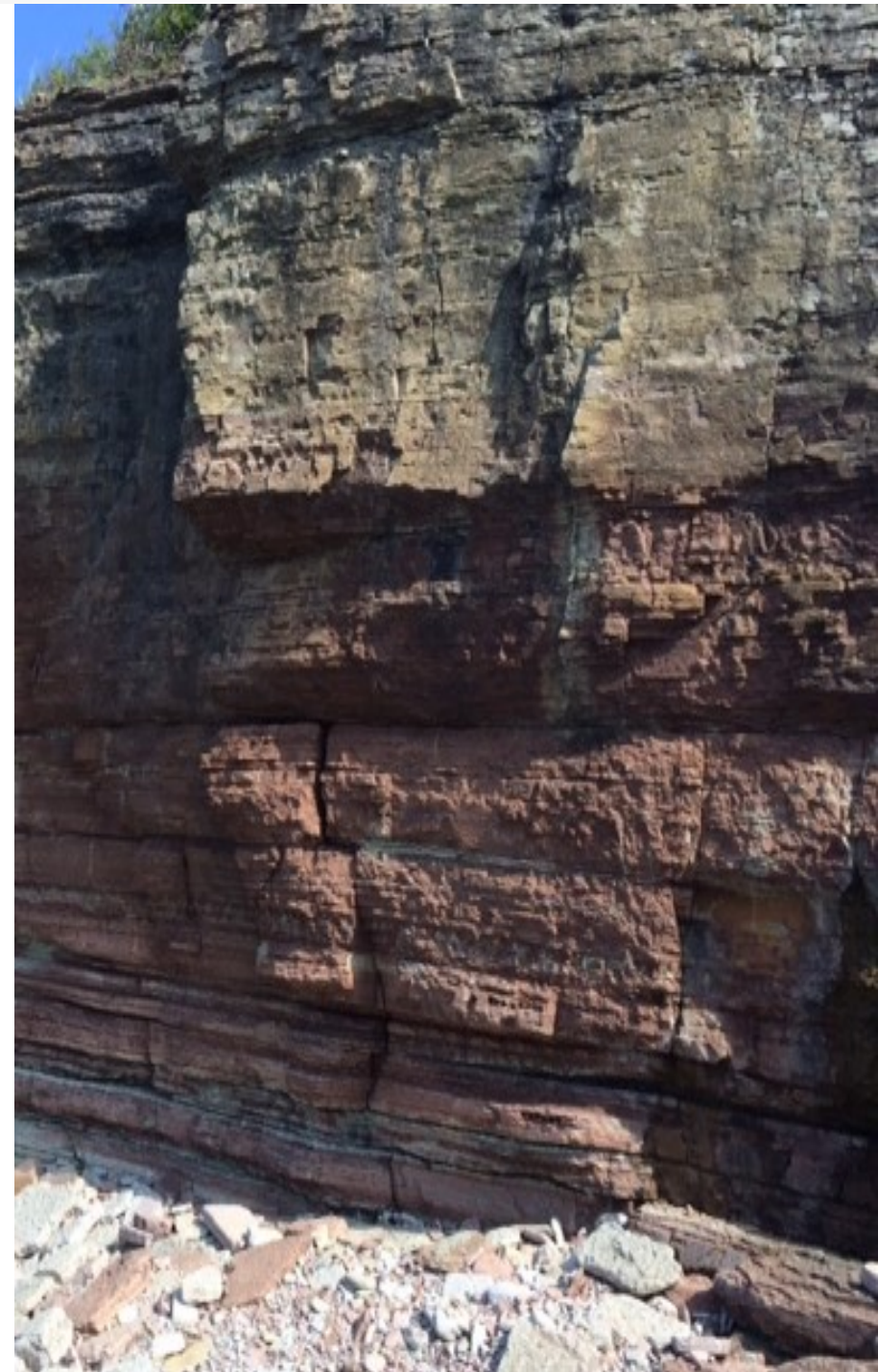
