Variability of the zooplankton community in the Northern Humboldt Current System (2007-2009) and its relation to physical forcing

Katia Aronés, Luis Vásquez, Alexis Chaigneau and Patricia Ayón

Outline

Introduction

Study area and data

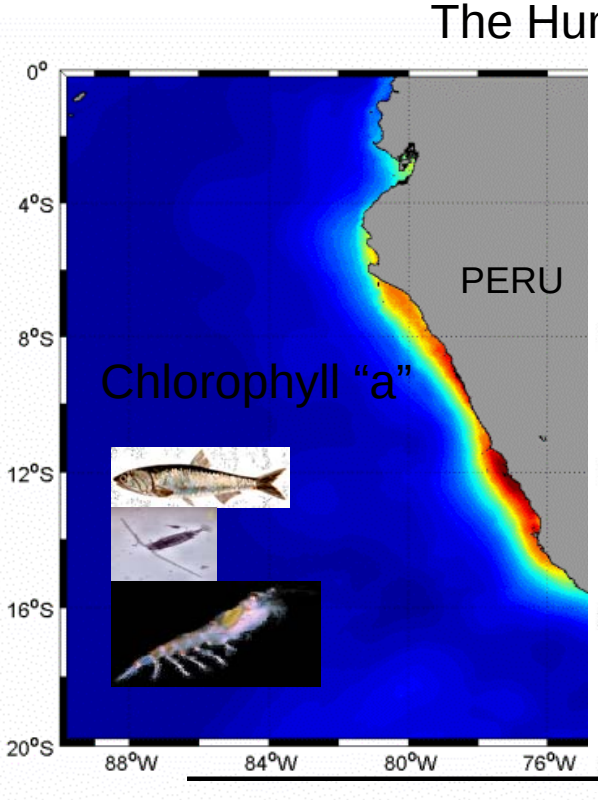
Mean Zooplankton Characteristics (abundance, diversity,…)

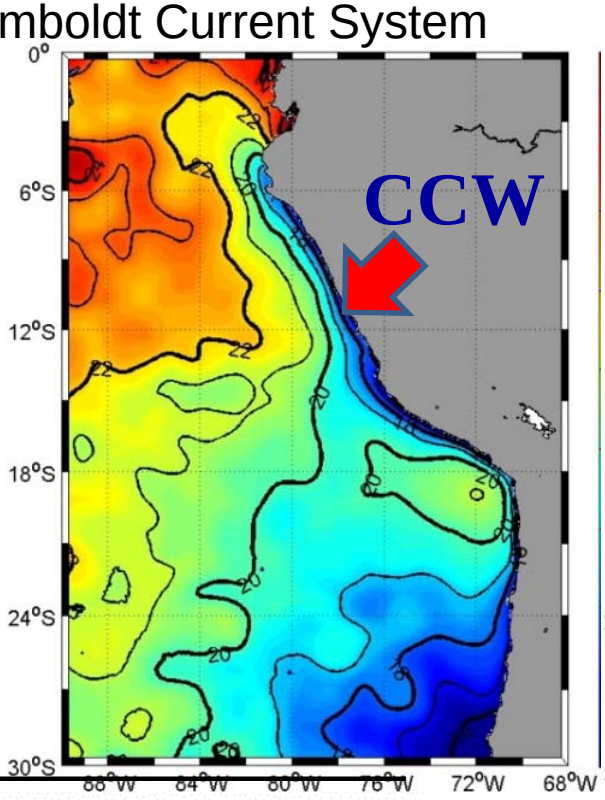
Temporal Variations of the Zooplankton Community and relation to physical forcing

