

**Régularisation des données CTD du point B
de Villefranche/mer de 1995-2011:
Années standards et anomalies**

**Atelier SOMLIT - Analyses de séries long terme, Talence, juin 2012,
J-Ph Labat**

Années standards et anomalies

But initial de ce traitement numérique :

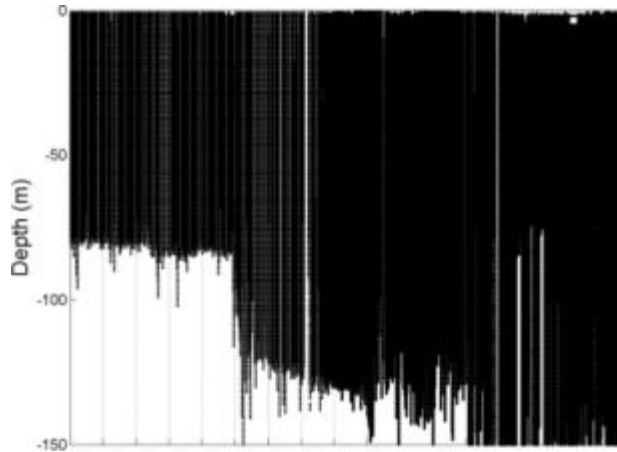
Pour répondre à des questions que des études ponctuelles posent sur les « particularités » hydrologique d'une année au point B, il était nécessaire de définir ce qu'est une année standard et de là les particularités des années, leurs anomalies par rapport au « standard ».



Cohu, S. et al, 2011. Development of the toxic dinoflagellate *Ostreopsis cf. ovata* in relation with environmental factors *Marine Pollution Bulletin*, 62(12).

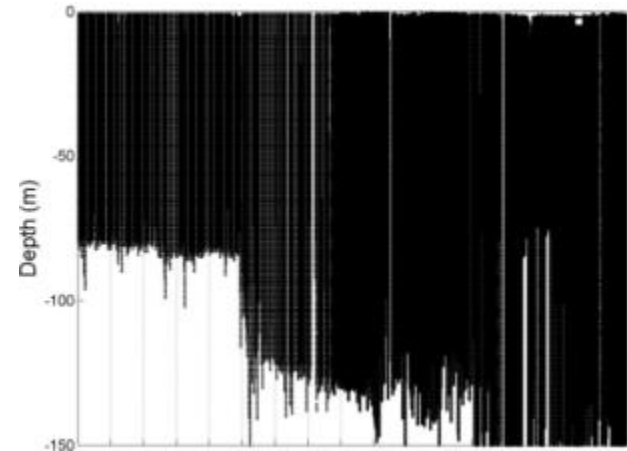
Occurrences des données

Température



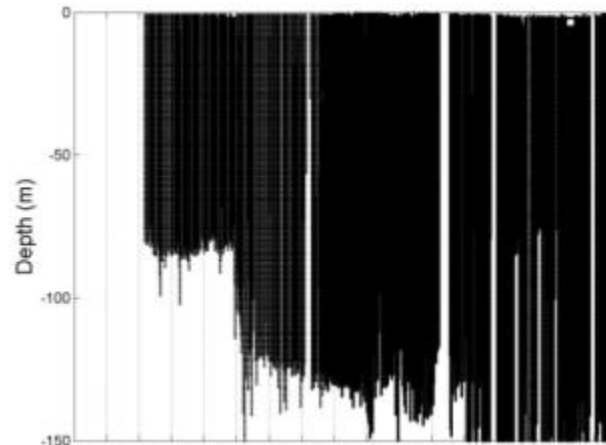
1995 → 2011

Salinité



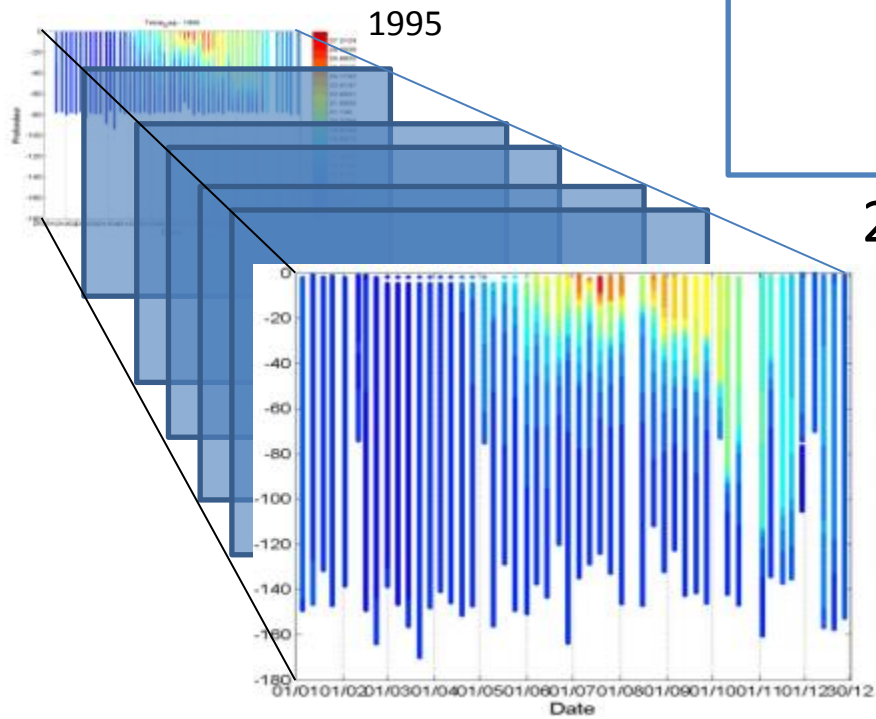
1995 → 2011

Fluorescence



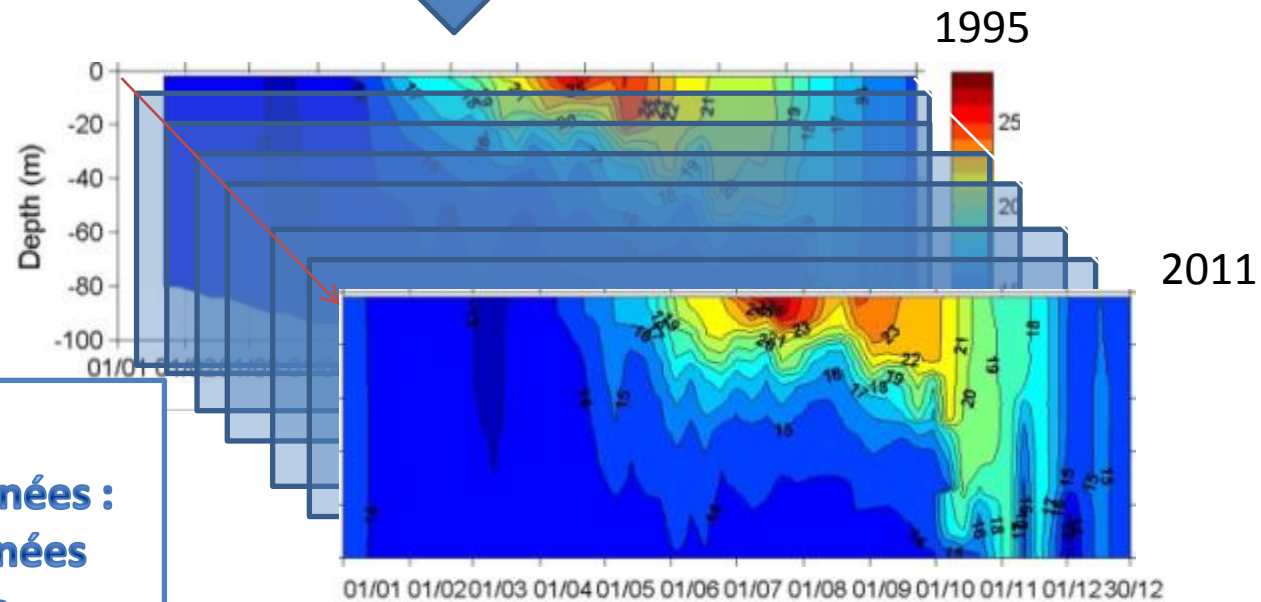
1995 → 2011

**DONNÉES « NON RÉGULIÈRES »
PROFONDEURS/LIGNES, JOURS/COLONNES,
ANNÉES/COUCHES**



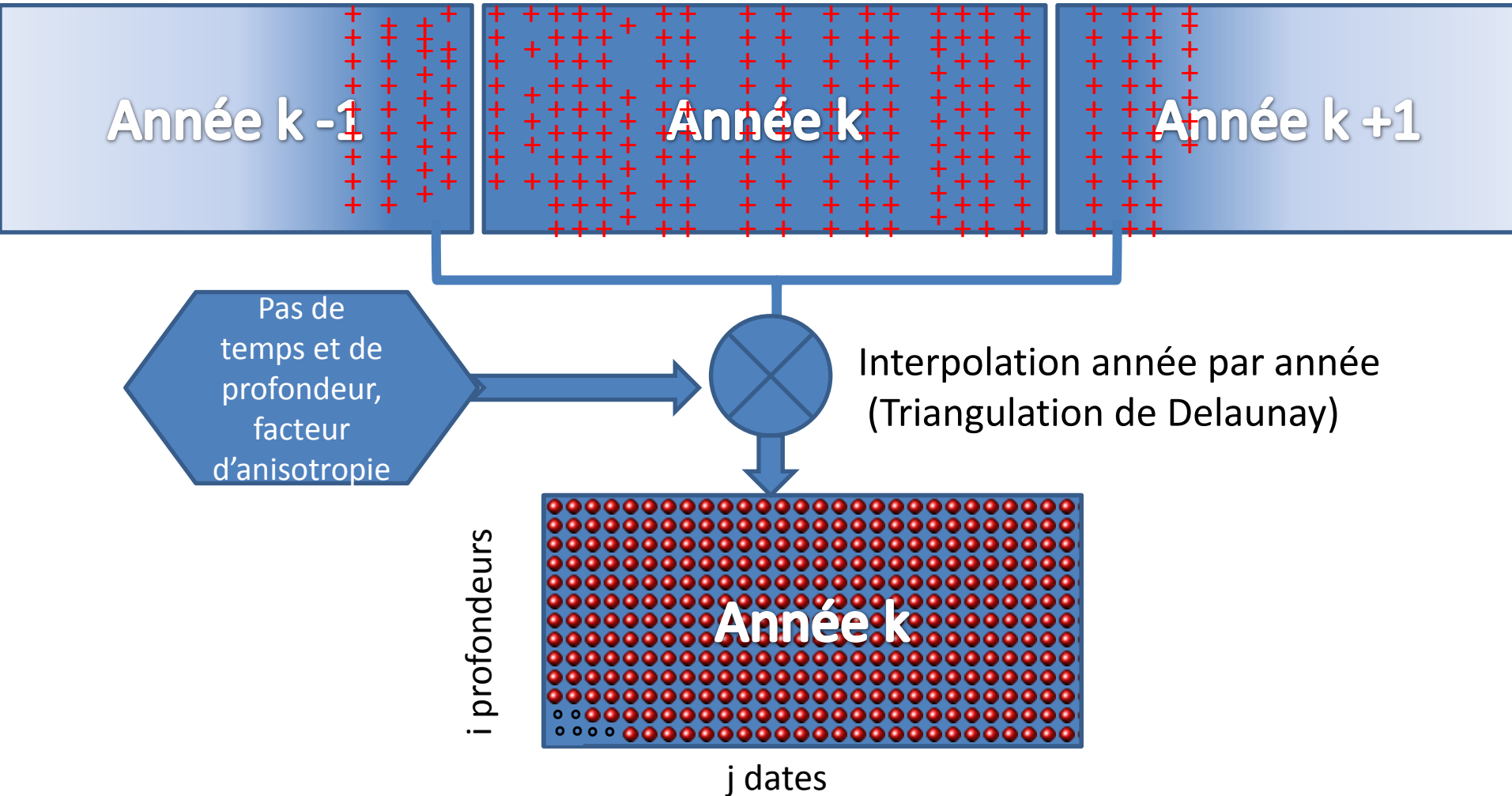
2011

Interpolation année par année



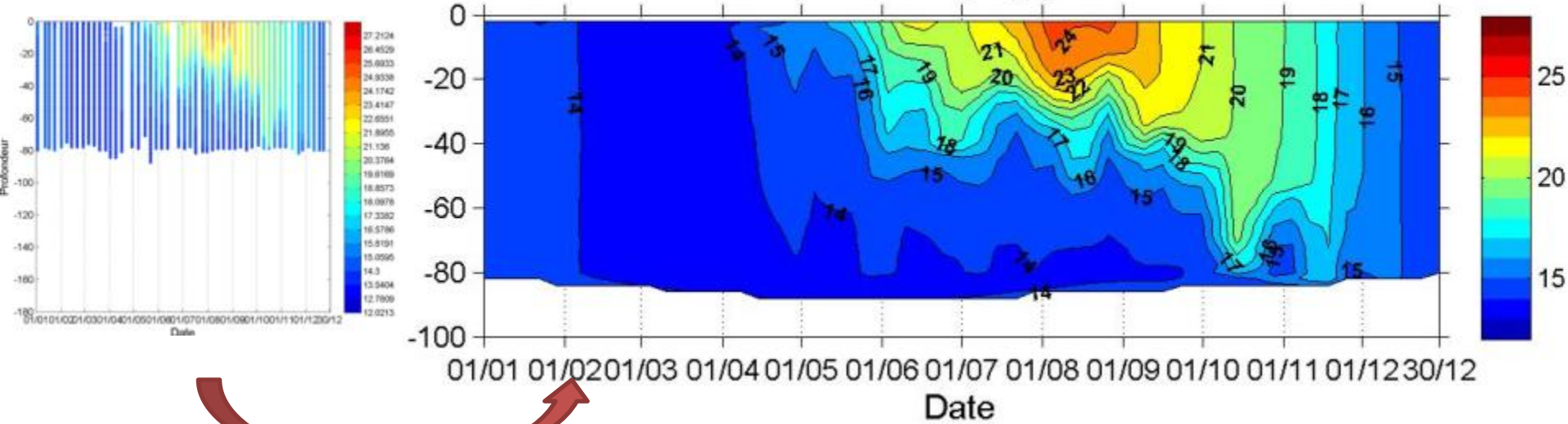
**But : grilles régulières,
identiques pour toutes les années :
Y profondeurs, X jours, Z années
Pas en Y et X adaptables**

