

Production of Seawater DMS and Related Compounds, measurements from the NOAA Ship Ronald Brown

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Questions:

is there sufficient marine DMS (dimethyl sulphide) production to sustain observed flux and is this enough to produce observed CCN (cloud condensation nuclei) and clouds?

what is the role light/UV (*f* clouds, POCs (pockets of open cells), and eddies, filaments on DMS production?

Oceans supply globally:

98% of atmospheric DMS

94% MSA (methanesulfonic acid)

32% SO₂

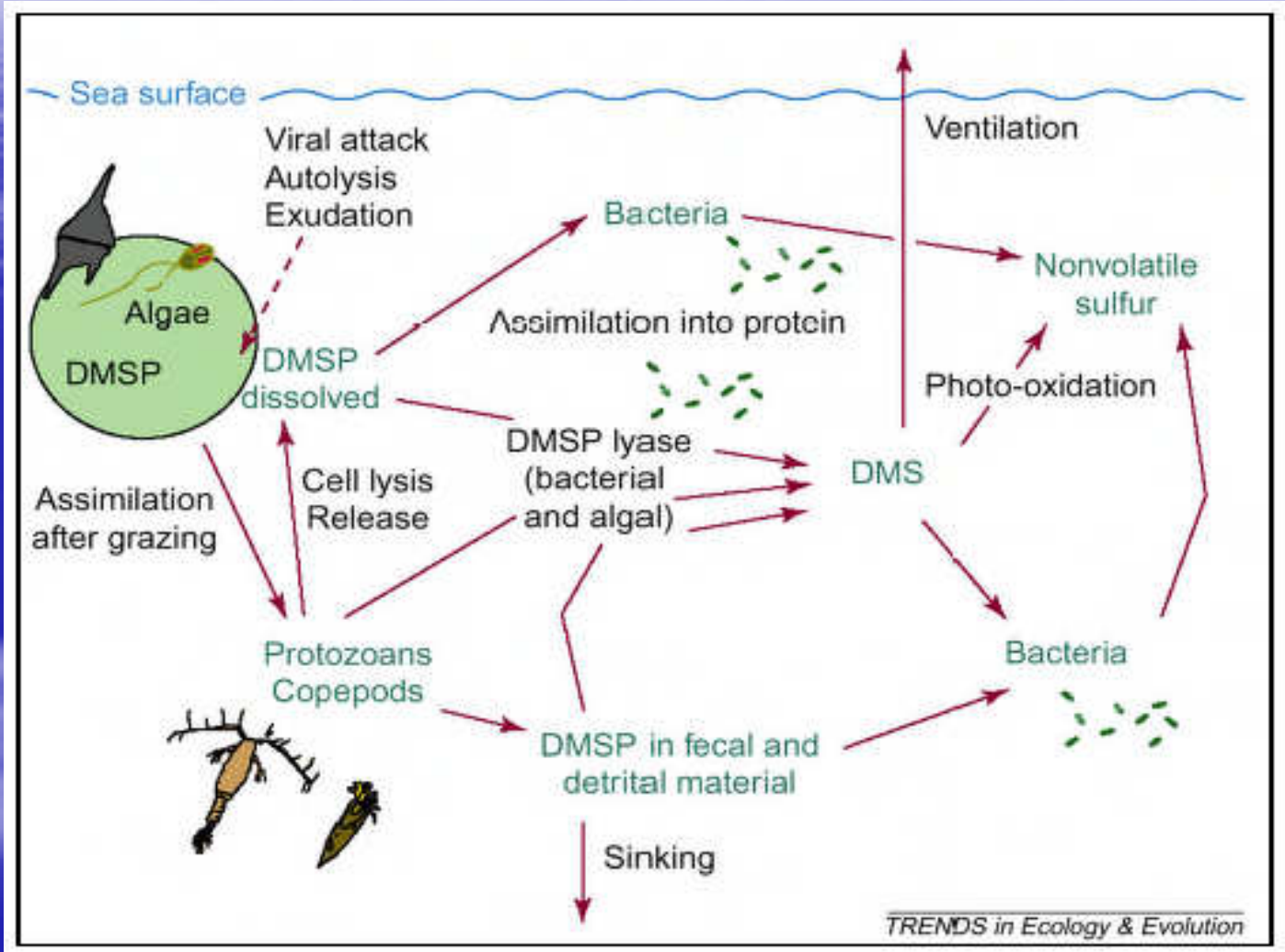
18% non-sea-salt SO₄²⁻ but in the S hemisphere this 43%

=>

Marine biology influences clouds, how do clouds influence biology? In which direction is the feedback?

