



Met Office



Argo float technology

Jon Turton

Met Office, Exeter



UK-IMON International Workshop on New Monitoring Technologies
Tuesday 10 - Thursday 12 September 2013 Southampton, UK

The banner features a series of hexagonal icons: a yellow buoy, a satellite, a person in a lab coat, and a satellite dish. Text on the banner includes 'UK-IMON 2012', 'A workshop to prioritise future investment in new monitoring technologies', and '10 to 12 September 2013'.



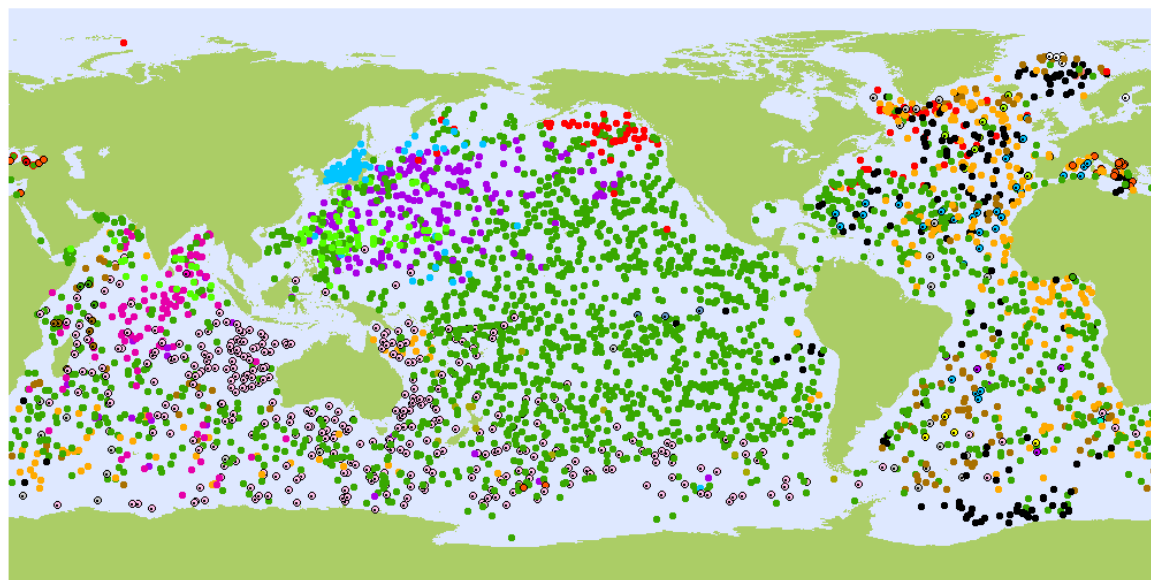
Argo

- In the last decade Argo has revolutionized our ability to observe the global oceans - by November 2012, Argo had collected its millionth profile, twice the number obtained by research vessels during all of the 20th century

Over 3,600 floats presently operating (~135 UK)



Apex, Arvor, Navis, Nova & S2A



3634 Floats

| | | | | | | |
|-----------------|-------------|---------------|--------------|------------------|------------------|----------------------|
| ARGENTINA (4) | CANADA (92) | FRANCE (257) | IRELAND (10) | SOUTH KOREA (84) | NORWAY (2) | SRI LANKA (1) |
| AUSTRALIA (379) | CHINA (37) | GABON (1) | ITALY (19) | MAURITIUS (8) | POLAND (0) | TURKEY (2) |
| BRAZIL (6) | ECUADOR (3) | GERMANY (178) | JAPAN (215) | NETHERLANDS (27) | SOUTH AFRICA (2) | UNITED KINGDOM (137) |
| BULGARIA (3) | FINLAND (5) | INDIA (109) | KENYA (3) | NEW ZEALAND (12) | SPAIN (29) | UNITED STATES (1981) |

July 2013



Argo floats

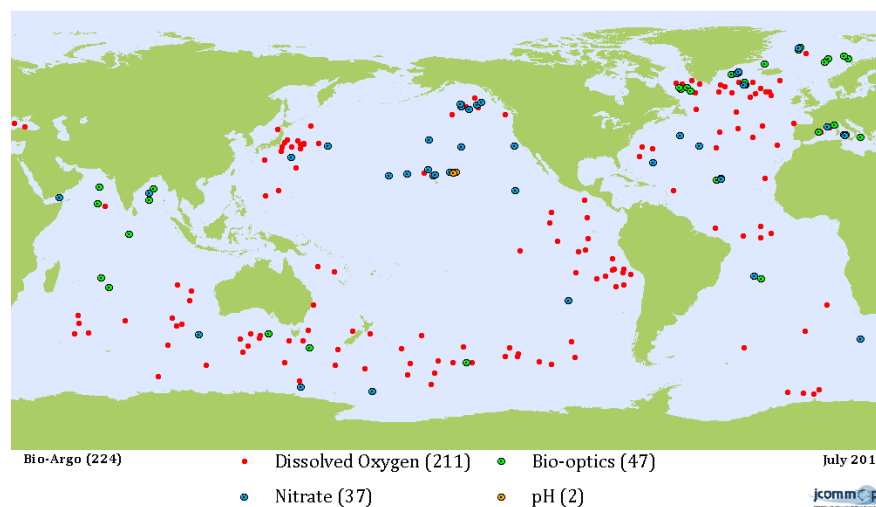
- Standard floats provide CTD to 2,000m depth
 - ~100 vertical levels with Argos, ~1000 levels with Iridium
 - lifetime ~150 profiles (or as many as 300 profiles with lithium batteries)
 - cost ~ £10k to £12k each
- New float designs capable of going down to 6,500m
 - Apex deep: in February 27, 2013 set a record diving to a depth in excess of 6,000 meters in the Puerto Rico trench
 - goal of at least 150 profiles using lithium batteries





