

17 aprile 2013



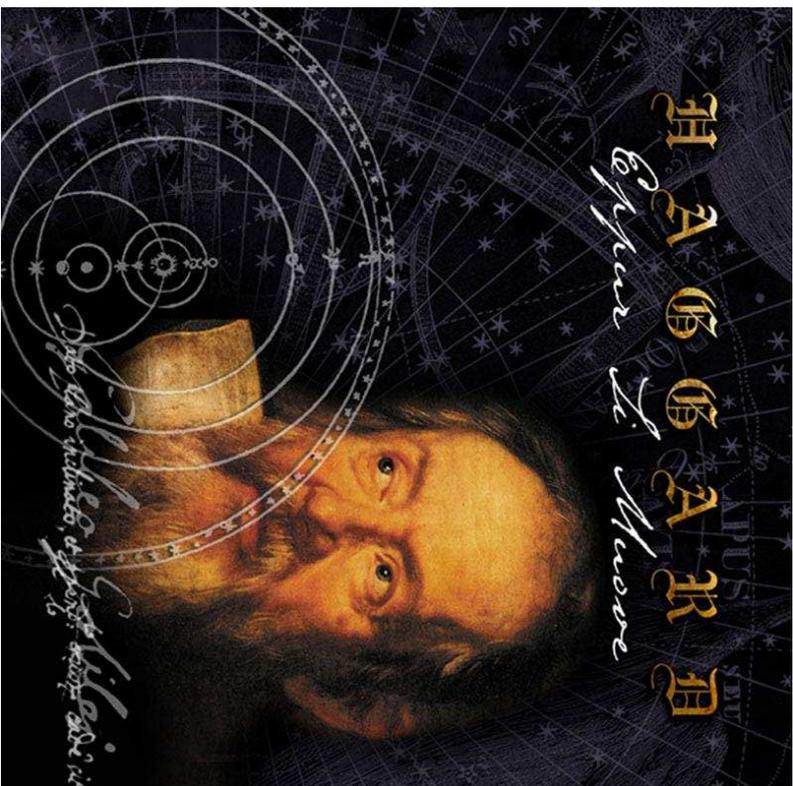
**Paola Del Negro**

**Sezione di Oceanografia**



# EPPUR SI MUOVE....

**EPPUR SI MUOVE...**

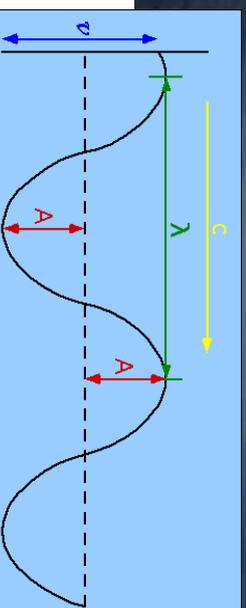


**Dev Drop Reggae**

# EPPUR SI MUOVE....



# Onde



Properties of waves:

- $\lambda$  Wave length – distance from crest to crest.
- $c$  Speed of light, 300,000 km/sec – rate of motion of crests or troughs.
- $T$  Period – Time between passage of successive crests.
- $\nu$  Frequency – Number of crest passages per unit time.
- $A$  Amplitude – Distance from level of crest to level of trough.

©M/A/P



## Scambio di gas- ossigenazione



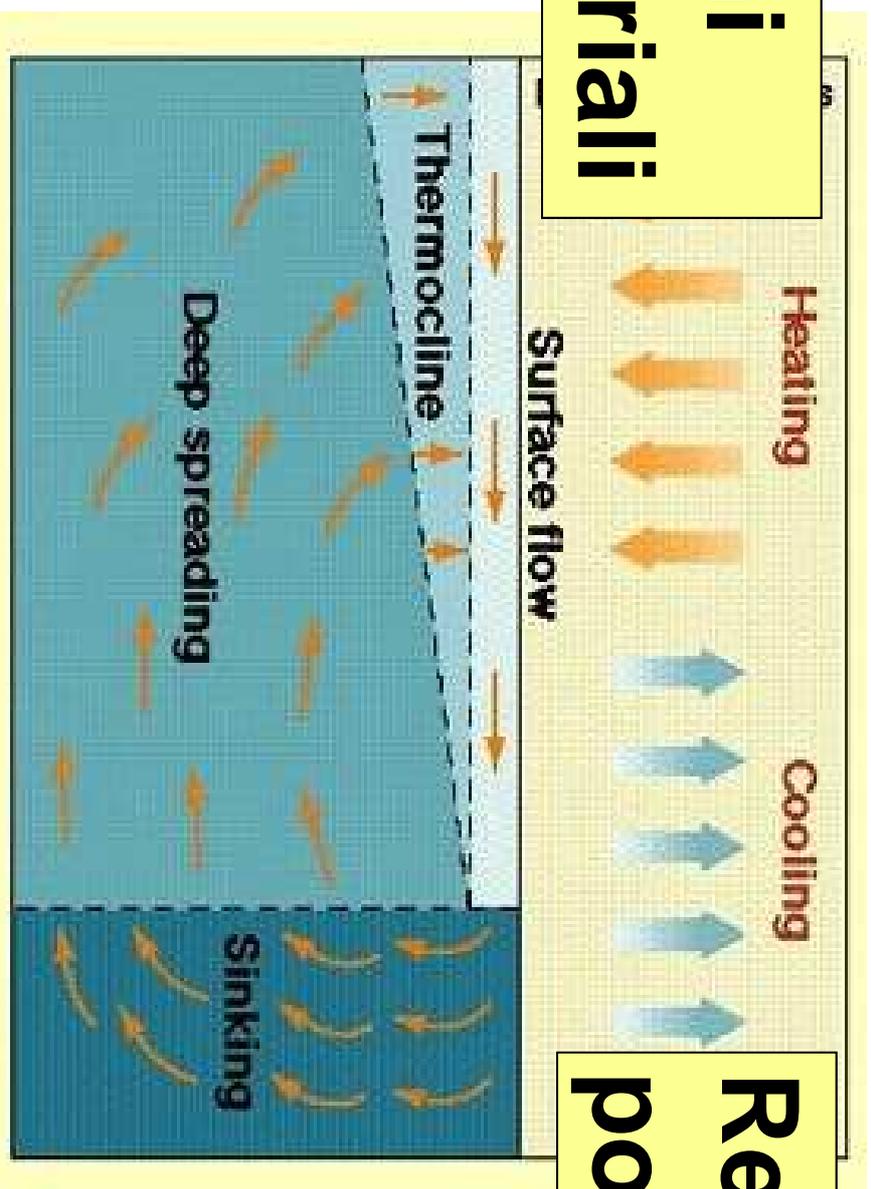
Stato	Termine descrittivo	Altezza in m delle onde	Stato	Termine descrittivo	Altezza in m delle onde
0	Calmo	0	5	Agitato	2,50 - 4
1	Quasi calmo	0 - 0,10	6	Molto agitato	4 - 6
2	Poco mosso	0,10 - 0,50	7	Grosso	6 - 9
3	Mosso	0,50 - 1,25	8	Molto grosso	9 - 14
4	Molto mosso	1,25 - 2,50	9	Tempestoso	oltre 14

TABELLA VENTO E MARE

VENTO FORZA NODI	Nessuno			Moderato		Teso	Fresco	Forte	Burrasca (forte)	Tempesta (forte)		12
	1	2	3	4	5	6	7	8	9	10	11	
1 - 3	4 - 6	7 - 10	11 - 16	17 - 21	22 - 27	28 - 33	34 - 40	41 - 47	48 - 55	56 - 63	>= 64	
Simboli grafici												>
ALTEZZA ONDE (METRI)	0,1	0,2 - 0,5	0,6 - 1	1 - 1,7	1,8 - 2,7	2,8 - 4	4 - 5,5	5,5 - 7,5	7,5 - 10	10 - 12,5	12,5 - 14	> 14
MARE STATO	1 Quasi Calmo	2 Poco Mosso	3 Mosso	4 Molto Mosso	5 Agitato	6 Molto Agitato	7 Grosso	8 Molto Grosso	9 Temp edoso			
Simboli grafici												>
Commenti	Molto bello	Bello	Discreto	Mareggiato	Impugnativo	Molto impugnativo	Duro	Burrascoso	Molto burrascoso	Tempestoso	Tempestoso violento	Tipo Uragano

