

Review of 'On the Role of Light and Mixing in Shaping Southwestern Atlantic Shelf Blooms' by Dogliotti et al.

This paper presents a study of phytoplankton phenology on the shelf of South America in the Southwestern Atlantic Ocean. Its primary focus is on the relationship between light penetration depth, mixed layer depth, and chlorophyll-*a* concentration, which serves as a proxy for phytoplankton biomass, building on Sverdrup's Critical Depth Hypothesis.

The study is well-structured, easy to follow, and a pleasure to read. I appreciate the extensive literature background and the solid introduction. While I do not see any significant flaws, I believe the paper could benefit from clarifying and explaining a few points.

1. As someone who lives and works in a very different part of the world, I would appreciate an additional figure illustrating the bathymetry, the main currents, and the extents of the Central and Patagonian Shelf. This would enhance the reader's understanding of the regional specifics, which was emphasized in the text.
2. I understand the challenges related to phenology metric estimation, as I have studied phenology in a different region. Defining the year is crucial, and this is challenging in your study area, as blooms begin at nearly opposite times of the year in the southern and northern ends. Did you observe any clear boundary in the locations where you transitioned from the conventional definition of the year to the June-May definition? Did this require any statistical "blending or merging" of the data?
3. In the modeling section, you mentioned that you analyzed values of the abiotic factors two and four weeks before bloom initiation to account for pre-bloom conditions. Did you explore time lag analysis, or were these time ranges adopted from previous studies? The rationale for the two- and four-week ranges was unclear.
4. I found it striking that there was only a minor reference to river outflow in the Río de la Plata area. Although shallow (<20 m) areas of extremely high turbidity were masked out, river runoff affects the surrounding waters in many ways. For example, the additional nutrients fuel primary productivity also far from the river mouth; introduced detritus and chromophoric dissolved organic matter (CDOM) can limit the euphotic zone, and water stratification may be enhanced due to significant salinity differences. Interannual and seasonal changes in river discharge were not included in the modeling section, which may have been limited by data availability. However, I would expect more direct references in the discussion section, not just minor references to frontal zones.
5. One last comment is, why in line 44 did you refer to PAR as the photosynthetically available region, while even later in your manuscript (line 201) you defined PAR as the Photosynthetically Available Radiation. The latter, seems to me to be a more commonly used definition.