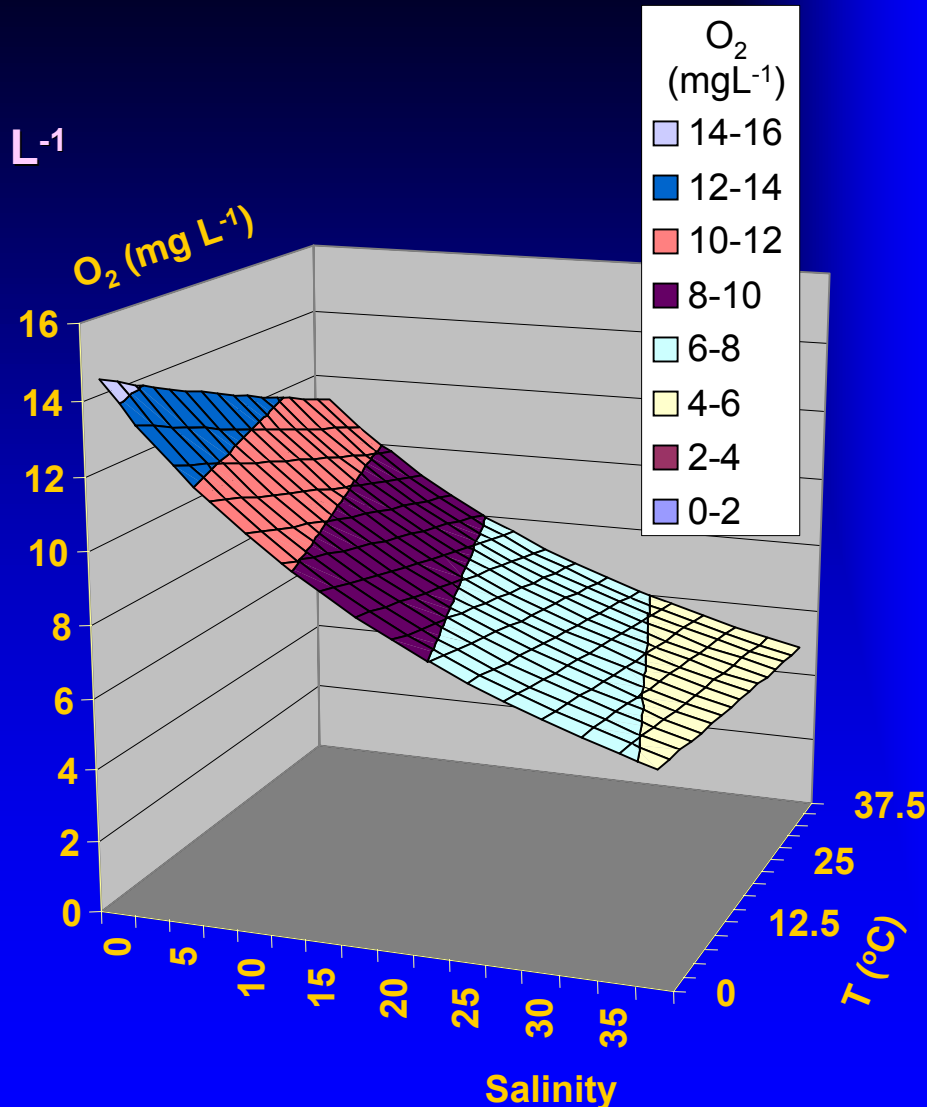


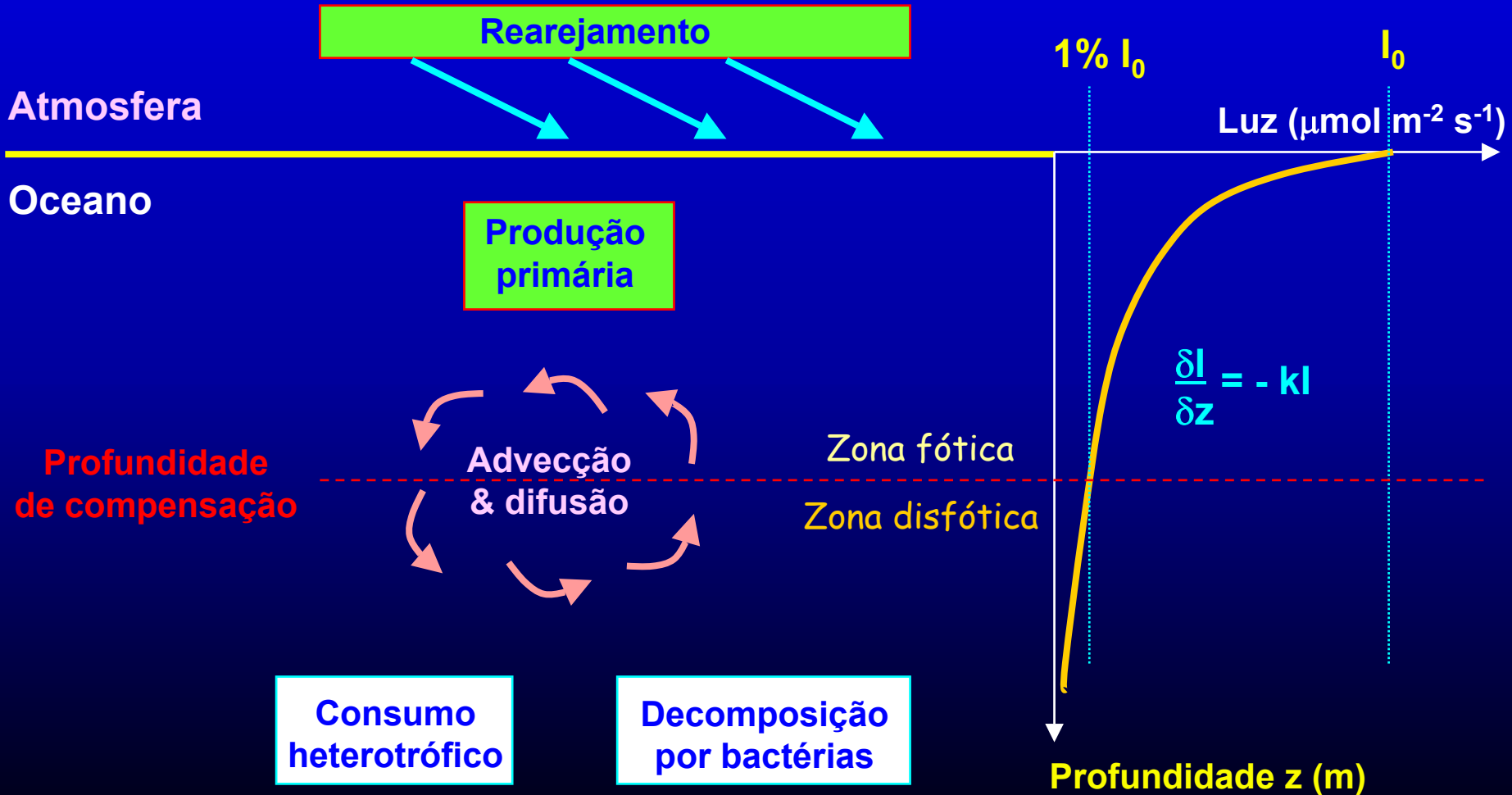
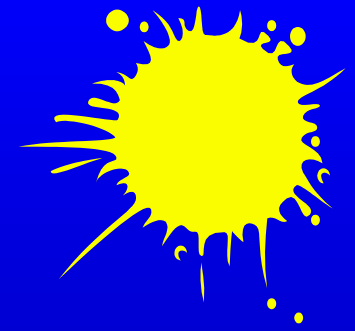
Dissolved oxygen in seawater

