



IX INTERNATIONAL FORUM

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# ARCTIC: TODAY AND THE FUTURE

December 5–7, 2019 St. Petersburg

## Waldemar Walczowski

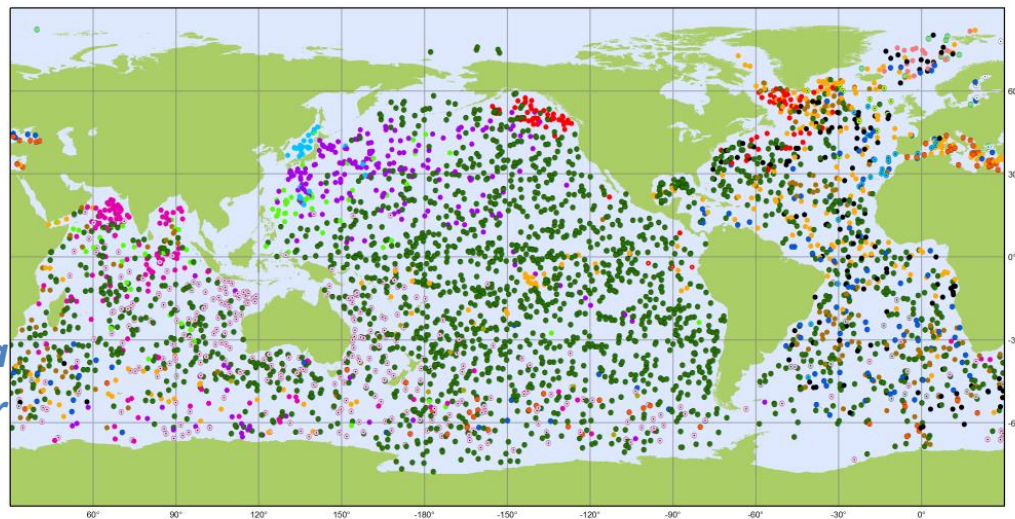
Institute of Oceanology Polish Academy of Sciences

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### An increasing role of Argo floats in Arctic oceanographic observations

## *Argo: a global in situ observina system*

- *About 4000 autonomous profiling floats are measuring ocean temperature and salinity up to 2000 m depth, all over the globe*
- *The Argo network delivers essential data both for climate change research and for ocean analysis and forecasting system*



