

High-Resolution Hydrography and Shelf/Slope Processes in the QPE Study Area: Pilot Results and Plans for the Main Experiment

Glen Gawarkiewicz

Woods Hole Oceanographic
Institution

Joe Wang

National Taiwan University

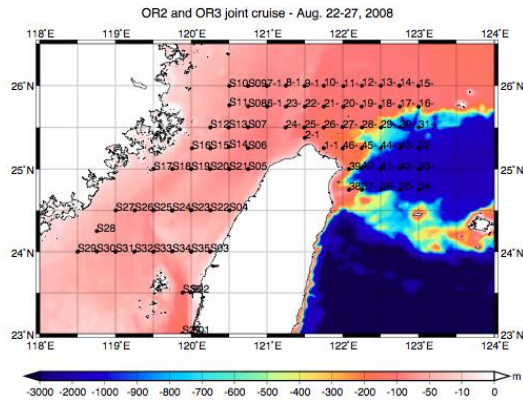
Outline

- Overview of Pilot Study
- SeaSoar Operations and Kuroshio Intrusion onto the shelf
- Mooring Data
- Implications for Environmental Keys
- Logistics Issues from Pilot Study
- Plans for Main Experiment

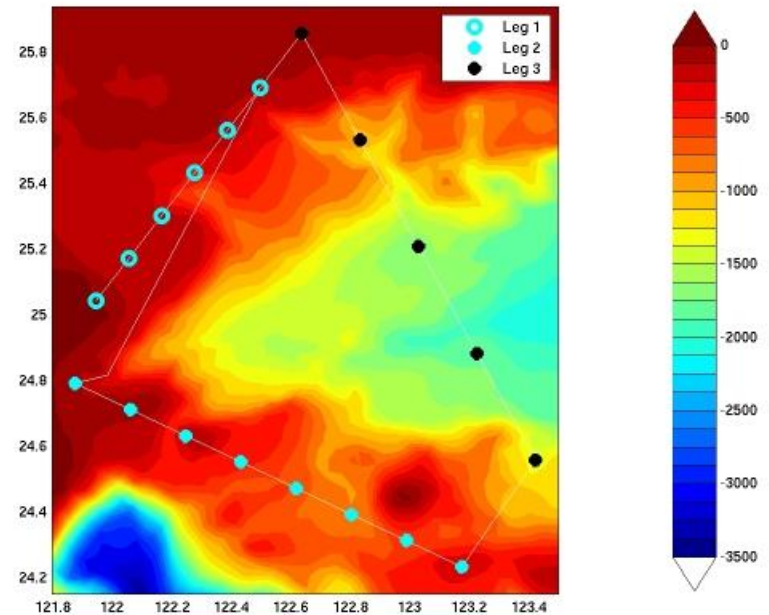
Pilot Study Objectives

- Dry run for logistics (Shipping, Port, Customs)
- Establish baseline conditions for oceanography and acoustics
- Test out major equipment in study area (SeaSoar, Mobile Acoustic Sources, Restrained Drifters)
- Develop satellite internet communications capability for OR1
- Integration of US and Taiwanese research goals and experimental planning

