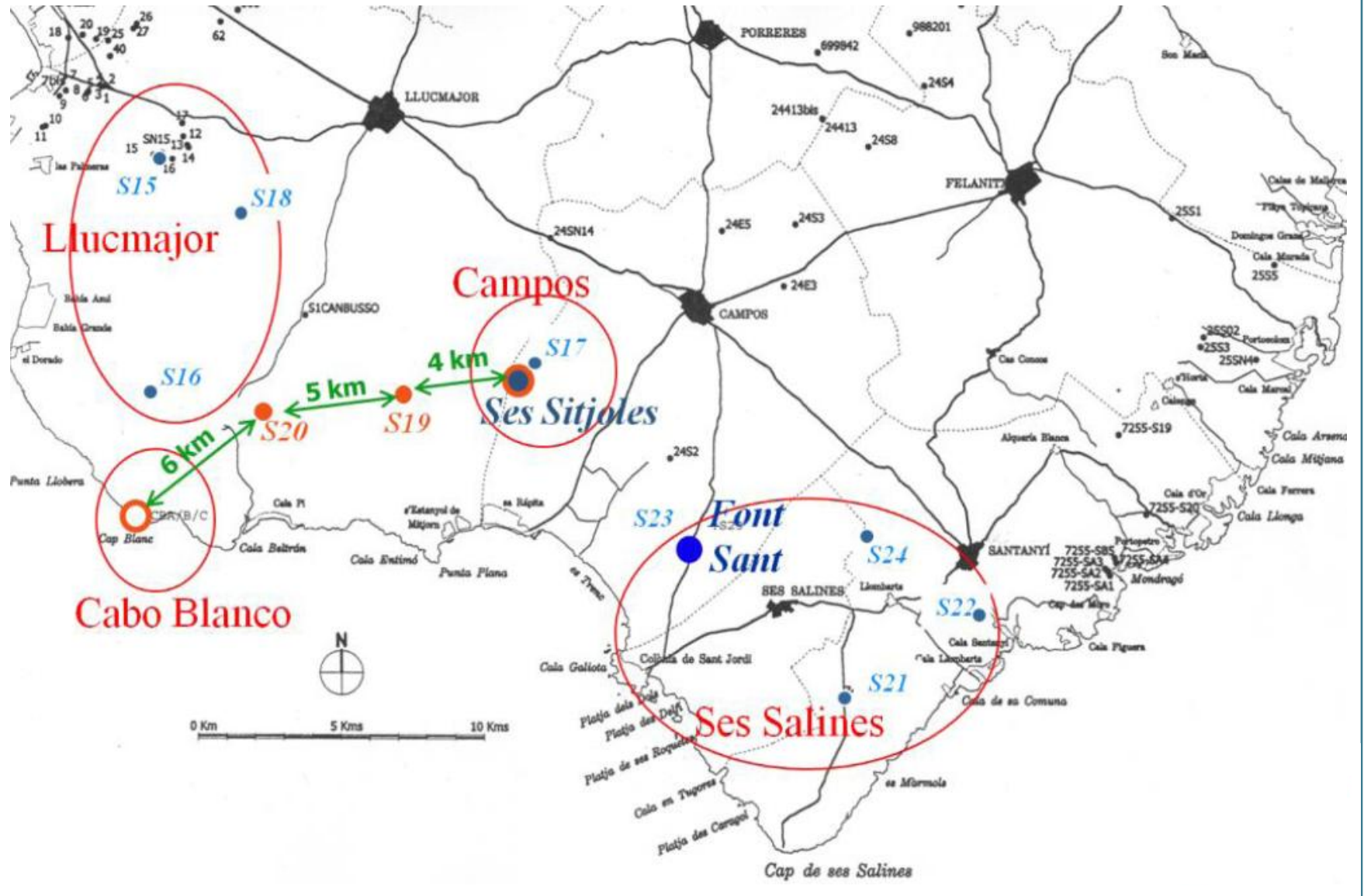
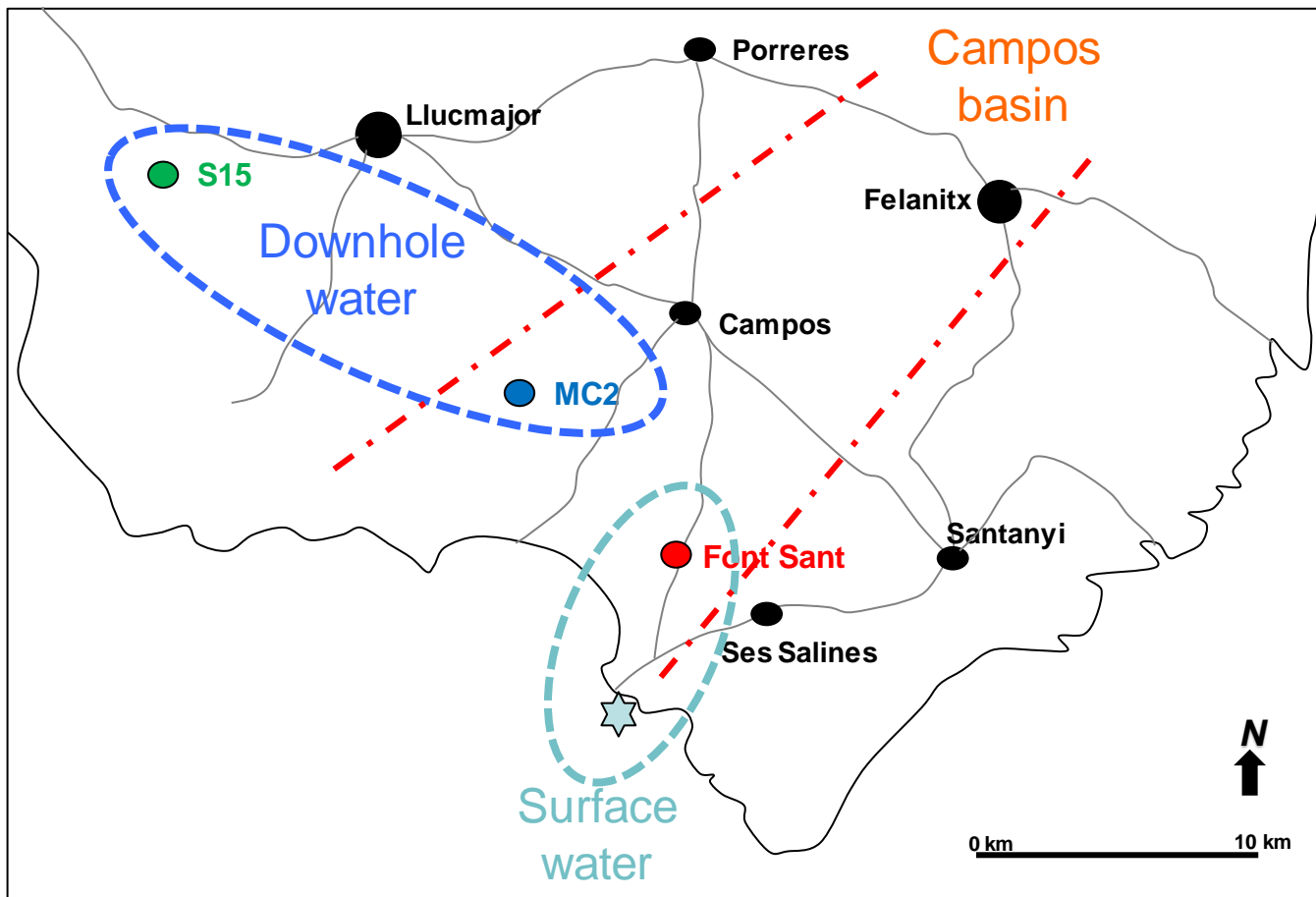


