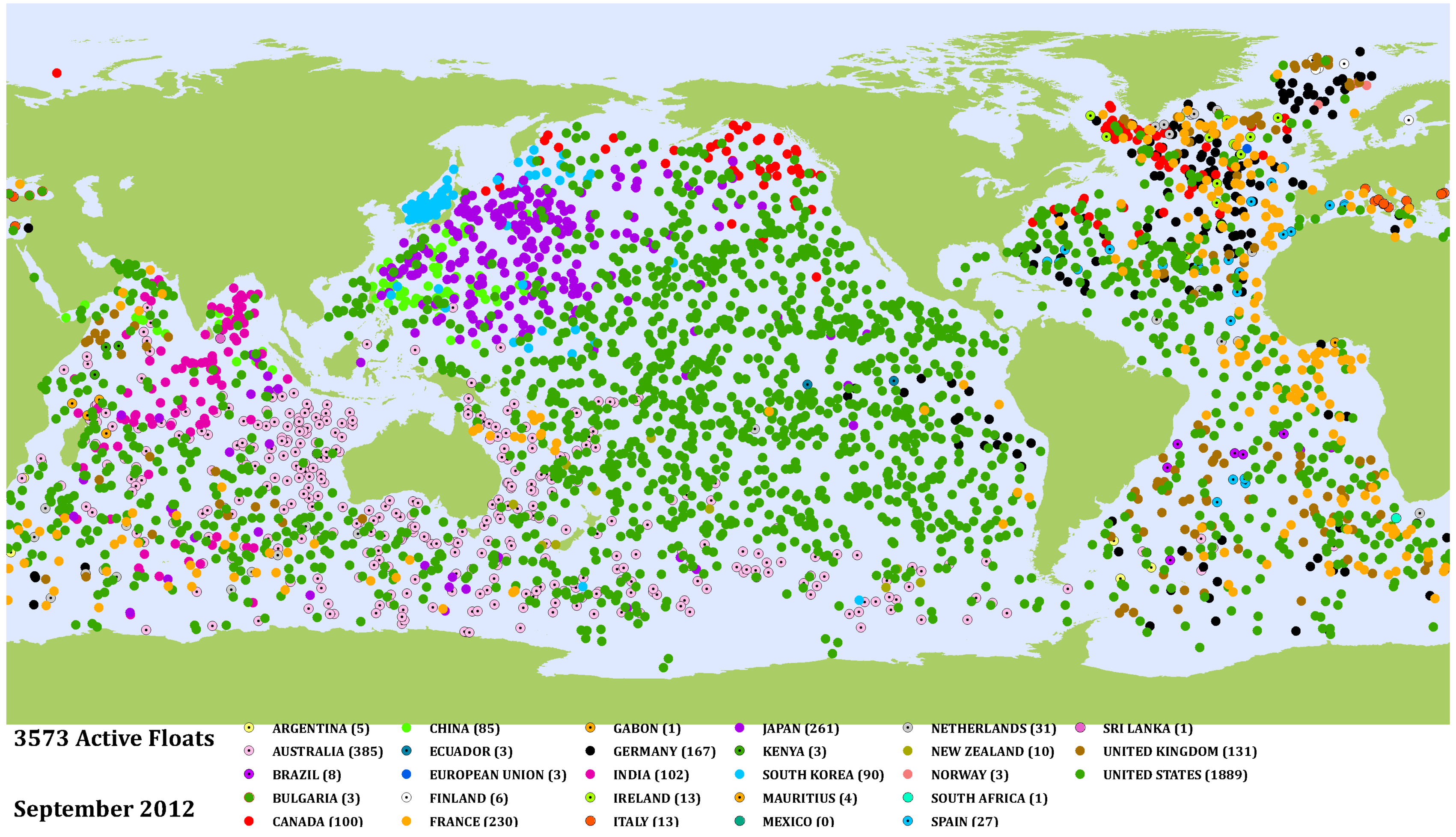
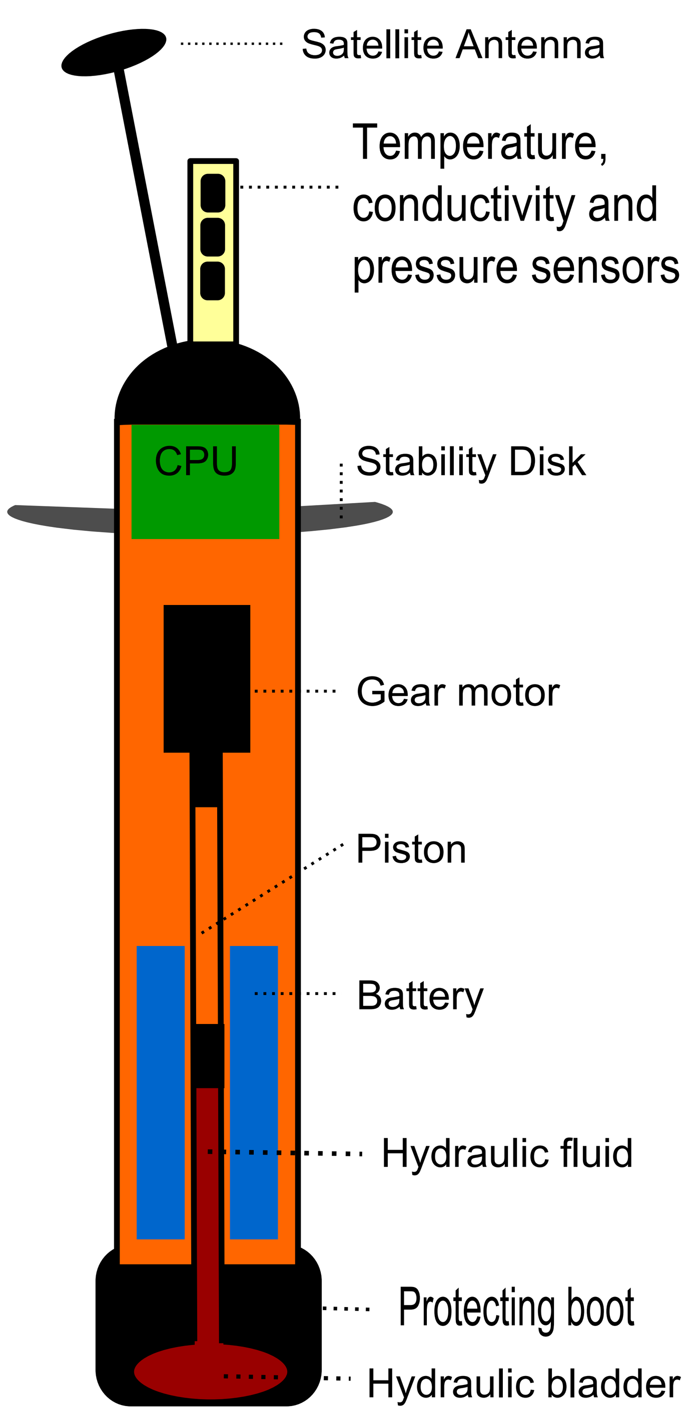
Fisheries and Oceans Canada   Pêches et Océans Canada