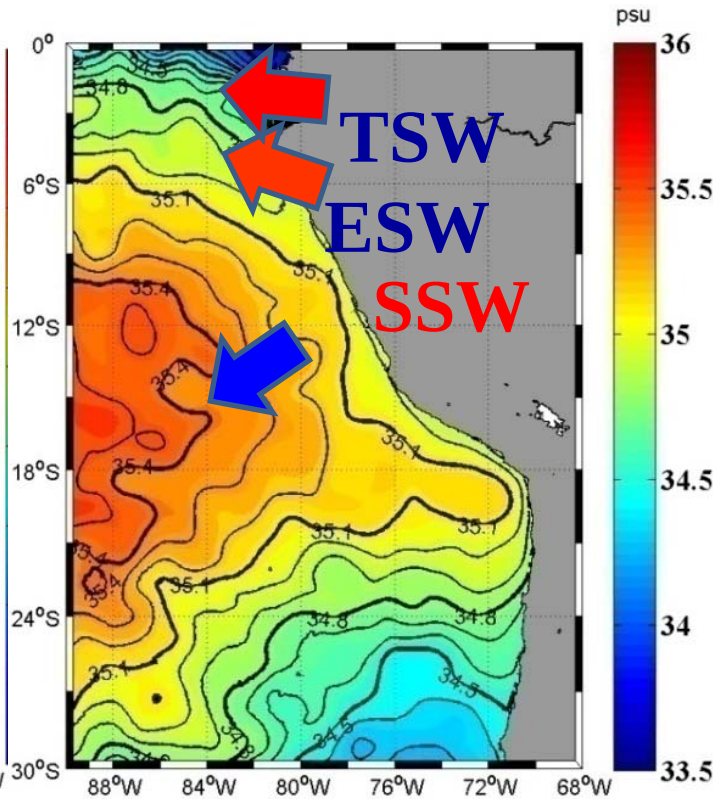
Conclusions

Introduction

The Humboldt Current System





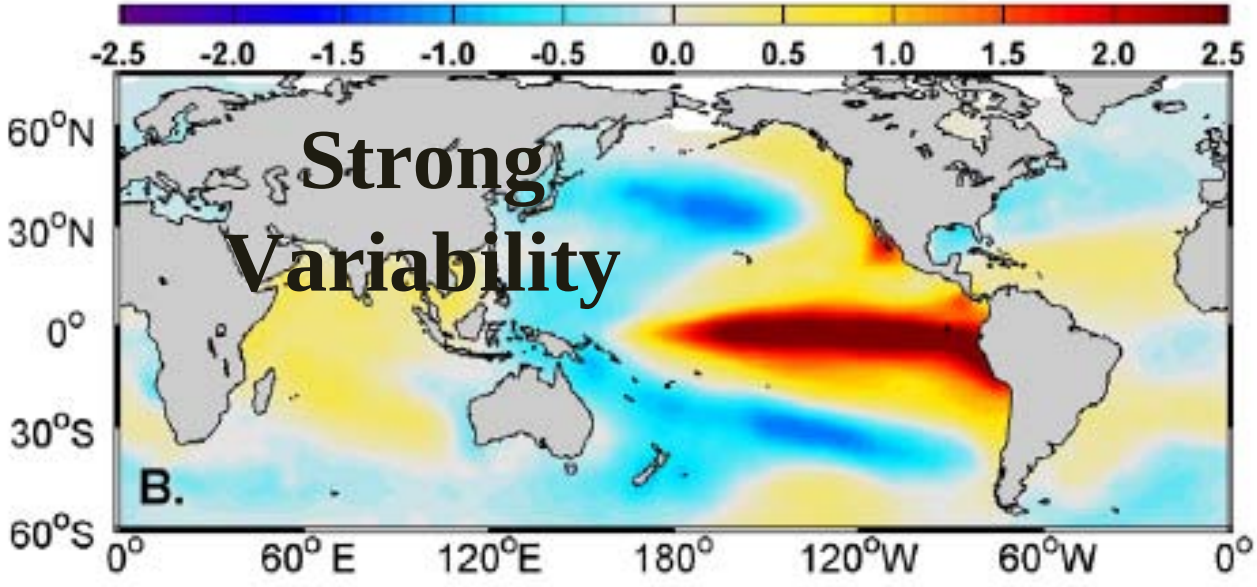


Water masses	Salinity	Temperature
Tropical Surface Water (TSW)	<33.8	>25°
Equatorial Surface Water (ESW)	33.8 <S< 34.8	20 < T < 26
Subtropical Surface Water (STSW)	>35.1	18 < T < 27
Cold Coastal Water	34.8 <S< 35.1	13.5 < T < 19

Source: Zuta 1970, Morón 2000, Gutierrez et al. 2005, Swartzman et al 2008

Introduction

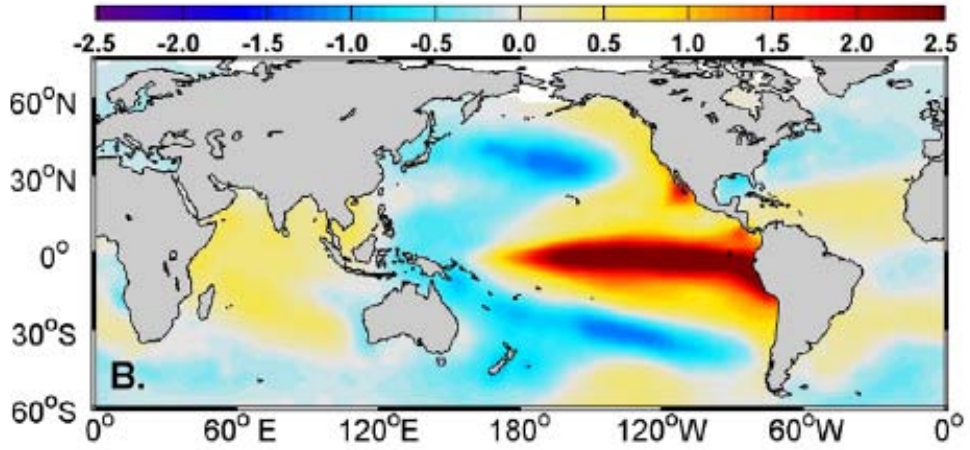
SST Standard Deviation (ºC)



Does this variability impact on the Zooplankton community?

Objetives

•Variability of the zooplankton community in the Northern Humboldt Current System (NHCS) and its relation to physical forcing



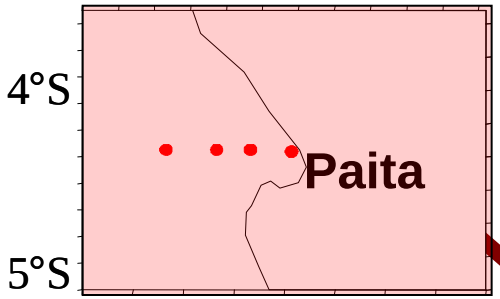
•Mean characteristics of the zooplankton: Abundance, Composition and Diversity measures.

•Temporal variation of the zooplankton community.

•Relationship with physical forcing : upwelling index and water masses.

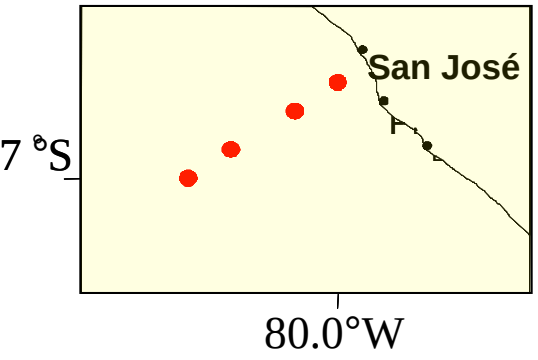
Study area

PAITA (05°00'S)