# EPPUR SI MUOVE....

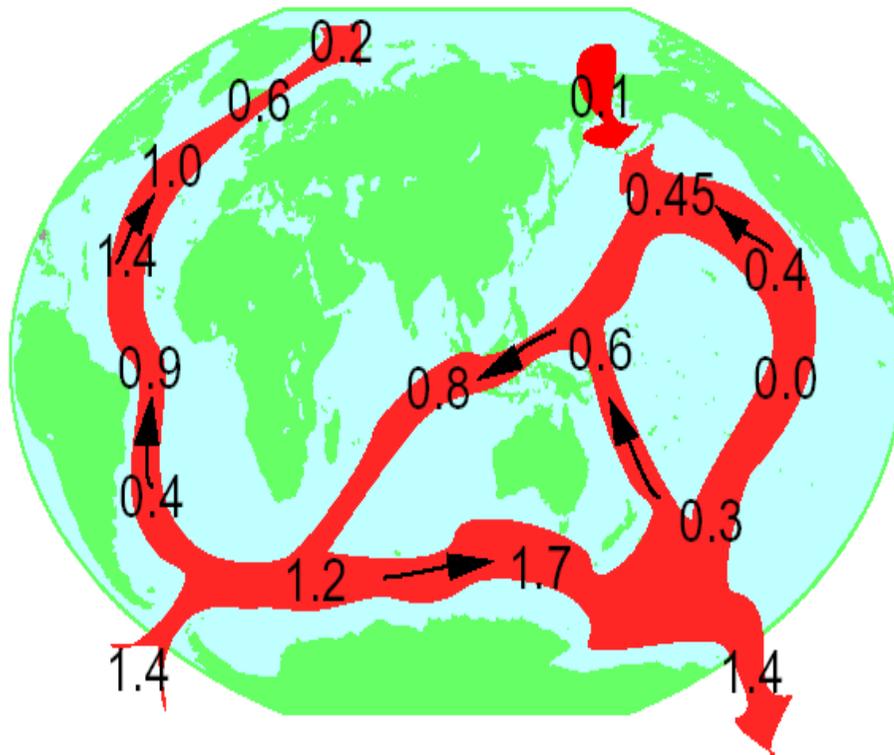
**Regioni equatoriali**



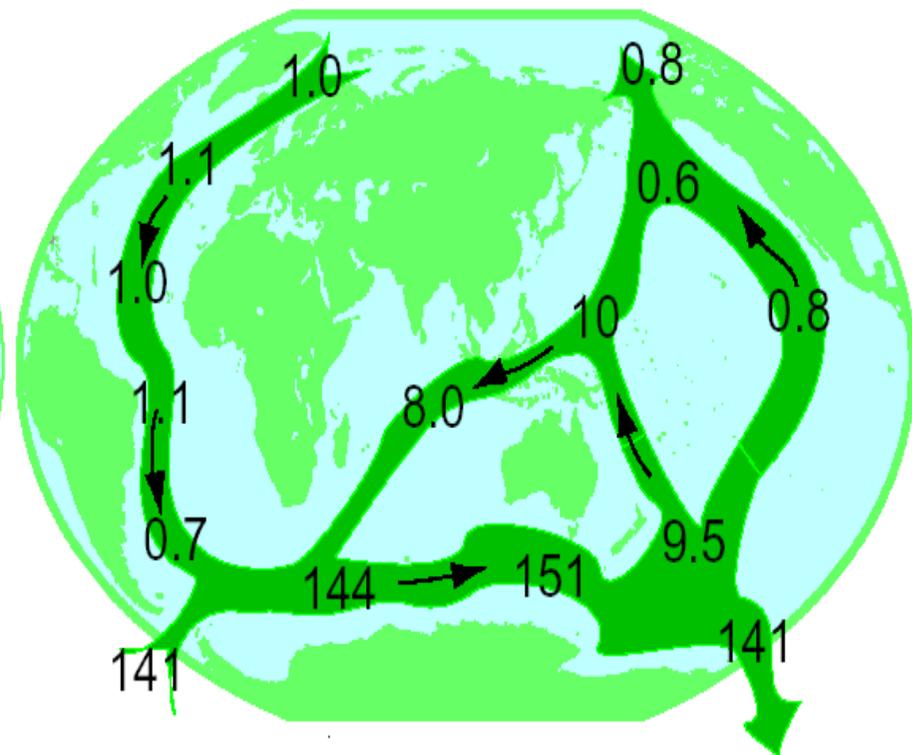
**Regioni polari**



# EPPUR SI MUOVE....



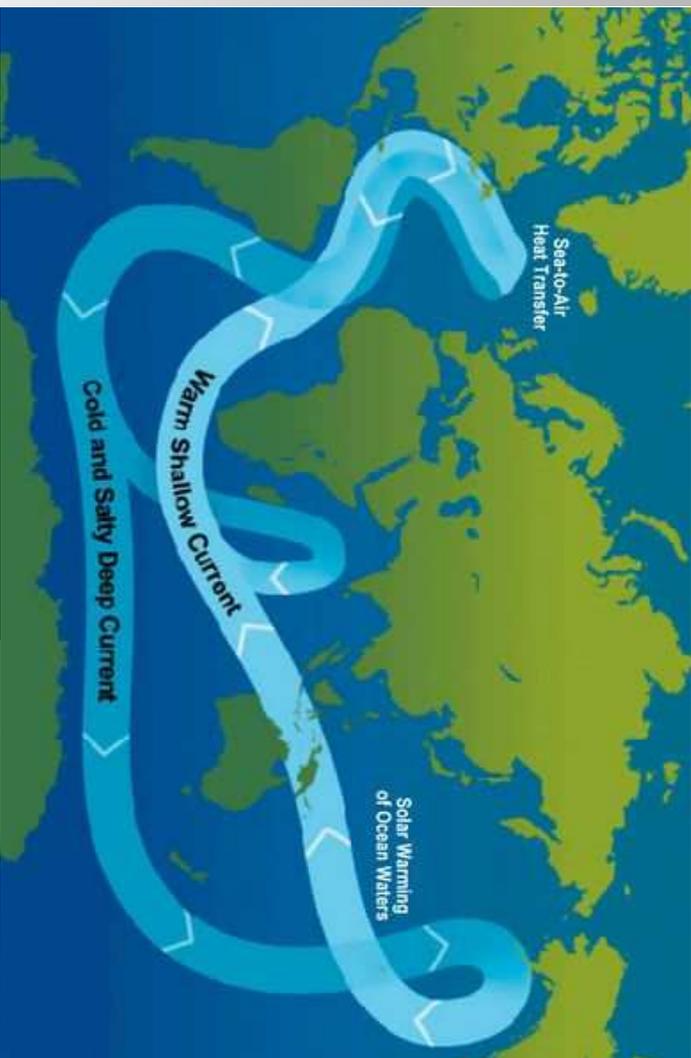
Ocean transport of heat in Petawatts ( $10^{15}$  watts). 1 PW is about 60 times the global consumption of energy.  
(A. McDonald and C. Wunsch, USA)



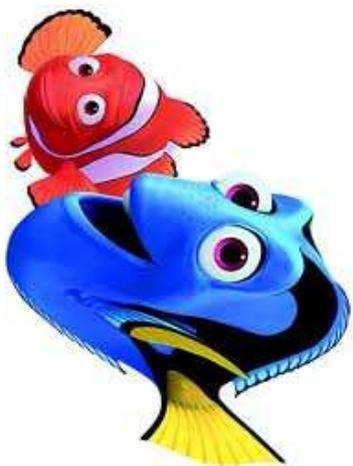
Fresh water transport in millions of cubic metres (approx. tonnes) per second,  
(A. McDonald and C. Wunsch, USA)



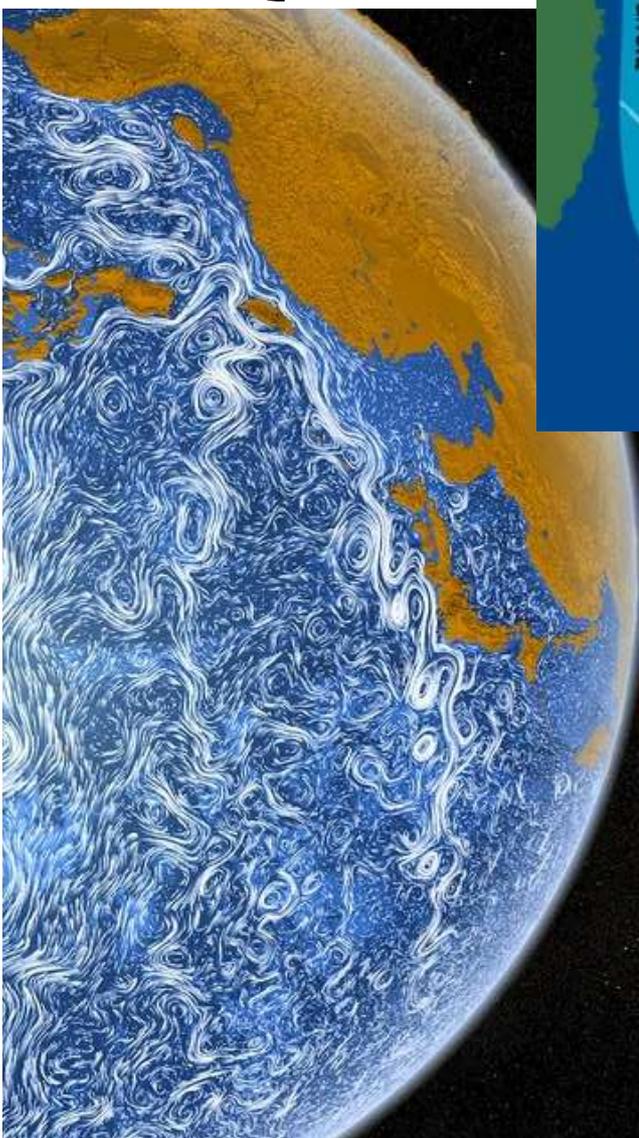
# EPPUR SI MUOVE....



