



# **WCRP-FPA2 Polar Challenge**

## **Regulations and Standards for Installation of Mission Verification Tags<sup>1</sup>**

### **16 May 2017**

Version 1.2

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<sup>1</sup> This document is subject to change, refinement and further development without notice, and only the latest issued version shall be considered as the official and binding reference. Please visit <http://www.wcrp-climate.org/polarchallenge> for the latest version.

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## 1 DOCUMENT REVISION HISTORY

7 April 2016	Version 1.0	Initial version
25 May 2016	Version 1.1	Modification regarding tag return requirements and related provisions; editorial changes.
16 May 2017	Version 1.2	Added cross-references to Section 5.9; harmonized application timing requirements; editorial changes.

## 2 DEFINITIONS

Throughout this document, as well as all other documentation relating to the WCRP-FPA2 Polar Challenge, the following definitions shall apply:

“Challenge”, “Competition”, or “Polar Challenge”	shall denote the WCRP-FPA2 Polar Challenge
“Guidelines”	shall denote the entirety of the Challenge’s documentation and information material onto which binding character is conferred. These documents include, in order of precedence: <ul style="list-style-type: none"><li>• the Application Form;</li><li>• the Rules and Procedures Document;</li><li>• this Regulations and Standards for Installation of Mission Verification Tags document;</li><li>• any other documents made available alongside the above three documents on the “Guidelines” section of the Challenge homepage.</li></ul>
“Organizer(s)”	shall denote the World Climate Research Programme (WCRP), its sponsors (including but not limited to WMO, IOC and ICSU), individual officers and employees as well as its contractors and agents, the Challenge sponsors, committees and panels
“Competitor(s)”, “Participant(s)”, “Team(s)”	shall denote any or all Teams competing for the Challenge
“Tag”, “Sensor Tag”, “Verification Tag”	shall denote the mandatory mission verification sensor tag, one of which is to be installed by the Competitors on each and every competing autonomous underwater vehicle (AUV).

### 3 INTRODUCTION AND PURPOSE

This document supplements the Challenge “Application Form” and the “Rules and Procedures” documents by giving detailed instructions concerning the mandatory mission verification sensor tag (hereafter: “tag”), one of which is to be installed by the Competitors on each and every competing autonomous underwater vehicle (AUV), insofar as not part of any alternative verification scheme in accordance with Section 5.9 of this document.

The subsection “Tags” of the Section “AUV requirements” in the “Rules and Procedures” document requires each and every participating vehicle (also when several AUVs are deployed by the same Competitor) to be equipped with a validation sensor tag. The purpose of that tag is to provide independent data to the Organizers on the accomplished course of the respective competing vehicle. This additional evidence will be compared to all data made available by the Competitors, and thus act as independent means of mission verification. Competitors will need to order and pay each tag with a specified third-party provider, as well as install, deploy and return it to the tag provider unaltered for mission validation according to Organizer specifications and instructions. Conditions for the admissibility of alternative verification schemes are outlined in Section 5.9 of this document.

### 4 GENERAL PROCEDURE

#### 4.1 Provider of verification technology

The Organizers have identified, through a survey of available technology and manufacturers, a third-party vendor (Wildlife Computers Inc., Redmond, WA, USA; hereafter: “tag provider”) of verification tags suitable for independent verification of AUV missions conducted within the context of the Polar Challenge. The Organizers and the tag provider are currently in the process of establishing a Memorandum of Understanding that formalizes technical and logistical cooperation for tag provision for the Challenge’s external verification.

#### 4.2 Ordering a verification tag

Competitors will be required to order, at their own cost and account, one Challenge-specific verification tag directly from the tag provider for each AUV with which they plan to attempt the Challenge. All aspects of the ordering and purchase process are a business matter solely between the tag provider and the respective Competitor. It is indispensable that each such order to the tag provider be made under the keyword of “WCRP-FPA2 Polar Challenge”, and submitted preferably via the tag provider’s regular online order portal at <http://wildlifecomputers.com/place-an-order> or through the tag provider’s alternative contact options given below. As verification tags for the Challenge are custom made, average delivery lead times of 8-10 weeks after order

confirmation should be taken into account. Likewise, although tag battery life is extensive and the tag will be shipped in a very low-consumption standby mode, Competitors may consider to not order the tag over one year ahead of planned mission deployment.

