



MS contributions - Croatian, Italian and Slovenian approach

Robert Precali
E-mail: precali@cim.irb.hr



Water types

On the basis of surface (density (σ_t) values three major water types have been defined:

	Type I	Type II	Type III
σ_t (density) (kg m^{-3})	<25	$25 < d < 27$	>27

The same three water types are defined below as salinity classes, since for Spain (Catalonia) variability due to seasonal fluctuation is marginal: using relationships between density and salinity, Spain calculated the following table (at 18°C)

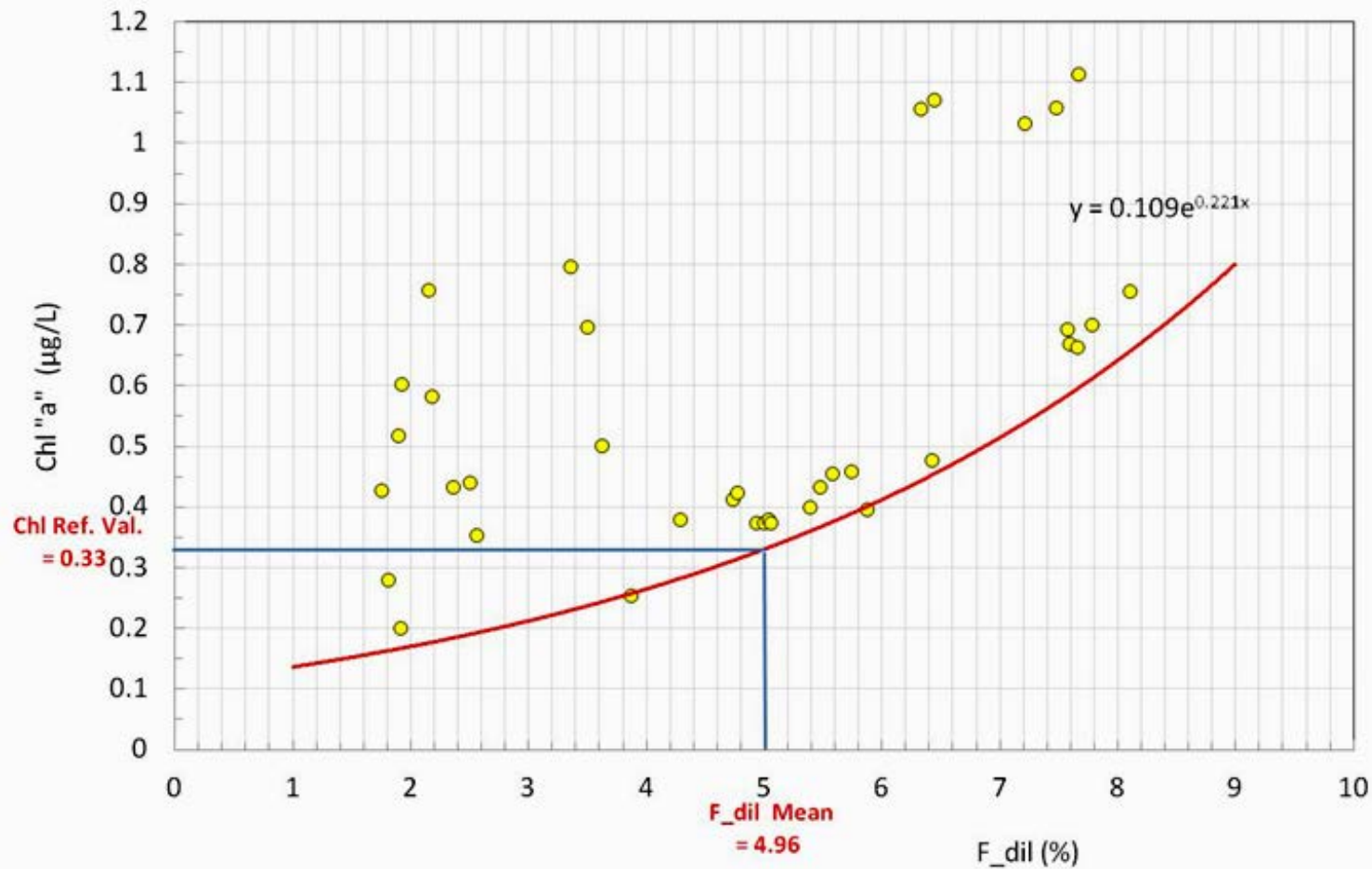
	Type I	Type II	Type III
Annual Mean Salinity (psu)	<34.5	$34.5 < d < 37.5$	>37.5

This type subdivision based only on salinity, is perfectly comparable with the previous ones, based on density, agreed by the rest of Mediterranean MSs. For more details about the use of salinity instead of density see the Annex: Spain MS report on phytoplankton element.