Regional setting - SE Mallorca carbonate platform

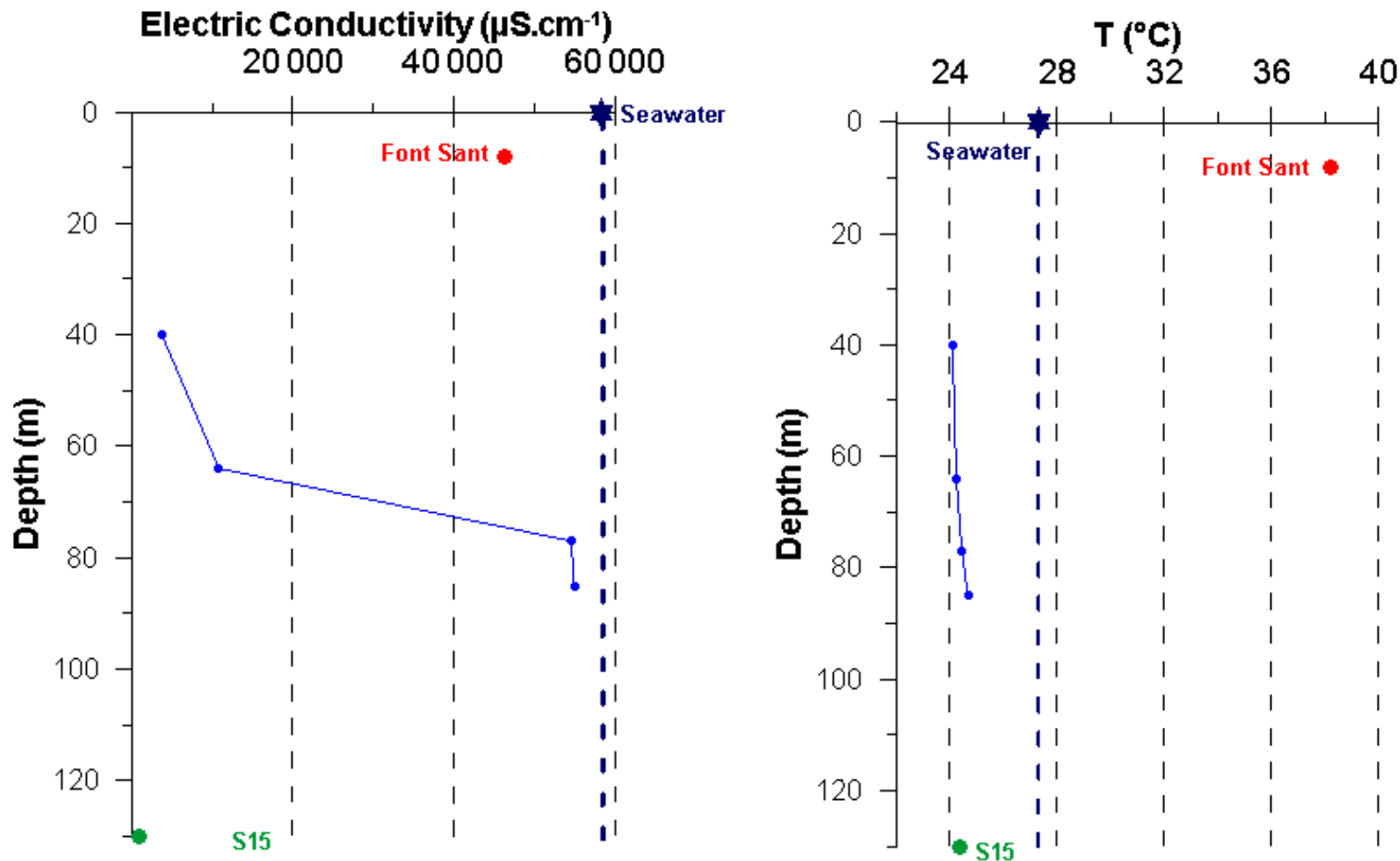


Downhole & surface sampling



- « **Fresh water** » reference sample from **S15** near Lluçmajor (non impacted by salt water)
- **MC2** monitoring hole : 4 sampling depth @ 40m, 64m, 77m, 85m
