

## - Preliminary results from organic-geochemical investigations of NE Atlantic waters

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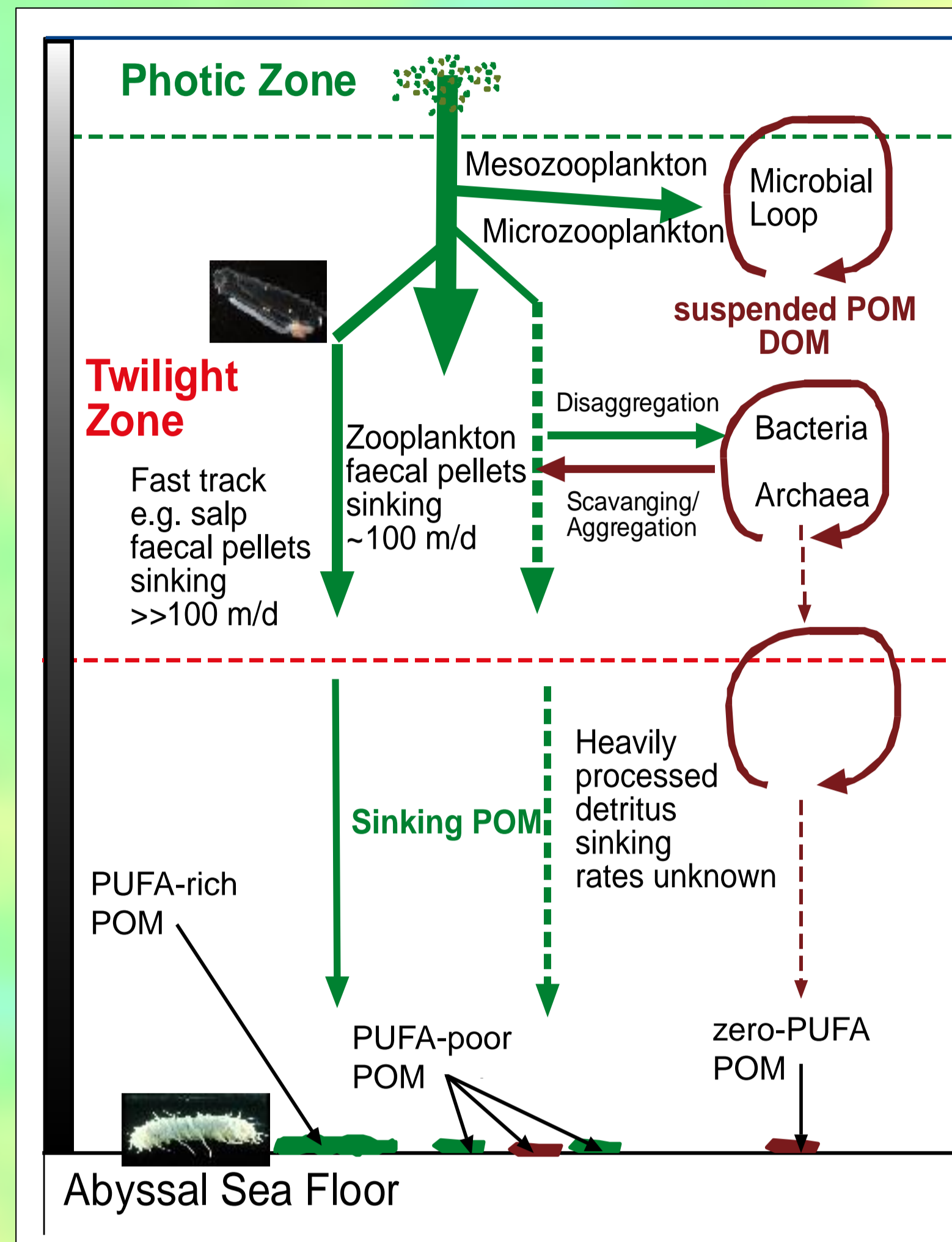
### 1 INTRODUCTION

The **biological pump** draws down atmospheric CO<sub>2</sub> and exports organic carbon from the surface ocean to the deep sea. There, organic carbon supports the benthic life and contributes to the ultimate carbon burial. The **efficiency** of this key element of the **global carbon cycle**, however, strongly depends on the degree of processing of particulate organic matter (POM) in the water column during sinking, particularly in the **Twilight Zone** (100-1000m).