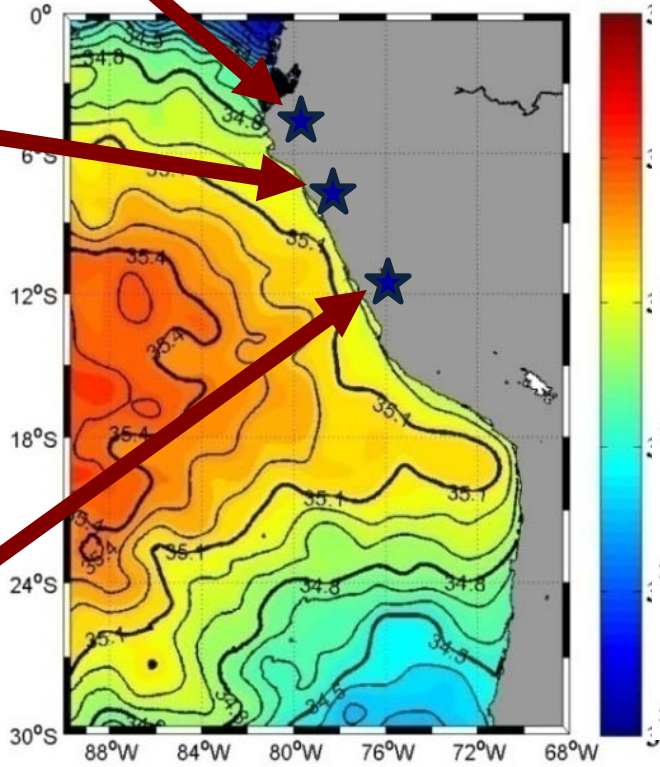


Temporal variations

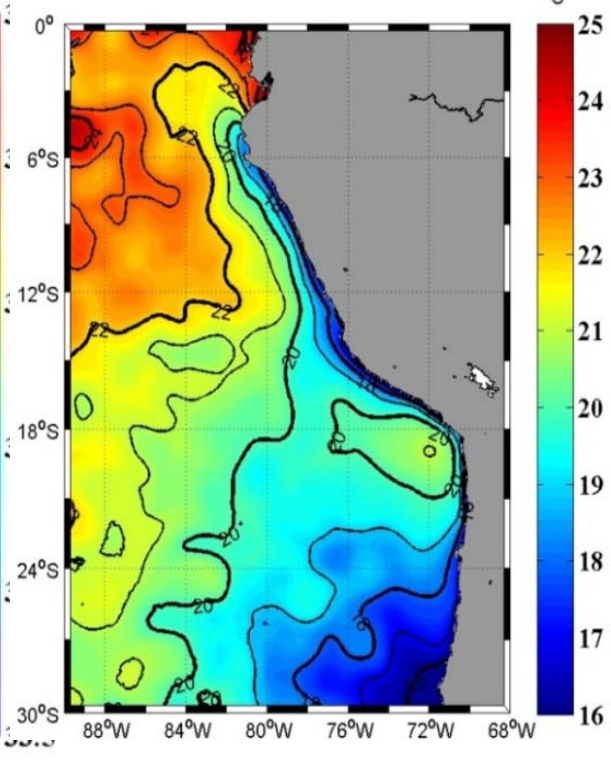
SAN JOSE (06°50'S)



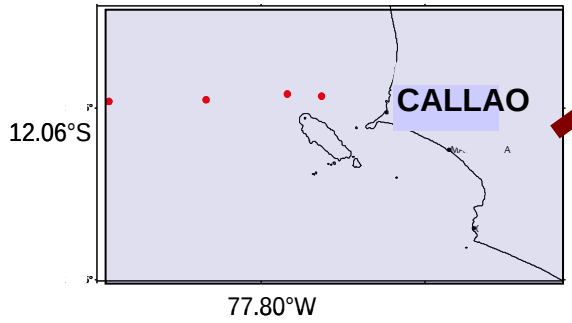
Salinity (SSW)



Temperature (SST)

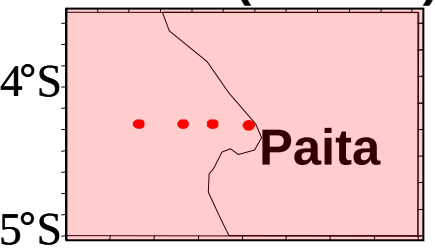


CALLAO (12°00'S)

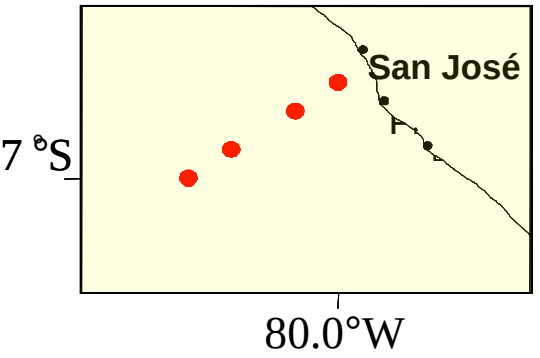


Data

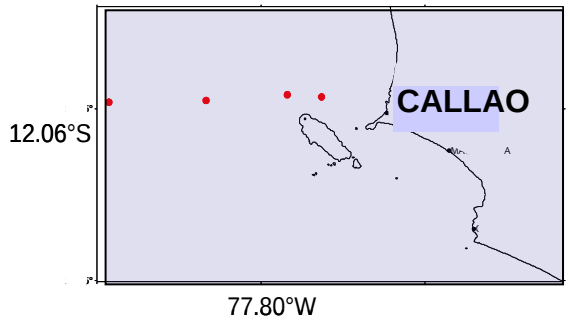
PAITA (05°00'S)



SAN JOSE (06°50'S)



CALLAO (12°00'S)



Zooplankton:

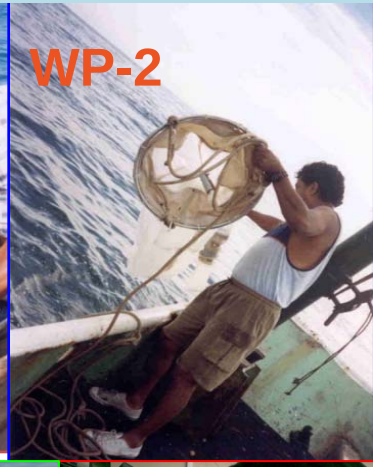
Bymonthly (Paita-San José)
Monthly (Callao)

