Plankton diversity and community structure based on a cabled observatory data

Gabriel R. **Freitas**[1], Hidekatsu Yamazaki[1], Takeyoshi Nagai[1], Rubens Lopes[2], Leandro Ticlia[2]

[1]Tokyo University of Marine Science and Technology, Tokyo, Japan; [2]Oceanographic Institute, University of Sao Paulo, Brazil.

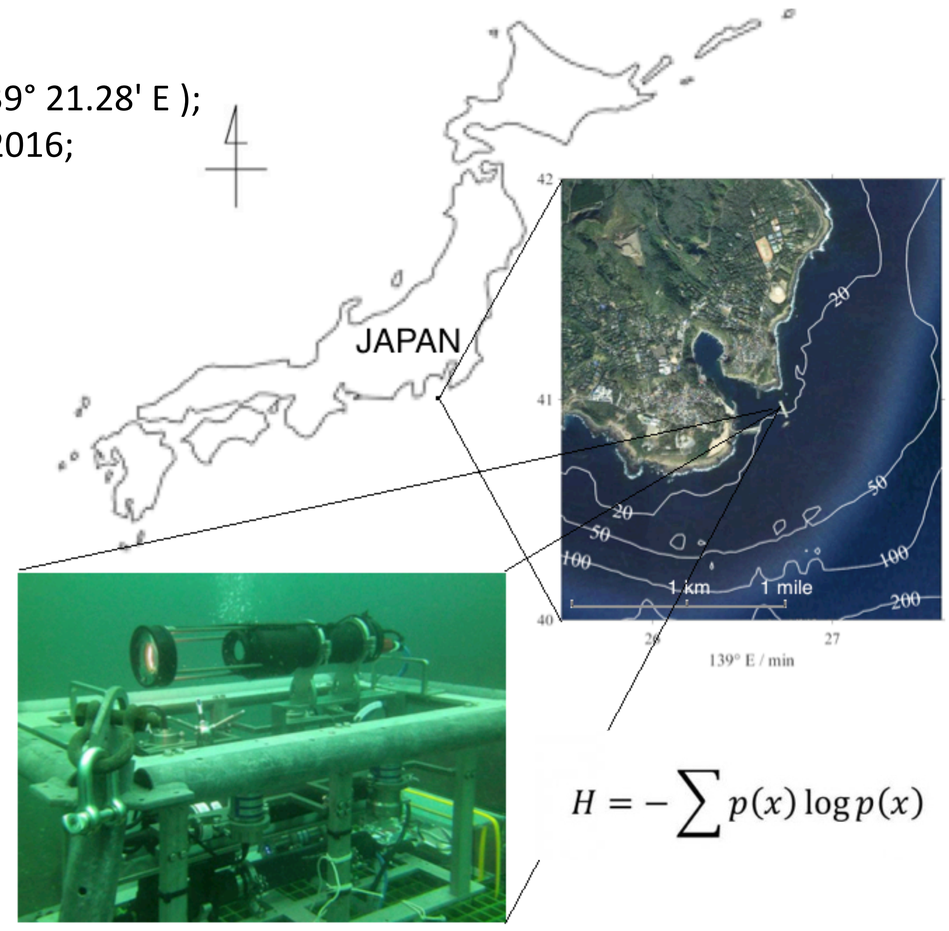
gabrielruske@gmail.com; Research supported by JST CREST (JPRMJCR12A6)

