Preservation methodology and stable isotope composition in sea stars:

Can museum collections be useful for trophic ecology studies?

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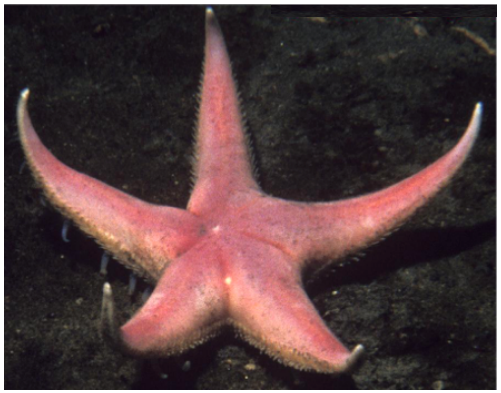
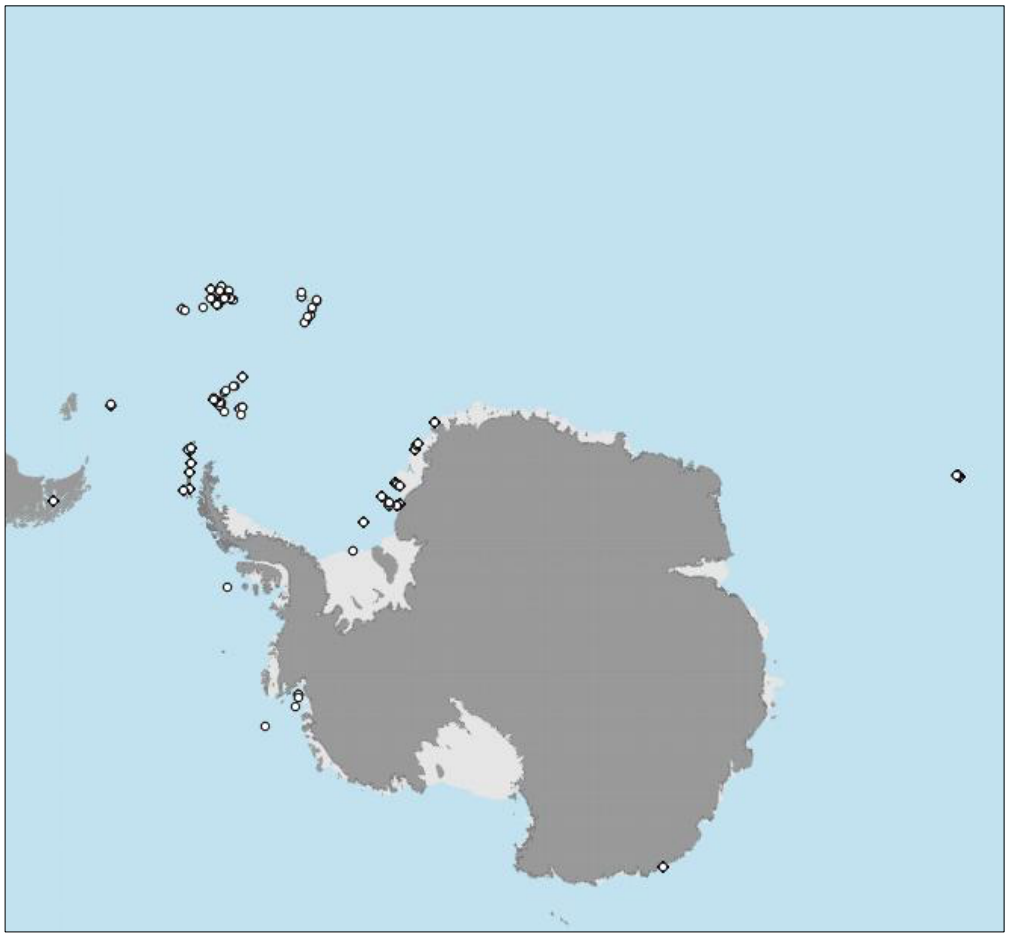
PhD project

- Study of trophic ecology of Antarctic sea stars using stable isotopes

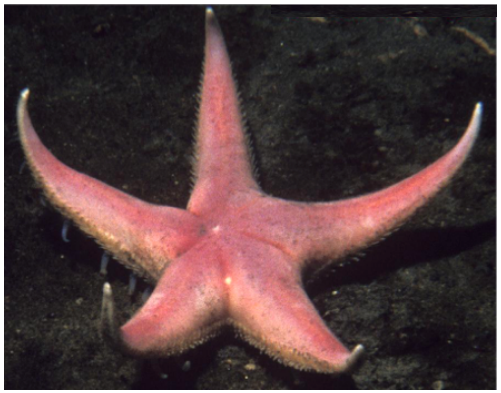
  → isotopic metrics

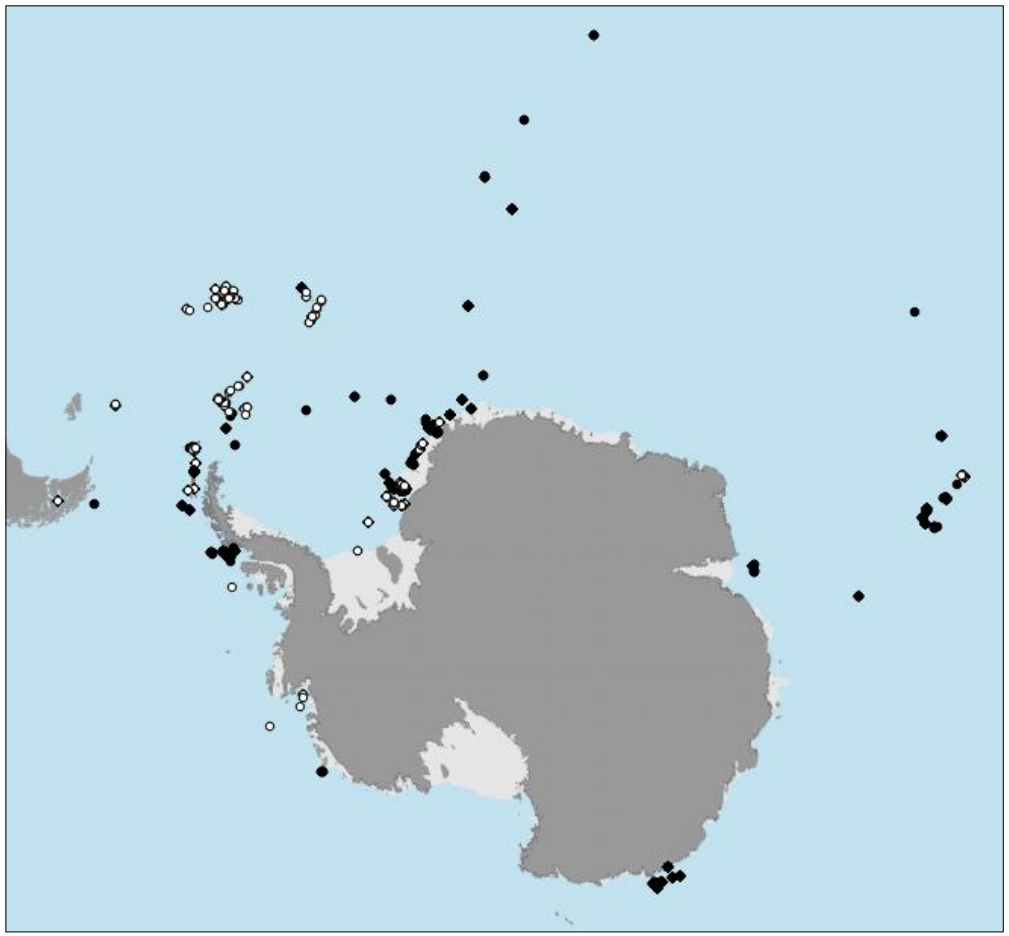




PhD project

- Samples provided by other institutions





- Museum specimens in food web studies?

