

Healy Seawater Ballast Delivery System

Ballast Tank Seawater Supply System

- Water baths on bow require near ambient ($\pm 1^\circ\text{C}$) seawater temperatures to not compromise experiments
- In solid ice, Healy science seawater system becomes clogged with ice when intaking volume necessary to supply water baths (~ 80 gal/min was required for this cruise). Calculations show that the system ingests ice at required seawater volumes of anything more than ~ 20 gal/min. (This despite improvements to ice separator done in 2003)



Improvements to the Science Seawater Plumbing on the Bow



This system, plus a few warm days early in the cruise, helped us pinpoint ingestion of ice rather than freezing as the culprit leading to frozen input hoses and ice in the science seawater throughout the ship

Ballast Tank Seawater Supply System

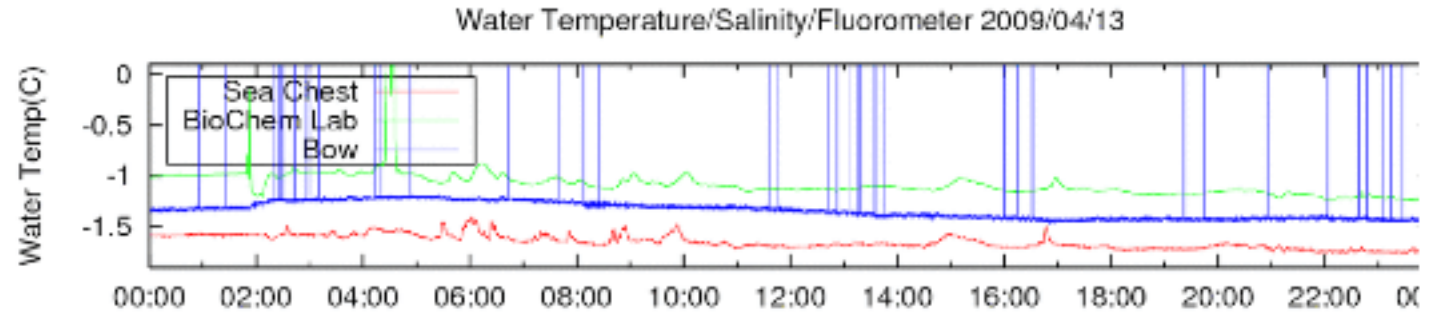
- The ballast water supply system can be used instead. For this system, ambient seawater is pumped into the forepeak ballast tank using fire hose connected to the science seawater system when the ship is stationary so that no ice is ingested. The water is then delivered to the water baths on the bow using a fire hoses running through the forward deck machinery room to a manifold on the deck.
- Requires coordination and teamwork between science party (Chief Scientists), engineers, and science support staff (Roberts, Maxwell) to monitor volume, plan filling times, connect fire hoses, and adjust science seawater pumps appropriately for filling
- Setting up and filling the ballast water tank required considerable effort on the part of the chief scientists and science support staff.
- System was used in 2002 and 2004 (SBI) and 2007 and 2008 (BEST)
- Documented in SBI cruise reports, BEST cruise reports, science support cruise reports, and engineering department reports
- Despite past documentation, turnover of CG personnel resulted in poor retention of the ballast tank seawater system. In 2008, members of the science party and only one MST (Eric Rocklage) remembered the system and Eric was able to locate the saved parts.

Ballast Water Plumbing on the Bow

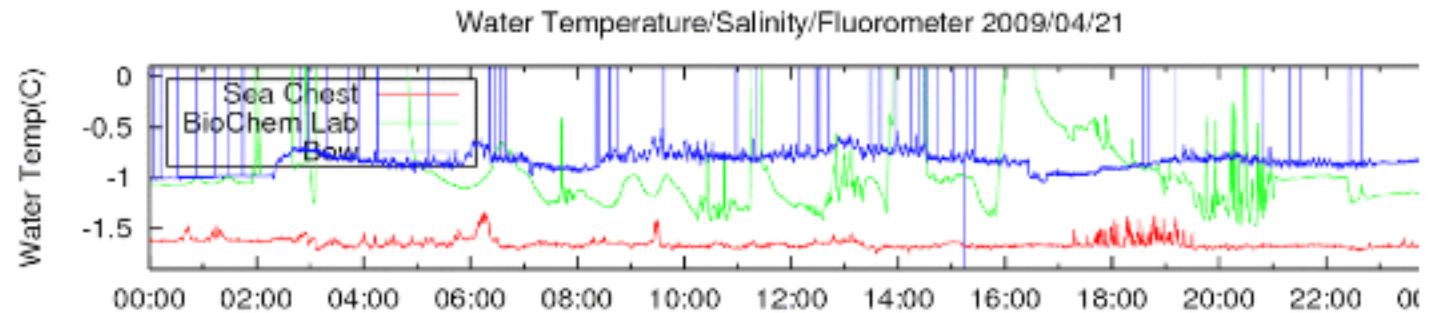


How Well Did it Work?