A partir de données « non régulières »



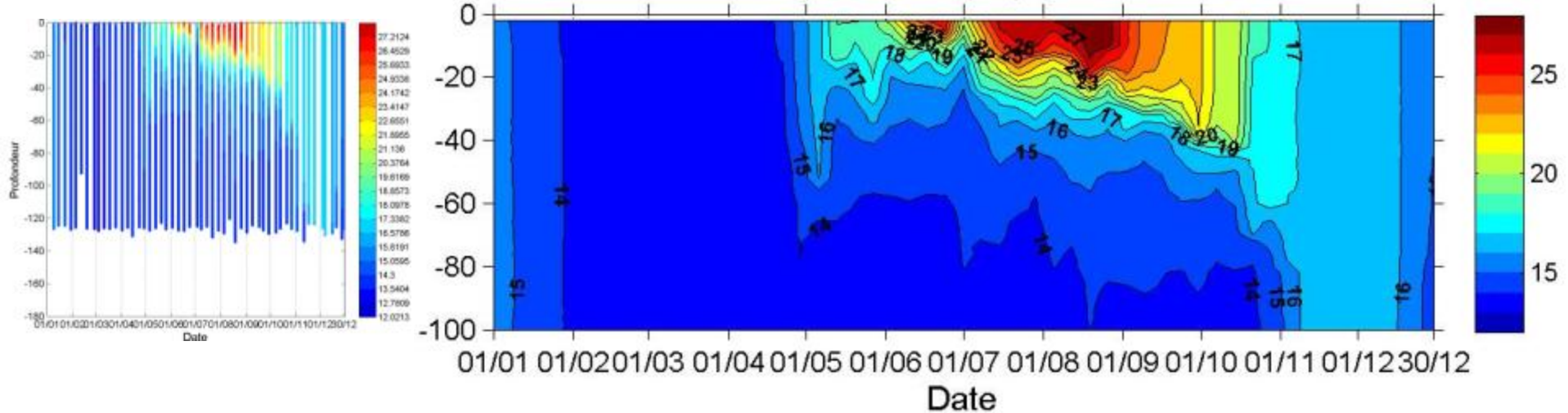
Interpolation d'une grille régulière pour une année

Temperatures (°C), year 1996

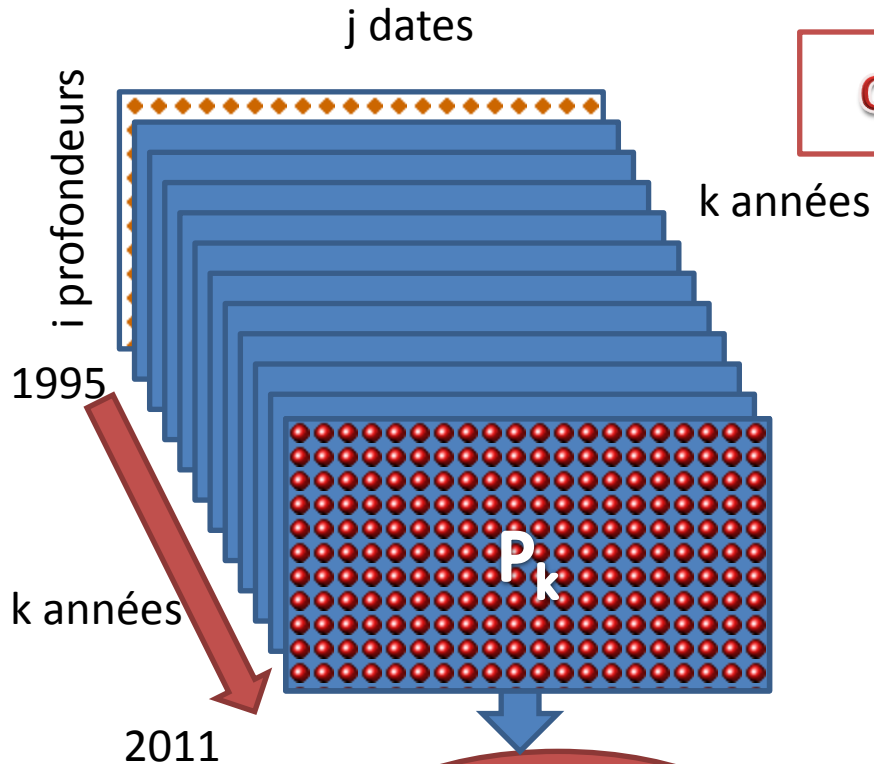


Interpolation d'une grille régulière pour une année

Temperatures (°C), year 2003



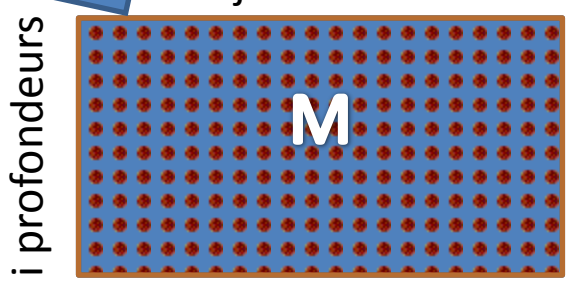
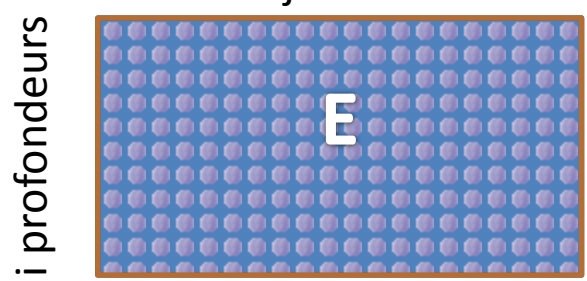
Opérations sur le cube de données



Opération sur les i, j vecteurs

écart-type

médiane

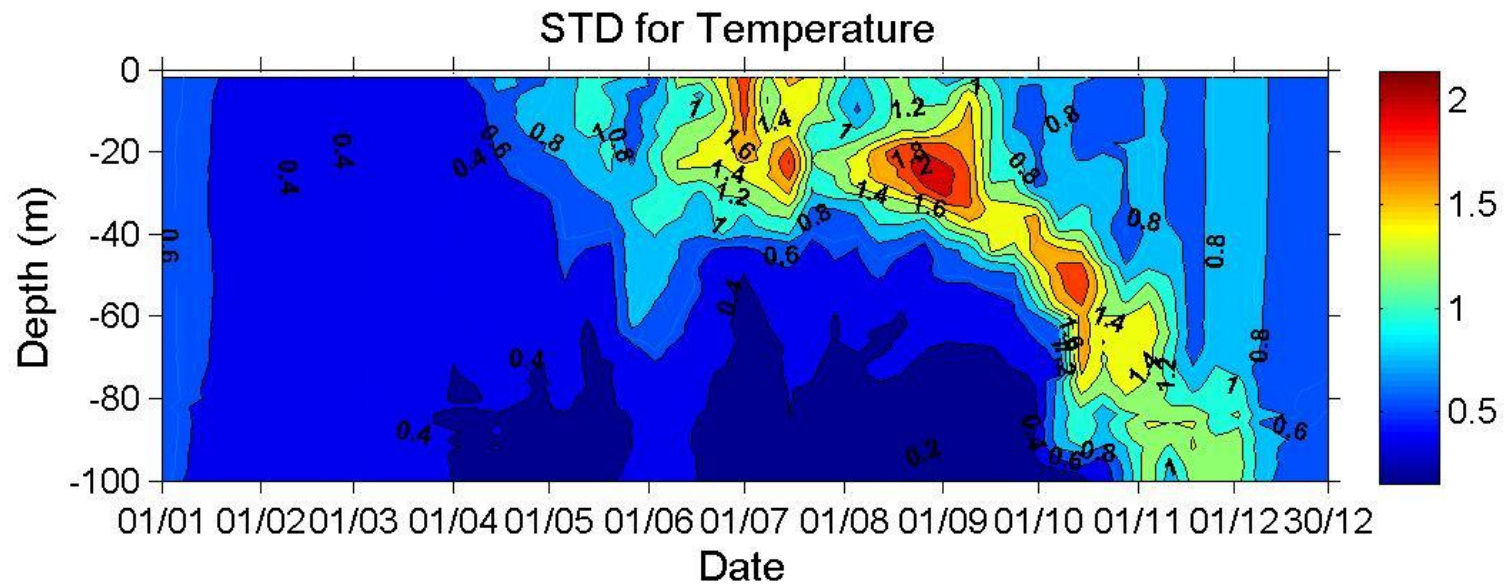
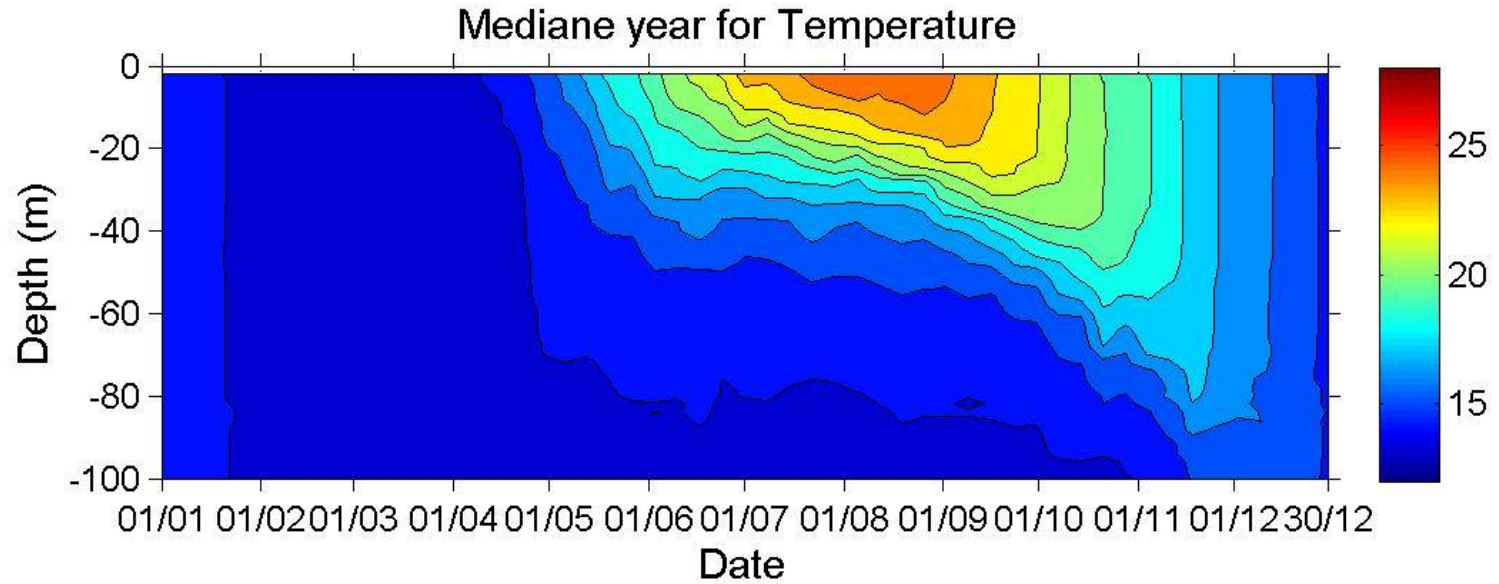


Année standard (i, j), $M = \text{médiane } P_{i,j,1:K}$
Variabilité (i, j), $E = \text{écart-type } P_{i,j,1:K}$