INTRODUCTION

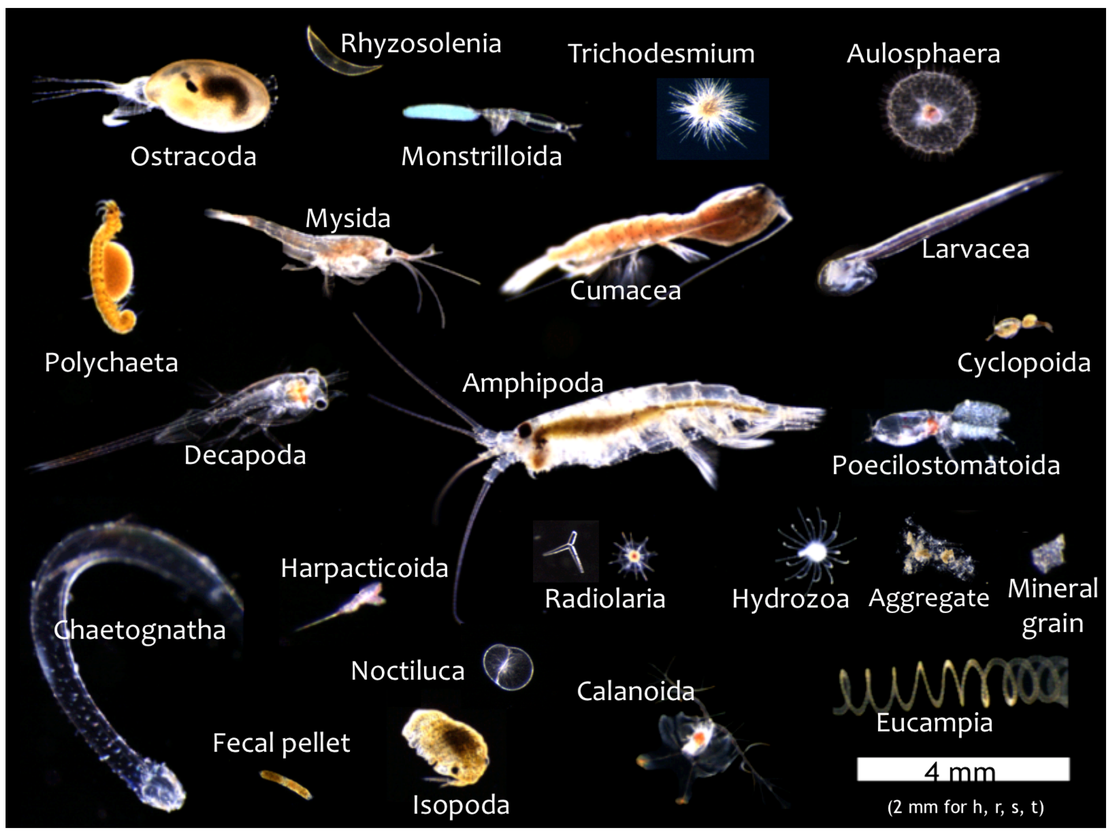
Marine ecosystems change at a myriad of scales (time and space wise). To better understand the planktonic environment – through communities' diversity, structure and function – a high resolution and multidisciplinary observational approach is necessary. Are there any changes in community diversity (seasonally/yearly basis)? What is its dominant frequency? How does it change when impacted by storms? What is the overall contribution of marine aggregates?

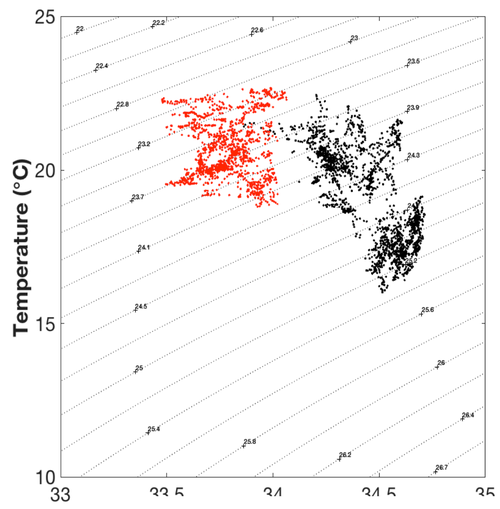
MATERIAL & METHODS

- Izu-oshima island, Japan (34° 40.48' N - 139° 21.28' E);
- Oct/2014 - Jan/2015 and Oct/2015 - Jan/2016;
- Oshima Coastal Environmental data Acquisition Network System (OCEANS);
- Continuos Plankton Imaging and Classification System (CPICS): 2,750 x 2,200 pixels, 50 um (resol.); 3 Hz - 3.5 L/h; 6 Hz - 7.12 L/h;
- LAPS Plankton Detector automatic classification system (LPD).



