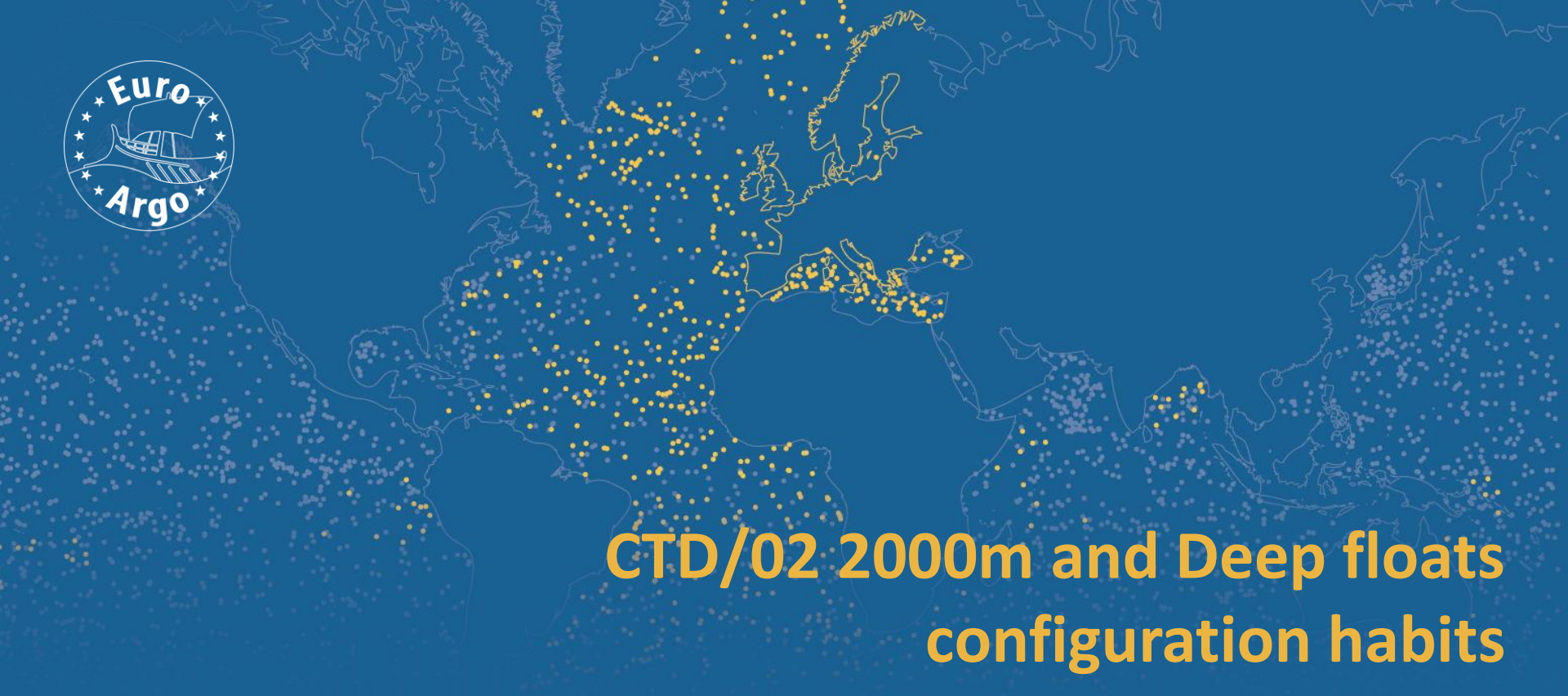


CTD/02 2000m and Deep floats configuration habits

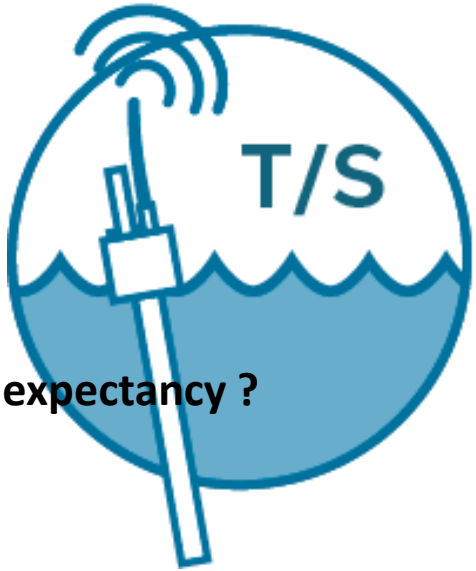
ARVOR-PROVOR technical Workshop

Andrea Garcia Juan, Euro-Argo ERIC Office

29/01/2020

Objectives

- How do we configurate our floats?
- Do we change configuration during lifetime?
- Is there a best configuration? How configuration affects life expectancy ?



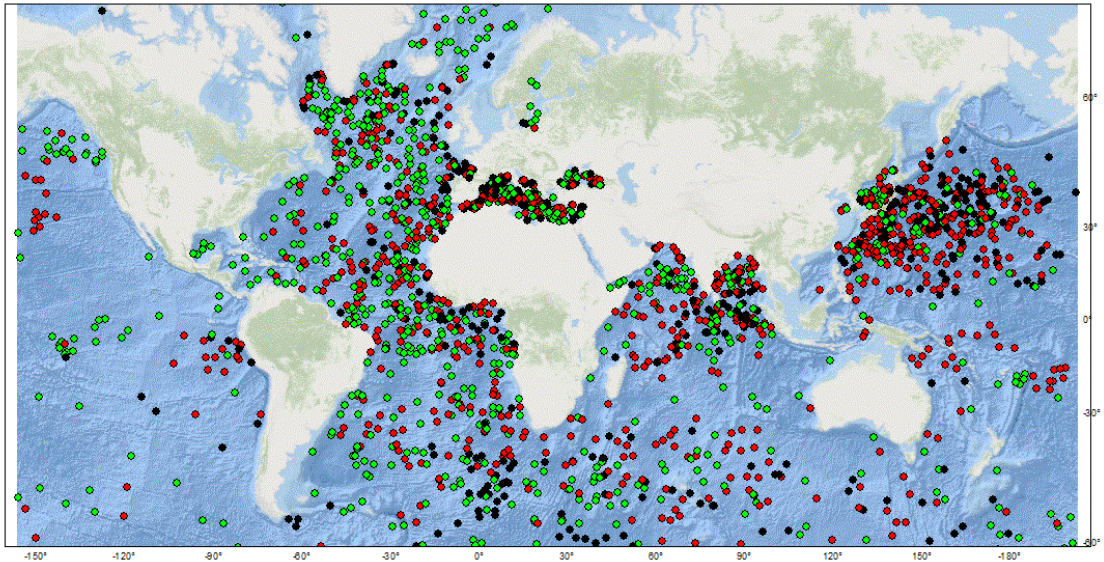
Presentation outline

- Sample
- Number of configuration parameters
- Number of missions
- Some configuration parameters
- Increase floats lifetime: EA-RISE project