Units and ranges

- O_2 is usually measured in $mg\ L^{-1}$ or $ml\ L^{-1}$
- Dissolved oxygen in seawater ranges from $0-10\ mg\ L^{-1}$
- The atomic mass of O_2 ($32g$) corresponds to 22.4 litres at STP, so $5\ ml\ L^{-1} = 5 \times 32/22.4$ i.e. about $7\ mg\ L^{-1}$
- The maximum oxygen concentration in seawater ($\sim 7\ ml\ L^{-1}$) is therefore about 30 times lower than in air ($200/7$)
- The solubility of oxygen depends on the salinity and temperature of the water.



Fontes e poços de oxigênio dissolvido na água do mar



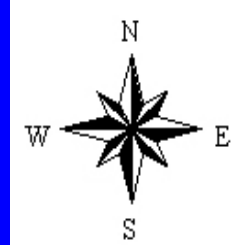
Unidades de radiação

Unidade	Conversão em	Tipo	Significado/Comentários
lux (lx)	$6 \times 10^{-6} \text{ ly min}^{-1}$		Luz à superfície do oceano
lux (lx)	1 IC m ⁻²		Fluxo (iluminação/tempo)
international candle (IC)			Iluminação
langley	1 gcal cm ⁻²	Energia/área	
einstein (1 mol)	6.02×10^{23} quanta	Energia	
einstein	52000 gcal	Energia	para $\lambda=550 \text{ nm}$
gcal	4.185 Joule	Energia	
$\mu\text{einstein m}^{-2} \text{ s}^{-1}$		Densidade de potência	500-1500 (aprox.) (à superfície do oceano)
wm ⁻²	1 J s ⁻¹ m ⁻²	Densidade de potência	200-600 (aprox.) (à superfície do oceano)

Adaptado de: Parsons, Takahashi & Hargrave, 1984. Biological Oceanographic Processes 3rd. Ed. e J rlov - Light in the Sea

