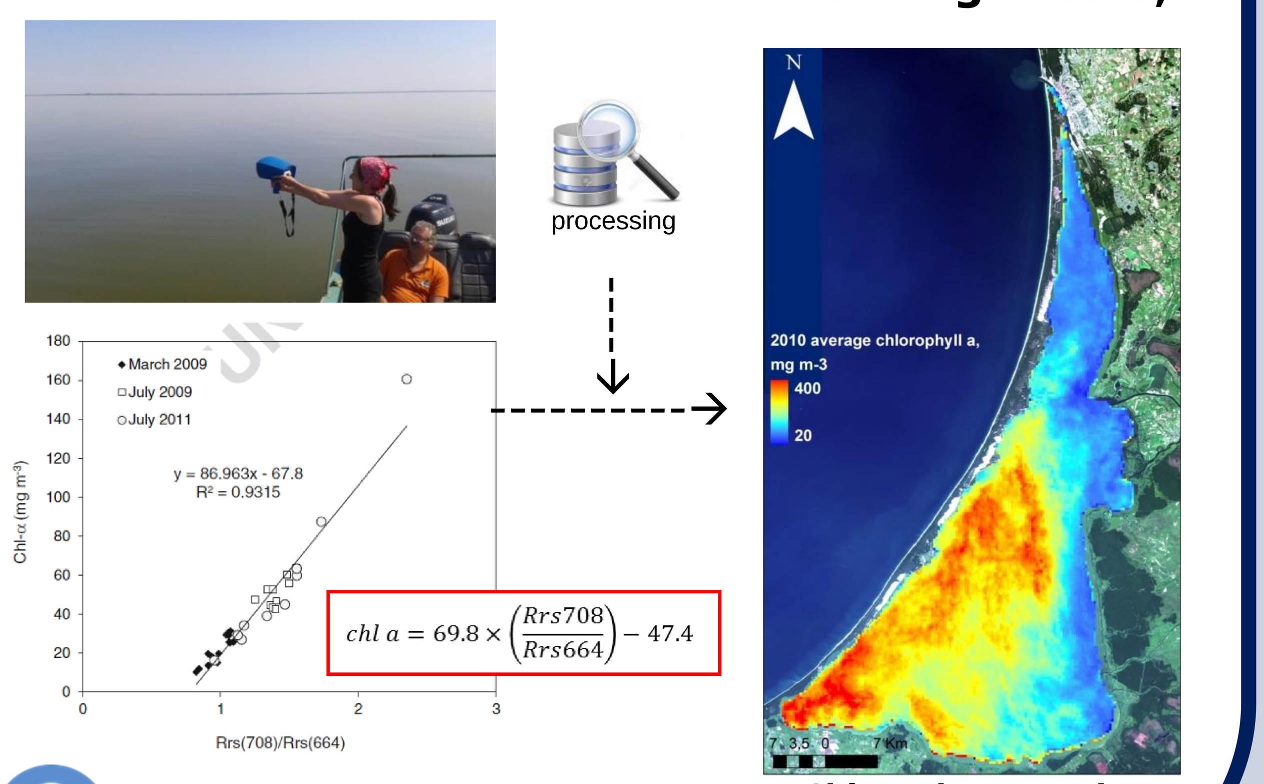


Fig. 2. History of N-fixing *Aphanizomenon flos-aquae* in the lagoon

CAL/VAL activities

From small ---> to large scale;



Chl-a, Phycocyanin, CDOM, TSM, Kd

References 1, 3, 5 and 6.

Rezults

Retrospective analysis

Satellite image analysis reveal the spatial (Fig. 3) and temporal (Fig. 4) variability of chl-a during 2004-2011;