Sample

- **CTD/O2 ARVOR and PROVOR (including Deep) deployed from 2008**

# floats	# operational floats	ARGOS	IRIDIUM	ARVOR	PROVOR	Deep
2038	816	1399	625	1462	530	46



Floats last position

OPERATIONAL

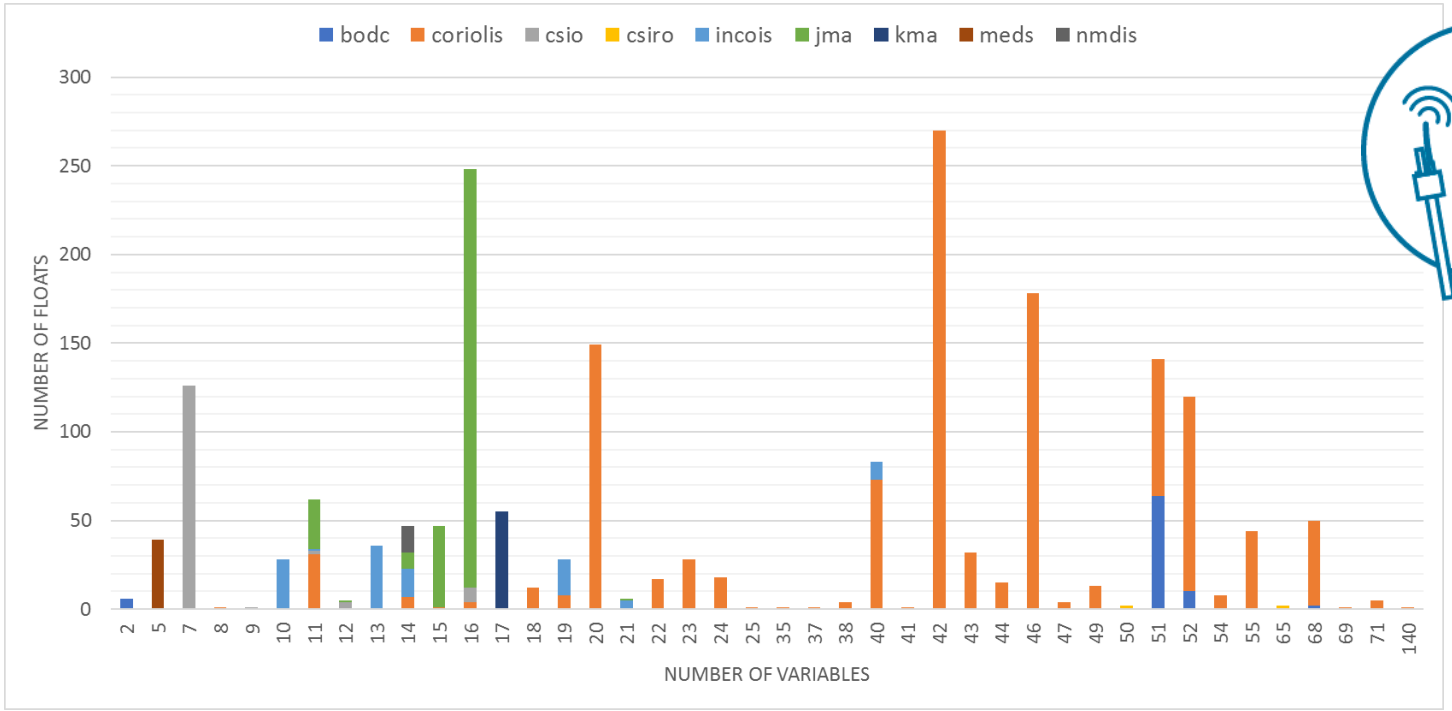
INACTIVE

CLOSED

Generated by www.jcomm ops.org

Number of configuration parameters

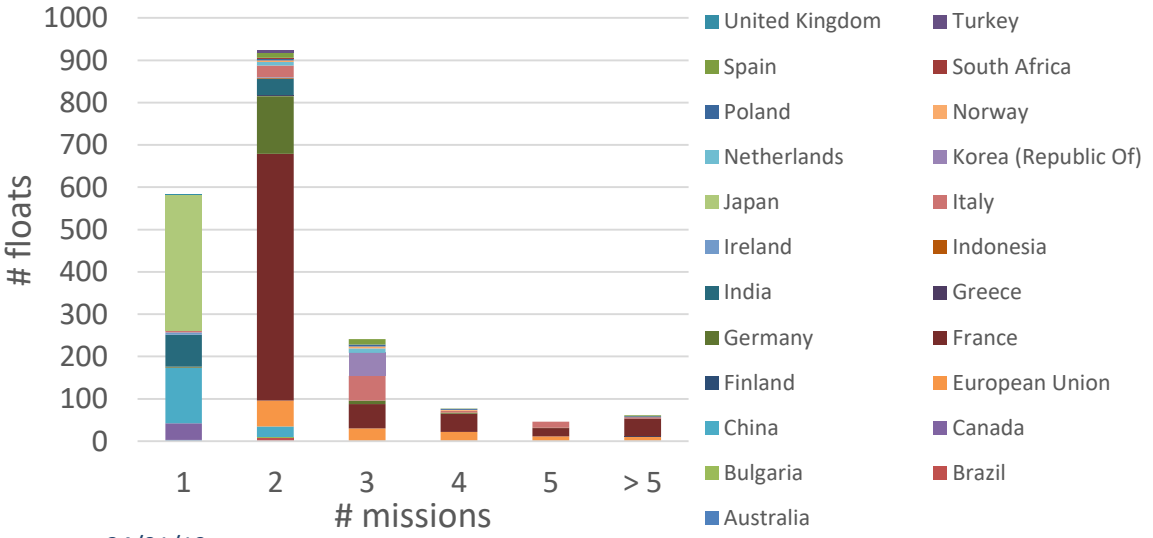
- **Number of configuration parameters per float depending on dac**

