

# The Italian contribution to SAS: the CASSANDRA project (Greenland Sea; 75 °N transect)



R/V *Laura Bassi*

- **Chief scientist:** Maurizio Azzaro (ISP - Institute of Polar Sciences), maurizio.azzaro@cnr.it

**Period of the cruise:**  
29/08/2021, Longyearbyen (NO) –  
14/09/2021, Bergen (NO)

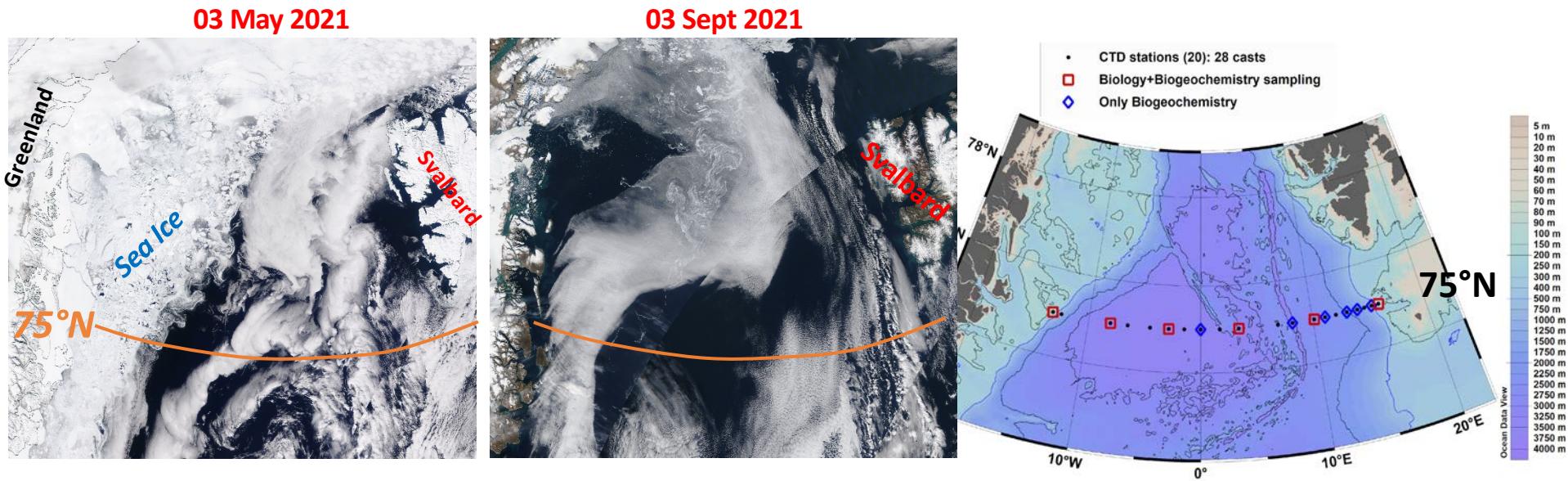
**CASSANDRA project:** AdvanCing knowledge on the present Arctic Ocean by chemical-phySical, biogeochemical and biological obServAtioNs to preDict the futuRe chAnges

Azzaro M., Bensi M., Civitarese G., Giani M., Lo Giudice A., Becherini F., Borme D., Cairns W.R.L., Cappelletti D.M., Caroppo C., Caruso G., Cerino F., Cosenza A., De Vittor C., Decembrini F., Diociaiuti T., Federici E., Feltracco M., Gandolfi I., Giordano P., Kovacevic V., La Ferla R., Langone L., Lupi A., Maimone G., Mansutti P., Mazzola M., Misericocchi S., Monti M., Papale M., Patrolecco L., Rappazzo A.C., Relitti F., Rizzo C., Spataro F., Tirelli V., Turetta C., Urbini L., Ursella L., Vitale V.

