

EP34C-0857: Thin layers of phytoplankton in the upwelling region off NW Iberia: occurrence, formation, and relevance



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Motivation

Thin layers of phytoplankton (TLP) are a particular case of blooms where high-cell densities are located within a narrow depth interval. They are believed to play an important role in the sudden formation and maintenance of harmful algae blooms. However, we have a limited understanding about the role that these features have in the growth of toxic phytoplankton in the Galician Rías (NW Spain), the third largest producer of Mediterranean mussels in the world.

Detection

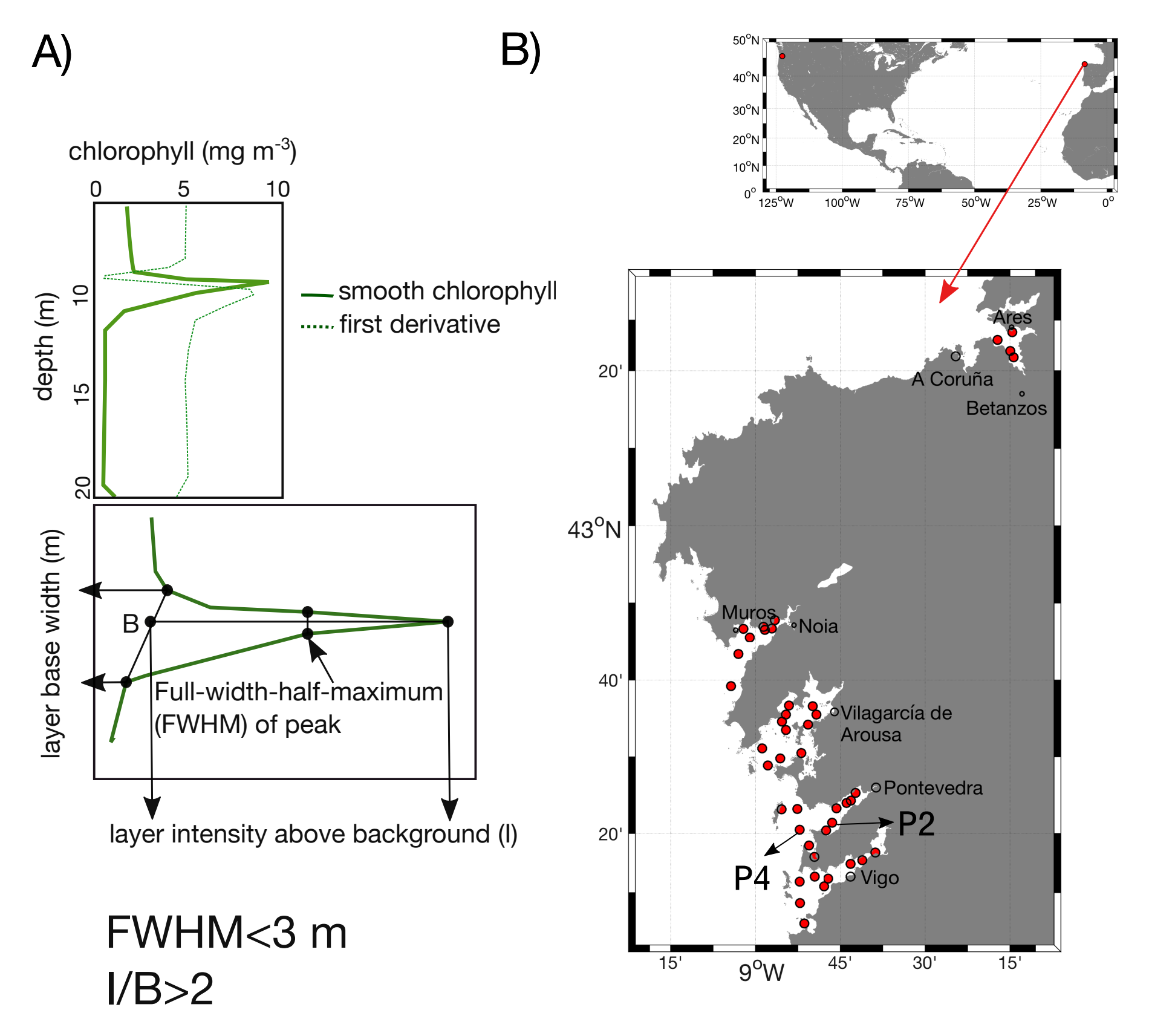


Figure 1. A) Criteria for the definition of TLP and B) location of the 43 sampling stations conducted weekly by the monitoring program in the Galician Rías.

