

Autonomous Navigation in Polar Environments: ICEX16 Ice Operations



NAVAL
POSTGRADUATE
SCHOOL



- Bring UAV and AUVs to the Arctic Circle as part of ICEX16
- Refine techniques for safe deployment and recovery of AUVs from under the ice.
- Develop techniques for under-ice navigation without GPS
- Exercise SUBDEVTRONTWELVE mission objectives to development multi-mission collaboration between subs and unmanned systems.
- Conduct research with Oceanography assessing acoustic propagation characteristics.
- Measurement of ice thickness with collaborative UAV/AUV ops
- Ice flow estimation for accurate beacon-based under-ice navigation
- Velocity estimation with upward looking Acoustic Doppler Current Profiler.

- Develop and test beacon homing filter for safe AUV recovery
- Investigate SONAR-based terrain-relative navigation using a map of the underside of the ice as a navigational reference
- SUBDEVTRON 12 - Search and detect semi-surfaced platforms and report results back in near real-time
- Acoustic propagation assessment – deploy passive acoustics and record acoustic transmissions from the REMUS and THAUS AUV
- Ice flow estimation – Use an external LBL and on board INS to correct for AUV position estimates
- Velocity estimation – collect data and assess possibility of using upward looking ADCP for linear velocities

- Monitoring Polar Regions is becoming increasingly important
- Joining ICEX16 presents an excellent inexpensive opportunity to conduct challenging unmanned system operations in extreme environments.
- New navigational techniques are required for the Polar regions.
- Data collection, experimentation and collaboration with Naval forces is critical for understanding operations and developing robust solutions.
- AUV and UAV operations in the Arctic environment permits greater environment understanding through the greater coverage and persistence.