*“ We chose the name **CASSANDRA** because the environmental message is getting through to more and more people on a social and political level. We hope to break the curse Apollo put on her and finally dispel her legend as an **unheard Prophetess!** ”*



## CASSANDRA cruise: from 29 August to 14 September 2021





## ARCTIC Expedition 2021

Cruise Report Project

*AdvanCing knowledge on the present Arctic Ocean by  
chemical-physiCal, biogeochemical and biological  
obServAtioNs to preDiction the futuRe chAnges  
- CASSANDRA -*

29/08/2021, Longyearbyen (NO) – 14/09/2021, Bergen (NO)

# PRA

PROGRAMMA DI RICERCHE IN ARTICO



2021



## Metadata of chemical and biogeochemical parameters

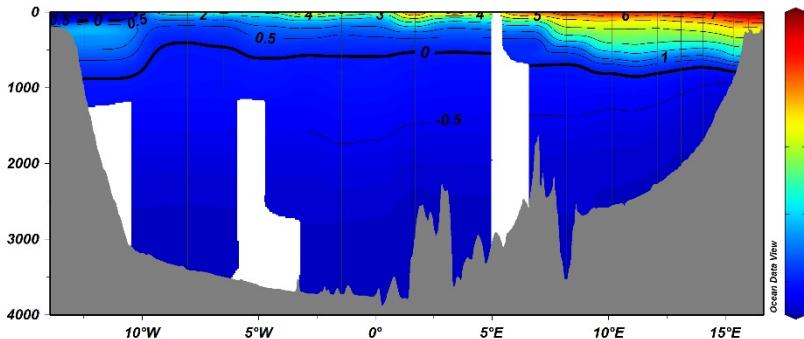
Station	Depth	O2	NO2 NO3	PO4	SIO4	TDN	TDP	$\delta^{13}\text{C-DIC}$	$\delta^{18}\text{O}$ $\delta\text{D}$ of H2O	pHT	Total Alkalinity	POC PON	DOC	Hg	Pesticides	Emergent Pollutants
CASS-001	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	240	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
CASS-002	sup	x	x	x	x	x	x	x	x	x	x					
	20	x	x	x	x	x	x	x	x	x	x					
	40	x	x	x	x	x	x	x	x	x	x					
	100	x	x	x	x	x	x	x	x	x	x					
	200	x	x	x	x	x	x	x	x	x	x					
	500	x	x	x	x	x	x	x	x	x	x					
CASS-004	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
CASS-006	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
CASS-006	1000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	1500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	
	1999	x	x	x	x	x	x	x	x	x	x	x	x	x	x	

## Metadata of biological parameters

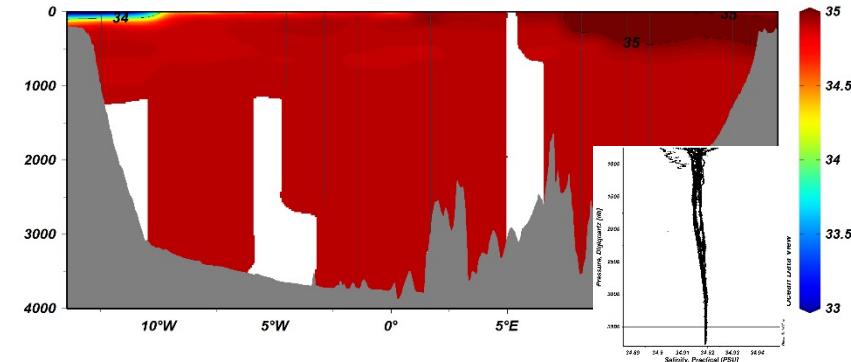
Station	Depth	Dapi	CTC	Live / Dead	LPS	Biolog	Virus	Prok	Prok DNA	Chla	Respiratory activity	Total Enzymatic Activity	Dissolved Enzymatic Activity	Phytoplankton	DNA Phytoplankton	Microzooplankton	DNA Microzooplankton	WP2 net Meso-, Macro zooplankton	Manta Net Iponetuston
CASS-001	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0-20 m	0-100 m	sup
	20	x	x	x	x	x	x	x	x	x	x	x	x	x					
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	240	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CASS-010	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0-20 m	0-100 m	sup
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	1000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	1500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	2000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	2520	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	2528	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CASS-020	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0-30 m	0-100 m	sup
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	200	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	1000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	1500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	2000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	2500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	3000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
	3500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		
CASS-030	sup	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	0-30 m	0-100 m	sup
	20	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	40	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	100	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	1000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	1500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	2000	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	2500	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
	3642	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			