GIS - Dissolved Oxygen

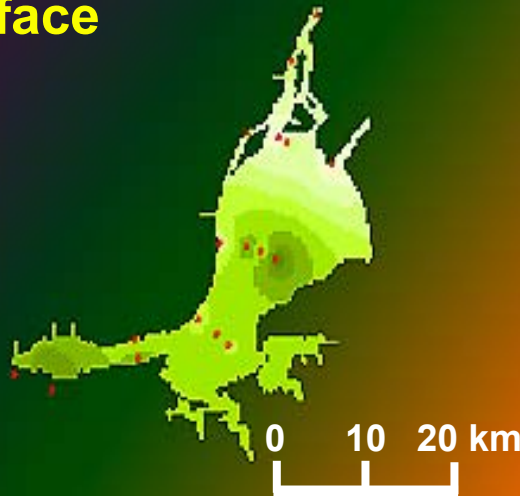
Tagus estuary



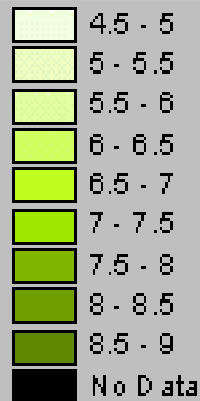
Summer

Winter

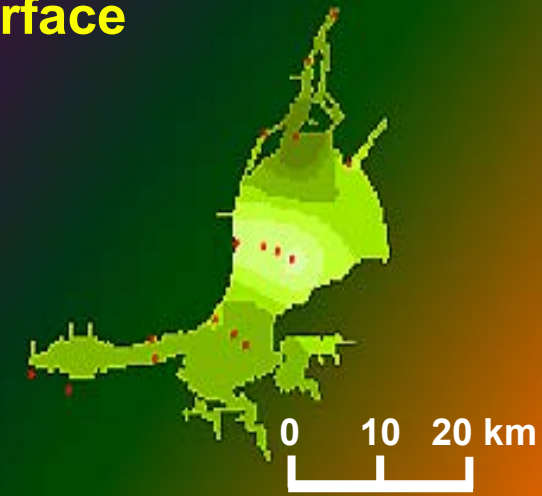
Surface



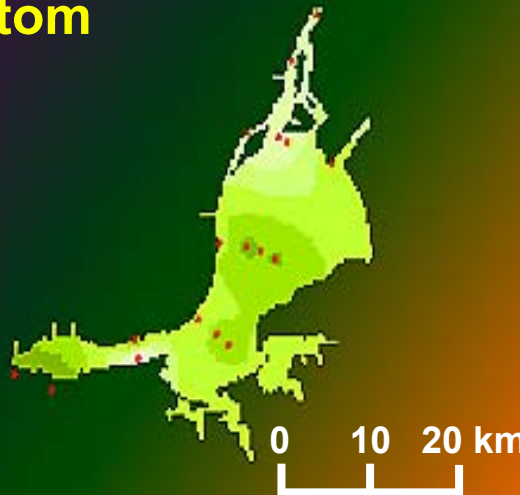
Summer D.O. (mg/l)



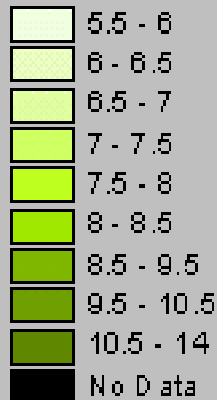
Surface



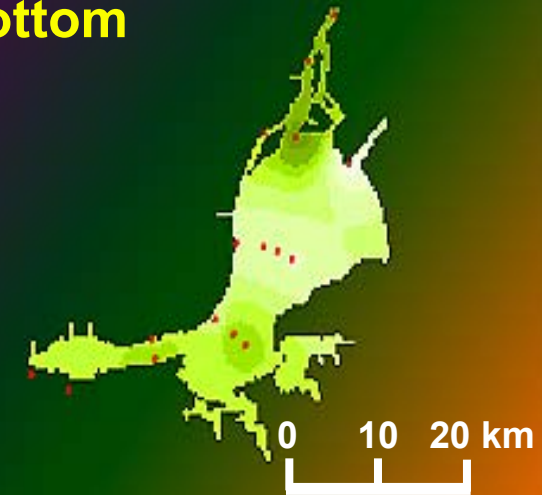
Bottom



Winter D.O. (mg/l)



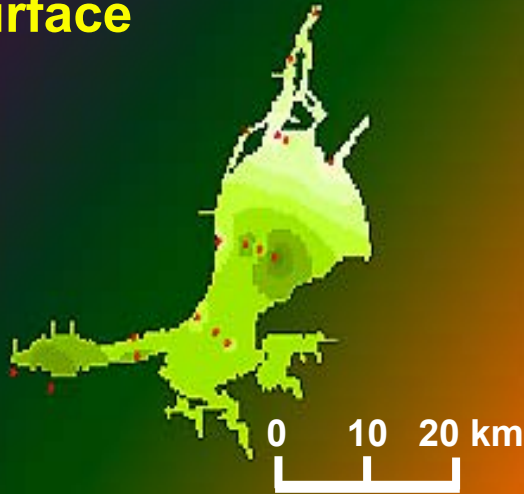
Bottom



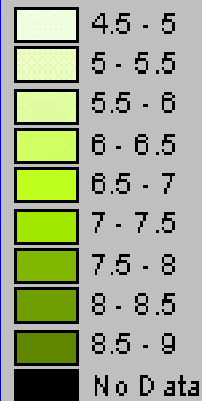
GIS - Dissolved Oxygen

Tagus estuary - Summer

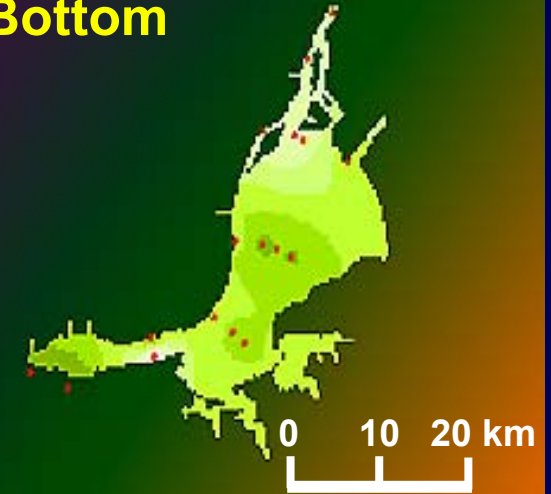
Surface



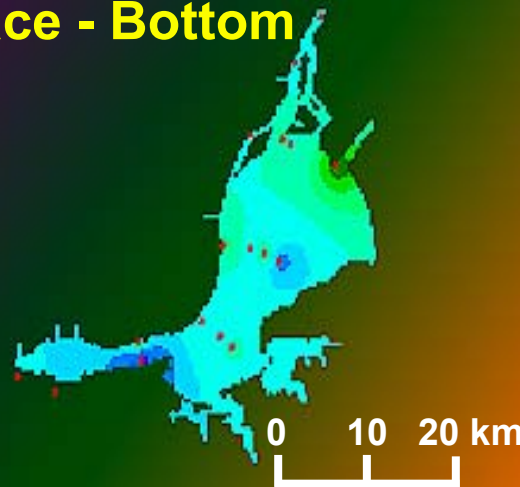
D.O. (mg/l)



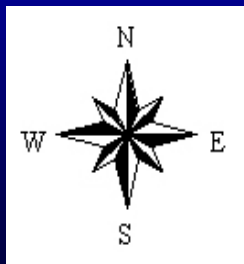
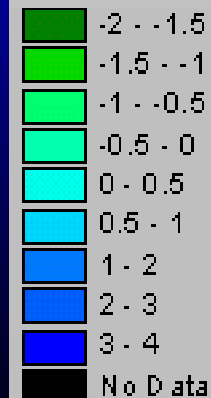
Bottom