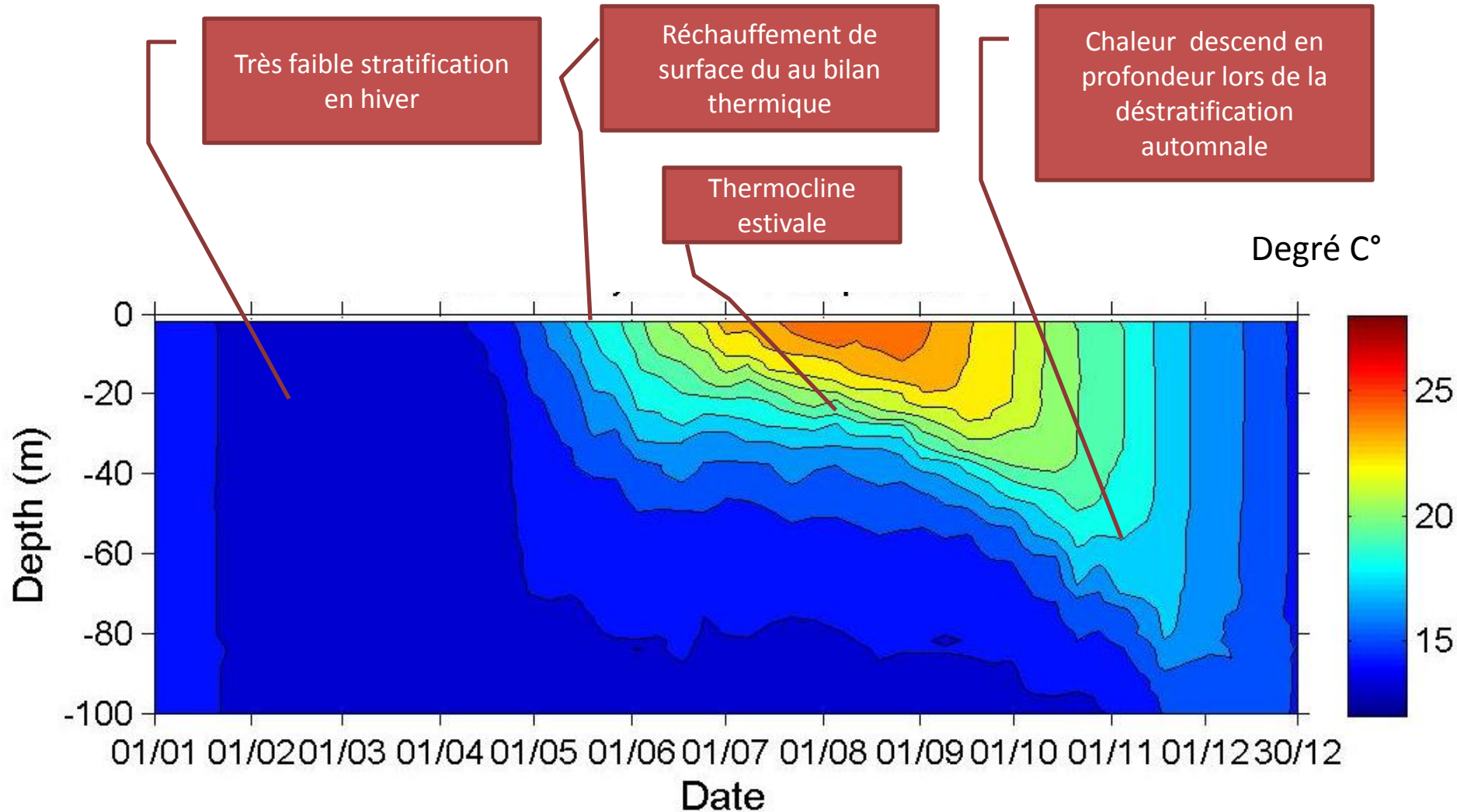
écart-type

médiane

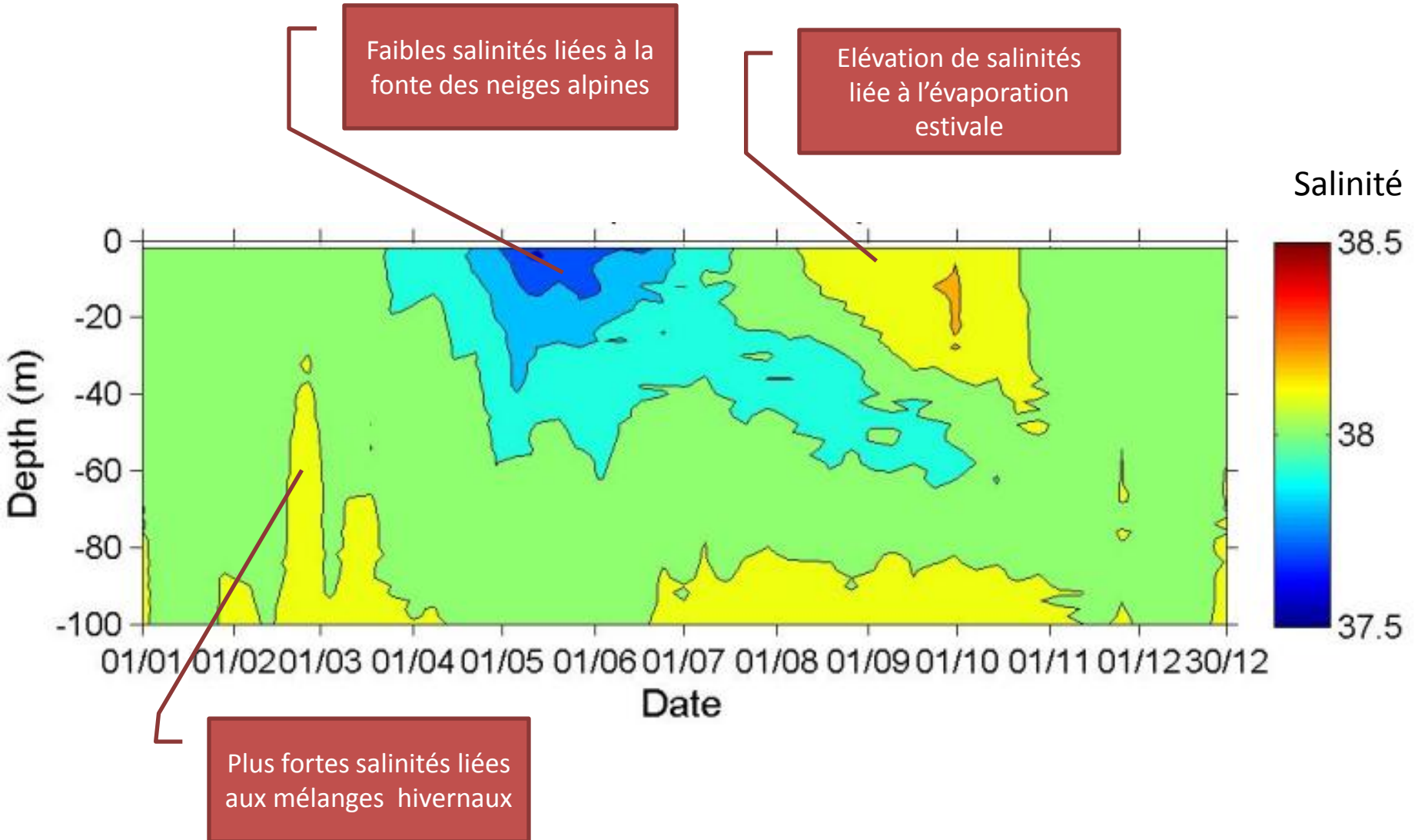
Exemple sur les températures de 1995-2011



Interprétation de l'année médiane de la température



Année médiane de la salinité

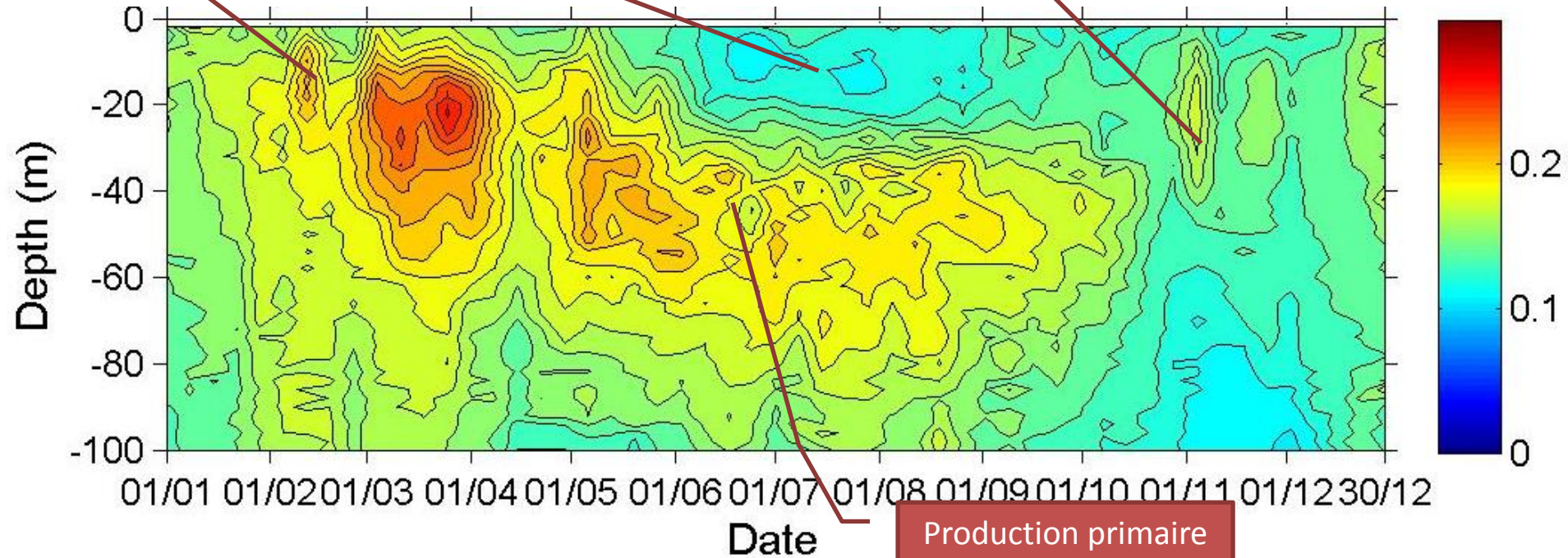


Année médiane de la fluorescence

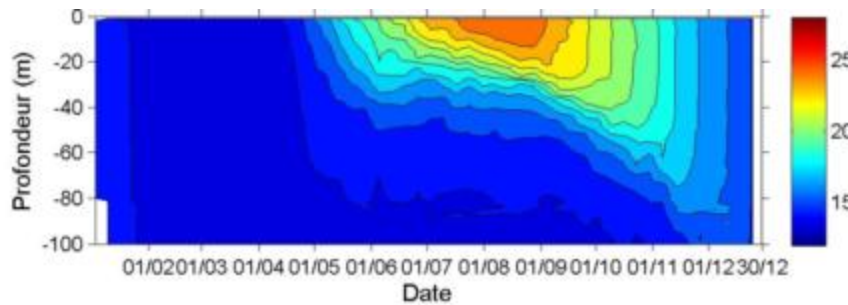
Bloom printanier

Oligotrophie de surface estivale

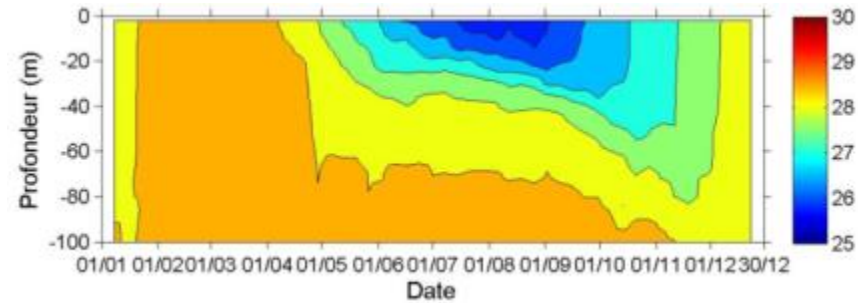
Bloom automnale du à la dé-stratification