- **Font Sant** : thermal water (hot and salty)
- ★ Present **sea water** (Colonia de Sant Jordi)

MC2 vertical profiles (Ses Sitjoles experimental site)



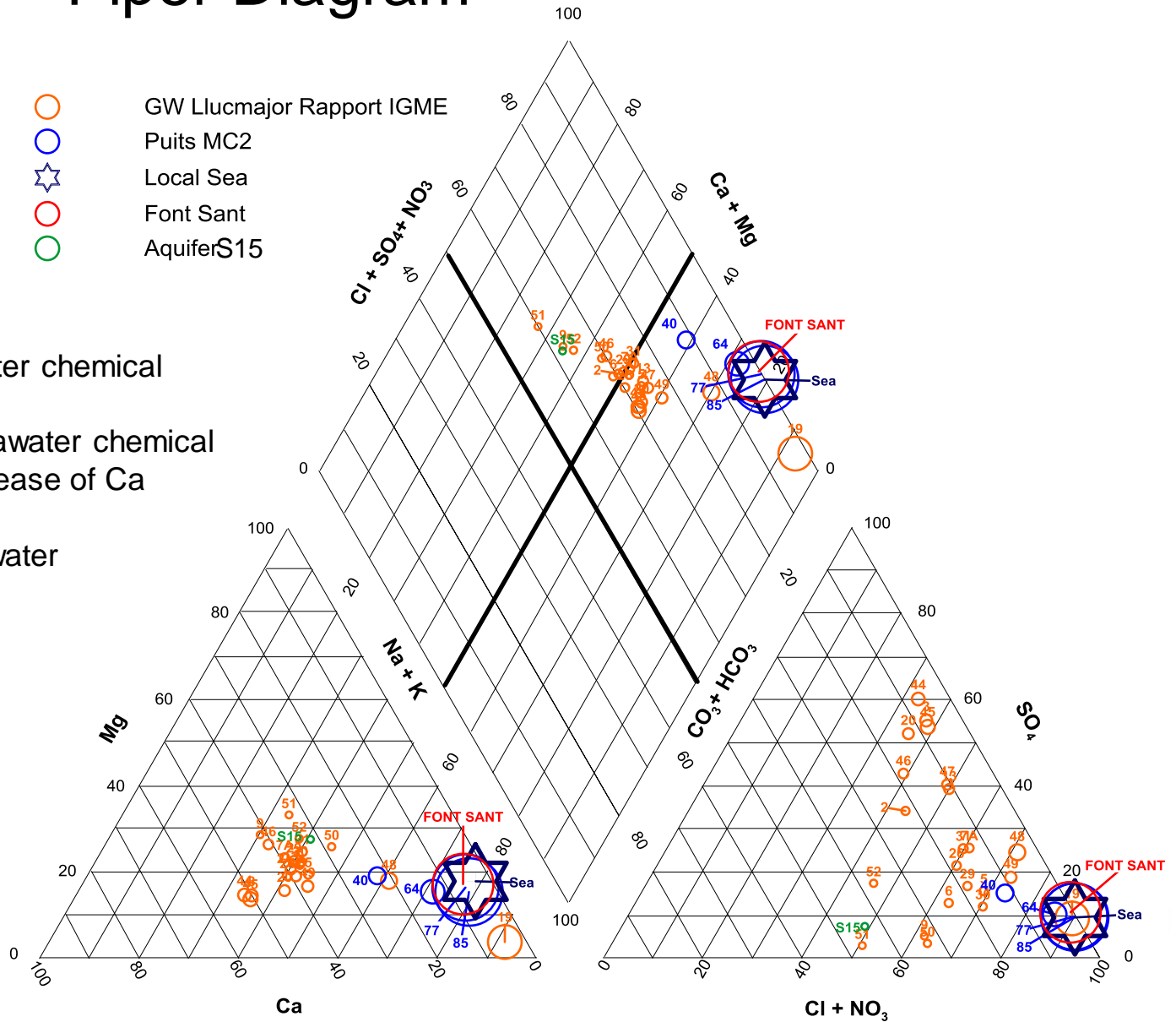
- EC in agreement with previous studies
- EC @ 40m > EC @ S15
- T° in agreement with previous studies
- T @ Font Sant >> T @ MC2