After having ordered a tag from the tag provider under the “WCRP-FPA2 Polar Challenge” keyword, the Competitor will receive from the tag provider a custom-modified version of the tag provider’s TDR10-F-297C tag model. For tag storage until AUV deployment, see Subsection “Tag storage” below.

### **4.3 Tag installation, recovery and return**

The Competitors will assign one tag thus received to each AUV they deploy. They will inform the Organizers about the resulting combination of AUV vehicle number and tag serial number in due time before mission start, and provide updates in case of changes. Before deployment, the tag must be securely and for the mission’s full duration attached to its assigned AUV (see Section “Physical installation” below). At a time sufficiently close to AUV deployment, the Competitors will activate the tag’s recording mode via a magnet swipe (see below).

For both deployment and recovery, reference is made to Subsection “Main Mission” of Section “Claiming a Prize” of the “Rules and Procedures” document, which requires Competitors to secure time-stamped photographic documentation of AUV launch and retrieval, with the tag visible from several angles and distances (also see the Section “Anti-Tampering” below).

After an AUV’s end of mission and recovery, it is the Competitor’s responsibility to retrieve and dismount the tag from the AUV, and to dispatch it to the tag provider via expeditious and traceable means, e.g. by registered Express Air Mail service. Competitors should use their own discretion when discerning what should be the fastest and safest mode of tag return (e.g., transport with expedition group’s crew luggage until the nearest major city, direct mailing from nearest settlement, etc.). Returning tags should be securely packaged, and, at the sender’s expense, express shipped to:

Polar Challenge Tag Return  
c/o Wildlife Computers  
8345 154th Avenue NE  
Redmond, WA 98052  
USA

The corresponding postal tracking number, together with place, date, and time of dispatch, should be also forwarded to both [polarchallenge@wcrp-climate.org](mailto:polarchallenge@wcrp-climate.org) and [support@wctags.com](mailto:support@wctags.com).

The Rules and Procedures document states a 1-month time frame after mission completion during which the Competitor’s claim is to be submitted. It is expected that the express physical shipping of the recovered verification

tag, which is part of any Prize claim, will result in the tag return to the tag provider surely within this time frame, and expectedly much faster. While the tag is equipped with various anti-tampering measures, Competitors are encouraged to consider that the quickest possible tag return is in their own best interest, both in terms of building trust that no tampering attempts may have occurred as well as in terms of reducing the risk for physical damage at any interim storage locations or during other delays.

#### **4.4 Competitor responsibilities**

As detailed in the “Rules and Procedures” document, it is each Competitor’s responsibility to provide to the Organizers evidence of any claimed completion of the Challenge. This burden of providing evidence extends to the responsibility of ensuring that the verification tag can operate on the Competitor’s AUV as foreseen, and that it will afterwards be returned to the tag providers in functional condition, in particular with regards to extraction of all recorded data. The correct installation and handling of the verification tag before, during, and after AUV deployment is incumbent on the Competitors. The Competitors undertake to employ the tags such that maximum capability for mission verification is maintained, both by adhering to the present document and the overall Challenge Guidelines, as well as by putting forth general best effort and exercising common technical operating standards. As mentioned throughout the present document and elsewhere, validation tags are depth rated to 2000m. Competitors are required, in their own interest, to conduct AUV operation strictly above depths of 2000m. Likewise, tags should not be exposed to extreme heat or cold beyond the temperatures ranges to be expected in normal operation and during long-term storage.

## **5 SPECIFICS OF TAG ORDER, DEPLOYMENT AND RETURN**

### **5.1 Tag price (at Competitor’s expense/account and per AUV)**

The cost of each tag is given by the tag provider’s March 2016 list price for the TDR10-F-297C tag model (USD 3,300). Tag prices for Challenge verification are payable to the tag provider under their respective general conditions of business.

