

History of ocean pCO₂ intercomparison

- 1994 Scripps
 - A.Dickson and CO₂ panel
 - Laboratory intercomparison with small seawater pool
 - Successful but water supply problem
- 1998 R/V Meteor
 - A.Koertzinger
 - Onboard intercomparison using natural surface seawater
 - Very successful but difficulties from natural variation of pCO₂ and on board laboratory share

International ocean pCO₂ intercomparison using indoor seawater pool

- SCOR/IOC CO₂ Panel activity
 - (Chair, D. Wallace)
- Merit of large indoor seawater pool
 - small T change
 - large water supply capacity
 - manageable pCO₂ with HCl and NaOH
- Facility
 - Floating in the pool for buoy type systems
 - Pool side deck installation for on board underway systems
 - calibrated standard gas supply (0, 270, 330, 390, 450ppm)
 - 100, 200V 50Hz AC power

International ocean pCO₂ intercomparison using indoor seawater pool

- Date
 - March 10 (Mon)–14 (Fri), 2003
- Post experiment workshop
 - around October 7, 2003
- Sponsorship
 - Ministry of Environment, Japan
 - National Institute for Environmental Studies (NIES)
- Location
 - Hazaki, Japan
 - 44 km east of Tokyo/Narita Airport

International ocean pCO₂ intercomparison using indoor seawater pool

- Target
 - critical comparison at 0.3 μatm level in ideal indoor laboratory condition
- How to do?
 - keep steady pool pCO₂ (ref. 1998 result)
 - critical T comparison of each equilibrator by calibrated T sensor
- Study for error causes in pCO₂ equilibrators
 - Pool pCO₂ can be changed by HCl/NaOH. Test at 250, 350, and 450 μatm can identify error relating to pCO₂
 - Pool T change (15 and 20 degree C) can identify error relating to T.