Chemistry – Piper Diagram

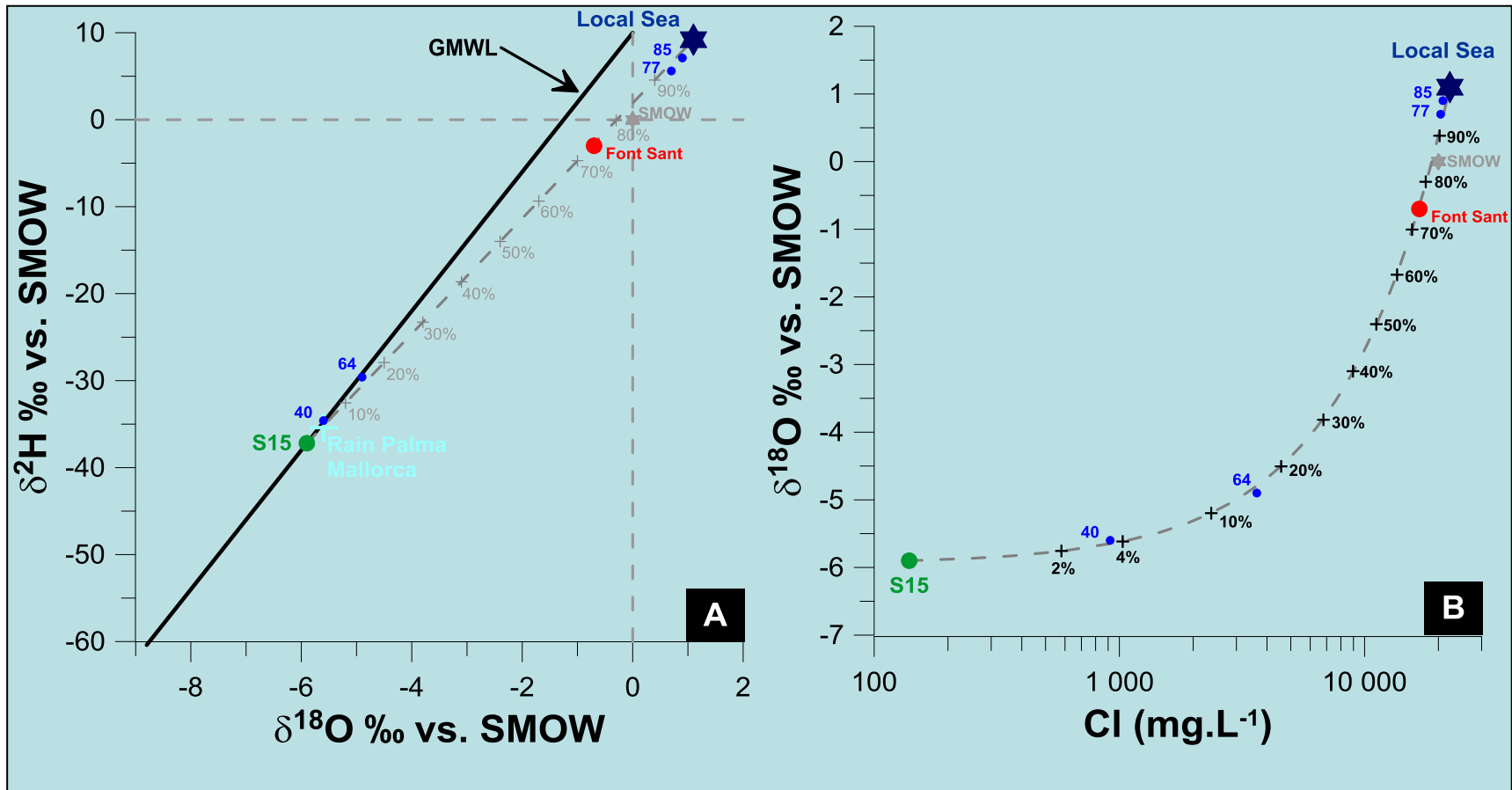
- GW Lluçmajor Rapport IGME
- Puits MC2
- ☆ Local Sea
- Font Sant
- AquiferS15

Dot size
proportional to EC

- **Font Sant** : seawater chemical facies
- **MC2** : in depth: seawater chemical facies, at 40m: increase of Ca proportion
- **S15** : facies ≠ seawater