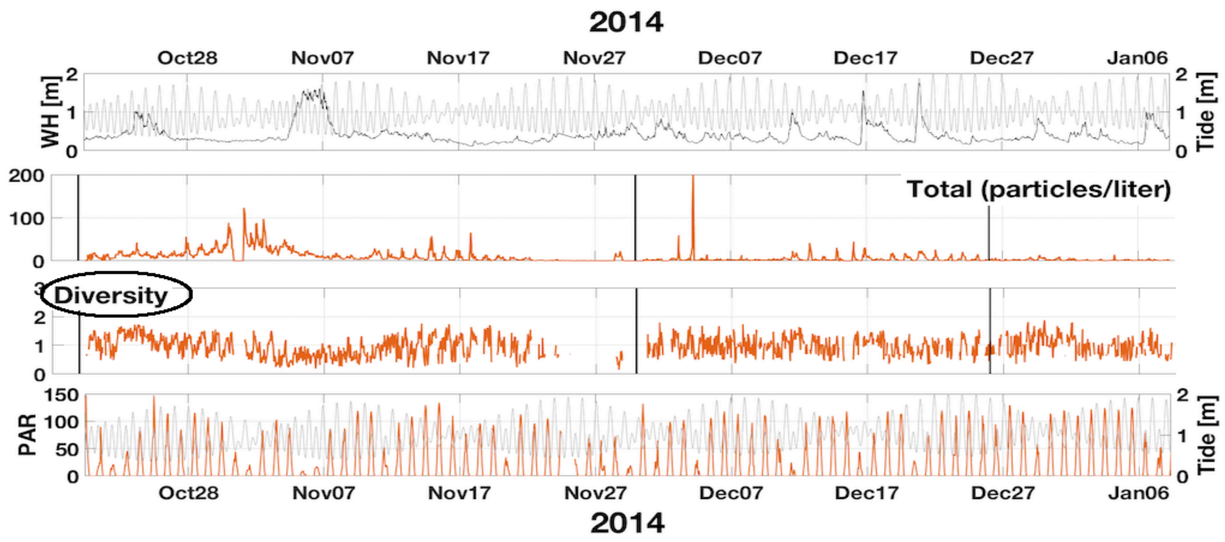
RESULTS

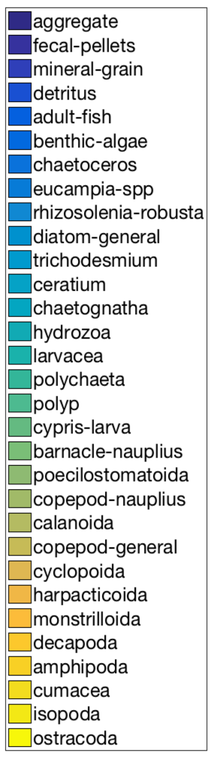


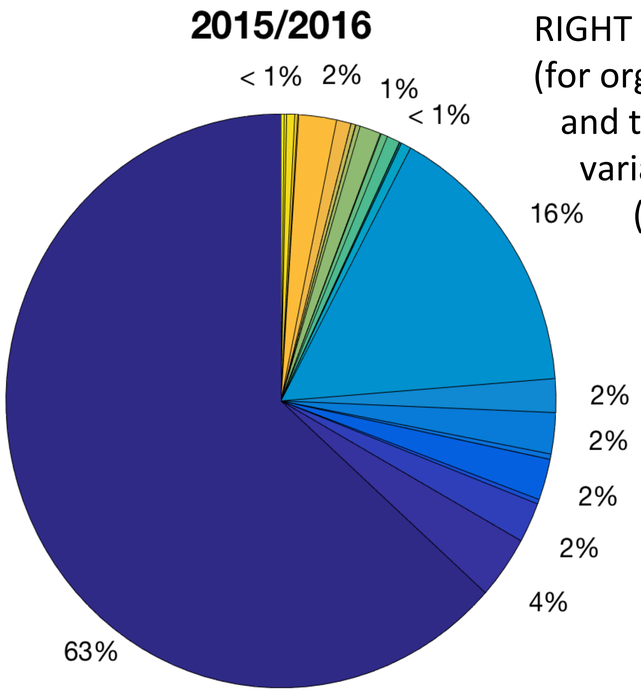


$$H = -\sum p(x) \log p(x)$$

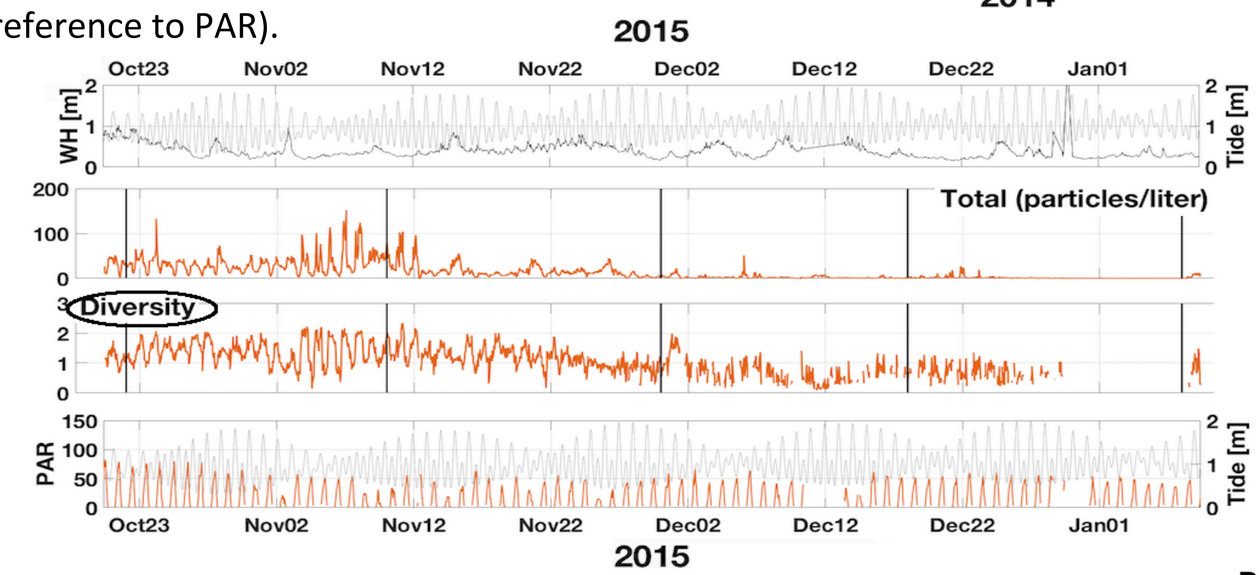
Sampling site and the equipment used (OCEANS and CPICS); TS diagram for 2014/2015 (black) and 2015/2016 (red); and sample images. Diversity was calculated acording to Shannon-Wiener equation (top).