Argo

**National contributions - 3850 Operational Floats**

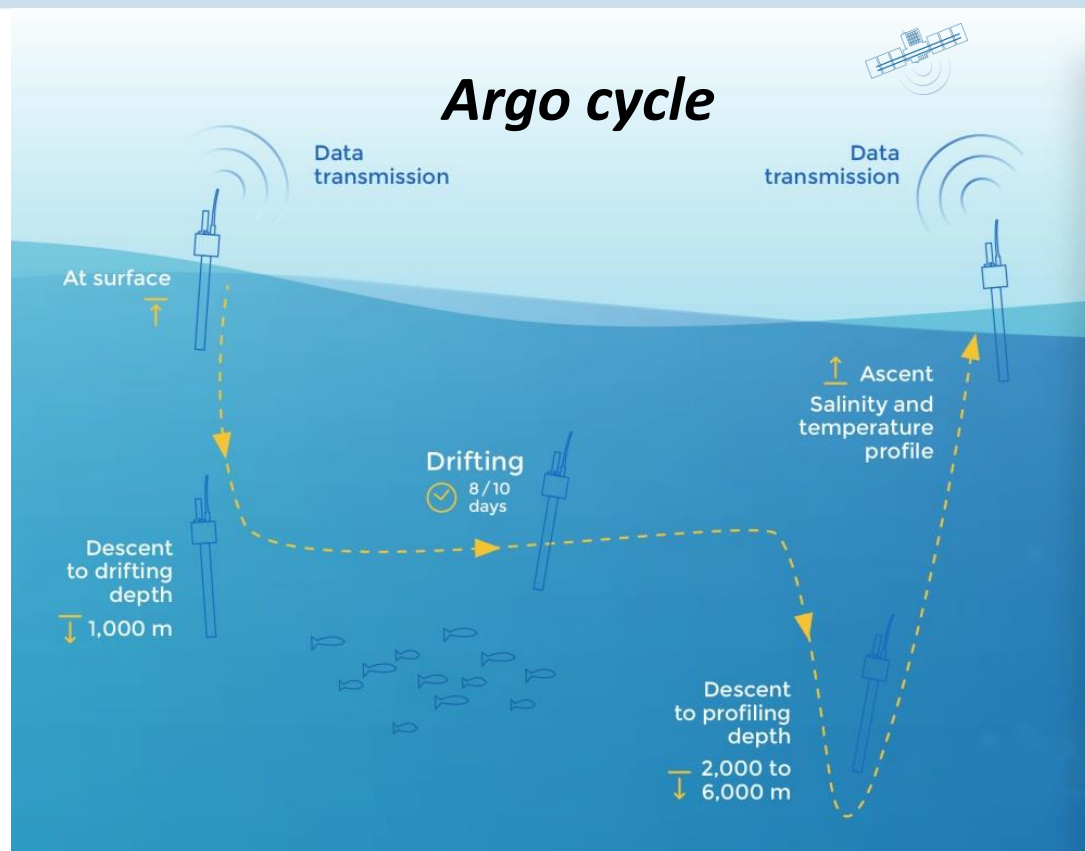
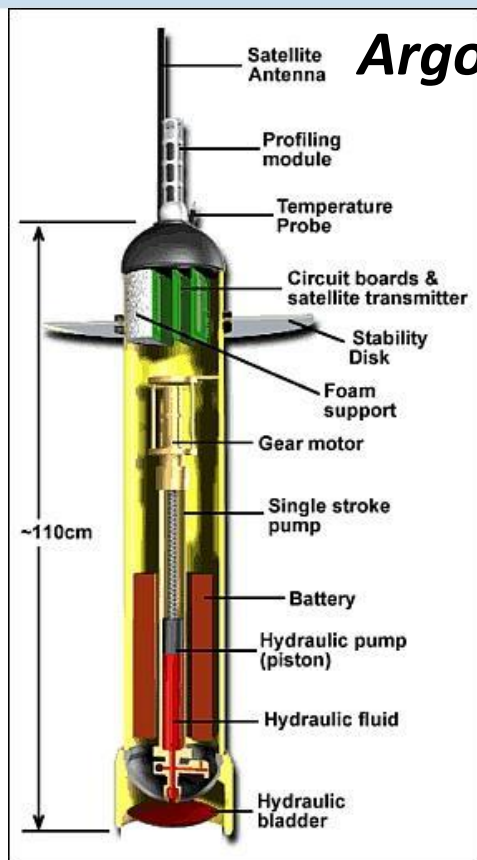
Latest location of operational floats (data distributed within the last 30 days)

October 2019



|                   |                 |                |                    |                           |              |
|-------------------|-----------------|----------------|--------------------|---------------------------|--------------|
| • AUSTRALIA (336) | • FINLAND (5)   | • INDIA (139)  | • KENYA (1)        | • NORWAY (22)             | • SPAIN (24) |
| • CANADA (93)     | • FRANCE (279)  | • IRELAND (12) | • MEXICO (1)       | • PERU (3)                | • UK (159)   |
| • CHINA (75)      | • GERMANY (155) | • ITALY (69)   | • NETHERLANDS (24) | • POLAND (11)             | • USA (2061) |
| • EUROPE (124)    | • GREECE (2)    | • JAPAN (214)  | • NEW ZEALAND (10) | • KOREA, REPUBLIC OF (31) |              |