## Correnti

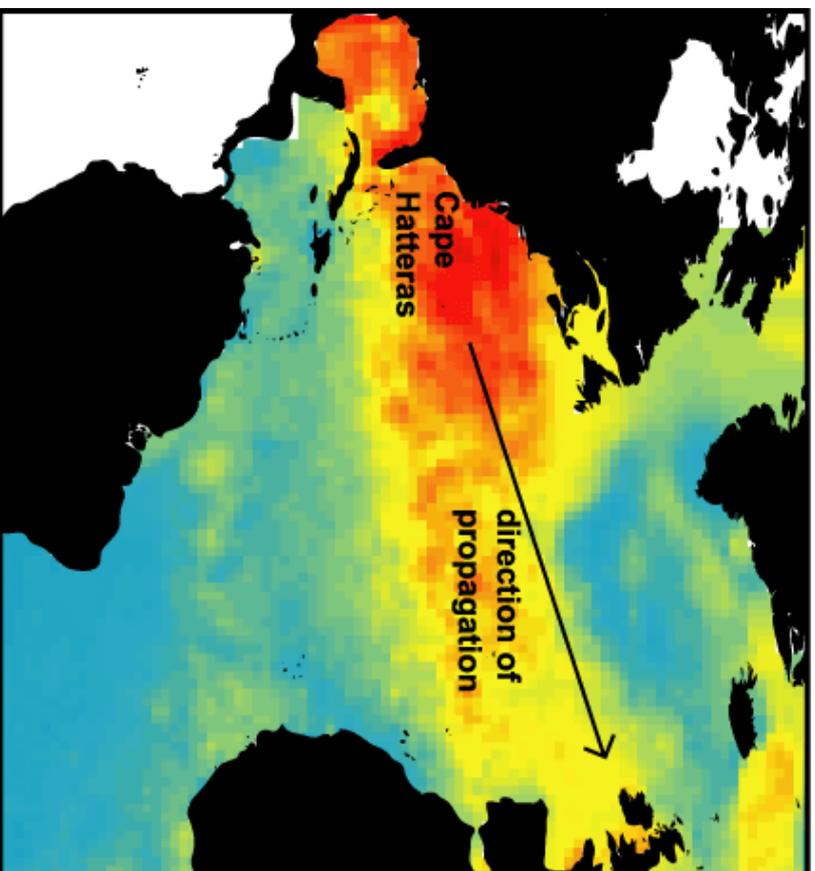


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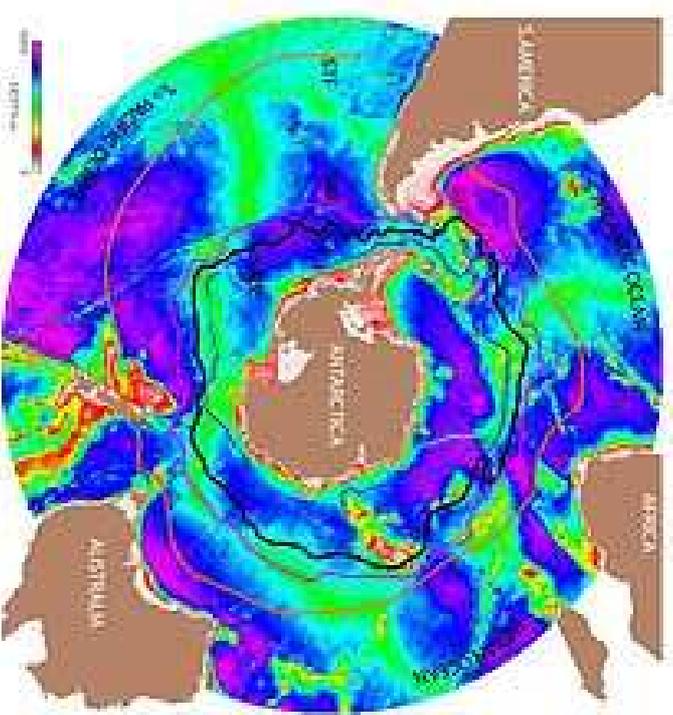


# EPPUR SI MUOVE....

## Correnti



Sea surface temperature anomalies propagating from west to east across the North Atlantic have been observed in infra-red satellite data