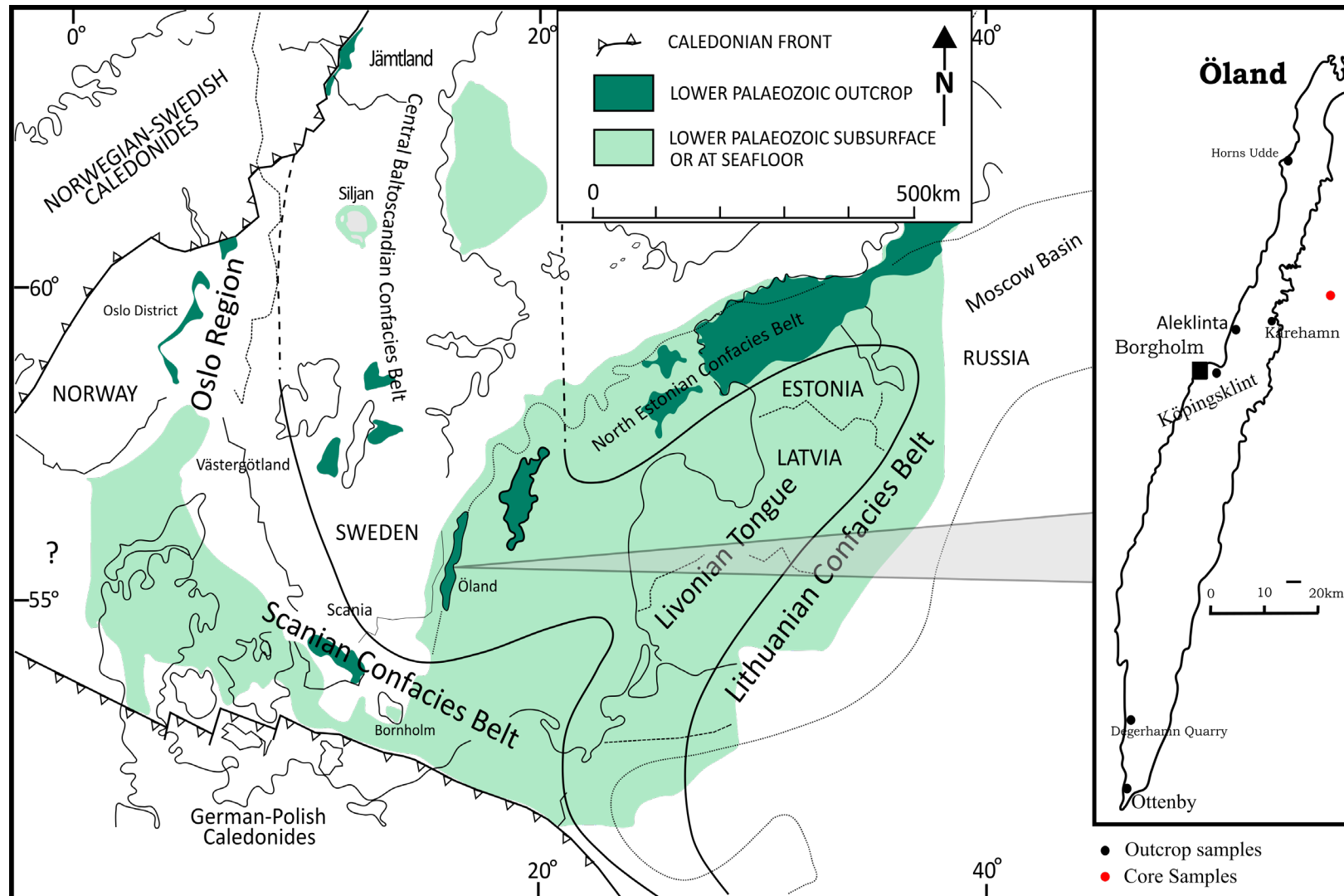