#### KEY QUESTION:

**How is organic matter modified when sinking through the Twilight Zone?**

of particular interest: mono- and poly-unsaturated fatty acids (MUFAs, PUFAs)



### 3 LABORATORY PROCEDURES:

- 1) freeze-drying of SAPS filters
- 2) extraction of lipids (with organic solvents)
- 3) elemental analysis (C-N analyser)
  - contents of
    - organic carbon (C<sub>org</sub>)
    - total nitrogen (N<sub>tot</sub>)
- 4) lipid analysis (GC-MS\*)
  - lipid composition
    - proportion of labile compounds (MUFAs, PUFAs)
  - lipid concentrations

\*gas chromatography - mass spectrometry

### 2 SAMPLING:

RRS Discovery

(cruise D341, June/July 2009)

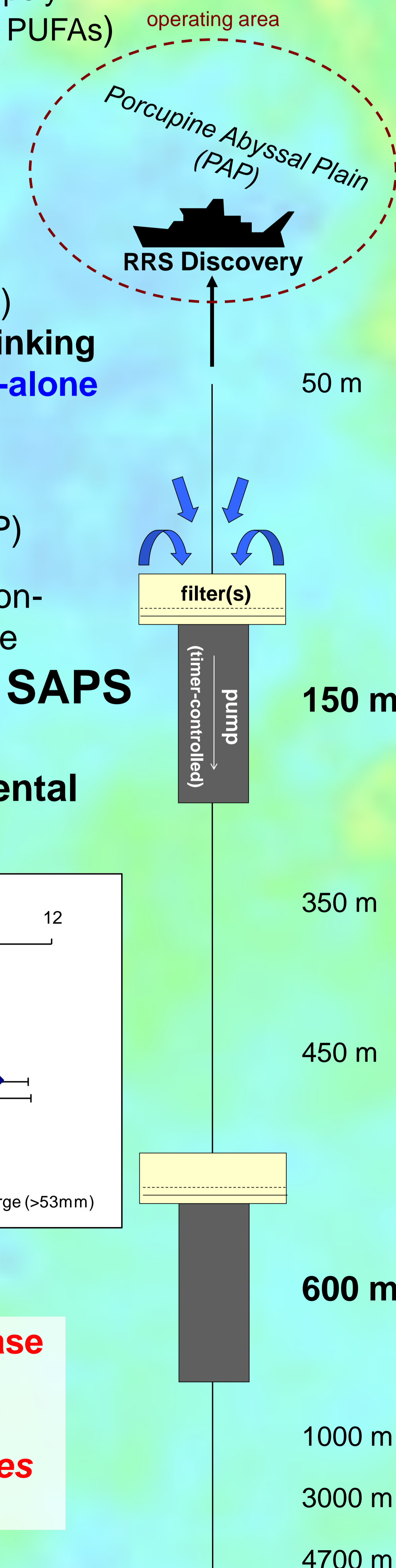
collected suspended and sinking organic matter using **stand-alone pump systems (SAPS)**