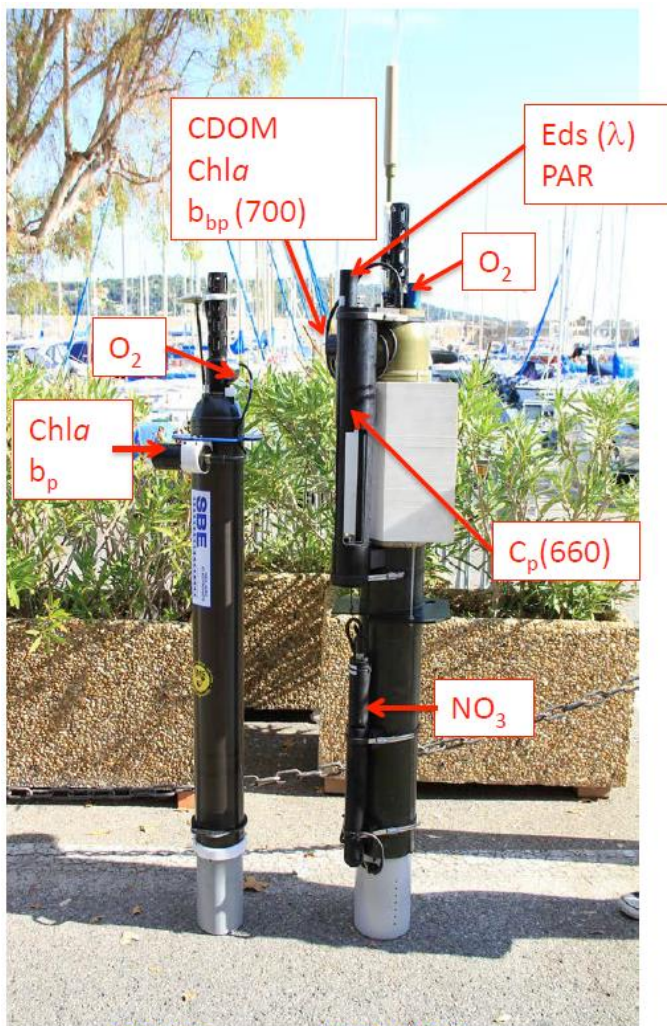
Bio-Argo

- Brings together advances in miniature, low power biogeochemical sensors and autonomous float platforms for observing the “biological” ocean
- In recent years, new generations of profiling floats have been developed and deployed with sensors for:
 - dissolved oxygen, chlorophyll fluorescence, nitrate and particulate backscattering; these are ready to transition to wider use
 - pH, radiometry (PAR, downwelling irradiance), transmissometry and CDOM are on their way



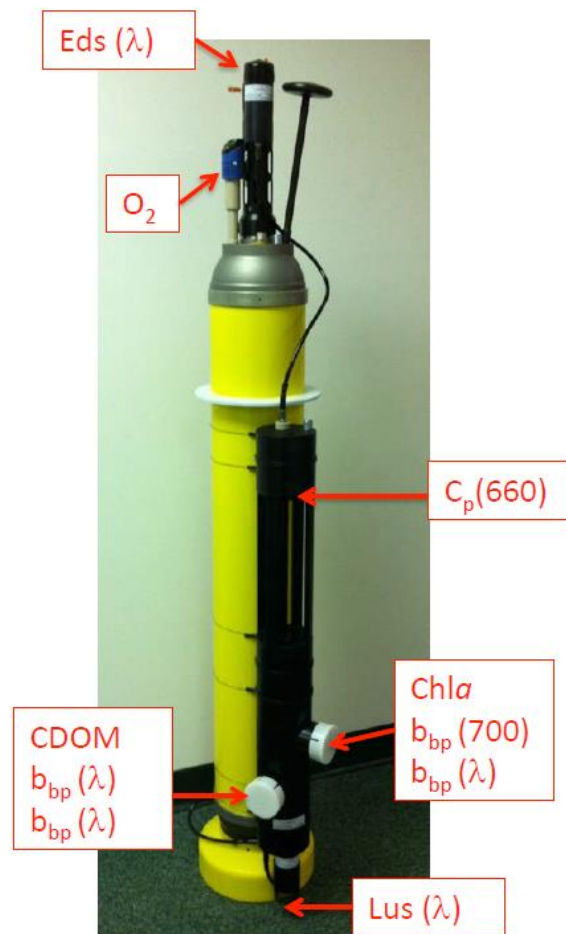


Bio-geochemical floats



NAVIS

PROVOR



APEX



Argo extensions

- Abyssal oceans (deep Argo)
- Bio-geochemical measurements (Bio-Argo)
- Marginal seas (use Iridium to minimize time at surface)
- Shallow seas (modified Apex used in the Baltic)
- Operation in high latitudes (ice-avoidance, store profiles while under ice)
- High resolution temperature profiles through the surface layer
- Iridium downlink allows the mission profile to be modified while the float is at sea (vertical sampling, cycle time)



Summary

- Argo has revolutionized our ability to collect CTD data from the open oceans – it is the only technology able to provide global coverage
- Over the next 10 years it is likely to revolutionize our ability to collect biogeochemical data from the oceans (focusing on regions that are hotspots for climate change)