# Late diagenetic versus near-primary isotopic compositions in Ordovician carbonate rocks and fossils: A Baltoscandian example

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**Outcrop samples: Floian to Darriwilian carbonates**

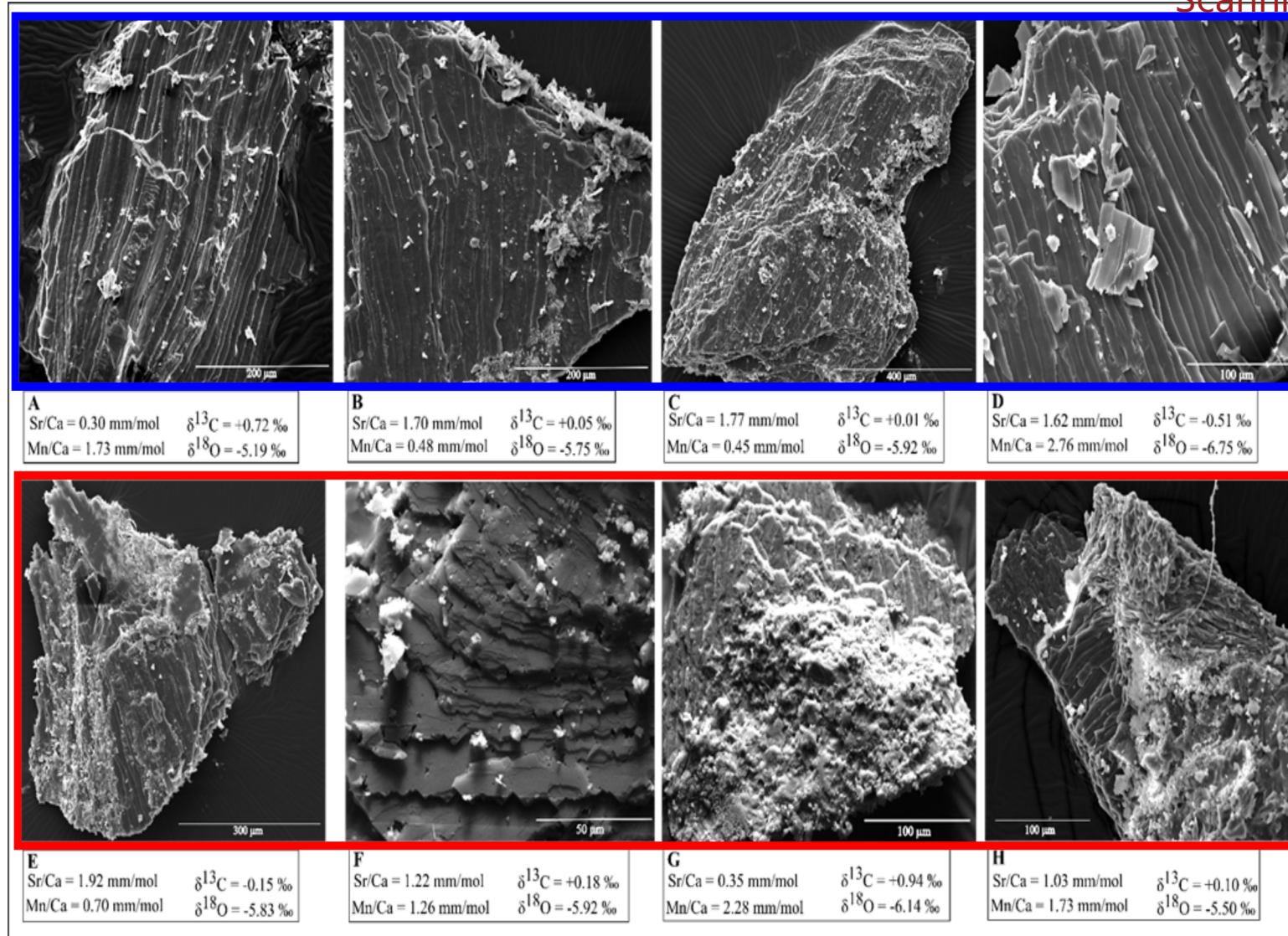
**Core samples: Darriwilian to Sandbian. Kärhamn core drilled offshore Öland, Sweden.**

The Baltoscandia Palaeobasin with Ordovician facies belts outlined (modified from Stouge, 2004).