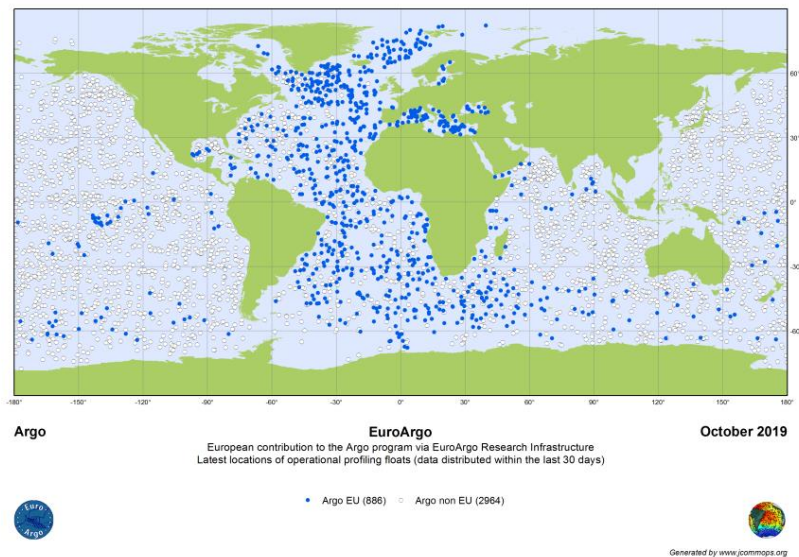
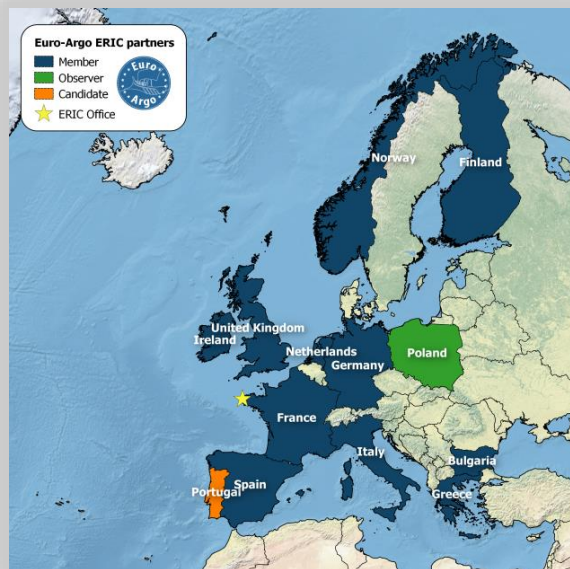




## *The Euro-Argo Research Infrastructure*

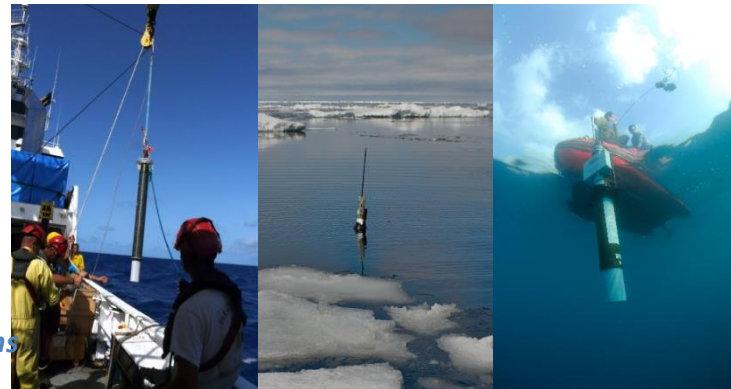
*To coordinate and sustain the European contribution to the global Argo network (1/4 of the network)*

- The Euro-Argo ERIC (European Research Infrastructure Consortium) was created in May 2014 with 9 funding members*
- Euro-Argo is a Landmark in the ESFRI 2018 roadmap*



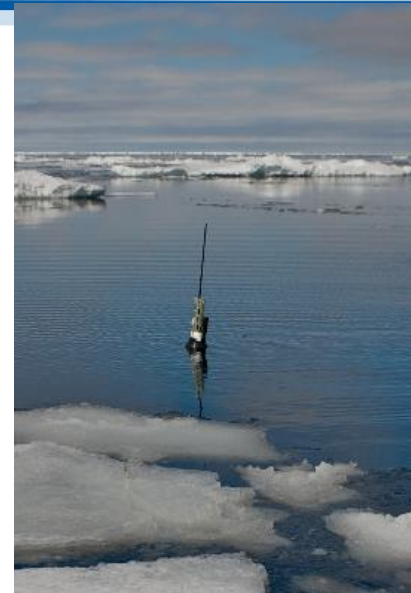
## Argo in Europe for the next decade

- **Main Challenges:**
  - *Maintain the Research Infrastructure*
  - *Extend its capacity to abyssal ocean (4000 to 6000m), biogeochemistry, partially ice covered areas and shallow waters regions*
- **Euro-Argo is developing the European strategy in coherence with Argo international:**
  - *Sustain the core T&S mission, with an emphasis in Western Boundary regions*
  - *Monitor European marginal seas (Baltic, Mediterranean & Black seas)*
  - **Monitor high latitudes**
  - *Monitor the abyssal oceans*
  - *Monitor ecosystem parameters*
- *Euro-Argo plans to contribute to ¼ of the global network and is now starting to implement the new phase of Argo*
- Reference document: “Strategy for evolution of Argo in Europe” (Euro-Argo ERIC, 2017) DOI: 10.13155/48526 5



