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UK Ocean Acidification
Research Programme
Benthic Acidification

Flume and percolation facilities at SAMS



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Benthic OA flume study

- Effects of OA, temp & OA x temp on sediment geochemistry
- 4 types of sieved sediments (mud, carbonate sand, silicate sand & mearl)
- 4 campaigns (3-4 months each)
- Two pCO₂: 380 & 750 ppm
- Three temp: 16, 20 & 24°C
- 6 flumes in total

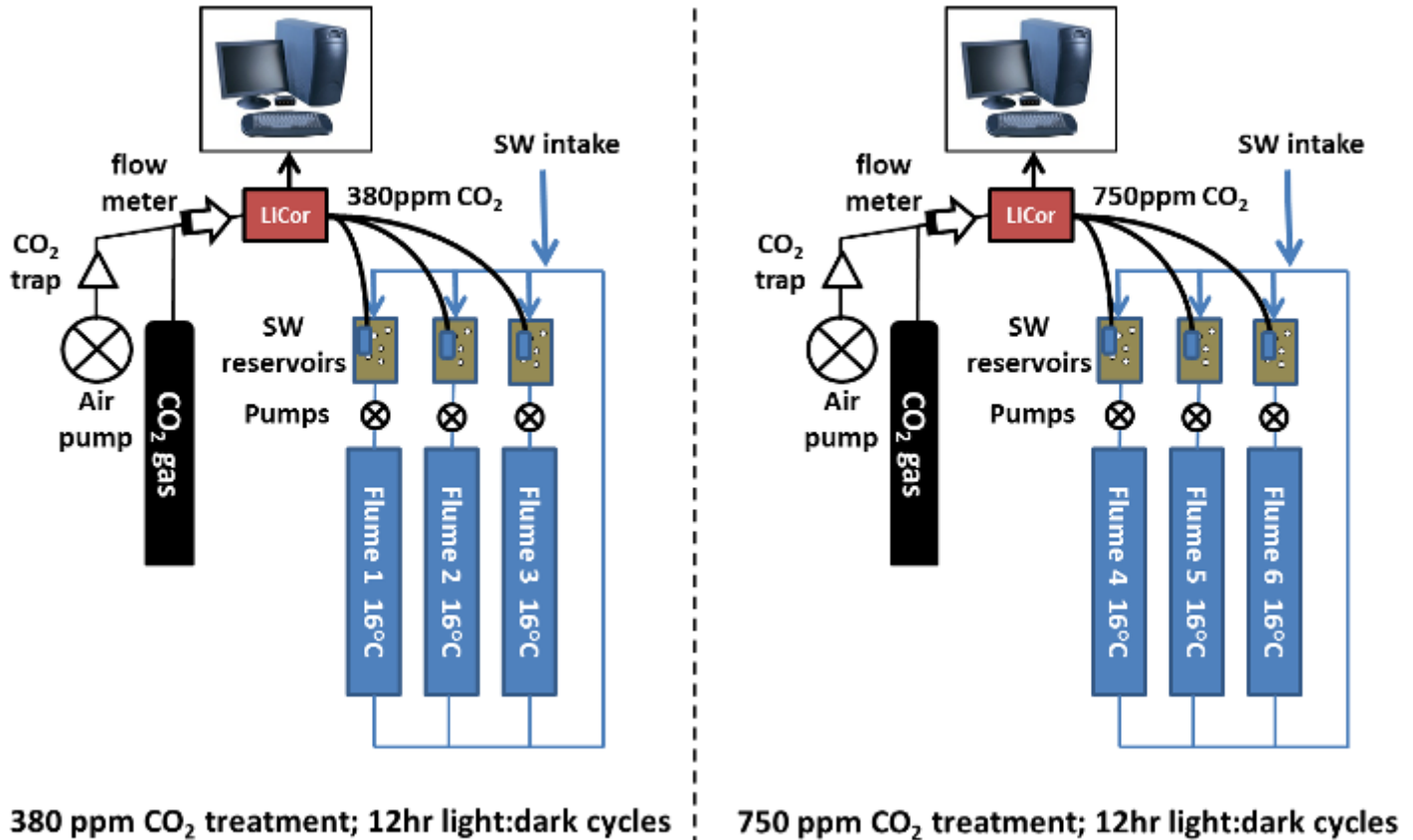


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Flume setup in CT room



(Findlay et al 2008)