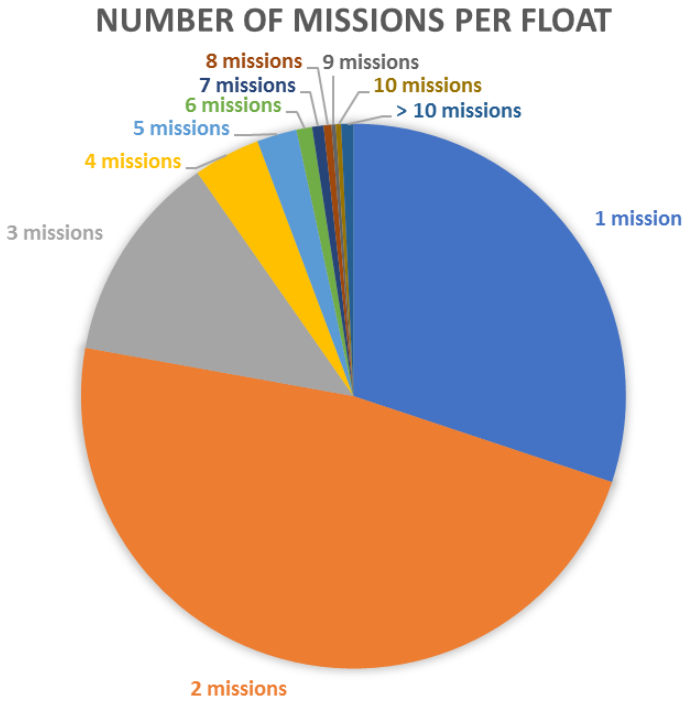


Sample: 1936 ARVOR-PROVOR floats, not including BGC

Number of missions

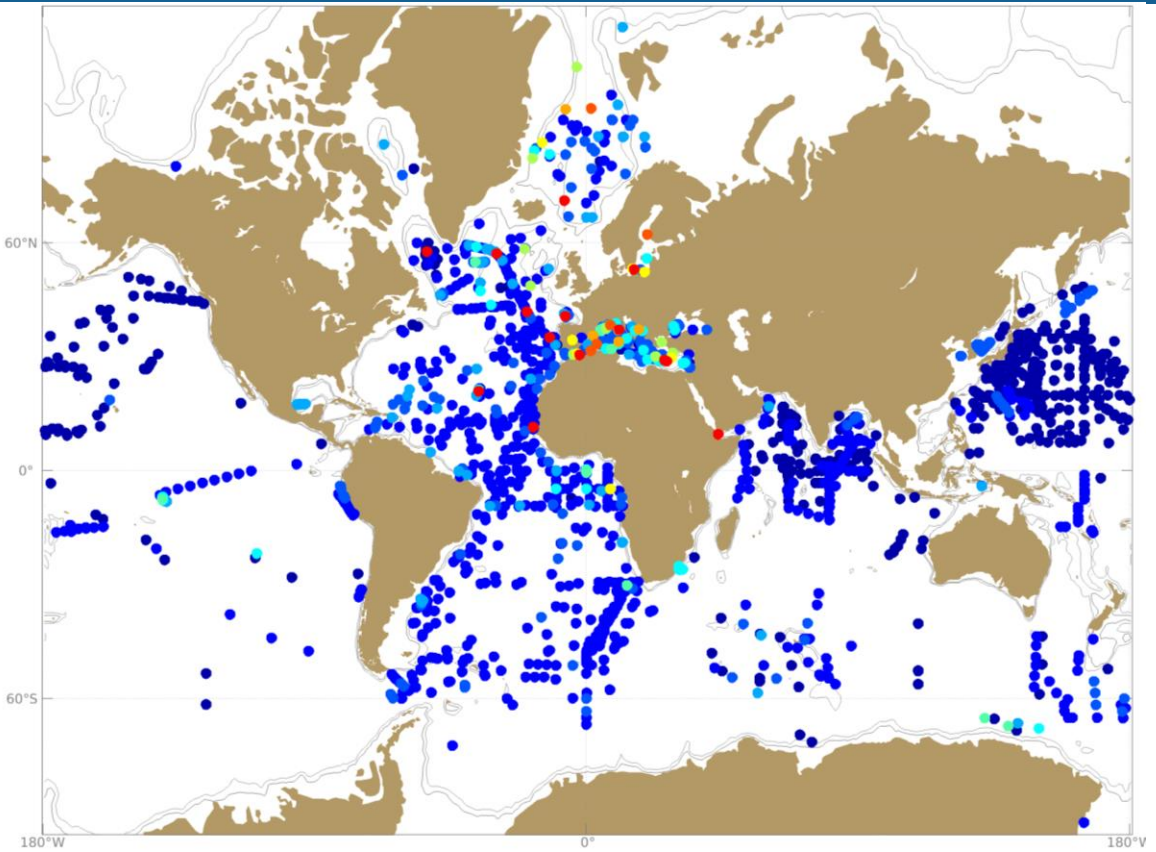
- When does mission change?
- Most of the floats have 2 missions
- 22 % of floats used > 2 missions (bi-mission, Iridium)