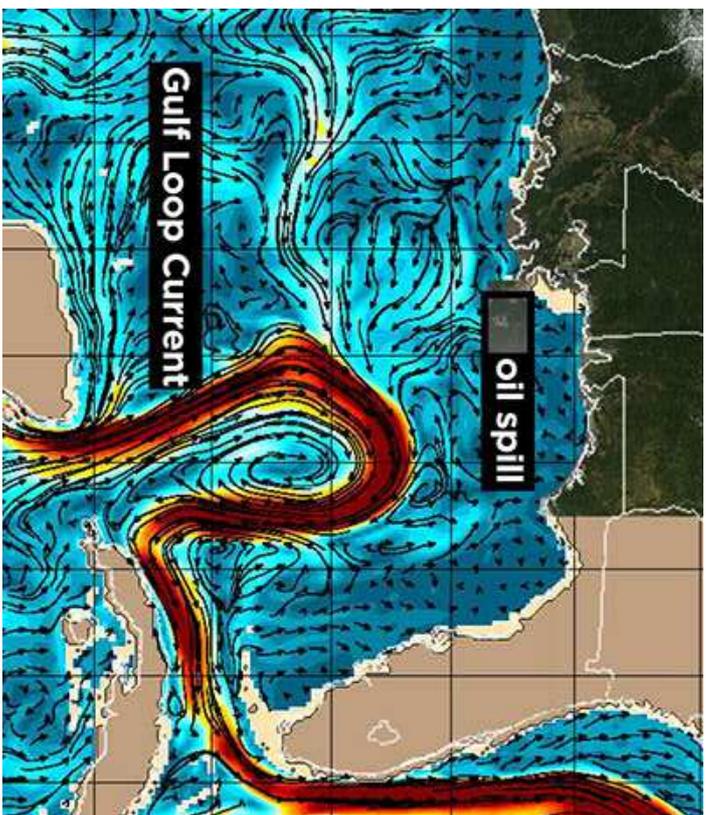




**EPPUR SI MUOVE....**



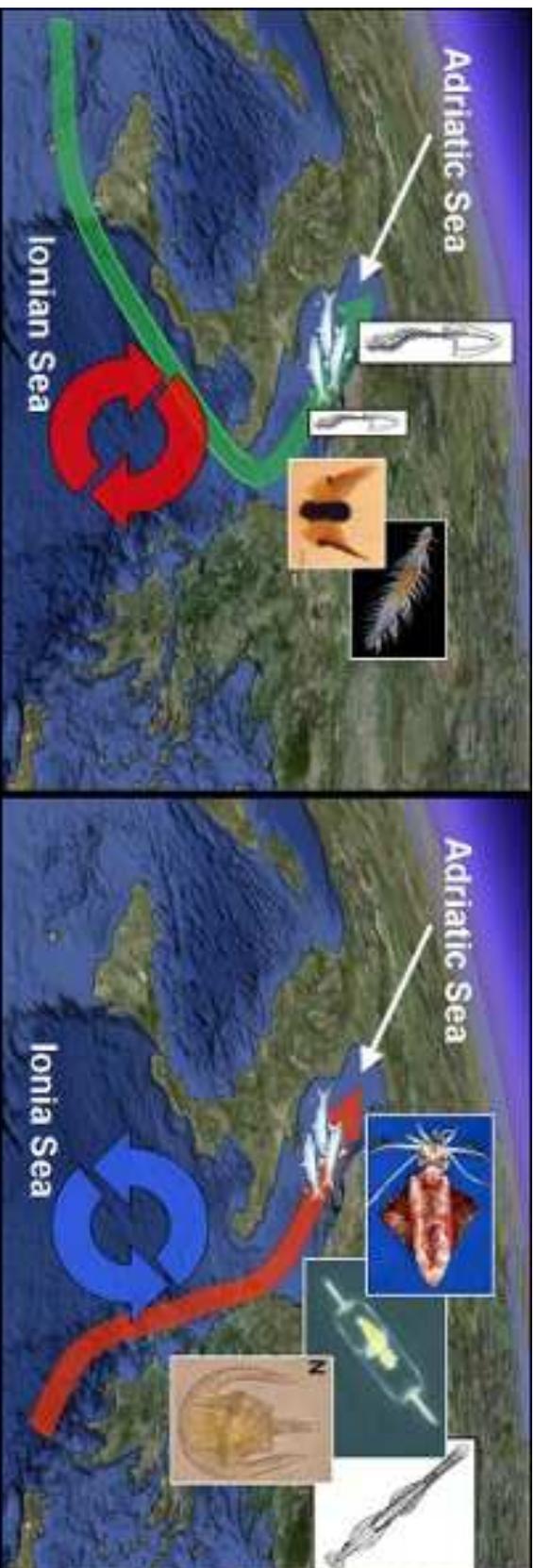
**Oil spill**



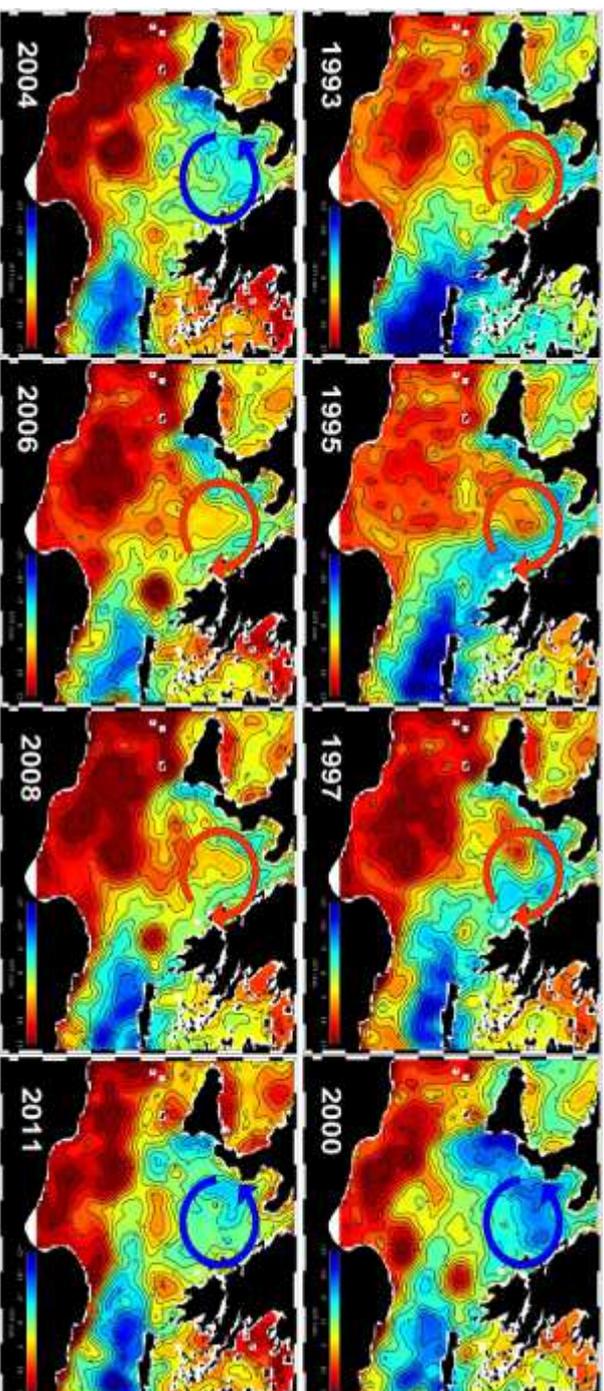


# EPPUR SI MUOVE....

## Scambi Adriatico - Ionio



temperatura  
superficiale





# EPPUR SI MUOVE....



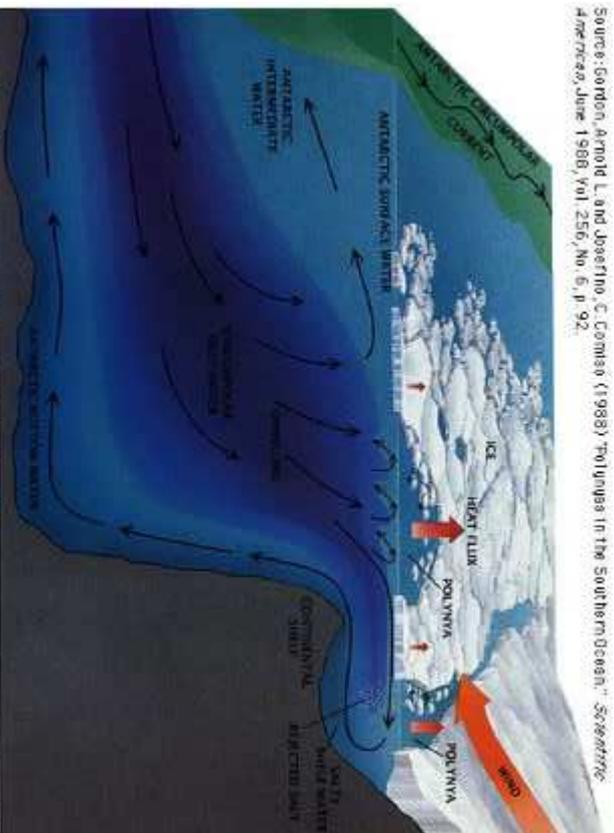
**Correnti  
le autostrade  
per il plancton**





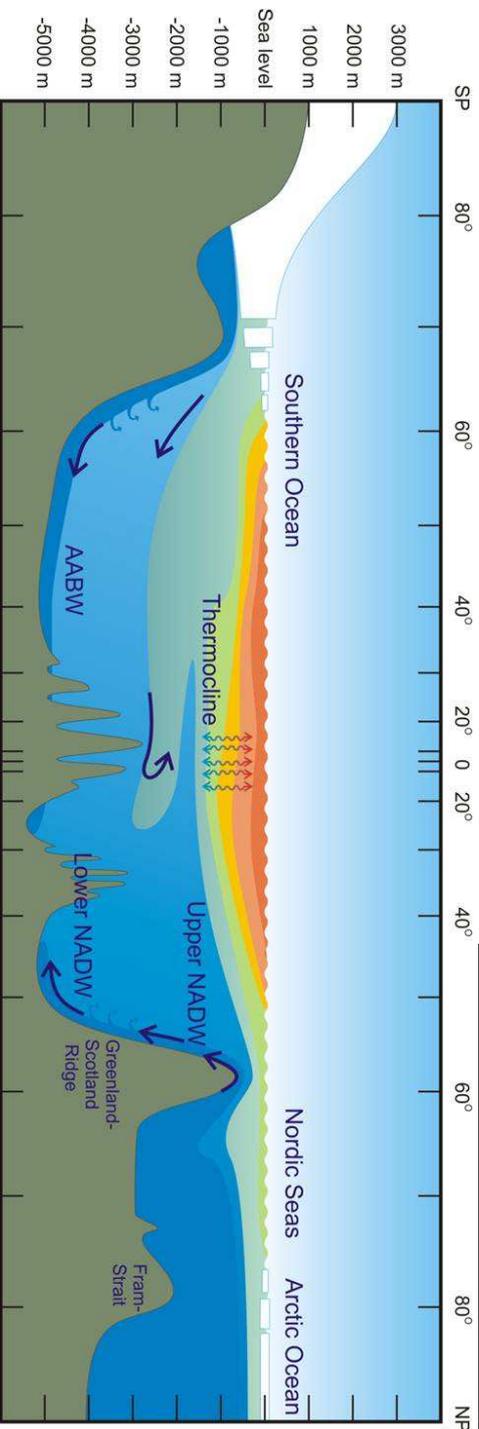
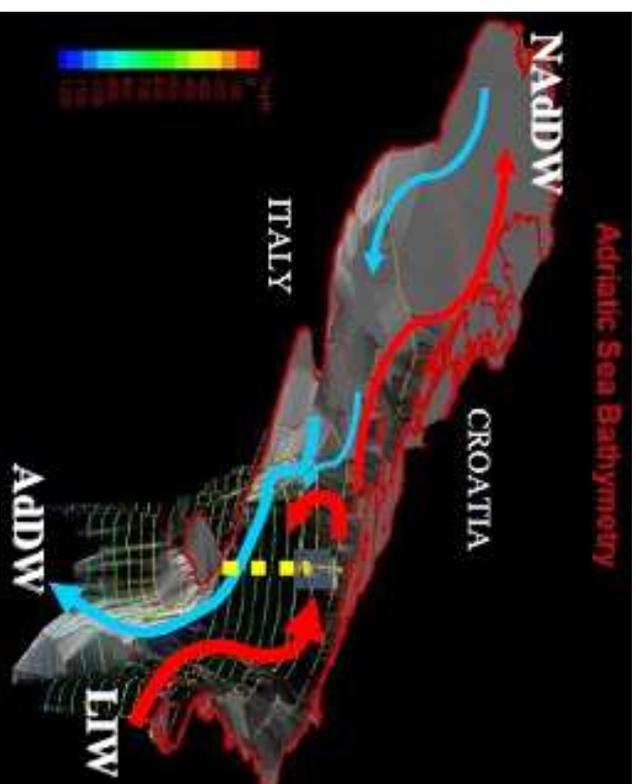
# EPPUR SI MUOVE....

Source: Gordon, Arnold L. and Josefino, C. Comiso (1983) "Tolujnas in the Southern Ocean." *Scientific American*, June 1988, Vol. 256, No. 6, p. 92.



Periodical circulation pattern of the Southern Ocean (the ocean surrounding Antarctica) is dominated by the upwelling of a warm, salty water mass called the Circumpolar Deep Water and its transformation into Antarctic Surface Water, which ultimately sinks to become Antarctic Intermediate Water and Antarctic Bottom Water. The circulation is driven by wind and the exchange of heat and fresh water between the ocean and the atmosphere.