#### Location:

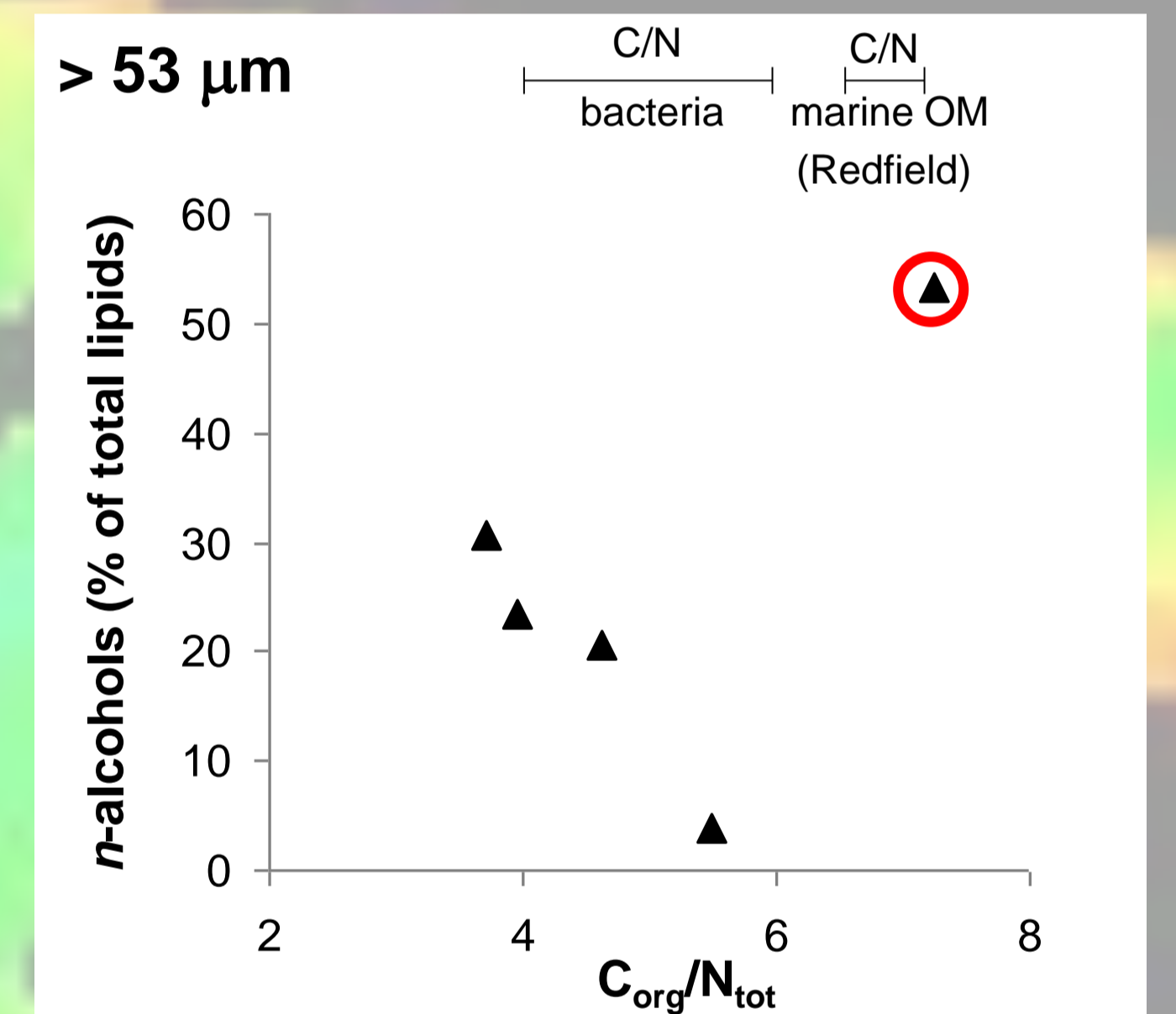