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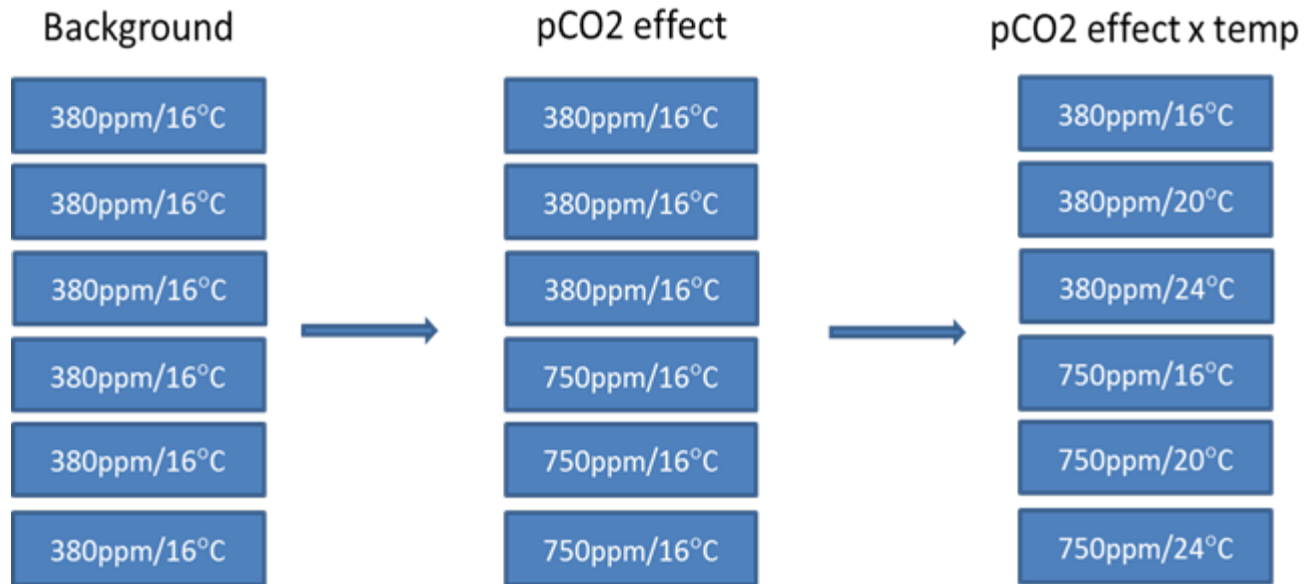


