Final Cruise Report
R/V Kilo Moana Cruise 0625
Cruise Name: EUCFe
Dates: 15 August to 2 October 2006
Chief Scientist: James W. Murray

State Department Cruise # 2006-014

Nature and Objectives of the project:

The main objective of this research cruise was to determine the distributions of iron, manganese and aluminum in a zonal section along the equatorial Pacific from 140°W to 145°E and along the coast of Papua New Guinea.

The reason for this objective was that one of the principle new findings from the 1992 US JGOFS EqPac Process study in the central equatorial Pacific was that iron in the equatorial undercurrent (EUC) was the most important source of iron for driving biological new production and carbon cycling in the central equatorial Pacific. It was hypothesized that the main source of the iron is from terriginous sources (rivers and sediments) on the northeast side of Papua New Guinea. Hydrothermal and atmospheric aerosol sources are also possible but are generally considered less important.

The cruise plan and station locations were located to determine:

- 1. Is there really a maximum of iron in the equatorial undercurrent?
- 2. What is its zonal gradient?
- 3. What is its origin?

We conducted this cruise on the R/V Kilo Moana from Honolulu from 15 August 2006 to Rabaul, Papua New Guinea on 2 October 2006. The cruise track is shown in Figure 1. After departing Honolulu test stations (T1 to T5) were occupied daily to fill the rosette-mounted 10-L Go-Flo bottles with low trace metal concentration surface seawater. This seawater sat in the bottles until the next day when they were emptied and another cast was conducted. The objective was to cleanse the Go-Flo bottles for trace metal sampling.

Stations were then occupied along the equator from 140°W to 145°E. We also occupied stations at 2°N, Eq, 2°S at longitudes where there was a moored ocean climate mooring (TAO-Trident)(140°W, 155°W, 170°W, 180°, 165°E, 156°E and 145°E). The cruise track between these TAO longitudes was done on a diagonal so that additional equatorial stations could be occupied to give higher resolution. Stations were also occupied on the NE coast of New Ireland and Papua New Guinea in the Bismark Sea. The final station was in the Vitiaz Strait.

Sampling at each station consisted of Rosette/CTD casts in the upper 1000m. A 24-bottle rosette was used for nutrient and biological sampling. A 12-bottle trace metal clean rosette will be used for iron and trace metal sampling.

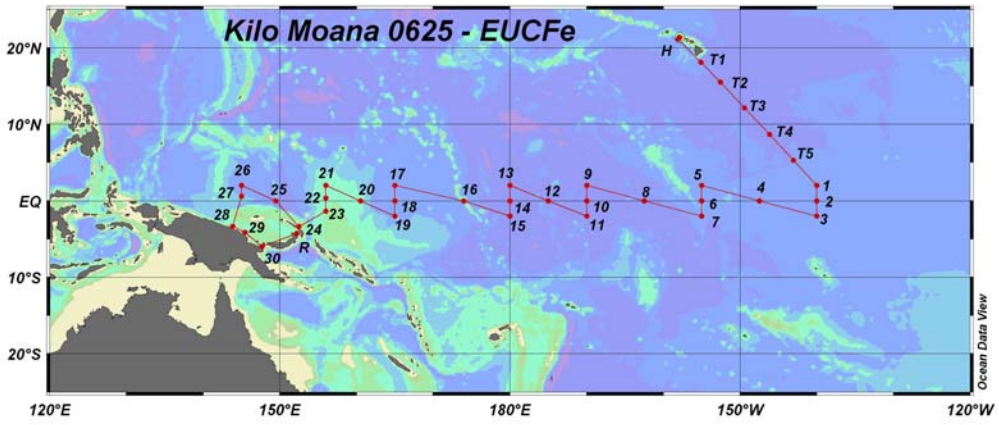

Figure 1 Stations locations and numbers for R/V Kilo Moana 0625

The participants in the cruise included chemical, biological and physical oceanographers. Brief summaries of their projects are given below. The data and interpretations that are available now have been posted on the cruise web site at:

http://www.ocean.washington.edu/cruises/KiloMoana2006/

The research projects conduced during the cruise are summarized below.
Those with data, posters or short summary reports on the cruise web page have a *.
Those without a * collected samples but do not have data to report yet.

- ***Lia Ossiander**, **Jim Murray**, **Barbara Paul** (Univ. Washington, School of Oceanography); **Joe Resing** (NOAA Pacific Marine Environmental Lab)
  Total acid soluble, particulate and dissolved iron, manganese and aluminum.
- **Francois Lacan** (LEGOS, Toulouse, France)
  Dissolved and particulate stable iron isotopes
- **Celia Venchiarutti** and **Francois Lacan** (LEGOS, Toulouse, France)
  Dissolved and particulate neodymium isotopes and rare earth elements (w/ Catherine Jeandel)
- ***Sharmila Pal** and **Barbara Paul** (Univ. Washington, School of Oceanography)
  Nitrate, nitrite and ammonium by autoanalyzer (Technicon AAII)
- ***Adrian Marchetti** (Univ. Washington, School of Oceanography)
  New production using ^{15}N labeled nitrate, ammonium and urea.

  Grow out experiments at 140°W and 165°E to test the potential limitation by Si and Fe.

- ***Oguz Yigiterhan** (Univ. Connecticut)
  Trace metal composition of plankton (samples from McLain pumps and trace metal clean net tows).

  Hg concentration and speciation (w/ Bill Fitzgerald and Robert Mason, UConn)

- ***Pierre Dutrieux** (Univ. Hawaii)
  Hydrographic and ADCP data
- ***Lindsey Shank** (Central Washington Univ.)
  Atmospheric aerosols: Total composition and solubility of iron (w/ Anna Johansen, CWU)
- ***Veronica Lance** (Duke Univ.)
  Primary productivity and P-I curves
  Spectral absorption by plankton (Quantum Efficiency)
  HPLC Pigments
- **Zach Johnson** (Univ. Hawaii)
  Phytoplankton genetic diversity
  Photophysiology (Fv/Fm)
  Flow Cytometry
- **Cecile Mioni** (Univ. Hawaii)
  Expression of iron regulating genes by prochlorococcus and trichodesmium
- **John Kirkpatrick** (Univ. Washington, School of Oceanography)
  Ammonium oxidizing archaea (w/ Dave Stahl, UW)
- ***Adrian Marchetti** (Univ. Washington, School of Oceanography)
  New and Regenerated Production
  POC/PON
  Phytoplankton composition (microscopy, flow cytometry, RNA/DNA)
- ***Diana Varela** (Univ. Victoria)
  Net and Gross Production of Biogenic Silica
  Biogenic Silica
- ***Wendy Guo** (Univ. Washington, School of Oceanography)
  Winkler oxygen analyses
- ***John Kirkpatrick** and **Wendy Guo**
  Continuous analyses of oxygen, argon and nitrogen by membrane inlet mass spectrometer (MIMS) (w/ Michael Bender, Princeton Univ.)
- **Sophie Bonnet** (USC)
  N_2 fixation rates
- ***AJ Lefevre** (Univ. Washington, School of Oceanography)
  Chlorophyll (size fractionated)
  CDOM (colored dissolved organic matter)(w/Norm Nelson, UCSB)
  Dissolved organic matter (DOM)