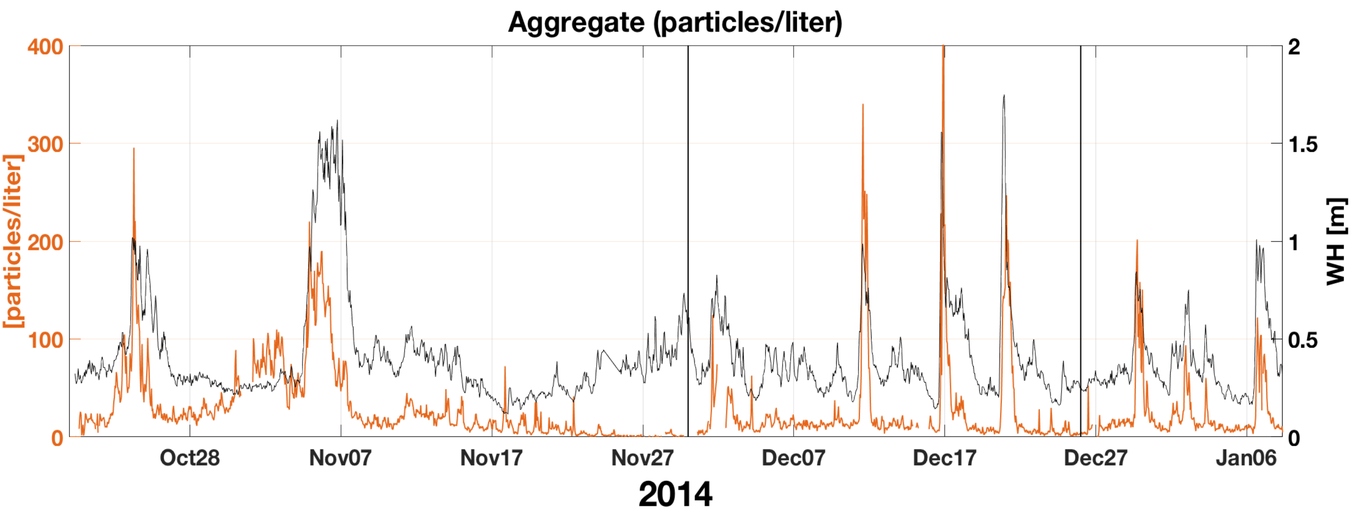




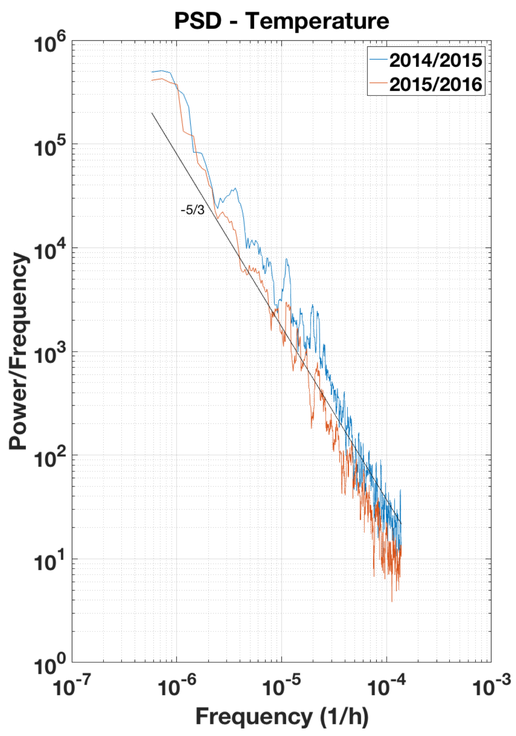
RIGHT AND UNDER: Time series (for organisms only) of diversity and total particles. A diurnal variation can be observed (reference to PAR).

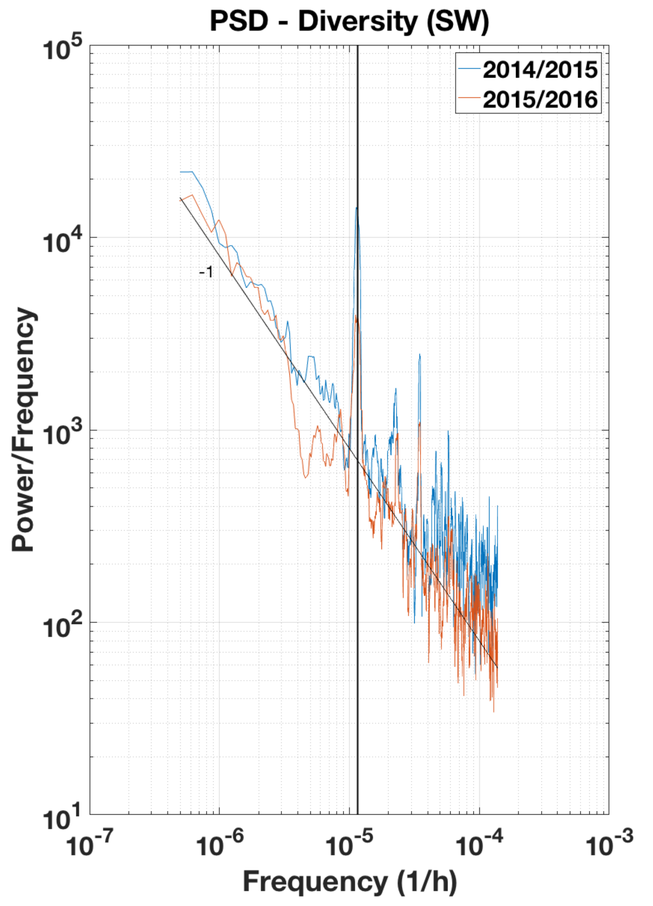


BELOW: Power Spectrum Density (PSD) of diversity and temperature. The peak for diversity is at the frequency of 1 day and the slope shows a 1/f power law signature ("pink noise").



ABOVE: Time series of marine aggregates (orange) and wave height (black) for 2014/2015. HIgh dynamic conditions increased the quantity of particles, either by aggreagate formation or destruction.





FINDINGS

- A inter-annual variability in diversity was correlated with a different water mass structure;
- Marine aggregates dominated the total images of particles with at least 63% of the total abundance;
- Alpha diversity showed a seasonal pattern and decreased towards winter, most markedly during the 2nd period;
- The estimated spectrum for diversity showed a 1/f power law signature with daily frequency peaks correlated to zooplankton DVM.