(numbers from Gondwe *et al.*, 2003)

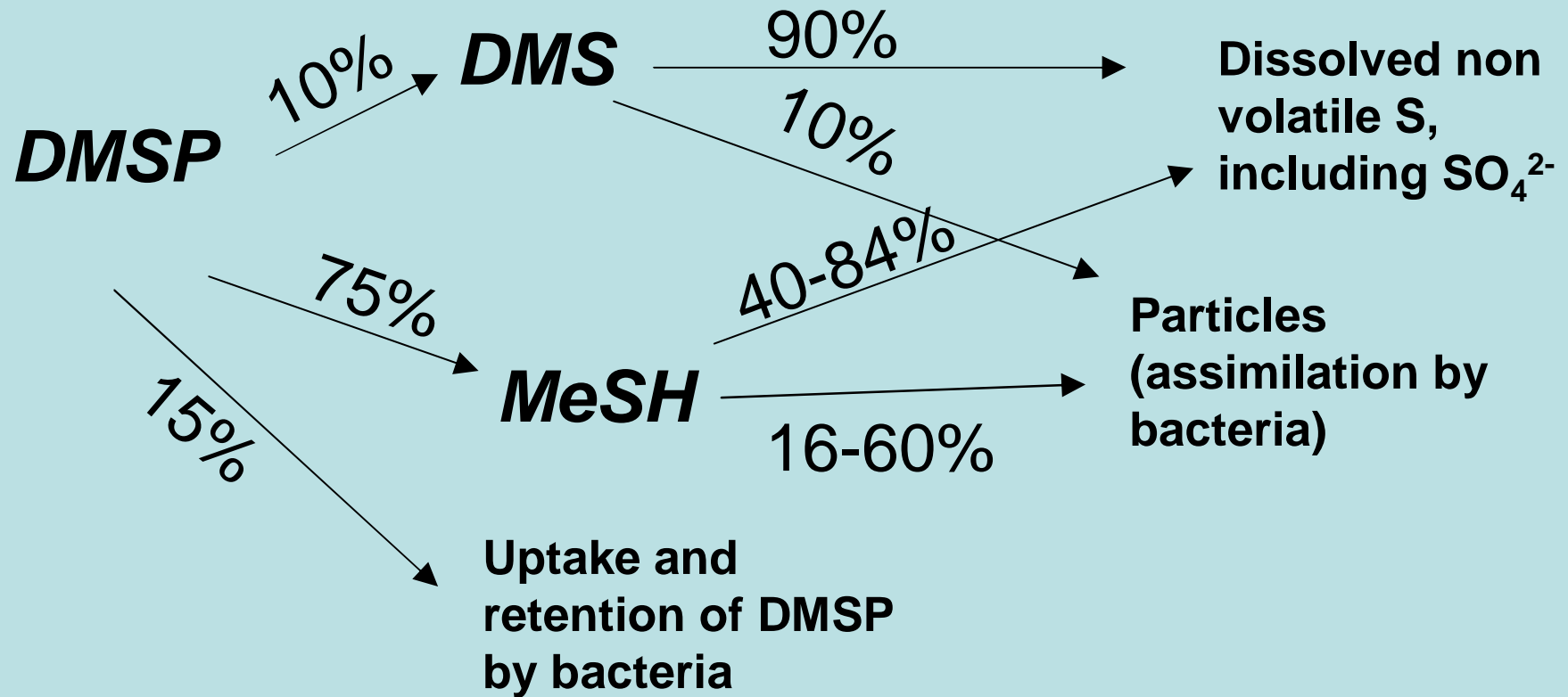
DMS production is complex and difficult to predict...



From Simo, 2001

Flux to atmosphere

0-10???



Adapted from Kiene and Linn, 2000

Seawater measurements we made:

Discrete DMS, DMSP

Chlorophyll fluorescence

DMS/DMSP production rates

Nutrients (NO_3^- , PO_4^{2-} , SiO_3^{2-})

