**3.1.6. Pop-up Floats**

Pop-up floats are designed for observation of the water-ice boundary, and to study how ice retreat modifies physical and environmental factors over time. Pop-up floats are moored to the bottom during fall (ice-free) months and sequentially released according to pre-set timers during the winter and spring (ice-covered) months. The floats collect data while moored along the bottom, during ascent through the water column, and while positioned directly underneath the ice. Once the float encounters open water, all data collected is telemetered to shore.

In order to reduce production costs for these expendable floats, they have been custom designed in-house by PMEL. A number of novel cost-saving design features have been integrated to achieve a cost per float of ~$2,700 - such as low-cost pressure housings and commercial off-the-shelf electronics. Despite cost-reductions, the floats still provide high-quality data, measuring temperature to ± 0.01°C accuracy, depth to ± 0.21m accuracy, and PAR to ± 3% accuracy, as well as tilt angle and GPS location. They transmit data to shore using an on-board Iridium modem.

**Five** floats are currently deployed in the Bering Sea with scheduled releases in spring 2018.

The primary goals for 2018 are to expand the sensor suite, as well as refine the existing software and sensors. The 3rd generation of Pop-Up Buoys will be additionally equipped with a wide-angle camera to capture daily images under ice and an optional Turner Cyclops-7 Fluorometer to measure Chl Fluorescence. Both the camera and Fluorometer will be used to aid in the understanding of primary productivity and phytoplankton blooms near the surface during ice break-up and melt periods.

Refinements to the 3rd generation of Pop-Up Buoys include a temperature probe with more rapid thermal response, significant improvements in data compression and data transmission, and a more efficient method of ice-free detection for better power management.

Development of the 3rd generation of Pop-Up Buoys will be completed in Fall of 2018, when 5 units will be deployed in the Bering/Chukchi Seas.