Net WP-2 (surface hauls)
Mesh size 300um
225 zooplankton samples

Daytime Samples

Spearman Correlations

Diversity measures



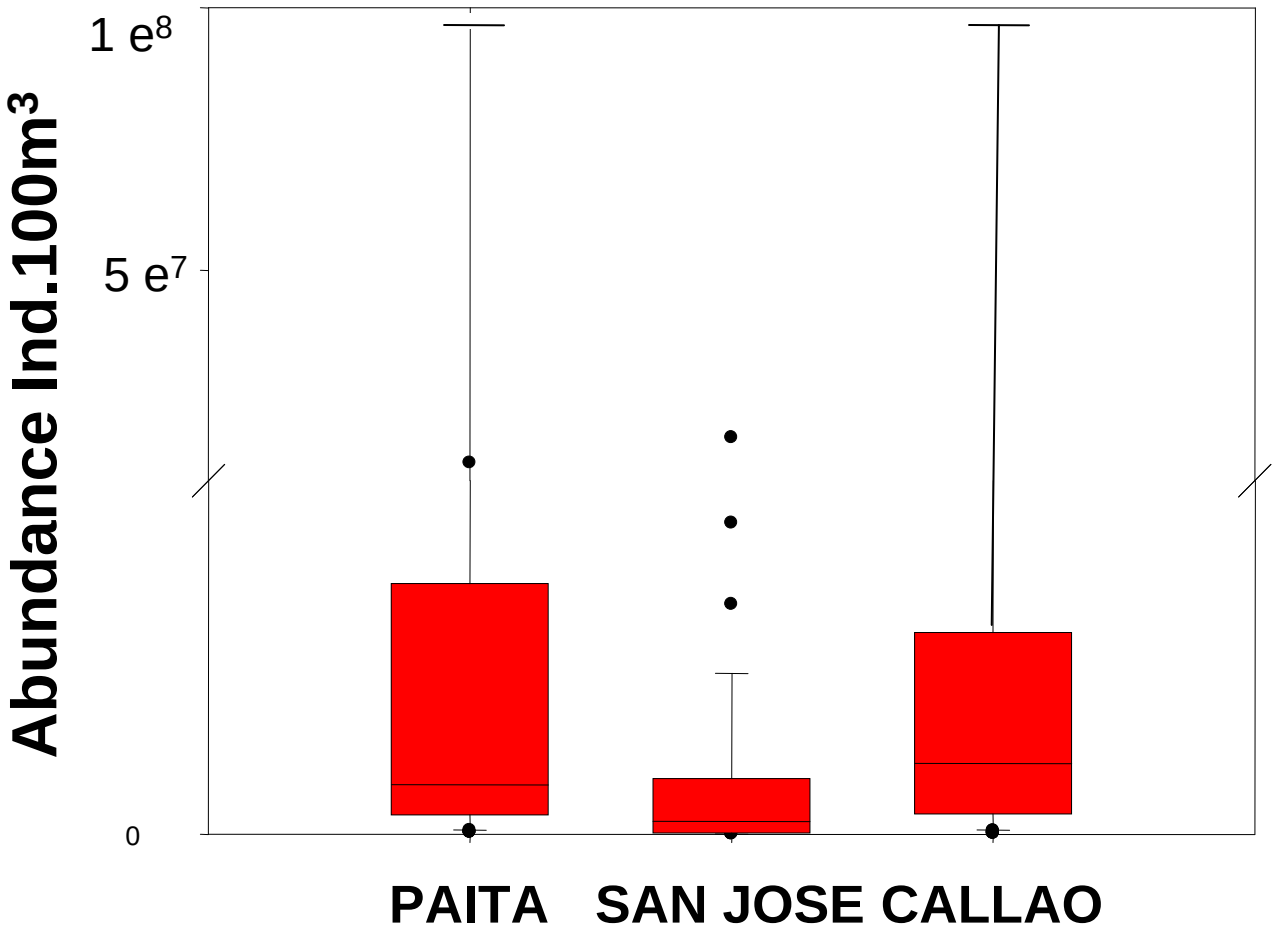
Physical Parameters:

Sea Surface Temperature (SST)

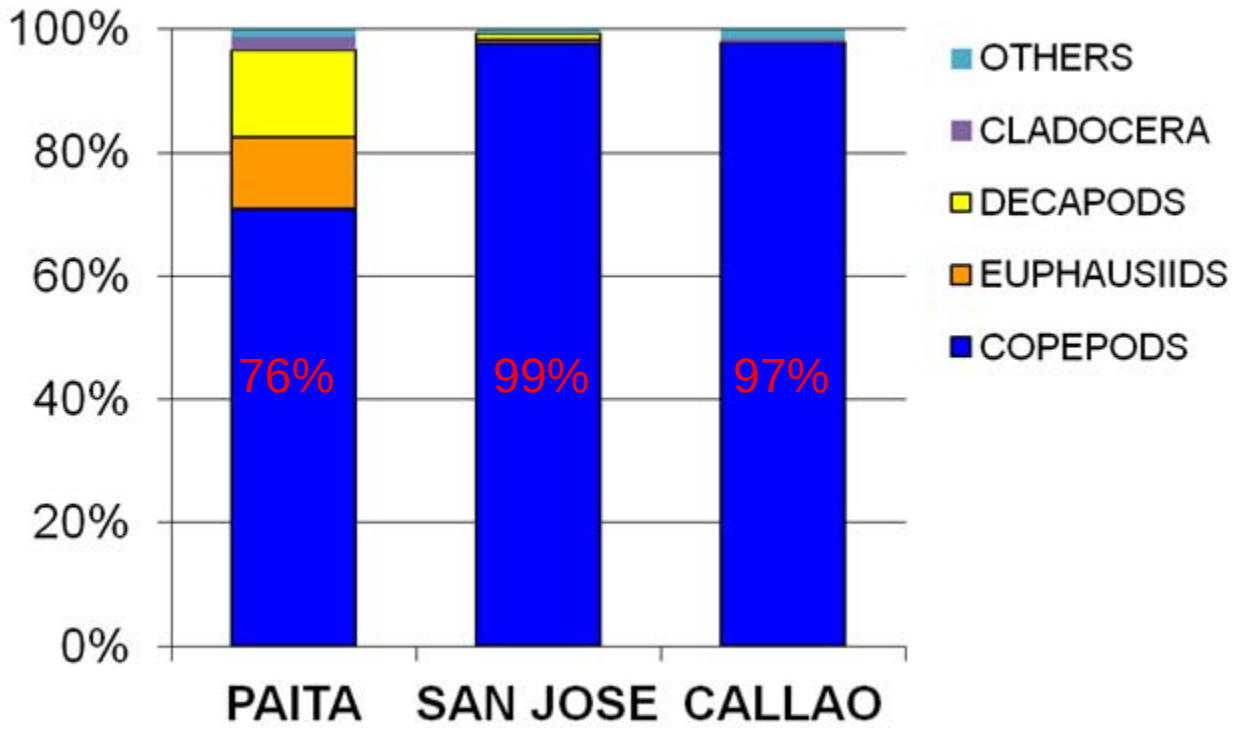
Sea Surface Salinity (SSS)