+

Light spectra, 300-800 nm

Incubations

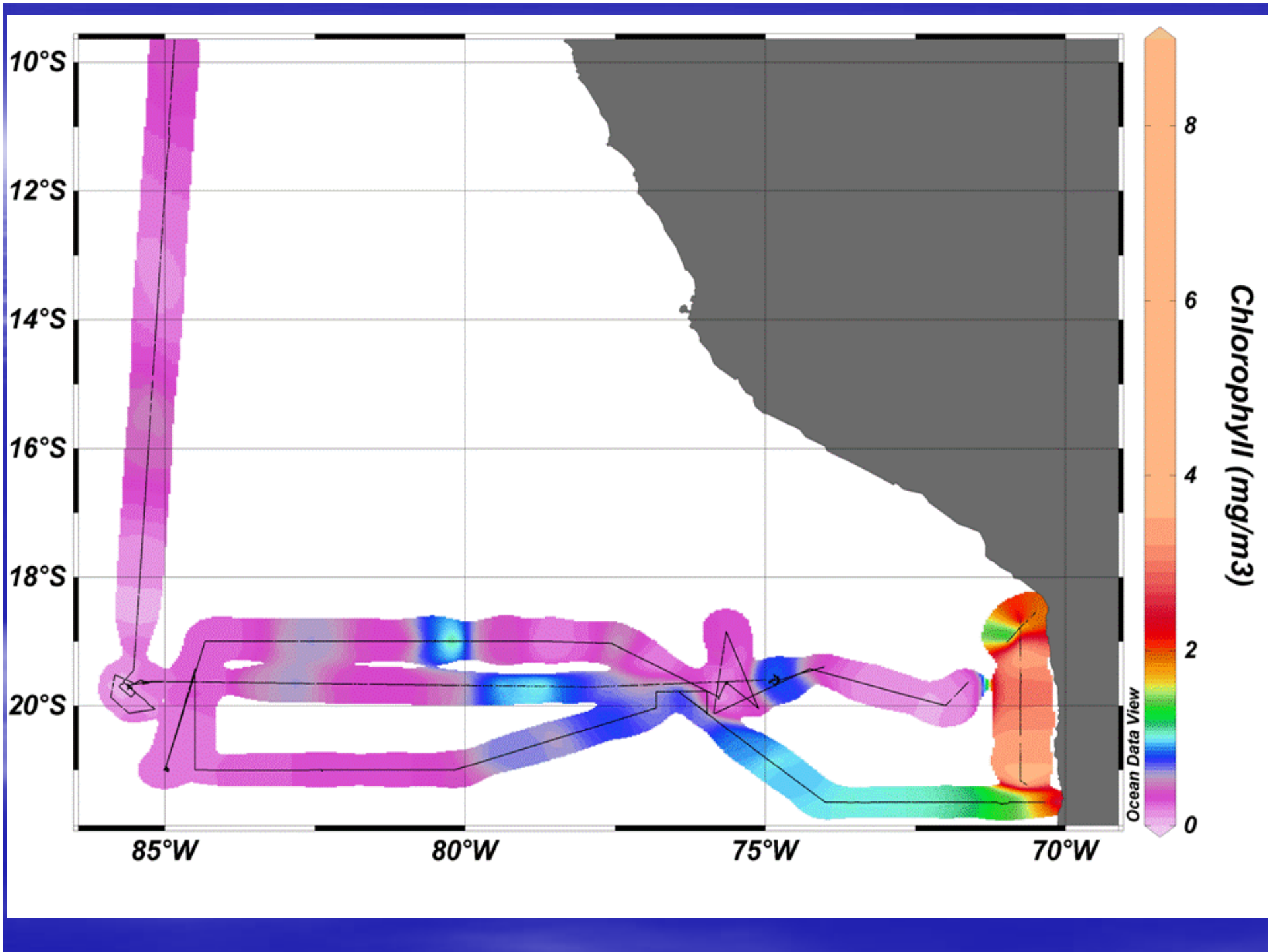
Examining the role of light/UV on surface seawater
Measuring changes in DMS/DMSPp/DMSPd/chlorophyll
over 24 hrs

