

RADIOACTIVITY IN NORTH ATLANTIC DEEP WATER CORALS

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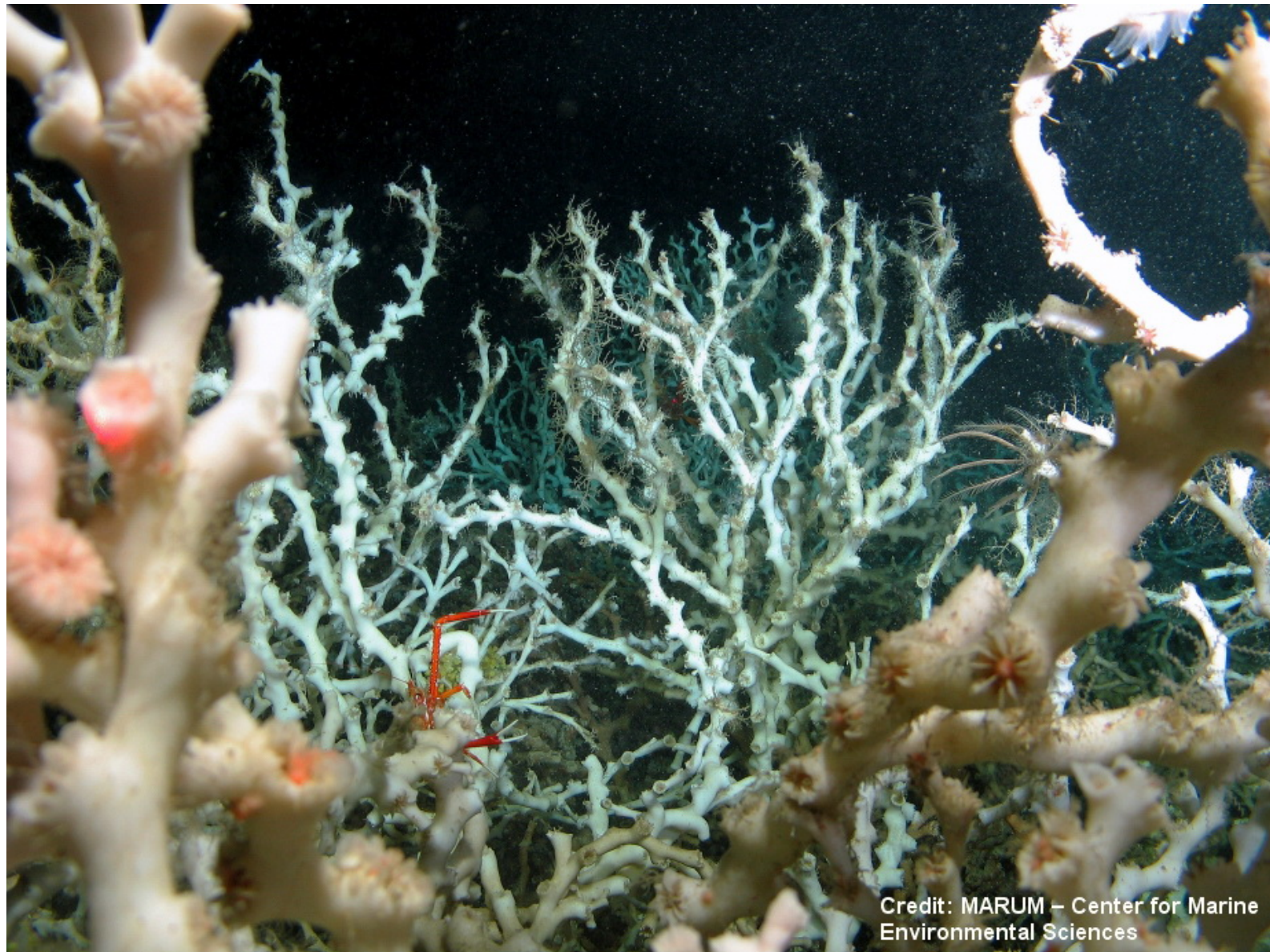
Deep water corals as natural archives

Advantages and limitations of different natural archives for reconstructing ocean changes in the Anthropocene:

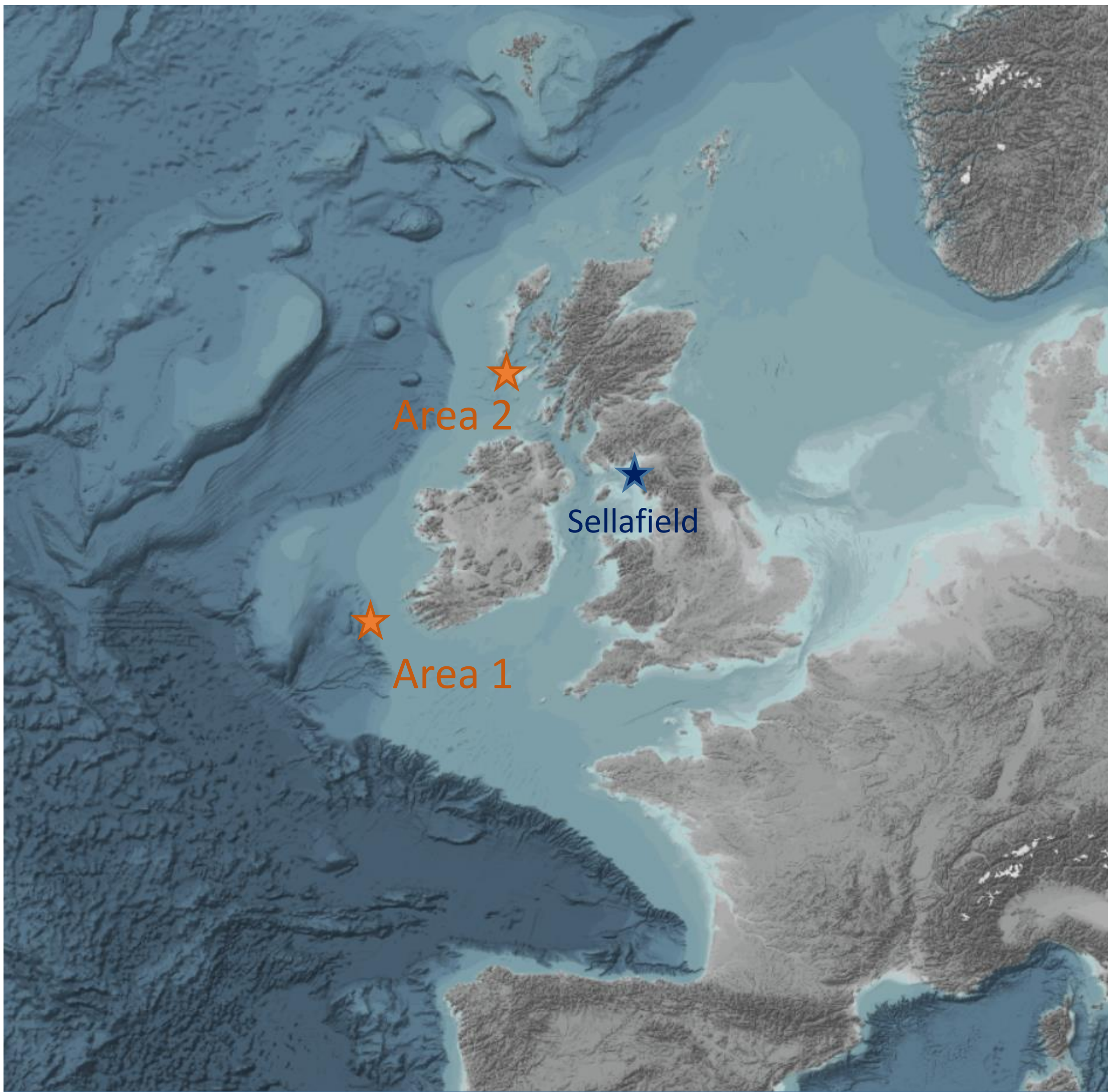
Natural archives	Advantages	Limitations
Sediment cores	No restrictions on samples due to protection of species Usually better availability of samples (core archives) Sample sizes usually higher (easier analytical detection)	Typically lower resolution (low sedimentation rates) in deeper ocean Post-depositional effects (physical, chemical) Sediment focusing Sampling of “the entire water column”
Tropical corals (e.g., <i>Porites</i>)	Excellent (sub-seasonal) resolution Well resolved yearly increments (precise dating possible)	Only surface ocean (photic zone) information Only information from tropical / subtropical regions
Deep water corals (e.g., <i>Lophelia</i>)	Information on deeper ocean processes Information also from temperate to high latitude regions	Not well resolved yearly increments (difficult dating)

Lophelia pertusa

- a cosmopolitan deep water coral species in the Atlantic Ocean
- occurring in wide range of depths
- forms bush-like colonies that may grow several metres across
- dead basal framework starts generally after 17–20 live polyp generations
- growth rates were estimated 5–34 mm·yr⁻¹ (Roberts et al. 2009 and references therein)



