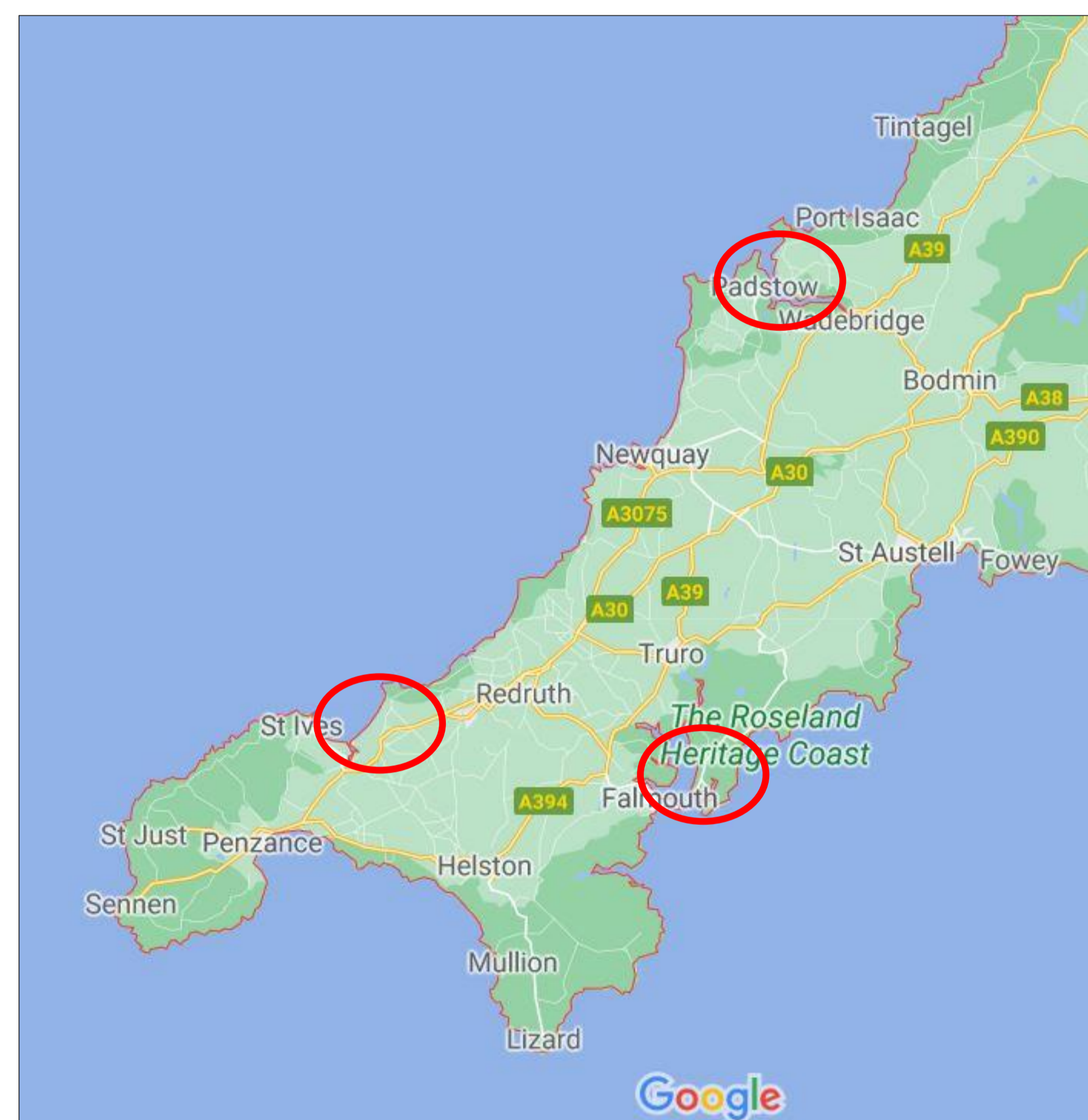


# Mining Contamination Disrupts Successional Change in Salt Marshes

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## Introduction



Sample site locations

Cornwall has a history of metal mining dating back to Bronze Age times, with many of Cornwall's estuaries being highly enriched in metals and arsenic.