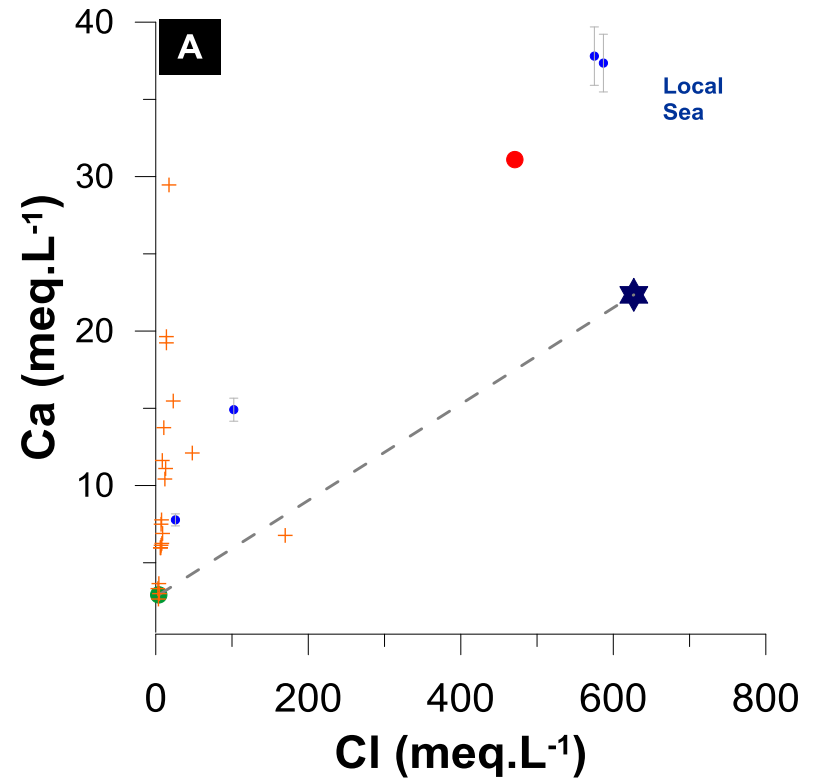
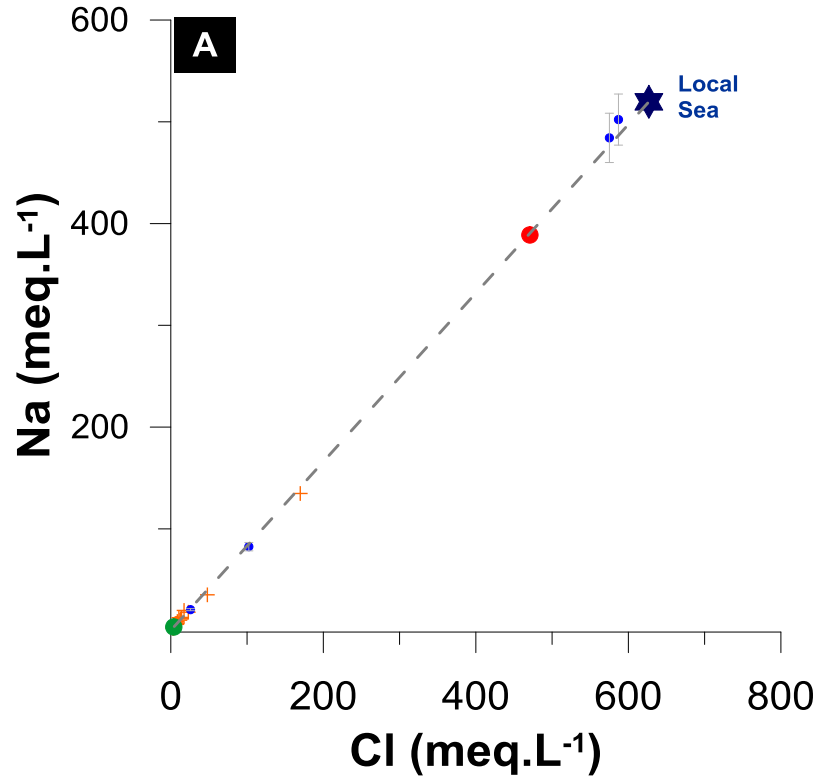


Stable isotopes of the water molecule (+ Cl)



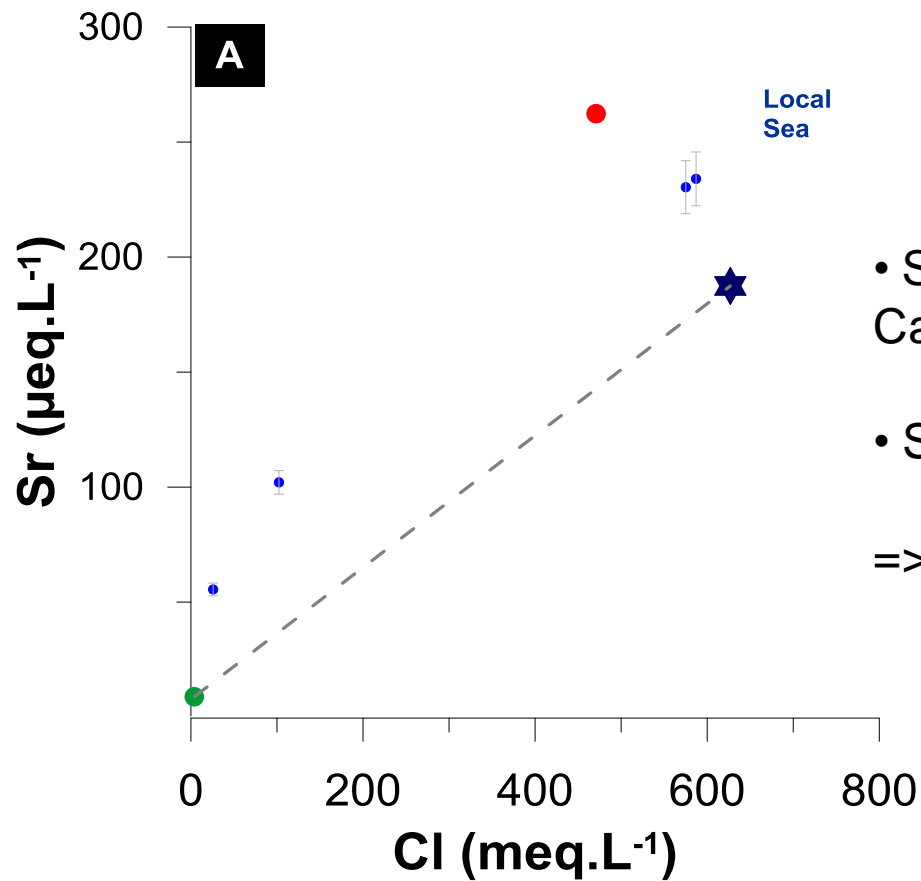
- **S15** : very similar to local rain
- **Font Sant**: signature of a binary mixing between fresh water (**S15**) and sea water: ~ 74% SW
- **MC2**: using **S15** as the fresh component reference : mixing with sea water in increasing proportion downward, from ~ 4% to > 98%

Major elements chemistry



- Conservative mixing for Na
- Ca excess compared to simple binary mixing: matrix dissolution (carbonates)