## *High Latitudes*

- *Argo is a complementary technology to other platforms, like Ice Tethered Platforms (ITP) in the Arctic, sea mammals, vessels and moorings in Arctic and Antarctic areas*
- *Technology has been proven in Weddell Sea with floats able to stay for a long period under ice located with acoustic sources and is under definition/testing for the Arctic and Nordic Seas:*
  - *Tests occurring in Baffin Bay (NAOS project) and in the Baltic Sea*
  - *First promising results of Ice Sensing Algorithm definition for the Barents Sea*
  - *Collaboration opportunities within INTAROS project for underwater positioning (acoustic sources)*

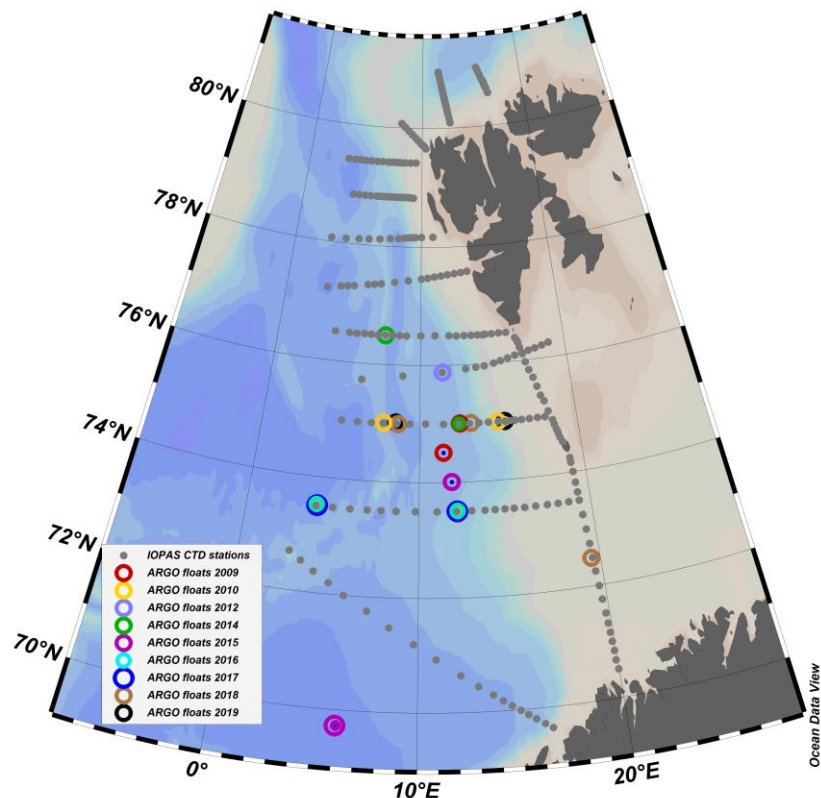






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## ARGO POLAND



### Initiative

#### ARGO POLAND

##### ARCTIC

##### BALTIC

##### ARGO LINKS

##### ARGO MATERIALS

##### ARGO DATABASE

##### ARGO NEWS

##### RESEARCH BUOY

The Argo Poland is a component of global array of temperature/salinity profiling Argo floats.

The Argo array amounts to 4000 floats at present. About 800 new floats are deployed per year (including circa 250 in frame of the Euro-Argo).

The data come from battery-powered autonomous floats that spend most of their life drifting at depth where they are stabilised by being neutrally buoyant at the "parking depth" pressure by having a density equal to the ambient pressure and a compressibility that is less than that of sea water. Satellites determine the position of the floats when they come to surface, and receive the data transmitted by the floats.

The Polish Argo programme is carried out by the Institute of Oceanology Polish Academy of Sciences (IOPAN). Since 2009 our Institute has deployed twenty-one floats. Fourteen of them were launched in the Nordic Seas from the board of *r/v Oceania* and three in the same region aboard *r/v Horizont II*. Since November 2016, also aboard *r/v Oceania*, IOPAN has launched four floats in the Baltic Sea.

Data received from the IOPAN floats and another Argo data sets were used to construct the mean hydrographic fields in the West Spitsbergen Current (WSC) for a comparison with the WSC structure obtained from the shipborne hydrographic measurements.