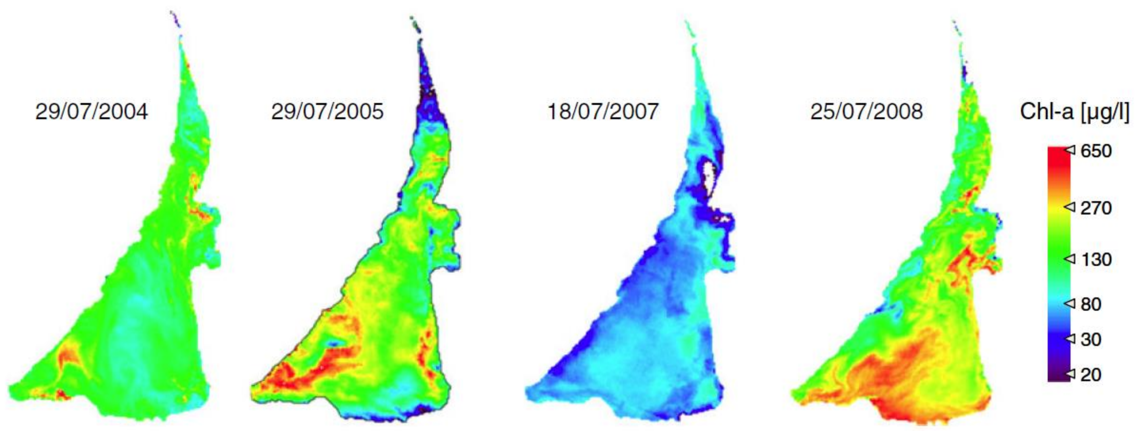
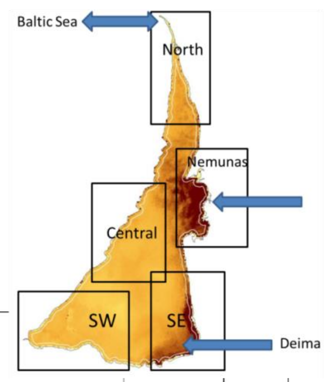


Fig. 3. Spatial distribution of chlorophyll *a* concentration.

The investigation confirmed the **hypertrophic conditions** of the lagoon's waters during summer.



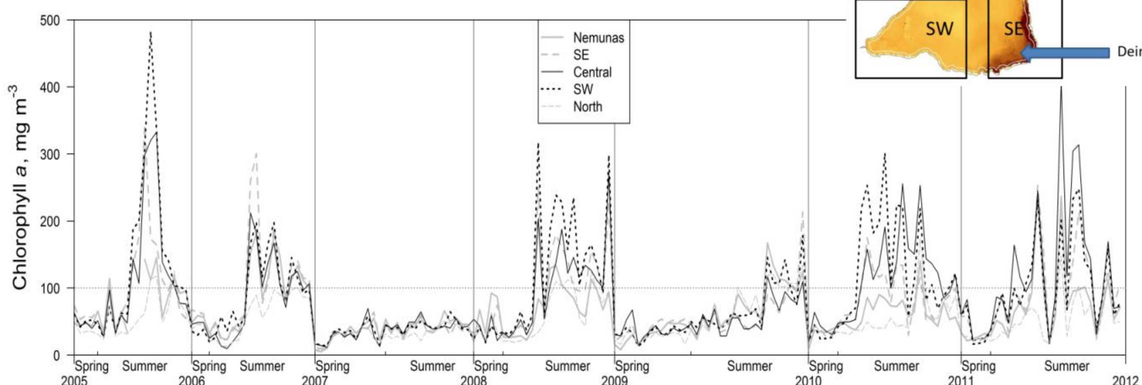


Fig. 4. Temporal variation of chlorophyll a during spring-summer of 2005-2011.

References 1 and 4.

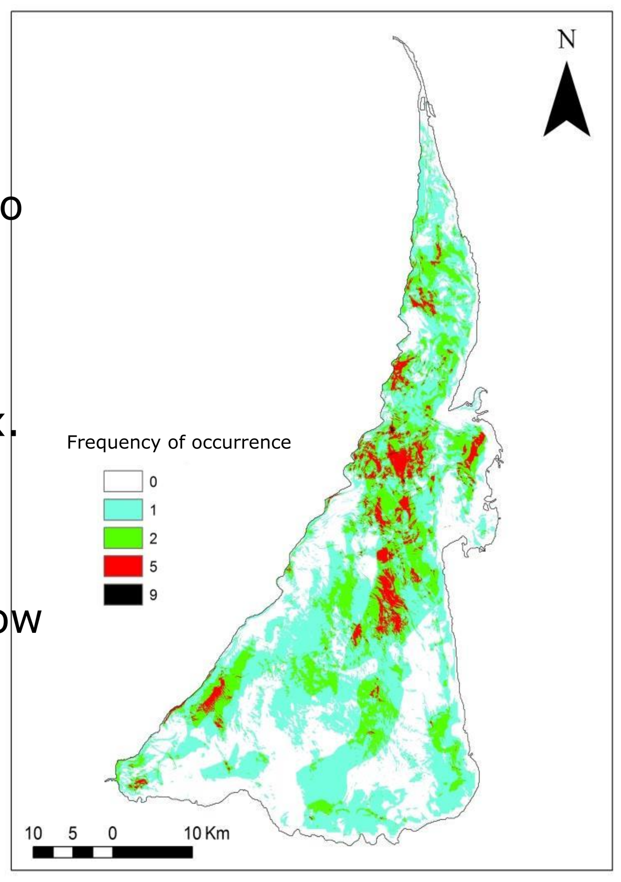
Cyanobacteria scums

The cyanobacteria surface accumulation and scums can be monitored with satellite imagery;

In May-October of 2014-2015 surface accumulations covered from 0.03 to 25 % total area of the lagoon (Fig. 5).