Surface - Bottom



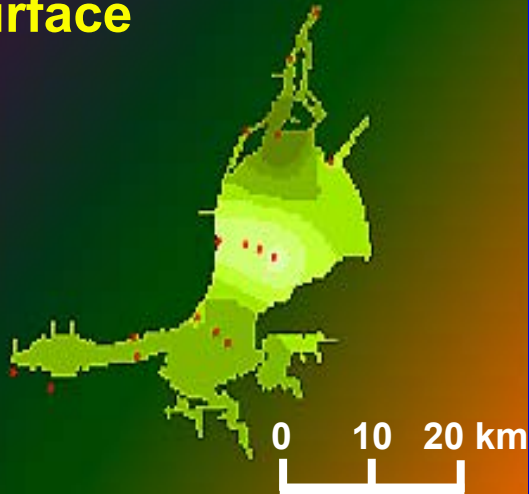
Surface - Bottom
D.O. (mg/l)



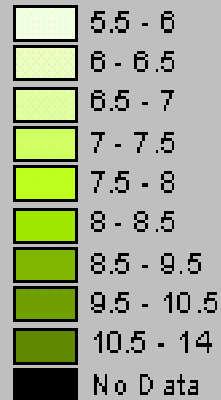
GIS - Dissolved Oxygen

Tagus estuary - Winter

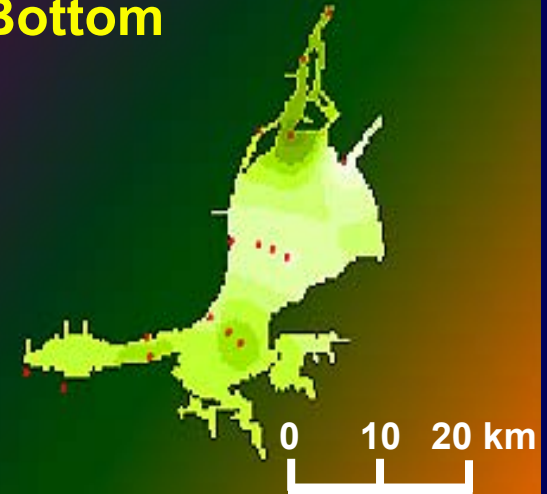
Surface



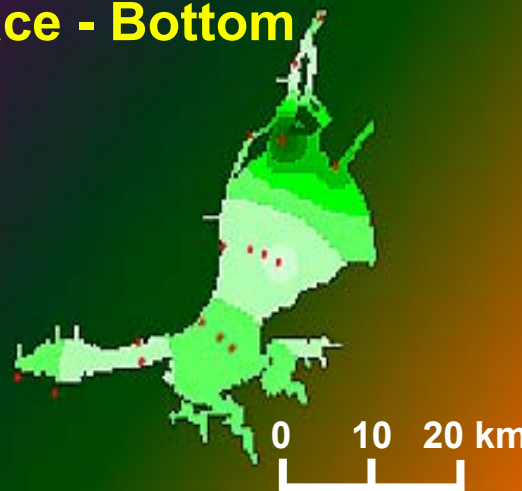
D.O. (mg/l)



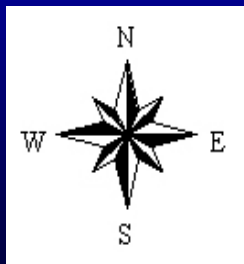
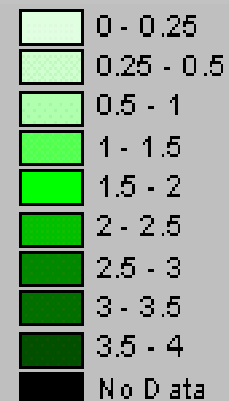
Bottom



Surface - Bottom

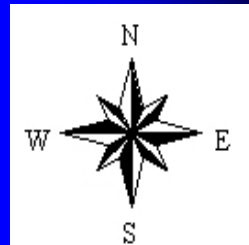


Surface - Bottom
D.O. (mg/l)