Pilot Study Components



OR2-OR3 Large Scale Surveys
August 22-26



OR1 Leg 1 Sept. 2-5

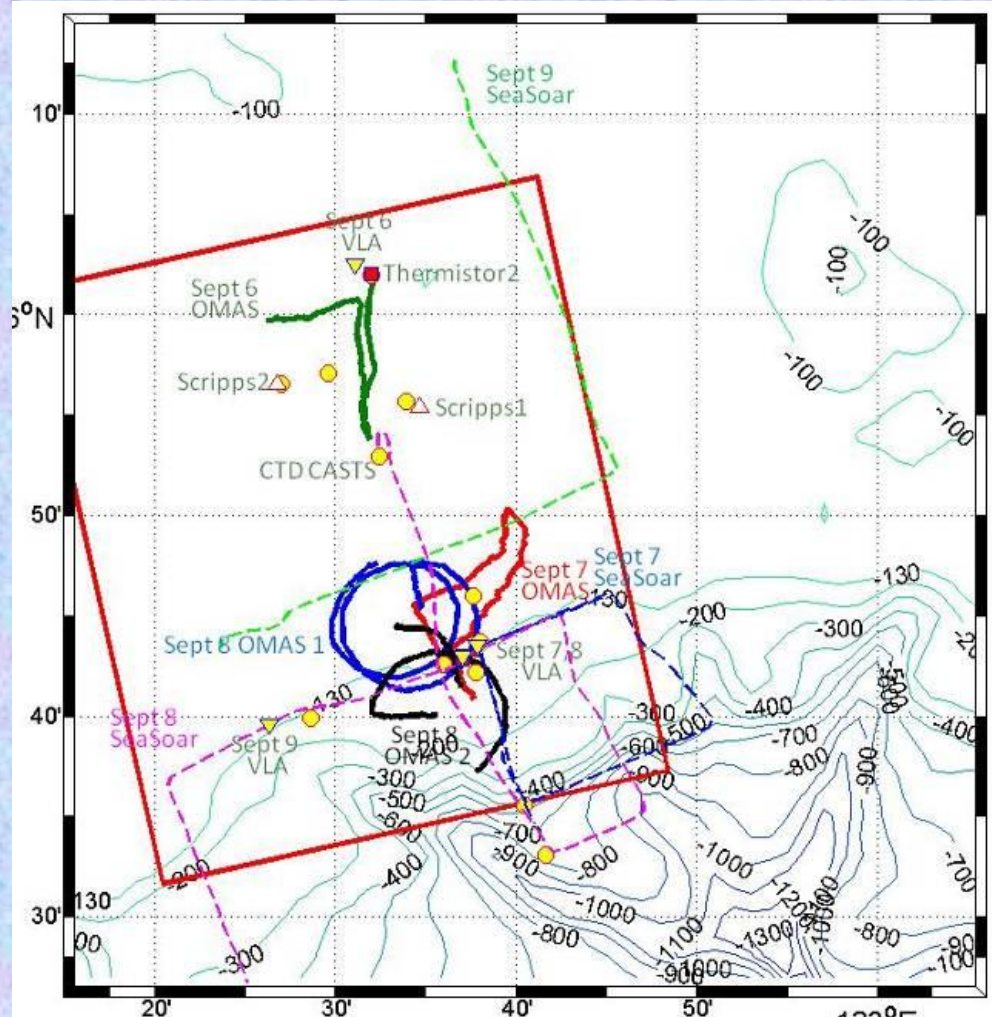
OR1 Leg 2- Integrated Acoustics/SeaSoar sampling