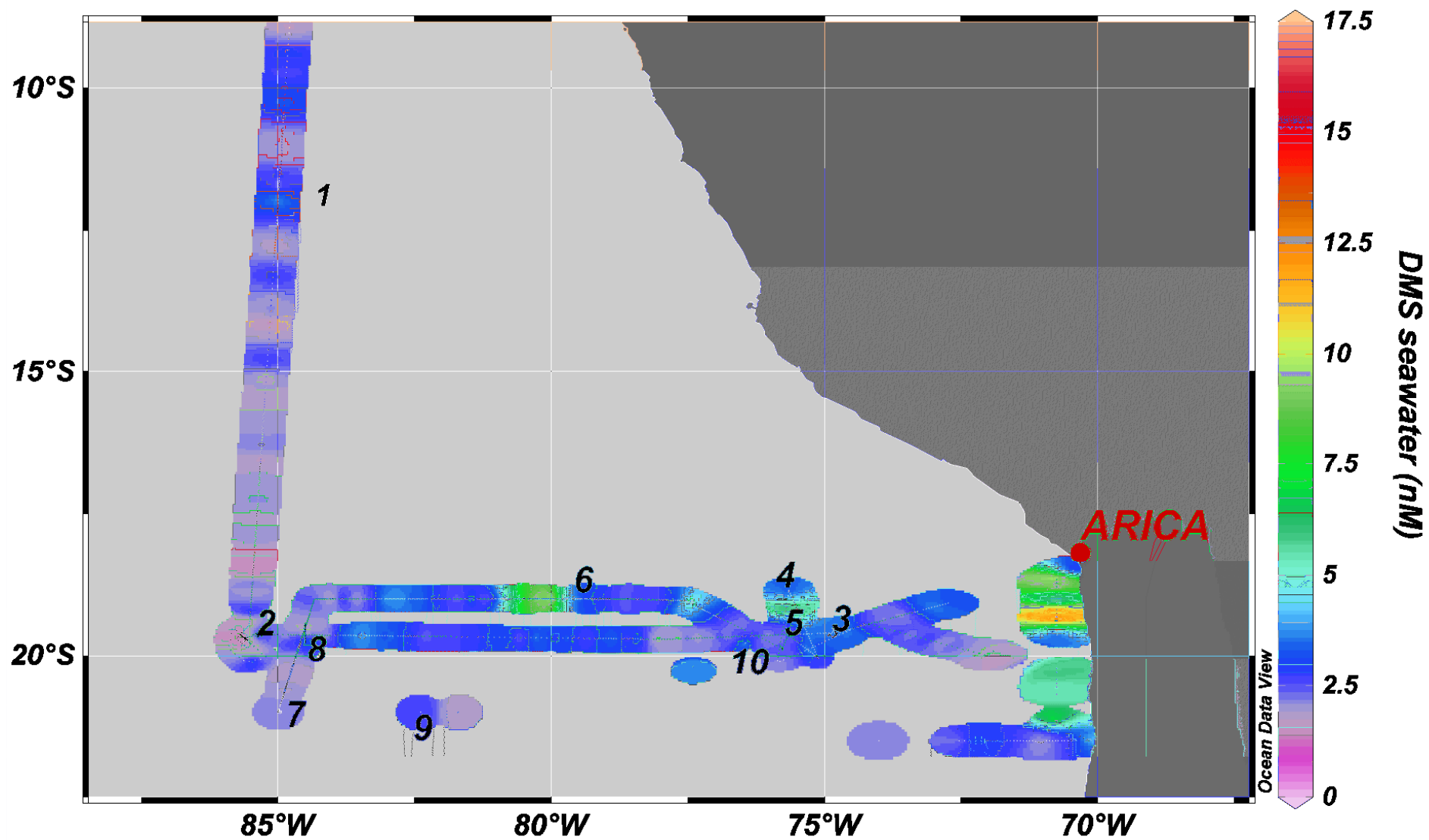
Typically 3 treatments, each in triplicate so 12 bottles