Argo profiling floats measure ocean climate in real-time

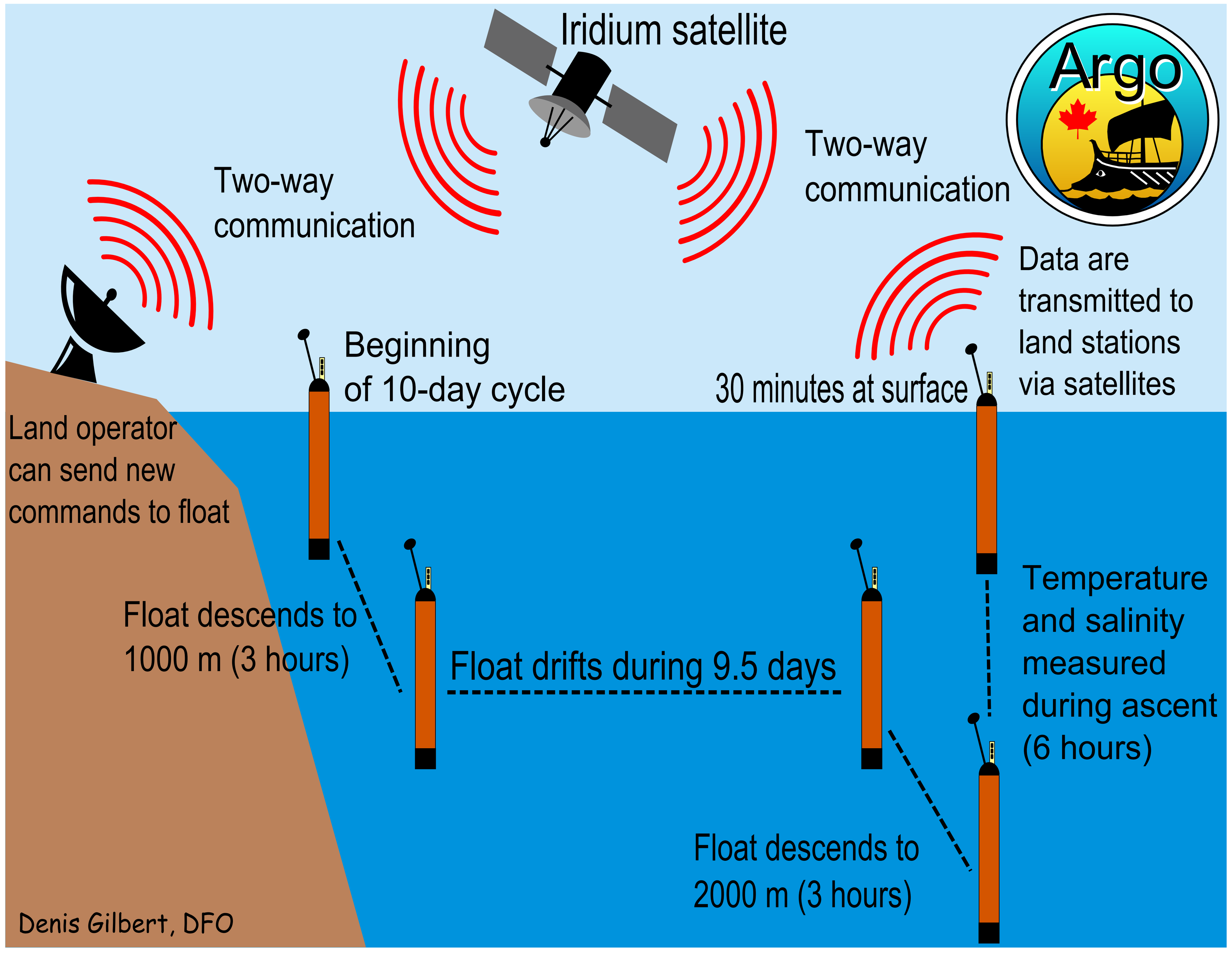
Argo is the largest ocean climate monitoring program in the world. The first Argo profiling float was deployed in 2000. The initial global objective of having 3000 active profilers was met in November 2007. In 2012 more than 3500 profilers were freely drifting in the world ocean. Each year, nations participating to the Argo program meet and coordinate their float deployment missions to try to maintain an average density of one profiler every 300 km.