  → Samples for past periods

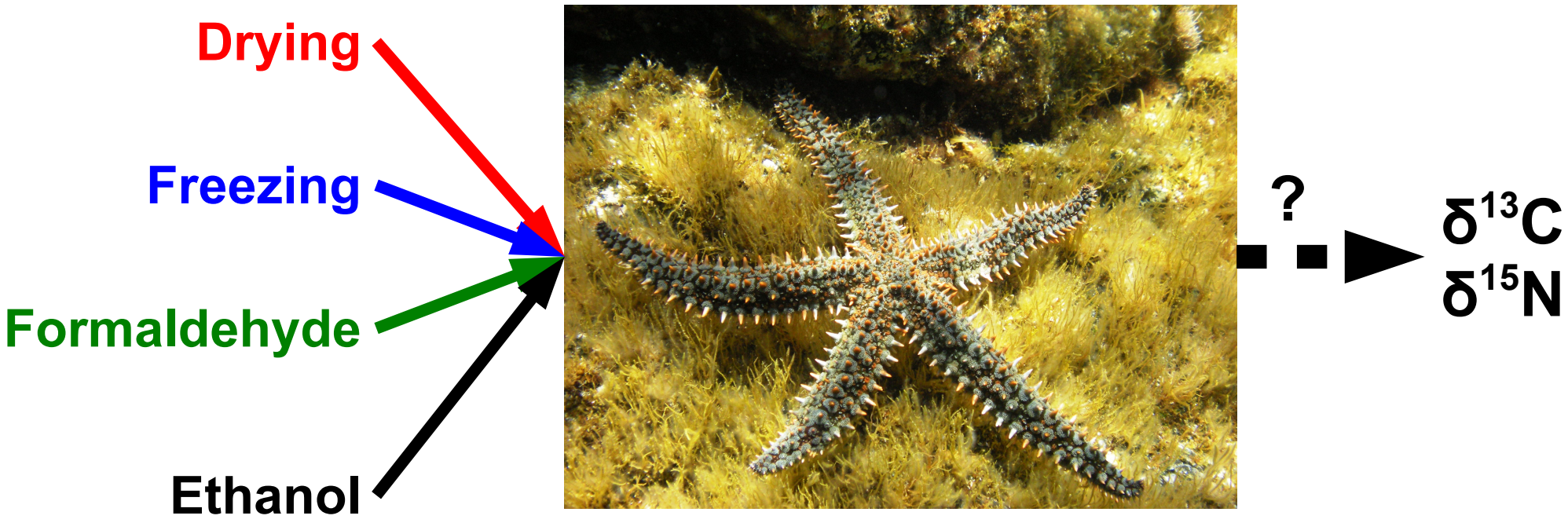
- Museum samples are stored/fixed with preservative fluids (formaldehyde, ethanol) or dried instead of frozen

- Impact of preservation method on stable isotopes ratios?