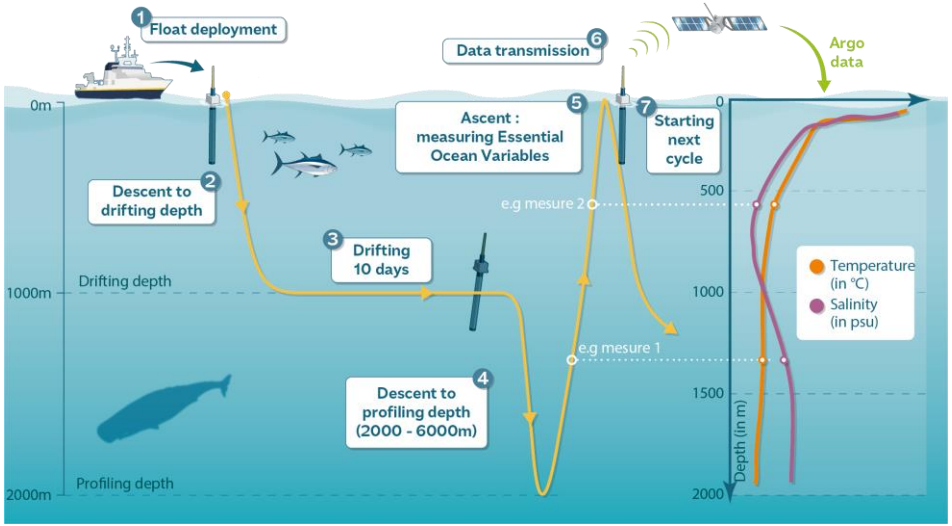


Number of missions

Number of missions for ARVOR –PROVOR floats



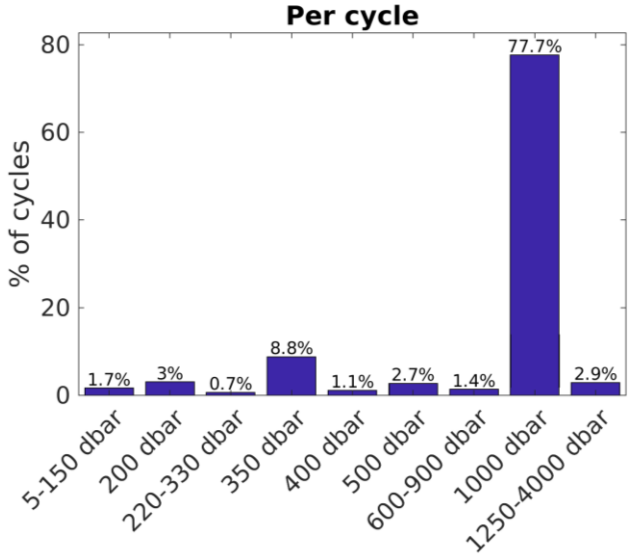
Configuration parameters

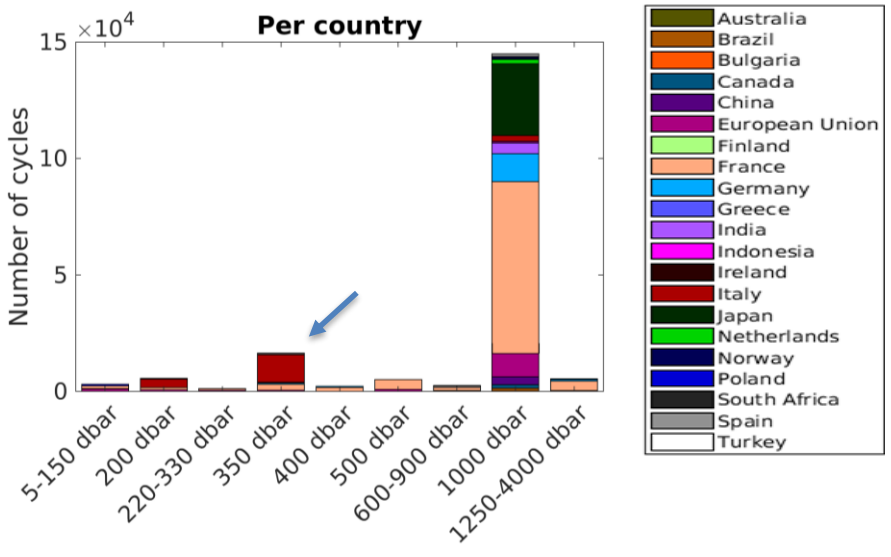


- Some configuration parameters …
  - **Parking pressure**
  - **Profile pressure**
  - **Cycle Period**
  - **CTD points in profile**

Parking pressure

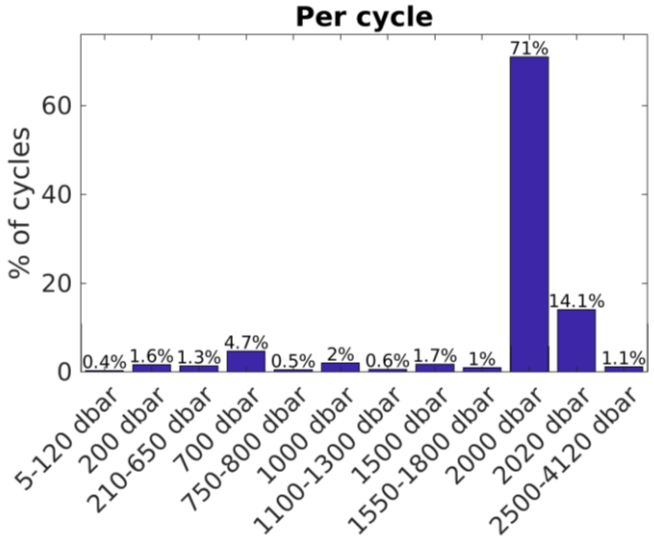
- 5,8 % of floats changed this parameter (in last years)
- Most of cycles go to 1000 dbar and 8,9% to 350 (Italy)

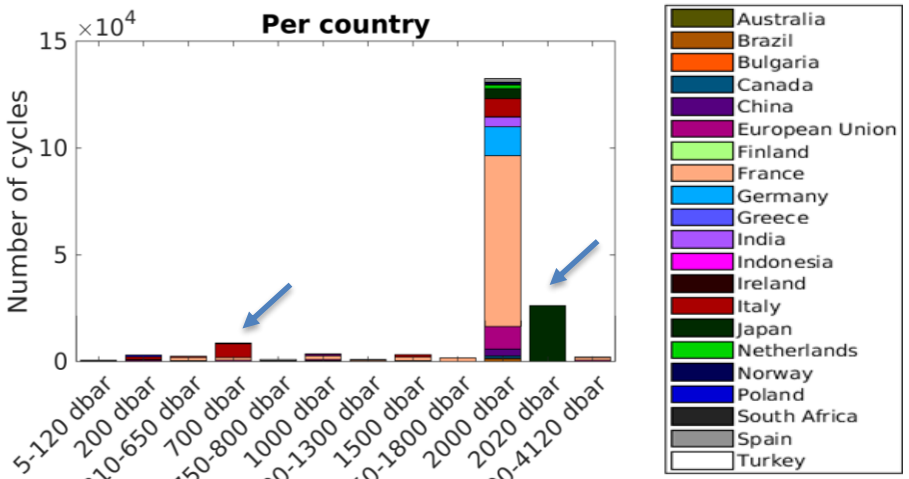




Profile pressure

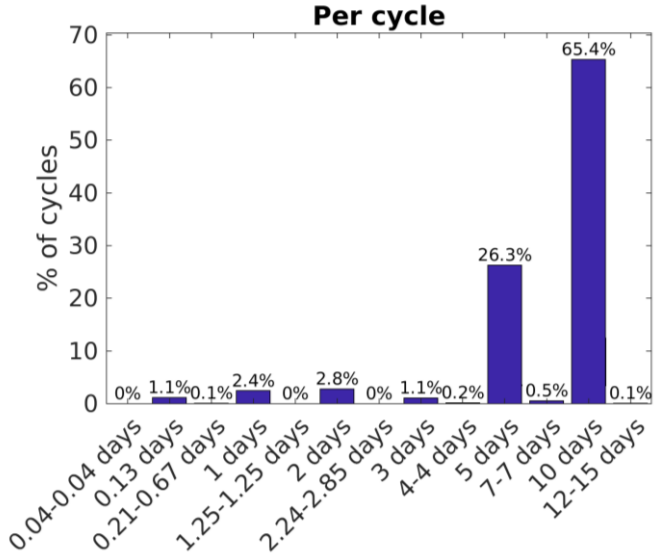
- 13 % of floats changed this parameter (alternate profiles)
- Most of cycles go to 2000 dbar, 14% to 2020 dbar (Japan) and 5 % to 700 dbar (Italy)