Sampling



Area 2

Species: *Lophelia pertusa*

Sampling: RRS James Cook 073 cruise (2012)

Location: Outer Hebrides, NE Atlantic, Mingulay Reef, 120 m water depth

Samples provided: Prof J Murray Roberts, University of Edinburgh, UK

Area 1

Species: *Lophelia pertusa*

Sampling: RV Poseidon POS400 cruise (2010)

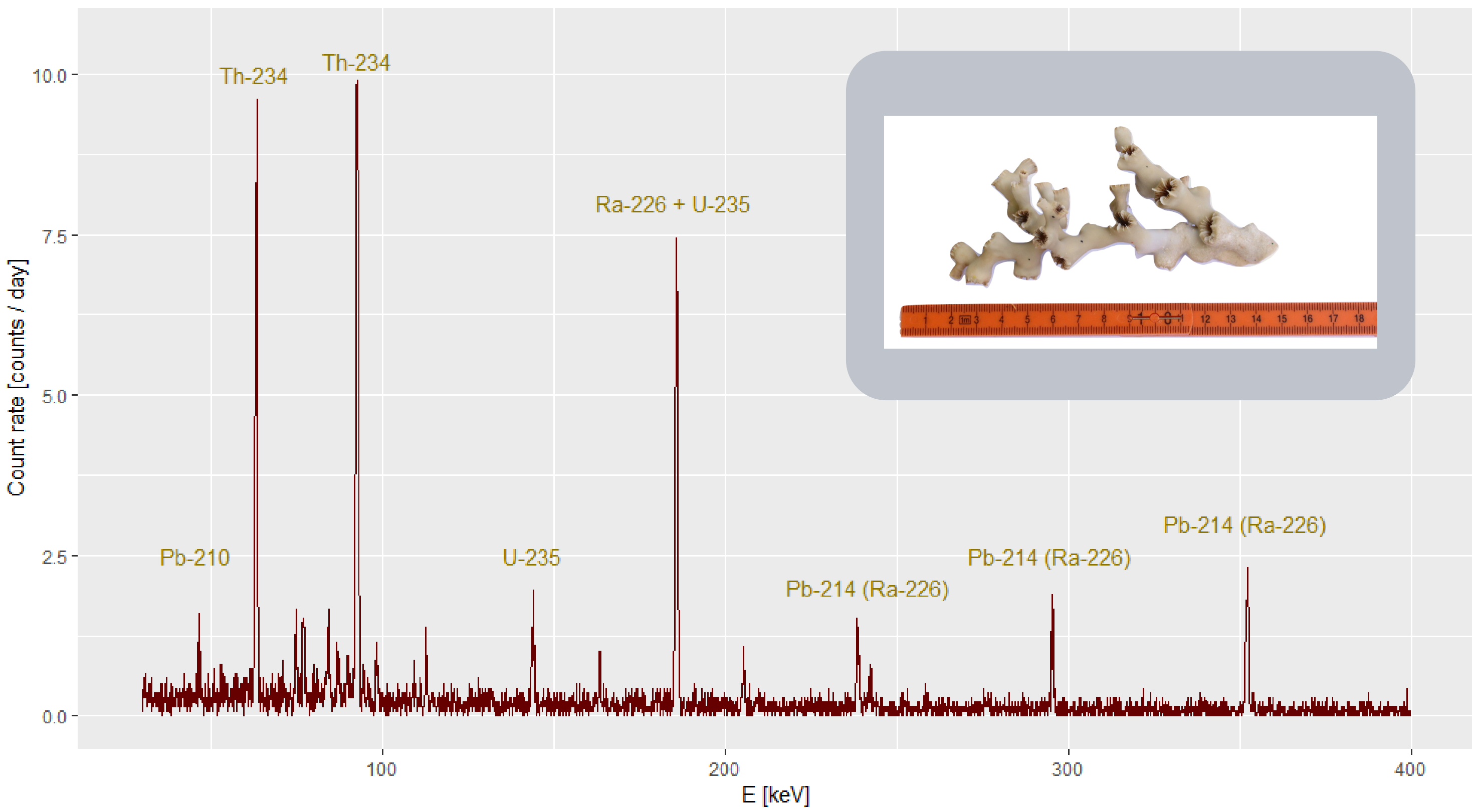
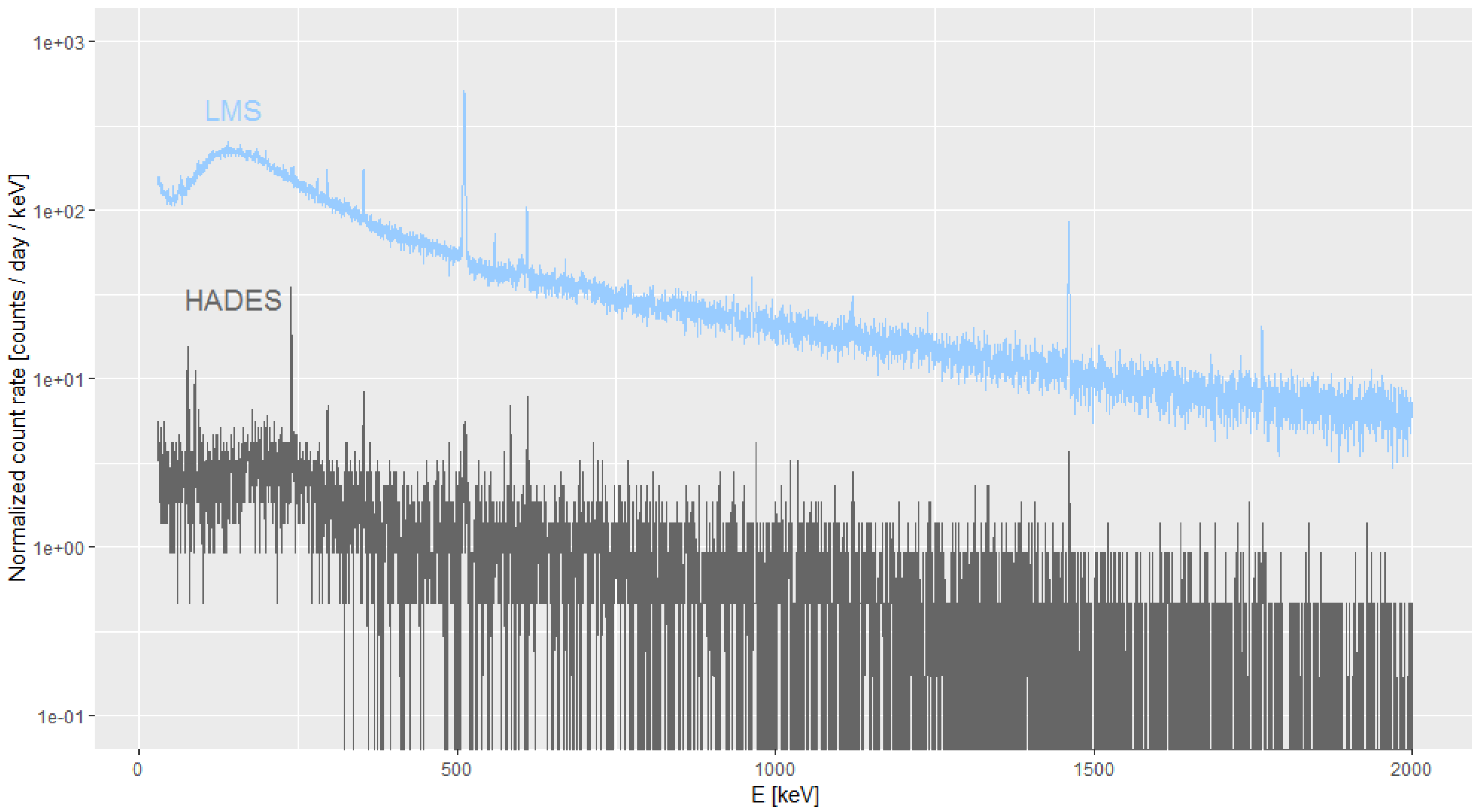
Location: SW off Ireland, NE Atlantic, Pollux Mound, 940 m water depth

Samples provided: Prof André Freiwald, Senckenberg am Meer, Wilhelmshaven, Germany

Gamma spectrometry: HADES underground laboratory, JRC-Geel

- Underground HADES (well detector Ge14): 2.57 kg and 120% rel. eff.
- Above ground LMS at IUP (low level coaxial detector 3): 1.0 kg and 50% rel. eff.

- Coral spectrum @HADES: 1.192 g coral measured over 14 days



Outlook

- Coral chronology using ²¹⁰Pb and ²²⁶Ra data from HADES
- Artificial isotopes radiochemical analysis, mass spectrometry: U & Pu isotopes
- Are radioactive tracers in deep water corals suitable proxies for deeper water masses circulation in NE Atlantic Ocean?

References

Roberts, J. M., et al. (2009). Cold-Water Corals: The Biology and Geology of Deep-Sea Coral Habitats, Cambridge University Press