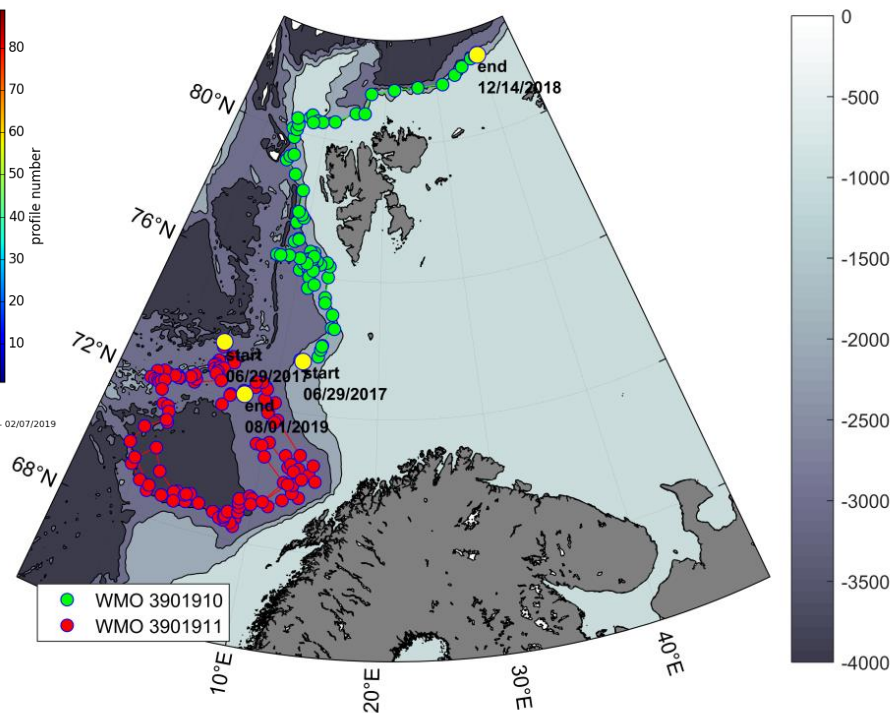
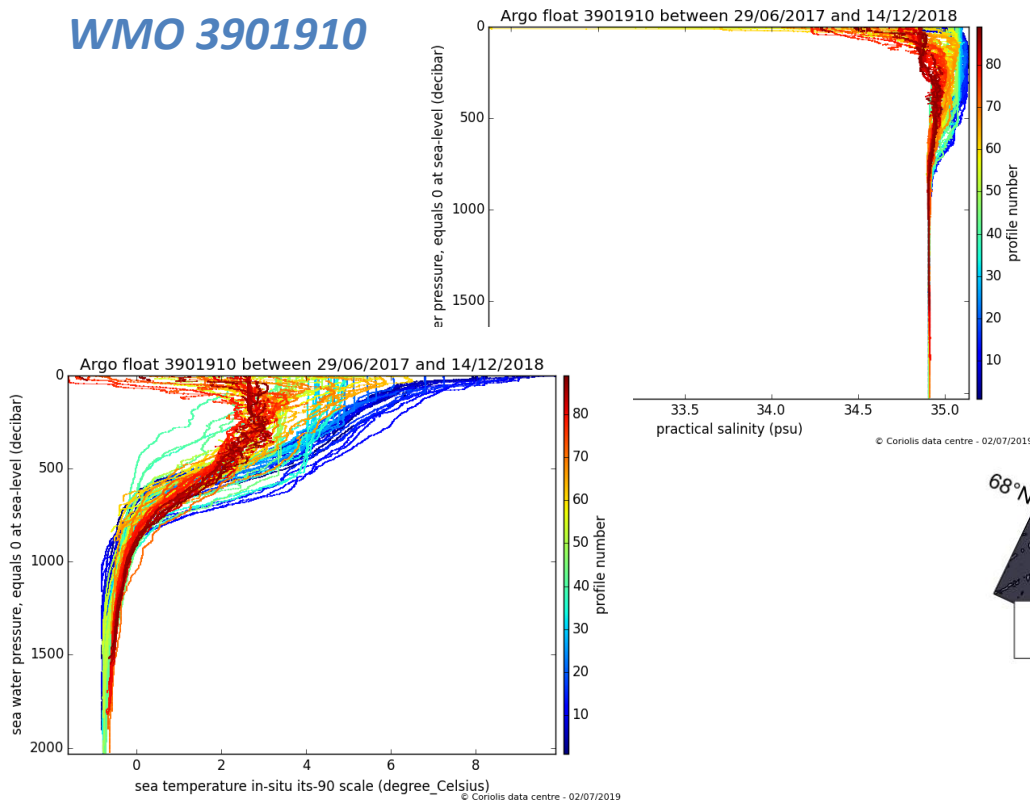