Wind (turbulens and upwelling index

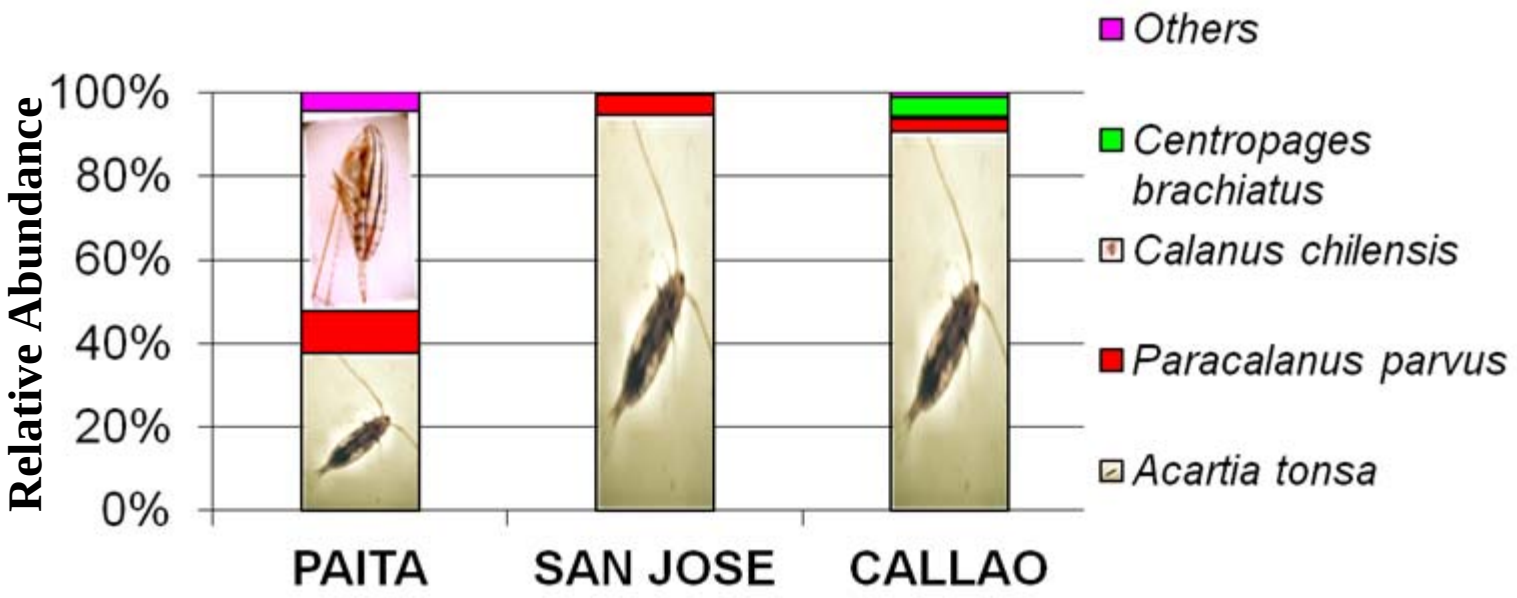
Zooplankton abundance



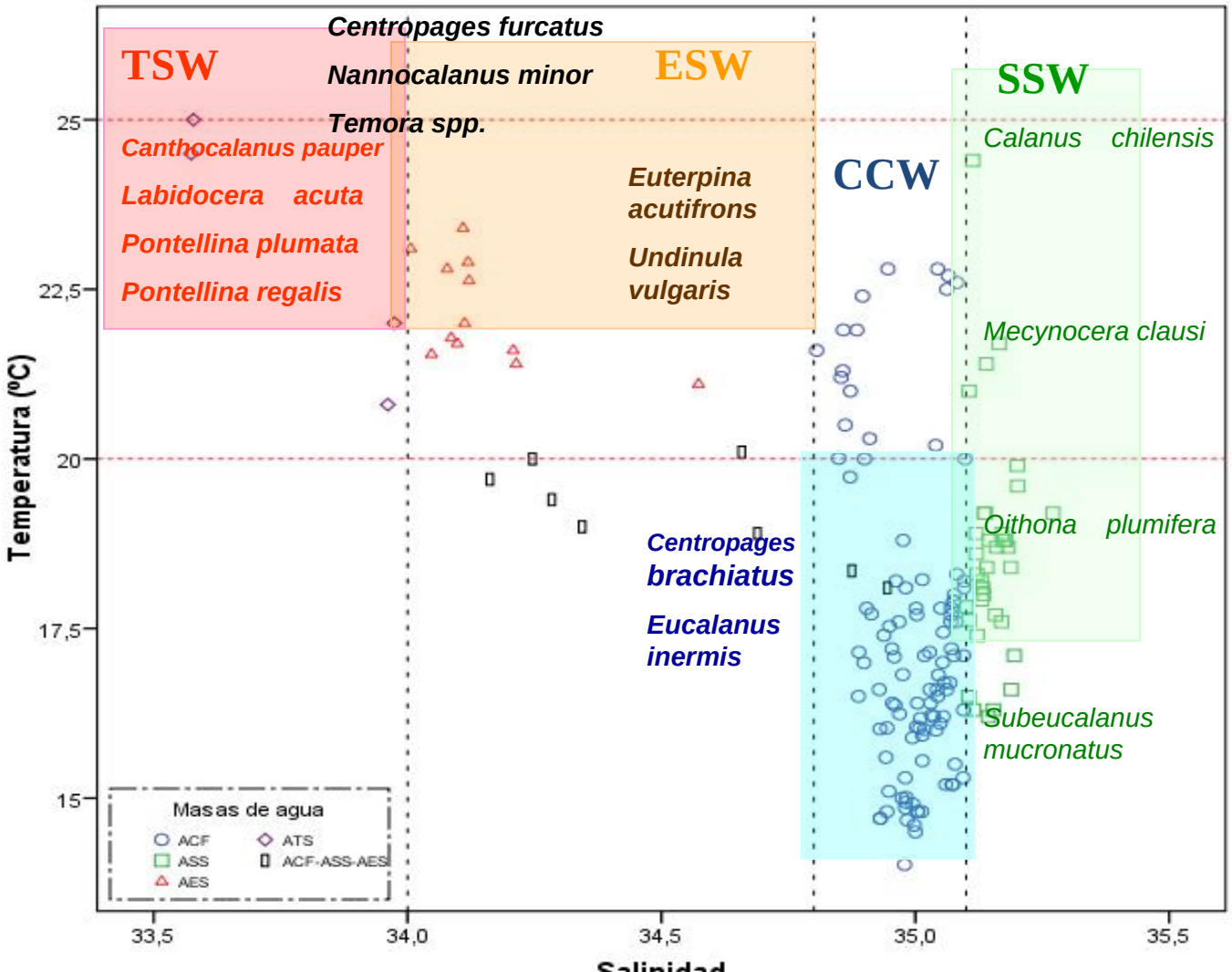
Relative Abundance of Zooplankton

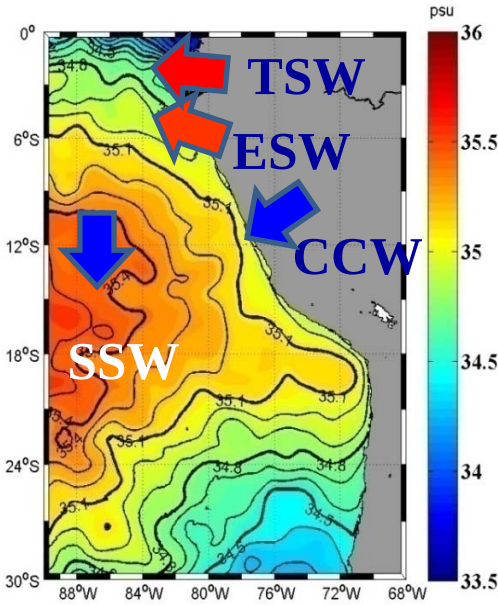


Relative Abundance of Copepods



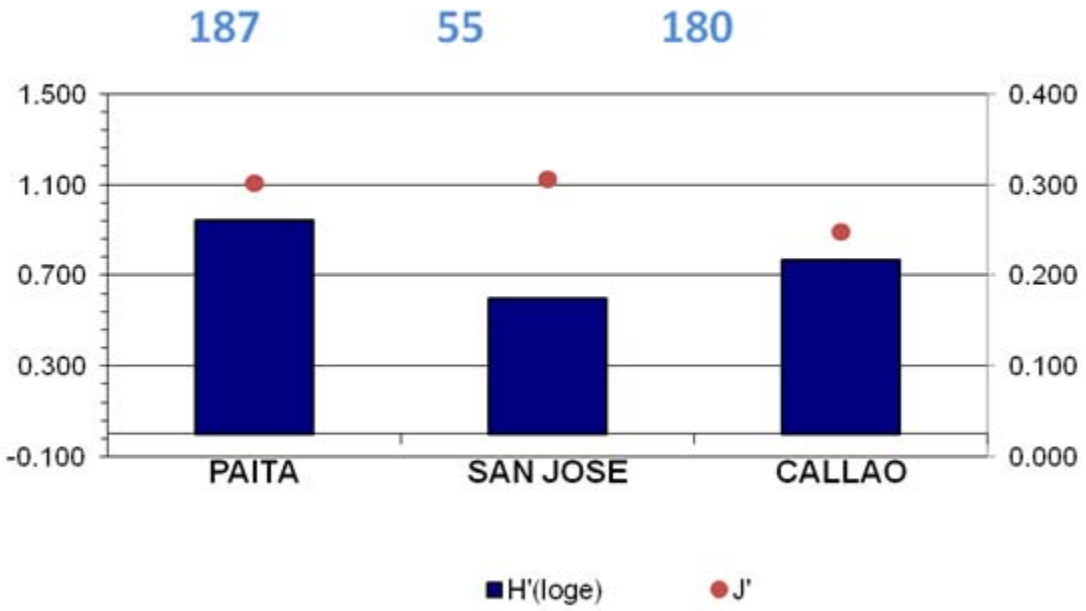