# CTD data overview

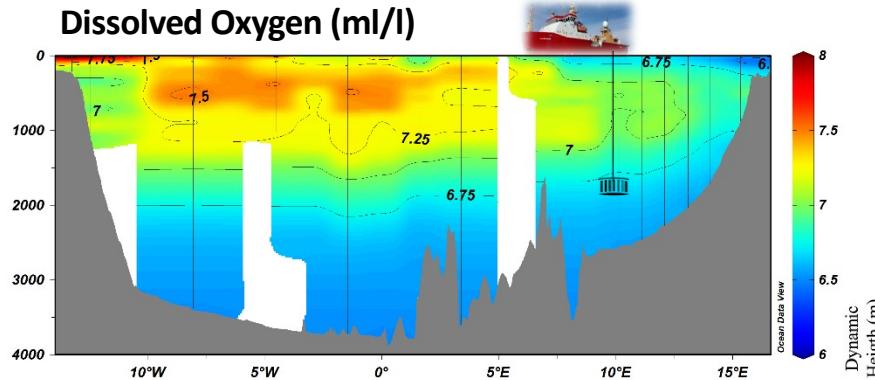
Potential Temperature ( $^{\circ}\text{C}$ )



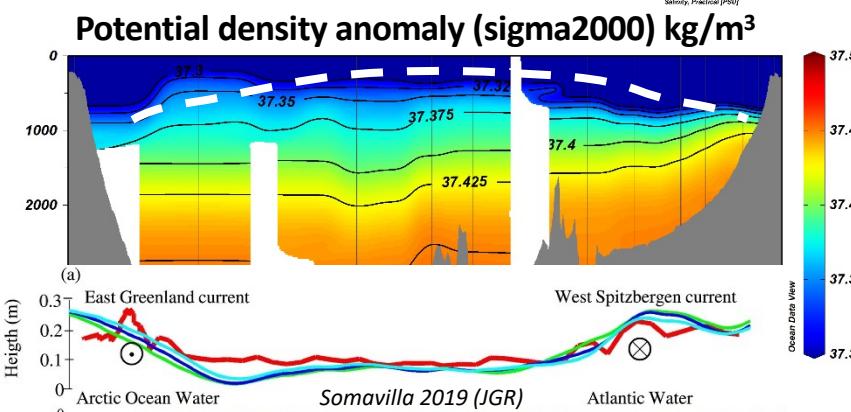
Salinity (psu)



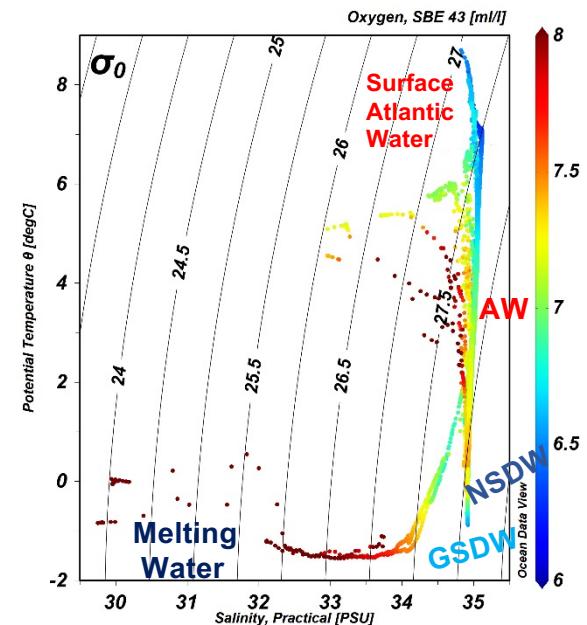
Dissolved Oxygen (ml/l)