SeaSoar runs
Sept 7,8,9

Dashed lines-
SeaSoar tracks

Solid lines-
OMAS tracks

Along and cross
shelf lines up to
40 km

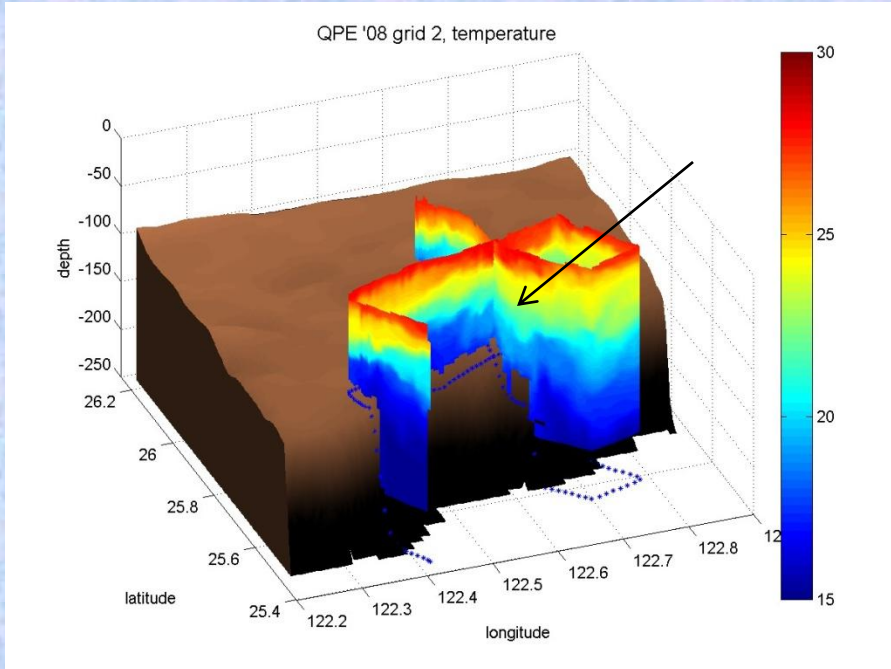


NTU SeaSoar



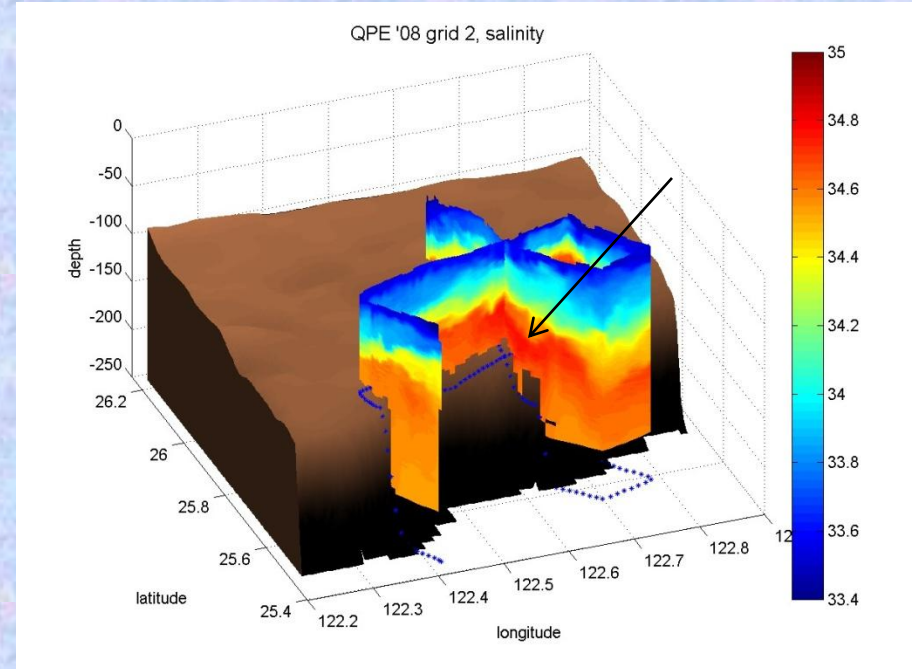
SeaSoar Sections Sept. 8

Temperature



Strong cross-shelf temperature gradients near bottom on eastern cross-shelf section
Correlation scale 18 km, $r=15$ km

