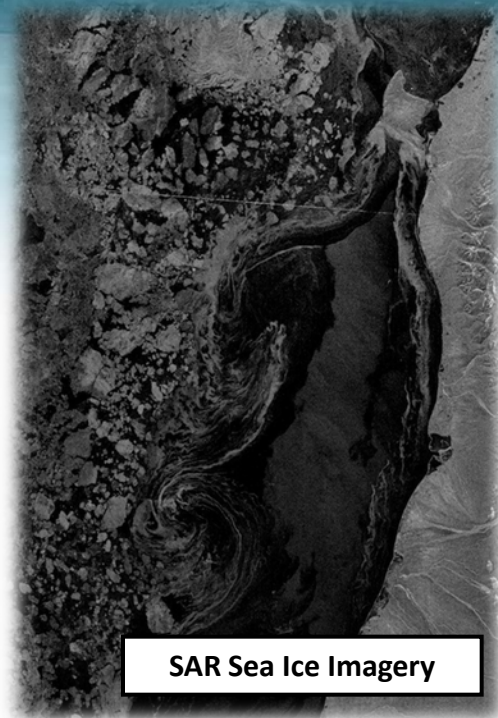




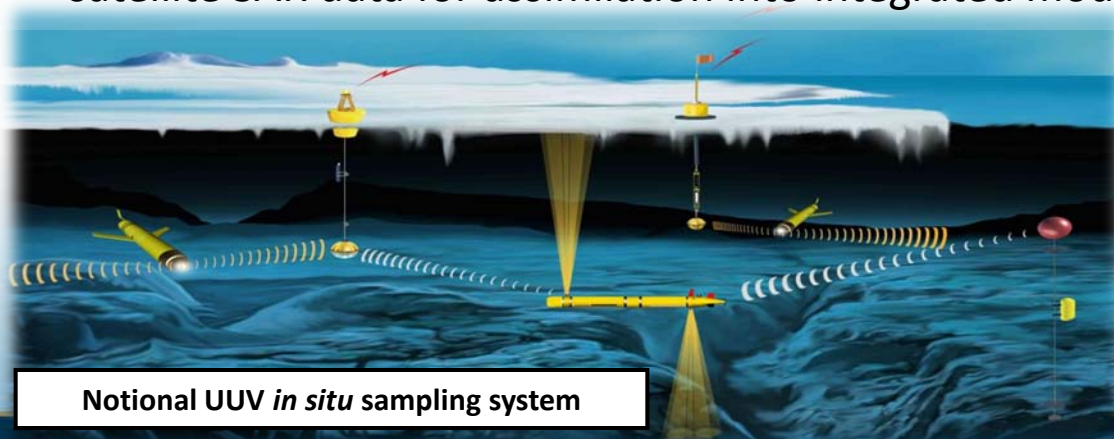
Environmental Arctic Research Program

MAJOR THRUSTS

1. Generation of **new observing technologies** (platforms, sensors, communications) that will enable persistent observation and operation in the Arctic
2. **Improved basic physical understanding** of the Arctic environment and important coupled processes operating in the Arctic region
3. Development of **fully-integrated Arctic System Models** incorporating the ocean, sea ice, waves and atmosphere for **improved prediction at longer lead times**, including the use of satellite SAR data for assimilation into integrated models



SAR Sea Ice Imagery



Notional UUV *in situ* sampling system

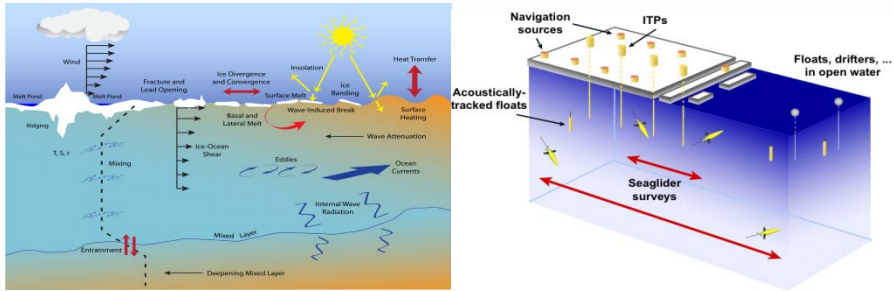
Advances in technology will be required to enable an interagency Arctic Observing Network that will support scientific exploration and be able to initialize predictive models of the environment