Frequency

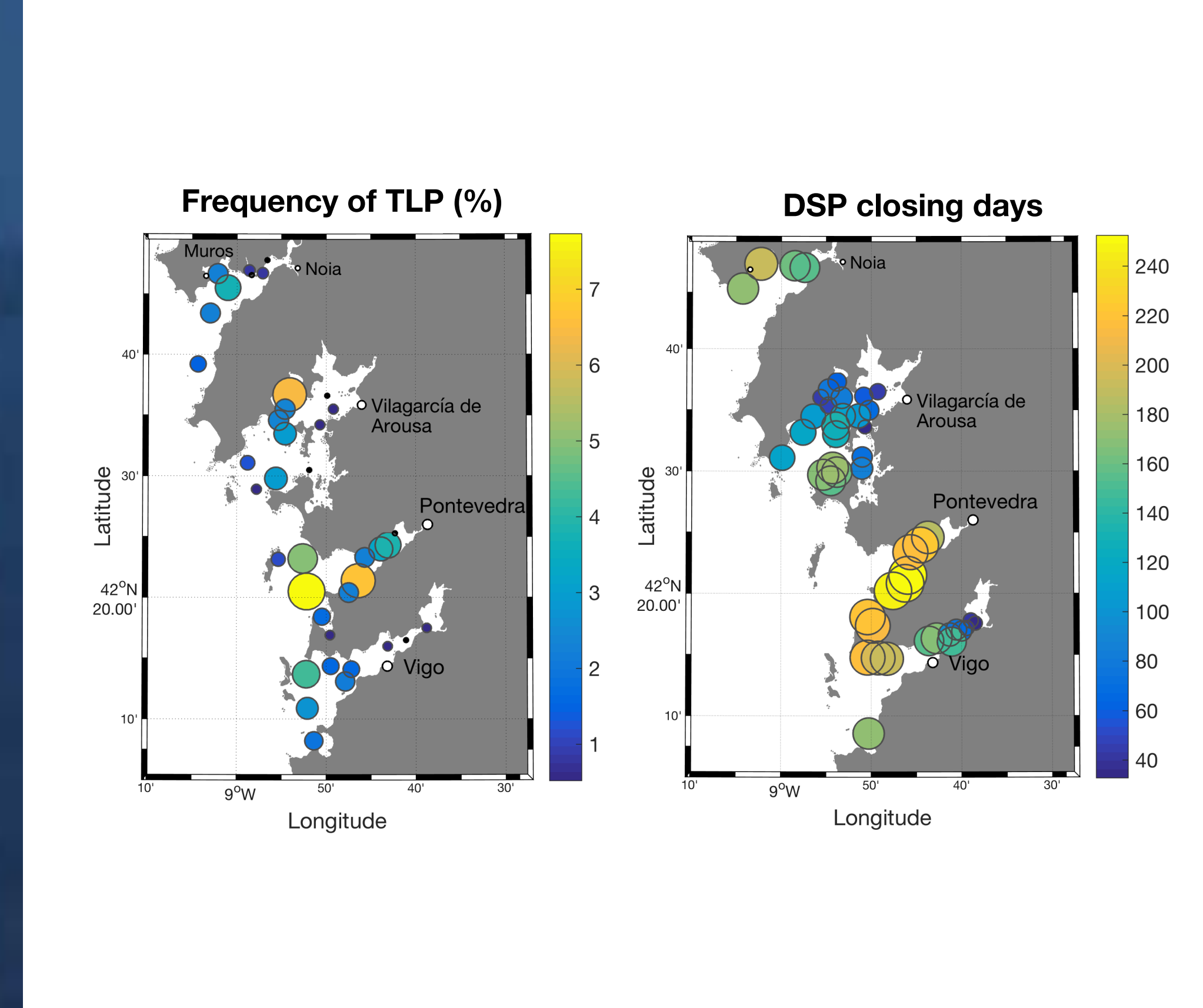


Figure 2. Frequency of occurrence of TLP and number of closing days for harvesting, due to Diarrhetic Shellfish Poison (DSP), per year during 2012-2015.