Strontium



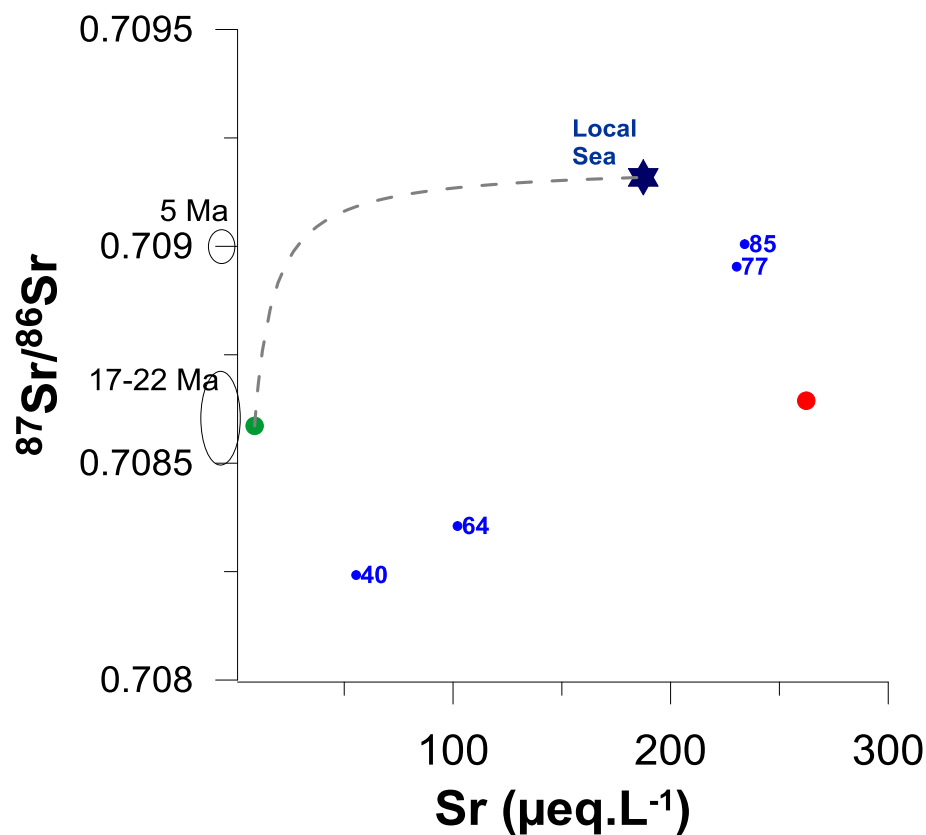
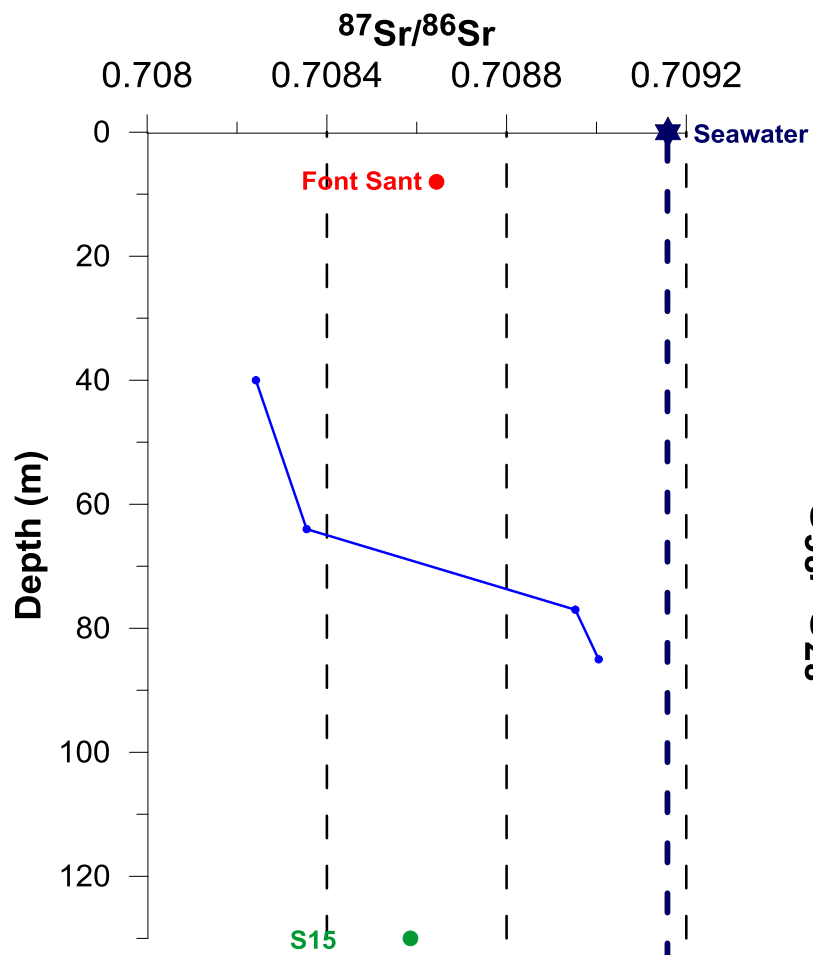
- Strontium is a chemical analogue of Calcium