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Experimental design



~3 months x 4 sediments; 12hr light:dark cycles

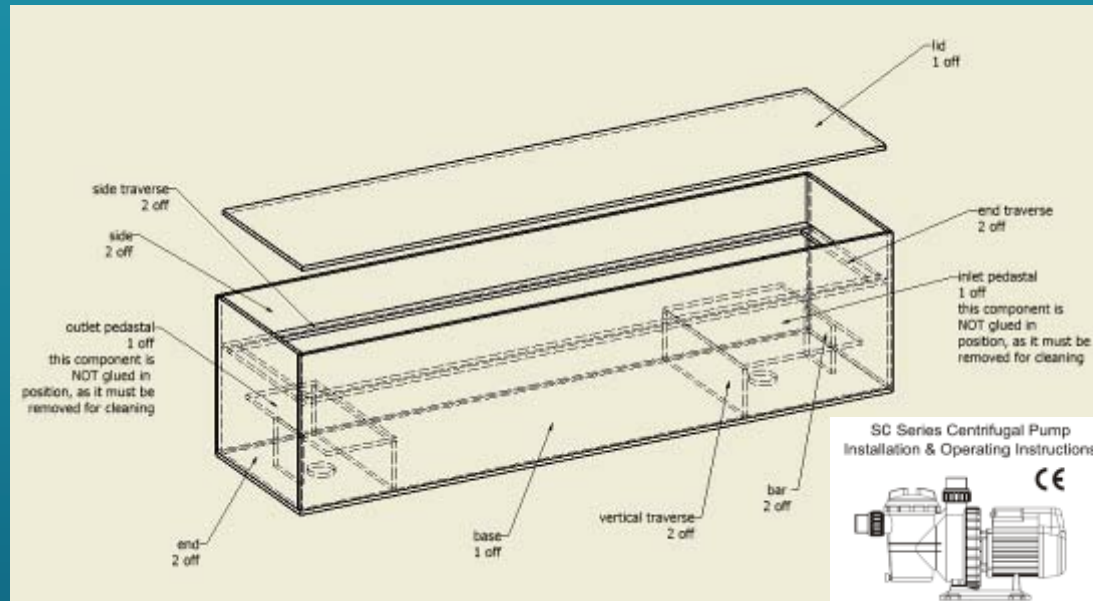


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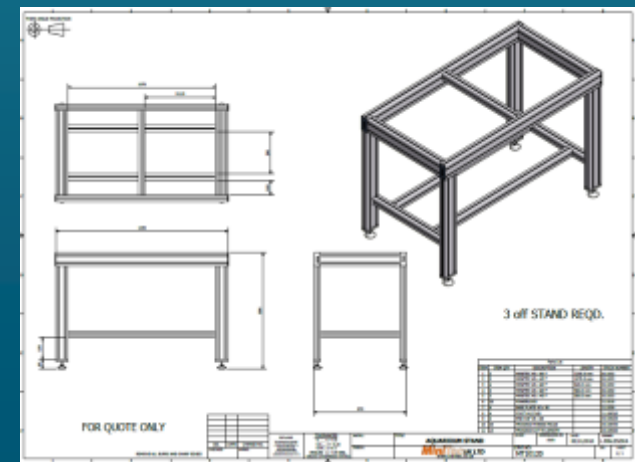


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Flume design



- 8 mm glass recirculating flumes
- Dimensions: 1200x316x300 mm
- ~21 dm³ sediment/flume
- ~50 dm³ SW/flume (+ reservoir)
- Anodized aluminium stands
- 2 flumes/stand
- Recirculating centrifugal pump



