

What is a Float?



Figure 1. A SOCCOM biogeochemical profiling float.

Floats are autonomous data collectors. Data records on ocean properties such as temperature, salinity, and nutrients were once hard to come by because samples can only be taken by scientific research vessels or volunteers on commercial ships. This all changed with invention of autonomous profiling floats: long, cylindrical tubes with the ability to sample temperature, salinity, and pressure at various depths. Floats control their own buoyancy, and thus their vertical position, but otherwise move freely with the currents of the ocean waters.

SOCOM floats will undertake comprehensive observations of the Southern Ocean. Much of the world ocean is currently being profiled by floats under a program called Argo. However, Argo floats in the Southern Ocean are only measuring temperature and salinity, and scientific information about nutrient and carbon cycling

sensors for nitrate, pH, oxygen, and bio-optics, are being deployed around the Southern Ocean, providing a much-needed window into this remote and important world. See Figure 2.

Scientists control the robotic floats via satellite. Once underwater, floats cannot communicate information to the satellite—and thus the scientists, but their task is simple enough to be performed autonomously. Once deployed, the float uses a piston (see Figure 3) to deflate a small “bladder”, reducing its volume (increasing its density) and causing it to sink. At around 1000 m, it halts its descent and drifts with the current for 5 to 7 days. Then,

further deflating the bladder, it sinks for another 1000 m. 2000 m below sea level, it re-inflates the bladder, slowly rising towards the surface, taking measurements along the way. At the surface, each float relays its data through a GPS antenna (see Figure 3) to a nearby satellite and can receive instructions for the next dive. The information that the float has just collected, from 0 to 2000 m, can be used to create depth profiles, train climate models, and record ocean changes over time. Each float can do this dive over and over again — its lithium batteries are intended to last for 5 years. The next time you look at oceanographic data records, remember: it was most likely collected by one of these incredible, autonomous floats!

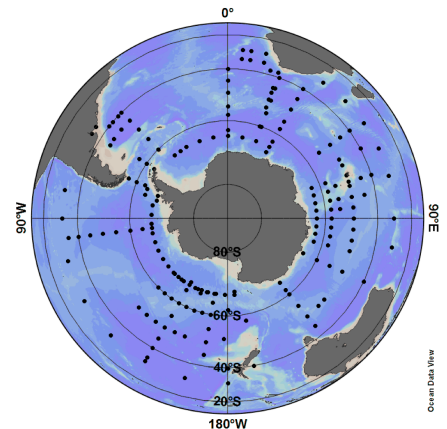


Figure 2. Current and future SOCCOM deployment locations.

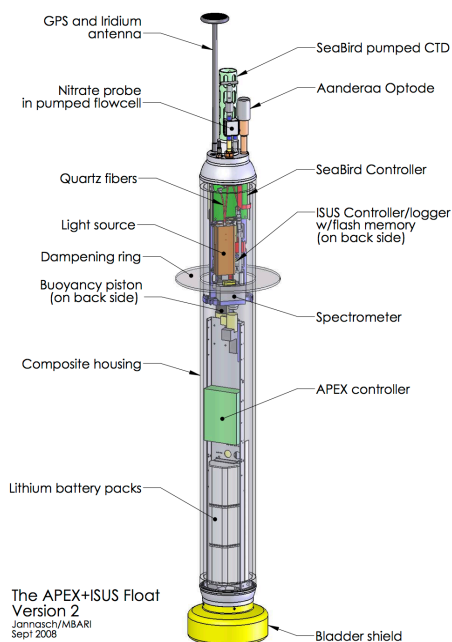


Figure 3. (Left) SOCCOM float schematic. Note the GPS antenna, buoyancy piston, and lithium batteries.