### **5.2 Tag provider’s full contact information**

*Address:* Wildlife Computers  
8345 154th Avenue NE  
Redmond, WA 98052, USA

*Web page:* [www.wildlifecomputers.com](http://www.wildlifecomputers.com)

Online

order form: [www.wildlifecomputers.com/place-an-order](http://www.wildlifecomputers.com/place-an-order)

E-Mail: Sales, Quotes, and Inquiries: [tags@wctags.com](mailto:tags@wctags.com)  
Technical Support: [support@wctags.com](mailto:support@wctags.com)

Tel: +1.425.881.3048

Fax: +1.425.881.3405

### 5.3 Tag technical specifications

The tag used for Competition verification is the tag provider’s “TDR10-F-297C” model, with dimensions 86 x 55 x 26 mm (L x W x H) and a weight of 165 gram.

The “TDR10-F-297C” tag features a depth sensor, temperature sensor, light level sensor, and FastLoc® GPS sensor. The tag provider will carry out a software configuration specific to the Challenge’s purposes and Organizer’s verification requirements. It is therefore not admissible for any Competitor to use in the Challenge a tag of the same model line and with the same base specifications, but without having been ordered under the Challenge’s order keyword “WCRP-FPA2 Polar Challenge” and without being set up specifically to the Challenge’s task by the tag provider; or with any attempted or successful modification of the tag’s hardware or software configuration (also see the Section “Anti-Tampering” below).

The tag’s operating time under deployment conditions (i.e., in full data-collecting mode) for the Challenge-specific configuration is estimated as 900 days. The Organizers believe that this is fully sufficient for any perceivable attempt toward Challenge completion. Should any Competitor still seek longer deployment times (for example, in order to allow for a longer-running or continuous series of repeated Challenge attempts with the same AUV and tag), they may contact the Organizers to discuss the ordering and use of the tag provider’s “TDR10-F-296B” or “TDR10-F-238F” models, which feature extended battery life at the expense of larger physical dimensions and weight. Irrespective of this mention of the potential use of longer-life tag variants, Competitors are not entitled to freely choose and order these latter two tags without prior consultation with the Organizers.

All tags by the tag provider are depth rated to 2000m, and neither tag operation nor physical integrity nor storage of previously recorded data can be guaranteed after exposure to greater depths. Competitors must therefore strictly limit AUV operations to 2000m depth at most. The Organizers recommend an additional appropriate safety margin, chosen in accordance with AUV navigational capabilities, properties and resulting uncertainties. As detailed in the below Section “Tag malfunction”, the Organizers have the expressed right, in their sole and final discretion, to exclude, or re-evaluate

the performance of, any competing AUV for which the verification tag has been damaged or malfunctioned any time before, during or after the mission; or which ceased to record data during the mission; or for which no data can be retrieved from the tag by the Organizers, regardless of the cause of such inability of data retrieval. This includes expressly, but is not limited to, any damage resulting from violation of maximum depth or pressure specifications, as the ability for precise navigation, in particular vertically in the water column, is one of the Challenge's core tasks and expected to be easily met by all contestants.

#### **5.4 Changes in tag availability and/or configuration**

In the unlikely event of tag discontinuation through the tag provider for any reason, and/or of overall cessation of operation of the tag provider's business for any reason, and/or any other change in availability and/or suitability (as assessed by the Challenge Organizers) for verification purposes of available tag models for any reason, the Organizer reserves the full right, in its sole discretion, to identify and make optional or mandatory alternative verification technology to be used by Competitors. Likewise, the Organizer, in its sole discretion, may in such a case define transitional as well as additional rules to address any potential issue of different verification solutions being in effect (be they ordered, in shipping, received, installed, deployed, recovered, or in any other status) across all competing AUVs throughout the full or partial duration of the Challenge. The Competitors in such a case expressly declare to not contest the Challenge's outcome and Jury Panel's decisions on the grounds of different verification tags and/or technologies having been allowed, required, or used for different competing AUVs.