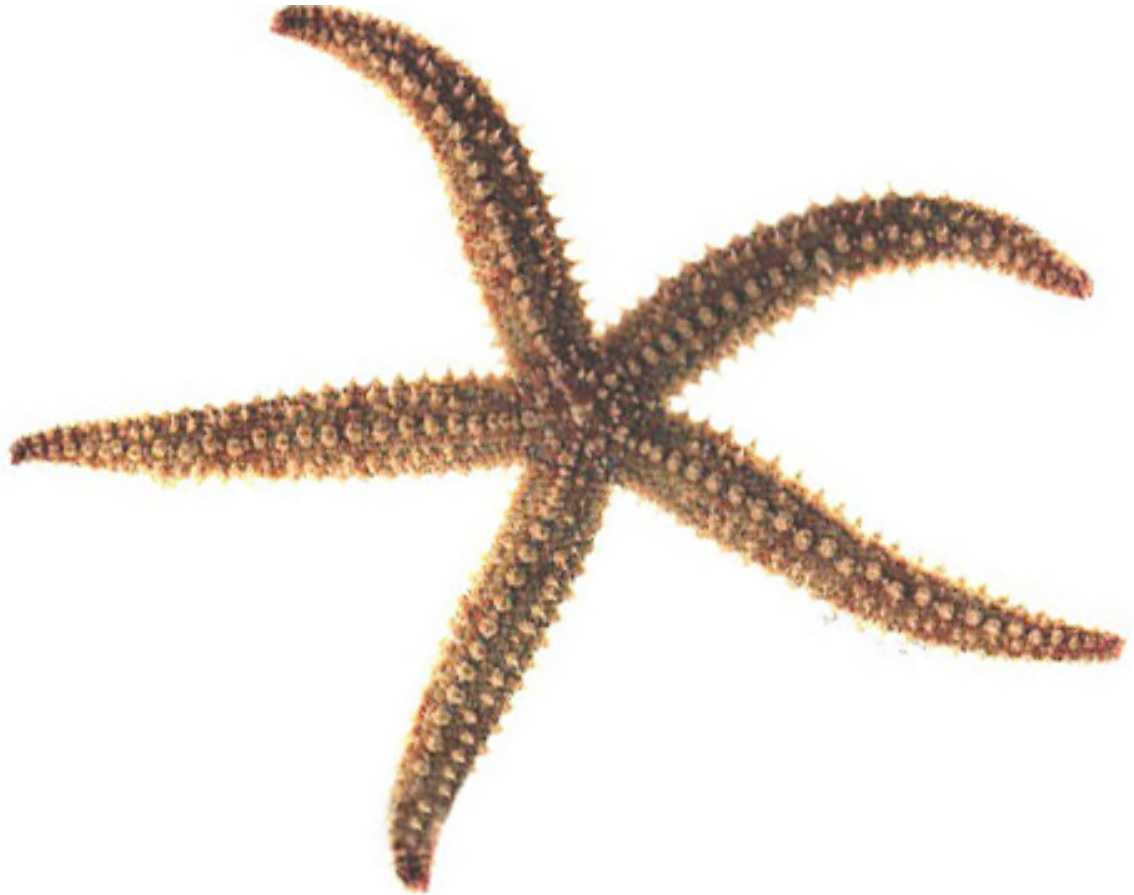
  → No studies on **sea stars**

Objectives

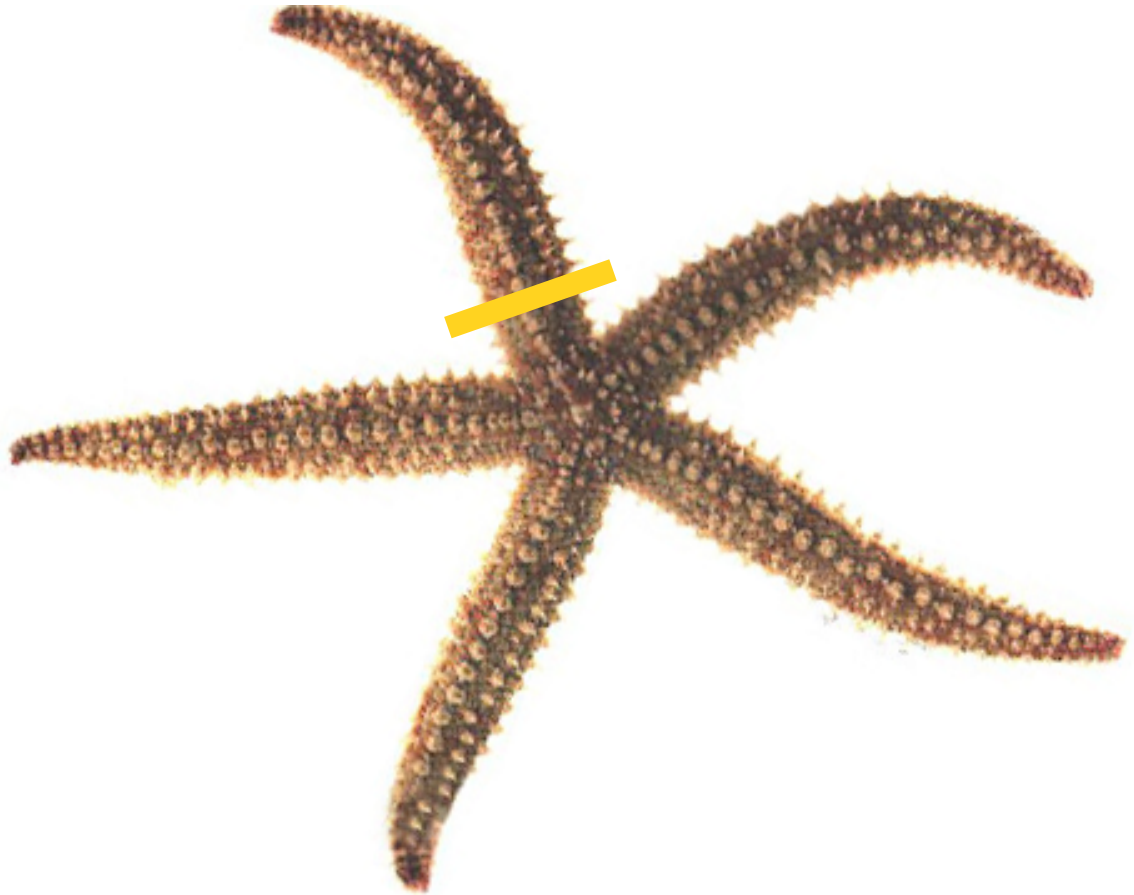
- To assess the **temporal evolution** of stable isotope ratios in sea star samples preserved with four **preservation treatments**:



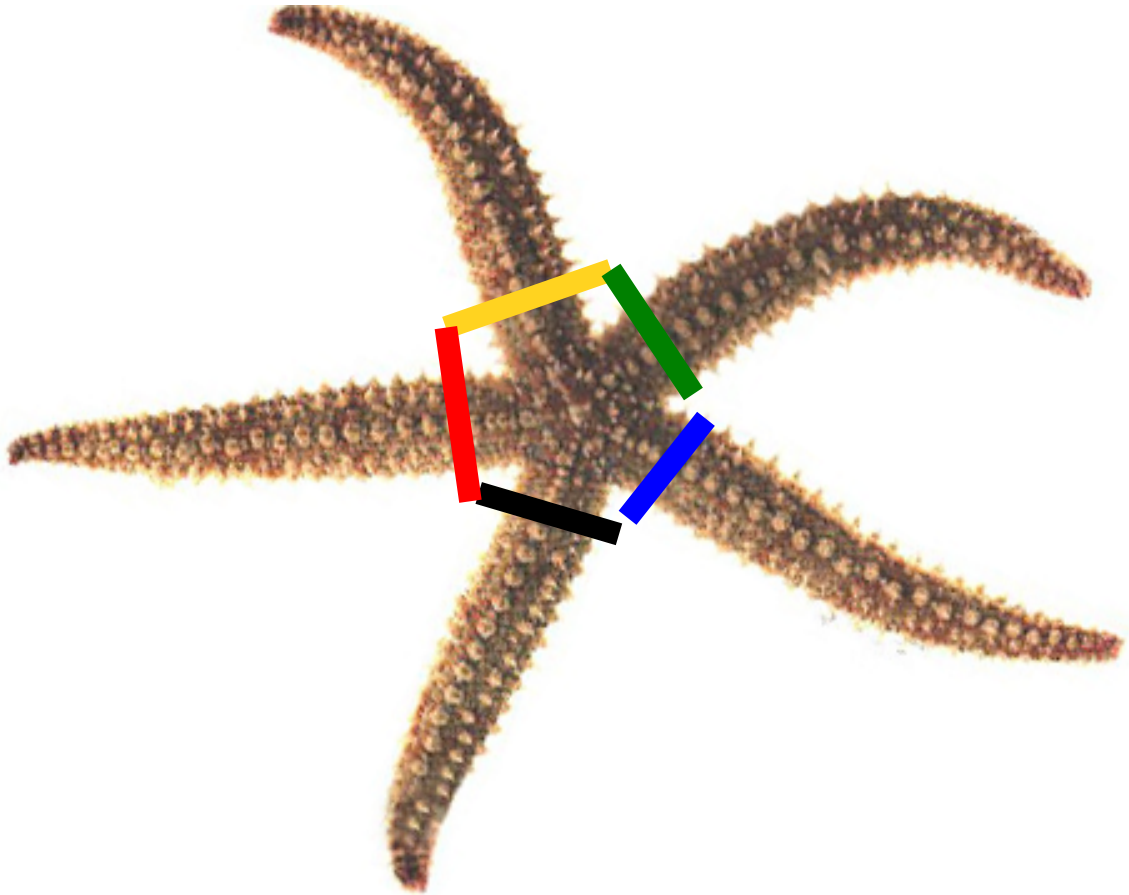
- *Marthasterias glacialis* (Atlantic Ocean), n = 20