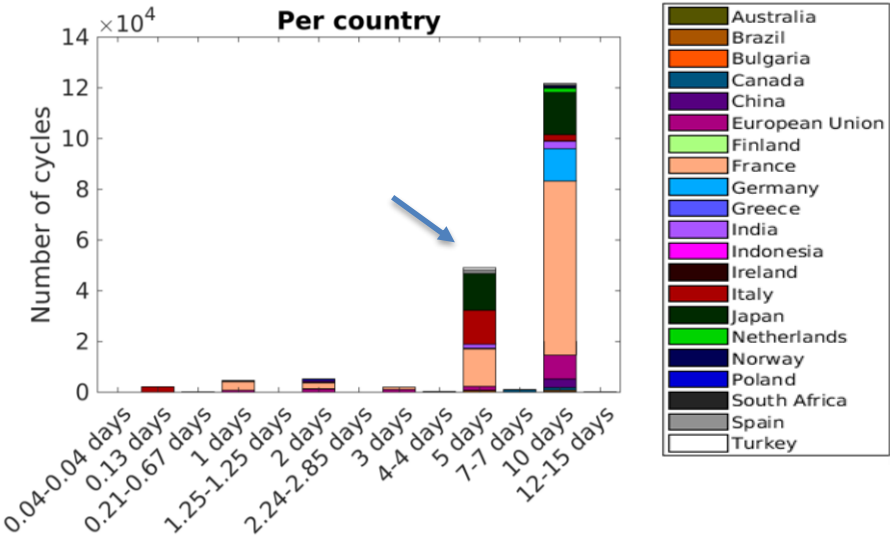




Cycle Period

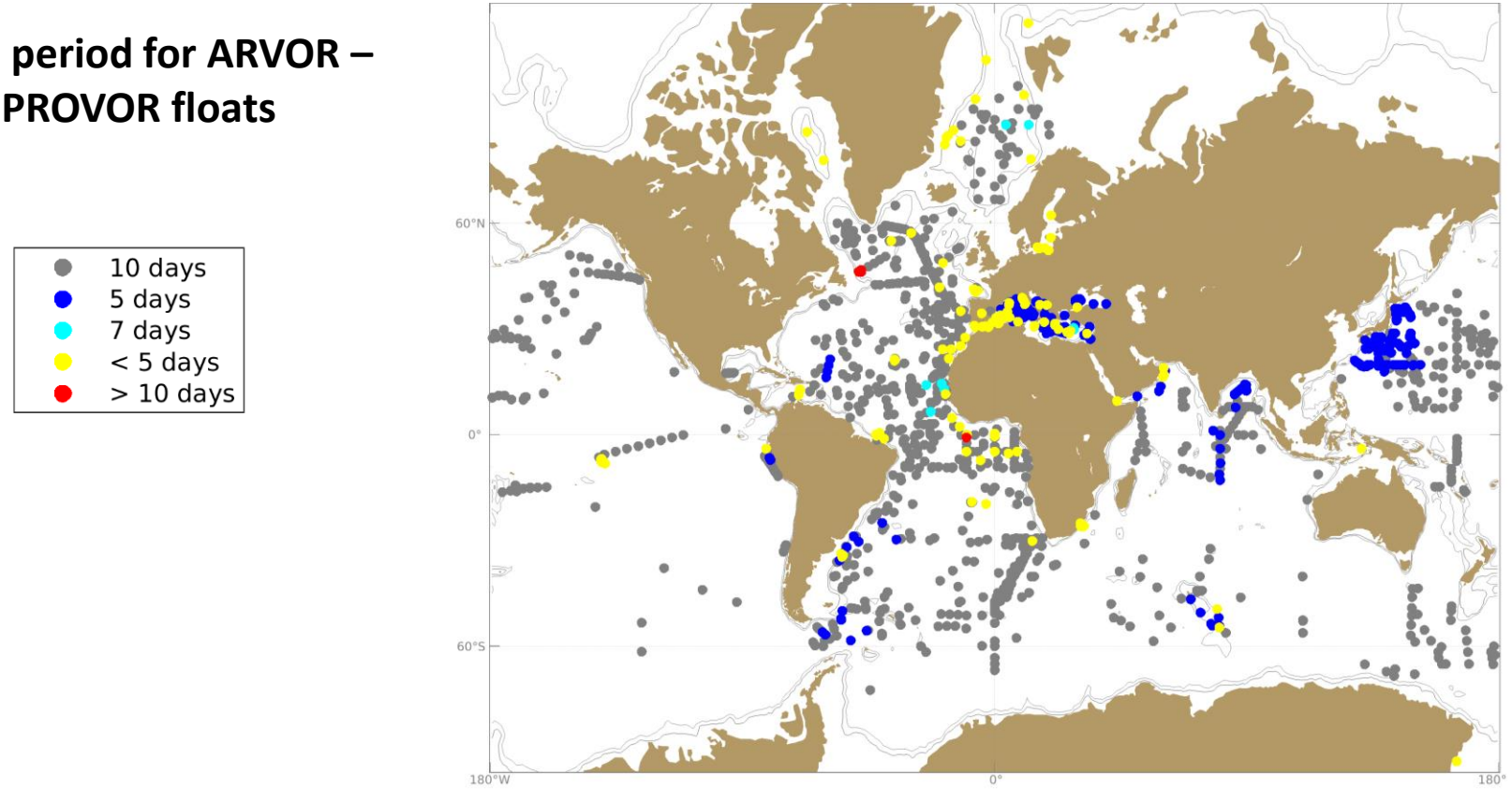
- 9,9 % of floats changed this parameter
- 65,4% of cycles do 10 days periods and 26,3% 5 days periods (Italy, Japan, France)