Copepods species associated to waters masses





Spearman correlations
Significanly p<0.05

Diversity Measures



Shannon Diversity
Richness Species

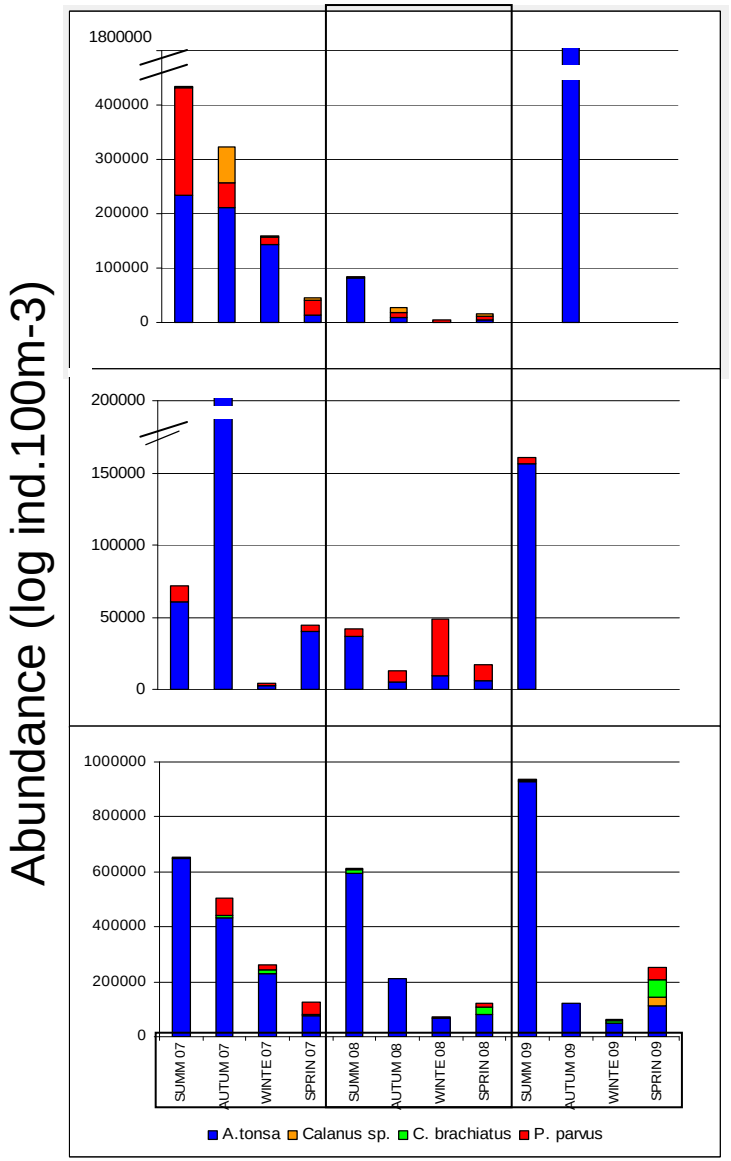
Paita
San Jose

Dominant species presence shows low Evenness index in the 3 coastal zones.