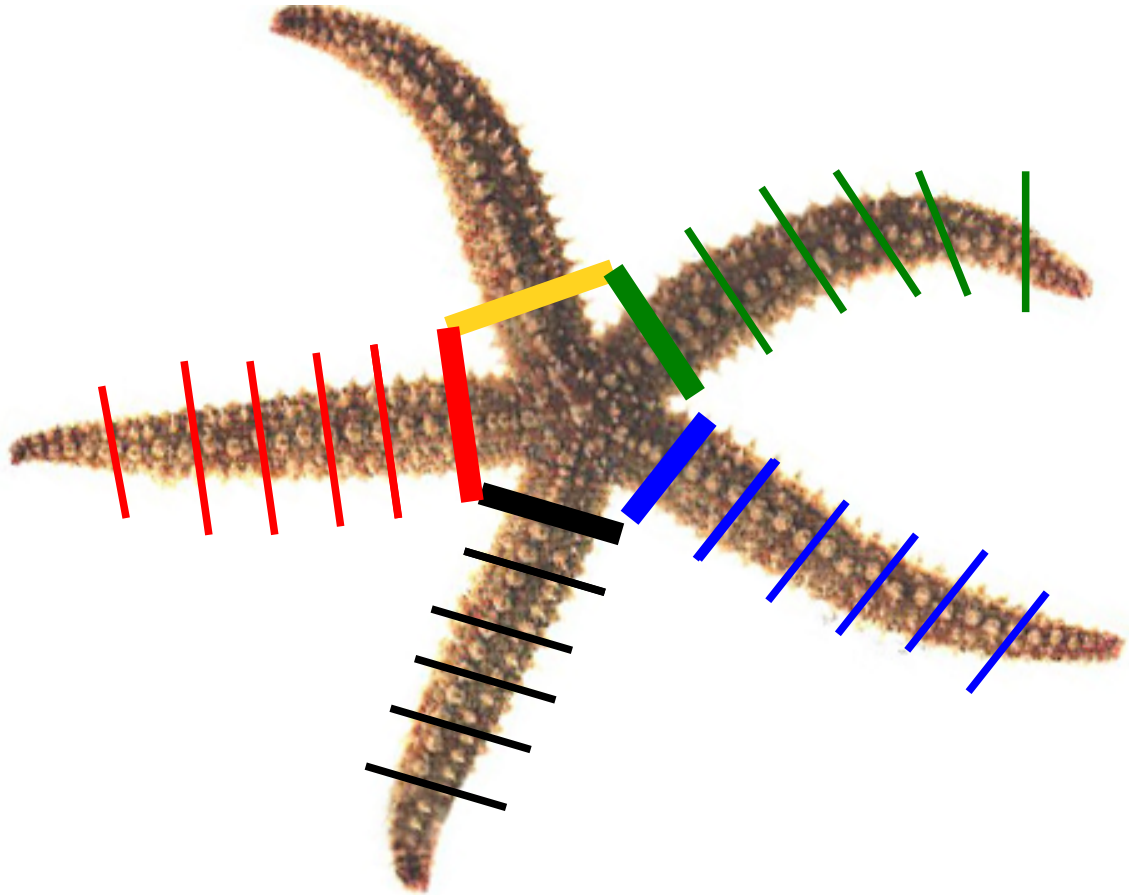
- *Marthasterias glacialis* (Atlantic Ocean), n = 20
- Arm 1 = control T0 (dissection, drying and grounding)



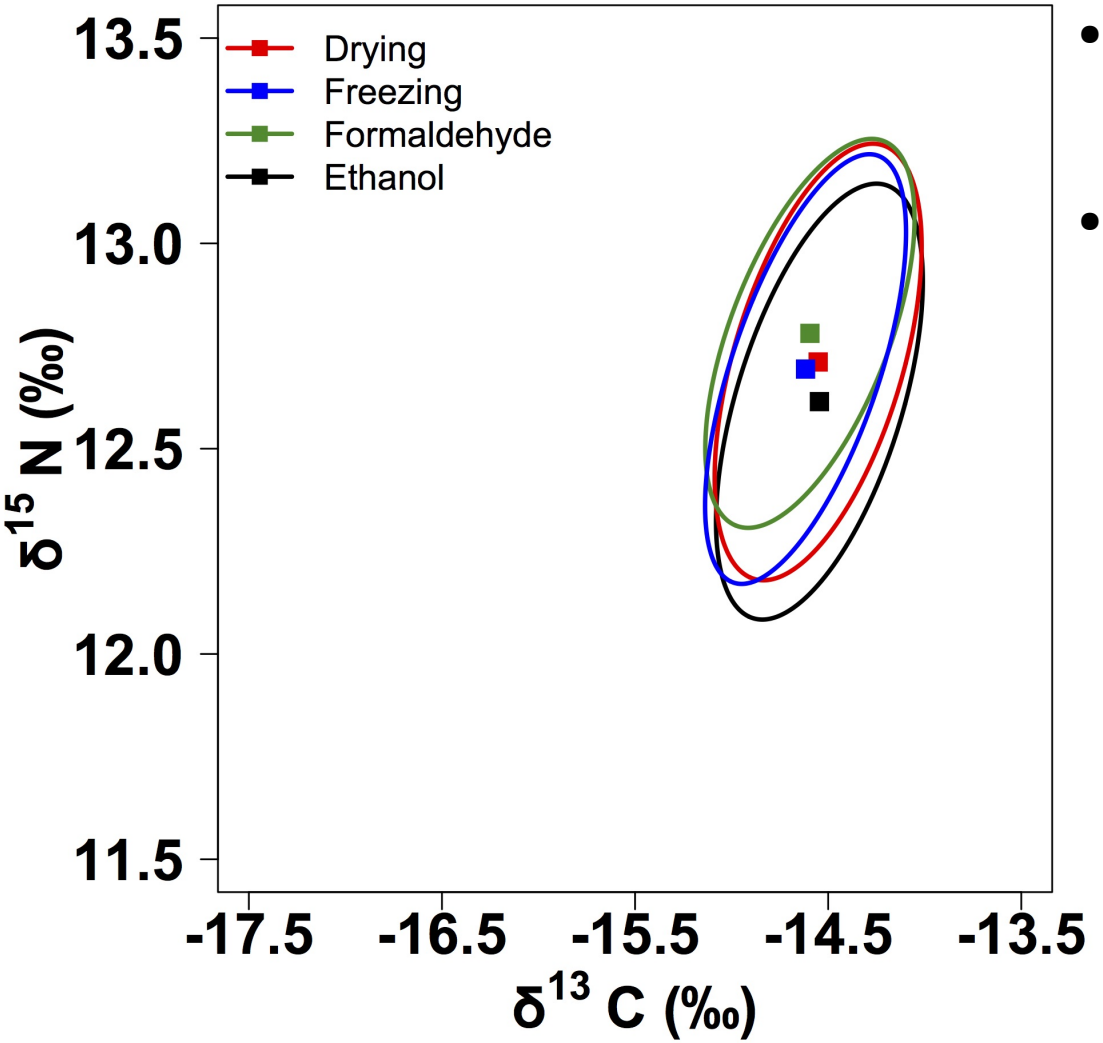
- *Marthasterias glacialis* (Atlantic Ocean), n = 20
- Arm 1 = control T0 (dissection, drying and grounding)
- Other arms = treatments: drying (control), freezing at -28°C, 3.4% formaldehyde, 99.8% ethanol)