Research into the mid-marsh zone heavily impacted by mining contamination suggests these are characterised by a less diverse vegetation compared with less-polluted sites in the same region.



Clear zonation patterns in Lelant

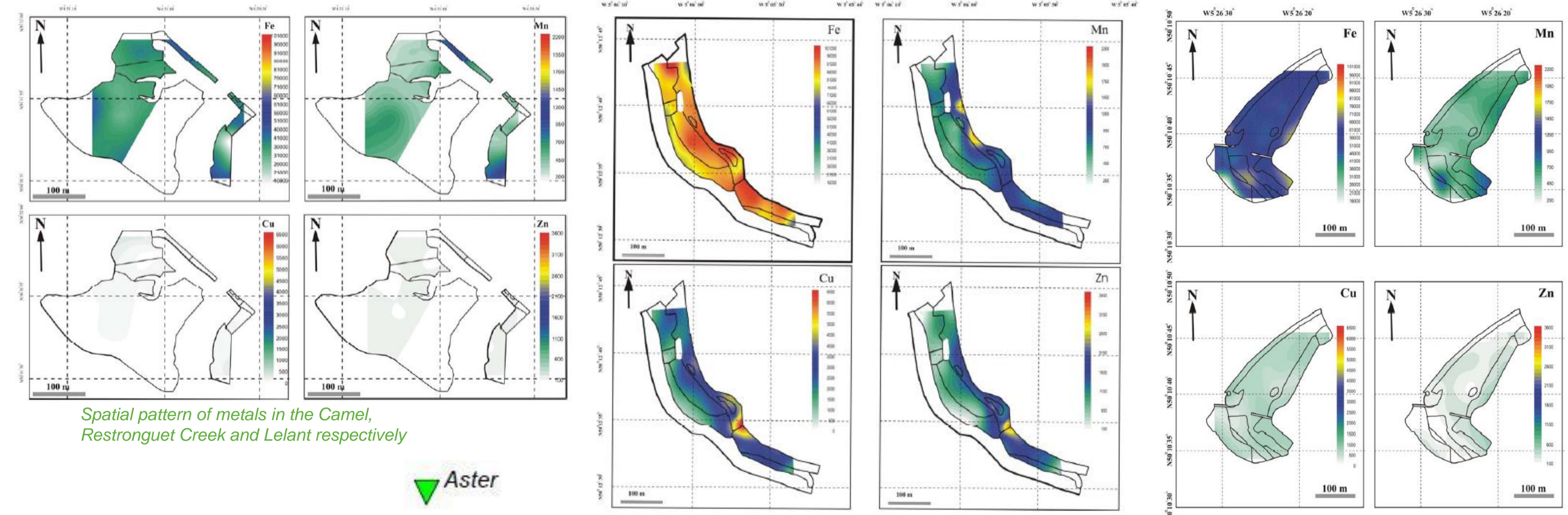
## Methods

- Quadrats measuring 4 x 4 m were analysed using National Vegetation Classification (NVC).
- Samples from the rhizosphere were collected, then oven dried for 80°C for 24 hours.
- To estimate bioavailability, metals were extracted using:
  - water (readily available);
  - ammonium acetate (AA) (most exchangeable)
  - DTPA (organic phase).
  - Total metals were extracted using X-RF.
- Multivariate analysis was performed using canonical correspondence analysis (CCA)