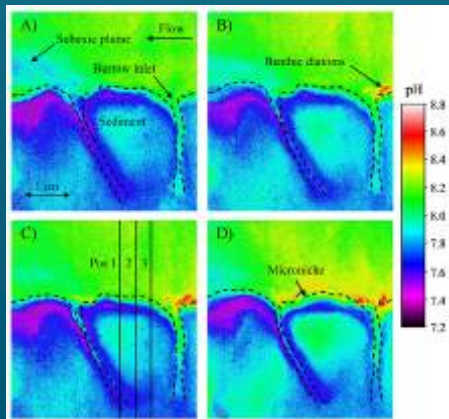
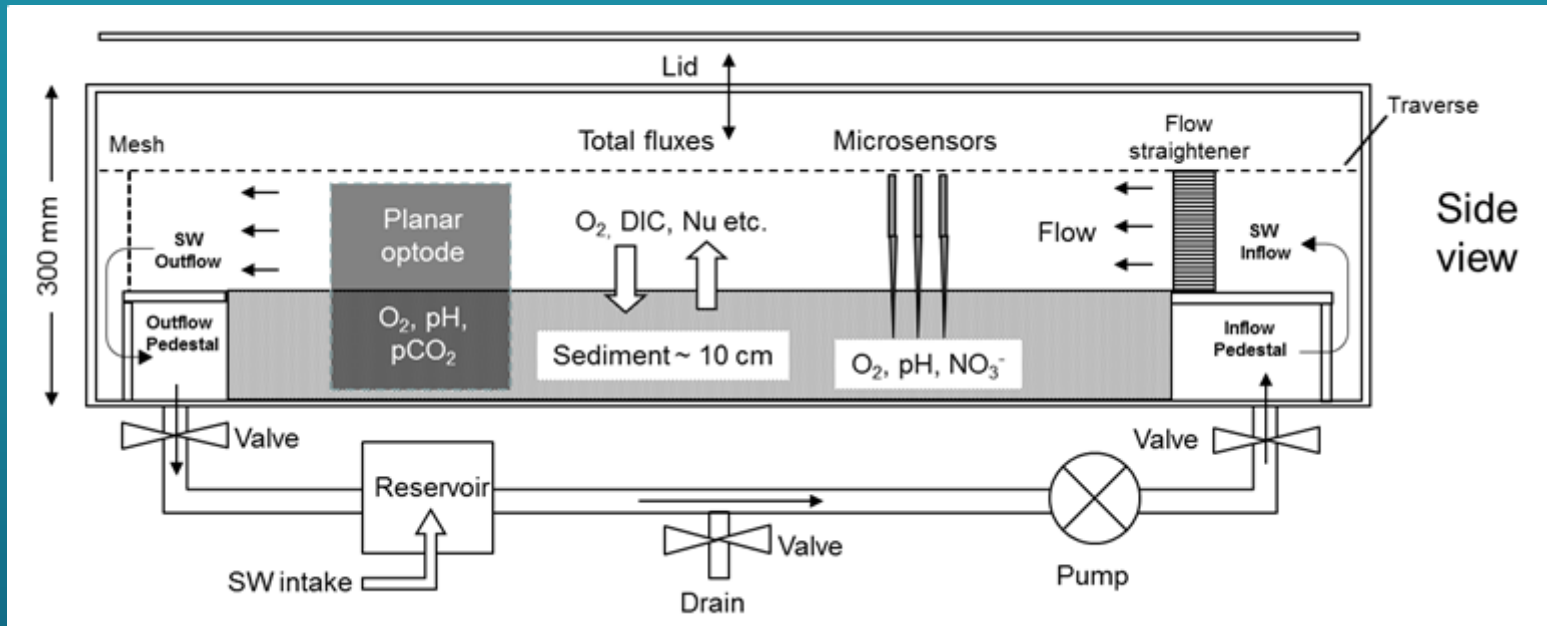
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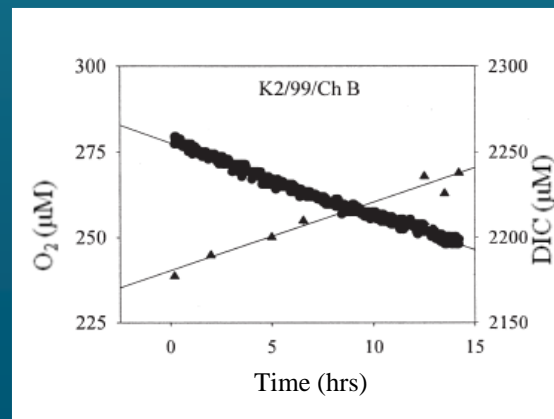
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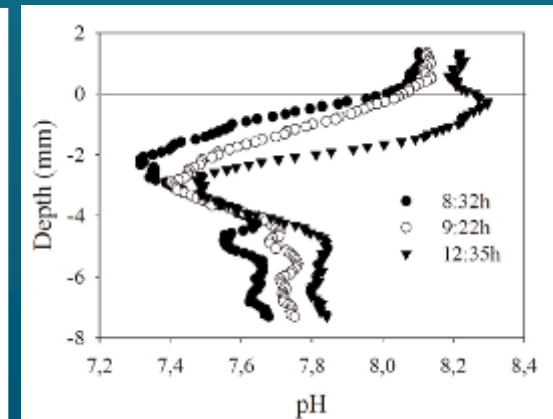
Flume measurements