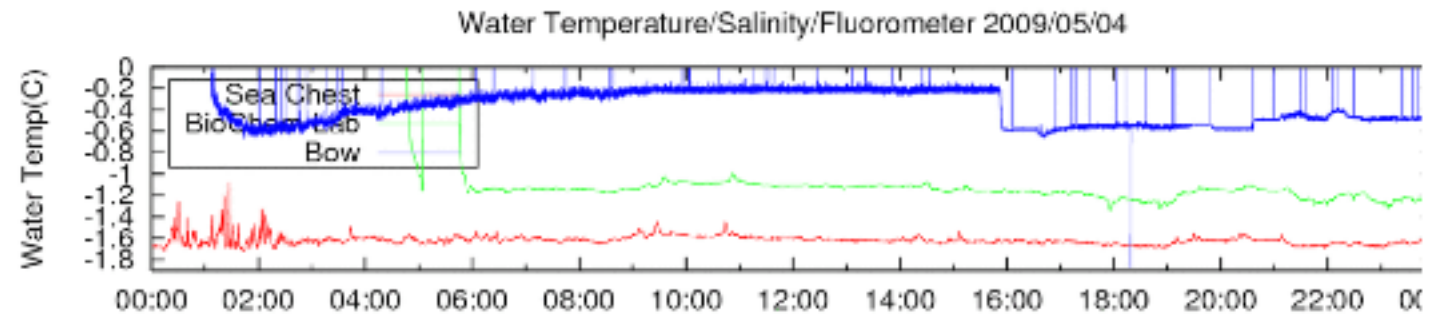
Very Well
(Happy
Scientists)



Still OK

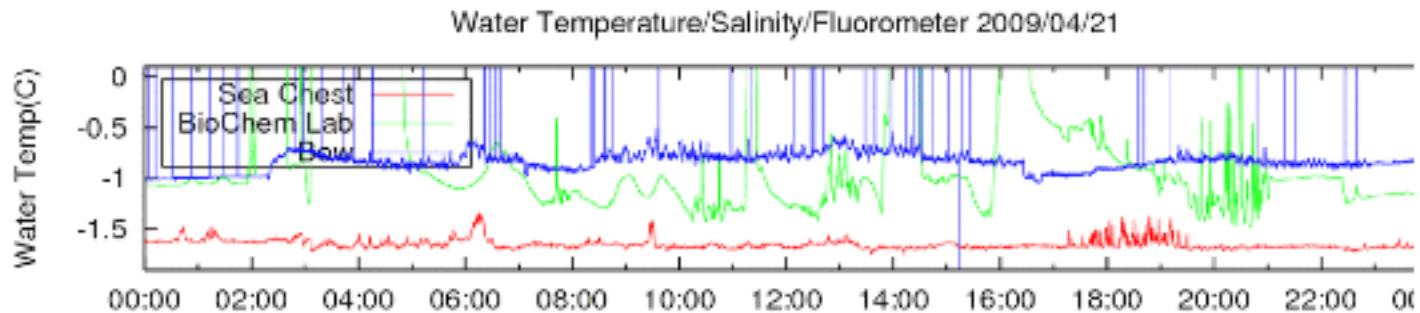


Not Well



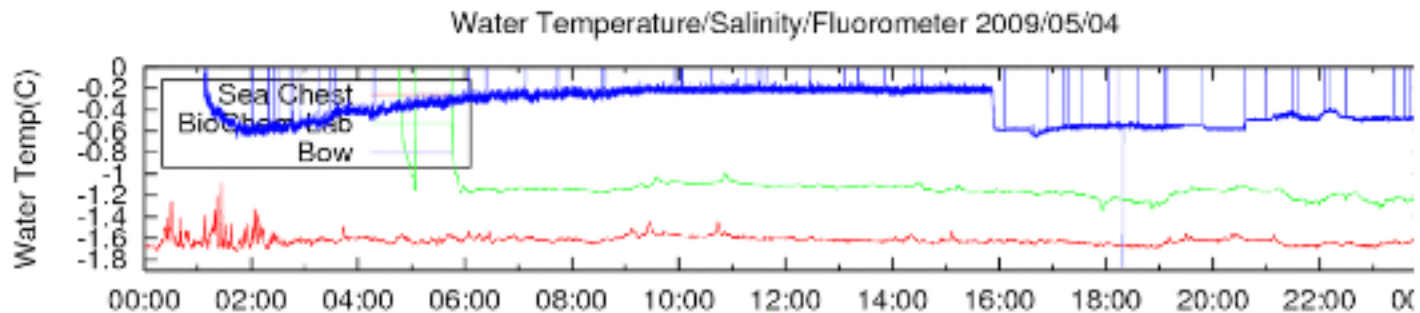
Why?

Still OK



Temperature of Water in Tank: -1.27°C

Not Well



Temperature of Water in Tank: -0.87°C

- Ballast water may have been heated in tank (there was more sun and air temperature was warmer later in the cruise)
- Ballast water may have been heated in transit from tank to delivery on deck

Solutions or Helpful Changes?

- Insulate top of tank?
- Insulate delivery hoses?
- Increase volume of pump or diameter of hoses so water moves more quickly through the forward deck machinery room?
- Permanent plumbing below decks to fill the ballast water tank from the science seawater system that would not require fire hoses on-deck to be connected/disconnected/drained each time filling of the tank is required?
- Figure out if there is something that can be done to improve the present ice separator?
- Better retention of information between successive CG crews