- Same Sr excess as observed for Ca

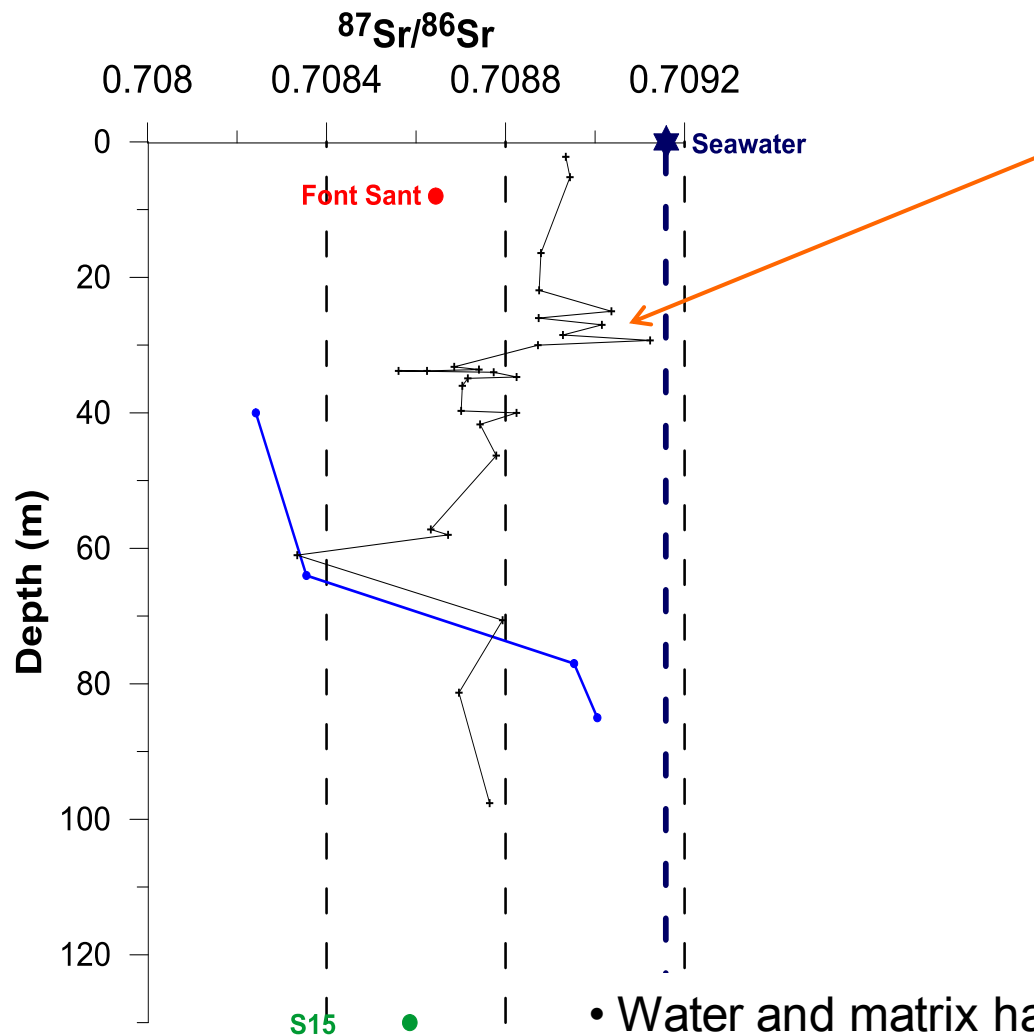
=> Sr and Sr isotopes can be used to trace matrix dissolution

Strontium isotopes

- Sr isotopes confirm that a different source of Sr is needed (in addition to SW) to explain **MC2** and **Font Sant** signatures