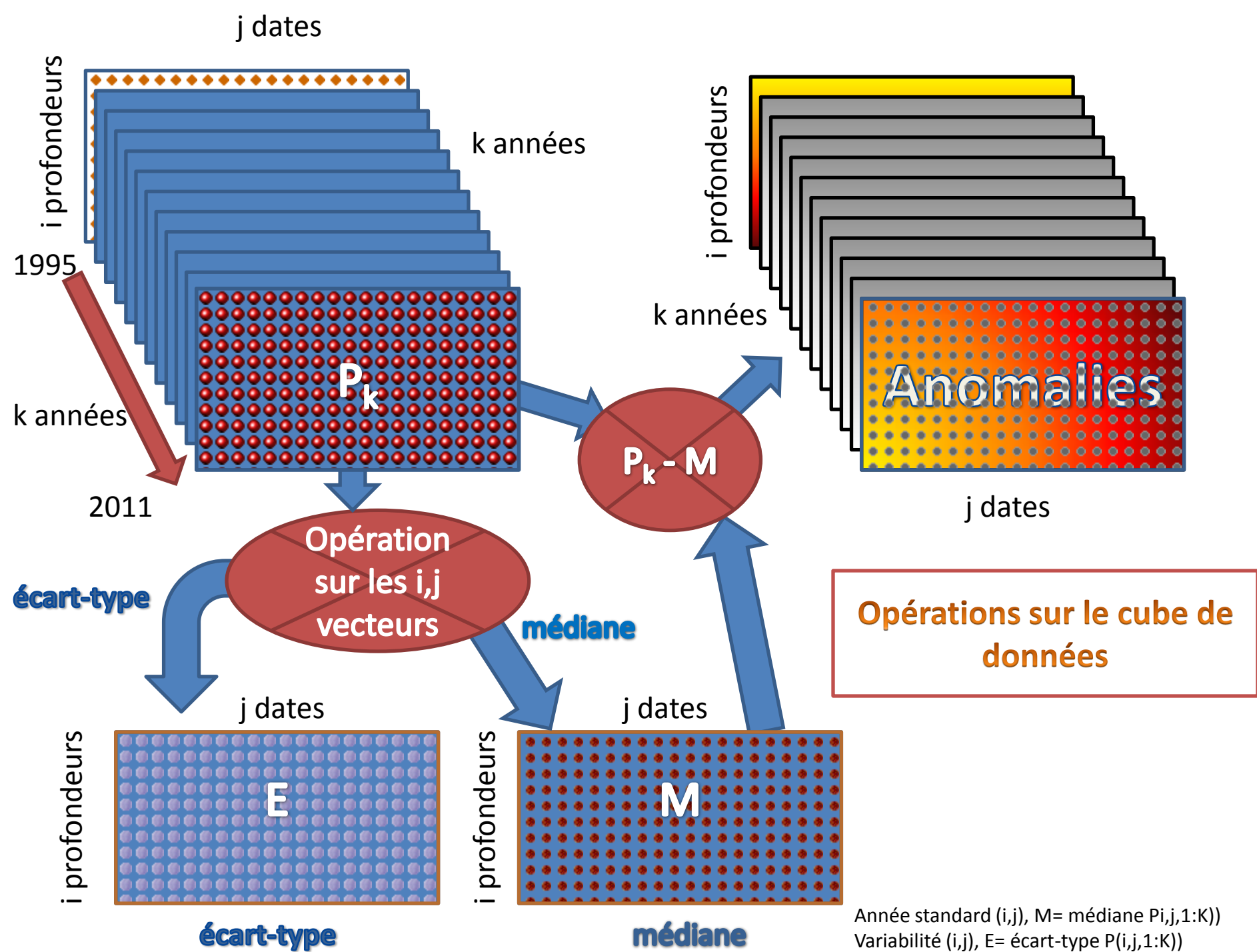


Température

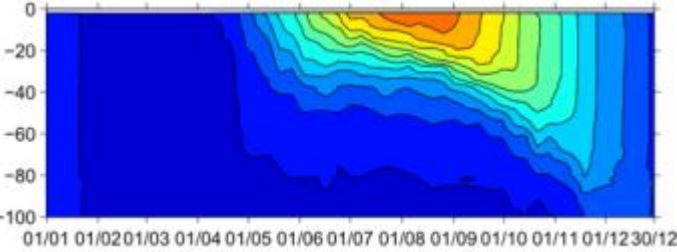


Densité

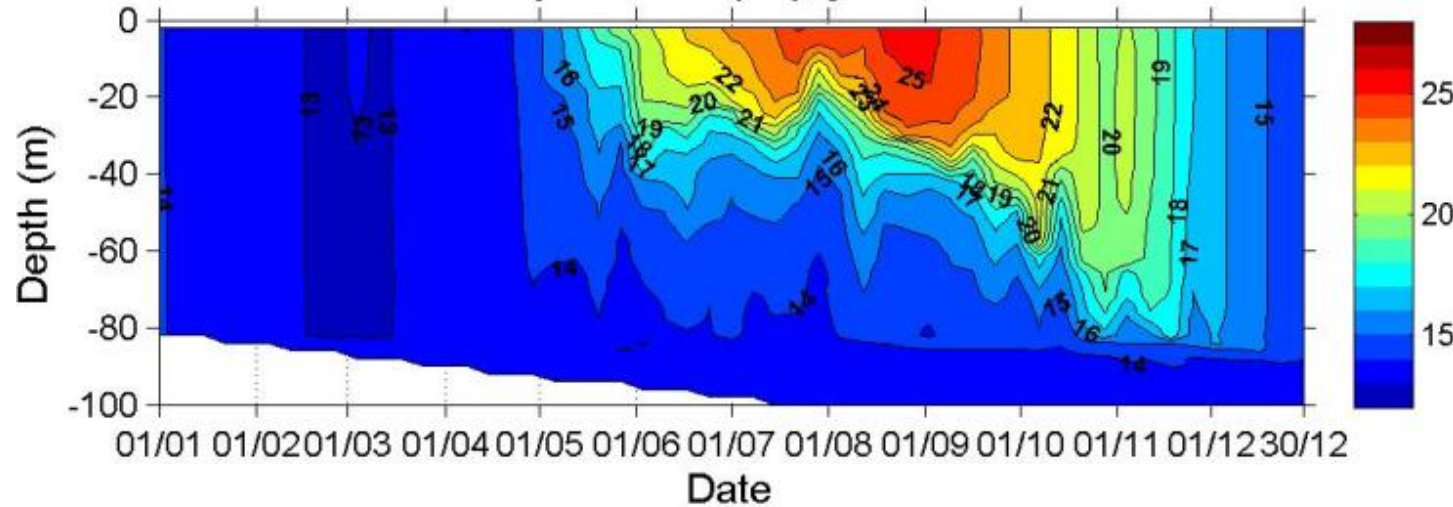




Immediate and delayed effects of a mass mortality event on gorgonian population dynamics and benthic community structure in the NW Mediterranean Sea.
Linares C. et al , 2005