Each bottle

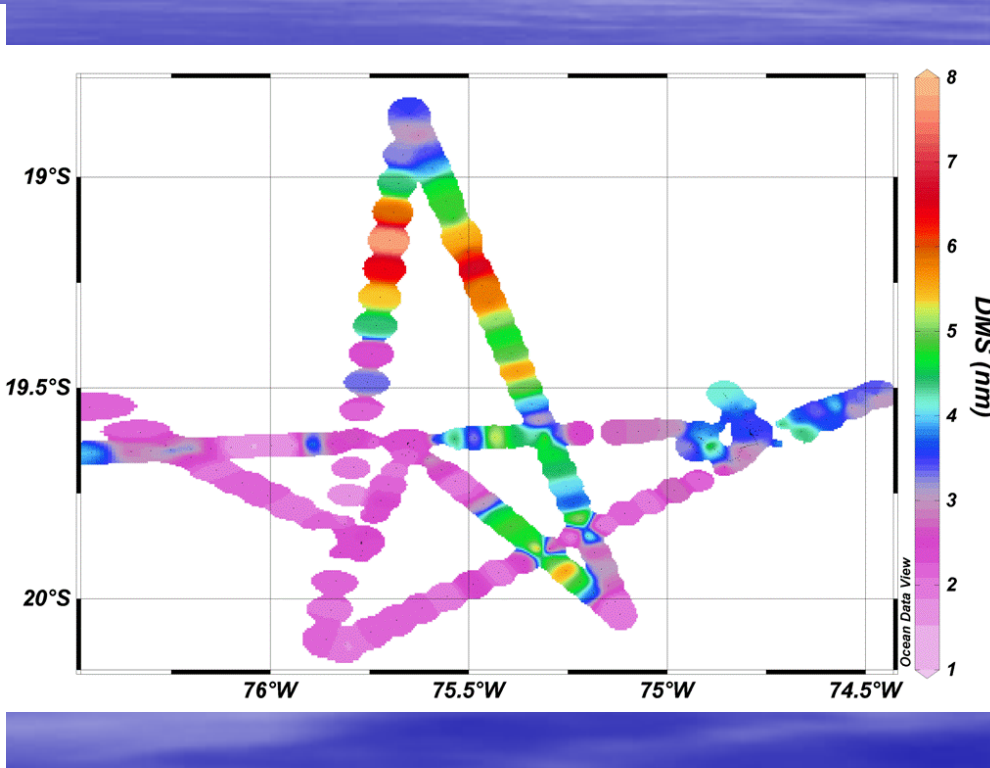
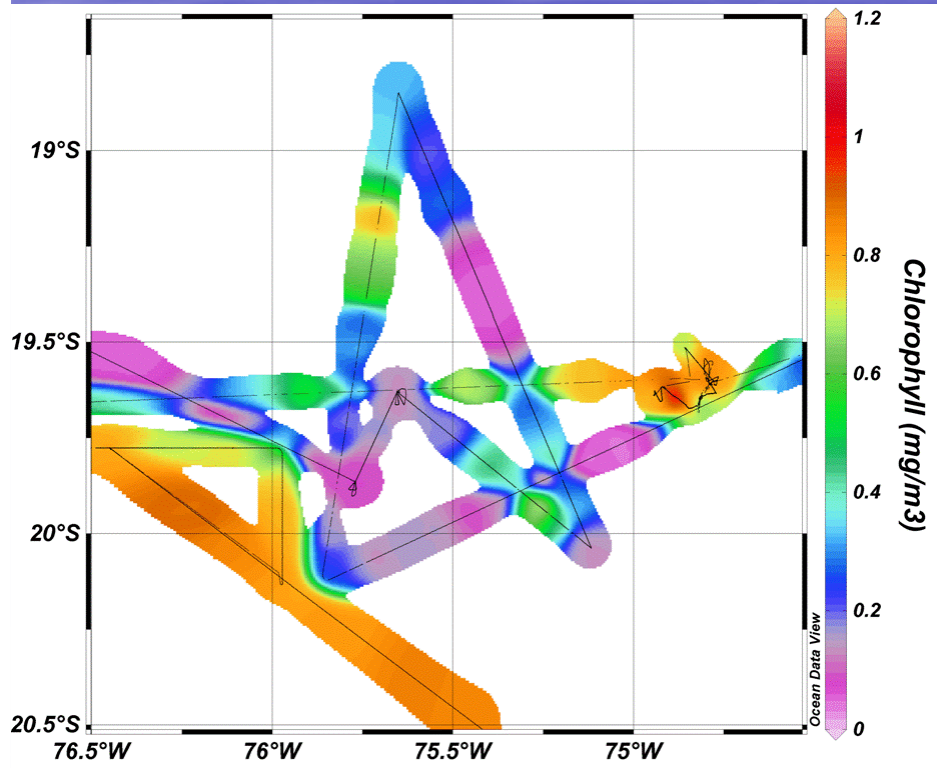
- 3 x for chlorophyll
- 2 x for DMS
- 2 x for DMSPp
- 2 x for DMSPd