Indoor Seawater Pool in National Research Institute of Fishery Engineering

see web page

how to access

http://ss.nrife.affrc.go.jp/index_e.html

pool facility

http://ss.nrife.affrc.go.jp/plant/gyogun/gyogun_e.html

Seawater pool of 170t!
stable temperature and pCO₂
manageable pCO₂ by HCl/NaOH

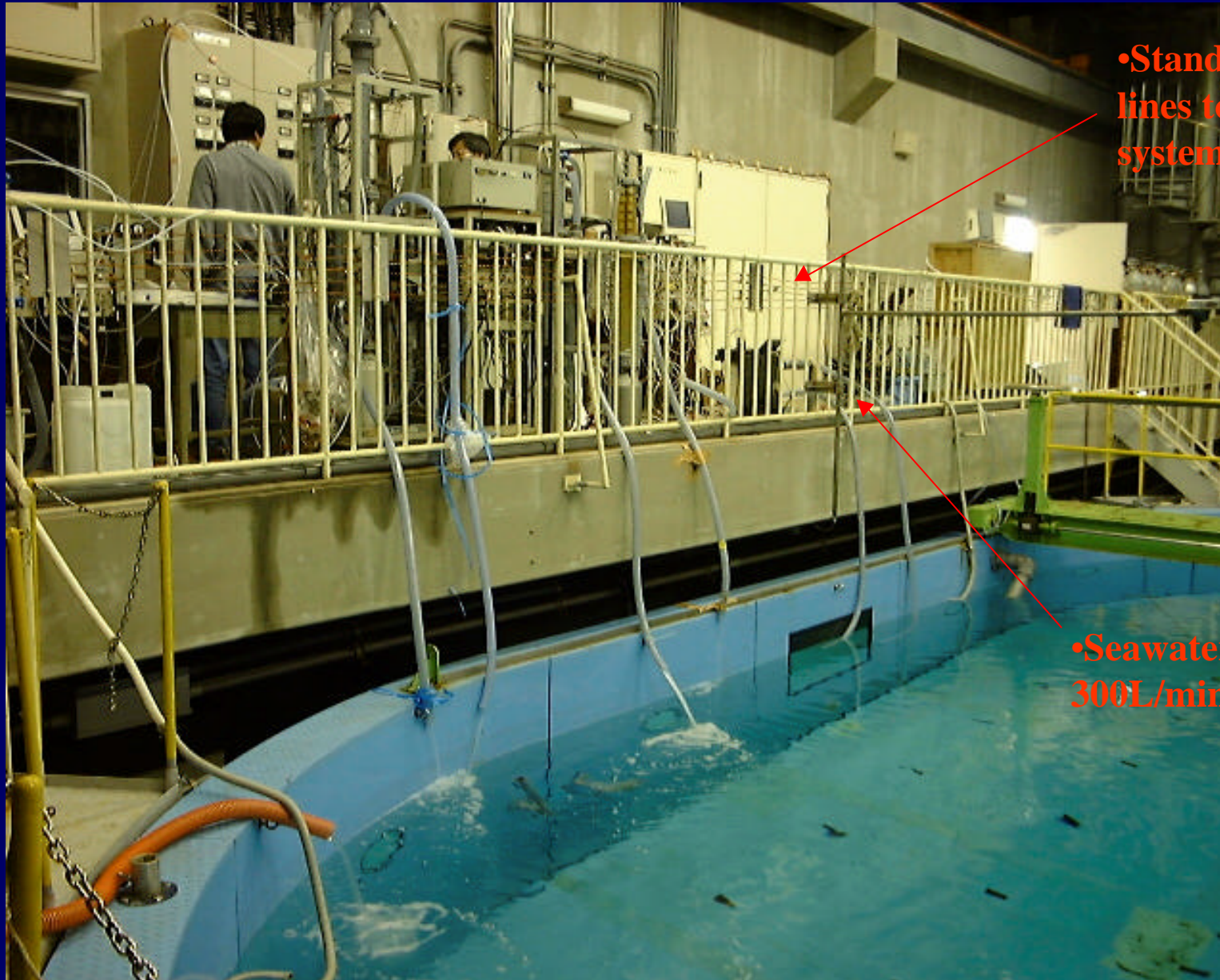


Pool building with wet and dry laboratories



- dimension = 15 x 8 m, 2 m in depth
- temperature control by heater
- uniform temperature by circulation

Photo of Japanese Domestic Intercalibration in 1998

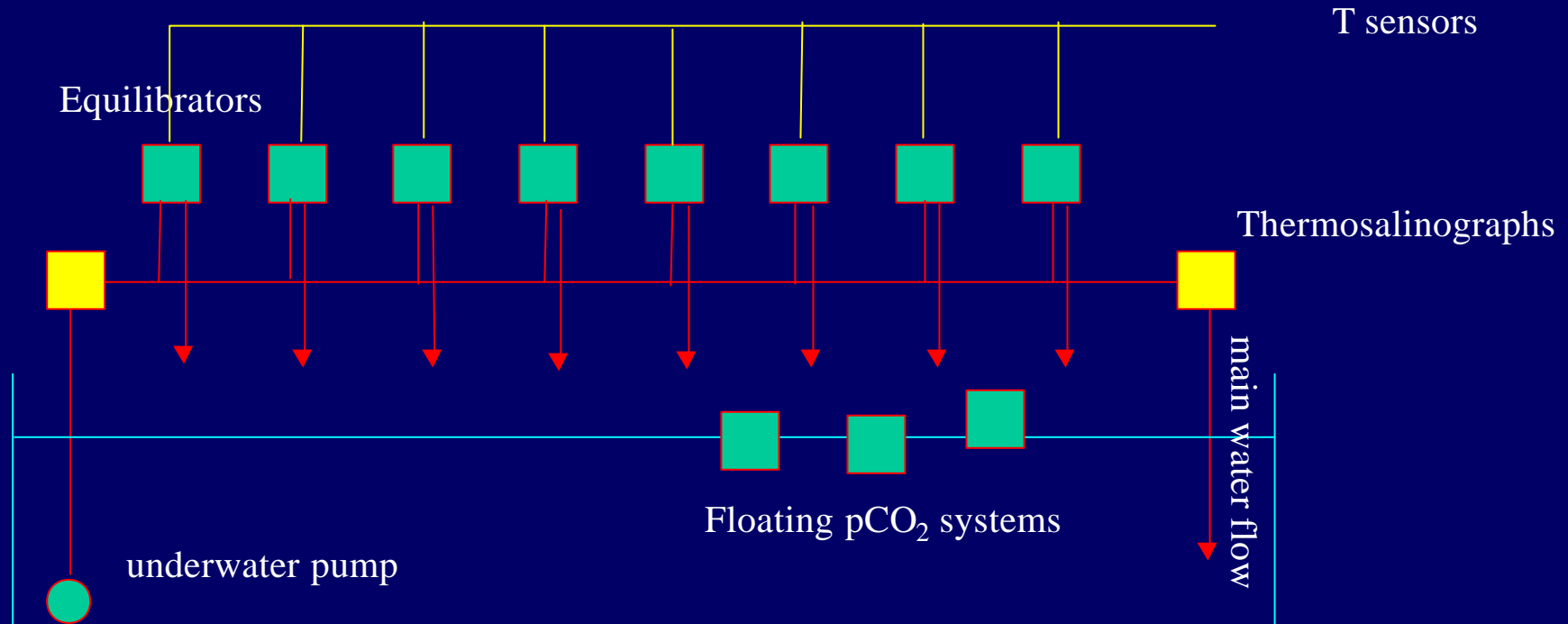


•Standard gas supply lines to all the pCO₂ system

•Seawater line of 300L/min flow rate.