Potential density anomaly ( $\sigma_{2000}$ ) kg/m<sup>3</sup>

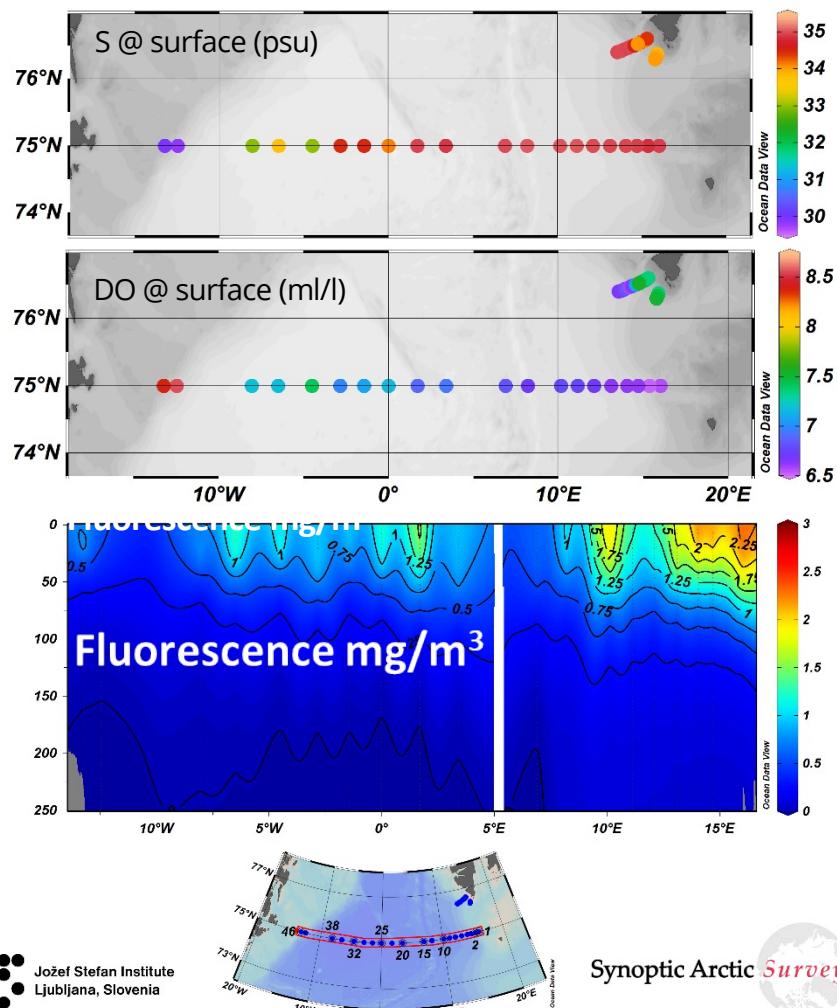


# CTD data overview

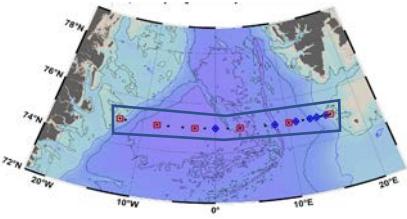