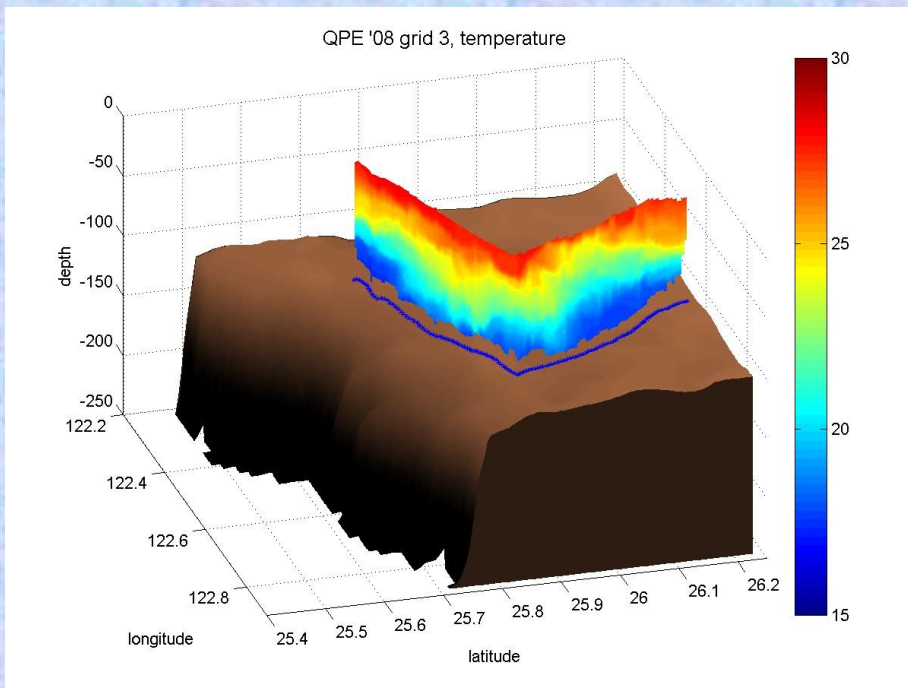
Salinity



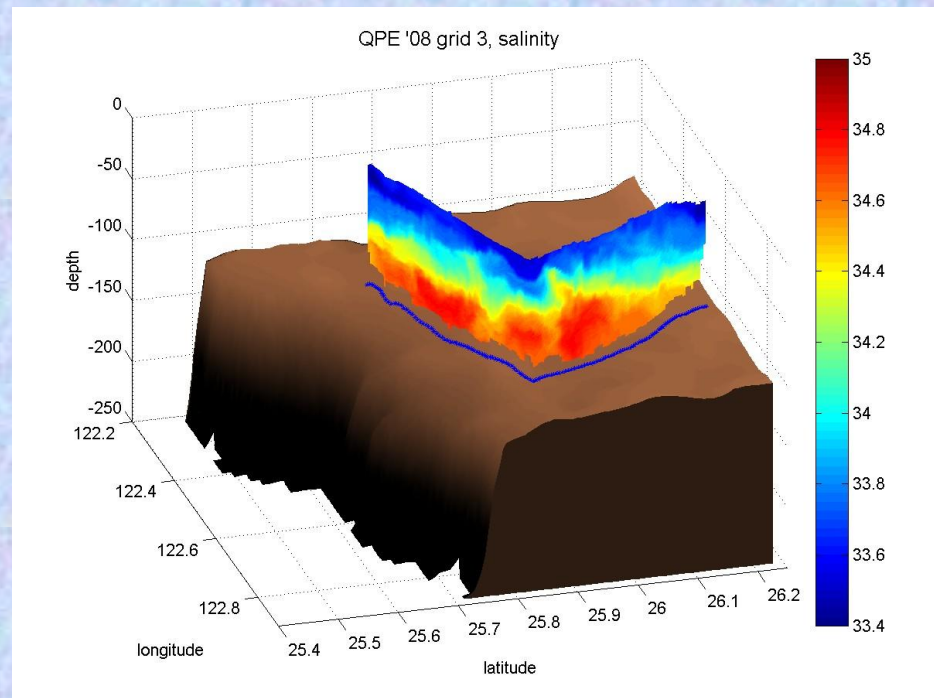
High near bottom salinities (34.8) indicative of Kuroshio water extending onto shelf

