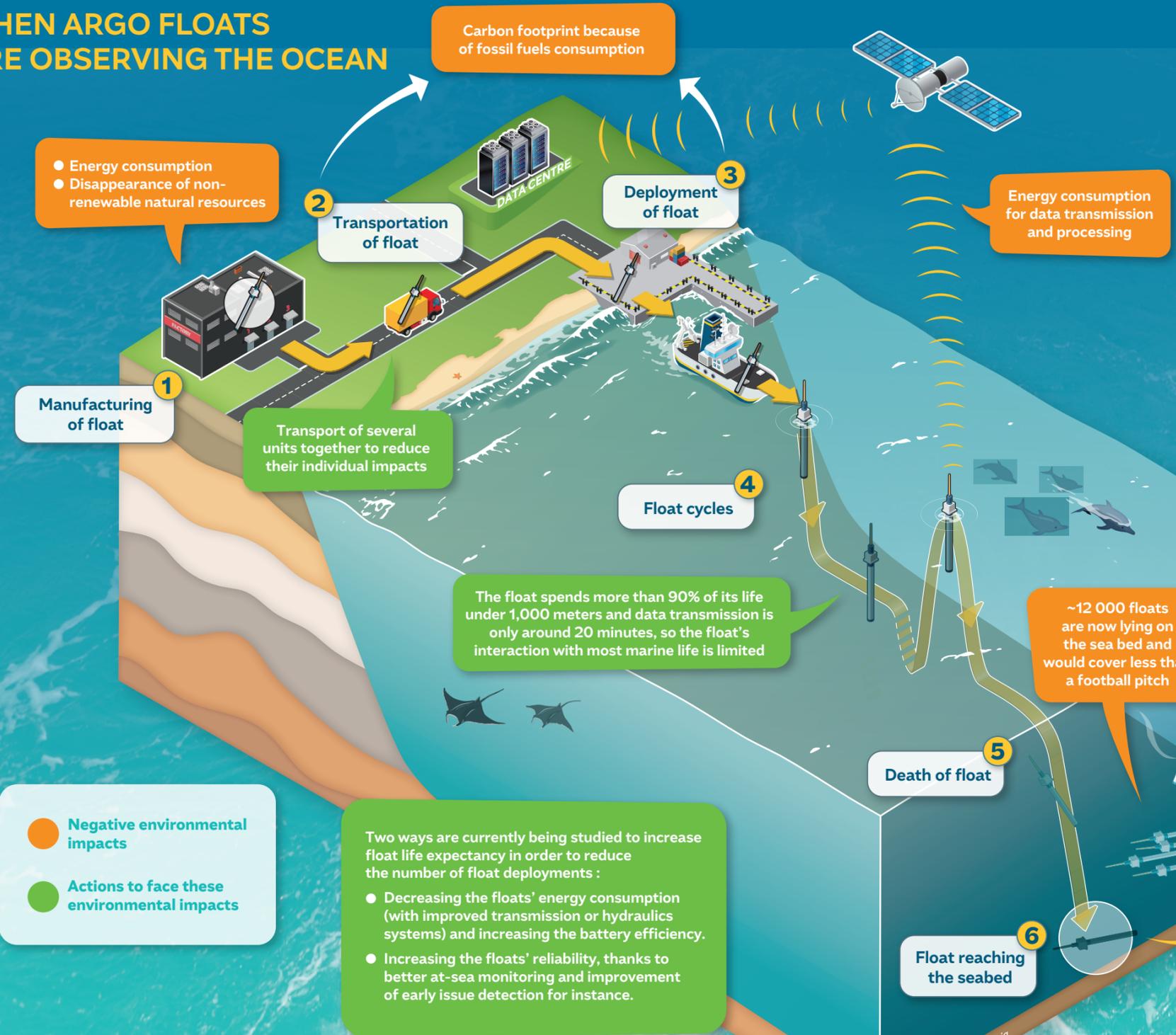


ENVIRONMENTAL IMPACTS OF ARGO FLOATS

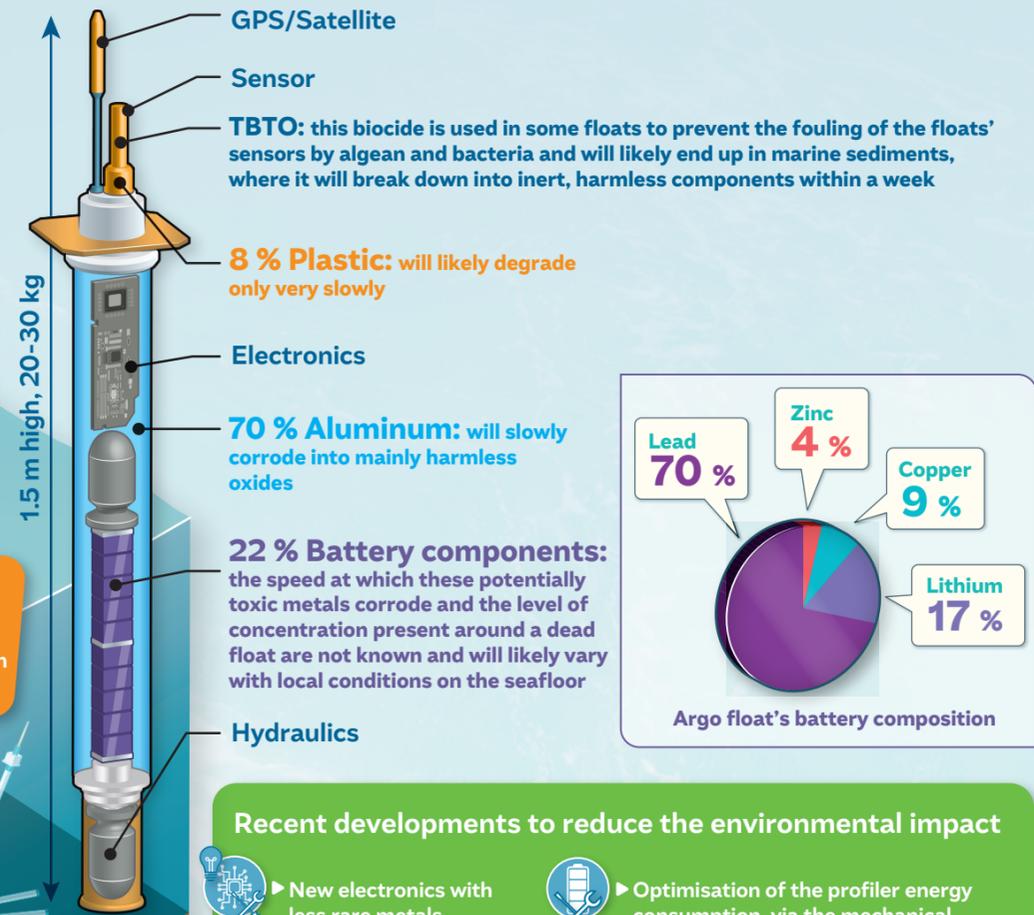


WHEN ARGO FLOATS ARE OBSERVING THE OCEAN



WHEN ARGO FLOATS REACH THE END OF THEIR LIFE

When their batteries are exhausted, Argo floats can't reach the surface anymore and they drift in the ocean. At this point, sea water fills the hull and starts its corrosive action. The float eventually sinks to the seafloor, mostly over deep abyssal regions. Decomposition processes will take place over the course of a number of years. Some elements from the battery will then spill to the surrounding sea water.



- ### Recent developments to reduce the environmental impact
- ▶ New electronics with less rare metals
 - ▶ Better choice of some electronics/mechanical components
 - ▶ Less and less polluting material
 - ▶ Evolution towards no TBTO for every float
 - ▶ Optimisation of the profiler energy consumption, via the mechanical, electronic and software design
 - ▶ Very high-capacity battery technology, which allows maximum energy storage in minimum volume
 - ▶ The impact of dead floats can also be limited by using or designing recovery systems

- Negative environmental impacts
- Actions to face these environmental impacts

Two ways are currently being studied to increase float life expectancy in order to reduce the number of float deployments :

- Decreasing the floats' energy consumption (with improved transmission or hydraulics systems) and increasing the battery efficiency.