=> 108 samples per incubation

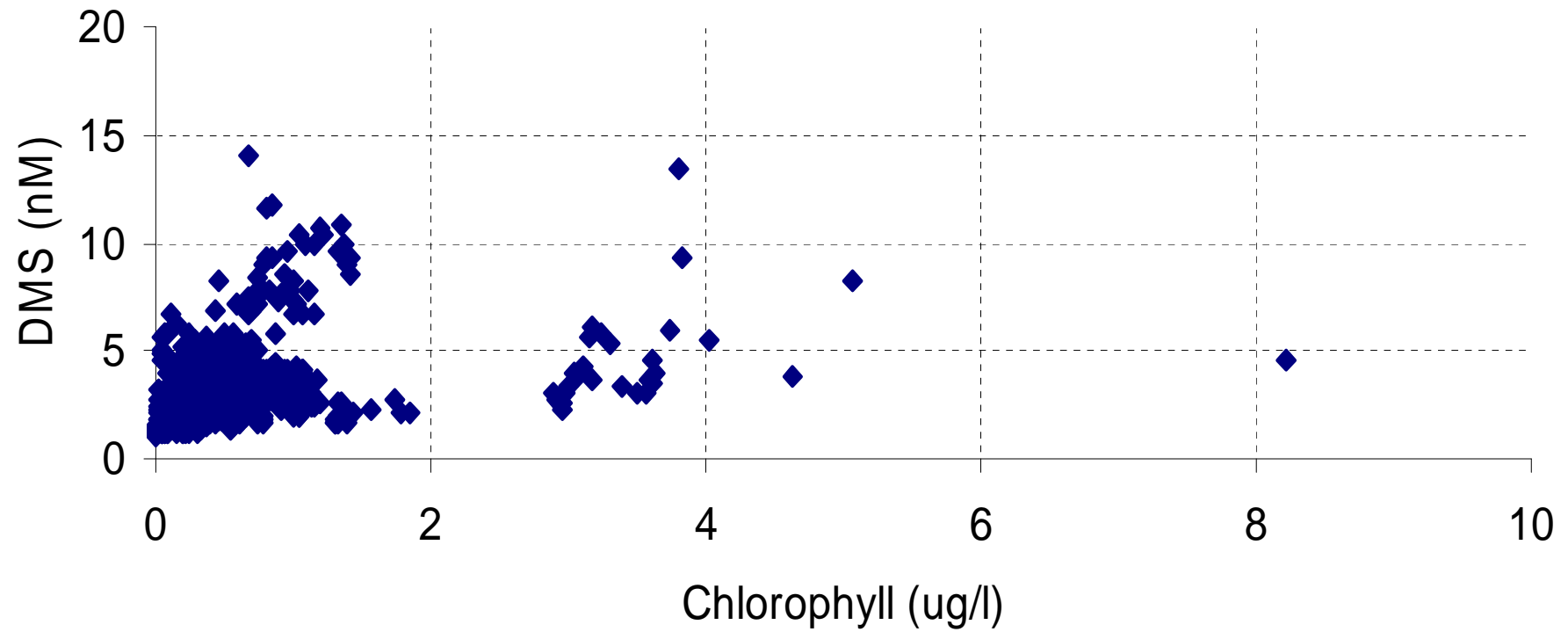




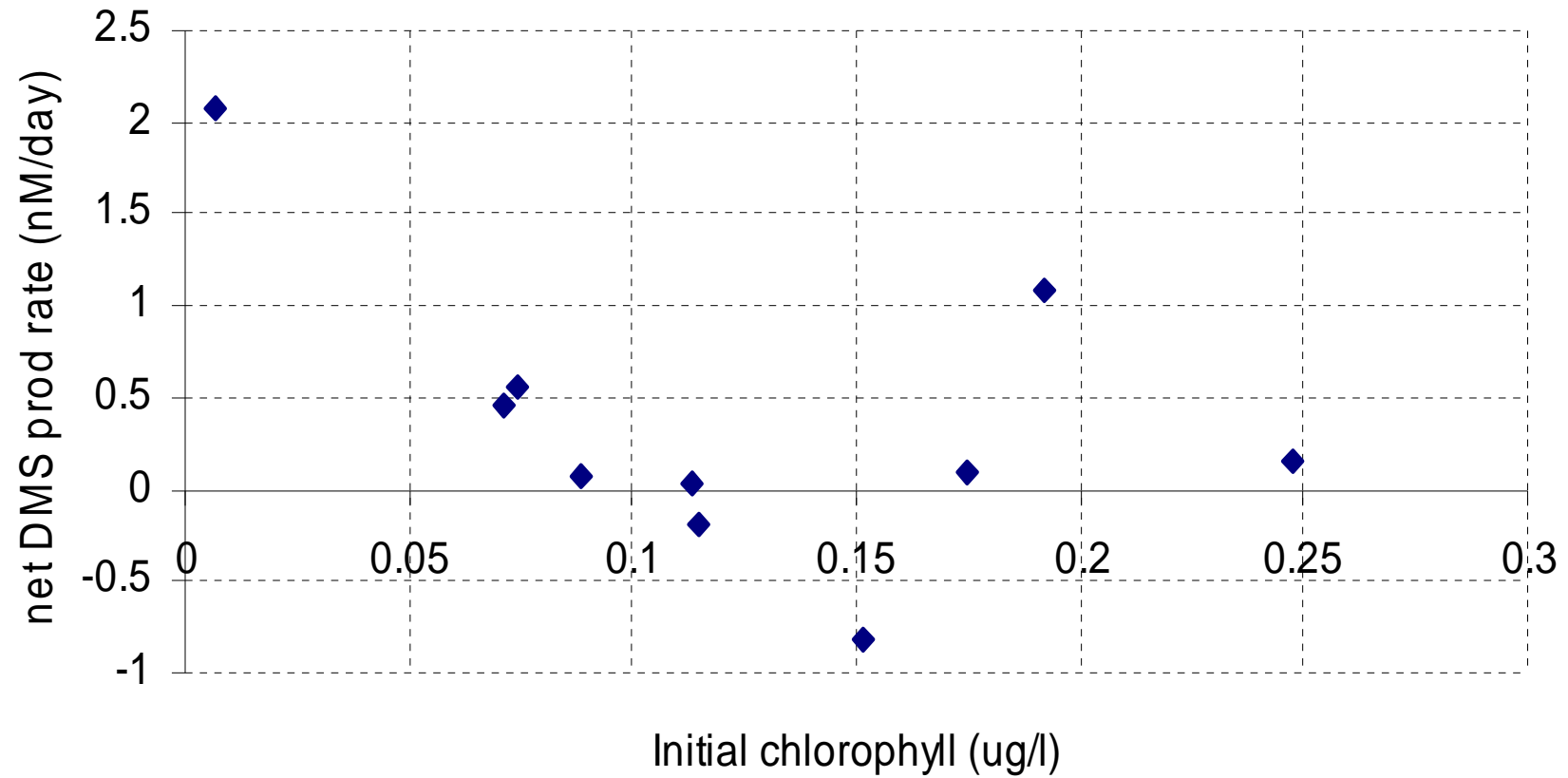
Most surface SW DMS data from the Huebert lab at UH,
thanks Barry, Ming and Rebecca