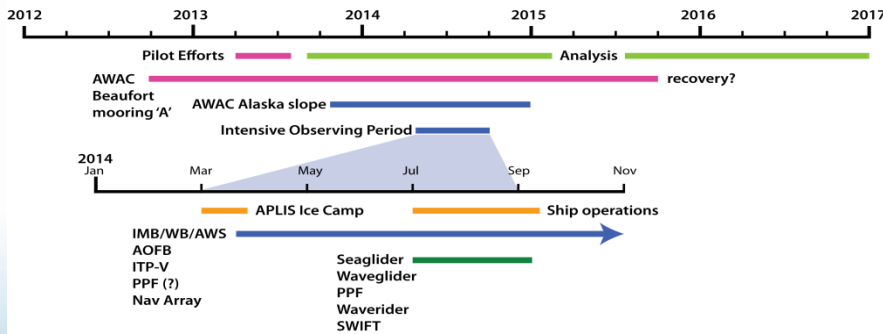
ONR Arctic DRI Field Efforts

Marginal Ice Zone DRI (FY12-FY16)

- A study of the emerging physics of the marginal ice zone during the summer melt-back period
- FY13: Pilot efforts complete for instrument development
- **FY14: Major field experiment using buoys and UUVs, with an ice camp in March and ship operations in July and September**



MIZ Program Timeline

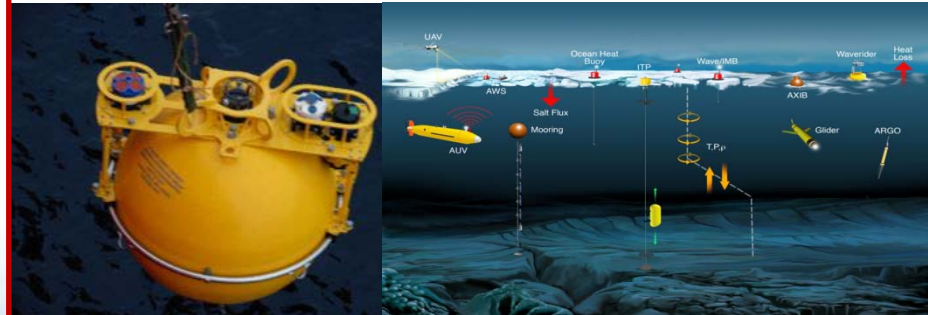
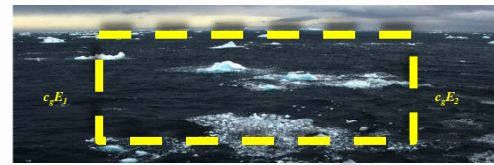


Better basic understanding of the dynamics of the Marginal Ice zone is needed to understand, model, and predict the ongoing decrease in ice coverage and volume in the Beaufort and Chukchi Seas

Arctic Waves DRI (FY13-FY17)

- A study of the impact of waves on air-sea interaction in the Arctic, and the propagation and interaction of waves and swell on sea ice
- FY14: Pilot projects to test new observing techniques
- **FY15: Major field effort involving both autonomous sensors and sampling from the UNOLS Arctic R/V SIKULIAQ**

$$d/dt (E) + d/dx (c_g E) = S_{wind} - S_{brk} + S_{nl} + S_{ice}$$



This program will lead to better forecasts of the Arctic operational environment through improvements in our understanding and modeling of the ocean, waves, ice, and atmosphere in this complex region.