GIS - Oxygen Saturation

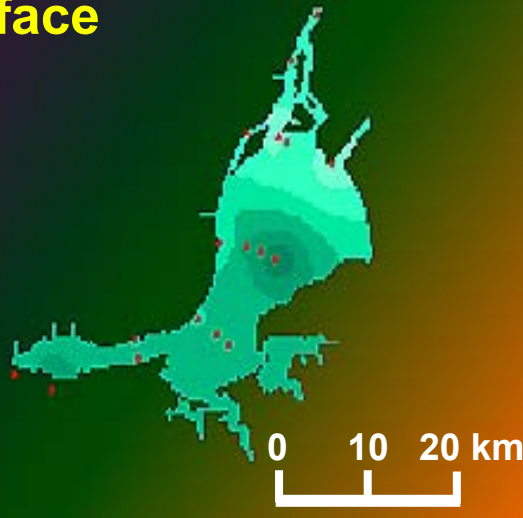
Tagus estuary



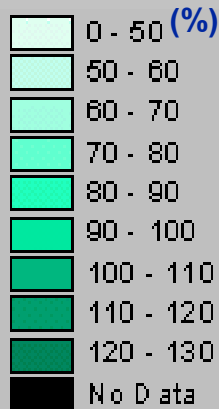
Summer

Winter

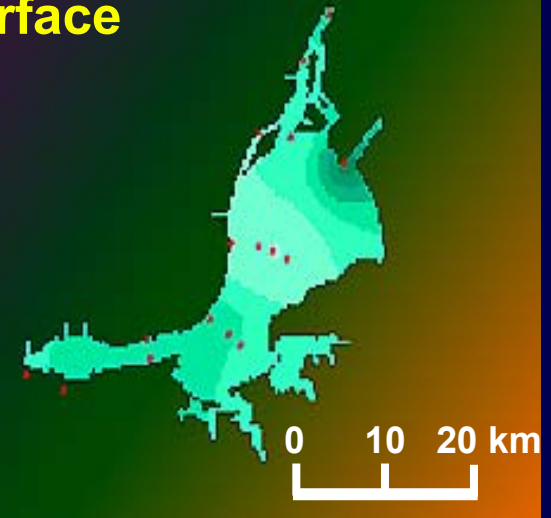
Surface



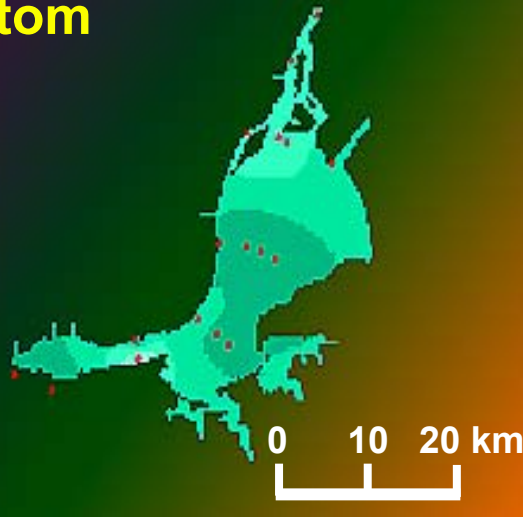
Summer Oxygen Sat



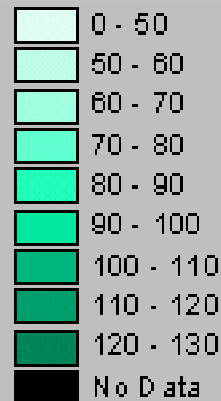
Surface



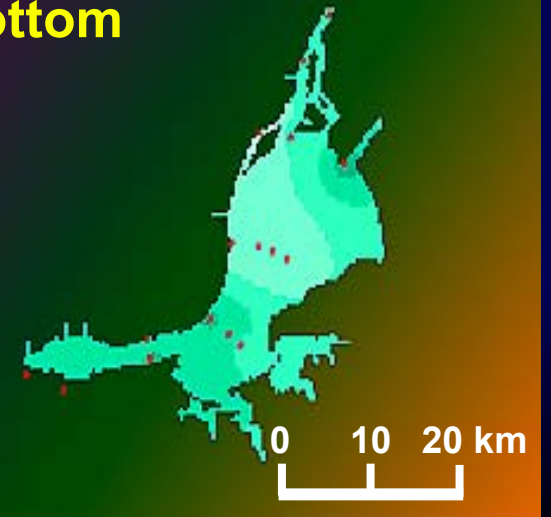
Bottom



Winter Oxygen Sat (%)



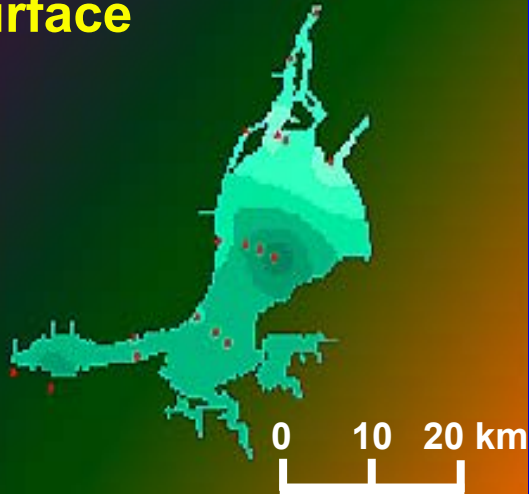
Bottom



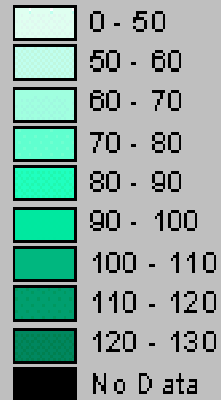
GIS - Oxygen Saturation

Tagus estuary - Summer

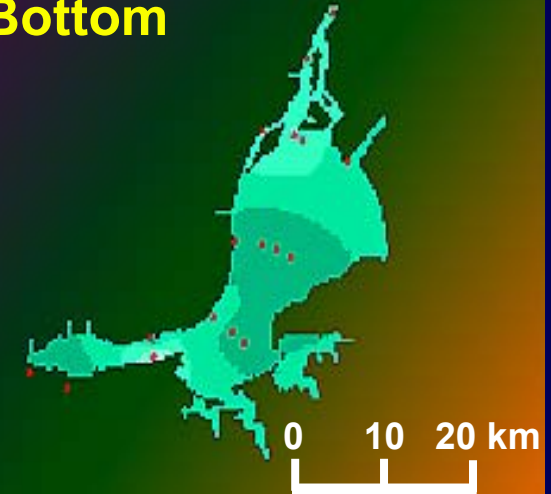
Surface



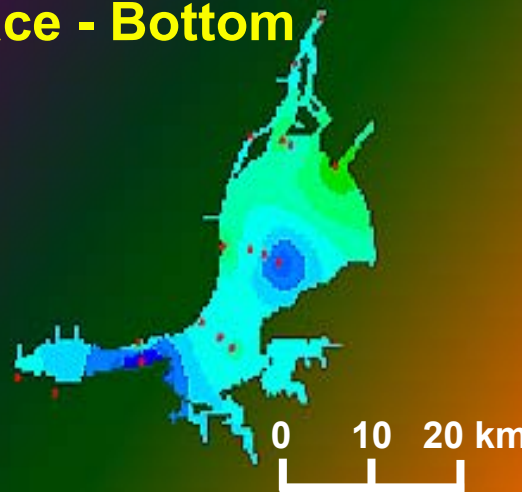
Oxygen Sat (%)



