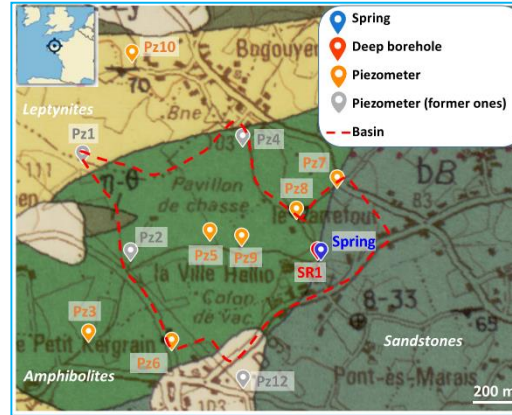
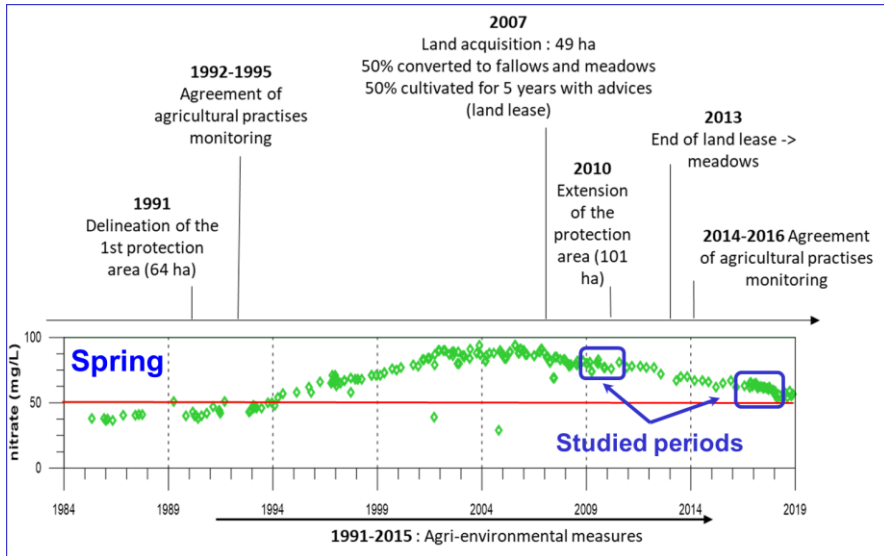


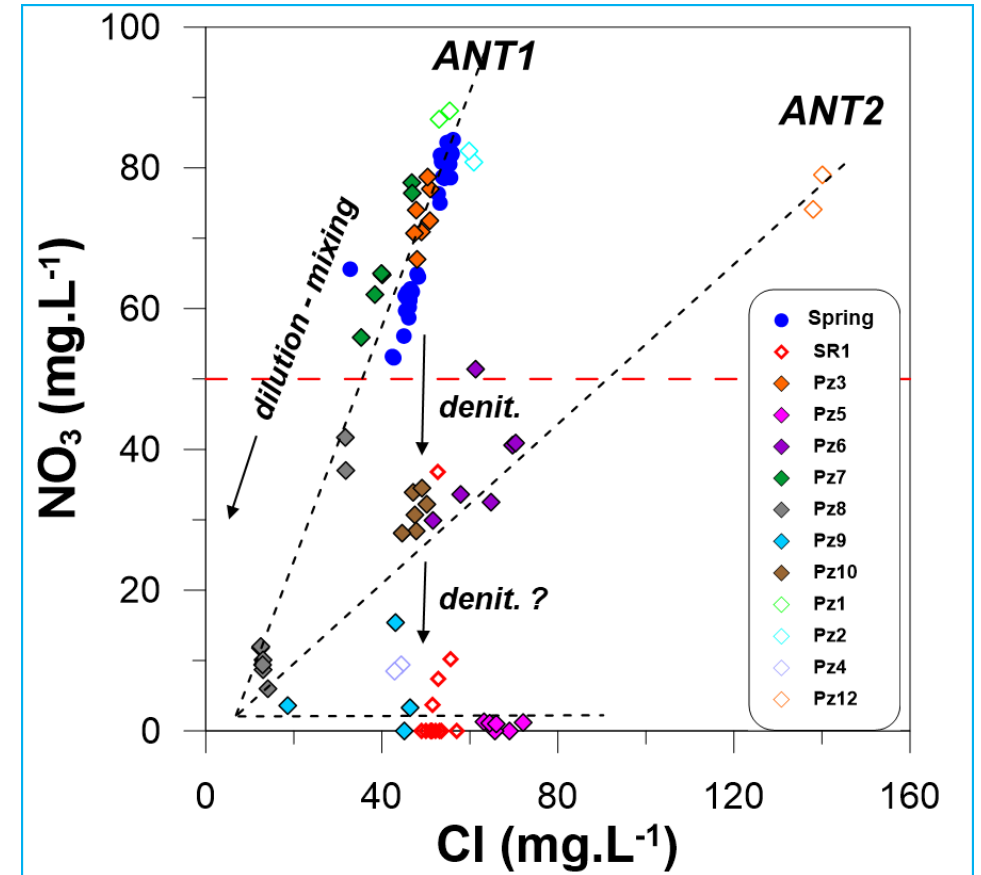
Nitrate transfer in the Critical Zone:

N & O isotopes of NO₃ and CFC-SF₆ groundwater residence time assessment

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The **Spring** has NO₃>50 mg/L since the early 90's which decreases back to ~50 mg/L nowadays.



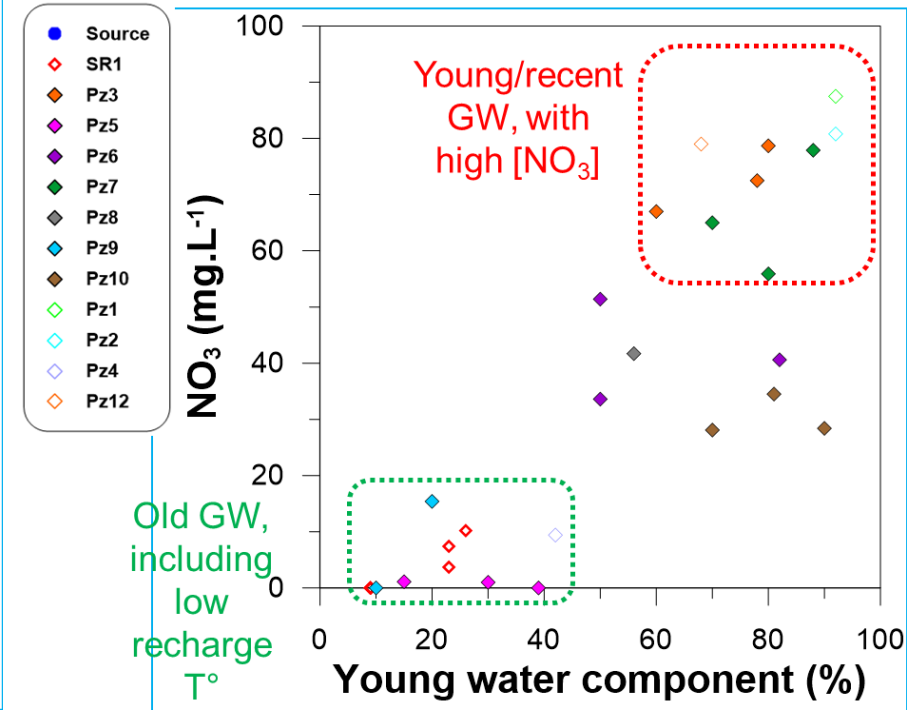
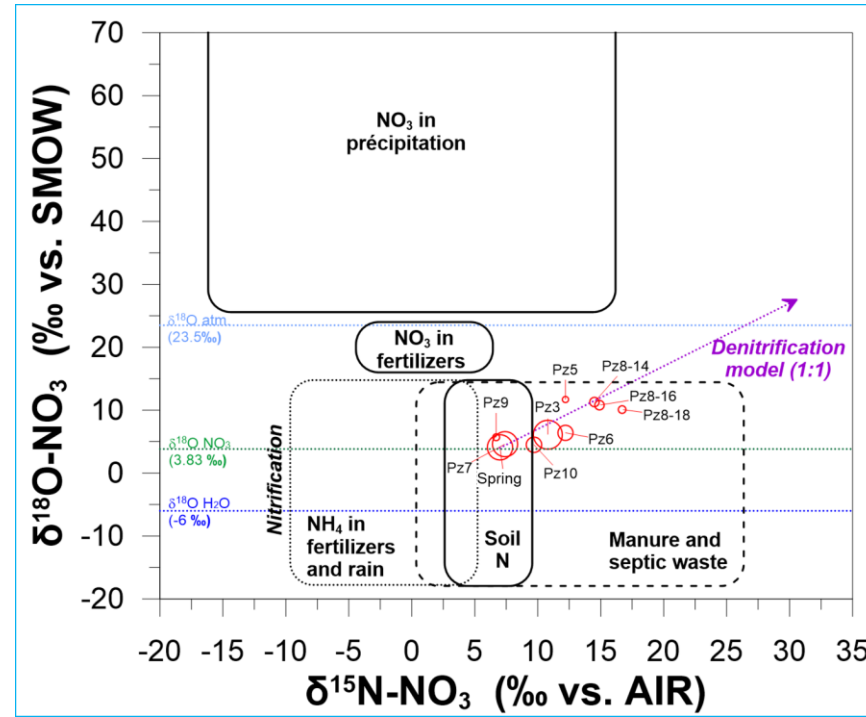
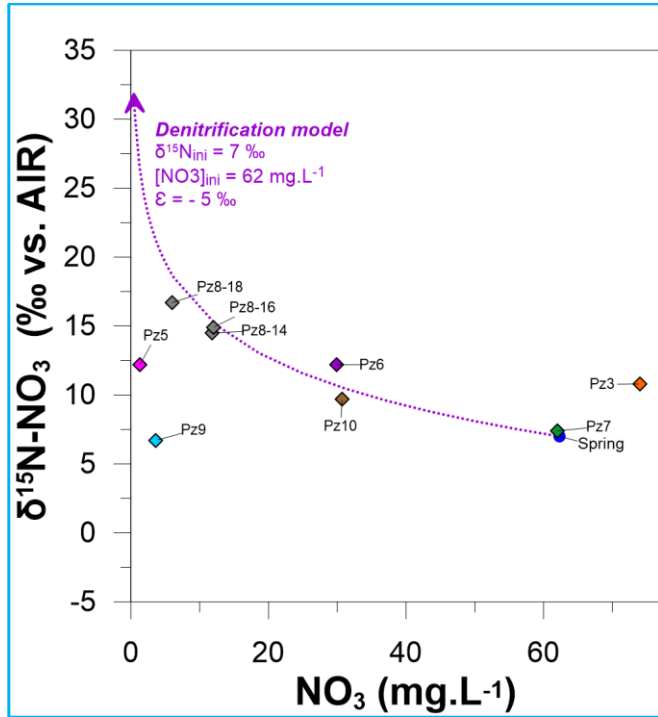
NO₃ vs. Cl shows two anthropogenic components :

- **ANT1**: impacts most of the samples: agriculture impact
- **ANT2** : **Pz12** could reflect an organic pollution enriched in Cl.
- **Between periods 1 & 2**, the **Spring**, **Pz7**, **Pz3** present [Cl] & [NO₃] attenuations: land use changes.
- **Spatially**, other samples could undergo denitrification process (at least partial), Cl remaining constant with a decreasing NO₃.

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A denitrification model from the **Source** & **Pz7** with $\epsilon = -5\text{‰}$ explains a partial denitrification for **Pz6**, **Pz10** & **Pz8**.

Pz5 & **Pz9** are not on this denitrification trend.

The initial $\delta^{18}\text{O}$ of mineral fertilizers is lost due to immobilization/mineralization in the soil resulting in a new $\delta^{18}\text{O}$ depending on the local water $\delta^{18}\text{O}$. The denitrification of **Pz6**, **Pz10**, **Pz8** is confirmed with a joint increase of $\delta^{15}\text{N}$ & $\delta^{18}\text{O}$ of NO₃ according to a 1:1 relation.

High [NO₃] samples: low residence time. **Pz5** & **SR1** have low recharge T°, long residence time, explaining the very low to null [NO₃].

Pz9: long residence time but present-day recharge T°.