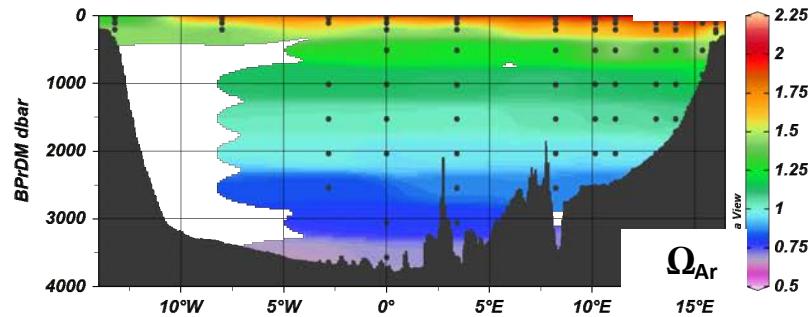
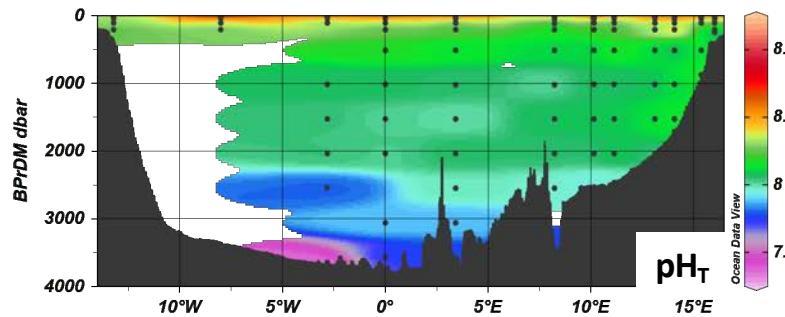
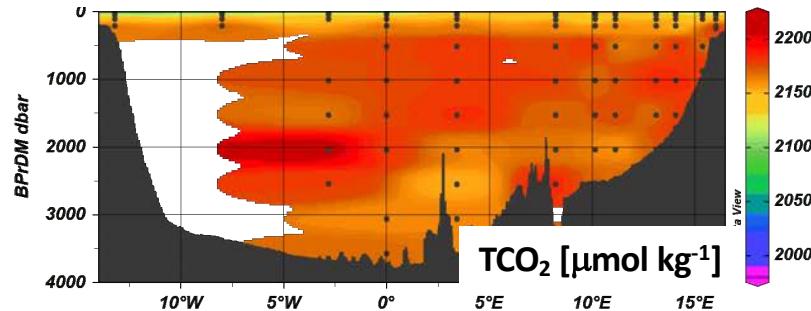
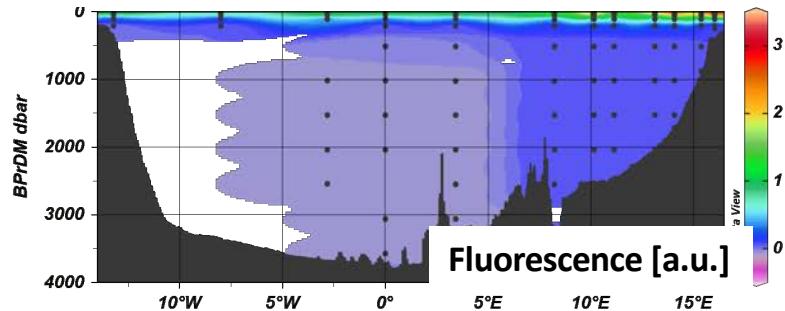