#### **5.5 Tag order and shipping**

It is solely each respective Competitor's responsibility to negotiate with the tag provider in case of lost, damaged or otherwise flawed deliveries. The Organizers advise to allow enough time between tag order and mission start to account for potential delays in delivery as well as for any potential replacement delivery in case of shipping, production or other problems.

#### **5.6 Tag storage and handling**

Competitors will receive their tags from the tag provider in standby mode. This is a very low-power consumption state, and a tag's standby shelf life exceeds the above given operating battery life times by far. Still, it is recommended that Competitors store their tag(s) in a refrigerator or freezer at temperatures between -20 and +5 degree Celsius in order to extend battery and tag service life. Other precautions during tag storage should concern tag physical integrity and maintenance of the passive standby state until deployment. As detailed in the below Section "Tag activation", tags are transferred from standby to recording mode either through contact with salt water or swipe activation by a magnet. Hence, tags should be stored clear of moisture, water and magnetic

influence. The tag's pressure sensor must never be subjected to mechanical force.

## **5.7 Physical installation**

The sensor tag is to be installed on the AUV's external hull, with tag sensors facing outwards from the vehicle. It is both in the Competitors' own core interest as well as their responsibility to ensure tag installation at a position on the AUV such that: the temperature and pressure sensors are in good contact with the surrounding ocean water; the light sensor is well-exposed to any potentially present sub-surface ambient light; and the GPS FastLoc® sensor is best exposed to GPS satellites during deployment, recovery and any other possible AUV extraction events. Reference is again made to the Challenge "Application Form", which requires that Competitors state their planned tag mounting location and orientation on each respective AUV model, as well as estimated impact of that installation location on all sensor readings. Competitors must further keep informed the Organizers of any change to that stated tag installation location. In each case, the Organizers retain the right, in their sole discretion, but taking into account expected drag behavior, to demand installation at a better suited location on the AUV. In severe cases, the Organizers reserve the right, in their sole discretion, to disqualify AUVs for which the chosen mode of tag installation runs counter to the purpose of mission verification.

All aspects of tag mounting (i.e., physically and securely attaching the tag to the AUV for the full duration of AUV deployment) are the Competitor's responsibilities. Any costs, risks, or effects on AUV operation resulting from tag mounting are to be solely entered into and borne by each respective Competitor. The tag provider may offer assistance and/or expertise regarding two different possibilities of tag mounting, namely, either by direct bonding via epoxy resin gluing ("direct gluing") of the tag to the AUV by the Competitor, or by epoxy resin gluing a perforated mounting plate to the tag by the tag provider, which then in turn may be mechanically attached to the AUV by the Competitor. Any such arrangements would be deliberated between the tag provider and Competitor directly. The Competitors are at liberty to devise, test, and employ further attachment methods beyond the aforementioned as long as these preserve the physical integrity as well as Challenge-specific software configuration of the tag and which do not interfere with any aspects of its data collection. In any case, the Competitors need to inform the Organizers on the planned installation location in the Application Form, and keep the Organizers updated in case of changes to the planned installation location and mode. During the tag installation process, Competitors should take special care not to damage any tag sensors, for example through direct physical pressure on the pressure or other sensors.

Both the Organizers and tag provider recommend the application of anti-fouling coating to verification tags. The tag provider offers the application of "PropSpeed" copper-free anti-fouling paint, which the tag provider has found to work well on their validation tags. Costs for application of anti-fouling

coating by the tag provider are to be negotiated with the tag provider as well as borne by the Competitors. Should Competitors opt to apply anti-fouling coating themselves, they must ensure that this will not interfere with sensor operations and data collection, in particular by excluding the relevant tag sensors areas.

## **5.8 Tag impacts on AUV behavior**

It is solely upon the Competitors to consider, and correct for, any potential influence of the externally mounted tag on AUV performance (including, but not limited to, endurance, asymmetric drag or change in buoyancy). The Competition is in all parts to be interpreted as requiring completion of its mission tasks by an AUV *to which an according verification tag as provided by the tag provider is mounted*. Reference is furthermore made to the Section “Liability” of the “Application Form”. Specifically, the Organizer’s refusal of liability expressly extends to, for example, but is not limited to, any AUV misbehavior or damage possibly effected by the presence of the verification tag, its installation process or indirectly of any auxiliary objects or procedures used for tag mounting. The above exclusions of liability or responsibility for any potential reduction in AUV performance due to tag installation also extend to any limitations that the tag may indirectly impose, such as for example, but not limited to, the requirement to not descend to depths below of 2000m. The Organizers further will not take into account any hypothetical AUV performance that may be postulated to have been achievable or provable without the externally mounted verification tag, or without any potential malfunction thereof.