Characteristics

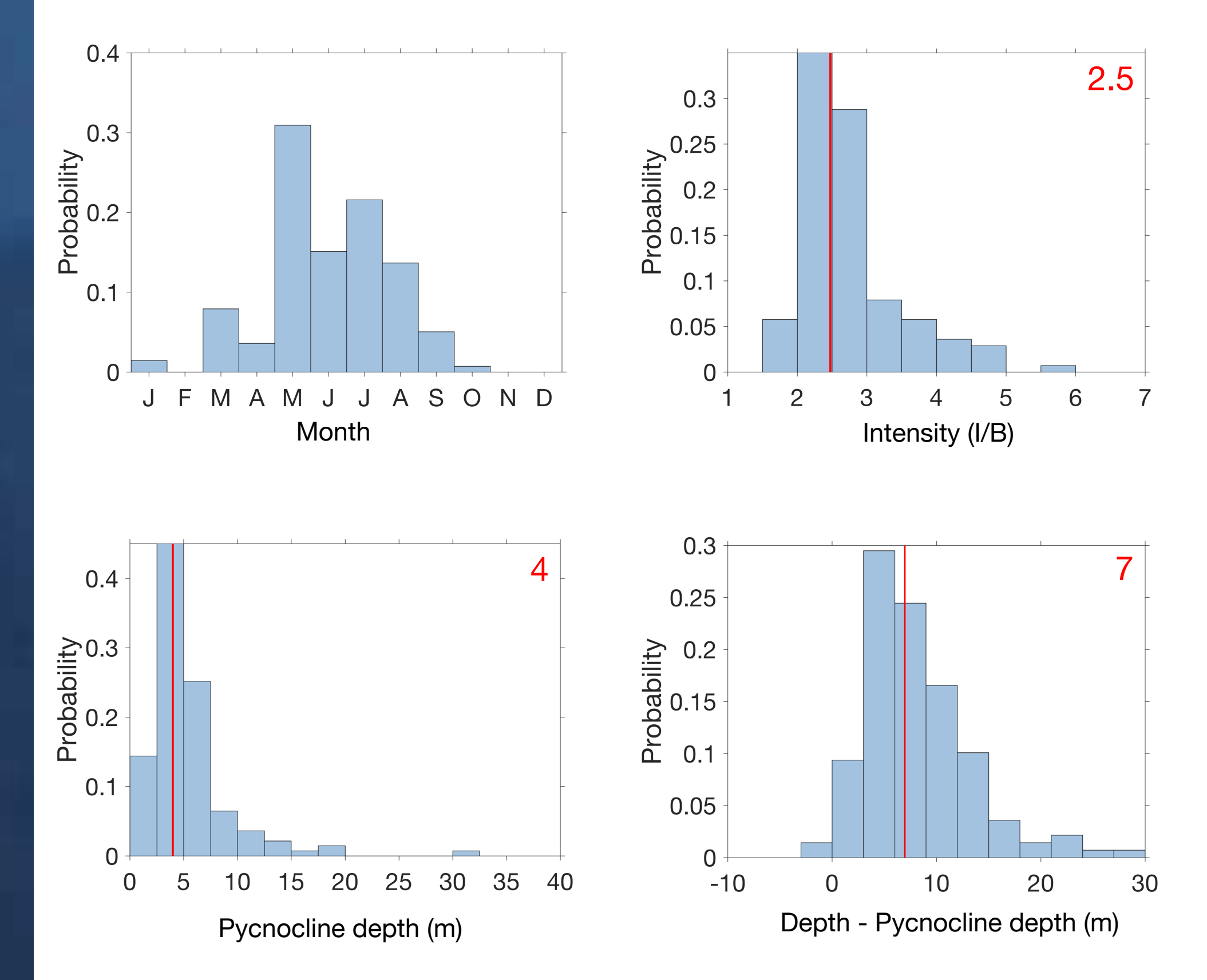


Figure 3. Characteristics of TLP detected in the Galician Rías during 2012-2015.