Sr isotopes – water and matrix

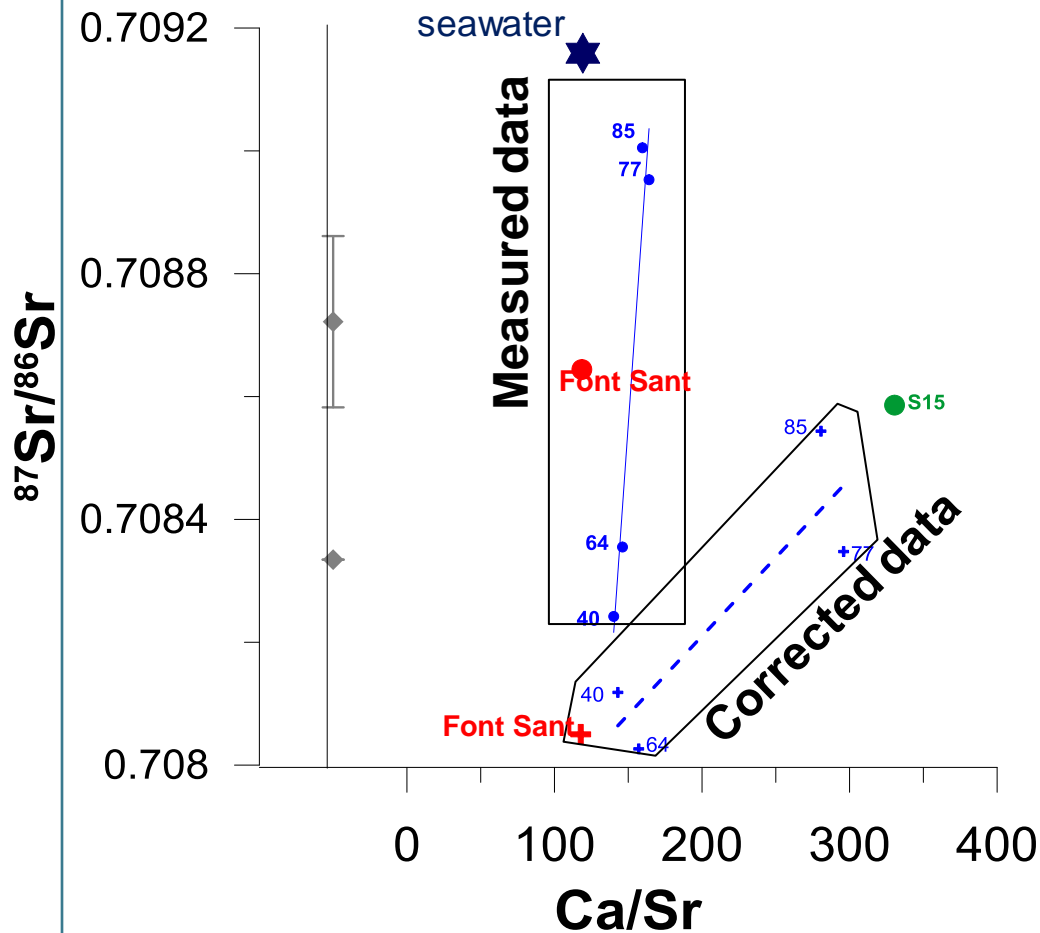


Depth	Nature
2.20	
5.20	bulk
16.40	shell
21.90	shell
25.00	micrite
26.00	shell
27.00	cement
28.50	cement
29.30	coral
30.00	
33.20	
33.60	
33.80	coral
33.80	
34.00	coral
34.70	
34.90	
36.00	
39.70	coralline algae
40.00	shell
41.70	coralline algae
46.30	shell
57.20	
58.00	calcite in karst
61.00	calcite
70.60	bulk
81.30	shell
97.60	bulk

Rock matrix
analyses
(Cerege)

- Water and matrix have distinct signatures
- Water signature =
mix fresh water + sea water + matrix dissolution

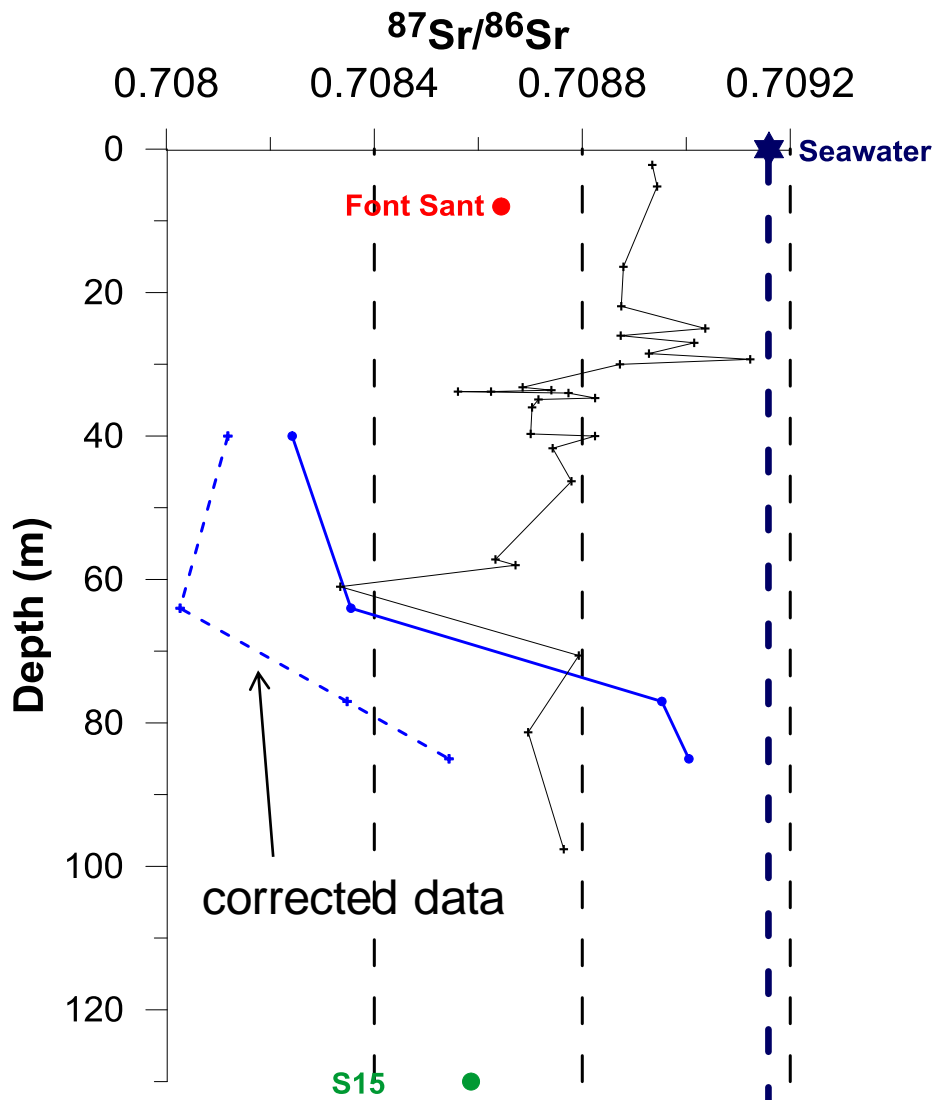
Data corrected from seawater influence



- After seawater influence removal :
 - deep samples (77 and 85m) present signature close to that of the reference fresh sample
 - shallow samples (40 and 64 m) present signature similar to that of Font Sant (also corrected)

=> Further discussions needed

Data corrected from seawater influence



- After seawater influence removal :
 - water signature still different from that of the matrix,
 - possible complex and successive precipitation/dissolution of carbonated phases (I_{Scalcite} > 0.5). Calcite normally precipitates with the pore fluid signature (resulting from complex mixing),
 - possible bias introduced by matrix sampling initially dedicated to constrain the age of the deposits (thus excluding newly precipitated carbonated phases)

=> Further discussions needed