The Competitors also undertake to not raise claims against the tag provider that seek compensations for losses, be it of the AUV itself, of Challenge prize funds or otherwise, caused by the presence of the tag on the AUV, even in case of tag malfunction. Responsibilities of the tag provider toward Competitors shall not extend beyond those granted by the tag provider within their general terms and conditions as well as any legislation to which the Competitor and tag provider are subject through the tag purchase itself.

If desired, Competitors may mount drag-reducing elements in the tag’s vicinity to further limit flow resistance introduced by the tag. Any such added elements must not interfere with sensor operations and data collection in any way, and in particular not cover any of the tag’s sensors. In case of doubt, Competitors are encouraged to contact the Organizers. The Organizers reserve the right to demand, in their sole discretion, alterations to or removal of any such drag-reducing elements if their interference with tag operations cannot with certainty excluded by the Organizers.

## **5.9 Alternative verification strategies**

As stated in Section “Rules and Regulations” of the Challenge “Rules and Procedures” document and in Section 4 of the Challenge Application Form, prospective Competitors are requested to contact the Challenge Organizers in

case they feel that any part of the current set of Guidelines documents prevents them from successfully demonstrating a novel approach toward an autonomous under-ice environmental monitoring network. Due to the special importance of independent verification, and in the interest of the Challenge's overall integrity and credibility, this applies to Challenge verification only within certain limits. However, should Competitors feel that the presence of an externally mounted verification tag, as described above, would prove prohibitive to their specific attempt at completing the Challenge, they are free to provide the Organizers with an end-to-end plan for an alternative verification strategy. Any such proposal must conform to highest standards of traceability; be as independent as possible of the Competitor's own navigation, logging, control, and data collecting system; fully amenable to external auditing and verification; as well as be fair and transparent to all other competing teams. According proposals and requests should be put forth as early as possible during the Challenge's duration, and include as justification a scientifically sound estimation of the expected prohibiting impacts of an externally mounted verification tag, and desirably also the results of according live field tests and feasibility studies.

Any decision to admit or exclude any alternative verification technology is solely and in final authority that of the Challenge Organizers. Competitors in particular agree to not challenge any decision by the Organizers, nor by the Judge Panel, that admits alternative verification technology or that awards, or does not award, prize money to an AUV for which alternative verification technology, as officially cleared for the Competition by the Organizers, was used.

### **5.10 Tag activation**

As detailed in the above Section "Tag storage", tags are delivered in a low-power consumption standby mode. Besides this standby mode, the tags feature a deployment/recording and a shutdown mode. Shutdown mode will not be used during the Challenge, as the standby mode itself is a highly resource-efficient state. In order to both query a tag's current state, as well as toggle between standby and deploy mode, magnet swipes in the vicinity of the communications port are used (the communications port will be sealed during all phases during which Competitors handle the tag). In addition, tags will transfer from standby to recording mode upon being submerged in salt water. While any reasonably strong magnet will work for status query and toggle, it is recommended to use the activation magnet provided with the sensor tag, or to first validate any alternative candidate magnets before departing on the actual mission.

The detailed procedure to query a tag's current state is as follows:

Passing a magnet once across the tag near the (sealed) communications port will make the LED flash in a sequence characteristic of the current tag mode:

- When the tag is in standby mode, the LED will display 2 blinks, a 1 second pause, 2 blinks, a 1 second pause, and 2 more blinks (note that the blinks are quite short and hence may be missed by an observer at times).
- When the tag is in deployment/recording mode, it will flash quickly 10 times.
- A third mode, not used during the competition, is the shutdown mode. In this mode, the LED will illuminate constantly as long as the magnet is present in vicinity of the (sealed) communications port. In this case, please remove the magnet quickly and contact the Organizers and/or tag providers. If the magnet is left in vicinity for too long, the LED will turn off to save power. When this happens, the tag will no longer respond to the presence of a magnet at all, and non-trivial recovery efforts will be necessary. In this case, please also contact the tag provider and/or Organizers.