# Correnti profonde

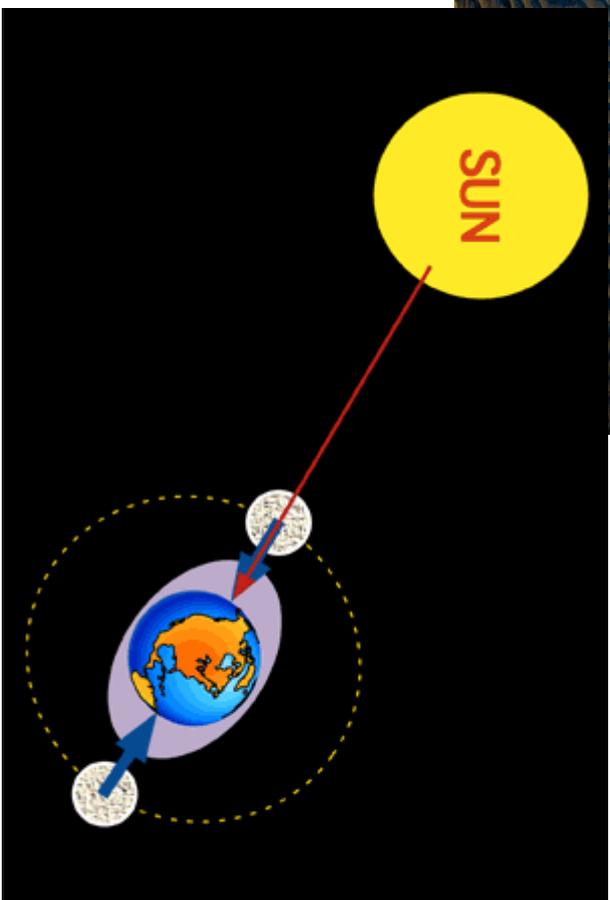




# EPPUR SI MUOVE....



## Marea

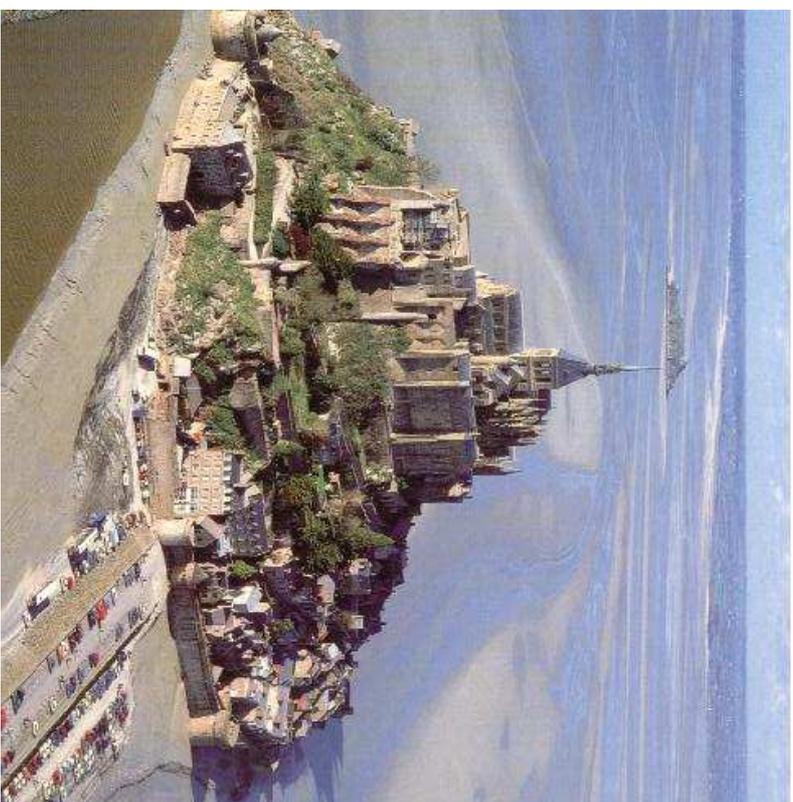




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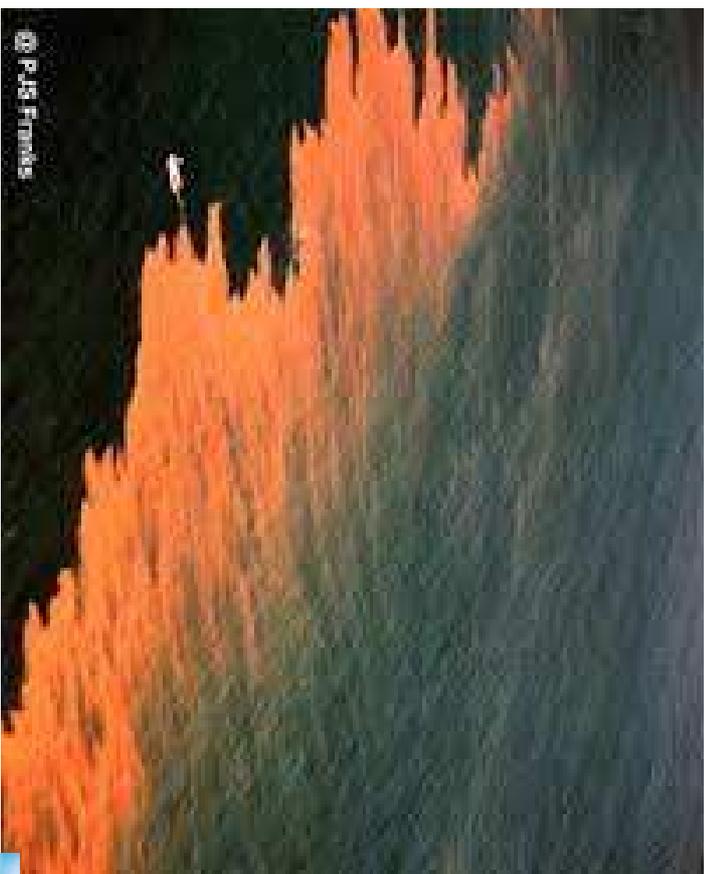