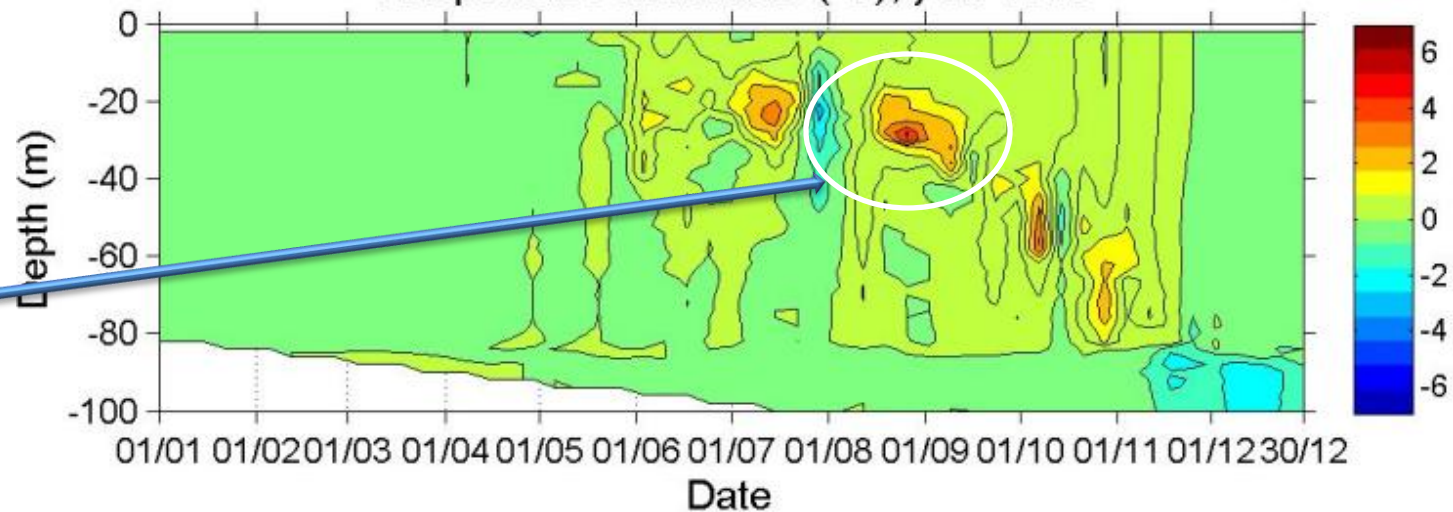


Temperatures (°C), year 1999



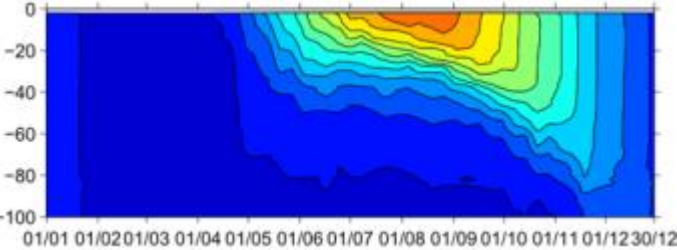
1999

Temperature anomalies (°C), year 1999

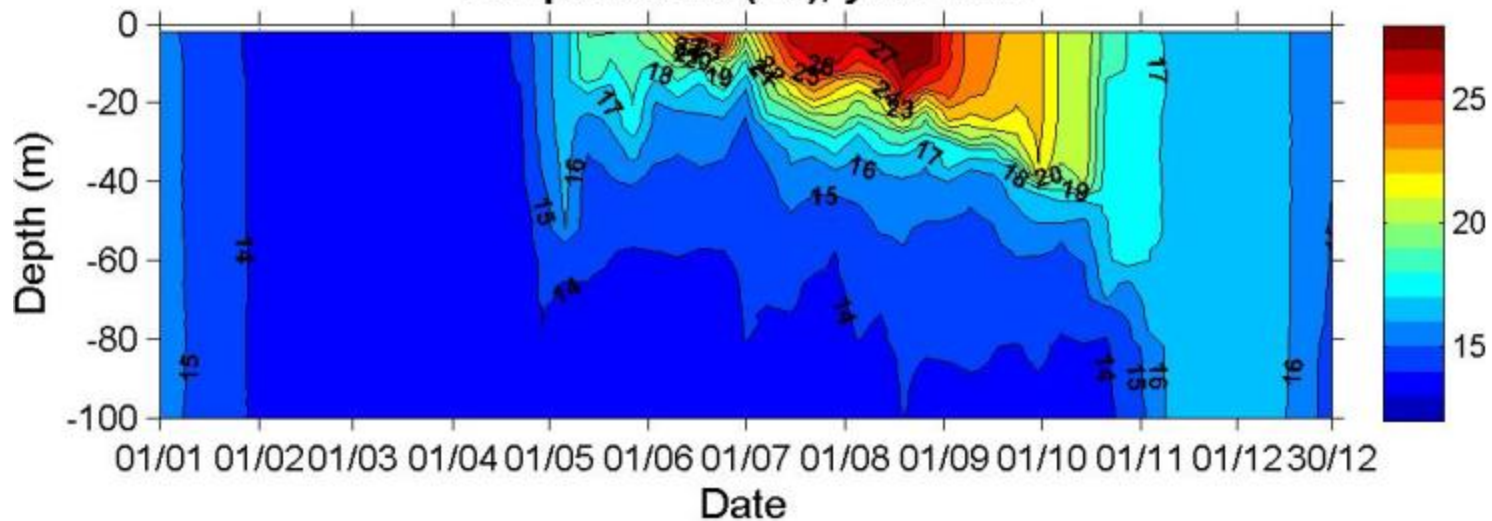


Anomalie

**Efflorescence de Posidonies en 2003 dans
la rade de Villefranche/mer**

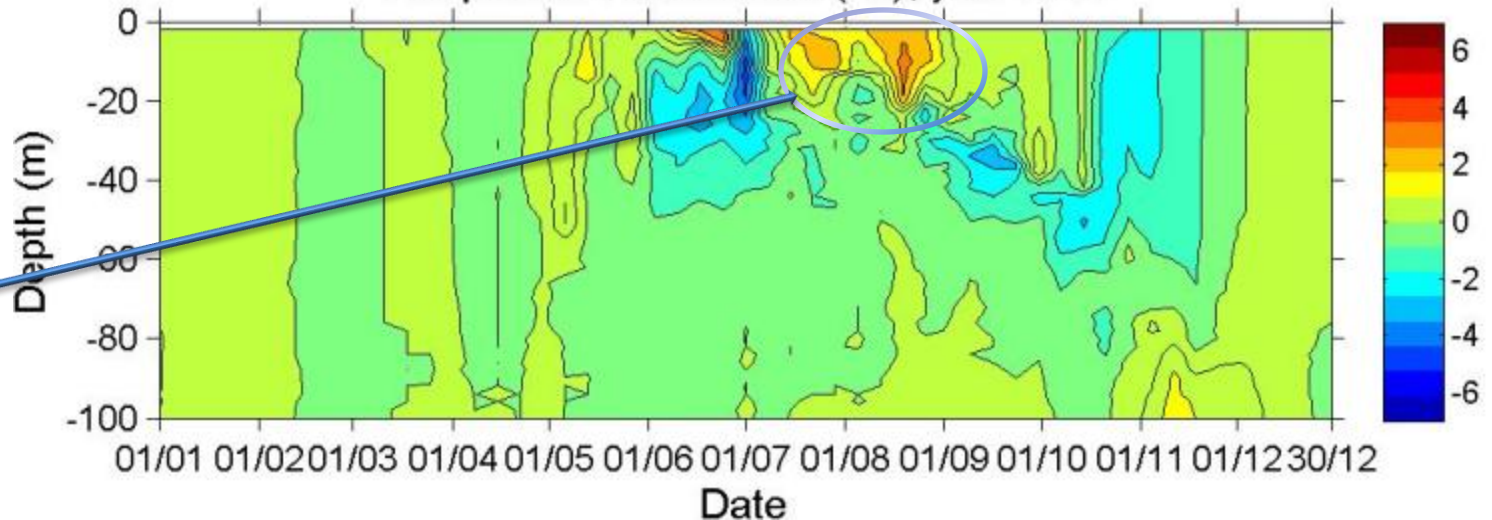


Temperatures (°C), year 2003



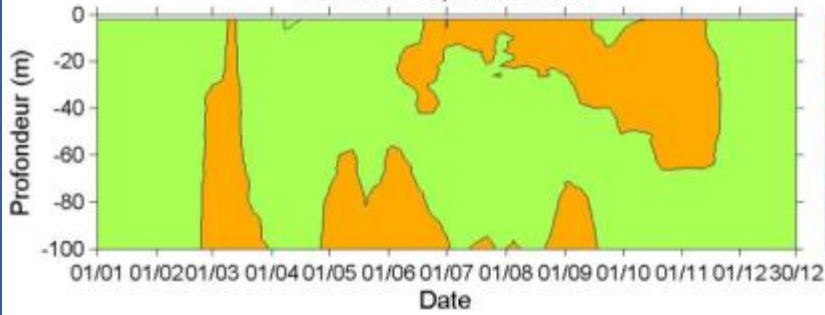
2003

Temperature anomalies (°C), year 2003

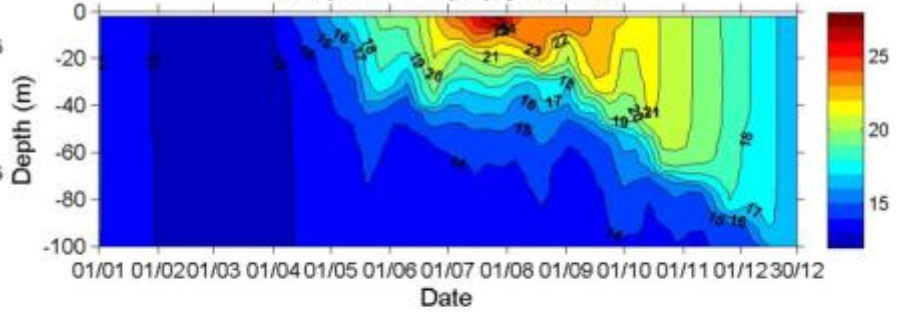


Anomalie

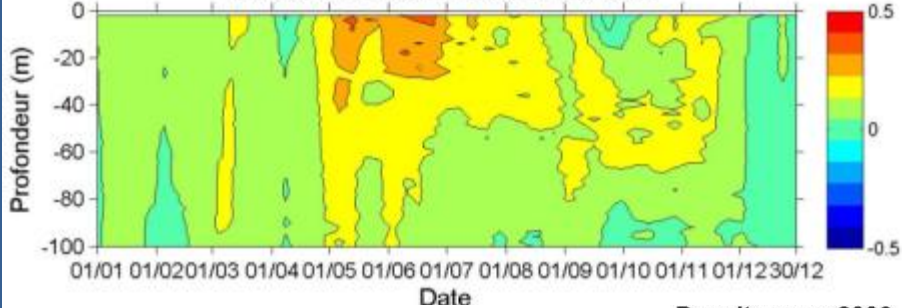
Salinité PSU, année 2006



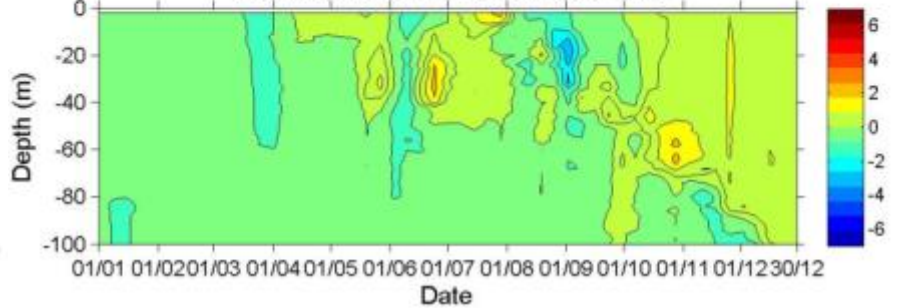
Temperatures (°C), year 2006



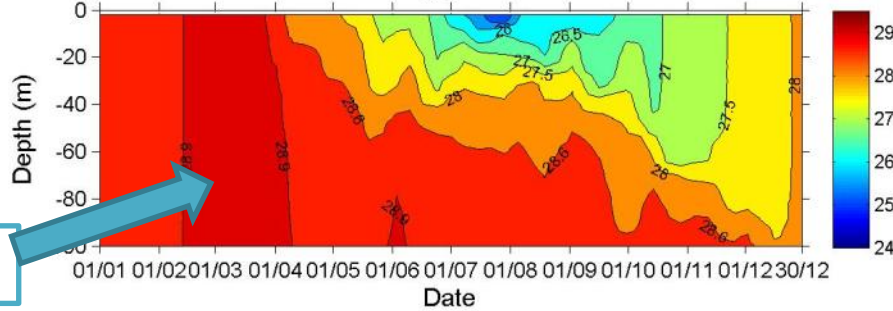
Anomalies des Salinités, année 2006



Temperature anomalies (°C), year 2006

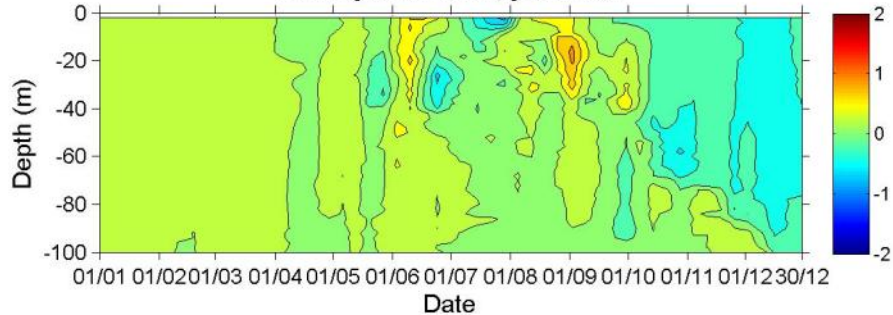


Density, year 2006



Sigma-T >28.9

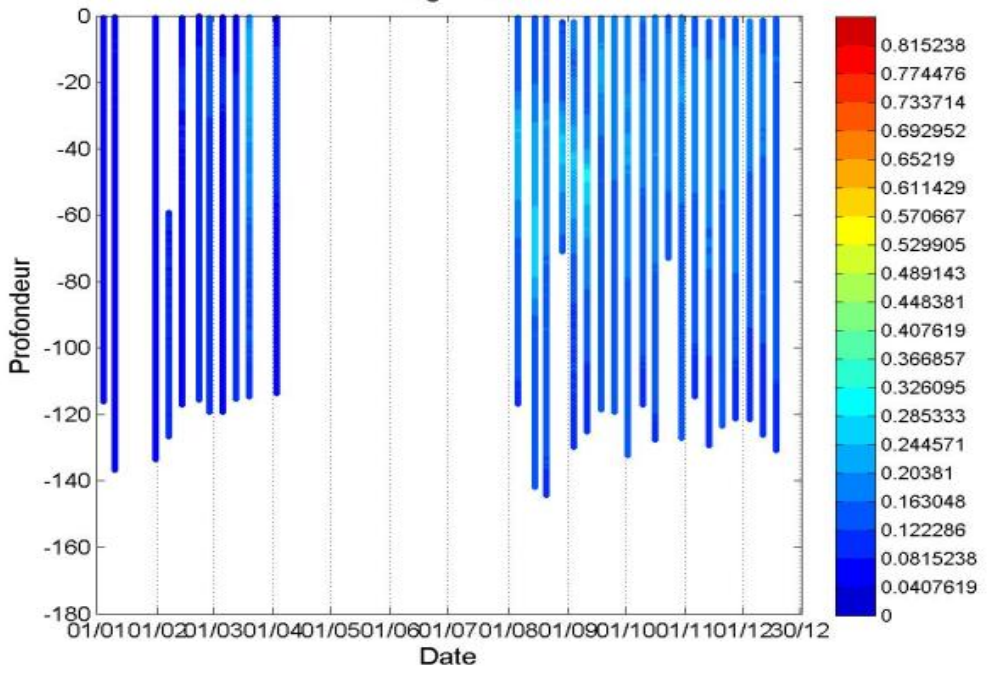
Density anomalies, year 2006



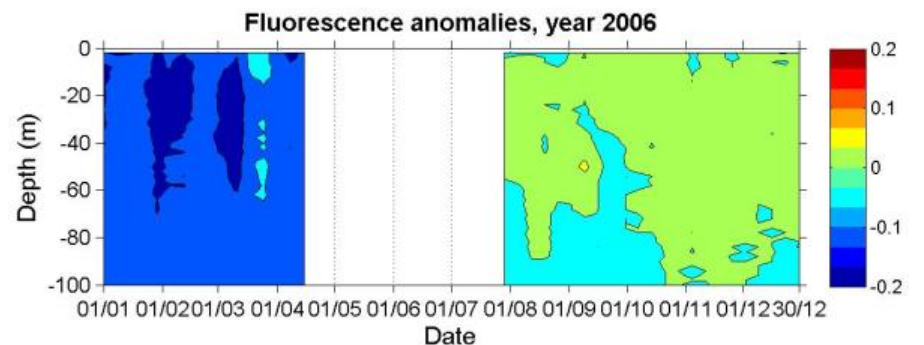
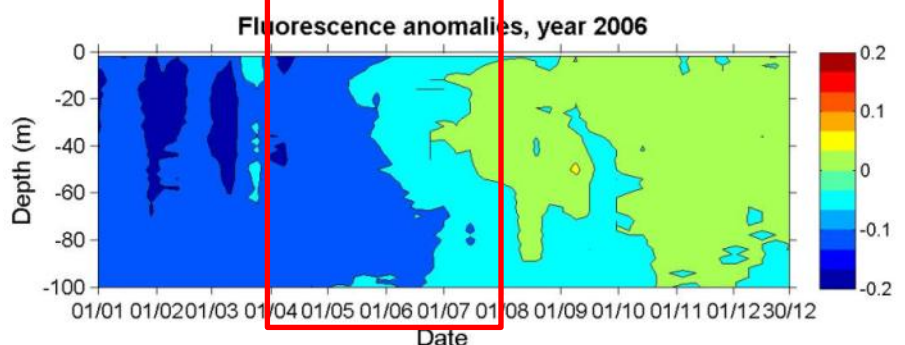
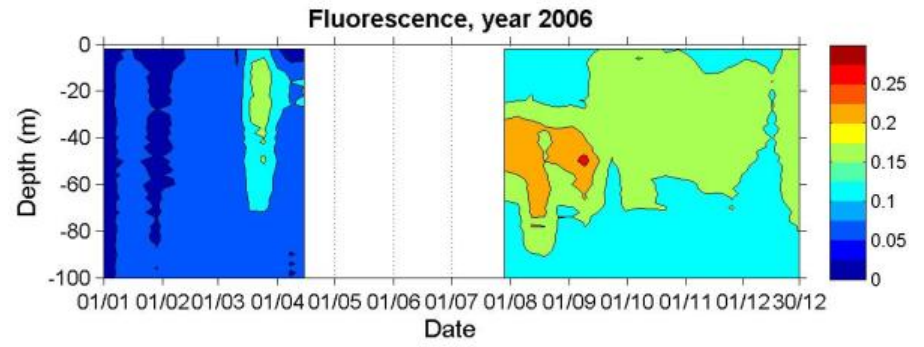
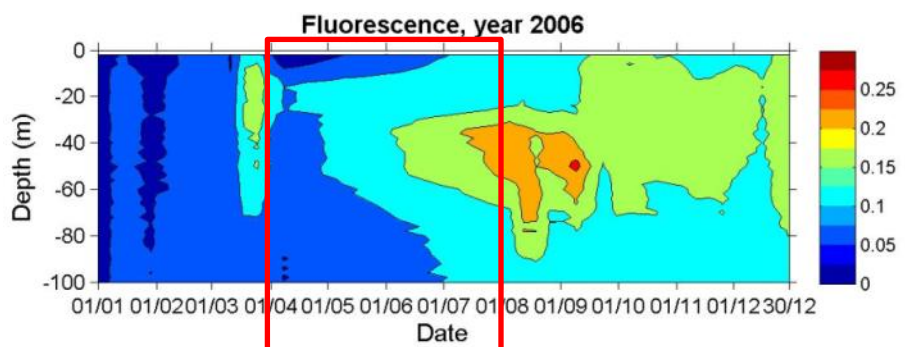
“The deep convection that occurs in the western basin of the Mediterranean Sea was investigated using ARGO float data over two consecutive winters in 2004–2005 and 2005–2006. » Smith and Bryden_2007

Quelques limites méthodologiques

Fluor_uF - 2006



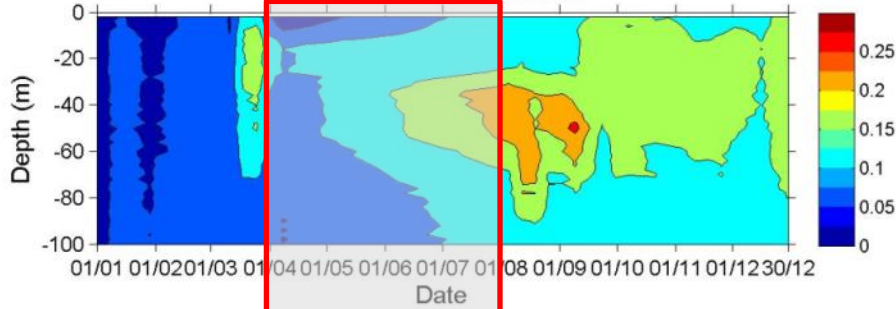
Interpolation
et
traitement des « trous »



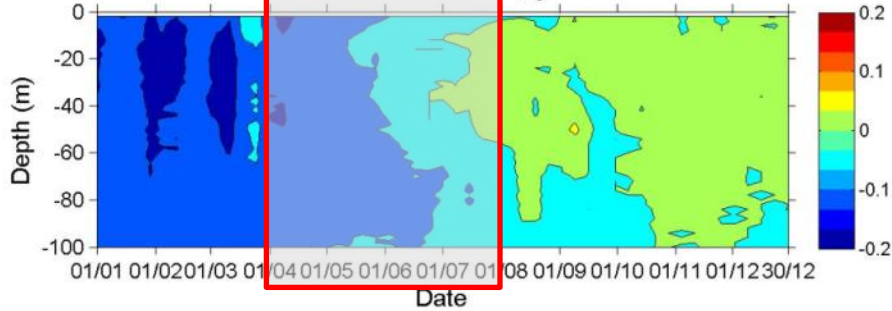
Comparaison fluorescence/chlorophylle en 2006