The above LED indication sequences for standby and deployment mode are always both automatically followed by another pause of 1 second, and a further LED light-up of 2 seconds duration. This 2-second blink indicates a time window of opportunity during which to toggle between standby and deployment mode. To transfer the tag to the respective other state, a second magnet swipe should be performed within that 2-second time window. To confirm the mode change, the blink pattern of the tag state that is now active will be shown.

In summary, one single magnet swipe will display the tag's current state. A second swipe during the ensuing 2-second window of opportunity indicated by the final 2-second LED blink will toggle between standby and deploy mode.

While the tag is designed to also transfer to deployment mode upon submergence in sea water, Competitors should make use of the magnet swipe activation as well.

After the above activation process, the tag will be ready for AUV deployment. As all tags feature a relatively long battery life also in data collection mode, Competitors could opt to conduct the activating magnet swipe any reasonable time before the actual launch. Likewise, there is no need to seek de-activation in case AUV launch is delayed (e.g., for weather or other reasons) for a reasonable time after tag activation. In any case, Competitors must log manually the time and date of tag activation, deactivation, AUV deployment, and AUV recovery, and include these times and dates both in the package by which the tag is returned to the tag provider, as well as in the electronically submitted technical documentation supporting any prize claim. In general, the Organizers encourage Competitors to email to the Organizers in as near to real-time as possible any times of deployment, recovery, or mission

interruption, as well as the times of any other relevant key events which may have a correspondence in the tag sensor's data logs.

### **5.11 Functionality tests**

Competitors should confirm tag functionality before AUV deployment. This can be done by monitoring the tag LED in deployment mode: after a magnet is passed by the tag once and the tag LED has displayed the deployment mode ID blink sequence, the LED will continue to glow dimly until the next full minute rolls over in the tag's internal clock. After this, the tag begins data collection and flashes its LED whenever it wakes up to take a sample. These LED flashes will cease after 31 hours to conserve battery.

### **5.12 Tag retrieval**

After AUV recovery, the tag should be retrieved from the AUV and returned to the tag providers according to the Subsection "Tag installation, recovery and return" of the Section "General Procedure" of this document.

It is foreseen that any analysis of the stored tag data is conducted by the Judge Panel only, plus any external technical experts it may appoint or commission for expert data evaluation. In particular, there is no obligation on the Judge Panel nor Organizers for data sharing with Competitors or any other third party. Even in the case that tag data is shared with the Competitors or any other third party, neither the Judge Panel nor the Organizers are under any obligation to receive, acknowledge, consider or follow any analyses of the tag or other mission-relevant data, or any interpretations thereof. No such analyses or interpretations will be accepted or considered by the Judge Panel unless any such information was specifically requested by the Judge Panel.

### **5.13 Tag return to Competitors after Challenge conclusion**

After the Challenge prize has been awarded or the Challenge otherwise been concluded, it is at the discretion of the tag-owning Competitor to inquire about and negotiate on the conditions of a possible tag return to the Competitors by the tag provider (including on options for battery replacement, refurbishment, etc.; and also depending on that particular tag's state of health and operations) for any of the Competitor's tags which have been returned to the tag provider and for which the data stored on it has already been extracted. No such tag returns will be possible before the official conclusion of the Challenge.

This option for inquiry about tag return is offered to retain hardware value and allow for potential ensuing tag use for each Competitor. The Organizers do not guarantee the successful tag return through the tag provider after the Challenge, nor any conditions under which these would be possible.