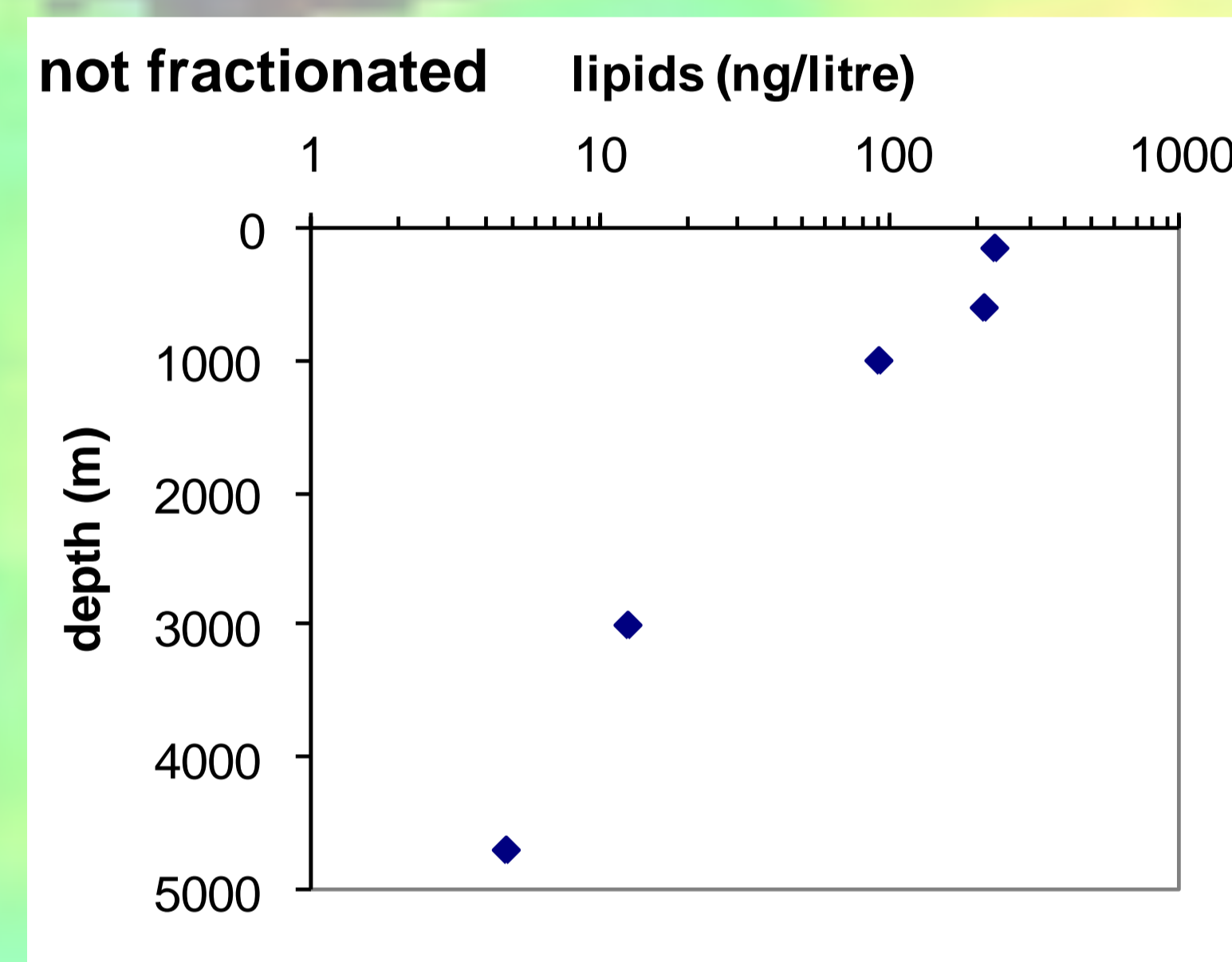
Porcupine Abyssal Plain (PAP)