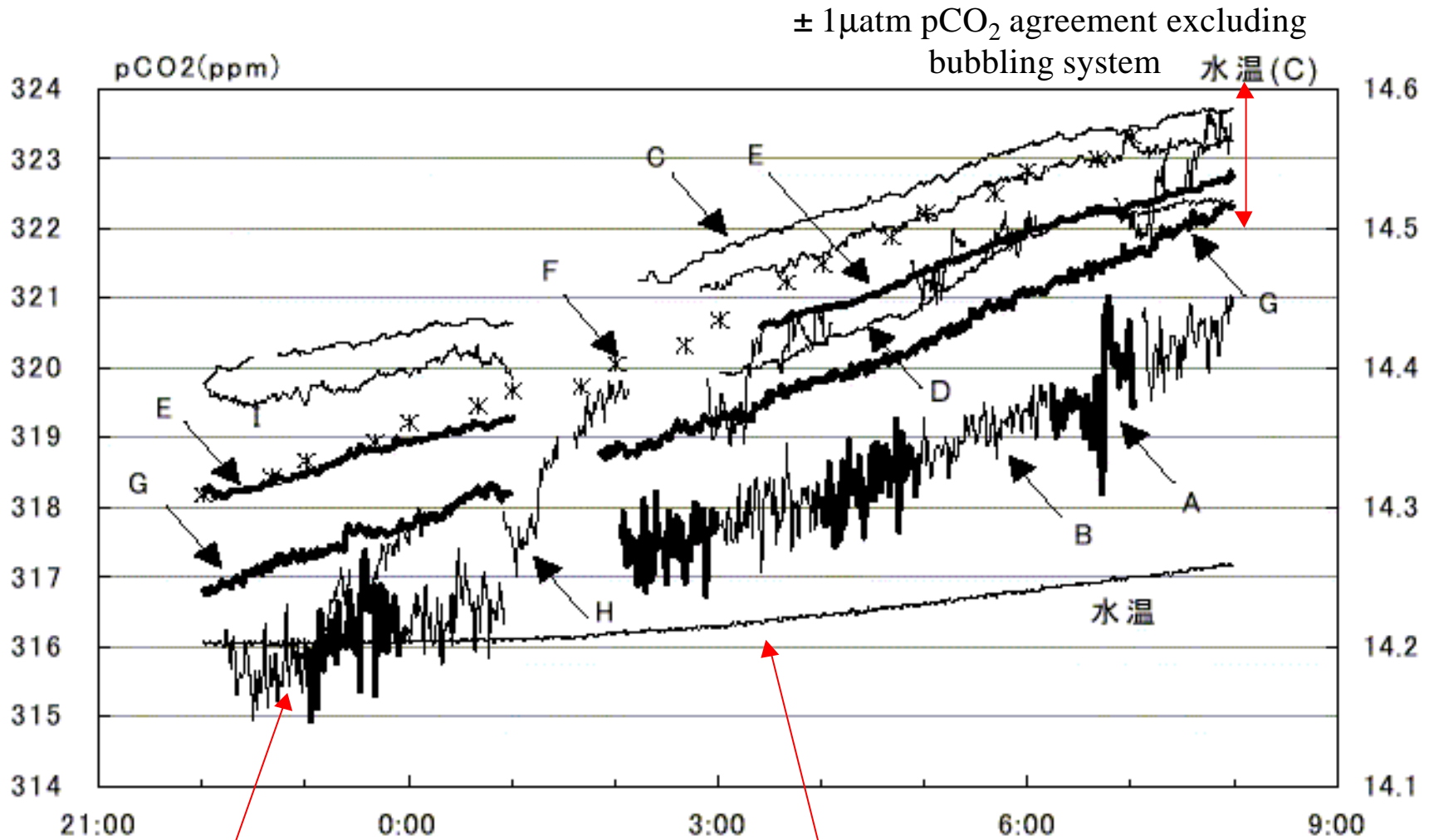
pCO₂ Inter-comparison setting

Pool side deck



- We will prepare the best set up for inter-comparison after the experience from the 1998 Japanese domestic inter-comparison.
- Standard gas (0, 270, 330, 390, 450 ppm CO₂ in air) supply lines to all the pCO₂ system will be installed.
- Main water line of 300 L/min will be installed on the deck.
- Two Thermosalinograph are installed at the upper and lower stream of the water line to ensure no temperature difference.
- Calibrated temperature sensors (0.02 degree C accuracy) will be supplied to all the equilibrators to ensure 0.3 μ atm resolution in pCO₂ comparison.

Result of Japanese Intercomparison in 1998



Bubbling equilibrator with low bias

Stable water temperature

Planned participants

- On board system
 - US
 - 2
 - Europe
 - 2
 - Korea
 - 1
 - Japan
 - Tandem (NIES)
 - Shower head
- Drifter/Mooring system
 - CARIOCA
 - MBARI