SeaSoar Sections Sept. 9

Temperature



Salinity

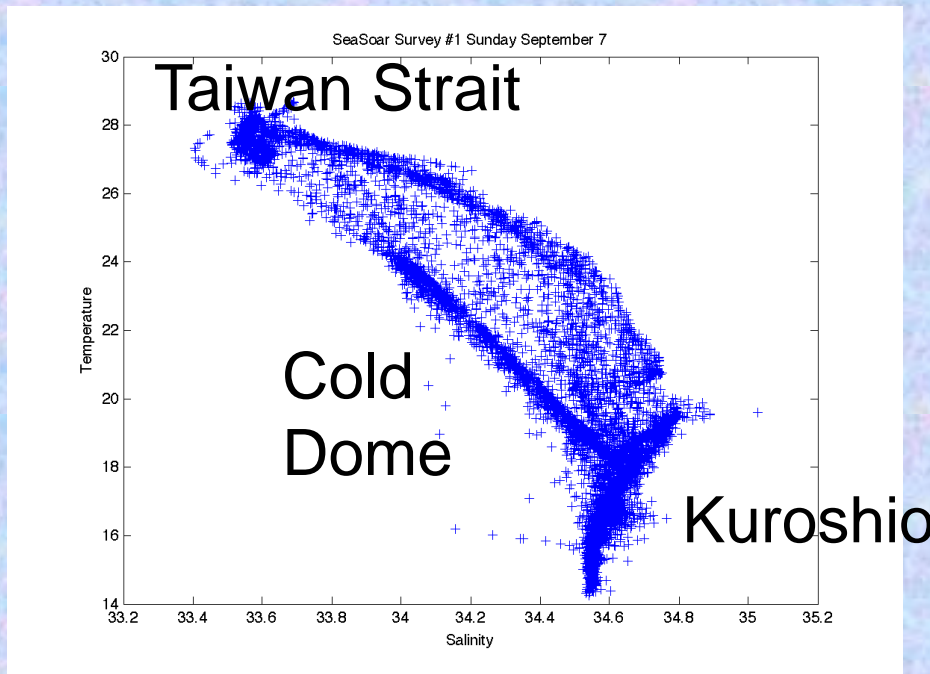


Large near-bottom alongshelf
gradients
Cold Dome evident in cross-shelf

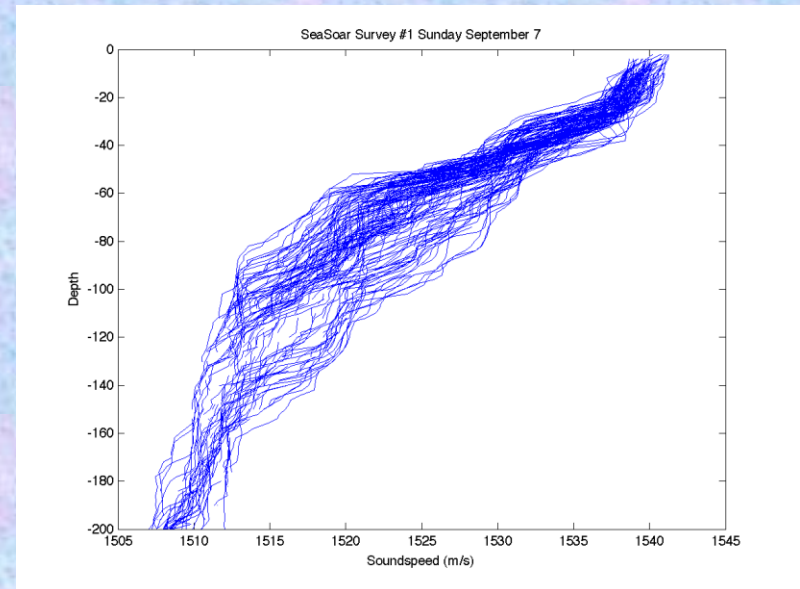
High salinity water extends
Significant distance onto
(~20 km)