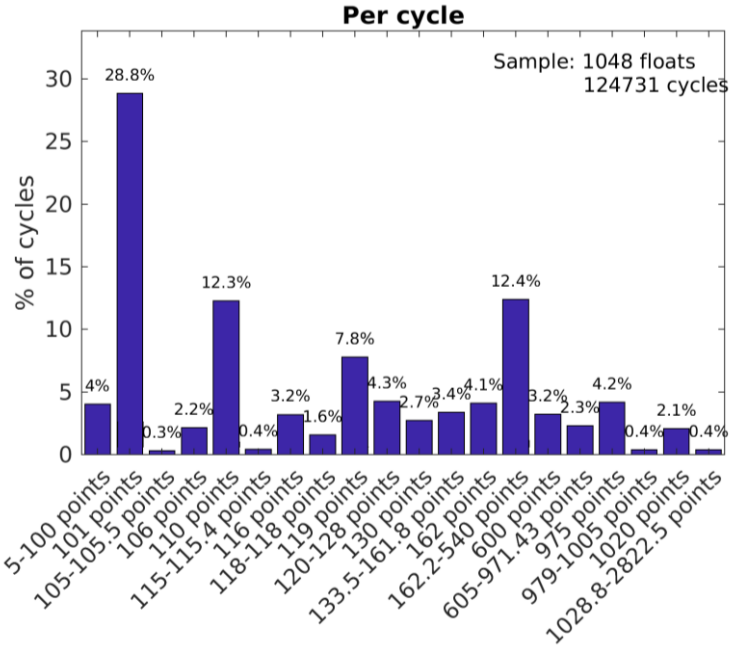
Cycle Period

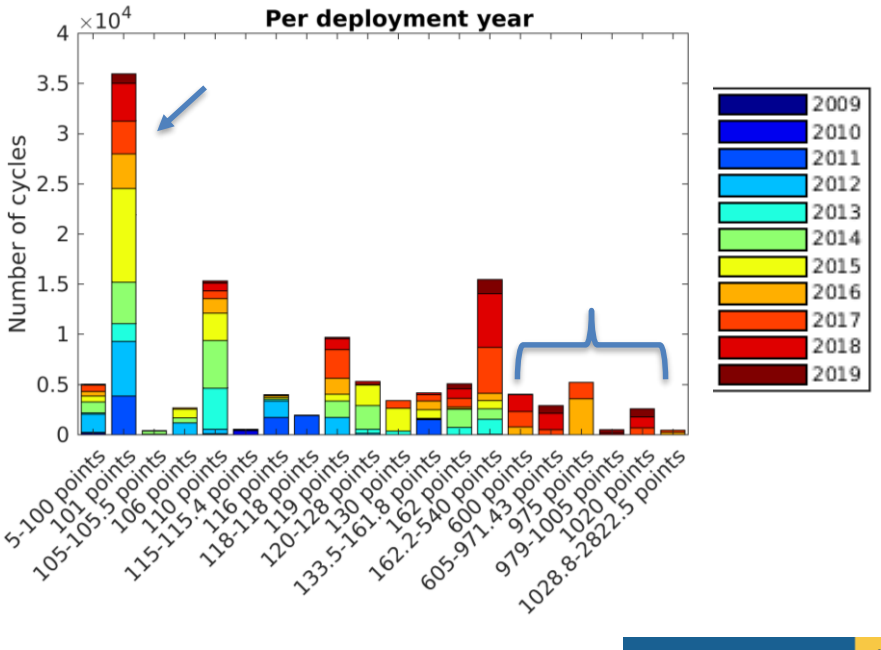
Cycle period for ARVOR – PROVOR floats



CTD points

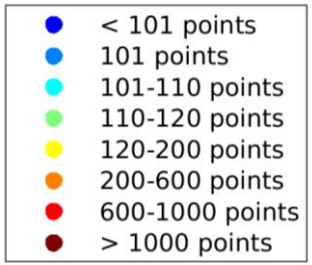
- 23,8 % of floats changed this parameter (in last years)
- Better resolution in last years