- *Marthasterias glacialis* (Atlantic Ocean), n = 20
- Arm 1 = control T0 (dissection, drying and grounding)
- Other arms = treatments: drying (control), freezing at -28°C, 3.4% formaldehyde, 99.8% ethanol)
- six sections per arm → time effect (1 to 24 months)

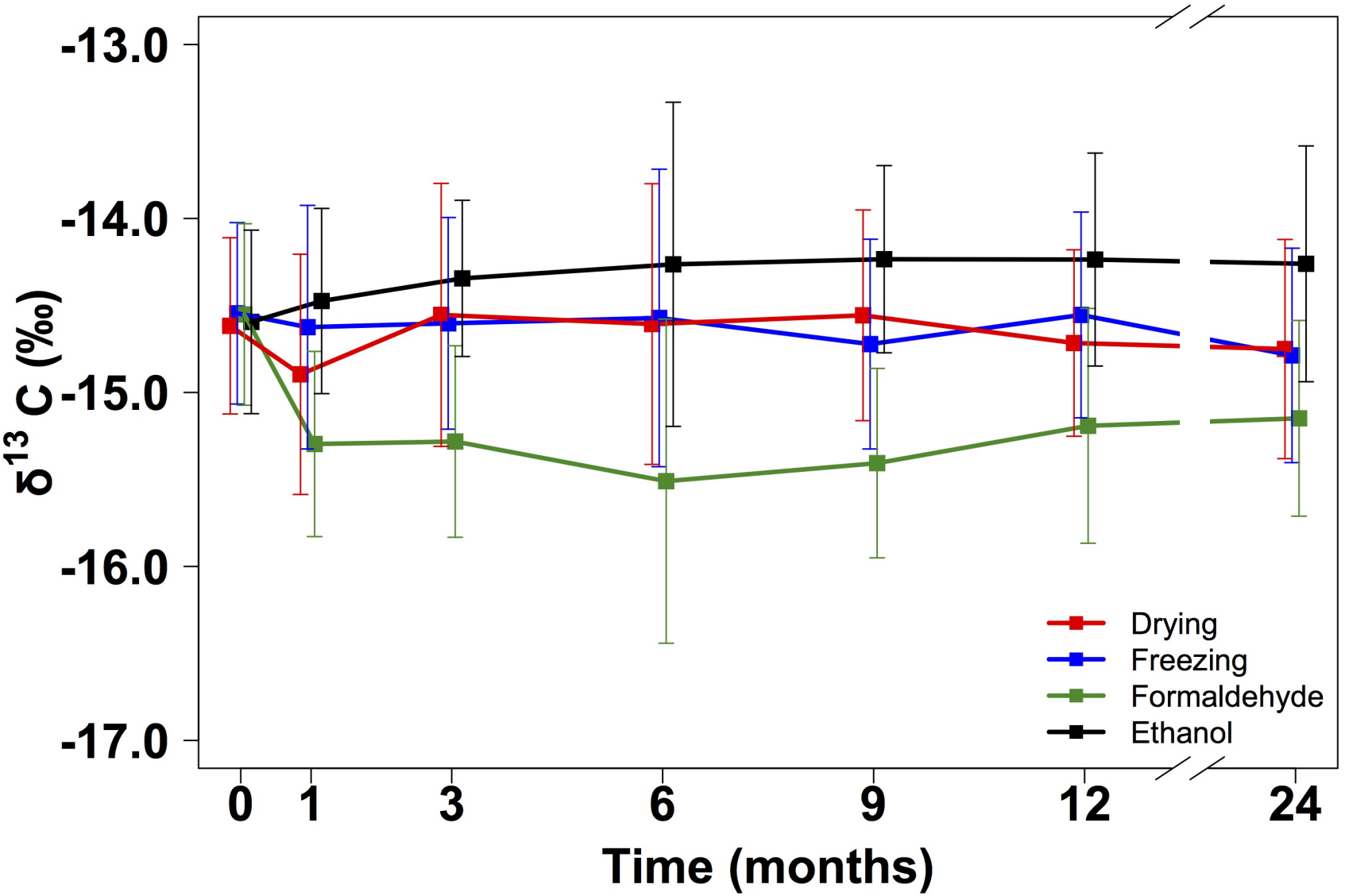


- Comparison of mean $\delta^{13}C$ and $\delta^{15}N$ between T0 and preserved samples
- Comparison of SEA_B between T0 and preserved samples