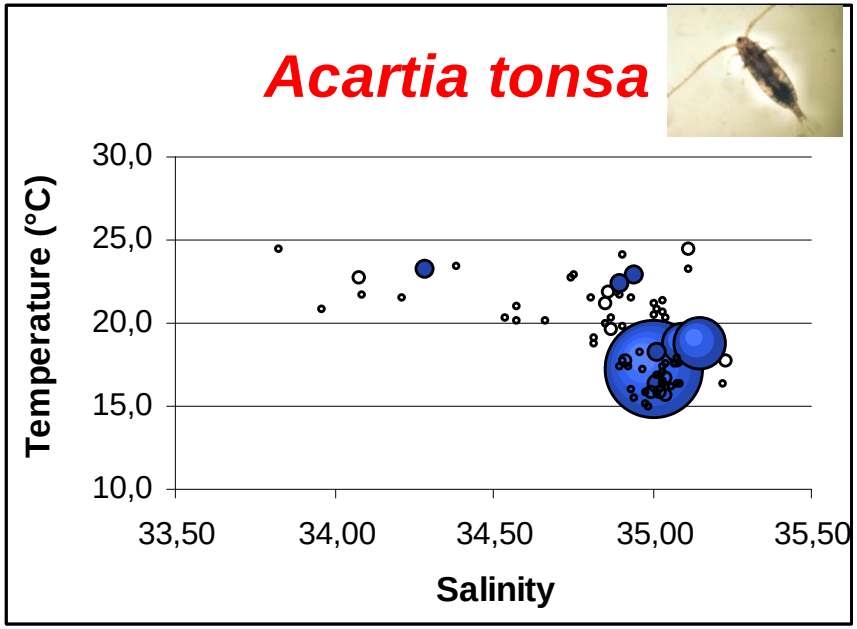
***Acartia tonsa* domined** in San Jose and Callao.

A.Tonsa* - *C.chilensis in Paita

Acartia tonsa

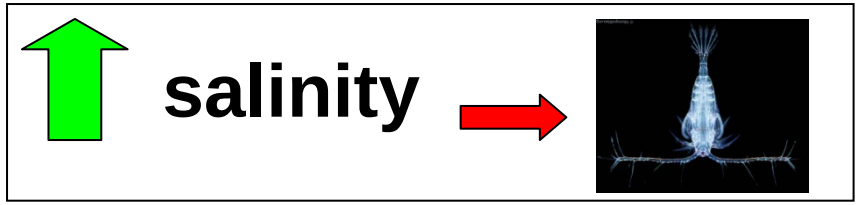


Zaiko A. 2004, Hubareva et.al 2008



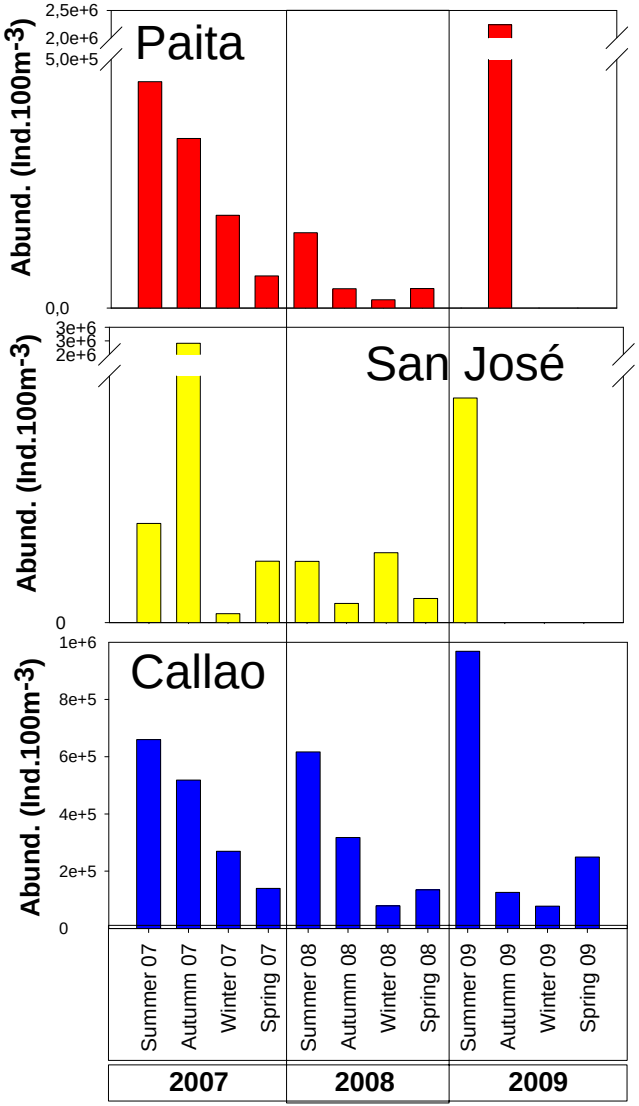
Coeficiente Correlación Spearman

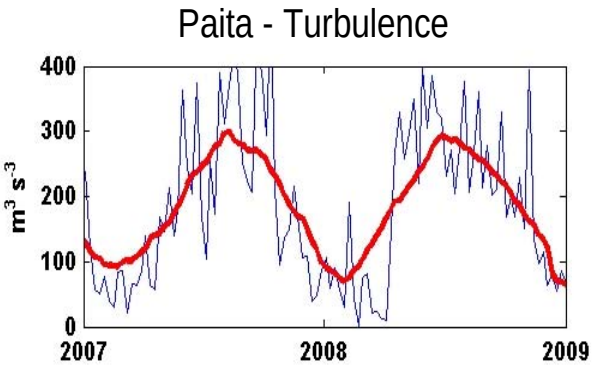
Especie	ACF	ASS	AES	ATS
A.tonsa	0,179	-0,364	0,257	-0,039
	0,034	0,000	0,002	0,645

