How Can We Improve Pre-Deployment Testing To Eliminate Failures

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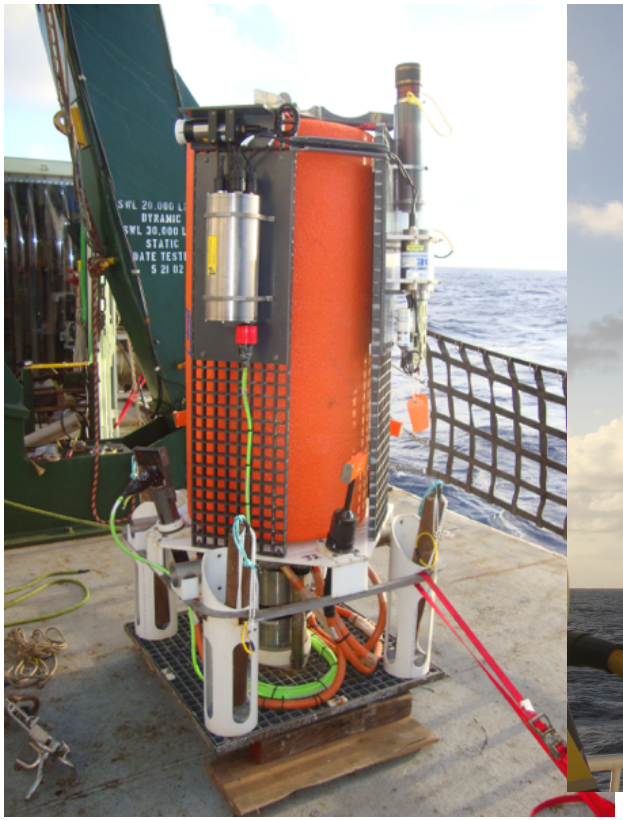
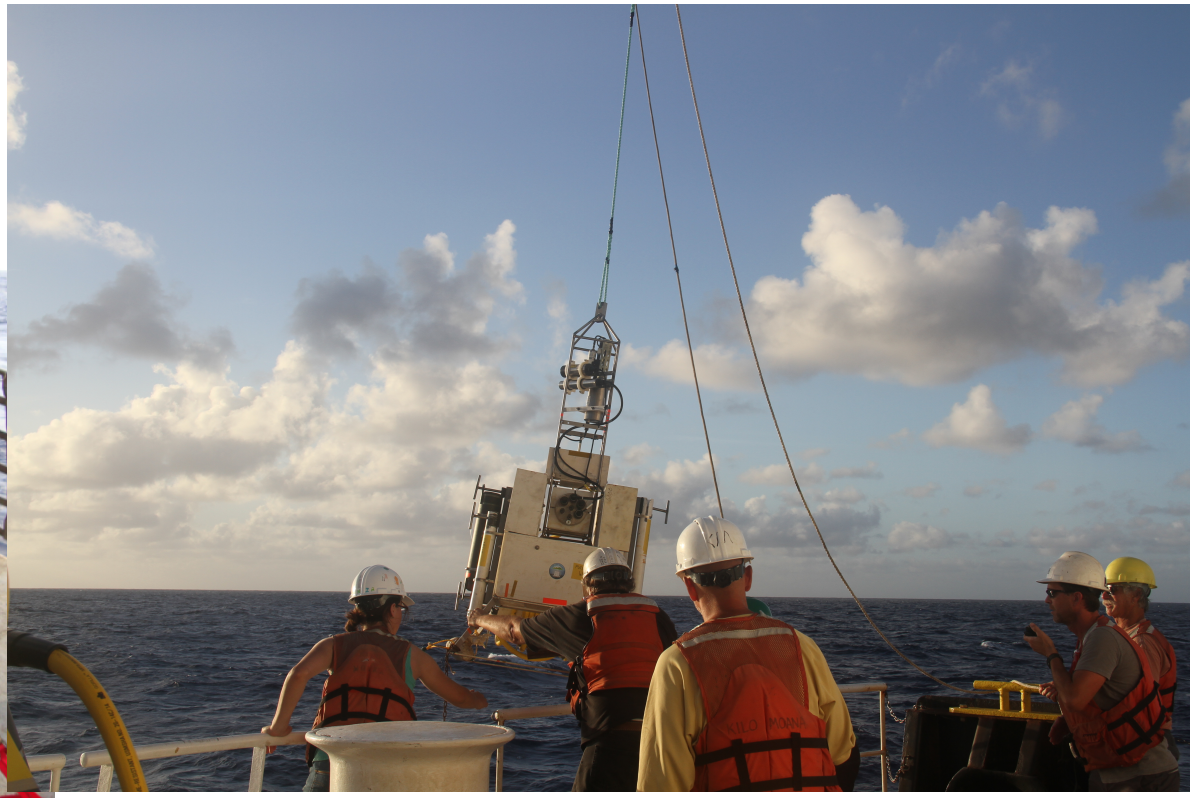
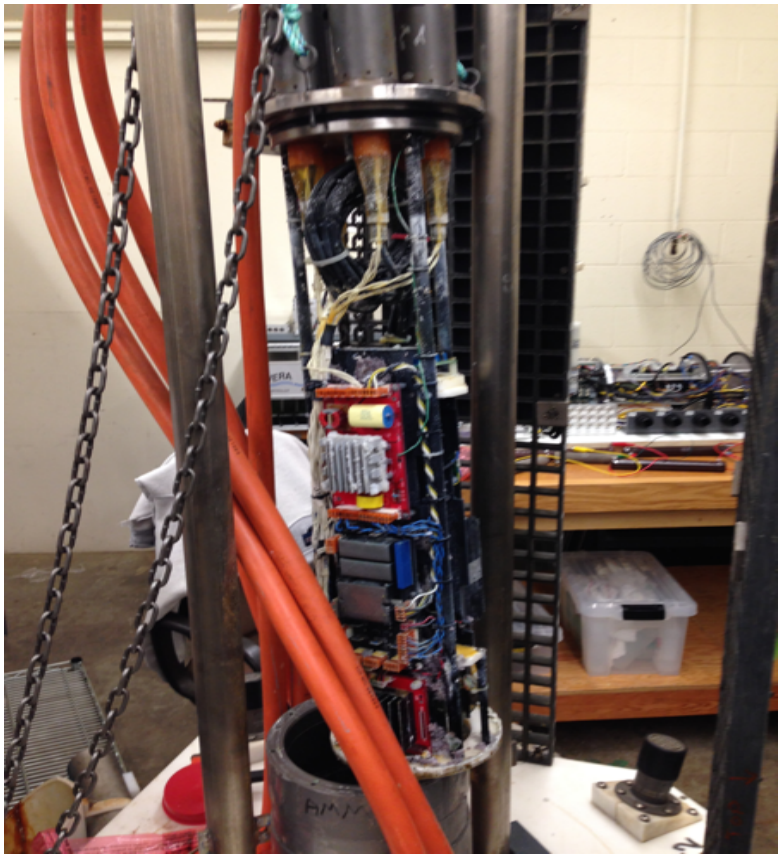
When Is Your Equipment Ready To Deploy?