Water mass properties and vertical profiles

T/S Properties

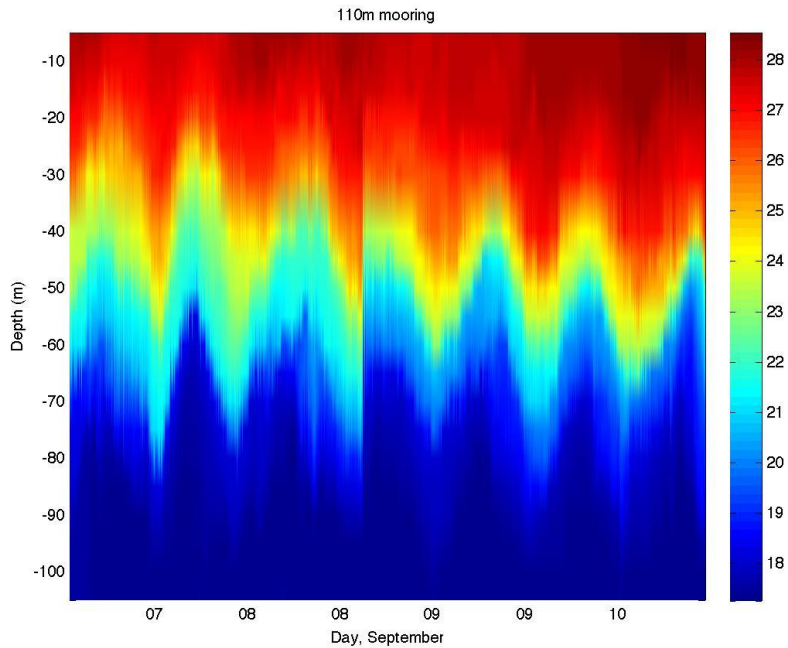


Soundspeed Profiles

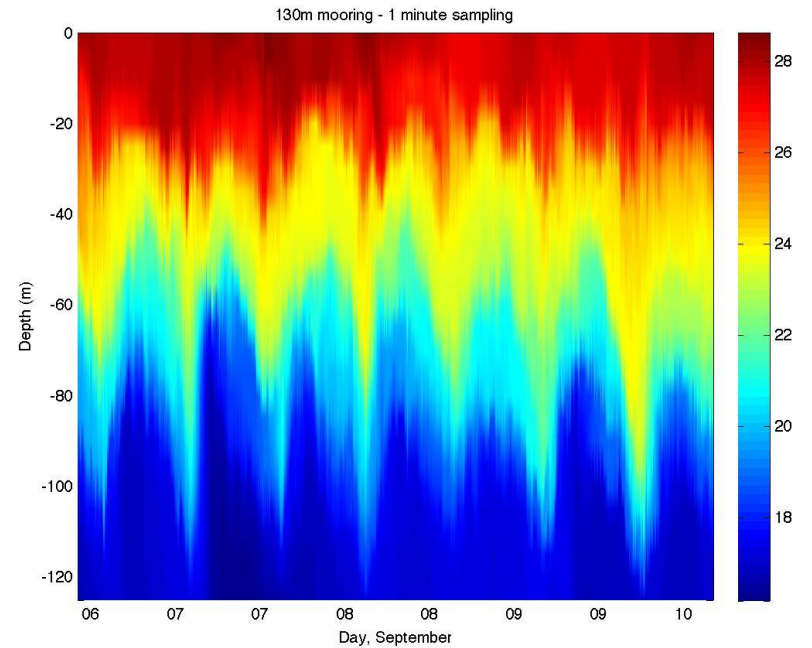


Strongly downward
Refracting
Max variance 60-150 m

Thermistor Strings



110 m Isobath



130 m isobath

Implications for Environmental Keys

- Near-bottom salinity probably best indicator of Kuroshio Intrusion with threshold of ~ 34.6
- Cold Dome present- vertical position of 20 Deg. C isotherm
- Bottom mixed layer was very thin- highly stratified near bottom. Likely to be very different in absence of Kuroshio Intrusion
- Internal tides significant and may complicate identifying the Cold Dome