Scums can be severe to the aquatic biota.

Nearly 70 % of the lagoon surface (approx. 1,000 km²) is prone to transient **hypoxia** development when blooms coincide with low wind speed conditions.



Reference 2.

Fig. 5. Cyanobacteria accumulations in the Curonian Lagoon.

CDOM pool in the Curonian Lagoon

Dissolved organic pool in the Curonian Lagoon has a mainly **allochthonous** origin in the high discharge period and an **autochthonous** origin in the summer, algal bloom period;

The collapse of cyanobacteria after intensive bloom adds to the budget of organic matter expressed as CDOM (Fig. 6).

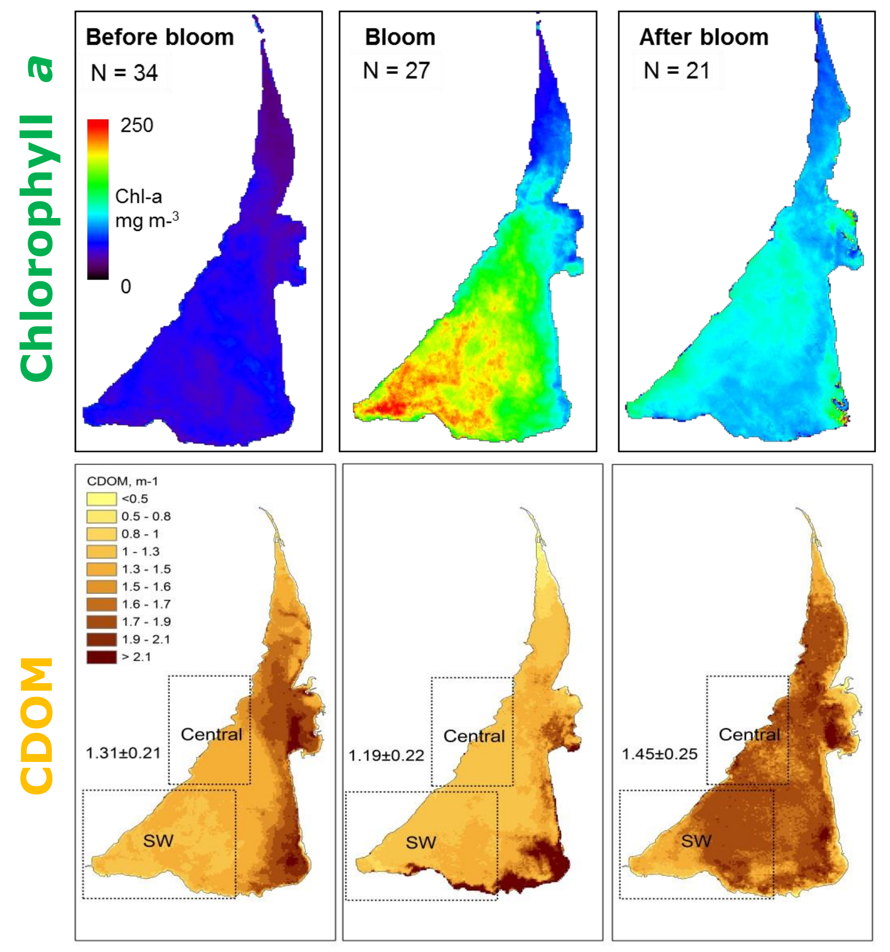


Fig. 6. MERIS derived average chl-a and CDOM before during and after the bloom.

Reference 4.

Future perspectives:

copernicus — The European Earth Observation Programme

- Integration of the new COPERNICUS satellites data;
- Identification of hot-spots and hot-seasons for algal blooms;
- Monitoring and early warning of changing water quality during warm season (EOMORES H2020);
- Extrapolation of pelagic processes (e.g. primary production) to the entire lagoon;
- Combination of nutrients sources and hydrodynamics with algal blooms;
- Mapping of macrophytes and coastal vegetation.

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