Stahl et al 2006



Stahl et al 2004

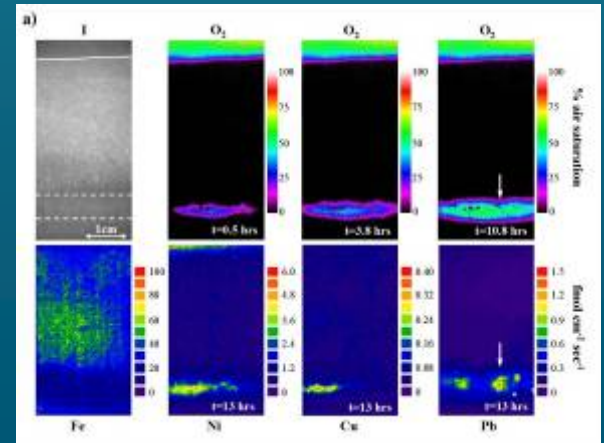
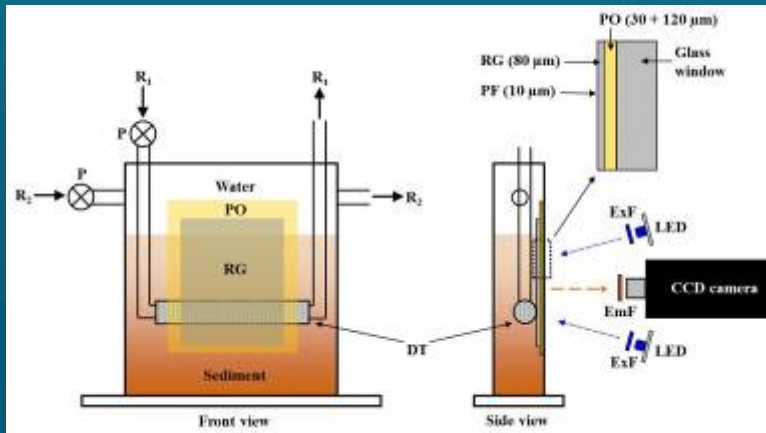
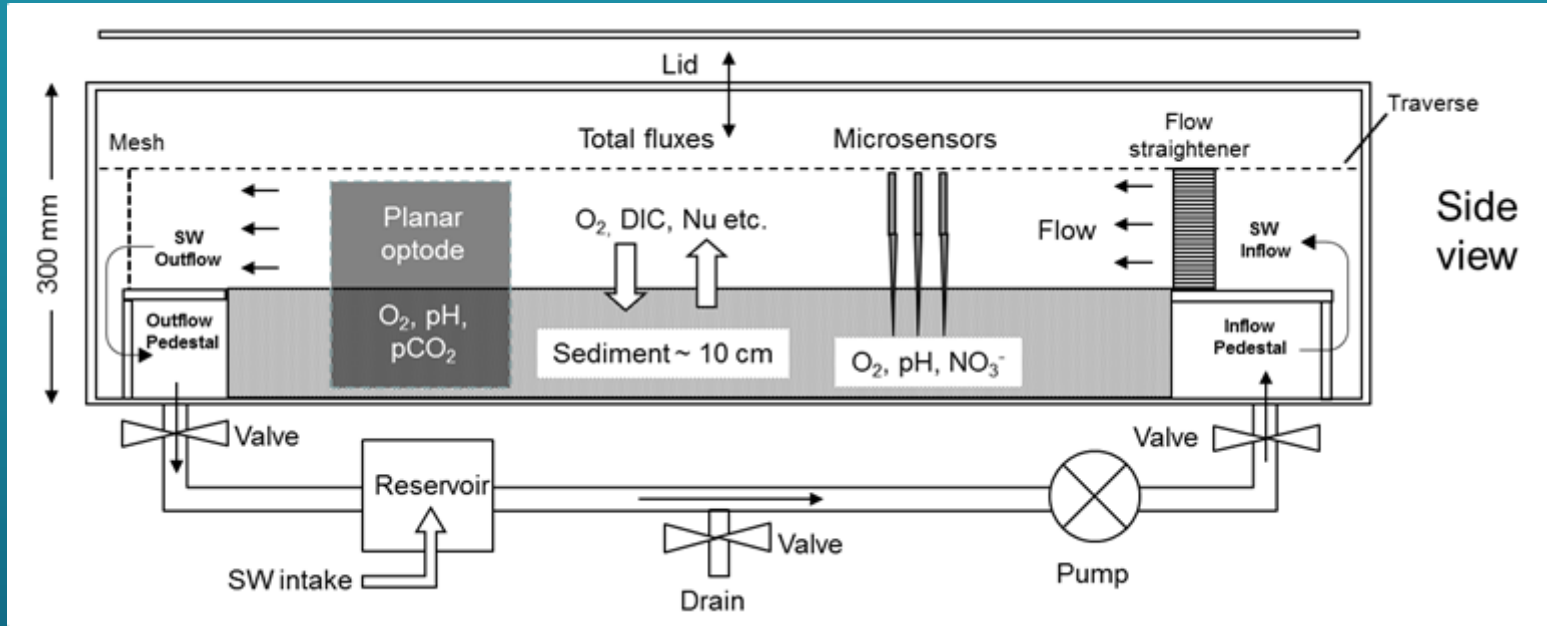