Interpolation de fluorescence

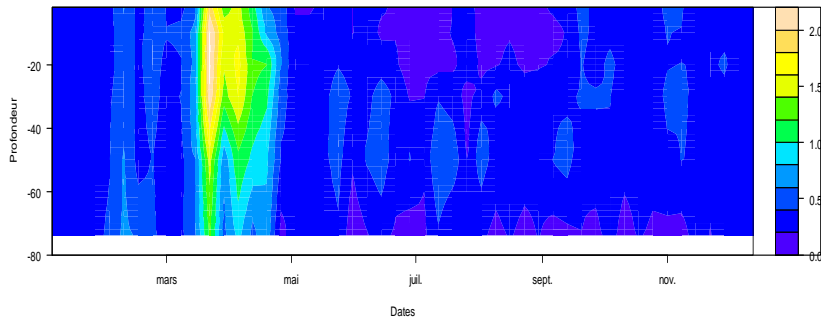
Fluorescence, year 2006



Fluorescence anomalies, year 2006

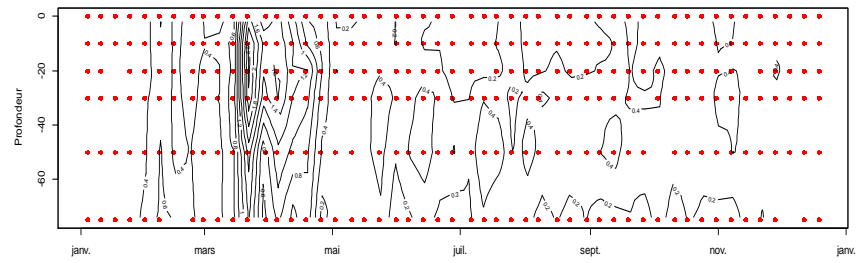


Année 2006, Chla

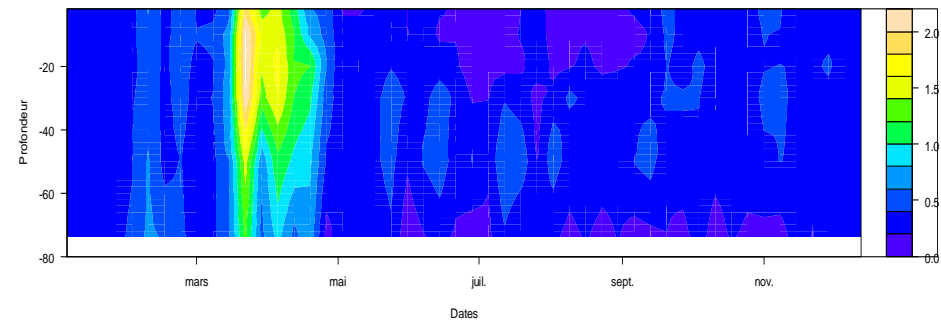


Interpolation de chlorophylle

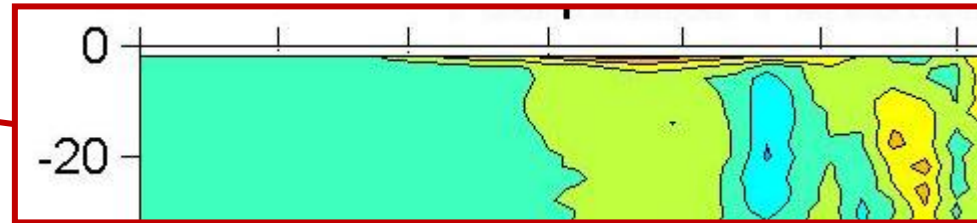
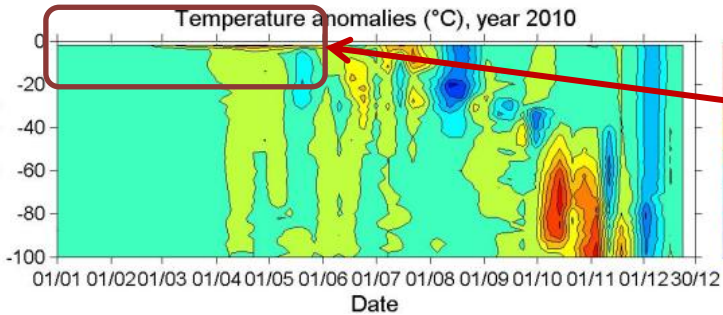
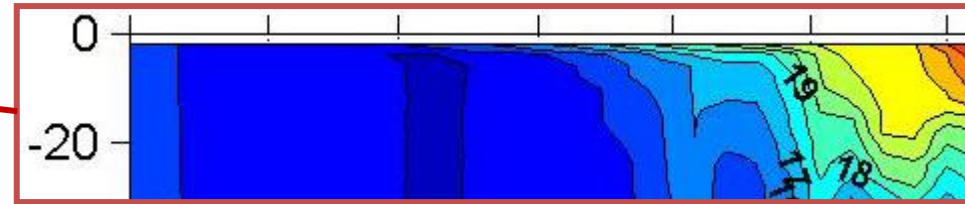
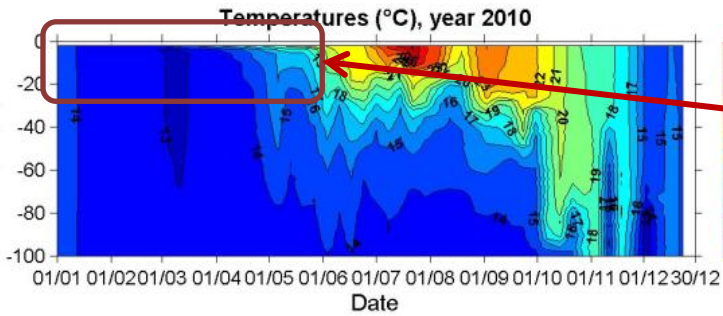
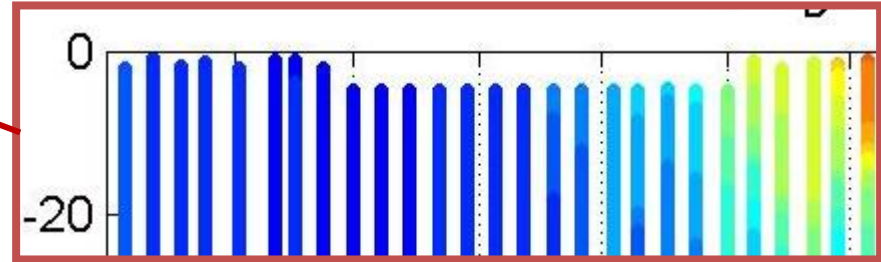
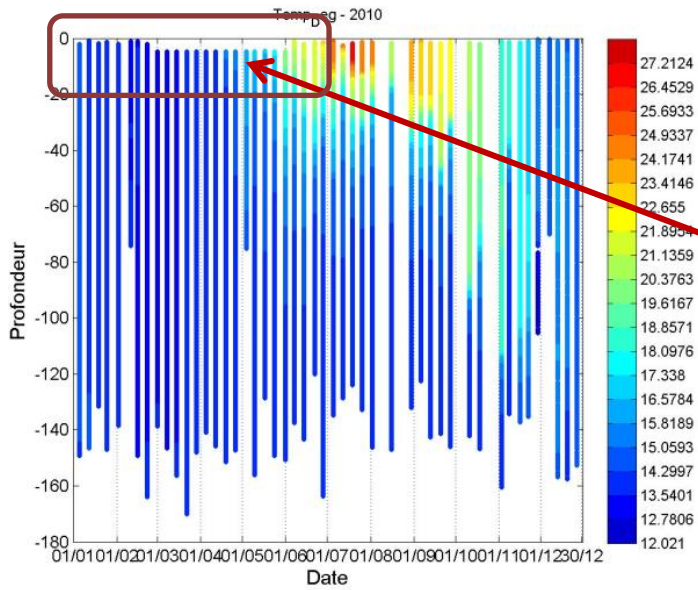
Année 2006, Chla



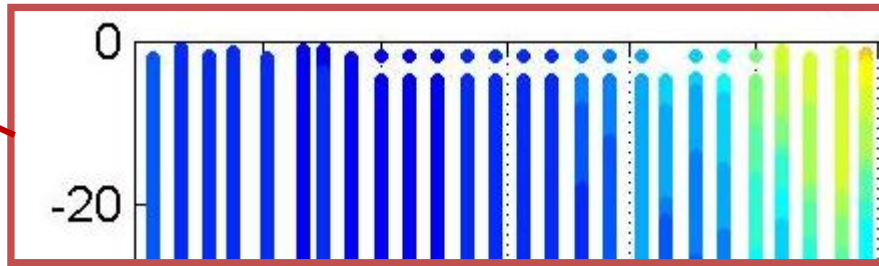
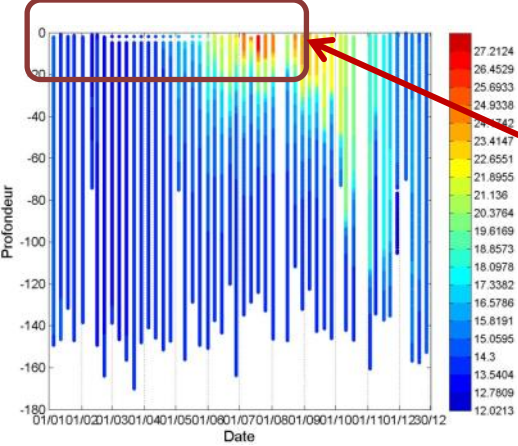
Année 2006, Chla



