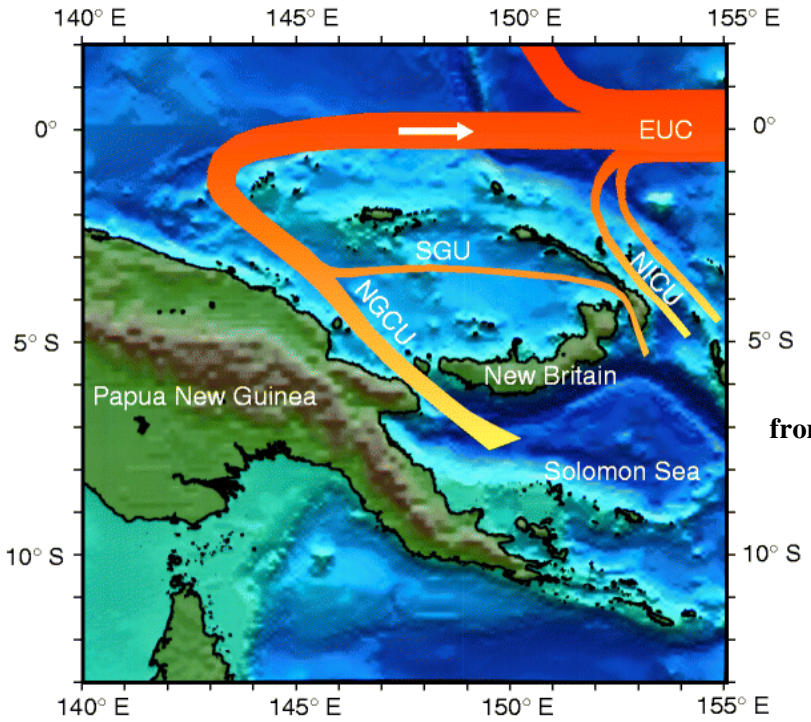
Log 17 Sunday

1. 182100Z September 2005
2. Position: Lat: 0-00.0S LONG 133-55.6W
3. Course: On station
4. Speed: 0 kts
5. Distance: 253.9 NM
6. Steaming Time: 23H 36M
7. Station Time: 0H 24M
8. Fuel: 4607 gals
9. Sky: Ptly Cldy: Cu
10. Wind: 130-T, 07 kts
11. Sea: 130-T, 2-3 ft
12. Swell: 110-T, 4-6 ft
13. Barometer: 1010.8 mb
14. Temperature: Air: 26.8 C, Sea: 27.2 C
15. Equipment Status: Stbd (S band) radar CRT, Sperry C2140 SSB radio loudspeaker,
and Navtex receiver inoperative.
16. Comments: On station #17, trace metal cast in progress.

So why are we looking at trace metals out here? There is clear evidence of Fe (Iron) limitation in HNLC waters. During the Iron Experiments in the East Equatorial Pacific (EEP) deliberate iron fertilization of surface water resulted in a localized, diatom dominated phytoplankton bloom in each system. So now we know that iron strongly affects the elemental composition of diatoms. When HNLC waters are low in dissolved iron diatoms grow with 3-4 times higher Si/C and Si/N ratios, primarily because of decreased ability to synthesize organic matter. So part of the objective out here is to distinguish among the roles of Fe limitation, Si limitation and zooplankton grazing in controlling the floristic composition of the phytoplankton in the EEP and o interrupts significant interactions among those three control mechanisms

Dr. Measures role in this is to sample dissolved and particulate Fe in the research areas. He also provides trace-metal free sea water for all shipboard experiments. He is also helping interpret all experiments measuring phytoplankton response to Fe enrichment. His lab is one of the few in the world that can reliably measure dissolved Fe at the <0.1nM concentrations found in much of the near surface ocean. No mean feat on a ship made of iron and steel!