Short-term variability

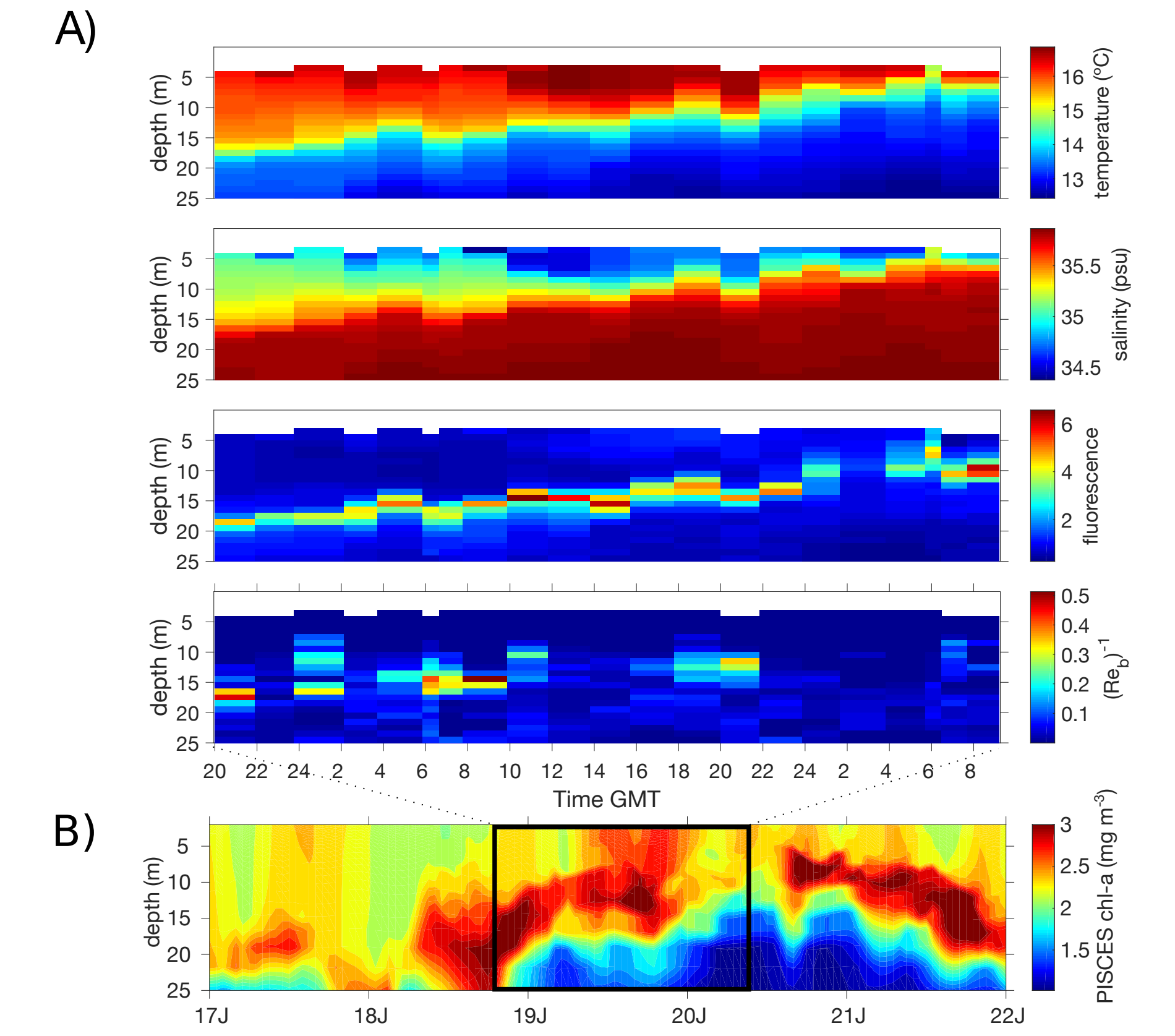


Figure 4. A) Temperature, salinity, fluorescence and inverse Reynolds number derived from a microstructure profiler in Ría de Pontevedra (st. P2) between 18-20 June 2013. B) PISCES-modeled chlorophyll-a between 17-22 June 2013.