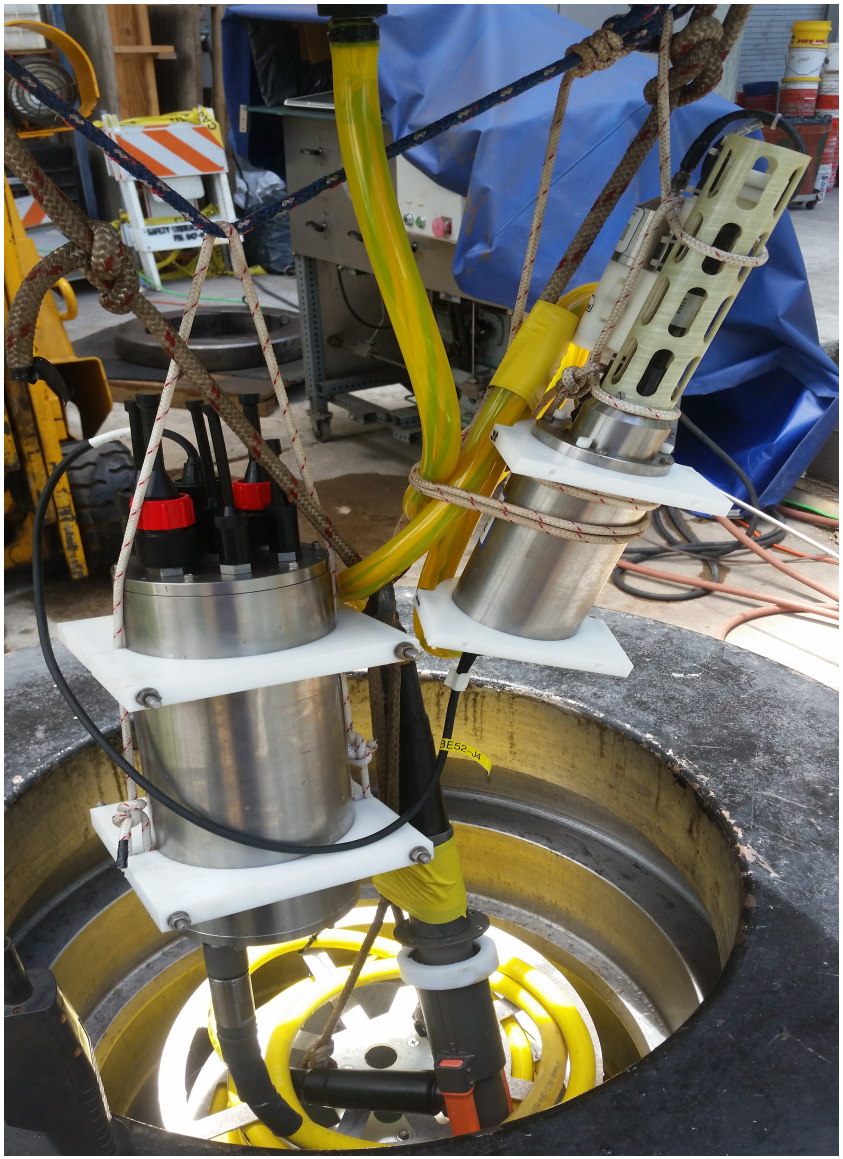


Failures Occur After Deployment That Do not Present During Testing



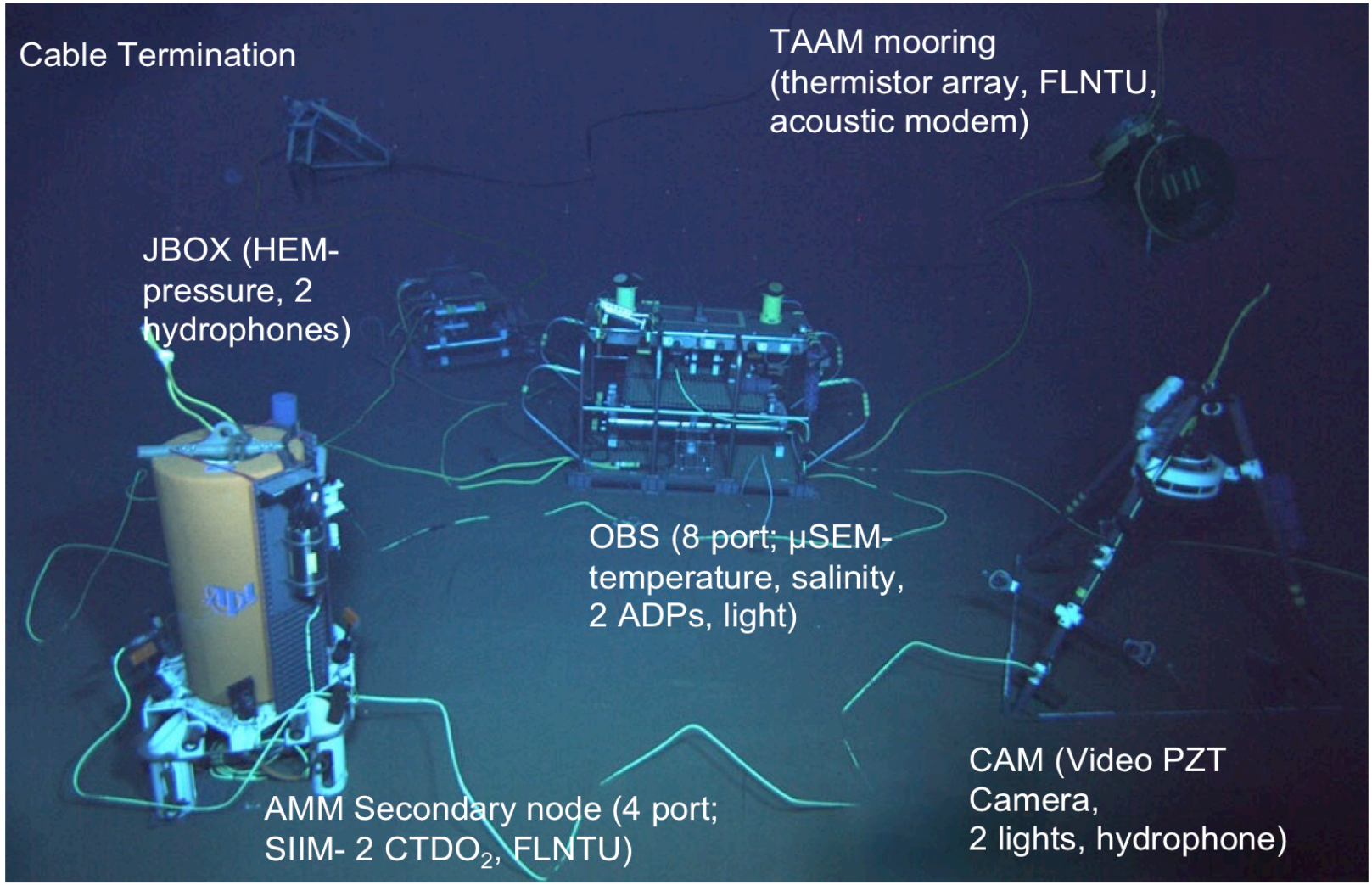
Detailed, Sequential Testing program

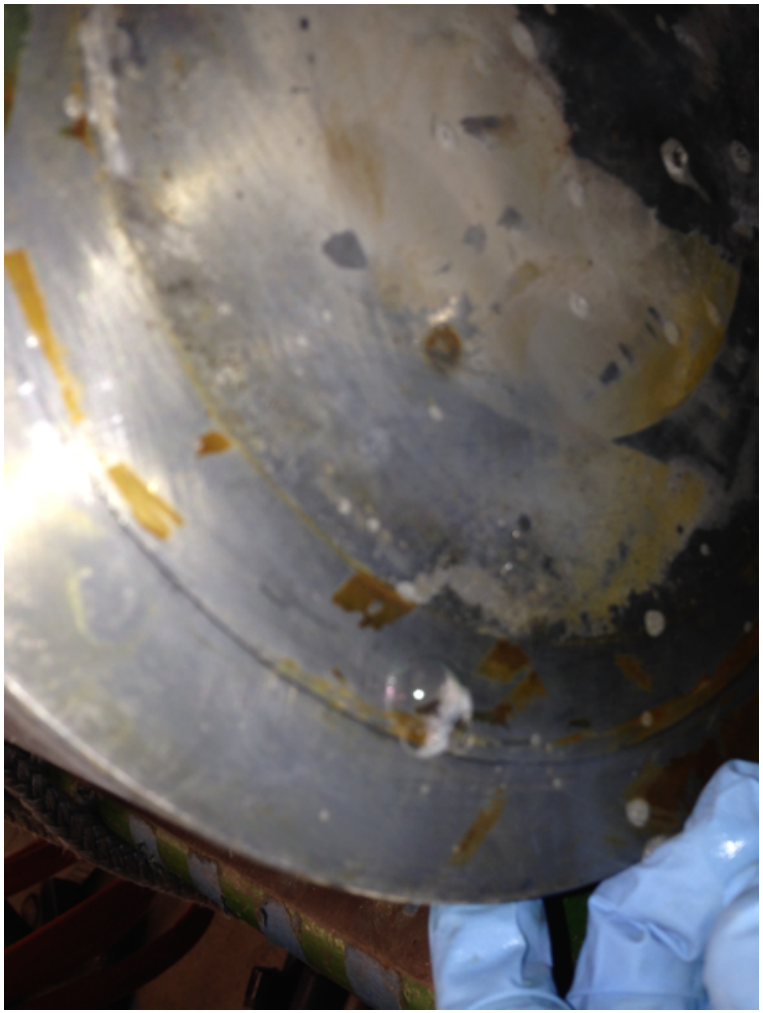
What Does a “Best Practices” Pre-Deployment Testing Program Look Like?



A Case Study:
ALOHA-MARS Mooring (AMM) Secondary Node Failure

- Secondary Node
- Science Instrument Interface Module (SIIM)
- Two CTDO2s (SBE52/43MP)
- Fluorometer (WetLabs FLNTU)


Cable Termination
TAAM mooring
(thermistor array, FLNTU,
acoustic modem)
JBOX (HEM-
pressure, 2
hydrophones)
OBS (8 port; µSEM-
temperature, salinity,
2 ADPs, light)
CAM (Video PZT
Camera,
2 lights, hydrophone)
AMM Secondary node (4 port;
SIIM- 2 CTDO2, FLNTU)



We suspect the pressure case material is AL 17-4PH stainless steel (PH – precipitation hardened).