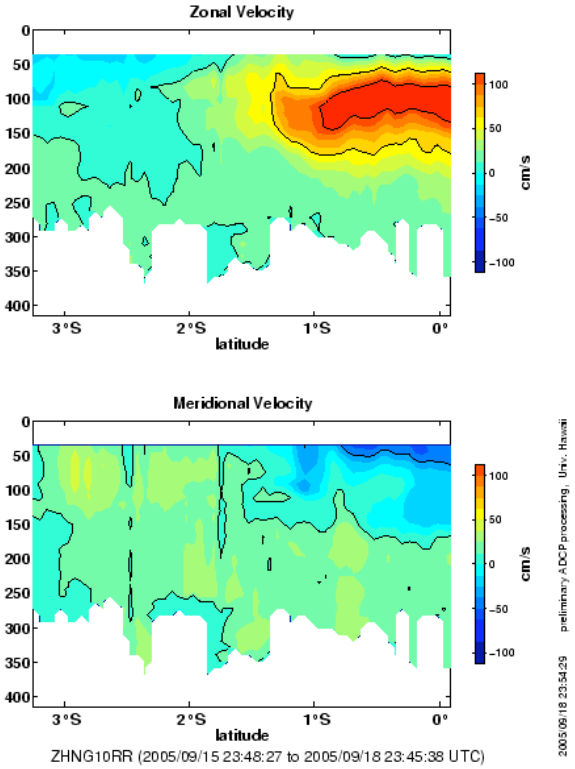
from Wells *et al*. (1999).

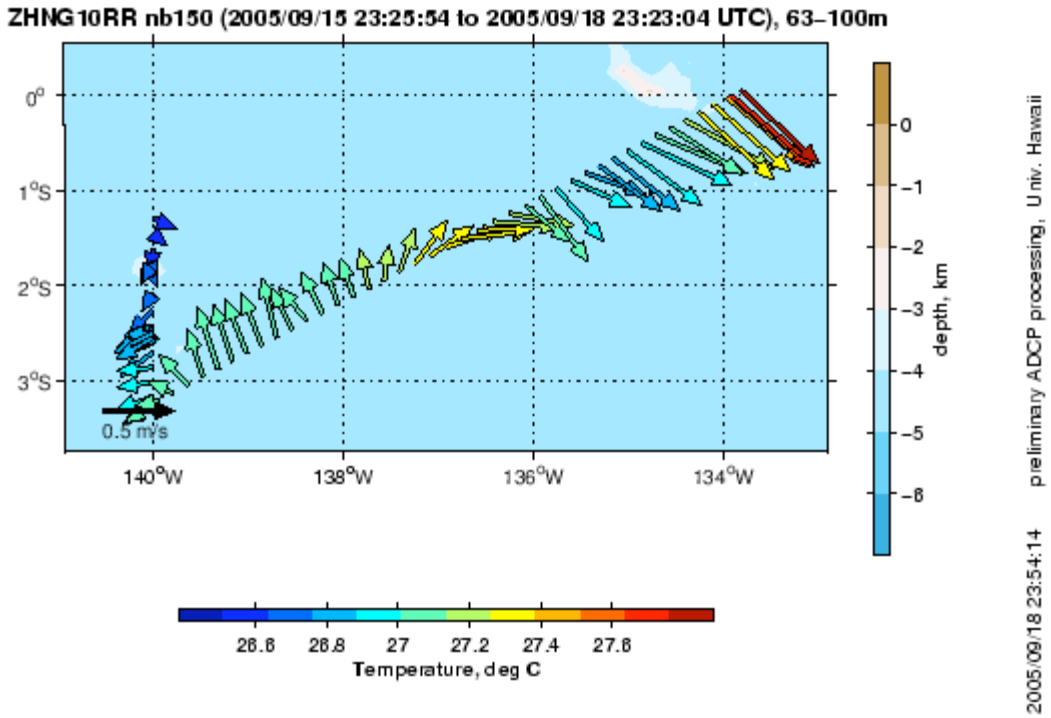
Kaupp/Measures

Origins of the EUC in the Western Pacific.

NGCU = New Guinea Coastal Undercurrent

SGU = St. George's Undercurrent, NICU = New Ireland Coastal


Zonal Velocity
0
50
100
150
200
250
300
350
400
3°S
2°S
1°S
0°
latitude
100
50
0
−50
−100
cm/s
Meridional Velocity
0
50
100
150
200
250
300
350
400
3°S
2°S
1°S
0°
latitude
100
50
0
−50
−100
cm/s
2005/09/18 23:54:29 preliminary ADCP processing, Univ. Hawaii
ZHNG10RR (2005/09/15 23:48:27 to 2005/09/18 23:45:38 UTC)