- Increasing the floats' reliability, thanks to better at-sea monitoring and improvement of early issue detection for instance.

SMALL AMOUNTS OF CHEMICAL COMPONENTS DILUTED IN THE OCEAN

Given the generally slow corrosion rates in the deep ocean, the speed of abyssal currents, the strength of nearbottom turbulence, and the large distances between floats (~300 km), a significant, local, short-term concentration of dissolved metal salts originating from a float seems unlikely.

The chemical species injected into the abyssal waters generally represent negligible amounts in comparison to the natural and anthropogenic fluxes of these substances. It would take over 176,000 years of Argo operations to inject the same amount of aluminum into the ocean that is employed annually to produce soda drink cans and a single year of the human contribution of plastic to the ocean is equivalent to 4.4 million years of the input from Argo.

By weight, the amount of chemical components released into the ocean by Argo floats is equivalent to:

- COPPER: 90 kg ~80
- ALUMINIUM: 17,000 kg ~70,000
- LITHIUM: 180 kg ~65

POSITIVE IMPACTS ON THE ENVIRONMENT

Argo is a game changer in terms of ocean observations. Argo floats collect about 120,000 surface-to-2,000 meters profiles of temperature, pressure and salinity per year. Presently there is no method of observing the global subsurface ocean that is more cost effective and less environmentally damaging than Argo.