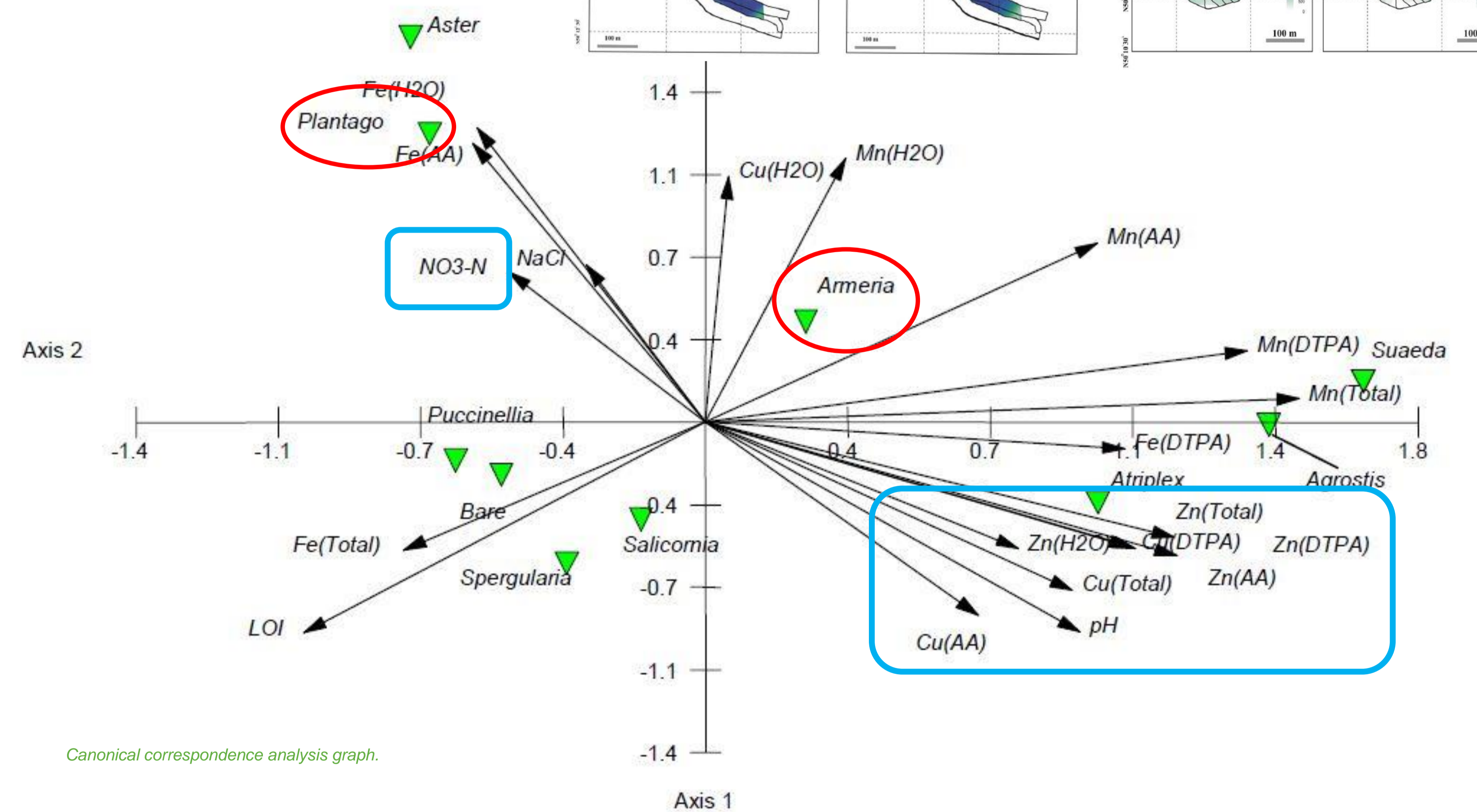
## Results

- *Plantago maritima* dominates the mid-marsh of the Camel,
- *Armeria maritima* dominated in Restronguet Creek.
- Lelant had both *P. maritima* and *A. maritima* abundant.
- *P. maritima* is opposed to the bulk of available metals (i.e. Cu and Zn) but aligned with higher nitrogen concentrations.
- *A. maritima*, however, is somewhat associated with higher metal concentrations but lower nitrogen than *P. maritima*.

## Results (continued)



Spatial pattern of metals in the Camel, Restronguet Creek and Lelant respectively



Canonical correspondence analysis graph.

## Conclusions

- When assessing plant-metal relationships in the mid-marsh, this research suggests:
  - There is a clear division between the plant species found solely within the less-polluted Camel Estuary and the more polluted marshes of Restronguet Creek and Lelant.
  - There is no salt marsh community within the NVC system where *A. maritima* is constant and dominant. This community only occurs in the heavily enriched marsh of Restronguet Creek.
  - *A. Maritima* and *P. maritima* appear to be in a successional relationship based upon concentrations of metal pollution.

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