## RESULTS

## Scanning Electron Microscopy

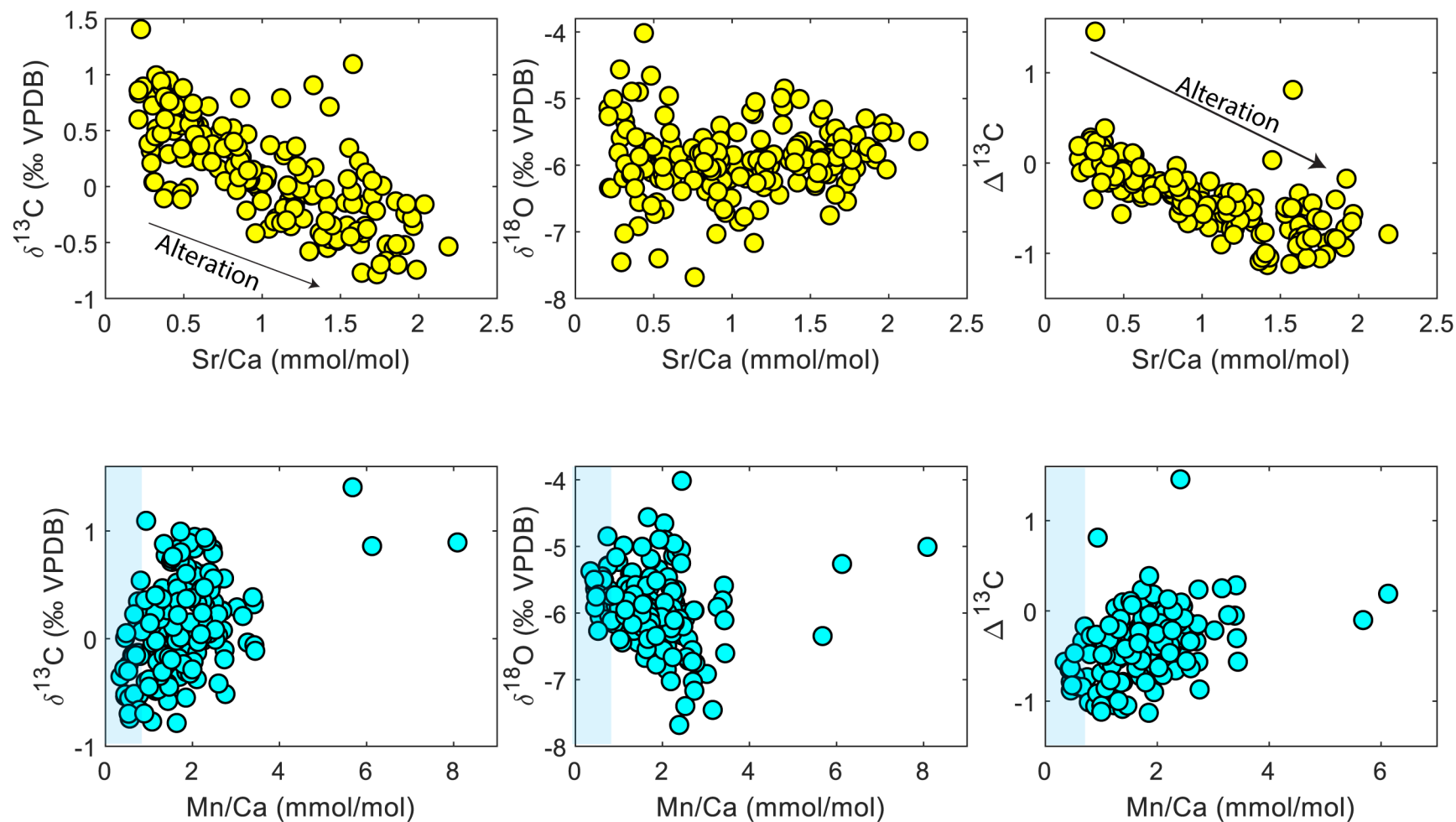


Well Preserved

Poorly Preserved

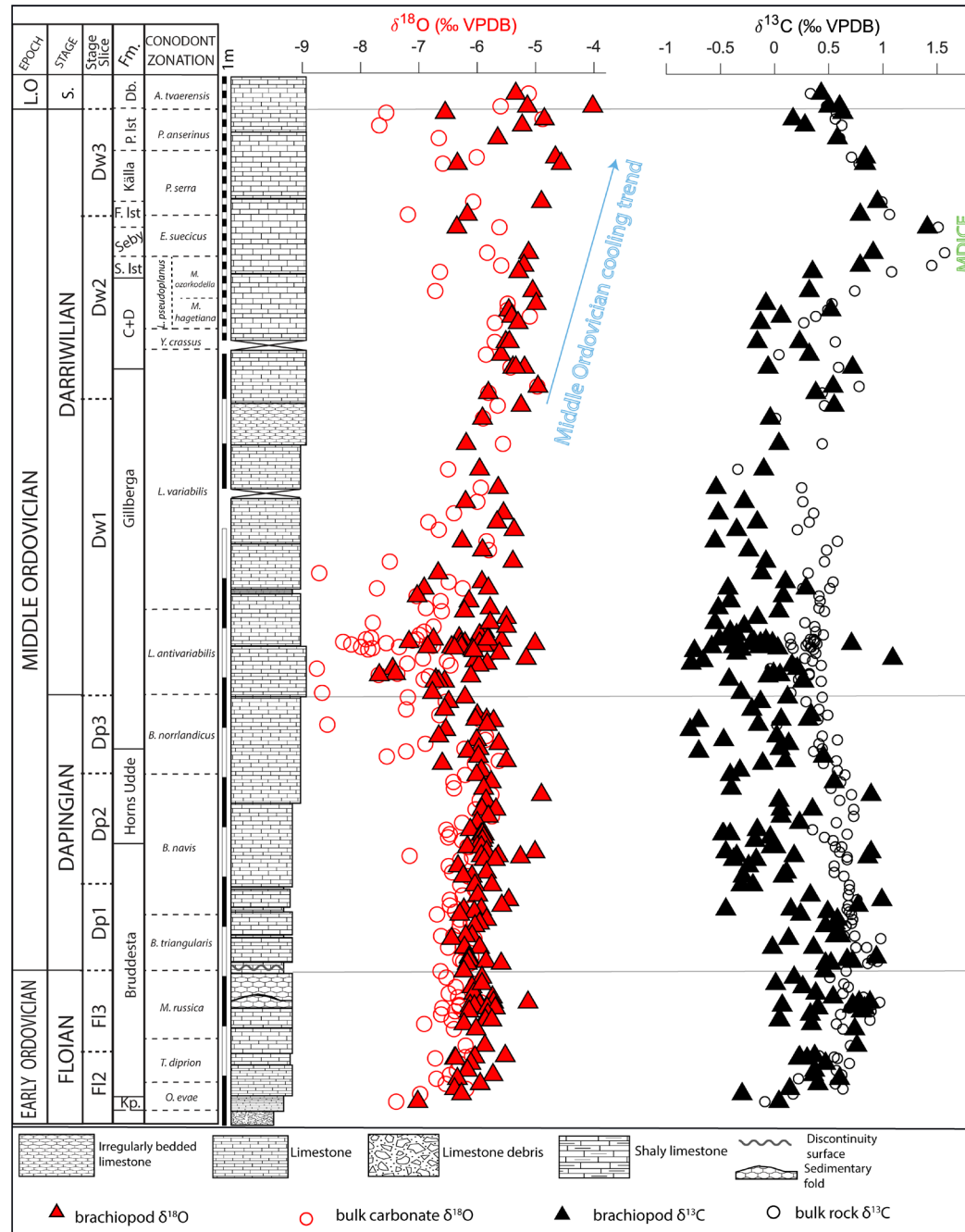
SEM photomicrographs showing varying degrees of shell preservation

- **Mn/Ca ratios do not systematically vary with C nor O isotope data.**
- **Heaviest C & O isotope values are associated with elevated Mn/Ca and depleted Sr/Ca**
- **Sr/Ca ratios show negative correlation with C isotope data suggesting that diagenetic alteration is associated with heavier C isotope values**

