Ocean Observatories

- Arthur Kaletsky, Susan Humphris, Maaten Furlong, Dan Hayes (Chair), Mark Patterson (rapporteur), Steve McPhail, Oivind Odegaar
- Competiton for limited funds between fixed nodes and AUVs
- US planning perspective, coastal obs are different than deep-sea cabled observatories
- 3 different roles for AUVs, survey for where to put nodes or moorings, active collector between nodes (docking capability would allow event response), help with maintenance or sample collection involved with fixed nodes (pick up rocks or collect water samples)

Ocean Observatories

- No standard for docking AUVs deep, but a solvable problem, no commercial vendor yet
- AUVs not fully integrated into observatories yet, tend to be done as skill experiments with finite duration (several weeks) with other platforms - the one recent exception are glider deployments
- Gliders not going to be in estuaries
- Range extension possible in tidal extension by imitating nature
- Deepwater AUVs can land and sleep to increase mission times
- AUVs are really useful for post sampling of events in geologically dynamic areas

Ocean Observatories

- In practice AUVs are slow, so comparison with shipboard sampling as part of an OOS should always be considered, given reliability of current platforms
- But we shouldn't beat ourselves up about reliability when compared to ships, fixed nodes, gliders - they all have warts
- Unfortunately AUVs are expected to be perfect
- Selling points for AUVs as part of OOS need to be developed understandable by policy makers, managers: e.g., refining tsunami understanding, HABs, hypoxia
- Is the day coming when fixed buoy will disappear? Probably not as buoys can support larger payloads, real-time data connectivity

Ocean Observatories

- Need to have an AUV working every day for a year with an OOS to make the point of their value
- Data visualization for multi-dimensional datasets is a huge need, especially for naïve end-user, need more tools like ANCOR, GeoZUI3D for AUV-equipped observatories. Maybe use Google Earth ToolKits for MatLab in the future!
- Caveat though is that speed of data acquisition must be linked to scale of phenomena under consideration. Separating time and space variability from AUV dataset is hard without a fixed node for some processes!
- Adaptive sampling for AUVs is still in its infancy. But should be straightforward. Hard part is if hardware needs to be changed on the fly, like switching out a sensor platform, e.g., swapping out multibeam for camera, or different sensors on sonar side.

Ocean Observatories

- Leaving an AUV in the water for months isn't yet here
- Can AUVs again play a role to help service things that need servicing (different toolsets)? Free up an ROV or ship? Probably easier to think about the design of the high maintenance items?
- Perhaps use AUV as a person in the loop if it gets close enough to node? Goes into high bandwidth mode and shows human on shore some video. A variant on the ALIVE project (hybrid AUV/ROV).
- There are untapped problems for AUV intervention that involve manipulation, e.g., taking corks out of Ocean Drilling Program boreholes (requires ship and submersible)

Ocean Observatories

- AUVs could potentially use elevator systems currently used for physical sample retrieval from ROVs are depth, or bring samples back to surface physically to surface ship
- Legal problems with using unsupervised ASV to extend delivery of AUVs to work site far offshore
- Under ice ops, AUVs can be data (acoustic mode) relay stations; this is needed because of the problems of transmitting data long distances in this environment
- New methods needed for detecting leads, including size, direction, and speed, so that AUVs can surface and send data home (and potentially receive new instructions)
- Long distance AUV could be a polynya hunter to stay for a day or two and squirt out large amounts of data from all the components in the system

Ocean Observatories

- DAMOCLES is a scheme for using gliders as store and forward network under the ice
- Wires with instruments that crawl up and down wire are not in use for profiling
- For now, routine AUV use as part of OOSes in iced over areas will be challenging
- Long-range acoustic navigation (20 Hz - 1000 km) maybe a long-term solution (till the cap melts), updates few and far between!