As the Judge Panel's decisions are final, any potential analyses by the Competitors themselves of any remaining data on the tag will in no way be taken into consideration by the Organizers or the Judge Panel. Neither the tag providers nor Organizers make any expressed or implied statement on the potential degree of suitability of a Competitor's tag for further use after tag return to the Competitors by the Organizers, and claims for compensation or other reimbursement due to non-functionality of a tag after its return to the Competitors by the Organizers are excluded.

#### **5.14 Anti-Tampering**

The verification tag is to be treated by Competitors as a "black box" in that they need not and should not be concerned with the tag's inner hardware or software configuration beyond ensuring the tag's full functionality and purpose through correct installation, deployment and return. In particular, Competitors must not attempt to modify any of the internally sealed hardware parts or of the tag's software configuration files, or otherwise attempt to interfere with the tag's foreseen operation. Several hardware and software anti-tampering measures serve to ensure the integrity of the Challenge verification tag. The Organizers have the expressed right, in their sole authority, to disqualify from the Challenge any Competitor, or discount any achievements made toward Challenge completion, for which the tag provider or the Organizers have sufficient plausible evidence of attempts, successful or not, to modify the tag's hardware or software mechanisms. Any such decision by the Organizers will be final and binding.

The tag's communication port will be sealed by the tag provider already from initial shipment on. As stated in Subsection "Main Mission" of Section "Claiming a Prize" of the "Rules and Procedures" document, Competitors should secure photographic documentation of AUV launch and retrieval, with the tag visible from several angles. These photos should include a close-up picture of the tag's sealed communication port while it is installed on the AUV, as temporally close to at-sea deployment and recovery as logistically possible. In the rare case that, after mission completion and AUV recovery, the communication port sealing is found to have been affected or damaged by sea water influence during AUV under-water operations, Competitors should not under any circumstances attempt to re-construct the seal's previous appearance, but rather document the seal in its current state and include a corresponding account in any claims to a prize.

#### **5.15 Tag malfunction**

Should a tag have malfunctioned or become damaged during or after AUV deployment, mission, or recovery, it is possible that no, partial or only corrupted verification data can be downloaded from the tag by the Organizers. Should such a case arise, the Organizers will work with experts from both the Judge Panel and the tag provider to attempt data recovery. In every case, it is solely at the Organizers' discretion to declare a tag's data content readable or unreadable by available technical and financial means, and any according

decisions will be binding and final. Depending on the degree to which data read-out is impacted, as well as on the quality and transparency of the Competitor's own logged data, the Organizers reserve the right, at their sole discretion, to fully, partially, or also not at all recognize any achievement toward Challenge completion claimed under a not fully functional verification tag. Any such decision by the Organizers will be final and binding.

Neither the Organizers nor the tag provider will accept liability sought for losses in Challenge prize money, or other direct or indirect losses (except those covered by the tag provider's general terms and conditions) which might be ascribed to any failure in data recording, recovery of data from the verification tag, or similar hindrances to data evaluation.

The Organizers will not accept any data claimed to have been extracted from the malfunctioned tag, or claimed analysis thereof, by any other entity than its own Judge Panel's technical experts or any third party from which assistance has been expressly requested. The Organizers do not accept any potential contestation of its assessment of the tag's state of health, the transferability of its data, and its conclusions and decisions based on such assessments.

#### **5.16 Contact, inquiries and general communication**

All aspects of the tag ordering, shipment, payment and delivery process are to be concluded between the Competitors and the tag provider. Competitors should communicate on these aspects directly with the tag provider, and inform the Organizers of the final combination of AUV and tag serial number, as well as in cases of stark delays or other impeding problems. In contrast, communication on all aspects of tag storage, installation, activation, operation, retrieval, and any aspect of Challenge verification in general, should be directed to the Organizers. This will serve the goal of facilitating information flow between all parties involved and avoiding multiple inquiries to the tag providers on the same questions.

## **6 PRIVILEGES AND IMMUNITIES**

Nothing in or relating to this WCRP-FPA2 Polar Challenge Document on "Regulations and Standards for Installation of Mission Verification Tags" or the overall Challenge Guidelines shall be deemed a waiver, express or implied, of any of the privileges and immunities of the World Meteorological Organization (WMO), including its subsidiary organs.