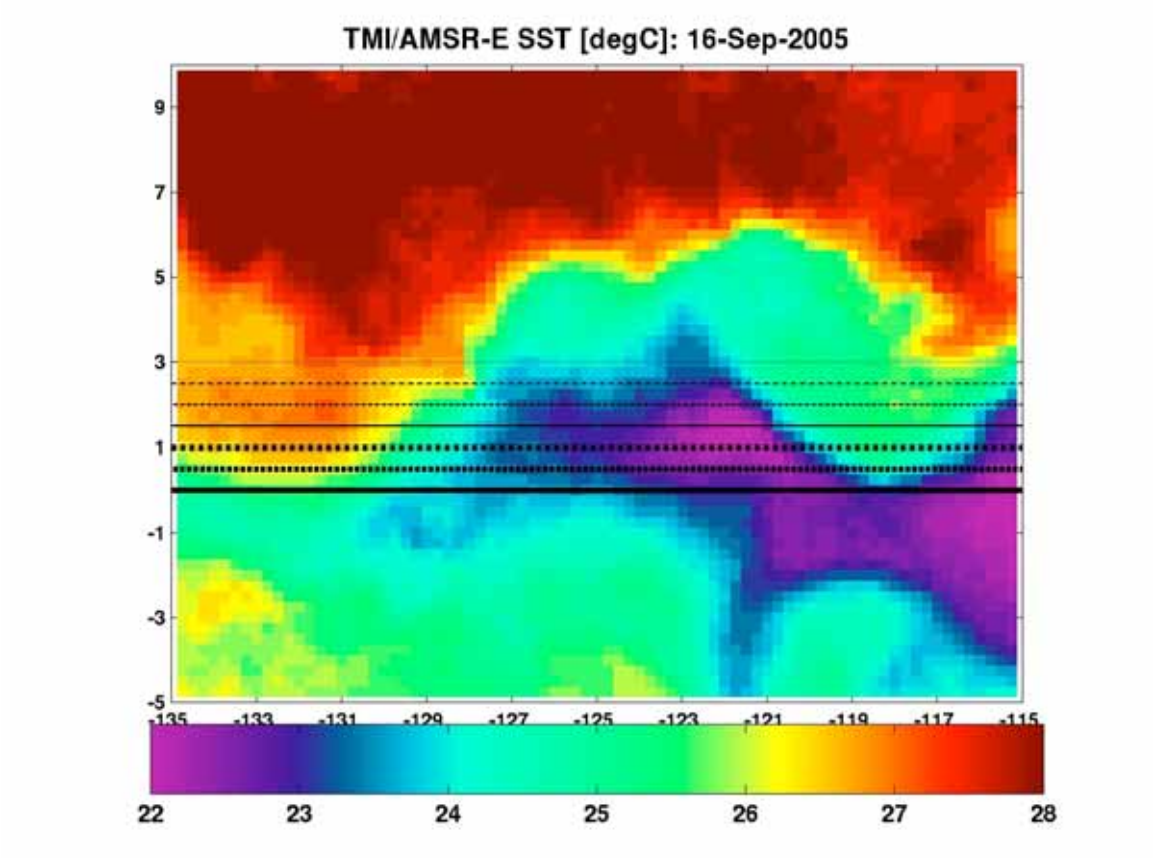

ZHNG10RR nb150 (2005/09/15 23:25:54 to 2005/09/18 23:23:04 UTC), 63–100m
0°
1°S
2°S
3°S
0.5 m/s
140°W
138°W
136°W
134°W
0
−1
−2
−3
−4
−5
−6
depth, km
26.6
26.8
27
27.2
27.4
27.6
Temperature, deg C
2005/09/18 23:54:14 preliminary ADCP processing, Univ. Hawaii

From the Chief Scientist:
We're presently on a course for 0.5°N x 133°W and expect to get there some time in the late afternoon tomorrow (9/18). We'll reach the equator at ~134°W at approximately 1000, and stop there for two casts. Those casts, and a carboy sampling at 1300, are shown on the attached very short schedule. Then we'll move on to 0.5°N x 133°W and do some positioning based on underway data (which I'll explain in a minute) to select a starting point for the TIW study. That study will begin at 0100 on Monday (9/19) with the same pre-dawn cast sequence we used on the transect at 140°W.