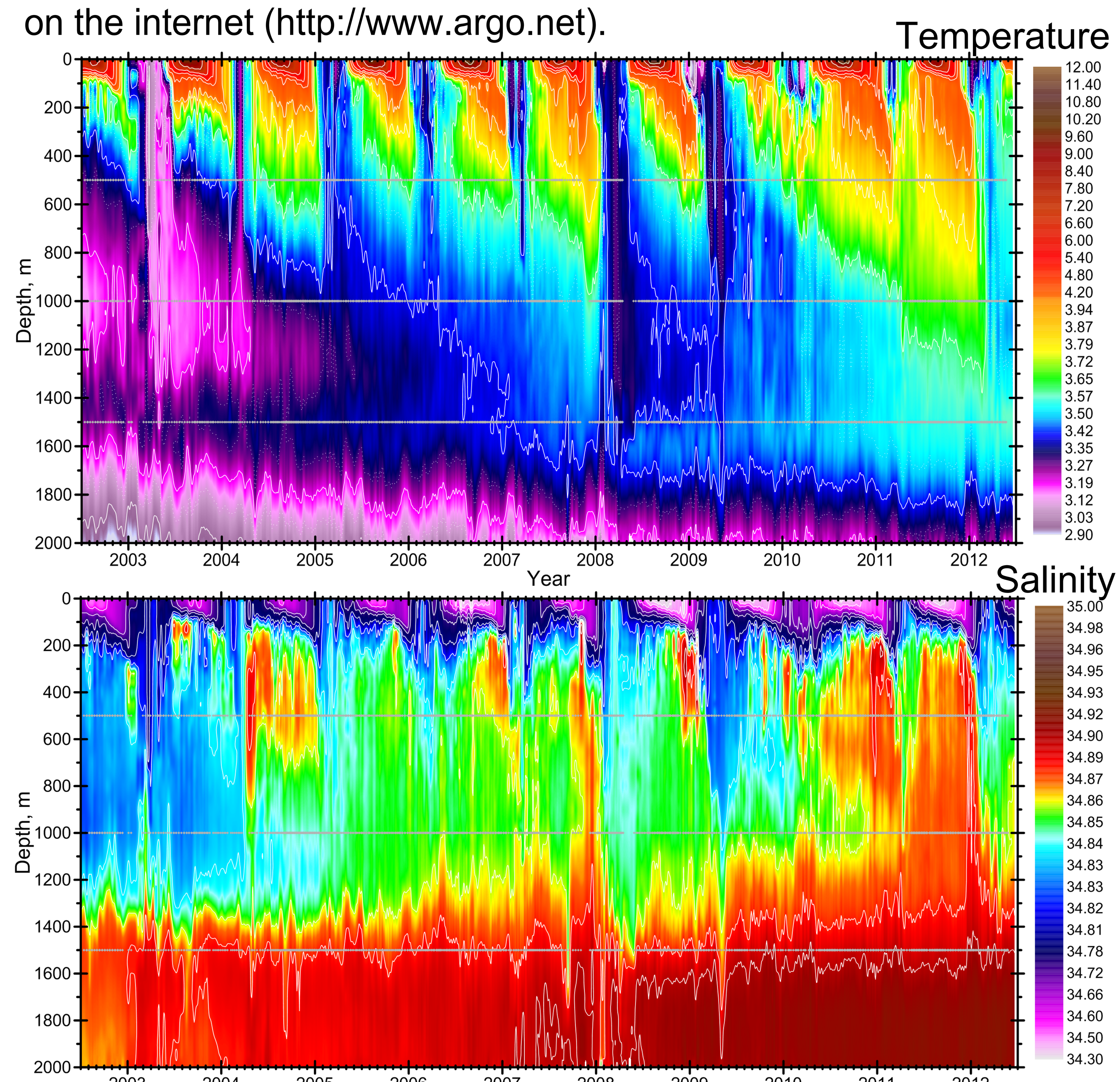
Argo floats are robotic devices that are deployed from ships or planes and that freely drift in the ocean over a typical period of 5 years. These floats pump fluid from an external bladder towards the interior of the float. This pumping action reduces the volume of water displaced by the float and, through Archimedes' principle, this makes the float denser allowing it to sink to a predetermined depth such as 1000 m or 2000 m.

By reversing the pumping action from the inside of the float towards the external bladder, we can increase the volume of the float and, again through Archimedes principle, increase the upward buoyancy force on the float allowing it to rise back to the surface.