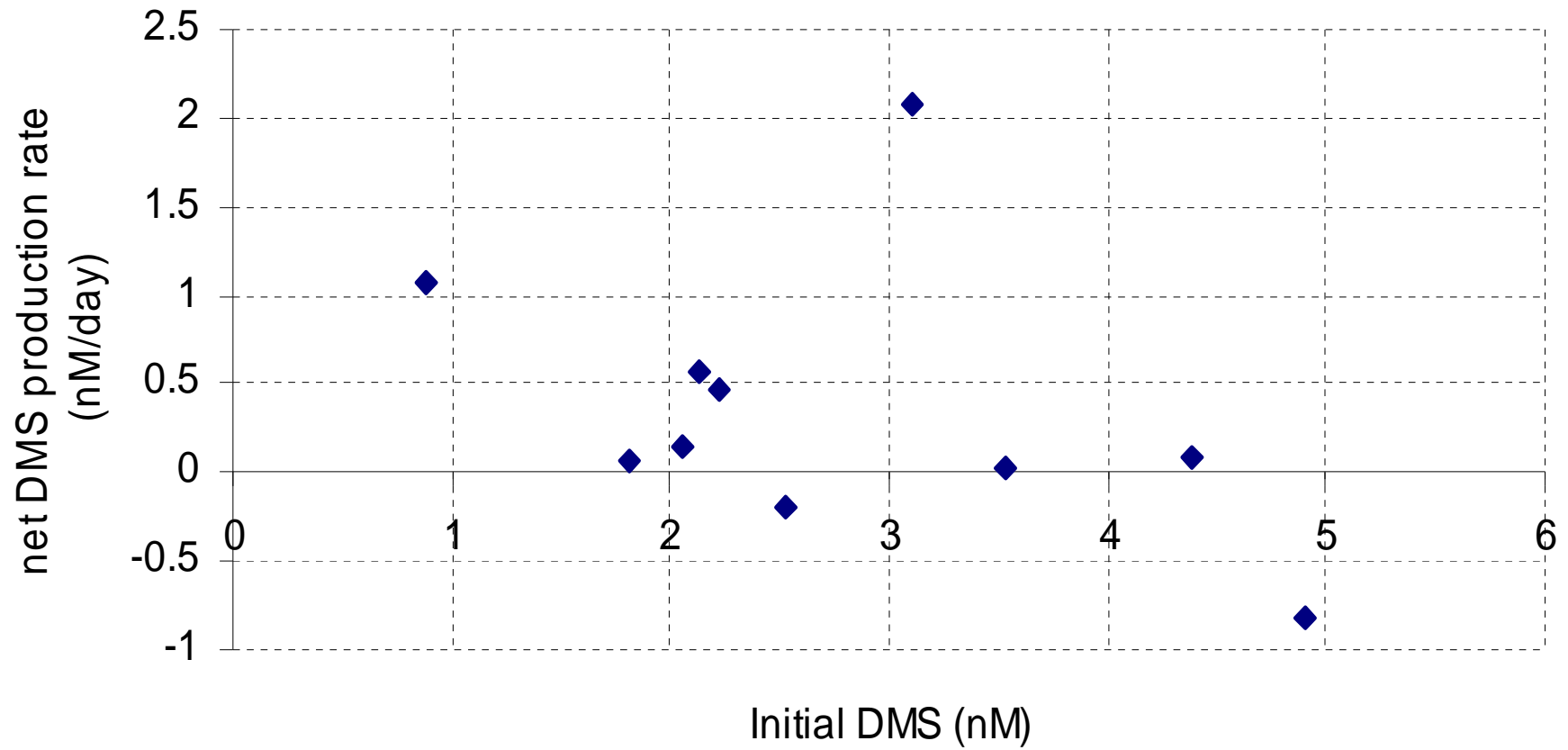
Surface chlorophyll vs. UH DMS



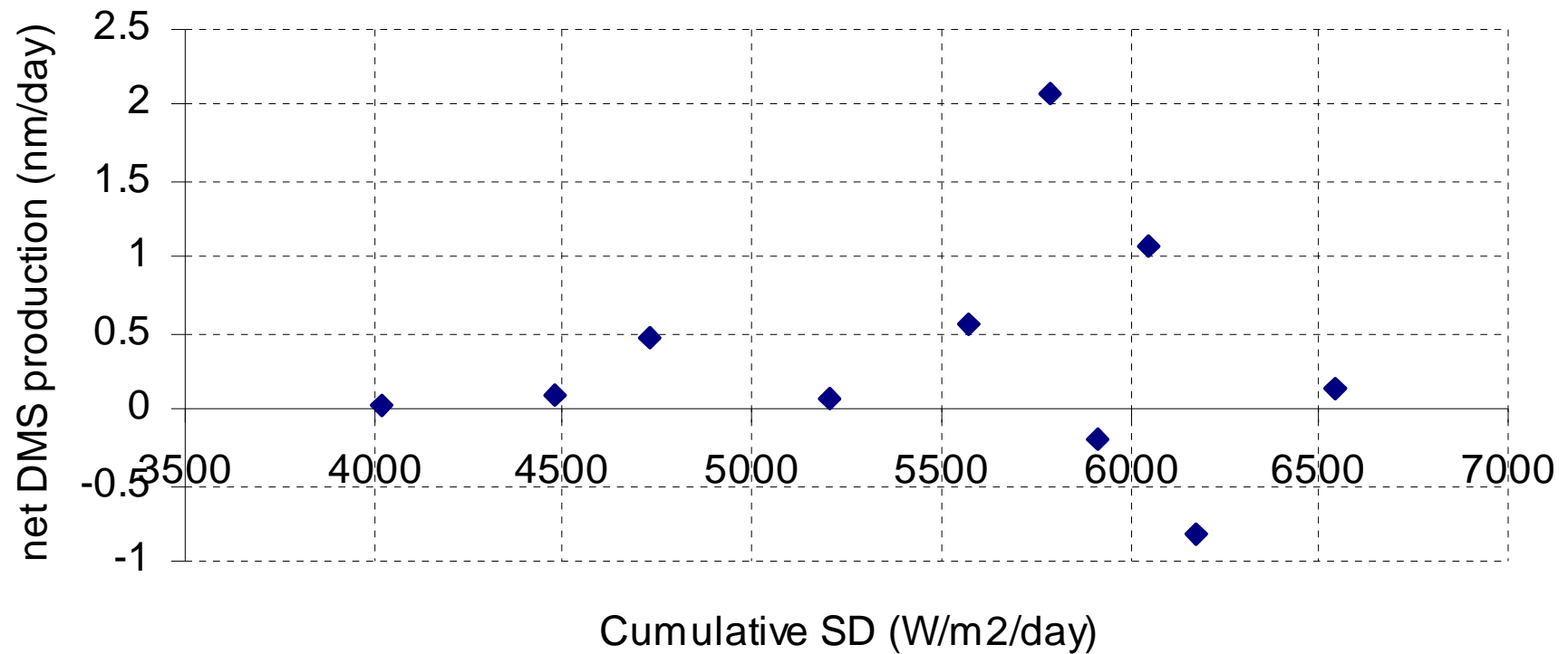
Initial chlorophyll vs. net DMS production



Initial DMS vs. net DMS production



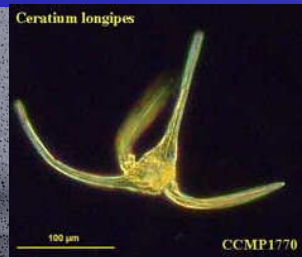
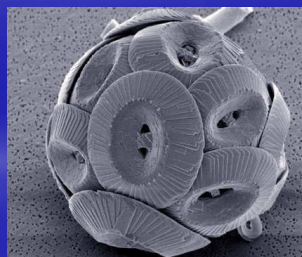
Solar dose vs. net DMS production



Thanks to Chris Fairall , Sergio Pezoa *et al.* for radiation data

Lots more to do

- Analysis of light and ocean mixed layer depth – relationship between DMS/DMS production and dose of light/UV?
- Test existing algorithms for SW [DMS] in this region (Vallina, Bell, *et al.*)
- What is the role of plankton species composition?



Or