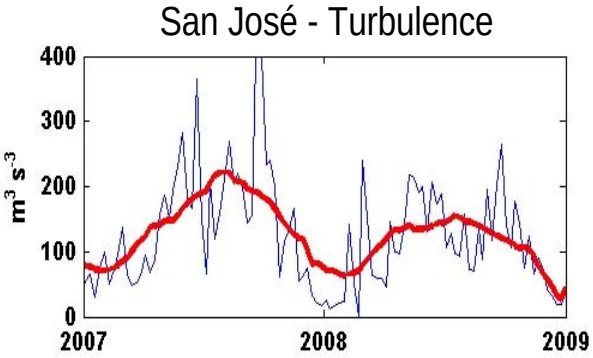


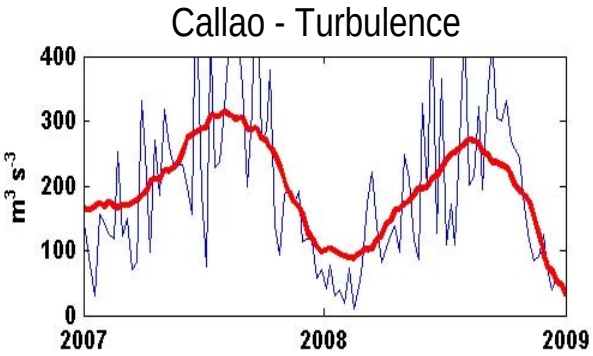
Temporal variations of Zooplankton

Associated with physical Forcing



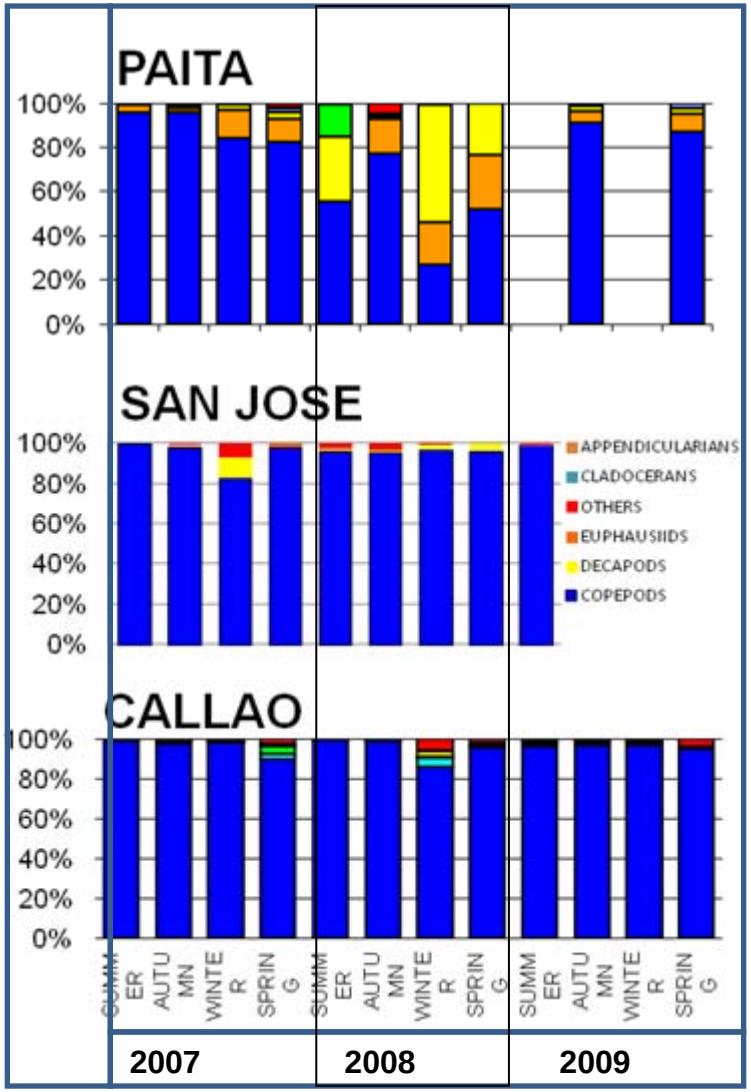




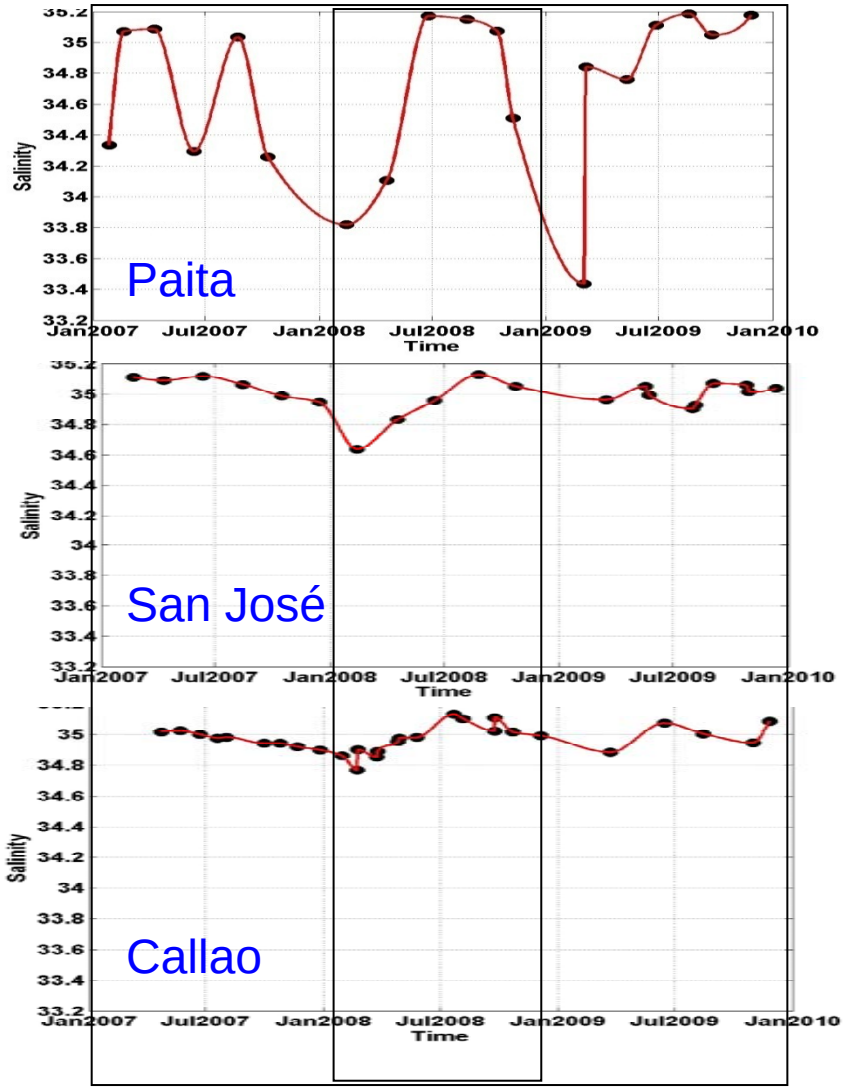


Interanual variations of Zooplankton

Composition



Water masses



Summary

- Highest abundance in Paita and Callao and lowest in San Jose

- Copepods are always the dominant group, but highest diversity in Paita associated with equatorial and tropical waters.

- Acartia Tonsa is the dominant specie and is associated with low salinity values

- At seasonal scale the zooplankton abundance is controlled by the turbulence index (more turbulence, less zooplankton)

- Water-mass variability, particulary in Paita, strongly influence the abundance and composition of the zooplankton.

Future work

- Extend the analysis between 1994 and 2010.

- Determine better the respective role of the wind-forcing and water-mass movements on the zooplankton variability

- Increase the temporal resolution of zooplankton samples to study relatively high-frequency variability

Acknowledgements

Financial support by IRD, PICES, DISCOH and CONCYTEC