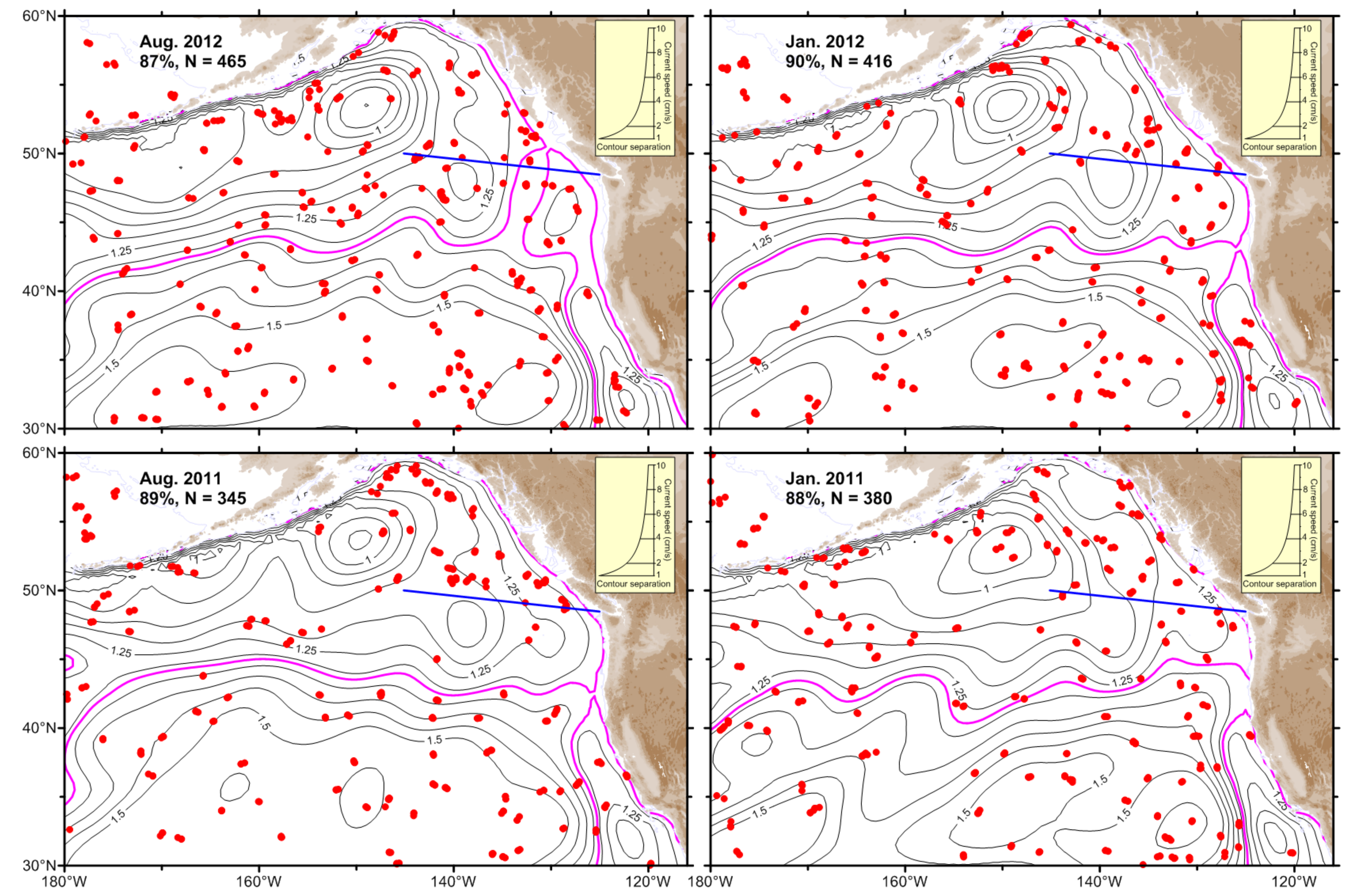


Early models of Argo floats used one-way communication, meaning that while we could receive data from the floats, we could not send confirmation to the float that we had received its data and we could not change the float's mission parameters once it was deployed. Newer models now take advantage of two-way communication capability and a much faster data flow, which allows us to reduce time spent by the float on the surface to merely 30 minutes compared to 6 hours in earlier models.

The Argo program operates in accordance with a data sharing policy adopted by the 31 participating nations, including Canada, that deploy profiling floats equipped with temperature, salinity, pressure and sometimes oxygen sensors. According to the data sharing policy, the data must be made available to everyone in real-time on the internet (http://www.argo.net).



Annual ship surveys conducted at the end of spring along the AR7W line in the Labrador Sea provide instantaneous snapshots of water temperature and salinity conditions a couple months after the peak winter convection of March. However these ship surveys do not inform us on the annual cycle of temperature and salinity and other events with shorter than seasonal timescales. Argo floats, which sample in all weather and all seasons, help us fill this information gap.



Four maps show how the changing circulation of the N.E. Pacific can be mapped by Argo from one month to another. These maps show the circulation in two Augusts and two Januaries. In each map the blue line marks Line-P and the purple line, as it crosses the Pacific Ocean, separates the subpolar gyre from the subtropical gyre. It is the line that separates water that eventually will flow southwards in the California Current from water that eventually will flow northwards around the Alaska Gyre. Maps like these help us track the movement of heat or objects (such as tsunami debris) across the Pacific.

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