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Title of Overall Project: Dimethyl sulphide (DMS) sea-to-air transfer velocities in the Southern Ocean

Project Duration: Feb. 2008 to Jan. 2009, 12 months.

Project Funding: NERC EPSRC BBSRC ESRC STFC Other None
(Enter Y)

If 'Other' please state funding agency:

Is this application associated with a NERC research grant and/or **fellowship**? (specify grant **ref. no.**, **alpha grade**, and name of PI. It is important to give the alpha grade where applicable.)

NE/F010656/1, grade $\alpha 4$, PI Stephen Archer: "Dimethyl sulphide (DMS) sea-to-air transfer velocities in the Southern Ocean".

Is this application associated with a studentship? (specify PhD, MSc or BSc; also **ref. number** if NERC)
No.

If supported by NERC, is the project: Responsive Directed programmes National capability
(www.nerc.ac.uk/research/)

Which NERC science themes does this project address? (enter Y for at least one: www.nerc.ac.uk/research/themes/)

Climate system	Biodiversity	Sustainable use of natural resources	Earth system science	Natural hazards	Environment, pollution and human health	Technologies
Y	Y					

Data Requirements: type of products required (see page 3: sensors, products, resolution, compositing)

- Sea-surface temperature (SST) from AVHRR.
- Chlorophyll-a concentration from MODIS Aqua (or MERIS).
- 1.1 km resolution.
- 7-day composites, plus individual scenes if useful.

Coordinate range and time period of interest: Southern Ocean, region of interest: 55 to 45°S ; 40 to 30°W.
Cruise dates: 02 Feb. to 31 Mar. 2008, with data available to browse on website from 10 Jan. onwards.

Choose data format(s): Coloured images GeoTIFF Data array ASCII Other (which?)

Detailed Project Description Please provide a description of your project in sufficient detail to enable peer-review. Resize the sections if necessary within this one page, or attach separate sheet. **NB:** A condition of usage is that NEODAAS are acknowledged in any resulting presentations and publications, and copies are sent promptly to the service. Disregarding this will hinder future applications.

Background and rationale for project

The rate of DMS flux from the oceans to the atmosphere is of critical importance because it controls atmospheric acidity and contributes to the formation of aerosol particles and CCN in the remote marine atmosphere; influencing the Earth's radiative balance with potential implications for a biosphere-climate feedback. A major uncertainty in models of gas exchange is the gas transfer velocity (k_x), a coefficient that converts an interfacial gas concentration difference into a flux (F_x). Direct measurement of F_x is challenging and until recently estimates of the flux of important trace gases have relied on parameterisation of k_x to wind speed, derived from indirect approaches to obtain k_x , and the Schmidt number which accounts for molecular diffusivity of the gas. In collaboration with the University of Hawaii, the project aimed to develop estimates of k_{DMS} in the high wind and wave environment of the Southern Ocean through a combination of direct measurements of F_{DMS} and high resolution DMS_{sw} measurements.

Description of project research or activity

DMS_{sw} will be measured, coincident with DMS_{air} and F_{DMS} (University of Hawaii), in underway mode using an automated gas chromatograph with a repeat analysis time of 6 minutes. This system was developed for and used successfully during the recent DOGEE cruise, June-July 2007. Seawater pumped from a towed fish at ≤ 2 m will be passed through a membrane equilibrator. DMS in the equilibrated gas stream will be trapped on Carbopack® and quantified on a highly sensitive Varian pulsed flame photometric detection system with a detection limit of <0.025 ng S. Calibration will be achieved using a Kinesis DMS permeation tube.

GasEx-III will incorporate a lagrangian experiment using a SF_6/He labelled seawater patch. Both CO_2 and ozone exchange coefficients will be measured during GasEx-III; together with our estimates of k_{DMS} this is likely to prove a powerful approach for clarifying the control on gas exchange. Extensive ancillary information will be generated that includes ocean surface wave properties and standard bulk meteorological variables

Explain in detail how the requested satellite data will be used in support of the research; include publication plans and references to any of your related publications.

Satellite information will be used to identify suitable locations in which to deploy several $SF_6/3He$ patches in the South Atlantic sector of the Southern Ocean.

The k_{DMS} data will form the basis of one or more papers on the controls on gas exchange rates between ocean and atmosphere.

In addition, the lagrangian experimental approach allows mass balance estimates of DMS production and loss from the poorly studied Southern Ocean region.

The DMS_{sw} data will be incorporated in the PMEL global database of DMS concentrations – an essential tool to modellers of DMS-climate interactions.

Principal Investigator's Signature: _____	Date: _____
Head of Department's Signature: _____	Date: _____
and Name: _____	

Send signed copy to: NEODAAS Manager, Plymouth Marine Laboratory, Prospect Place, Plymouth PL1 3DH.
To speed up the reviewing process please also e-mail this document to: pim-at-pml.ac.uk.