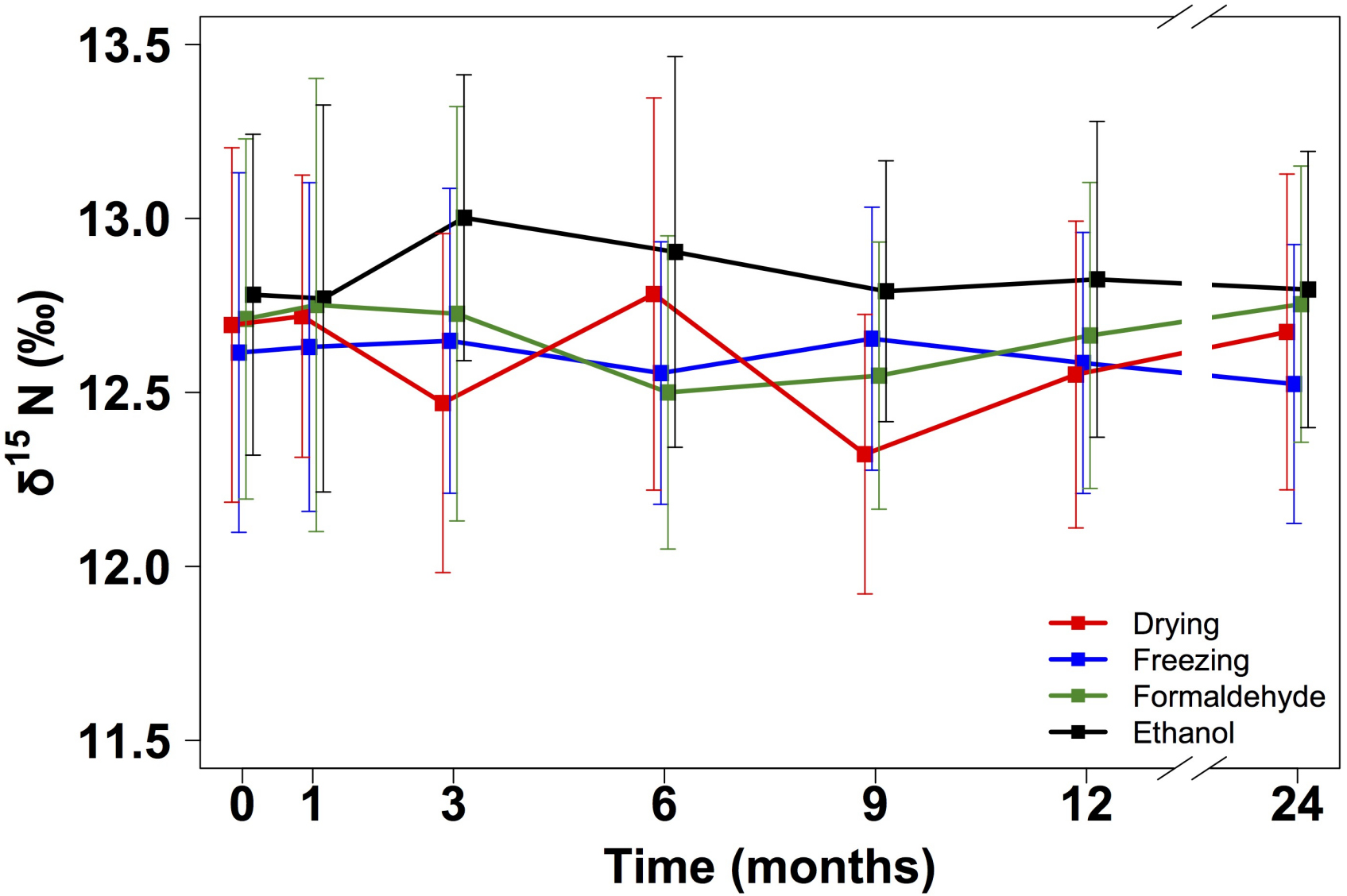


- Estimation of overlap between T0 and preserved samples
- Good overlap if similar or higher than the overlap between the T0 of each treatment

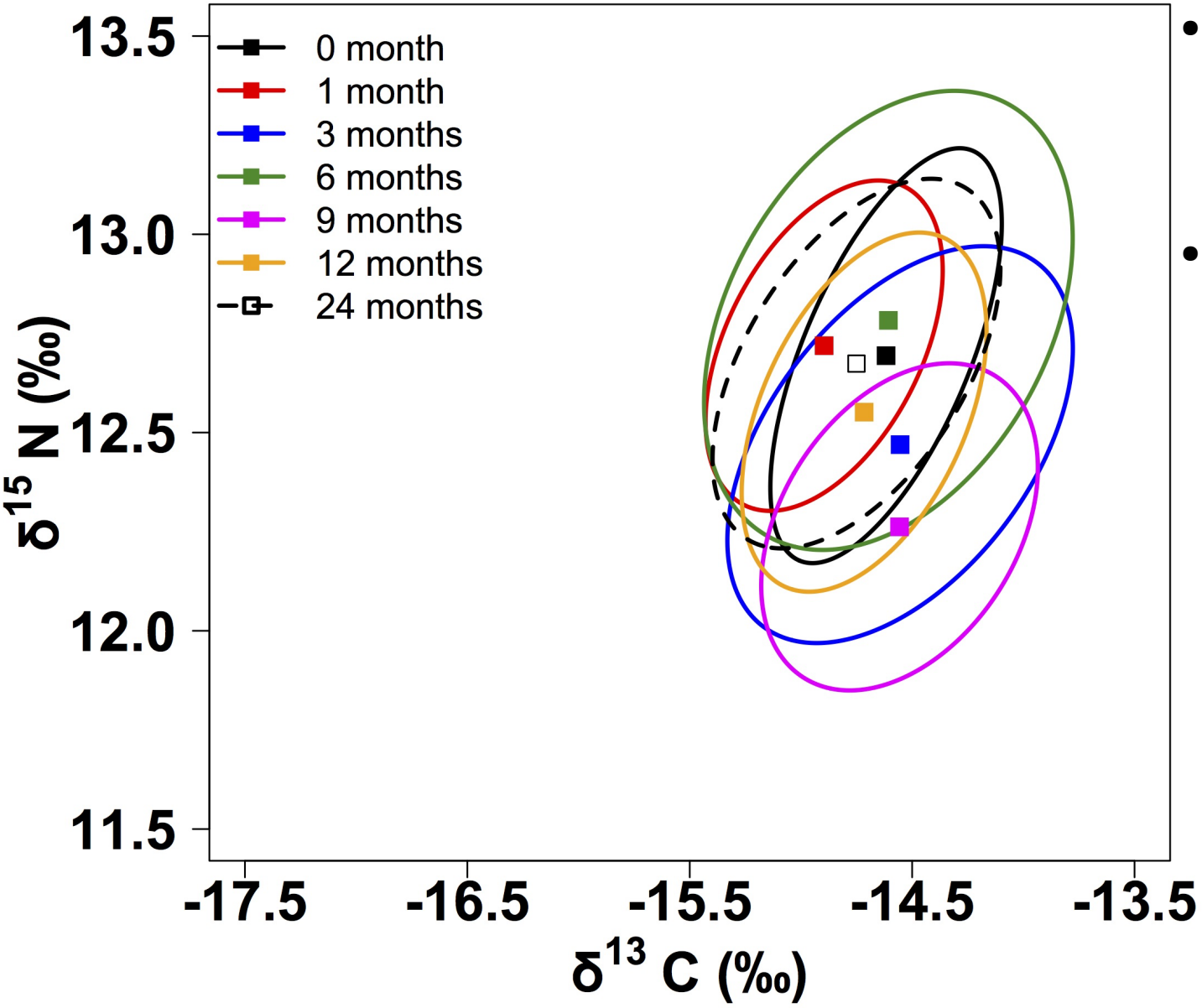
- Formaldehyde: sharp decrease of $\delta^{13}C$ and then stability
- Ethanol: non-significant and continuous increase of $\delta^{13}C$