Larger salinity, dissolved oxygen, and fluorescence values were found in the upper layer of the Easternmost part of the section, occupied by Atlantic Water

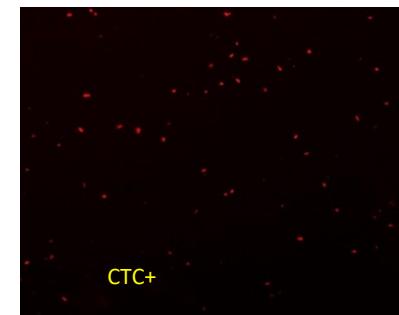
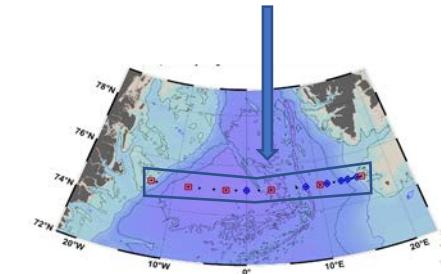
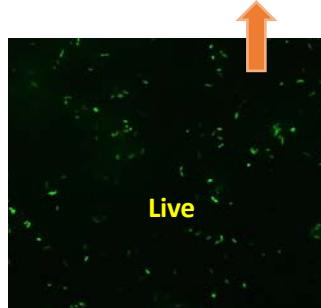
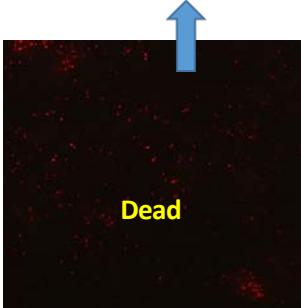
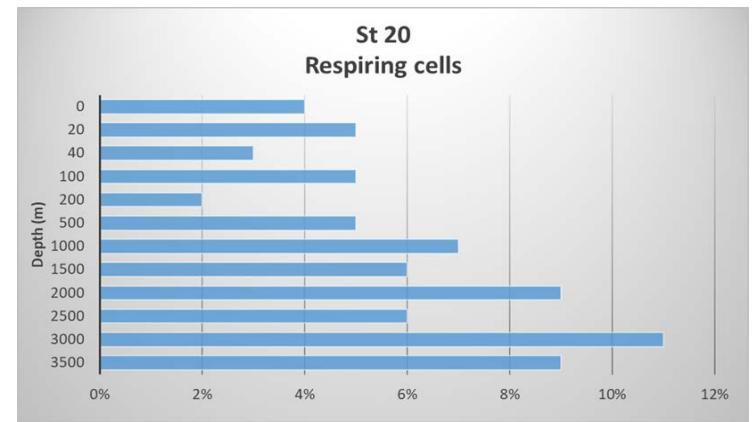
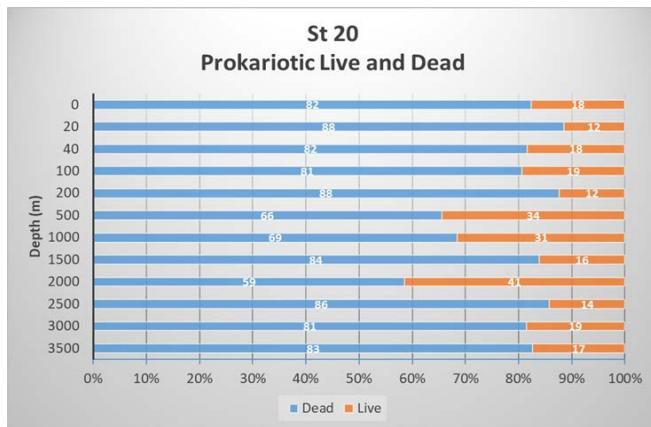
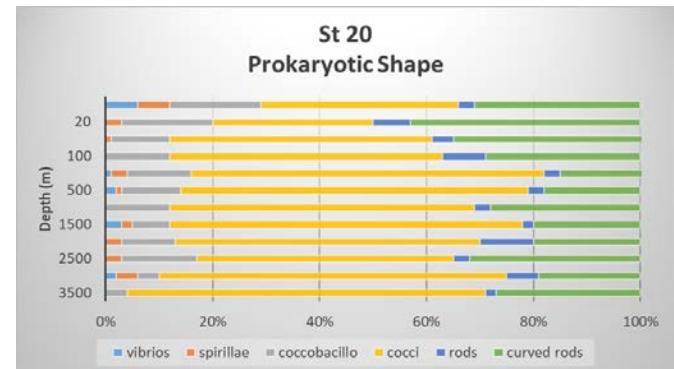
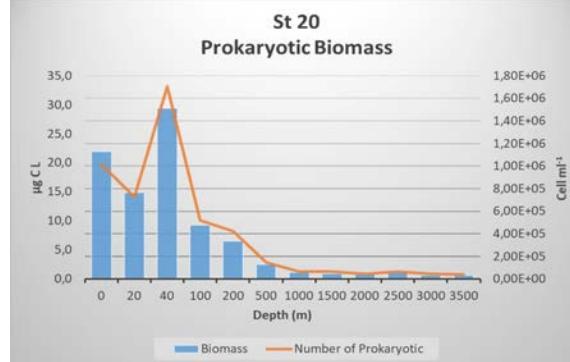
Signals of ice melting water on the Westernmost part of the section.



## Biogeochemical data overview



- TCO<sub>2</sub> drawdown by phytoplankton in the photic zone linked to higher pH<sub>T</sub> values;
- Lowest pH<sub>T</sub> values in bottom waters were undersaturation of aragonite occurs ( $\Omega_{\text{Ar}} < 1$ )



## CASSANDRA project: next steps

- Finish the analysis of biogeochemical and biological samples and validation of the Cassandra data set;
  - Store all datasets in the CNR (<http://iadc.cnr.it/cnr/>) and OGS (<https://nodc.inogs.it/>) data centers, which are First Level Nodes of the Italian Arctic Data Center (IADC) funded by Italian Arctic Research Programme (PRA);
  - Define mixed layer depth along the transect; Analyze physical data in the context of the long term variability (i.e., compare our data with previous ones); Are dense waters modified with respect to the recent past?
  - Investigate mesoscale structures (eddies) and their implications with biological and biogeochemical data spatial distribution during the cruise;
  - Define the biological data framework in terms of both diversity and functioning;
  - Respond to the goals of SAS;
- 
- Decide on a common policy for how to share data within the Synoptic Arctic Survey community.

**Thanks for your attention**