From one material spec sheet (www.alleghenyludlum.com):

> "Tests have shown that the corrosion resistance of AL 17-4 Precipitation Hardening Alloy is comparable to that of Type 304 stainless steel in most media. In general, the corrosion resistance of AL 17-4 alloy is superior to that of the hardenable 400 series stainless steels. As with other precipitation hardening alloys, AL 17-4 Precipitation Hardening Alloy is more susceptible to stress corrosion cracking at peak strength. Consequently, in applications in which chloride stress corrosion cracking is a possibility, the material should be precipitation hardened to produce the lowest hardness compatible with the intended end use. This is done by heat treating at the highest temperature which will produce suitable minimum properties.
> Material in the annealed condition should not generally be put into service. In this condition, the material has an untempered martensite structure and is less ductile than aged material. The untempered martensite may be subject to unpredictable brittle fractures. In corrosive environments, the untempered martensite is more sensitive to embrittling phenomena such as hydrogen embrittlement than material which has had one of the precipitation hardening heat treatments. Similarly, untempered martensite is more sensitive to chloride stress corrosion cracking than material in which the martensite has been tempered."

What Should The Pre-Deployment Testing Program Look Like?

- Pressure
- Number of Cycles
- Duration of Each Cycle
- Temperature
- Fresh vs. Seawater
- Data