## Marea





**EPPUR SI MUOVE....**

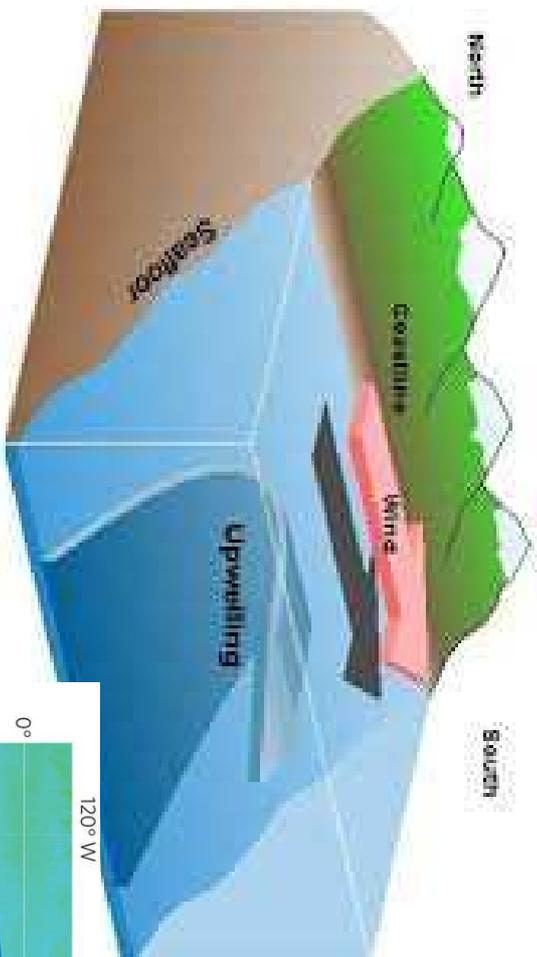


**Marea  
(rossa,  
marrone,...)**

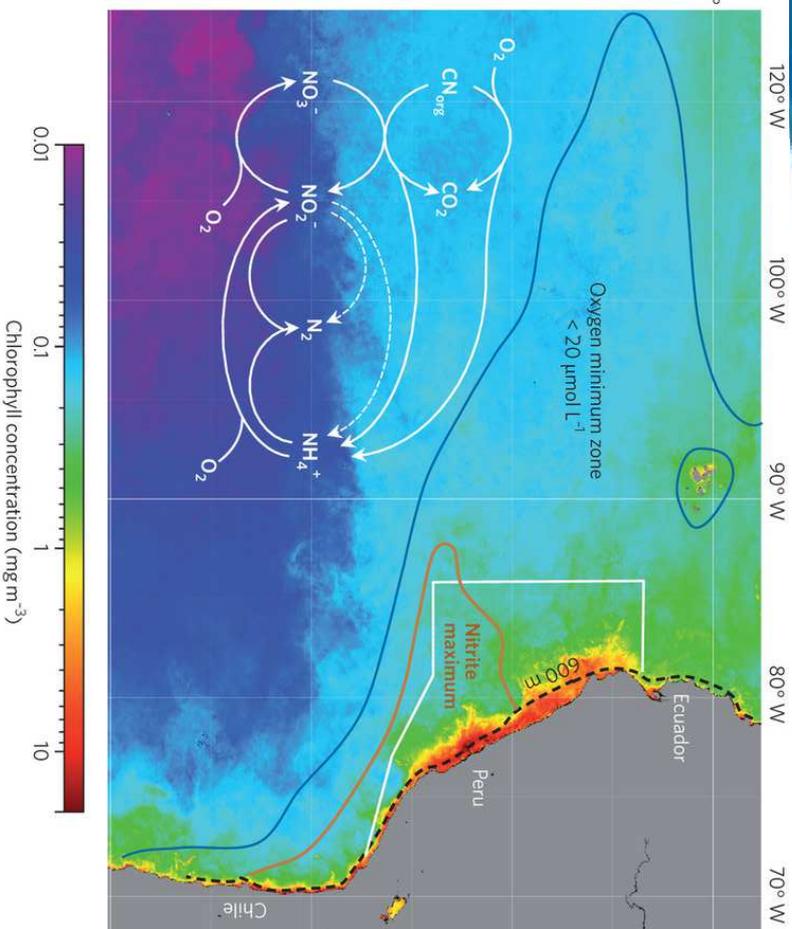




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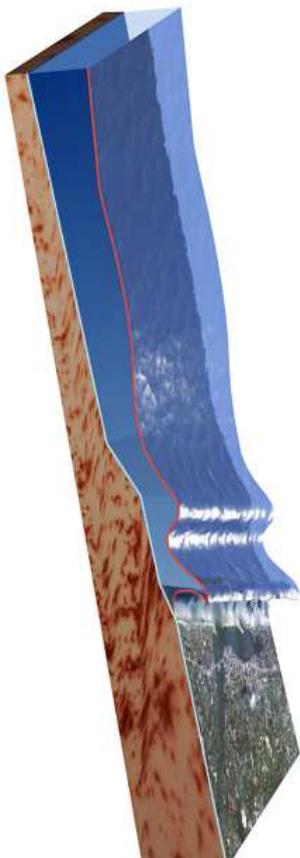
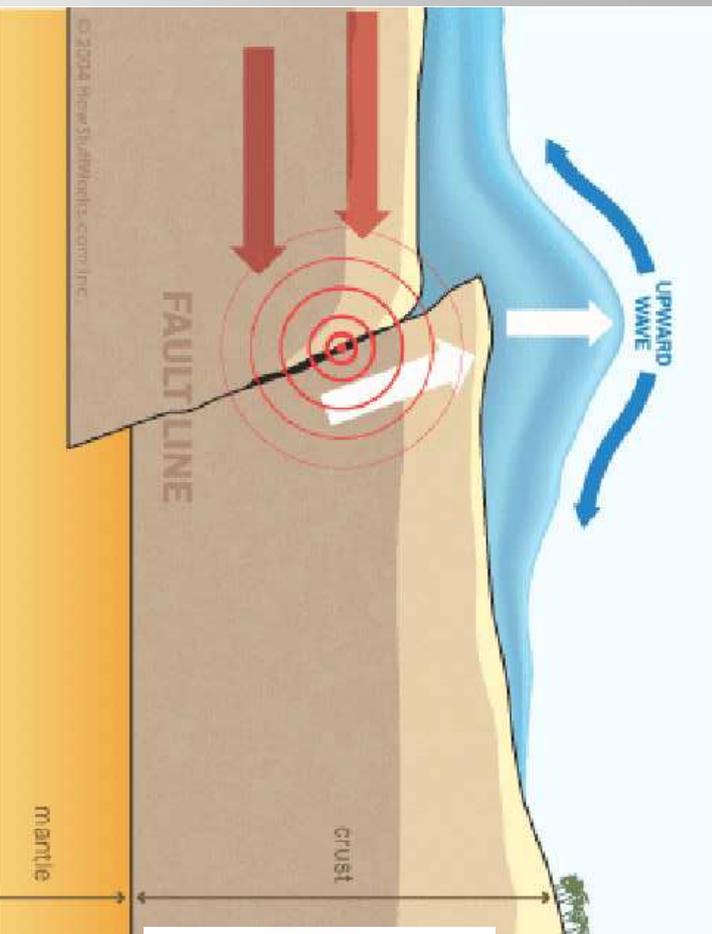


# UPWELLING





# EPPUR SI MUOVE....



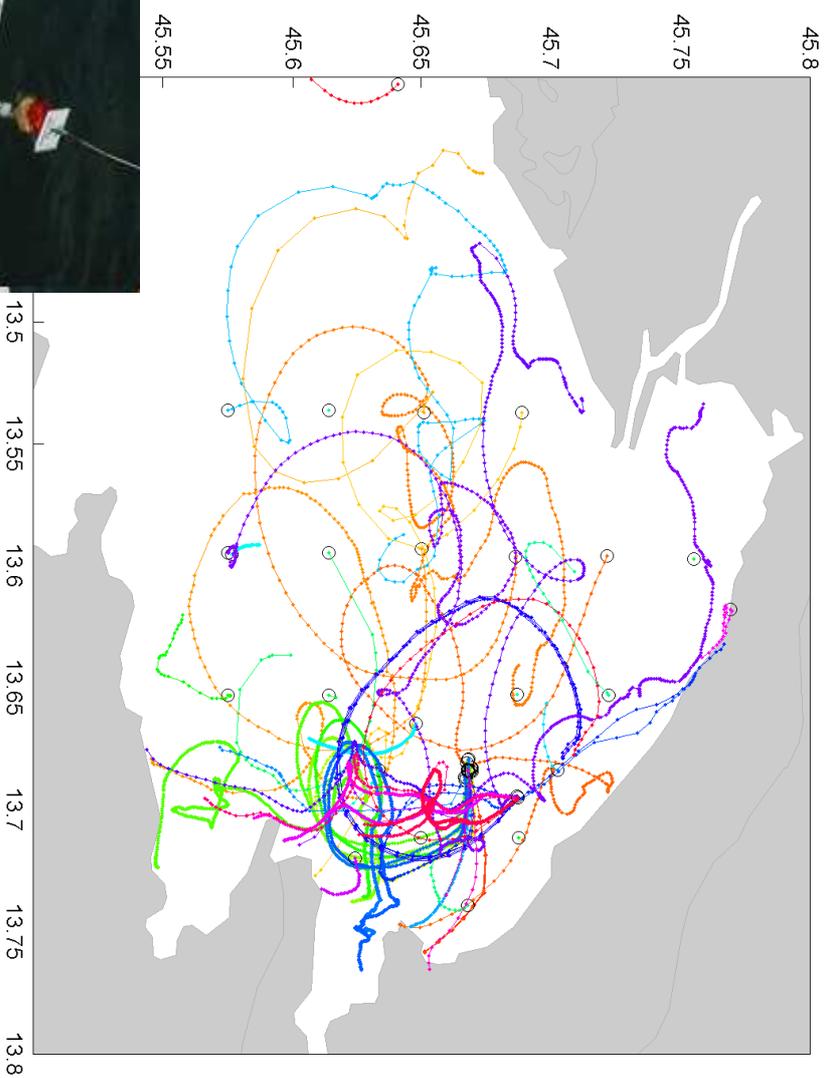
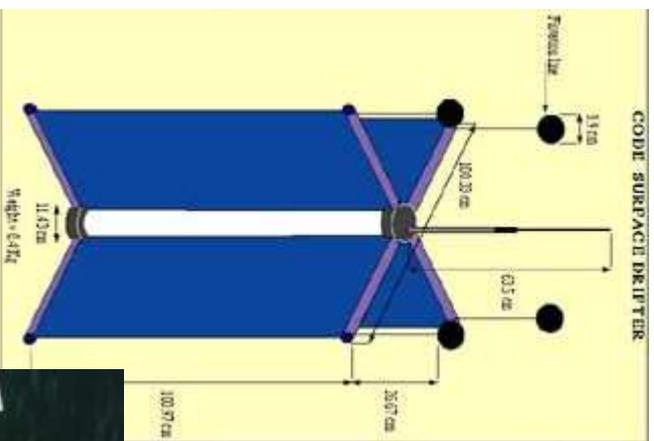
# Tsunami (Maremoto)





# Strumenti per misurare i movimenti dell'oceano

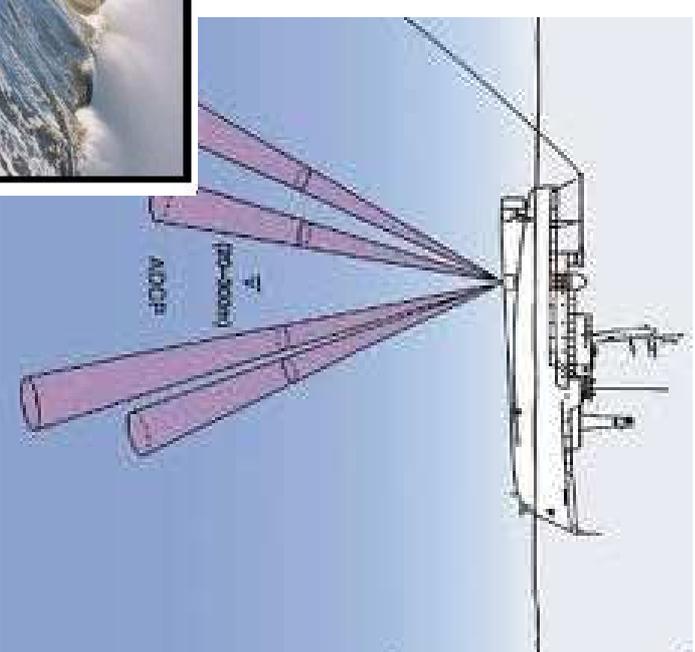
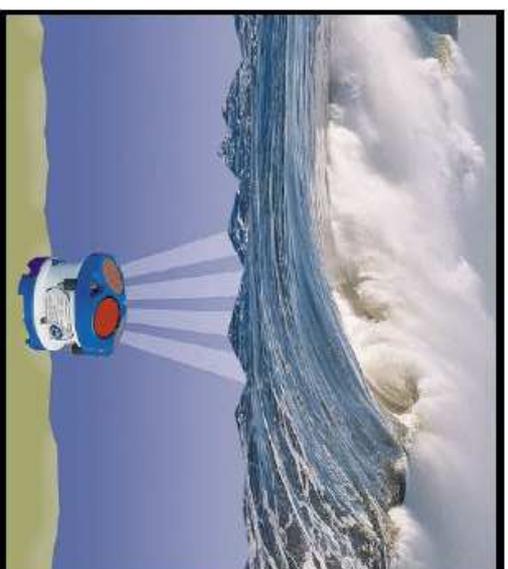
- Drifter
- ## Correnti