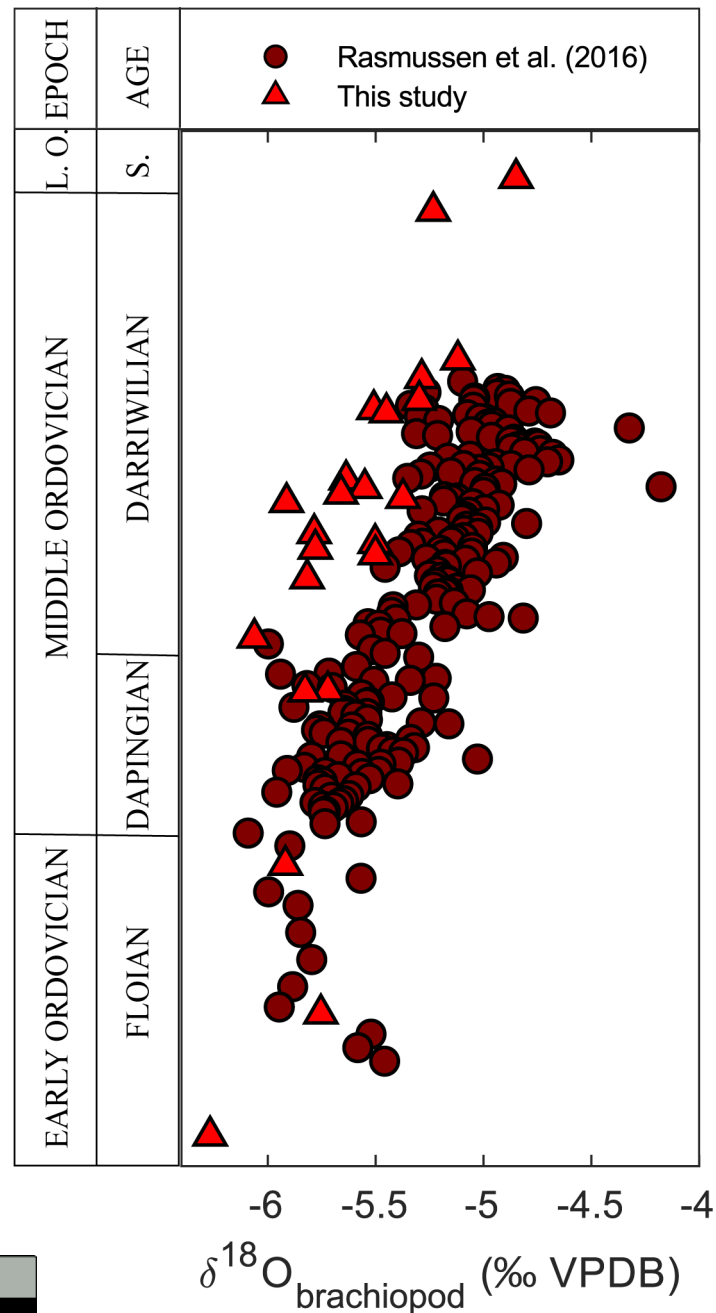


Sr/Ca and Mn/Ca ratios plotted against brachiopod oxygen and carbon isotope data

$\Delta^{13}\text{C}$  = difference between brachiopod and bulk carbonate C isotope values



- Bulk carbonate and brachiopods show similar carbon isotope trends
- Brachiopods are offset by  $-0.5\text{‰}$  wrt C isotopes.
- The prominent Middle Darriwilian carbon isotope excursion – MDICE – is preserved in both bulk rocks and brachiopods.
- O isotopes show an overall Early to earliest Late Ordovician increasing trend.



- O isotopes show a clear Darriwilian increase similar to coeval trend documented in the east Baltic (Rasmussen et al. 2016) both when all brachiopods are included or when only those with Mn/Ca  $\leq 0.75$  mmol/mol are included.
- Although partially altered, these fossil brachiopods are interpreted to retain a record of Middle Ordovician climate amelioration.