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## WMO 3901910





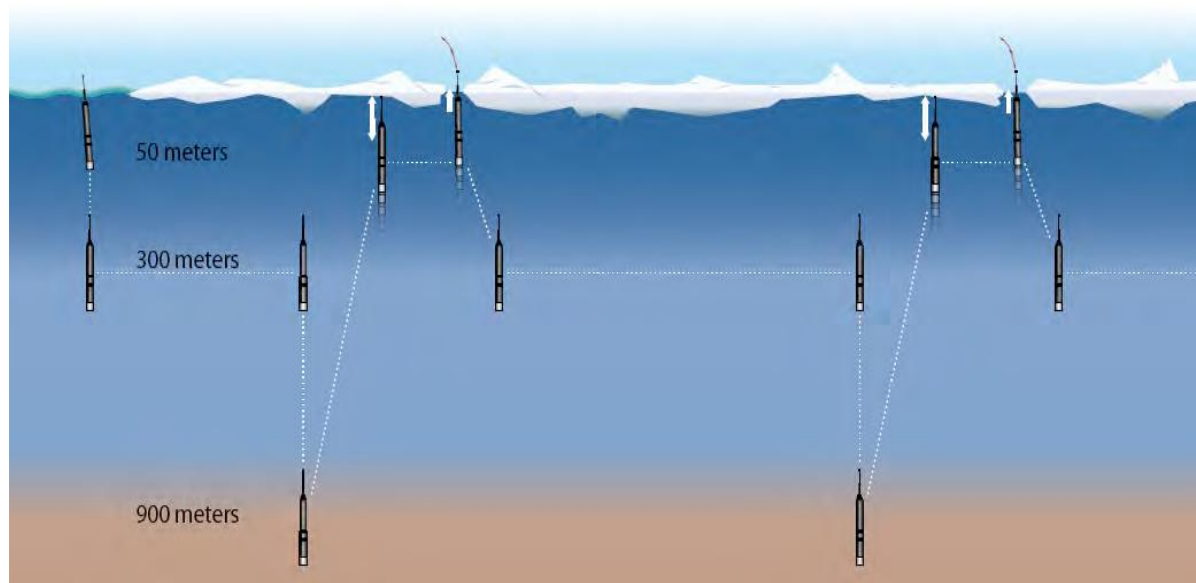
## Main Challenges

### Sea ice cover

- *Mechanical detection*
- *Ice Sensing Algorithms (ISA) (temperature, salinity)*
- *Optical ice detection*
- *Acoustical ice detection*

### Underice navigation

- *RAFOS (acoustic system)*
- *Inertial navigation*



## *Biogeochemical Argo (BGC Argo)*

### *Measured variables*

- *Temperature*
- *Salinity*
- *Oxygen concentration*
- *Nitrate concentration*
- *pH*
- *Chlorophyll-a concentration*
- *Suspended particles*
- *Downwelling irradiance*





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## *Conclusions*

- *The importance of autonomous devices in oceanographic measurements in Arctic is increasing;*
- *Argo floats are the reliable and cheap sources of oceanographic real time data;*
- *Argo array is well organised and maintained, data are available in Coriolis Service;*
- *In the near future, in addition to standard CTD floats, the number and importance of BGC floats will increase;*
- *The new Arctiv float is needed;*
- *International collaboration in Argo projects in Arctic is very needed*





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- *Euro-Argo RISE project organises a workshop focused on international collaboration on Argo activities in the Arctic*
- *Time 23-25 September 2020*
- *Place - Sopot, Poland*

**WELCOME**

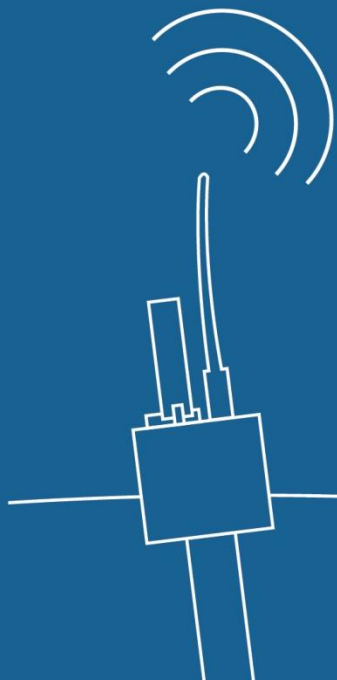


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