On the TIW study we plan to run a west-to-east transect at 0.5°N, beginning in the warm phase of the wave and working our way into the cool phase. We want to extend that transect as far into the cool phase of the wave, and as close to San Diego, as time permits. To do this we want to locate our first station as far to the east as we can while remaining in the warm part of the TIW. So we'll stay on our present course until we reach 0.5°N x 133°W tomorrow afternoon or early evening (after the stop for a two-cast station at the equator). The SST images we've gotten from Pete Strutton show that 0.5°N x 133°W should be reliably in the warm part of the wave tomorrow evening. Then we'll turn right and head east at 0.5°N, monitoring underway surface data - especially SST and pCO2 - to make sure we stay in the warm phase of the wave. If SST stays warm and pCO2 doesn't increase we'll keep heading east until 0100 on Monday, where we'll take our first station and start the transect. If SST and pCO2 data indicate that we're coming into cooler, higher pCO2 water we'll stop, backtrack a bit if necessary and wait until 0100 to start the station.

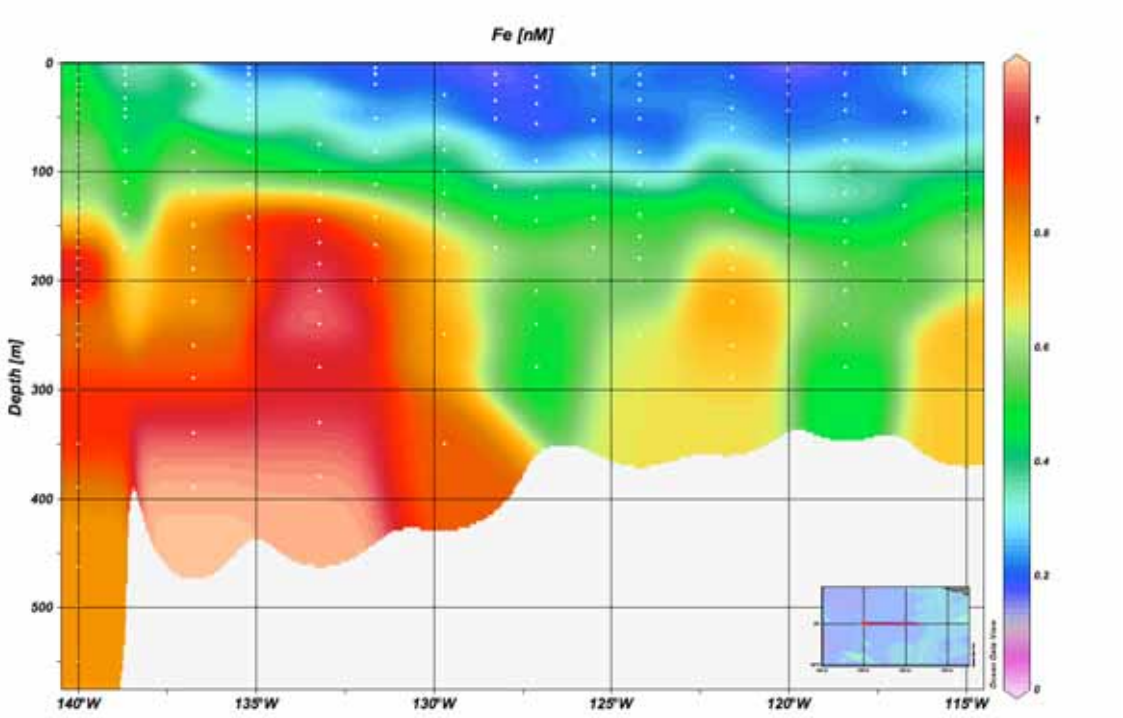
We plan to do six full incubation stations along 0.5°N (Monday through Friday). By Friday's station we should be well into the cool phase of the wave. Then we'll use Pete Strutton's SST images to find the coolest water that's northeast of Friday's station location and go there for our final station on Saturday. Each of those six stations will start at ~0100 and will include our usual pre-dawn sequence of casts to collect water for incubations. Each will last up to 12 hours, depending on other casts that are wanted. We'll steam the other 12 hours each day, with no mid-afternoon or early stations at intermediate locations, covering ~130-135 n miles to the east and reaching our next station at 0100. Some time Saturday (9/24) we'll break off all station work and leave for San Diego

So here is what the rest of our transect will look like:

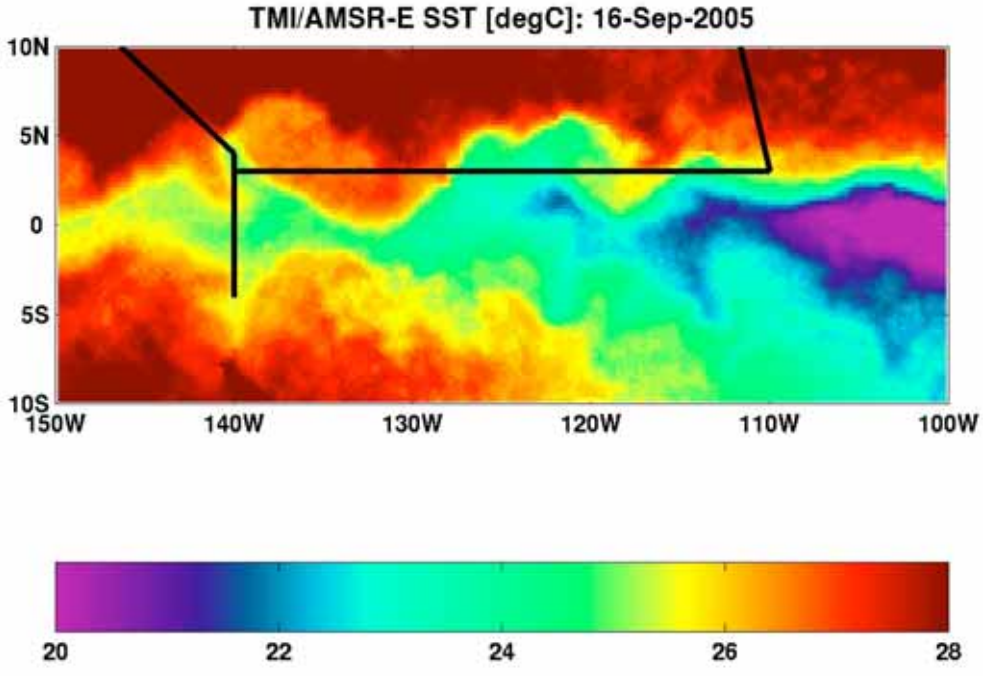


We are taing the 2nd dotted line from the equator (that's the solid black line) This will give us samples from warm and cold water and different areas within the TIW

Here is a sample of what last years cruise Fe trace metal sampling looked like, we will have a similar plot for the end of this cruise. Aluminium is used as an indicator for current profiles, it is not involved in the biology.



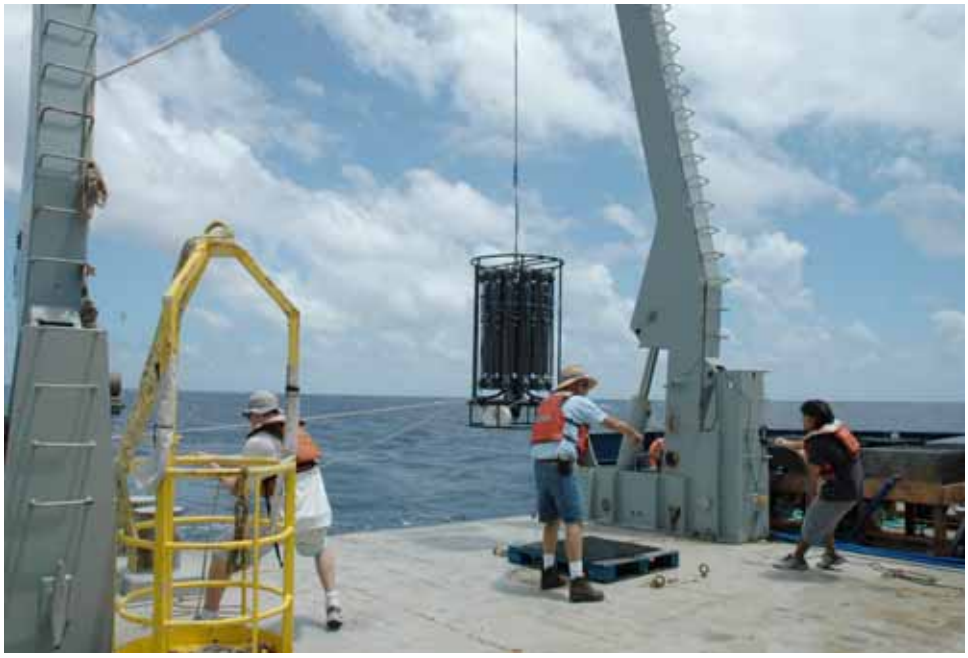
Fe along E-W transect



Today we are back up at the equator and will do 2 casts and then move on to our next station.

Lyle and Jing Jing sampling in the Trace Metals lab.

I am doing the logging while Jing Jing samples the bottles.



Trace metal CTD going in the water

Lyle and Jing Jing processing Fe samples in the lab