

Notes - Teleconference #1 Gas Ex III planning group

Monday April 10, 2006

Notes by Rik Wanninkhof, with input from David Ho and Dick Feely

Attendees:

Fairall, Chris
Feely, Richard
Ho, David
Matrai, Paty
McGillis, Wade
Sprintall, Janet
Strutton, Pete
Wanninkhof, Rik

Discussion points:

1. Where should the study take place?

- This depends to large extent on the delta pCO₂ between surface water and air.
- The previous two GasEx studies were conducted in an environment where delta pCO₂ was about 100 µatm. The signal to noise (S/N) of measurements under these conditions was about 1 for the 30-minute measurements. Only through bin averaging of a large amount of points could a clear trend be discerned. Questions that need to be addressed in determining the minimum delta pCO₂ for which we can execute an experiment include:
 - Is the signal to noise more closely related to the flux and delta pCO₂?
 - How much of the noise is inherent and does not scale with the signal (e.g. instrument noise)?
 - How much have the techniques improved since GasEx-98?

2. Atlantic vs. Pacific

Each basin has specific attributes. A summary is listed below:

+ = Better for this basin; - = Worse for this basin; 0 = Makes little difference

Attributes	Atlantic	Pacific
Delta pCO ₂	+	-
Sub-mesoscale variability	-	+
Swell waves	0	0
Wind	0	0

No decision was made on which basin to recommend pending some additional work to be performed (see "to do's"). If the Atlantic were chosen it appears that the NE corner of the Atlantic box of the figures that Mary-Elena Carr provided would be a possible site.

3. Infra structure

- The Brits are trying to secure a NERC ship to participate in the study. David Ho is in touch with Rob Upstill-Goddard, and Wade McGillis has discussed the possibility with Peter Liss. Upstill-Goddard will discuss the possibility with NERC at the DOGEE-SOLAS cruise meeting in late April/early May.

- If the conditions are as expected, using a horizontal boom at deck level probably will not be feasible. The gradient method will be somewhat impaired by the inability to get close to the sea surface for much of the study.

4. Miscellaneous

- While the study focus is a high wind/wave regime, ship's scientific operations will be curtailed when winds are greater than 15-20 m/s. Getting many measurements in the 10- 15 m/s range will be sufficient for a successful study.
- Sampling from *in situ* observing platforms and instruments, as well as surface measurements from underway systems will probably be not affected by wind and as much. Novel measurement techniques like those developed to study the oceanic environments in high wind speed conditions should be encouraged.
- Iron fertilization will not be pursued as part of this study.
- Timing: the productivity signal seems to vary by location and year. Paty Matrai saw very clear waters in December and a large productivity signal in January. We probably will not have much say in exactly when the study will take place due to (external) shiptime considerations other than that it will be in the SH spring/summer season.
- The announcement of NOAA/GCC will be submitted this week. If we want to provide additional input (e.g. site selection) it will have to be provided by mid-week.

5. Web site

David Ho will set up a website for SO GasEx that will contain:

- Implementation plan.
- All background plots and materials provided by many members of the group.
- A section for comments/discussion by the community.

6. "To do's"

- Wade and Chris: Estimate S/N for eddy correlation for different wind speeds and delta pCO₂.
- Pete: Determine small-scale variability (in Chl) in the NE Atlantic sector under investigation.
- Janet: Determine mesoscale variability (e.g. from SSH) and average current speeds in the NE Atlantic sector under investigation.

Addendum to notes of Teleconference #1 Gas Ex III planning group
Thursday, April 13, 2006
By David Ho

Chris Fairall and Wade McGillis provided an estimate of the uncertainty in direct covariance measurements due to $\Delta p\text{CO}_2$. At a wind speed of 10 m/s, the uncertainty in k will drop from ca. 50% to ca. 25% if the $\Delta p\text{CO}_2$ is 20 vs. 40 μatm . This argues for conducting the experiment in the Atlantic.

Pete Strutton and Janet Sprintall provided images of SST, surface current velocities, and eddy kinetic energy from satellites for the Pacific and Atlantic. Even though the Atlantic is more energetic than the Pacific overall, and mesoscale variability is higher in the Atlantic, it is nevertheless possible to find "quiet" spots in the Atlantic that would be conducive for conducting SO GasEx.

Based on the data available, it was decided that SO GasEx should be conducted in the Atlantic sector of the Southern Ocean.