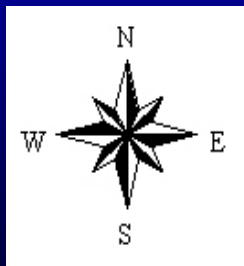
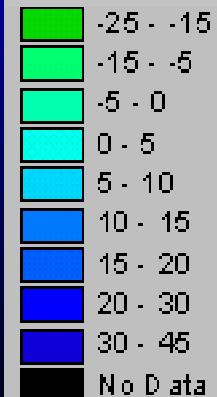
Bottom



Surface - Bottom



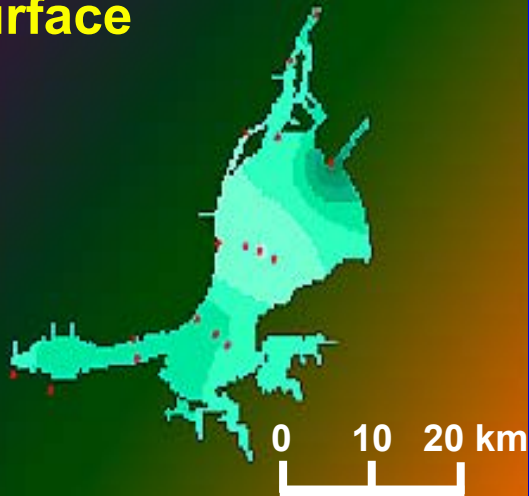
Surface - Bottom
Oxygen Sat (%)



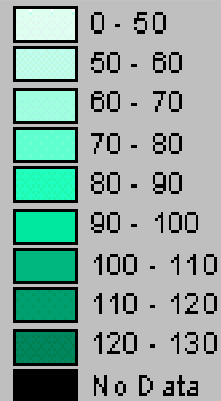
GIS - Oxygen Saturation

Tagus estuary - Winter

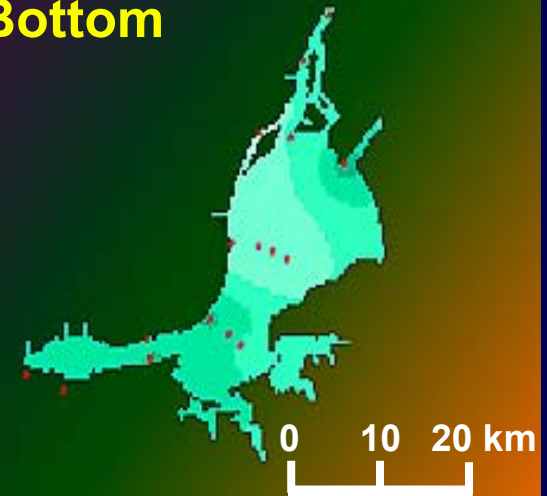
Surface



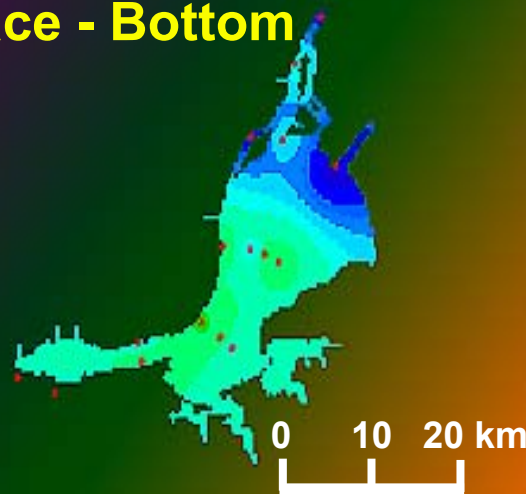
Oxygen Sat (%)



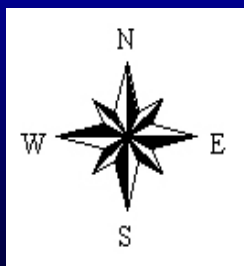
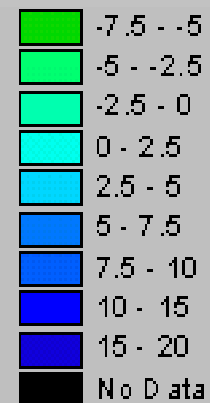
Bottom