- Inconsistent changes of $\delta^{15}N$ for drying and formaldehyde

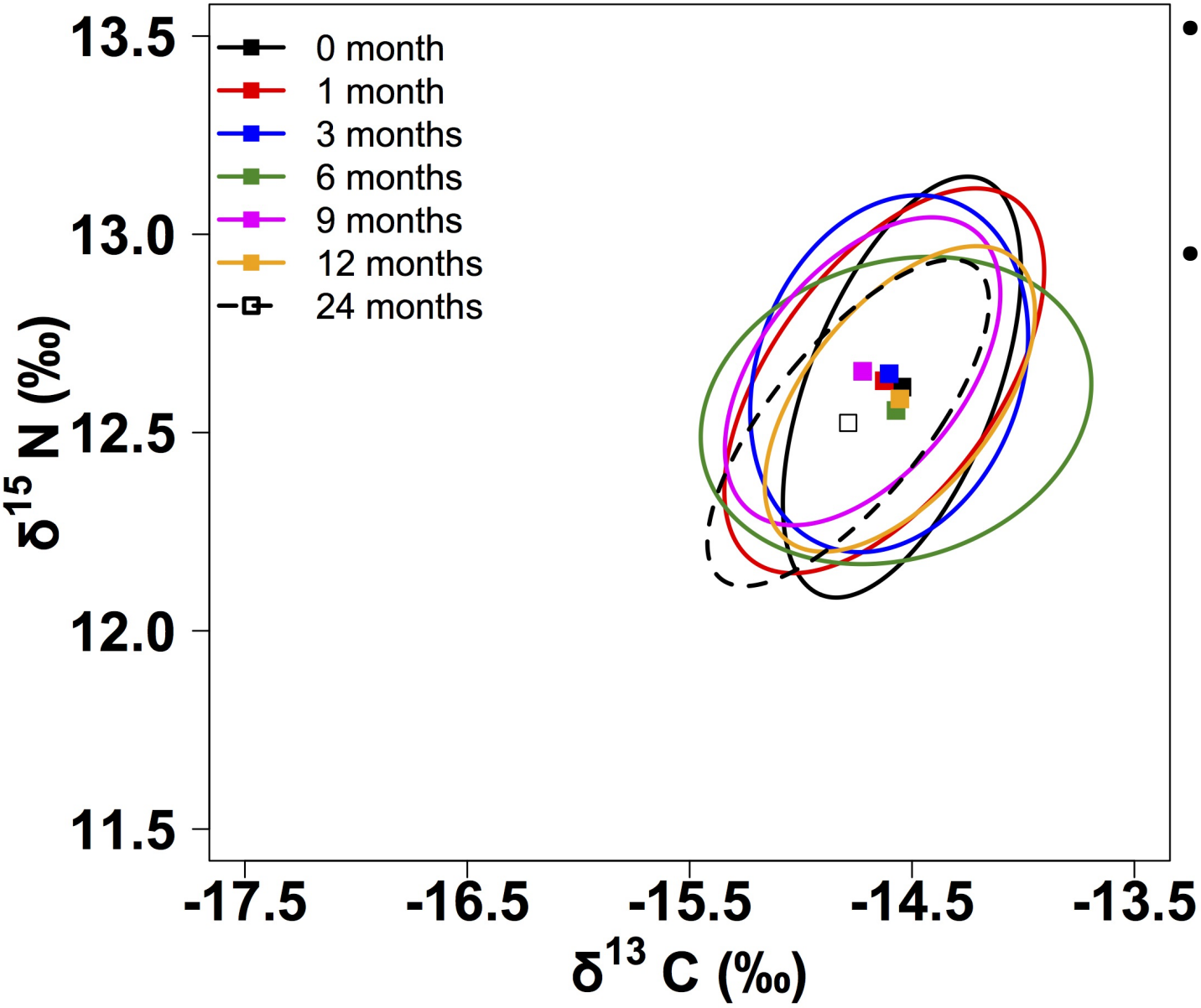


Drying (control)



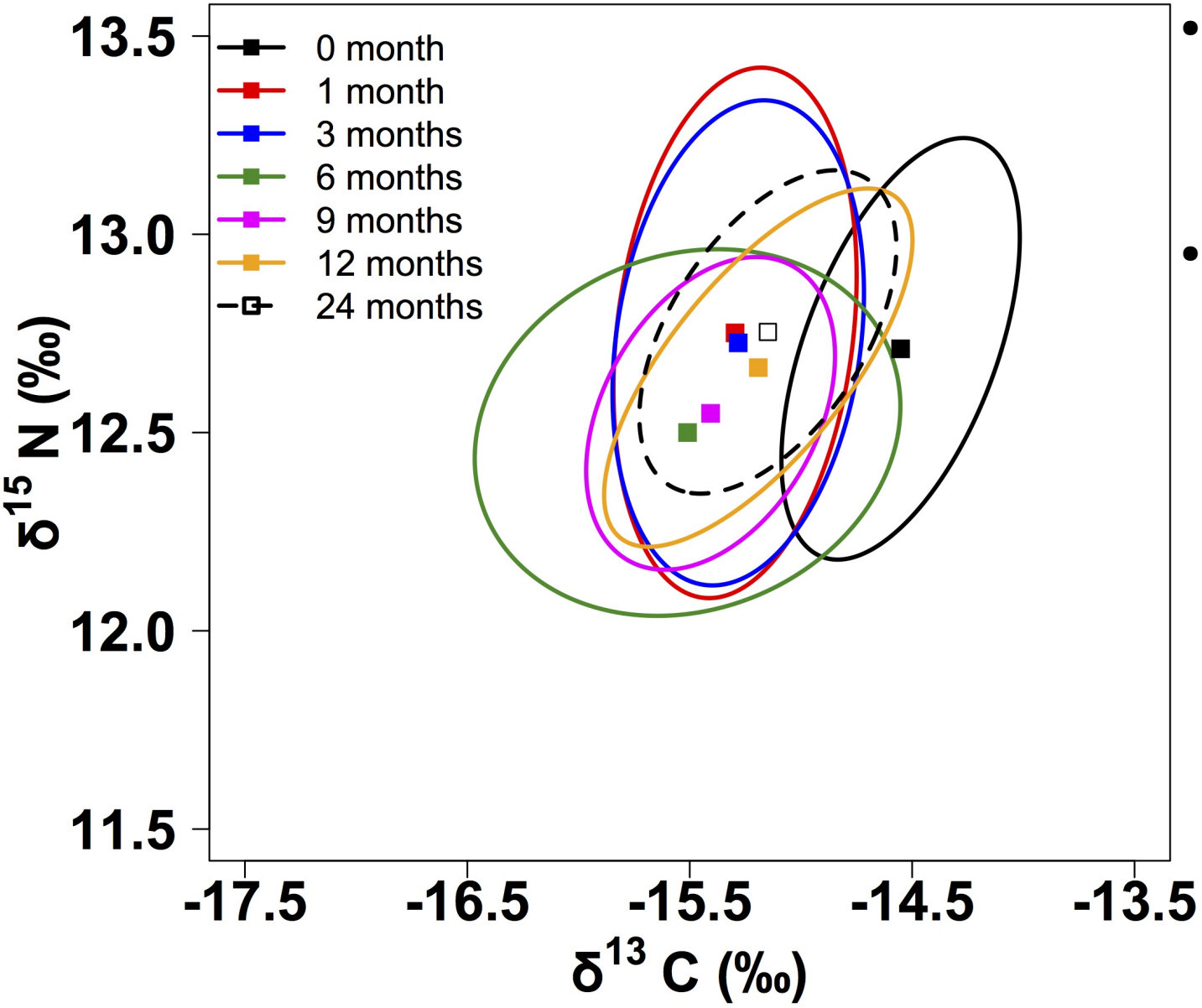
- No consistent change of SEA_B through time.
- Low overlap from 3 to 9 months.