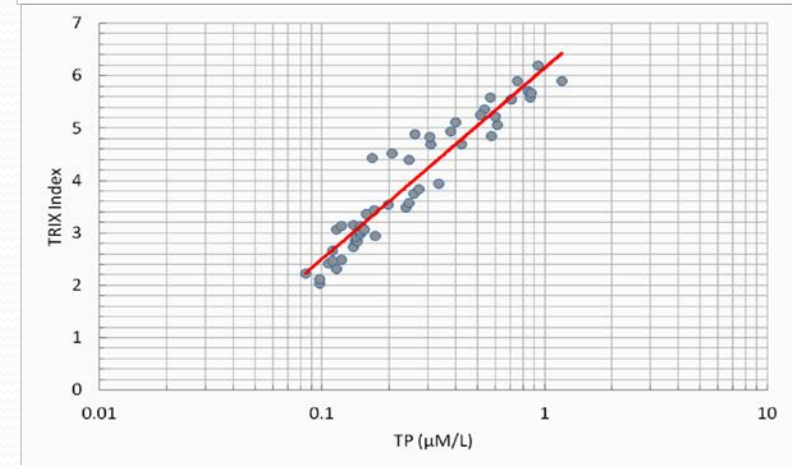
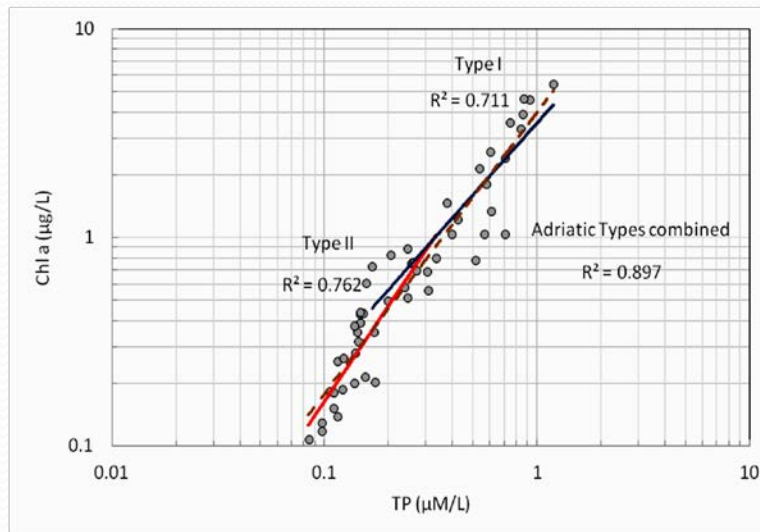
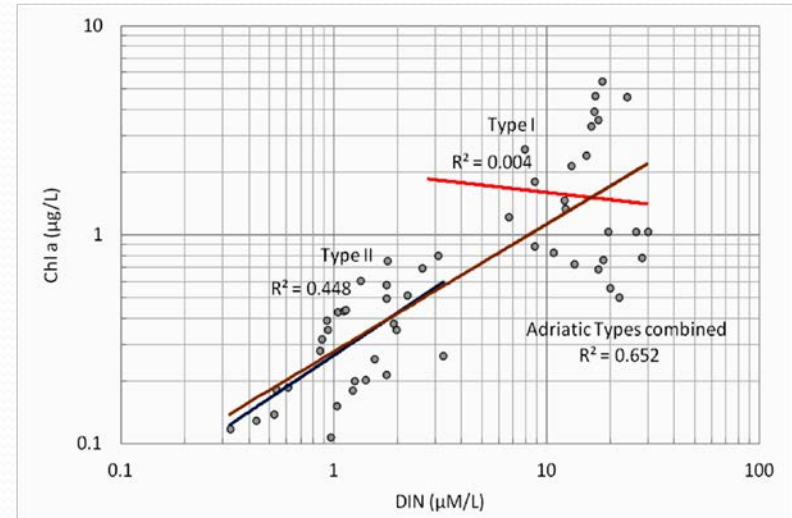
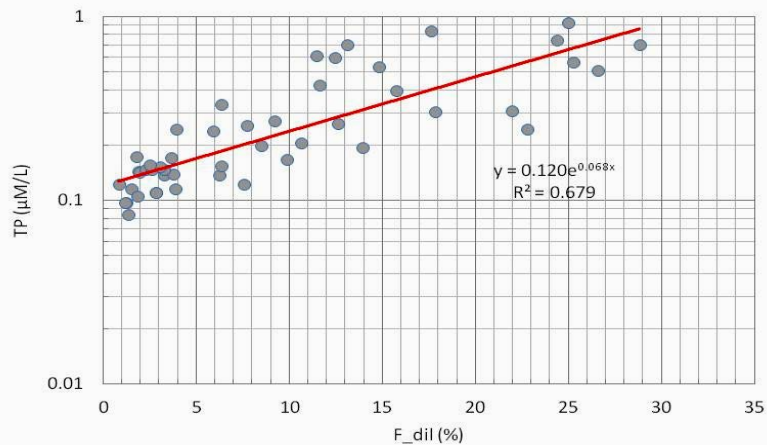
The three different water types, in an ecological perspective, can be described as follows:

- Type 1 coastal sites highly influenced by freshwater inputs
- Type 2 coastal sites not directly affected by freshwater inputs
- Type 3 coastal sites not affected by freshwater inputs

Type II A “Adriatic”



Type II A “Adriatic”



Trophic index (TRIX)

TRIX assigns a numerical value (a measure) to the trophic levels of coastal waters :

$$\text{TRIX} = (\text{Log}_{10} [\text{ChA} \cdot \text{aD\%O} \cdot \text{DIN} \cdot \text{TP}] - k) \cdot m$$

where:

ChA = Chlorophyll *a* concentration as $\mu\text{g/L}$;

aD%O = Oxygen as *absolute % deviation from saturation*;

DIN = Dissolved Inorganic Nitrogen, *N-(NO₃+NO₂+NH₄)* as $\mu\text{g/L}$;

TP = Total Phosphorus as $\mu\text{g/L}$.

$k = 1.5$

$m = 10/12 = 0.833$

The parameters k and m are scale coefficients necessary to fix the extension of the related Trophic Scale, i.e. from 0 to 10 TRIX units.

Vollenweider, R.A., Giovanardi F., Montanari, G. and A. Rinaldi (1998). *Characterization of the trophic conditions of marine coastal waters, with special reference to the NW Adriatic Sea: proposal for a trophic scale, turbidity and generalized water quality index*. Environmetrics, 9, 329-357

Eutrophication degree (status) classification scheme (Yamada et al., 1980, Chiaudani et al., 1982, UNEP, 1994). TRIX were taken from the Italian legislation (D. LGS. 152/99).

Eutroph. status Eutroph. degree Color	z_{sd}/m	$\gamma(O_2/O_2')$	$c(TIN)$ mmol m ⁻³	$c(TP)$ mmol m ⁻³	$c(Chla)$ mg m ⁻³	TRIX	Description
High Oligotrophic Blue	>10	0,8-1,2	<2	<0,3	<1	2-4	<ul style="list-style-type: none"> - low trophic level - good water transparency - absence of anomalous colours of water - absence of subsaturation of dissolved oxygen
Good Mezotrophic Green	3-10	s.- 1,2-1,7 b.- 0,3-0,8	2-10	0,3-0,6	1-5	4-5	<ul style="list-style-type: none"> - average trophic level - occasional clouding of water - occasional anomalous colours of water - occasional hypoxia
Moderate Eutrophic Yellow	<3	s.- >1,7 b.- 0,3-0,8	10-20	0,6-1,3	5-10	5-6	<ul style="list-style-type: none"> - average trophic level - occasional clouding of water - occasional anomalous colours of water - hypoxia and occasional anoxia - problems in benthic communities
Poor Ekstremely eutro. Orange	<3	s.- >1,7 b.- 0,0-0,3	>20	>1,3	>10	6-8	<ul style="list-style-type: none"> - high trophic level - high turbidity of water - persistent colouring of water - persistent hypoxia and anoxia - dying of benthic organisms - alteration of benthic communities

z_{sd} - transparency, γ – oxygen saturation rate, c - concentration, TIN – Total Inorganic nitrogen, TP – Total phosphorous, Chla – Chlorophyll a, TRIX– Trophic index, s.- surface and b.- bottom layer

Type II A “Adriatic”

Boundaries	TRIX	Chl-a annual G_Mean	Chl-a 90th percentile	TP annual G_Mean	EQRs	EQRs
		(µg/L)	(µg/L)	(µmol/L)	actual	normalized
Ref. Values	-	0.33	0.87	-	1	1
H/G	4	0.64	1.7	0.26	0.52	0.82
G/M	5	1.5	4	0.48	0.22	0.61
M/P	6	3.5	9.3	0.91	0.09	0.40
P/B	7	8.2	21.7	1.71	0.04	0.19

Thanks for your attention!