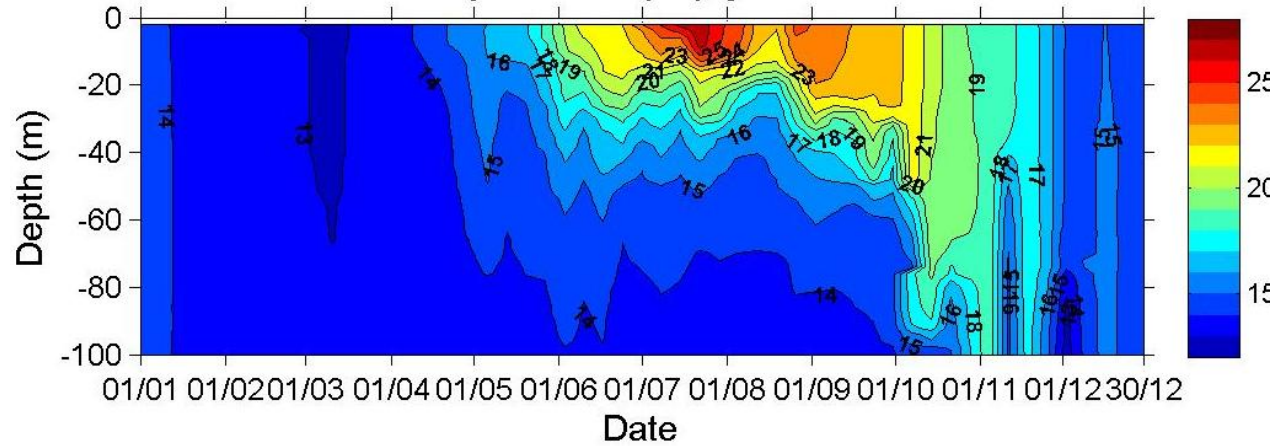
Effets de la méthode Triangulation 1



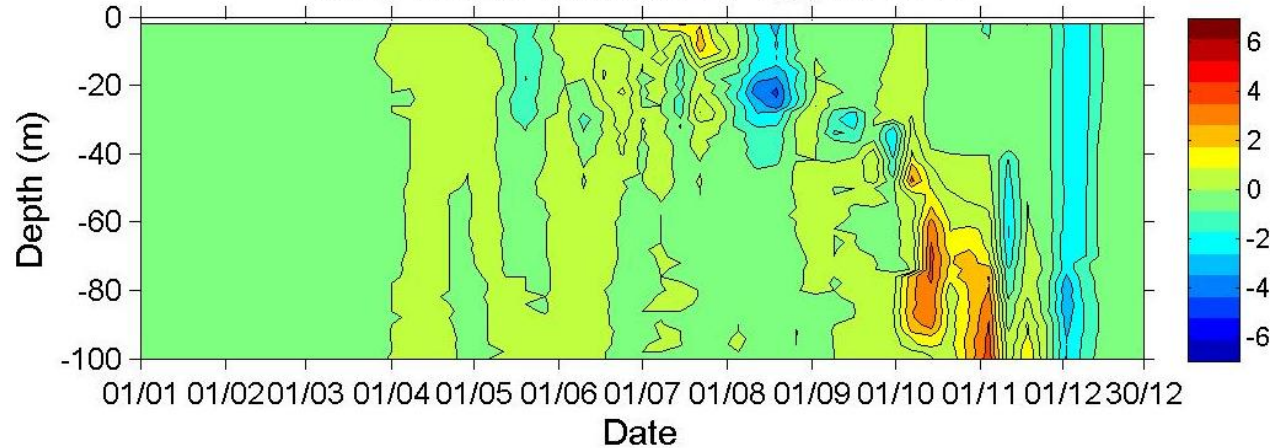
Effets de la méthode Triangulation 2



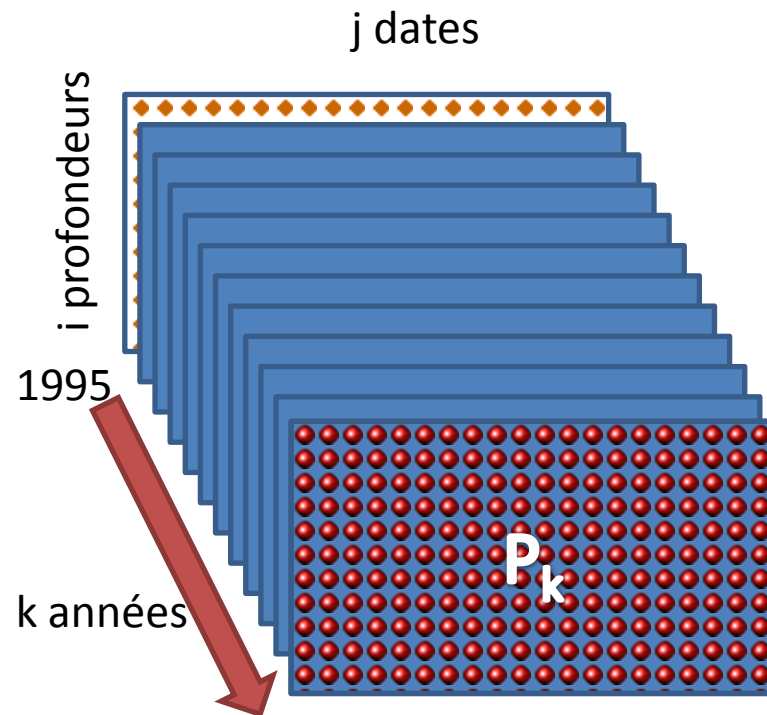
Temperatures (°C), year 2010



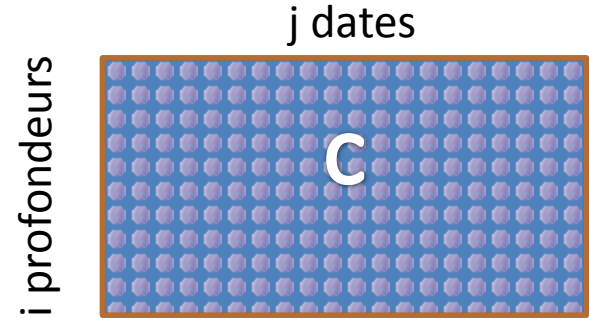
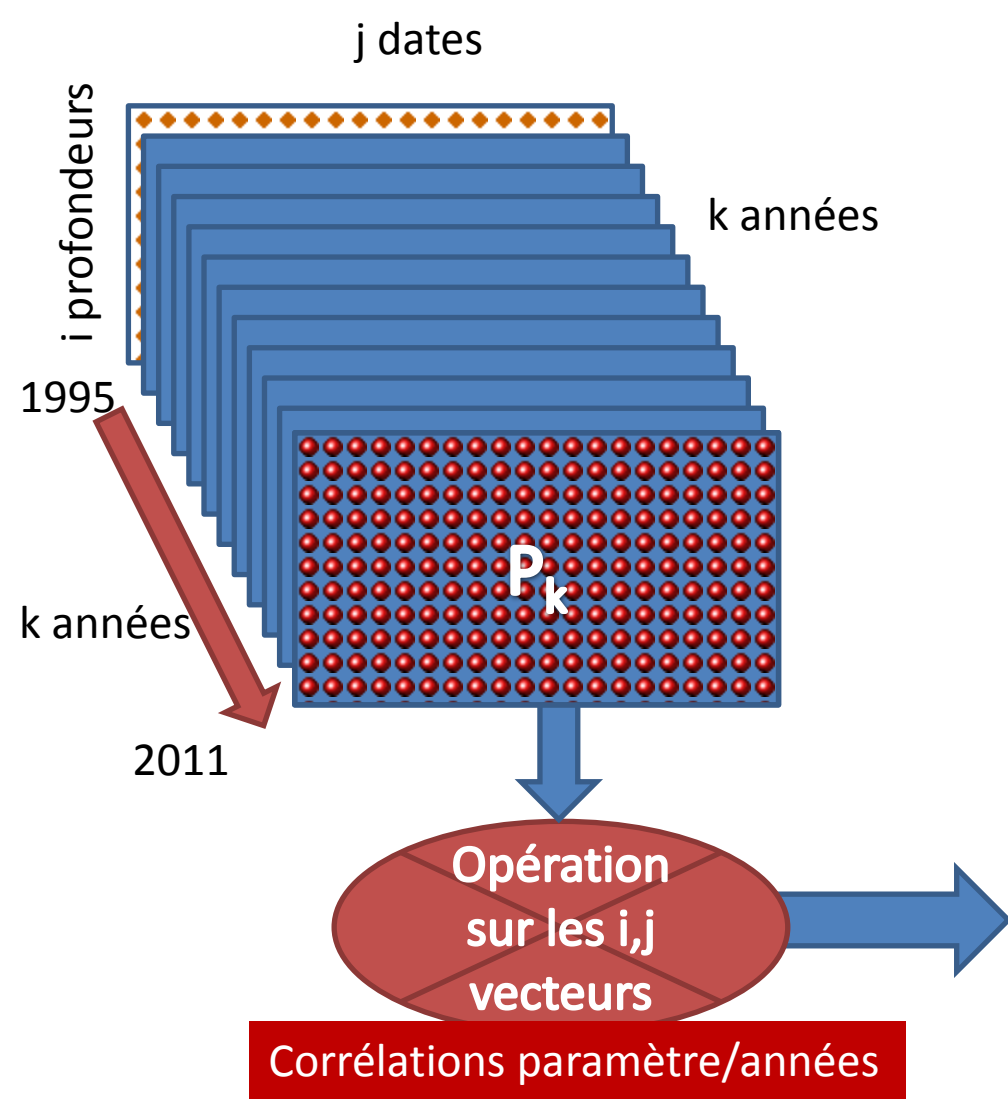
Temperature anomalies (°C), year 2010