Freezing



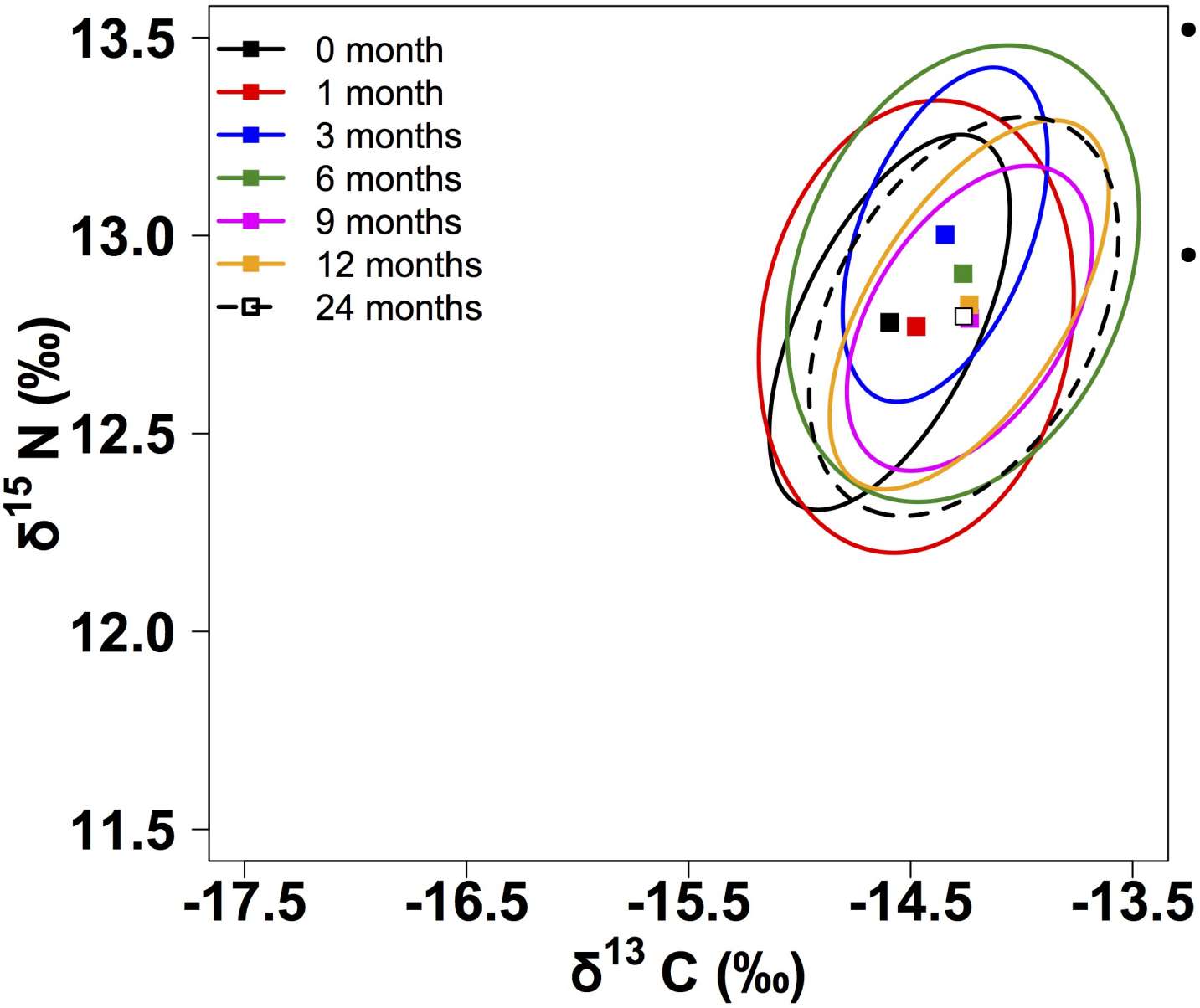
- No significant changes of SEA_B through time.
- Low overlap at 6 months.

Formaldehyde



- No consistent change of SEA_B trough time.
- Decrease and then stability of $\delta^{13}C$ → no overlap.

Ethanol



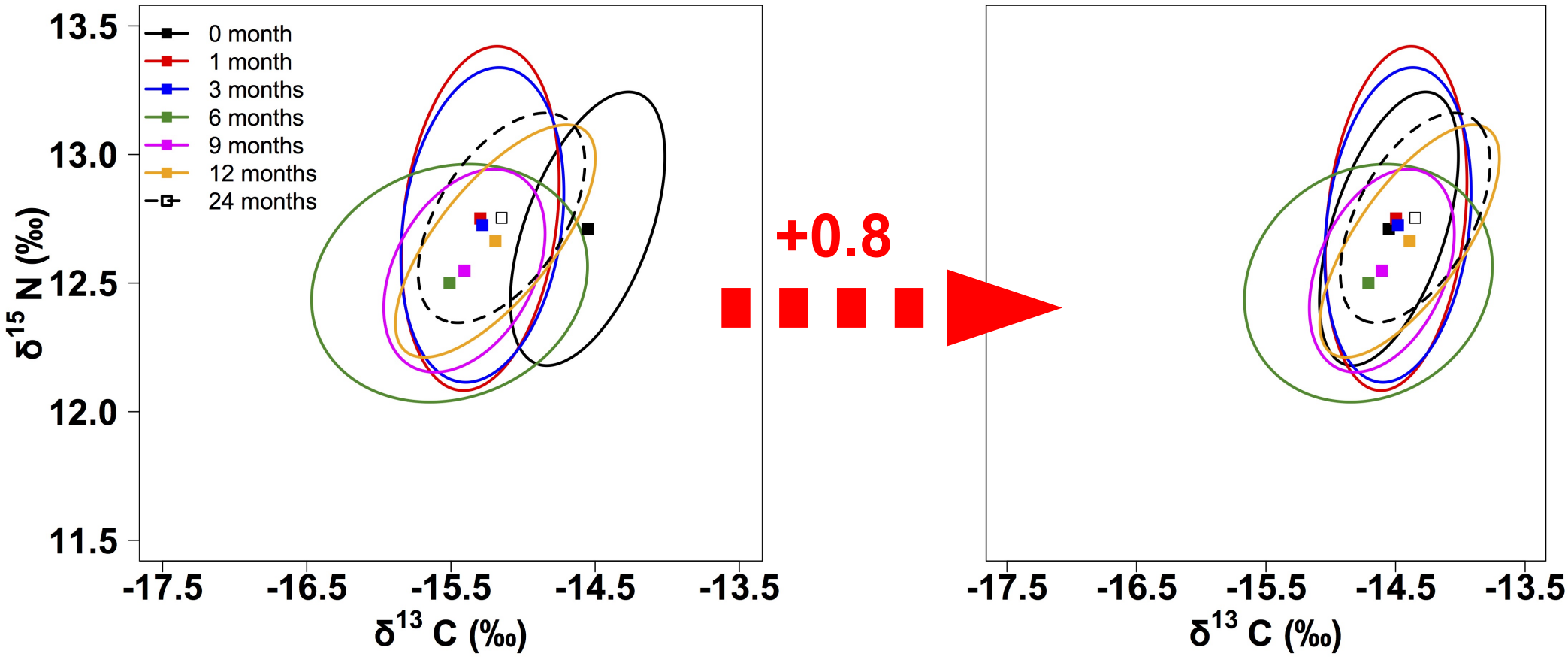
- No consistent change of SEA_B through time.
- Low overlap at 6 months.

	Mean $\delta^{13}C$	Mean $\delta^{15}N$	SEA_B	Overlap
Drying	NS	NS	NS	NS
Freezing	NS	NS	NS	< T0
Formaldehyde	Decrease	NS	NS	Low
Ethanol	NS	NS	Inconsistent	< T0

- Non-consistent changes of stable isotope values, ellipse size and reduction of overlap (6 months)

  → variation of isotopic ratios in individual sea stars, minor preservation-induced variation or **analytical error**

- Freezing: Best preservation method
- Ethanol: Beware of lipid content
- Formaldehyde:



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Thank you for your attention