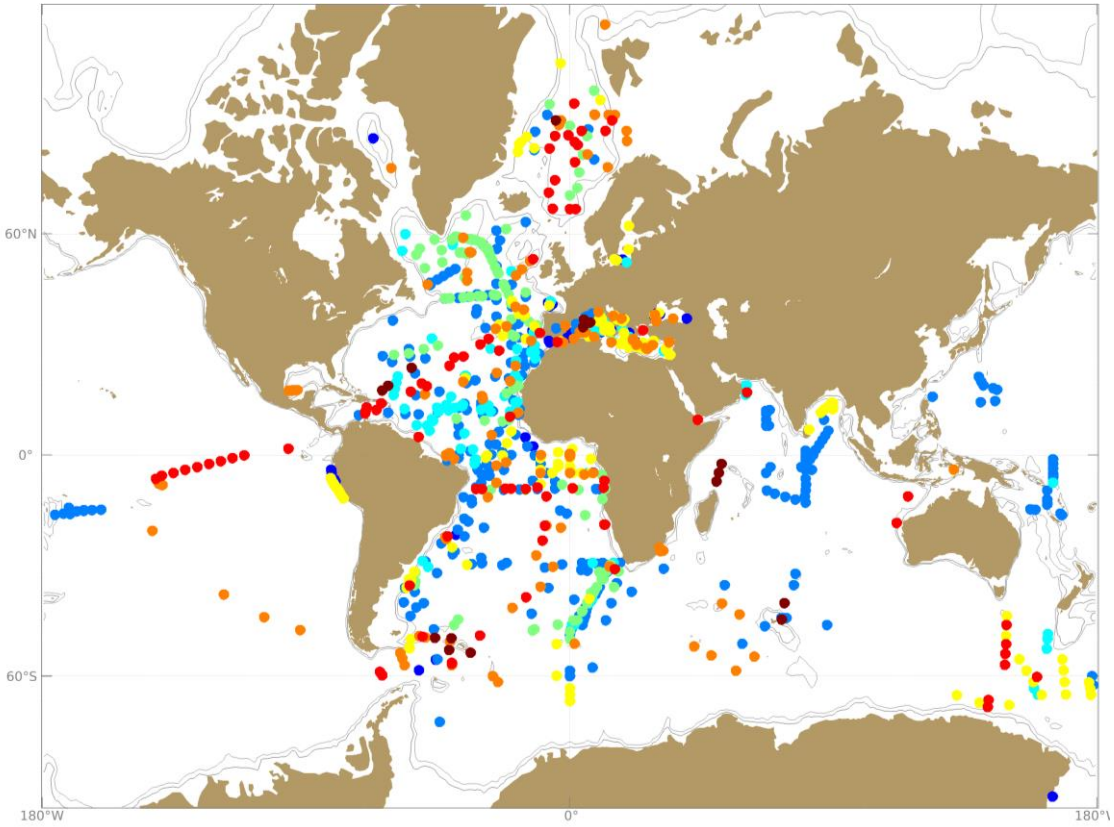




CTD points

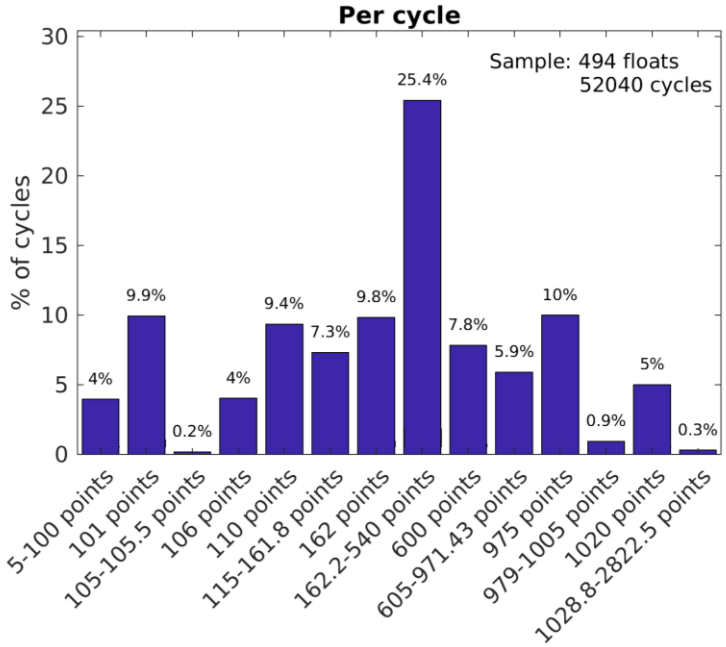
CTD points for ARVOR – PROVOR floats

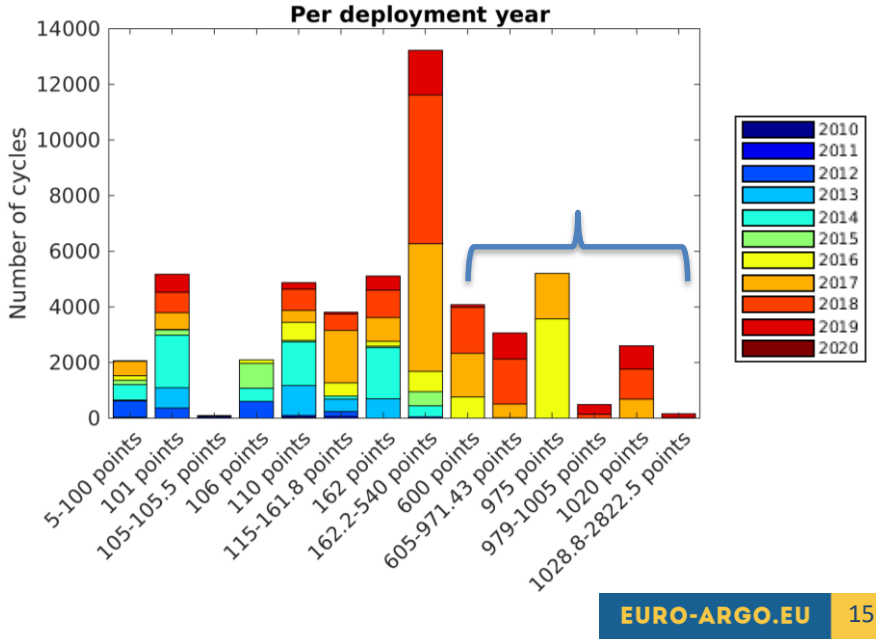




CTD points (only Iridium)

- Higher resolutions (> 600 points) from 2016
- Deep floats configurated with 162 - 540 points





CTD points (only Iridium)

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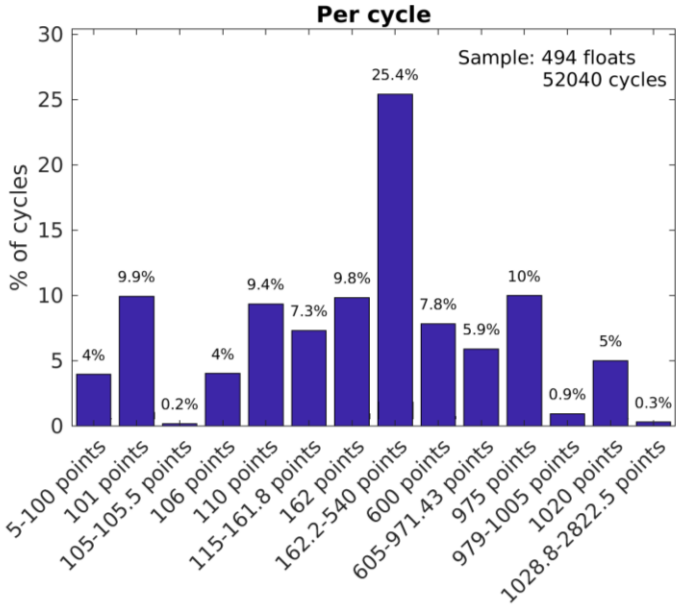
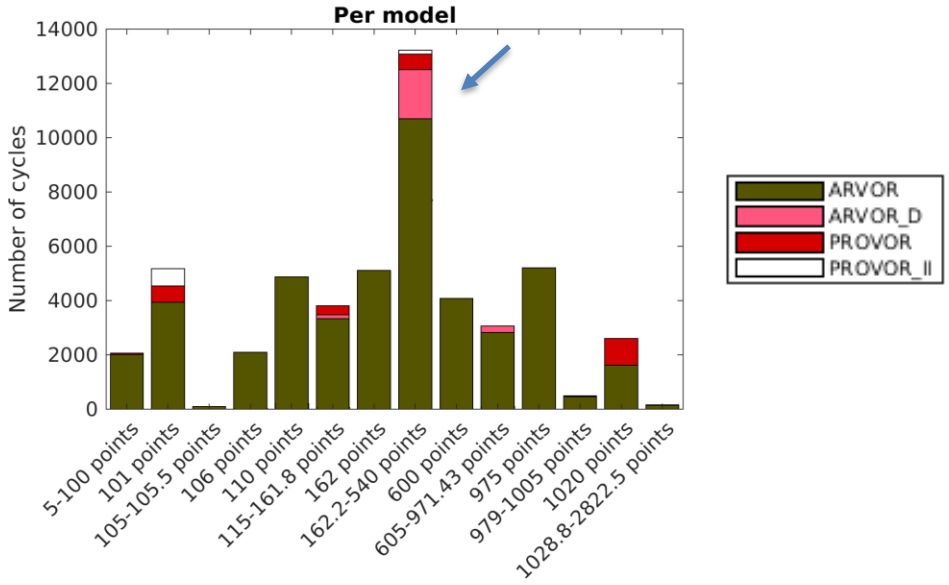




To sum up

- How do we use our floats? Standard argo configuration still the most used

	Standard Argo configuration		"Exotic" configurations
	Value	% cycles	% cycles
Parking pressure	1000 dbar	77.7 %	22.3 %
Profile pressure	2000 dbar	71 %	29 %
Cycle Period	10 days	65.4 %	34,6 %

But .....

What is the cost in terms of **life expectancy** of using "exotic" configurations?

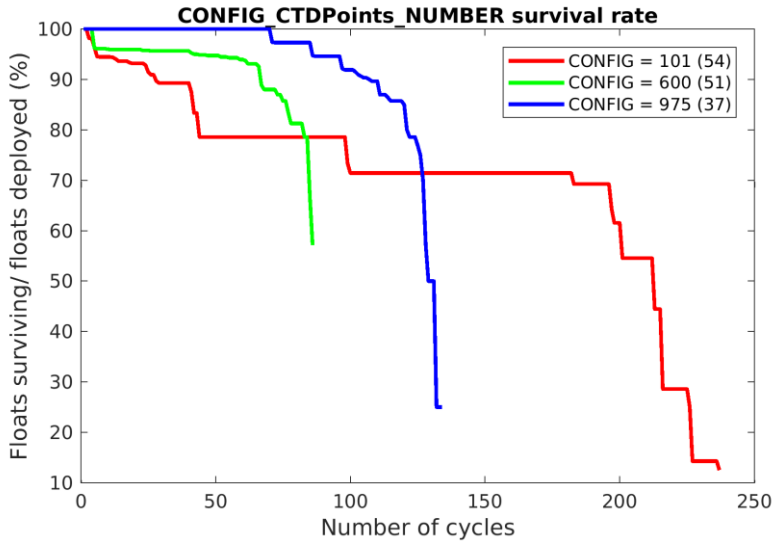
Not only mission parameters: what is the cost of using high resolution? What about other configuration parameters as number of CTD measurements during park? Or second GPS point?

