First PMEL Navis float: going strong at 41 profiles
• Iridium/GPS float 95222B Rudics
• Firmware based on APF-9 (UW – Swift & Riser)
• SBE-41CP CTD

• Sufficient power for > 300 profiles to 2000 dbar

• Minimum fractional volume change 1.7%
• 300 ml oil reservoir

• 14 cm hull diameter, 24 cm ring diameter, 159 cm length
• Weight in air ~18.5 kg

• Rated to 2000 dbar
• Pressure activated

Please contact SBE for more details
Navis Issues: Oil Pump

• Old reciprocating pump cavitation problem (air in the oil) raises its head again
• Most pronounced in “cold” near-surface conditions (high latitudes)
• Sea-Bird mitigation:
  Leduc inlet redesign, reduced oil viscosity & float vacuum, testing new bladder
• Affecting 10 out of 42 floats deployed to some degree.
• Reduces lifetime and if really bad, float stops functioning.
Navis Issues: Air Valves?

- 130 solenoid valve permanently closed ("vacuum" count also near 120) – dead.
- SBE has replaced unit with one with a lower voltage set point (different coil winding).
- Also a check valve between air bladder and interior of float that can stick.
- Check valve sticking has affected at least 4 floats (130, 142, 150, 152).
- Makes it hard to leave the surface, killed 142. This can come and go or be permanent.
- SBE cleaned up parts tolerance & cleanliness, also removing redundant valve.
Navis Issues: Buoyancy Change

- Oil bladder permeability to gas causes this artifact (probably not worsening pump issue)
- Seabird testing a new impermeable oil bladder.
- Few rapid “buoyancy losses” (165 = leak?, 132,136,157 = constellation of symptoms)
- Could be artifact in some cases, SBE testing a different potentiometer.
Navis Issues: Summary

- Quality control of delivered floats is excellent
- Advantages: small size, long life, buoyancy, warranty

- Out of 42 deployed floats, 10 are not currently reporting data
  - One never reported a profile
  - Seven stopped reporting after exhibiting oil cavitation
  - One stopped reporting after air valve stuck
  - One stopped reporting after oil & air symptoms

- SBE making progress on needed hardware improvements.
  - Implemented oil cavitation fixes (pump inlet, viscosity, vacuum)
  - Implemented air check valve fixes
  - Testing an impermeable oil bladder

- Data transmission efficiency still needs to be improved
- Ballasting could be improved
  - has required some parameter changes, but not impacted ability to reach target depth or surface