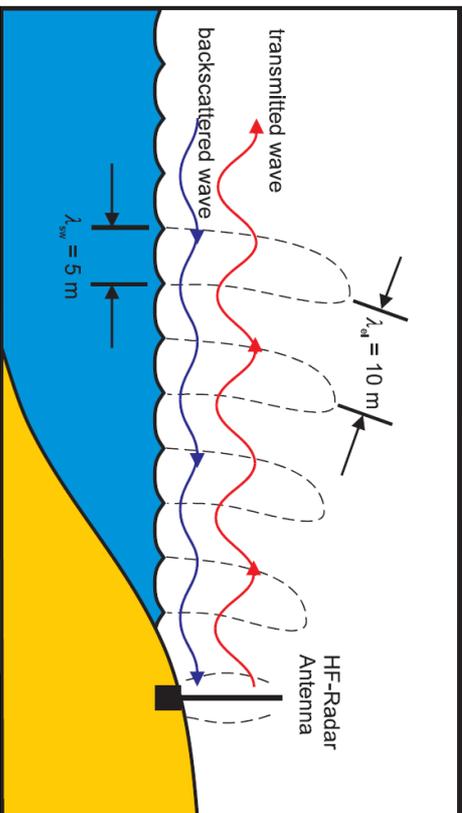
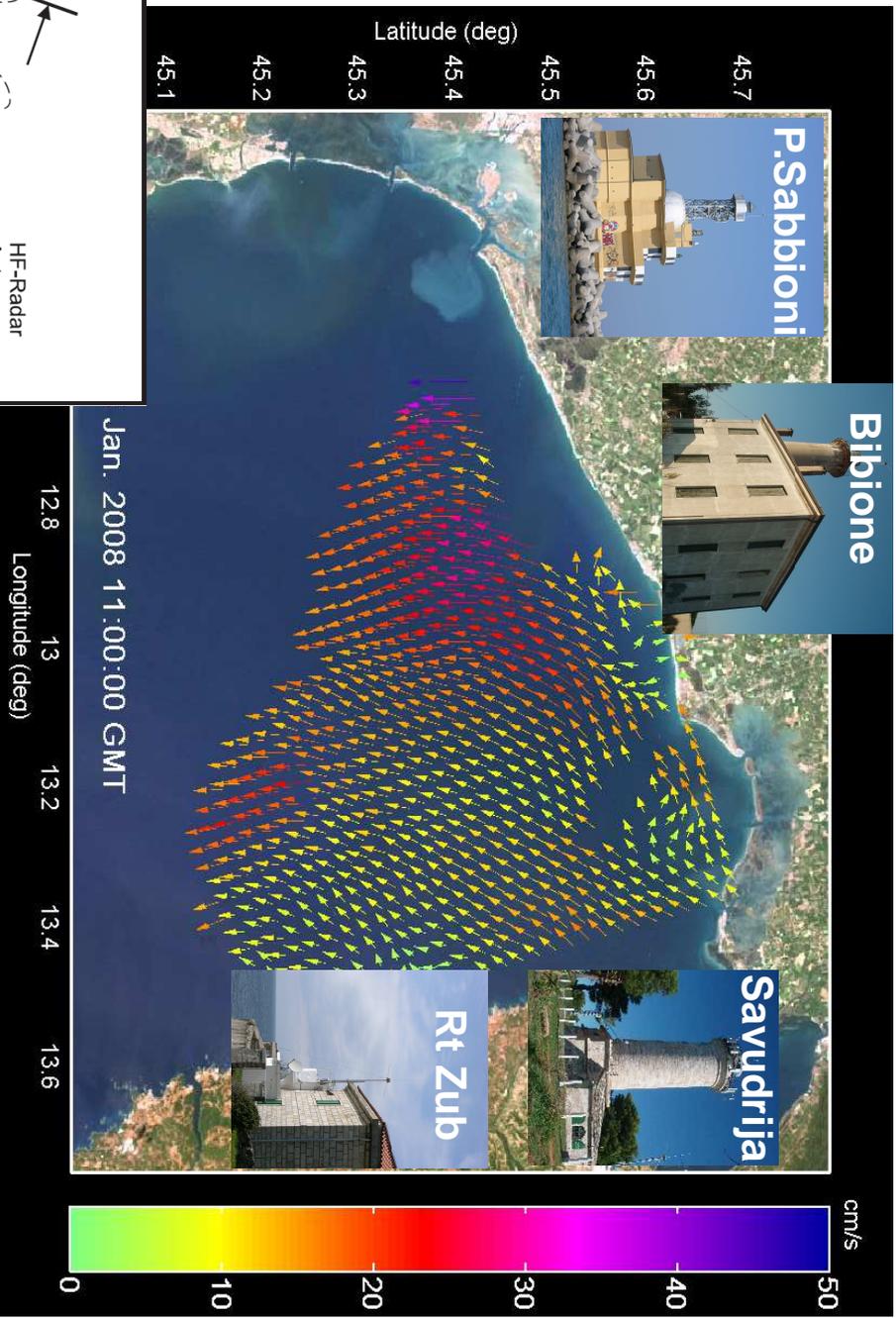
# Strumenti per misurare i movimenti dell'oceano

- Correntometri acustici: ADCP  
Correnti (Doppler)





# Radar e punti di misura





# Strumenti per misurare l'oceano

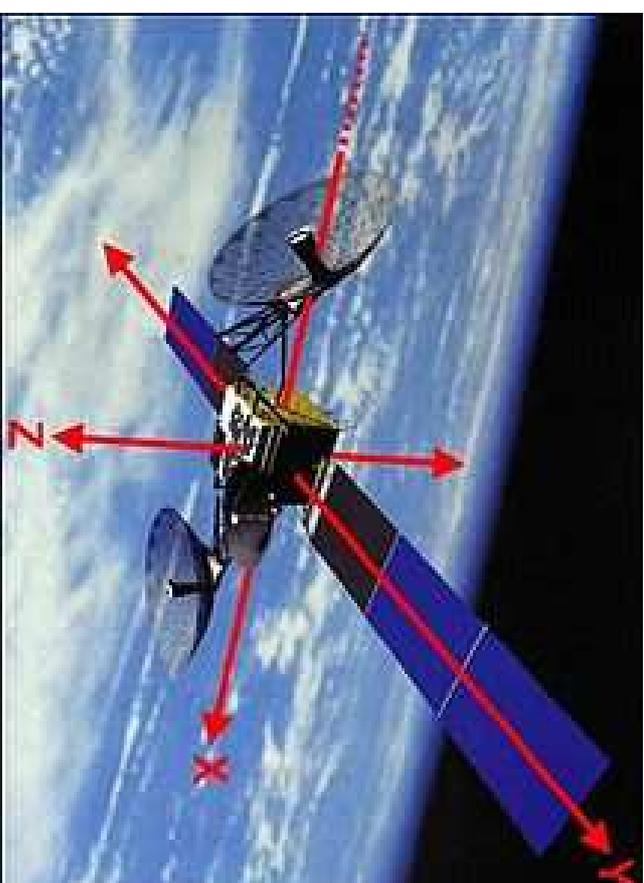
- Float  
Temperatura, salinità e correnti  
(intermedie e profonde)





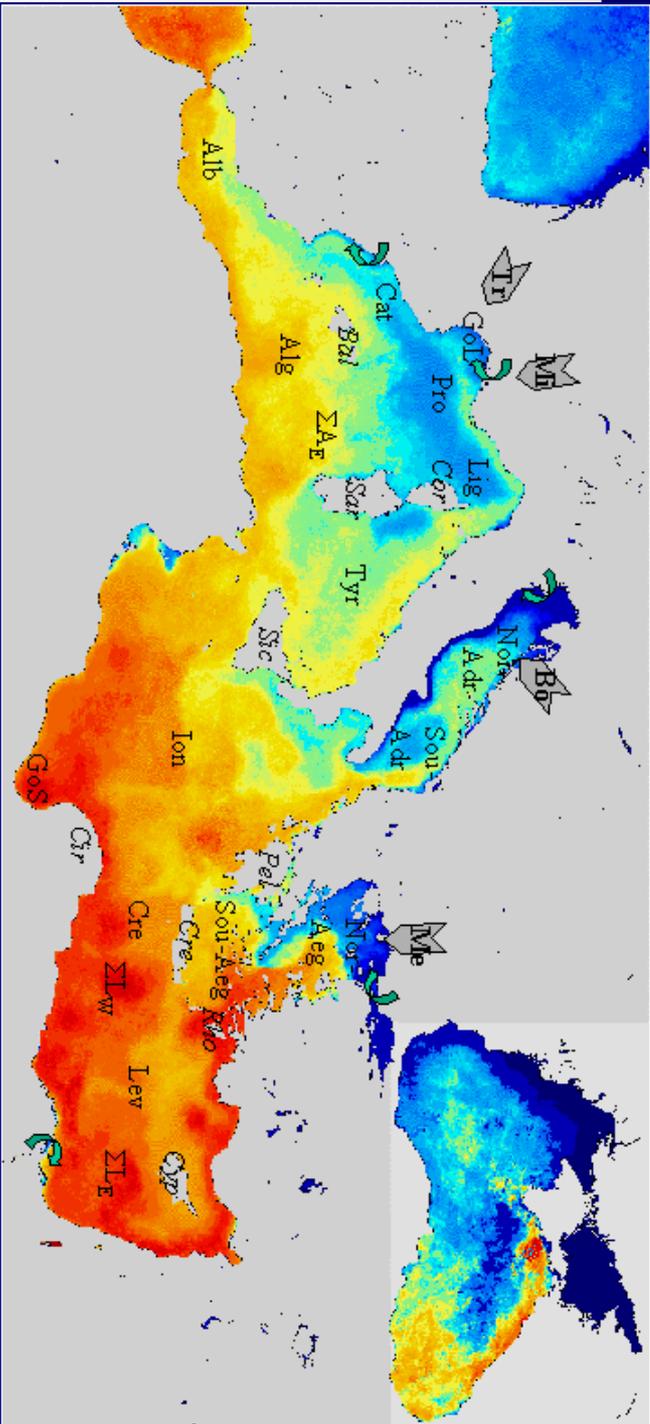
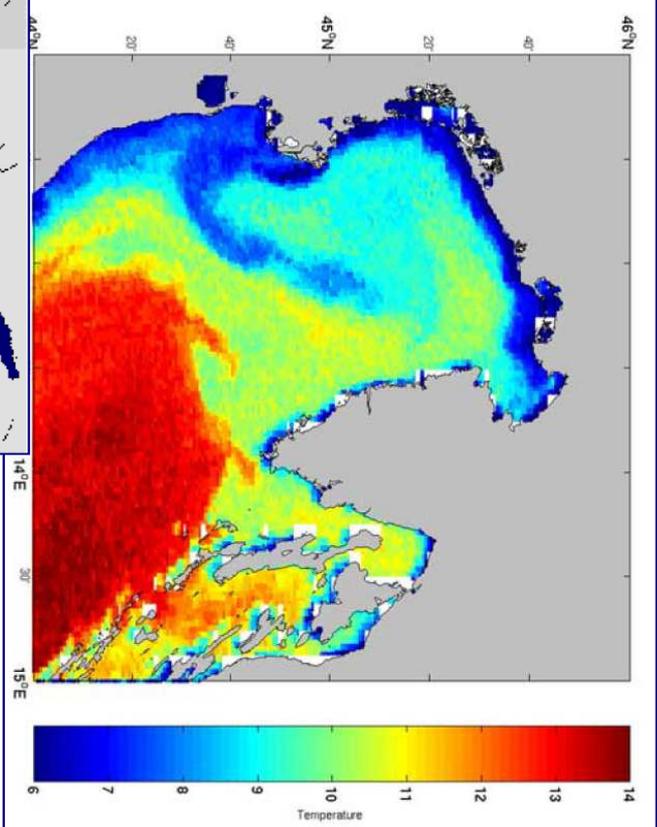
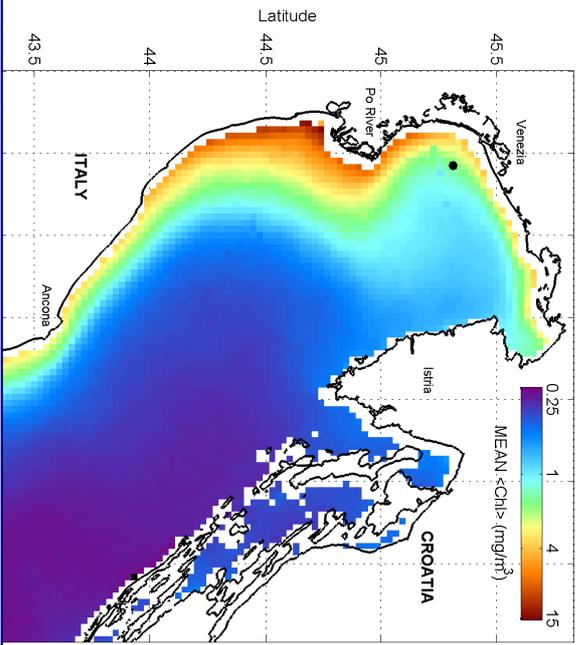
# Strumenti per misurare l'oceano