Large-spatial scale

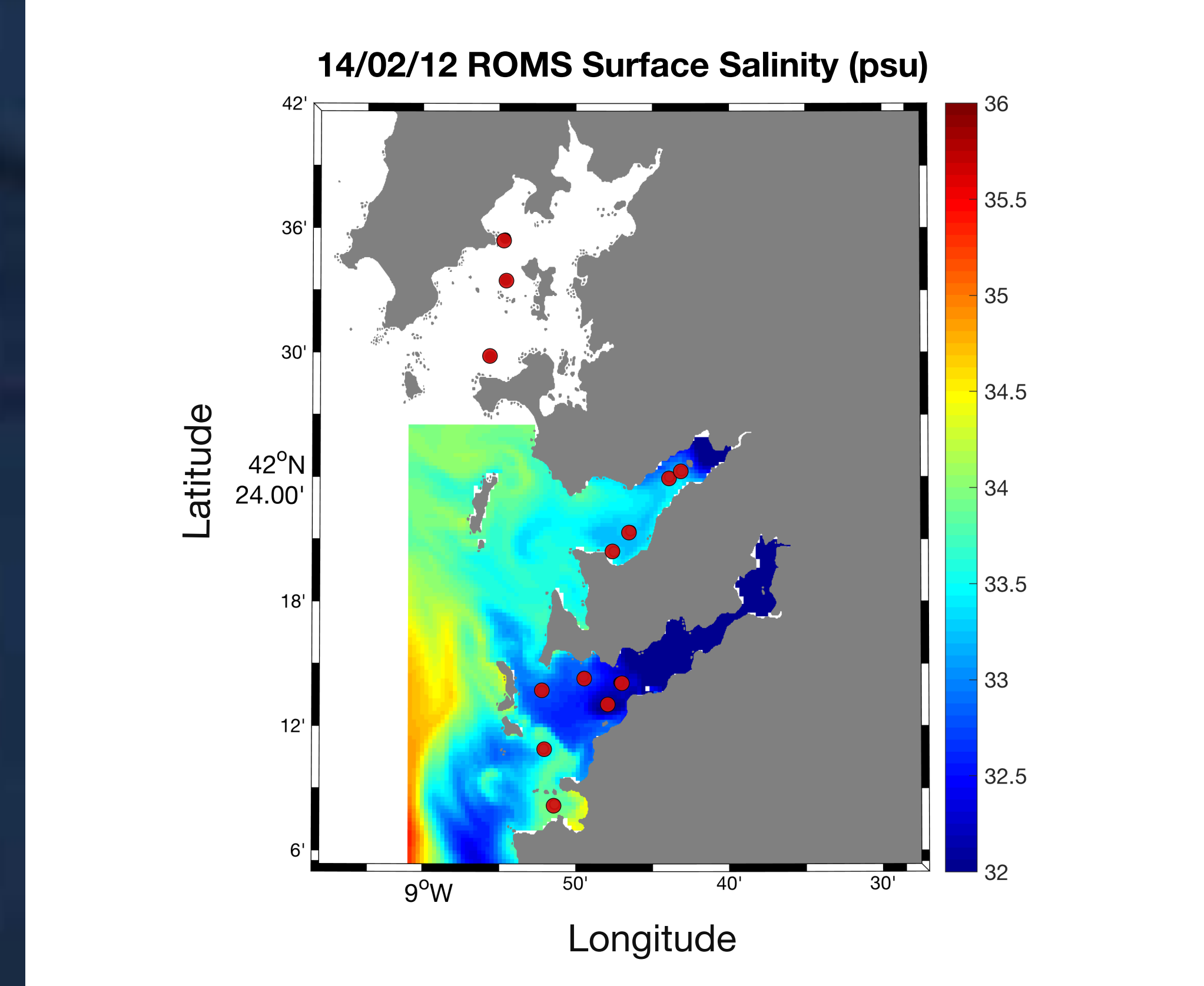


Figure 5. ROMS modeled surface salinity and stations affected by TLP on the 14 May 2012.