- Answers → EA-RISE project

Increase floats lifetime: EA-RISE project (WP2 task 2.1)

Using statistics

- Look for the configuration that **improves life expectancy** of floats
- Identify config. params which can be important for **battery consumption**
- Smaller sample: ARVOR Iridium floats, standard configuration, global ocean (sample size: 288 floats) or groups of similar configurations using machine learning
- Calculation of survival rates



Using energy budget

- Calculate the cost in cycles of choosing a specific configuration parameter
- More than configuration: Impact of other events like groundings

Main conclusions

- Floats configurations can be also used to improve floats lifetime
- “Exotic” configurations will be used, and we should know what is the cost in terms of float lifetime (number of cycles) to make the correct choices

Merci

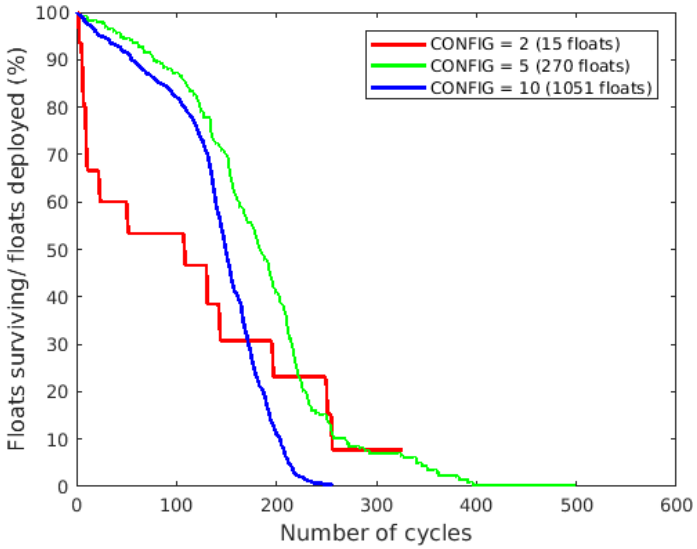
Methodology to explore our data

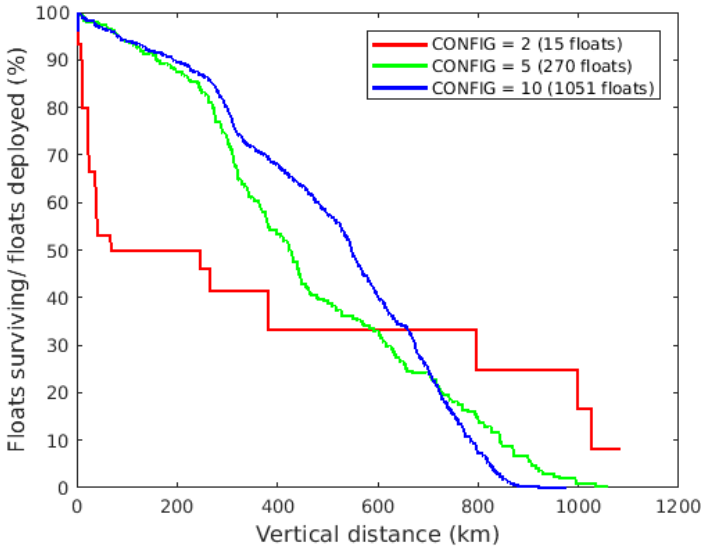
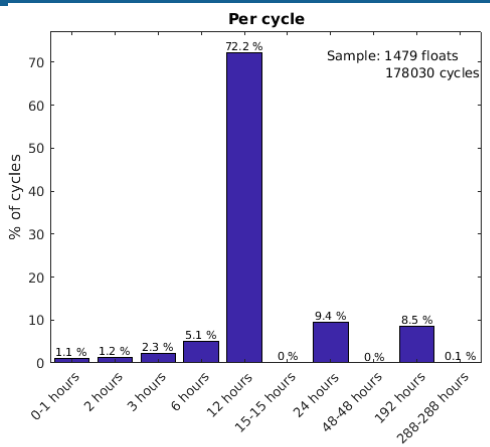
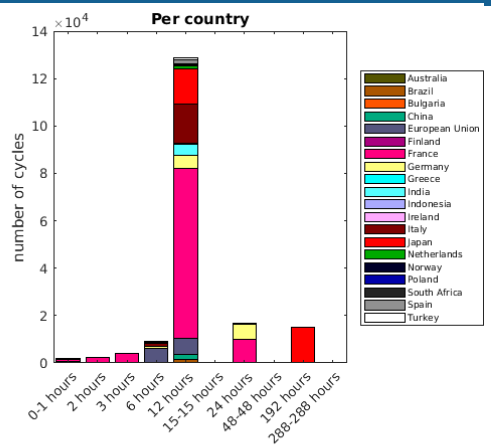
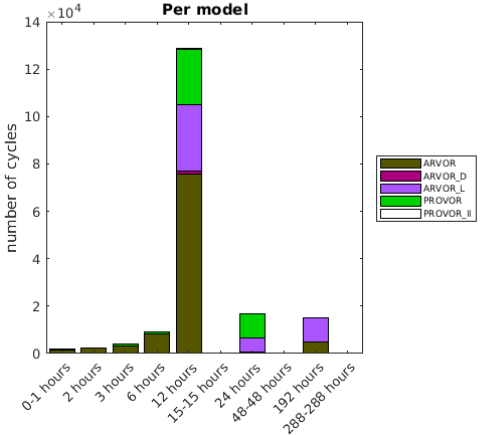
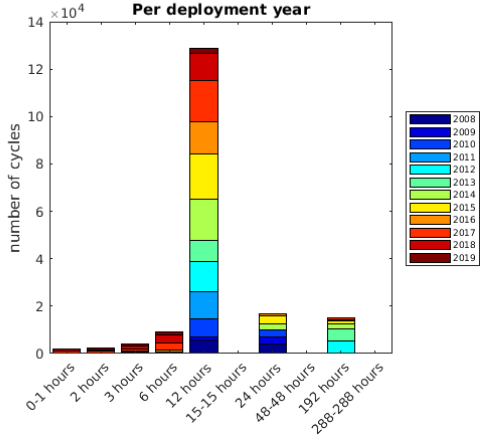
- **Calculate survival rates for each configuration parameter value**
  - Using number of cycles
  - Using vertical km: 2x max depth

$$\frac{Floats > x\ cycles}{Floats > x\ cycles + death\ floats < x\ cycles}$$

- **Analyze results**

CONFIG_CycleTime_days





Park sampling period