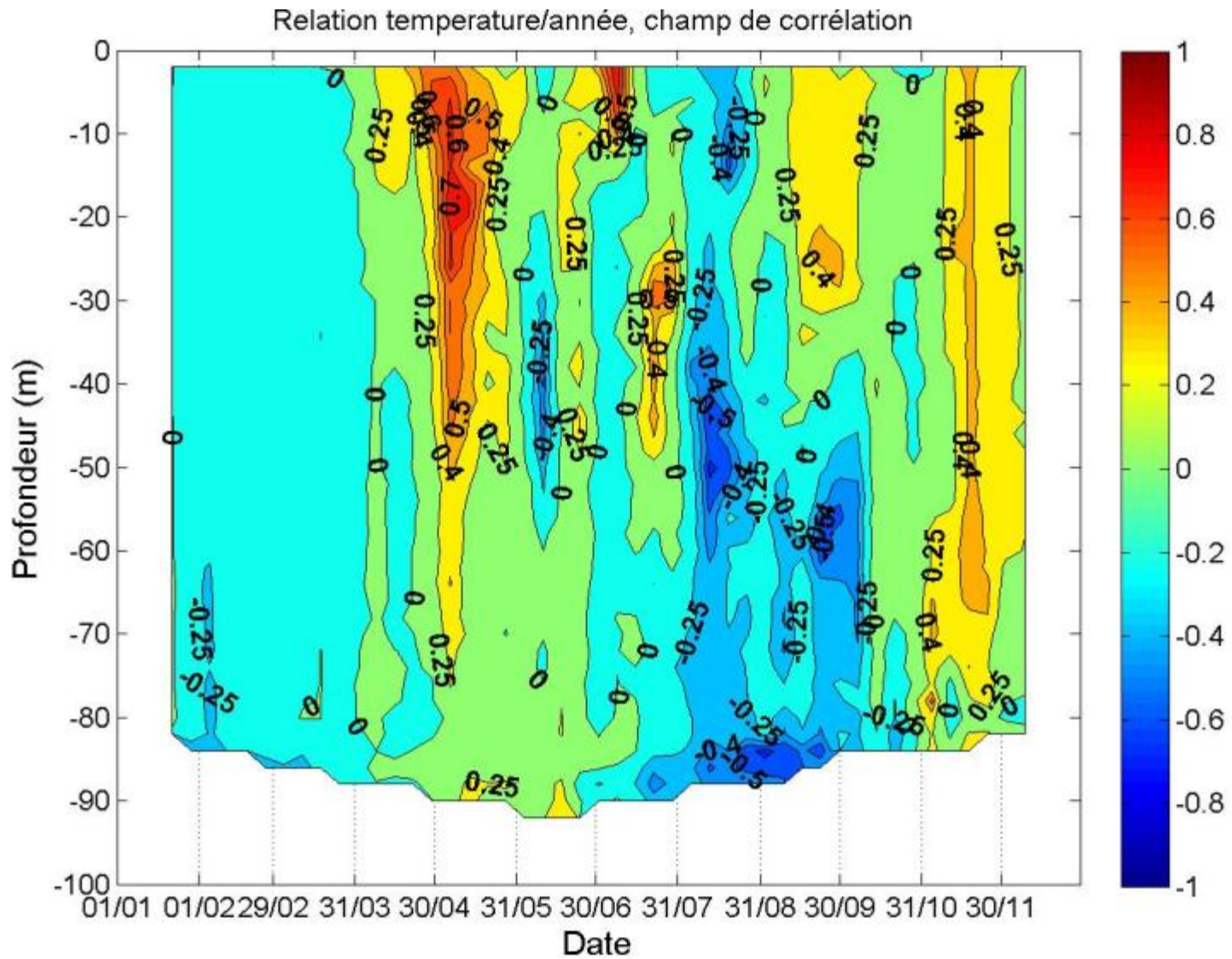
Autres exploitation du cube de données



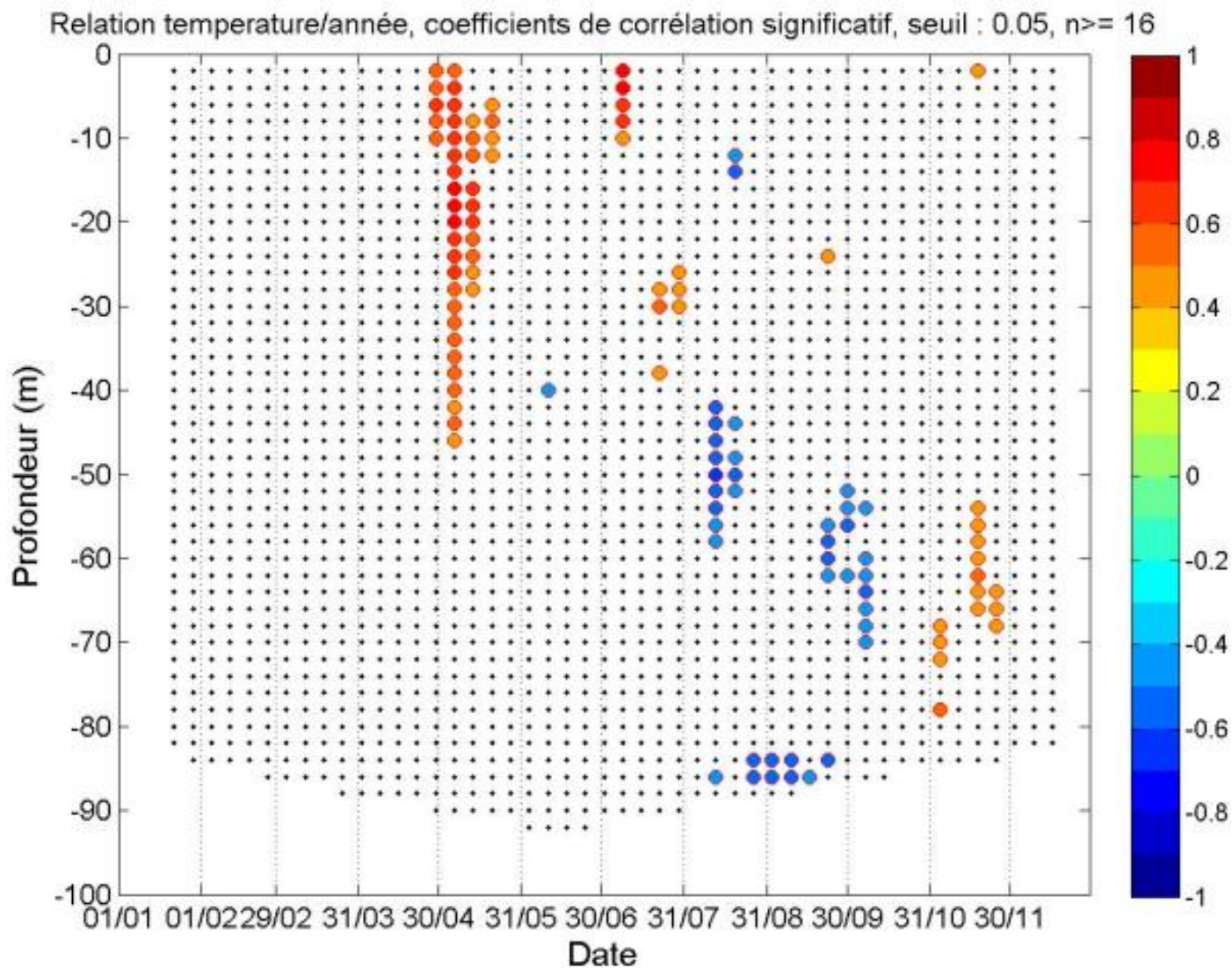
Détection de tendances



Détection de tendances

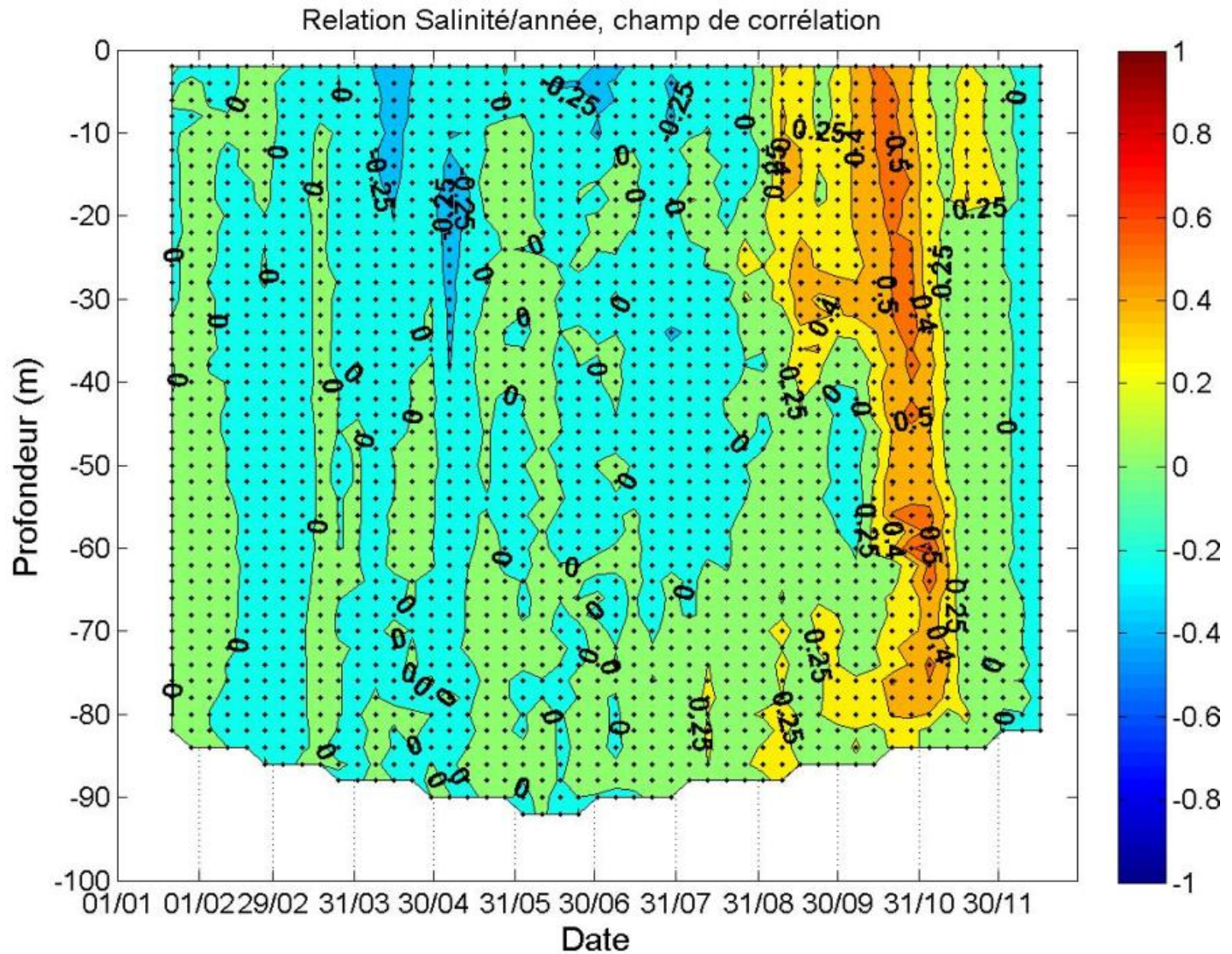


Détection de tendances



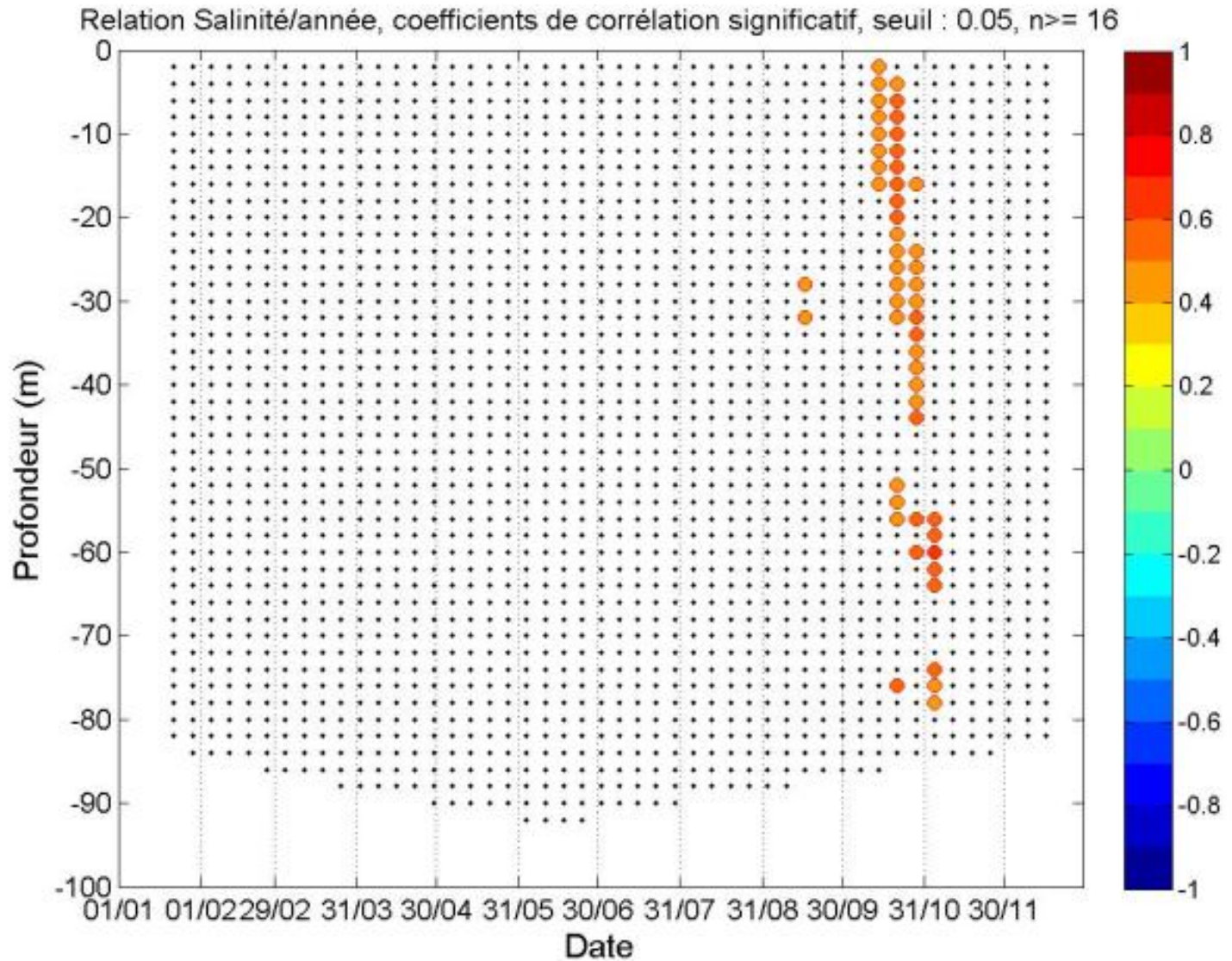
Coefficient de corrélation de Spearman

Détection de tendances



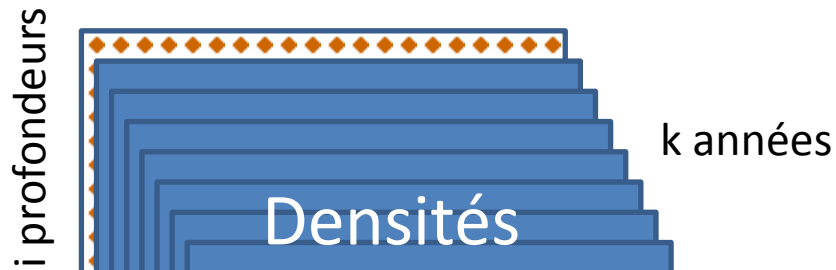
Coefficient de corrélation de Spearman

Détection de tendances

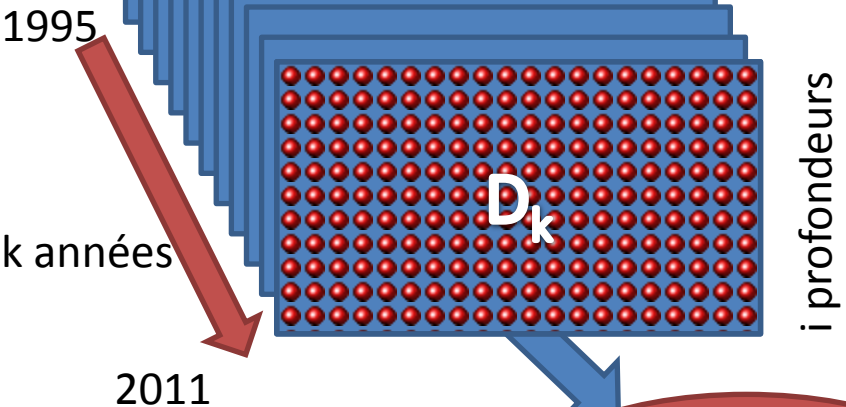


Coefficient de corrélation de Spearman

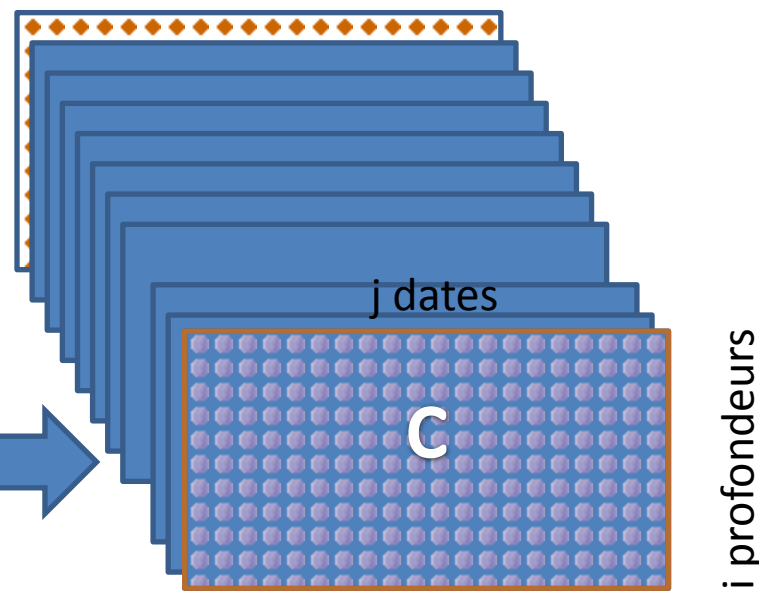
j dates



Caractérisation de la stratification

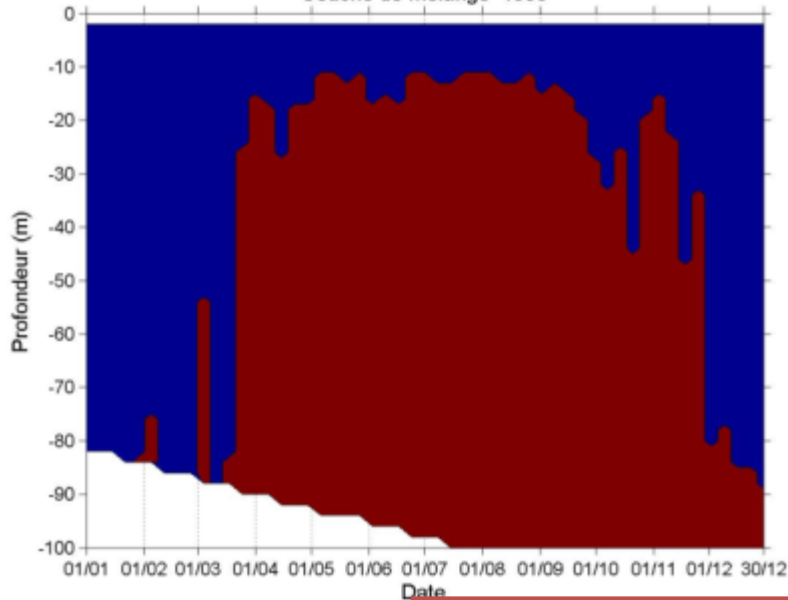


Opération sur les matrices années

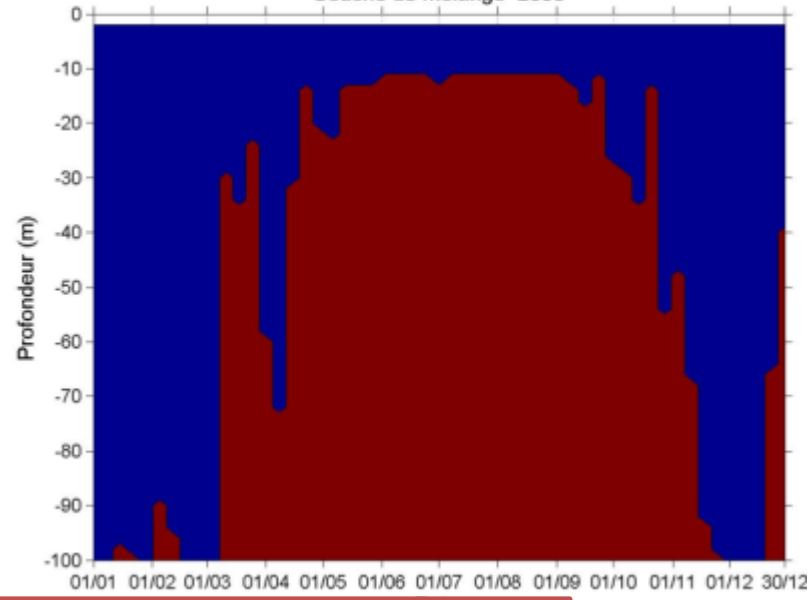


Indices de stratification

Couche de mélange 1999

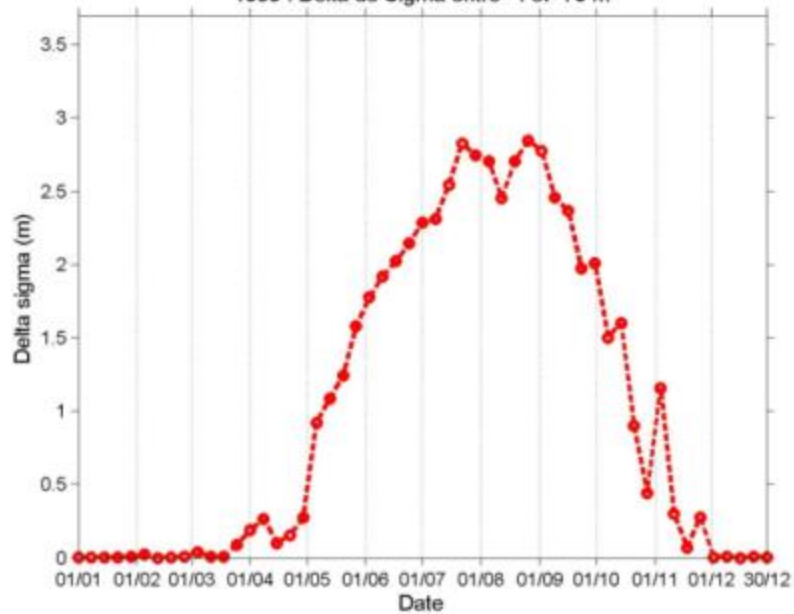


Couche de mélange 2003

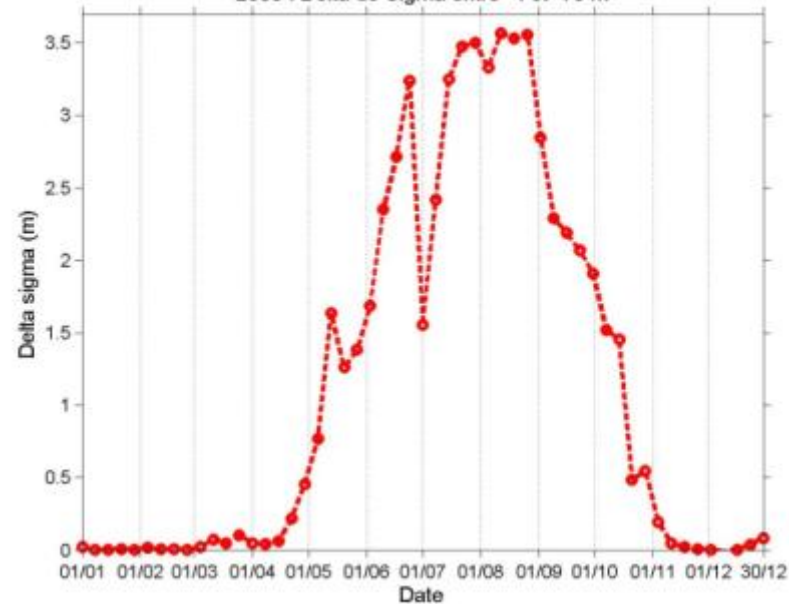


Exemples de caractérisation de la stratification

1999 : Delta de Sigma entre -4 et -70 m



2003 : Delta de Sigma entre -4 et -70 m



Merci de votre attention



Annexes

Prétraitement

Fichiers années avec paramètres initiale pour l'année



- Date_Ori
- Date_Jul
- Heure_TU
- Press_Db
- Prof_Met
- Temp_Deg
- Fluor_UF
- Oxyg_Mll
- Oxyg_Sat
- Sali_Psu
- Dens_Kgm
- Par_Em2s

Data initiales
Data calculées *
Data NA



Fichiers années avec paramètres sélectionnés

* The Gibbs SeaWater (GSW) Oceanographic Toolbox of TEOS-10