TLP and harmful phytoplankton

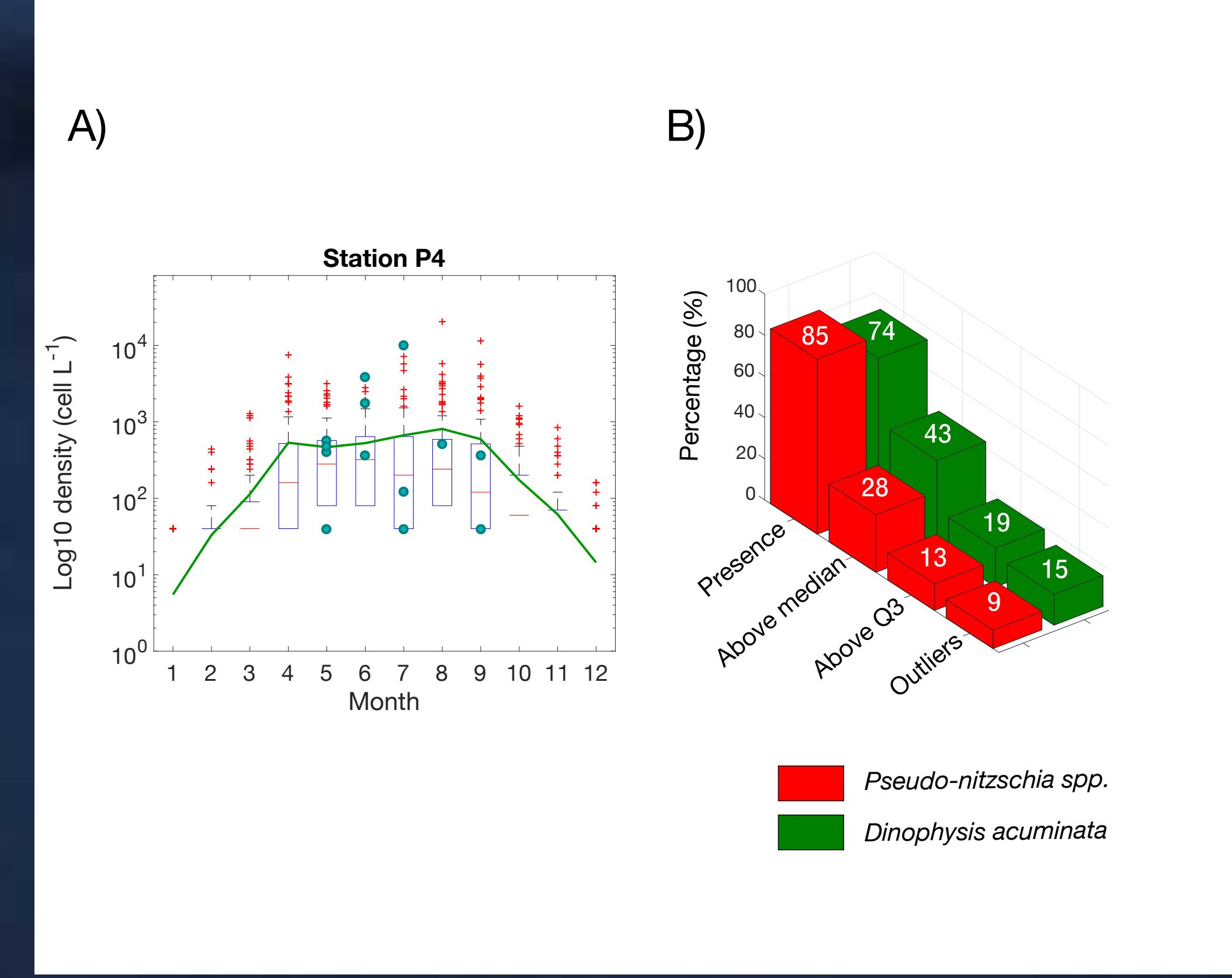


Figure 6. A) Density of *Dinophysis acuminata* in the Ría de Pontevedra (station P4) between 1992-2015. B) Percentage of TLP associated with presence, above median, above third quartile and outliers of *Pseudo-nitzschia* spp. and *Dinophysis acuminata* during 2012-2015.

Conclusions

- 1) Frequency of TLP (ca. 3%) was probably underestimated by weekly monitoring, as these features form and disappear over short periods of time in response to changes in mixing.
- 2) TLP occurrence was associated with the base of shallow pycnoclines and more frequent from late spring to early summer.
- 3) Large-spatial events of TLP co-occurred with the intrusion of fresh water into the Rías.
- 4) TLP were frequently observed in Ría de Pontevedra, characterized for longer harvesting closure periods due to species of the genus *Dinophysis*.
- 5) In this Ría about 40% of TLP were associated with *D. acuminata* densities above the median; 20% above the third quartile; and 15% with outliers.

Hypothesis

TLP play an important role in the formation of harmful algae blooms in the Galician Rías

Objectives

- 1) To describe the characteristics and investigate the mechanisms of TLP formation.
- 2) To analyze the relationship between the occurrence of TLP and harmful phytoplankton densities.

What is the relevance?

The occurrence of TLP could be related with the growth or accumulation of certain phytoplankton species, including the main shellfish-toxin producers in the region.

Acknowledgments

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