Stahl et al 2006



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Flume measurements



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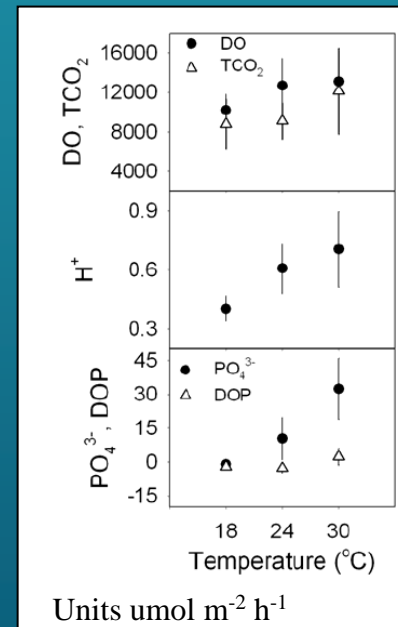
(Stahl et al. in review)



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Percolating cores (FTR's) to complement flumes for permeable sediments



Units $\mu\text{mol m}^{-2} \text{h}^{-1}$

Eyre et al 2008



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Buffering capacity of silicate and carbonate sand



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Other measurements in flumes and percolation cores

Patterson et al - microphytobenthos/microbial films



PAM-pigments



Mag PI



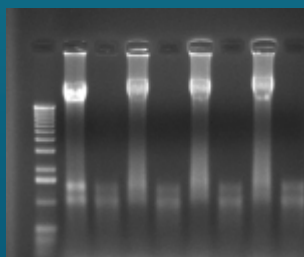
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EPS



Osborn et al - molecular techniques (nitrification/denitrification, anamox bact)



DNA/RNA isolation



Diversity responses:
454 tag-sequencing
of rRNA genes



Community structure
Responses (T-RFLP)

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Kamenos et al - mearl, DMSP fluxes



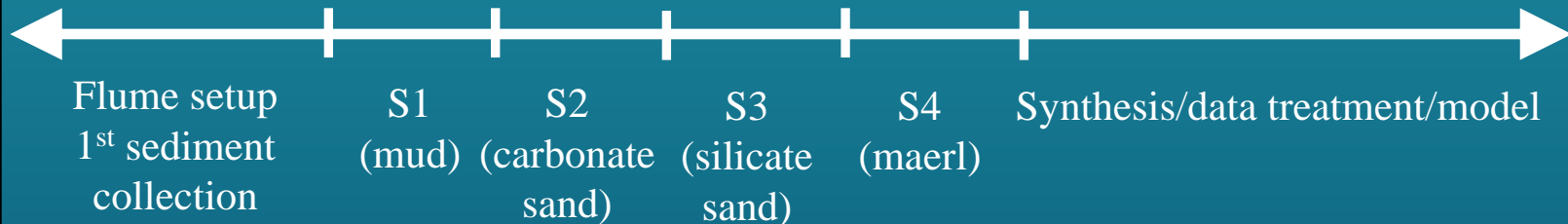


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Time line

March 2011 July 2011 Nov 2011 March 2012 July 2012

0-8 9-12 13-16 17-20 21-24 25-36



- D2.2 - month 20: Dataset describing changes in the structure and diversity of microbial communities in response to OA in relation to changes in sediment geochemistry
- D2.1 - month 24: Total solute exchange rates (O₂, pCO₂, DIC, alkalinity and nutrients) from flume & percolation experiments
- D.2.2 - month 27: Dataset describing qualitative and quantitative changes in N-cycling guilds in response to OA in relation to N-cycling process measurements