- Satelliti



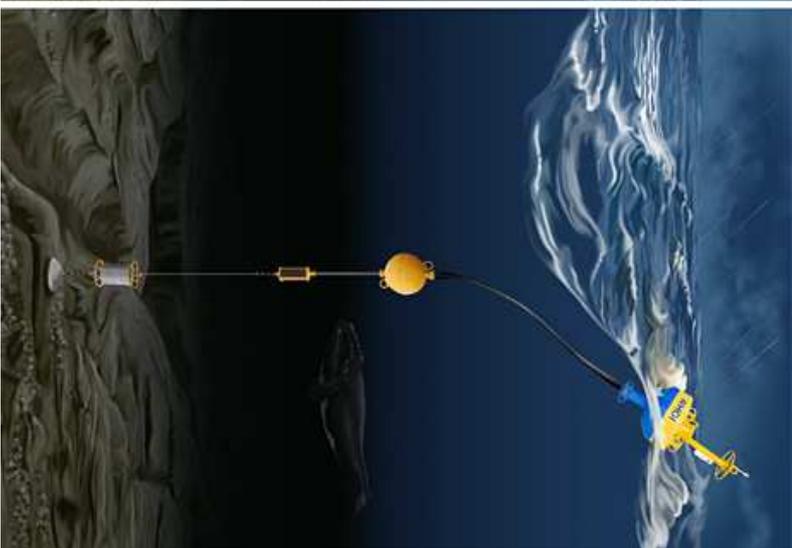
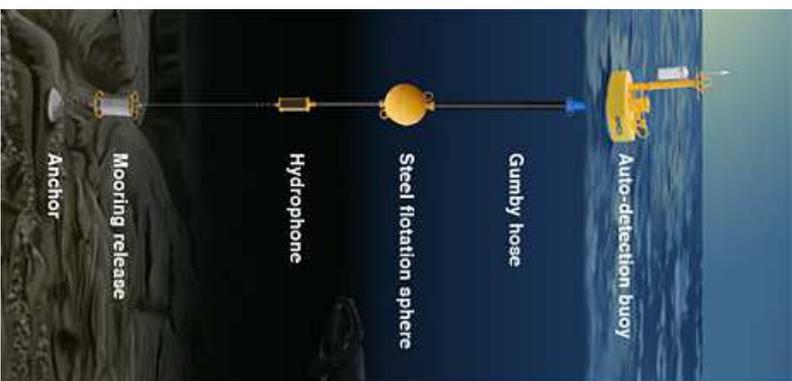
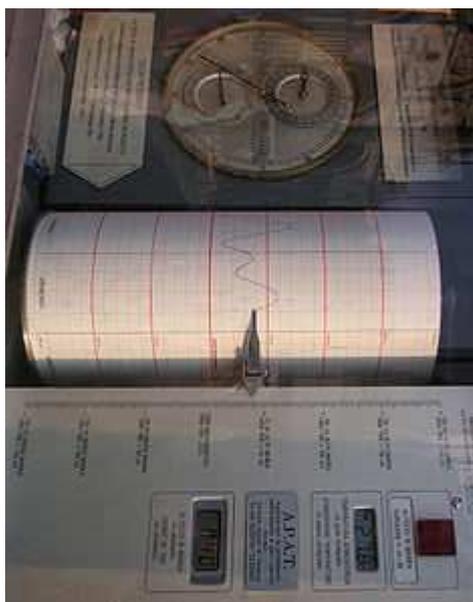


# Osservazioni da satellite



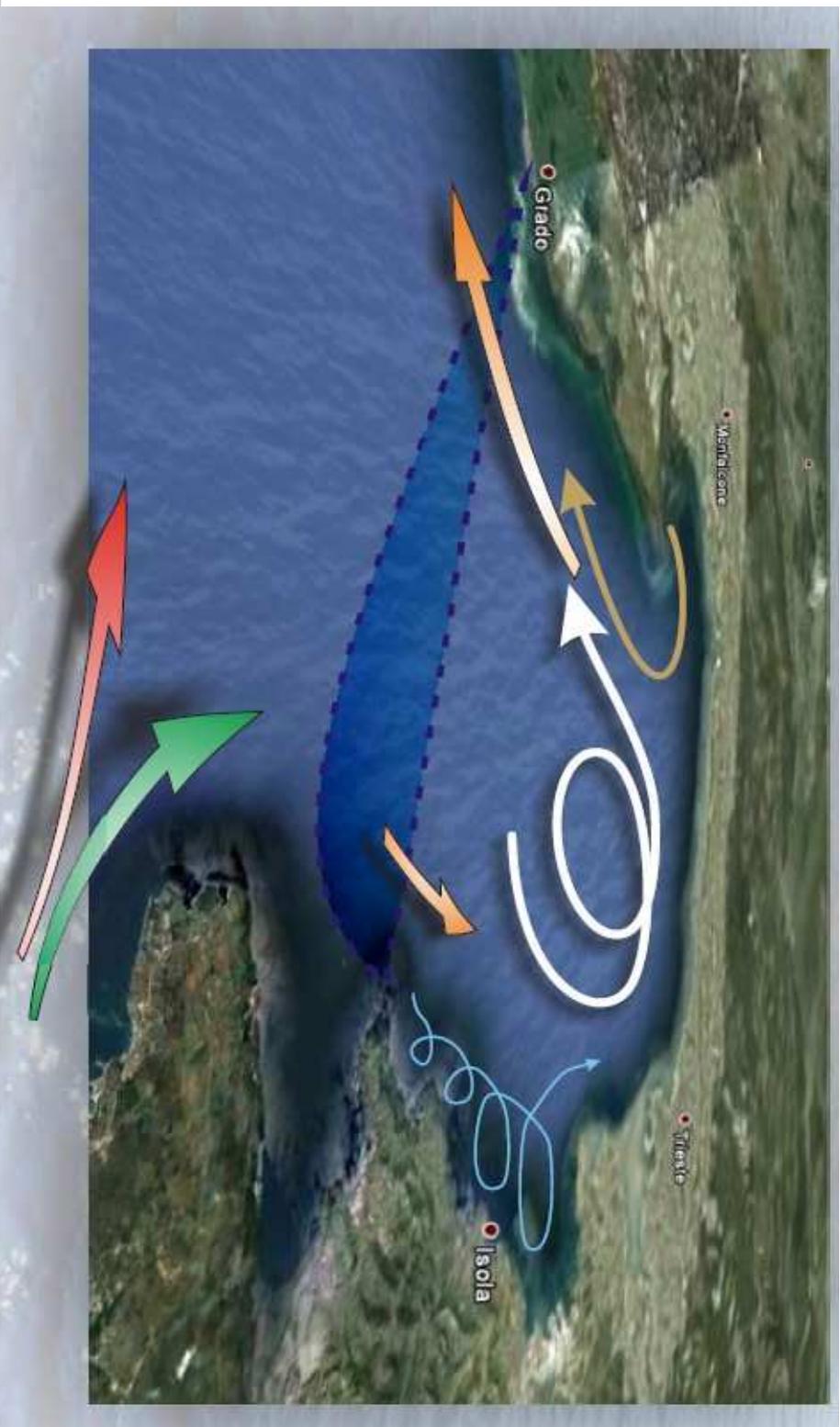


# ■ Mareografo





# Circolazione nel Golfo di Trieste



**TOSCA**  
NETWORK FOR A BETTER RESPONSE  
TO MARITIME ACCIDENTS



Project cofinanced by the  
European Regional Development Fund

# Caravate per la vostra antichità



Sulla nostra tavola.....  
avvertiamo gli effetti dei movimenti del mare?