1 or 2 filters used for either non-fractionated or small and large particles samples

SAPS



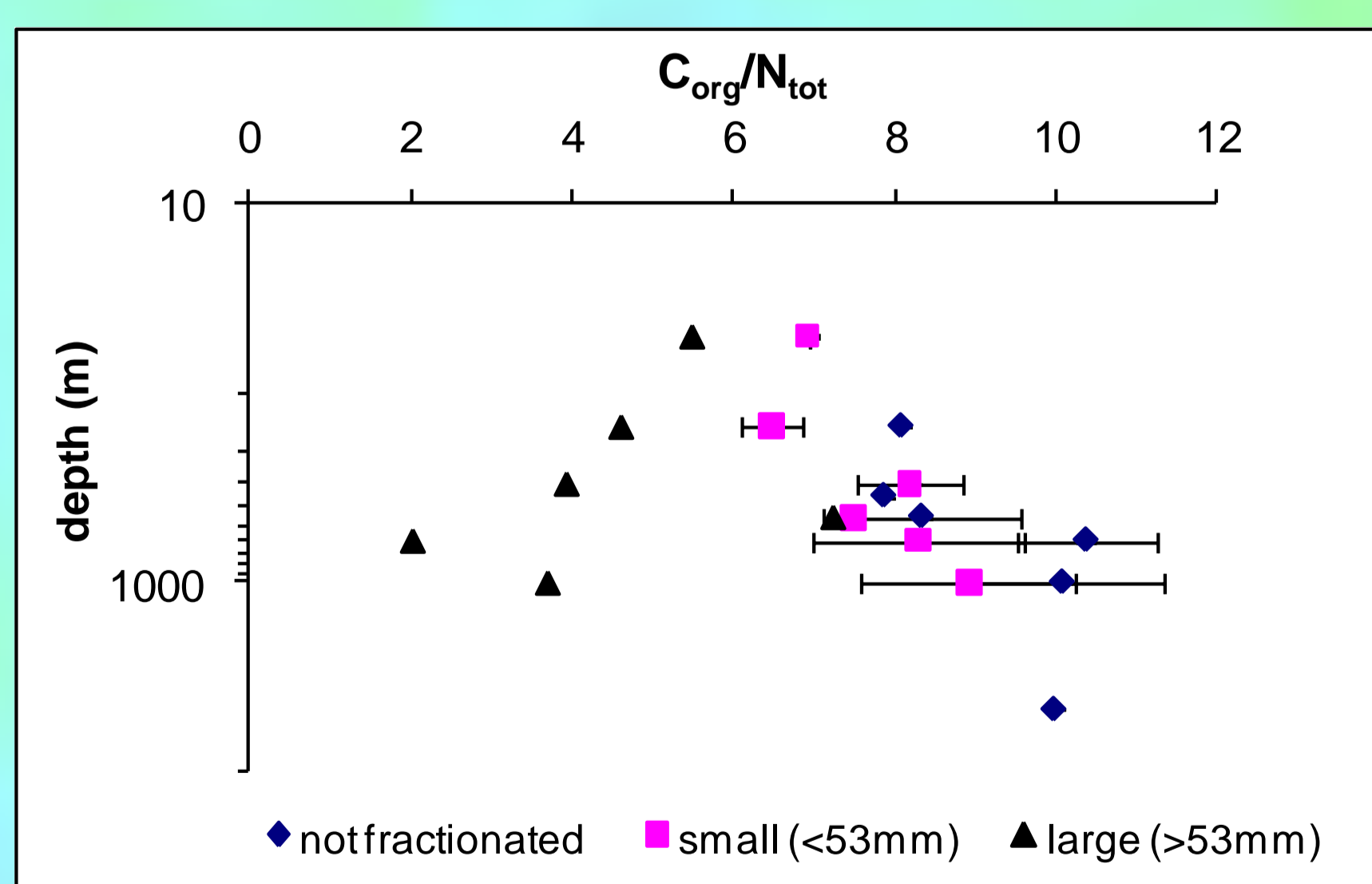
### 4a RESULTS from lipid analysis



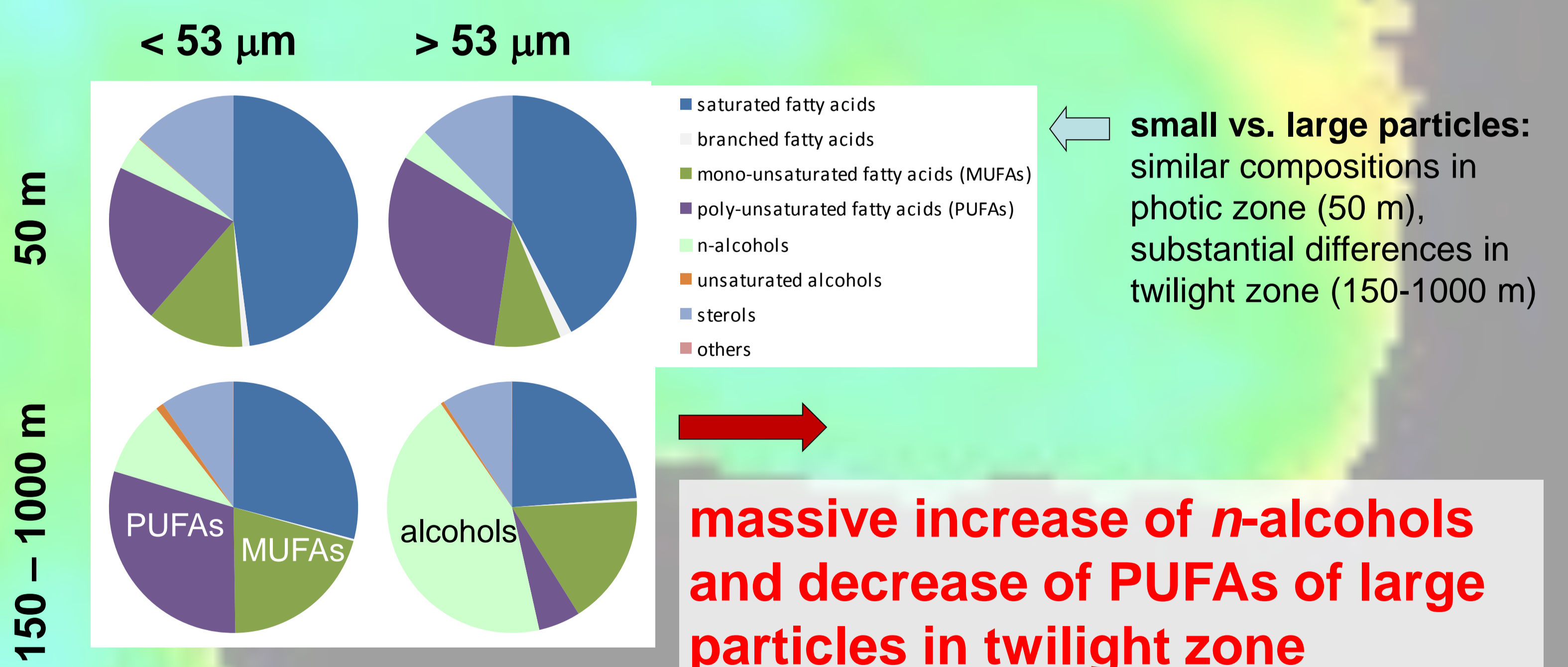
○ = extremely high proportion of n-C14 alcohol; source yet unknown

- lipid concentration decreases with depth
- increase of alcohol concentration in **large particles** correlates with decrease in C/N ratio

### 4b RESULTS from elemental analysis



→ **C/N ratios generally increase with depth**  
**however:**  
**C/N ratios of larger particles decrease!**



### 5 CONCLUSIONS:

- large part of essential lipids reworked in the water column
- small amounts of branched fatty acids and unsaturated alcohols suggest contribution from bacteria (photic zone) and zooplankton (twilight zone)
- n-alcohols produced during POM processing
- clusters (large particles) increasingly made up of bacterial organic matter (low C/N, alcohols?) and likely to consist largely of faecal pellets