Logistical Issues from Pilot

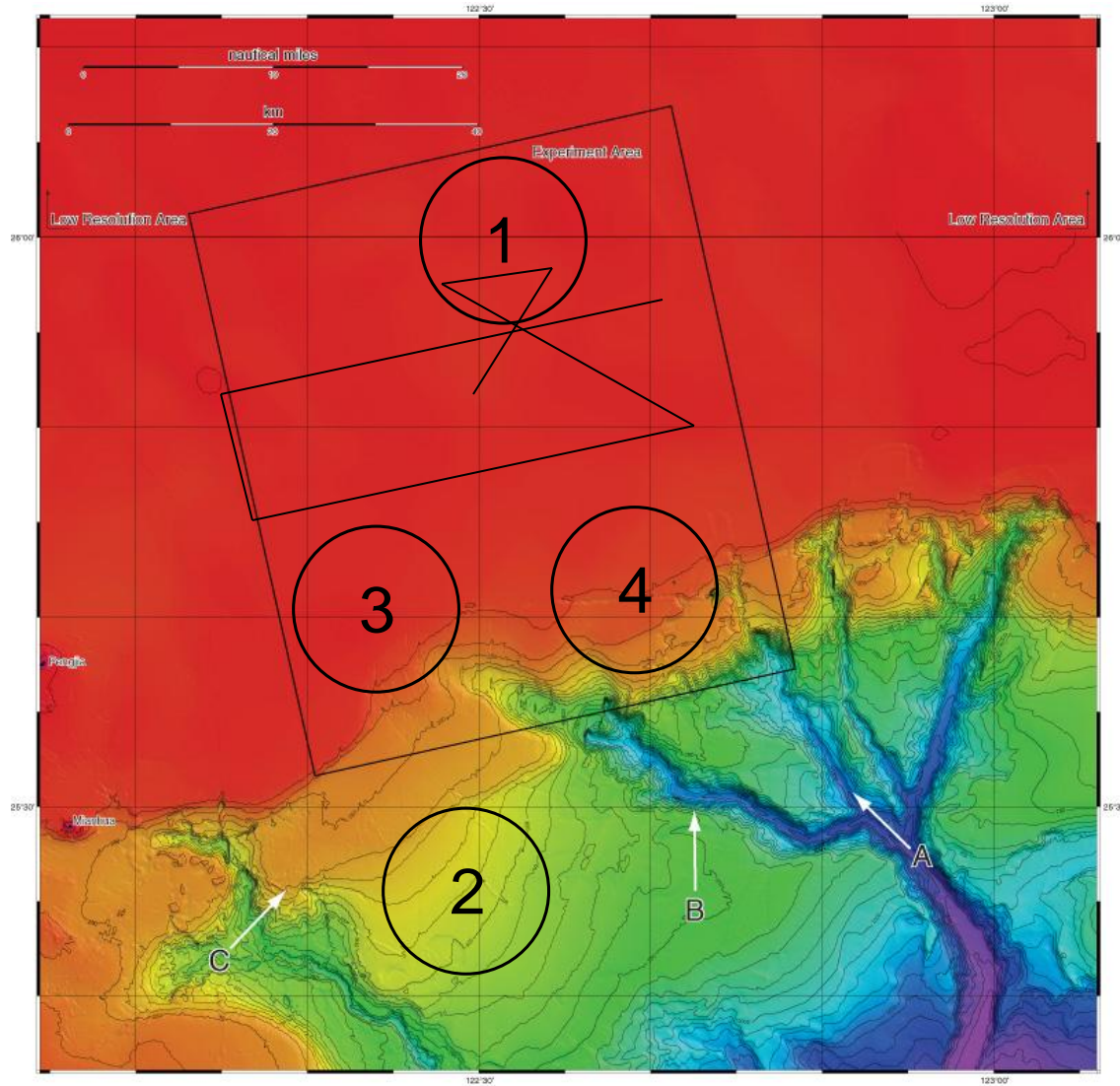
- Warehouse at Harbor Authority inadequate. Suggest staging at NTOU
- Security passes for Harbor major problem
- OR1 docked at Taiwan Shipbuilding Company dock. Will this work for OR1 and possible Melville for main experiment?

OR1 Internet Communications

- Thune and Thune Fleet Broadband 500 used on WHOI ships
- Cost \$11 per megabyte. Very expensive and need to limit use. \$4000 total for OR1 legs 1 and 2
- Requires Taiwanese license to use
- Data sent to MIT successfully and assimilated into Pierre's regional model
- Allows Pierre to work remotely at MIT. Same for main experiment?

Plans for Main Experiment

- SeaSoar in 10-12 hours/day while doing coupled work with Mobile Acoustic Sources
- Combine long lines (40 km) for frontal detection and spatial statistics with close in adaptive sampling near intensive sites (~10 km scales)
- Mooring equipment includes 2 300kHz ADCPs and 4-6 thermistor moorings from WHOI



Sample pattern at Site 1- Two 40 km alongshelf sections with local radials near moorings as well as adaptive sampling of high versus low uncertainty

Typhoon Sinlaku