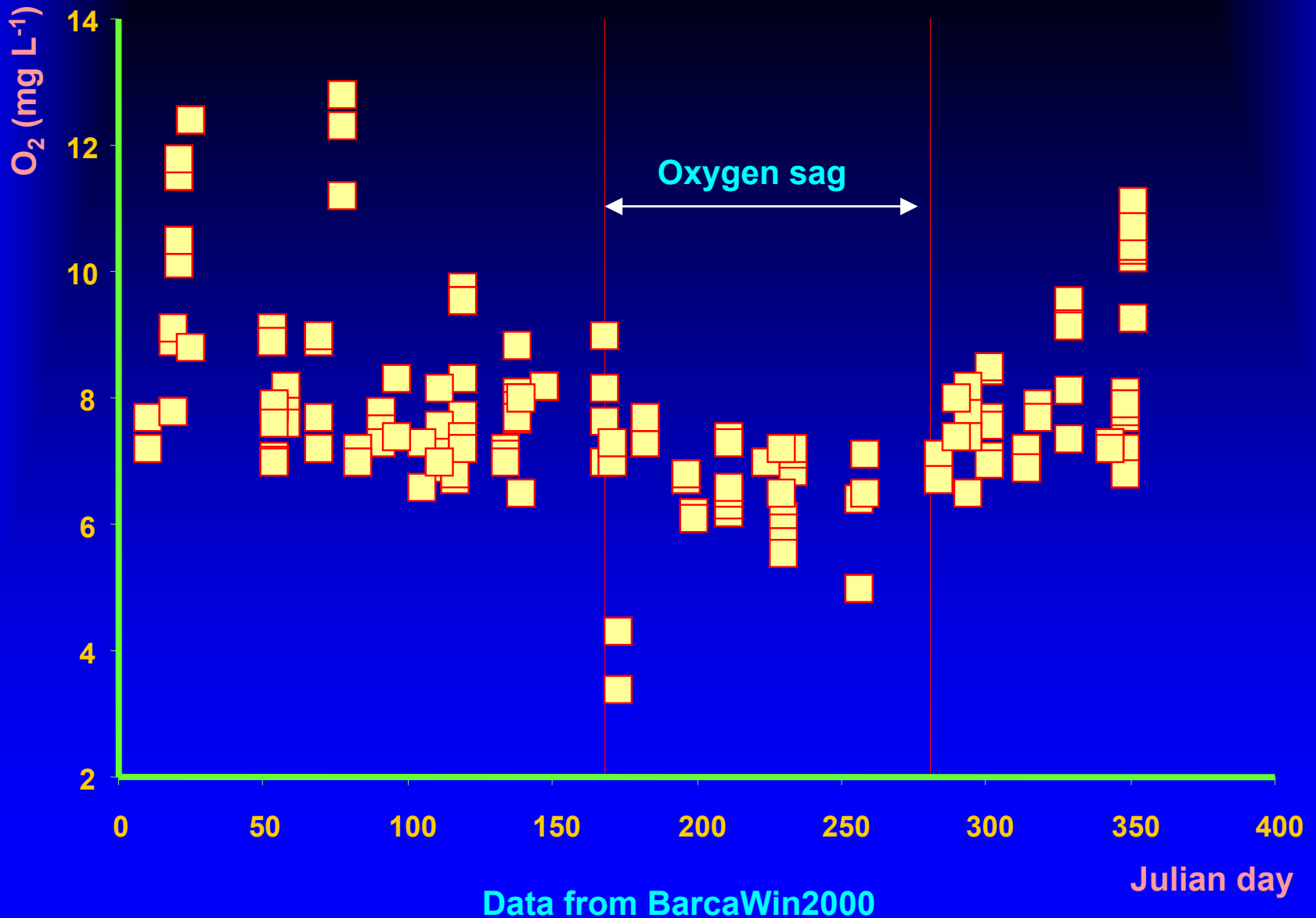
Surface - Bottom



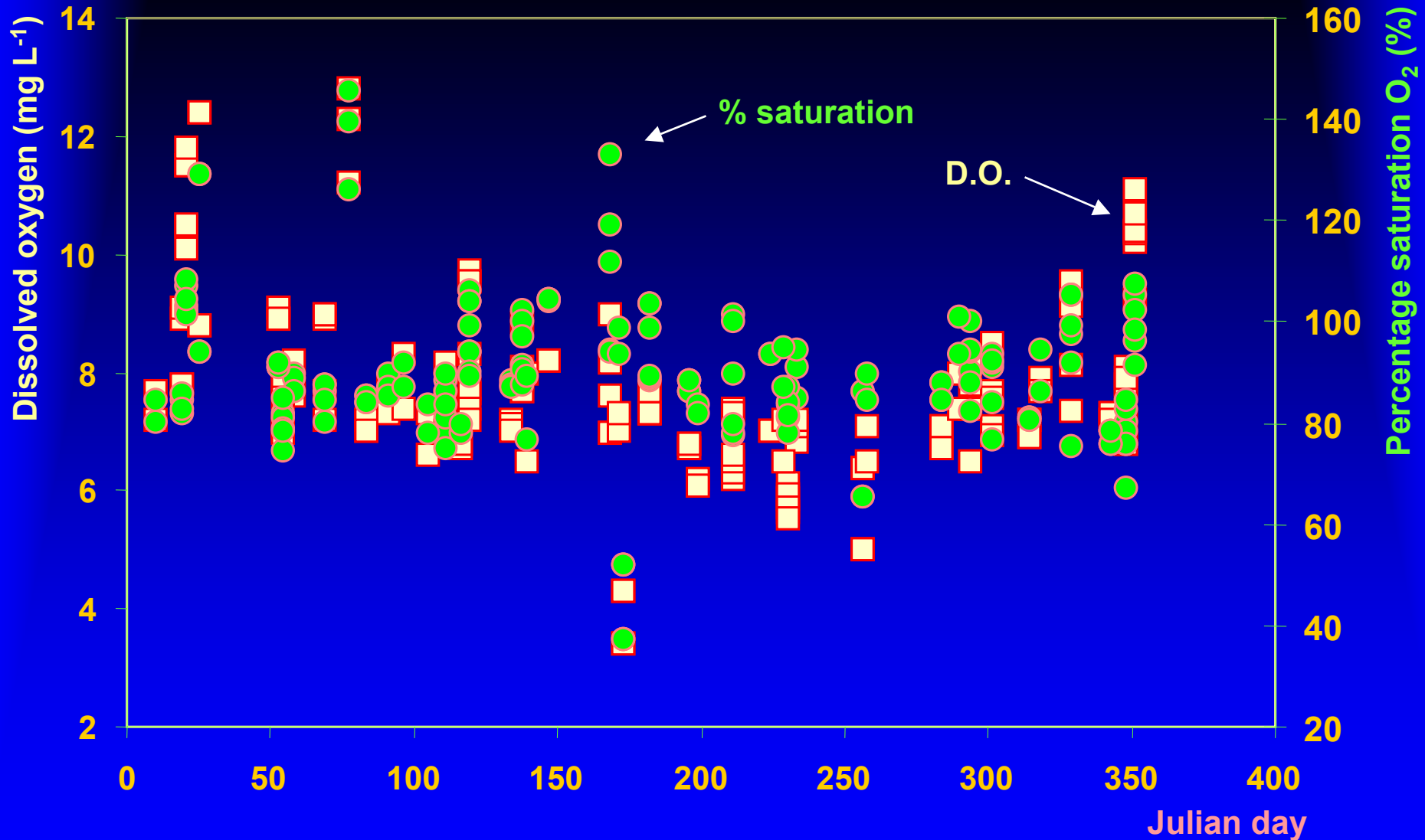
Surface - Bottom
Oxygen Sat (%)



Tejo estuary – dissolved oxygen in the maximum turbidity zone



Tejo estuary – D.O. And % saturation O₂ in the maximum turbidity zone



Data from BarcaWin2000

Black Sea – Location



Black Sea – SeaWifs image

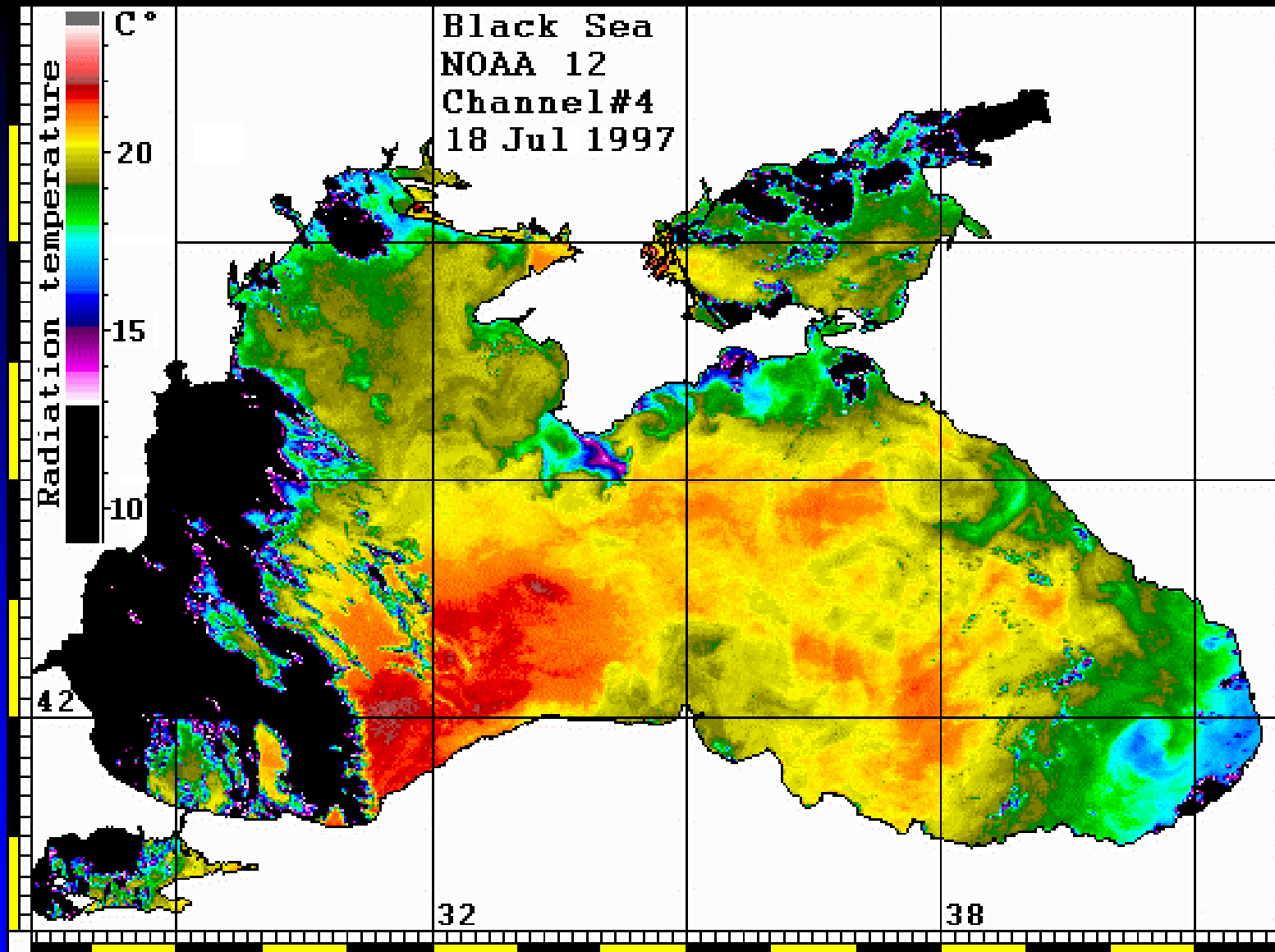
Danube
estuary



Bosporus



Black Sea – Surface temperatures



Black Sea – Circulation

Freshwater input from the NW coast

Name	Catchment area km ²	Length km	Total runoff km ³ y ⁻¹	Total runoff m ³ s ⁻¹	Sediment discharge 10 ⁶ t y ⁻¹
Danube	817000	2860	208	6596	51.7
Dnieper	505810	2285	51.2	1624	2.12
Dniester	71990	1328	10.2	323	2.5
Southern Bug	68000	857	3	95	0.53
Chorokh	22000	500	8.69	276	15.13
Rioni	13300	228	12.8	406	7.08
Inguri	4060	221	4.63	147	2.78
Kodori	2030	84	4.08	129	1.01
Bzyb	1410	-	3.07	97	0.6
Yesilrmak	-	416	4.93	156	18
Kizilrmak	-	1151	5.02	159	16
Sakarya	-	790	6.38	202	-
Total	1505600	8363	306	9693	83

Black Sea – Circulation

