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Bid Receiving Public Works and Government  
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Room 100,  
167 Lombard Ave.  
Winnipeg  
Manitoba  
R3B 0T6  
Bid Fax: (204) 983-0338

**SOLICITATION AMENDMENT  
MODIFICATION DE L'INVITATION**

The referenced document is hereby revised; unless otherwise  
indicated, all other terms and conditions of the Solicitation  
remain the same.

Ce document est par la présente révisé; sauf indication contraire,  
les modalités de l'invitation demeurent les mêmes.

**Comments - Commentaires**

**Vendor/Firm Name and Address**  
Raison sociale et adresse du  
fournisseur/de l'entrepreneur

**Issuing Office - Bureau de distribution**  
Public Works and Government Services Canada -  
Western Region  
Room 100  
167 Lombard Ave.  
Winnipeg  
Manitoba  
R3B 0T6

|  |  |
|--|--|
| <b>Title - Sujet</b><br>weather station  |  |
| <b>Solicitation No. - N° de l'invitation</b><br>F2402-170093/A   | <b>Amendment No. - N° modif.</b><br>001                            |
| <b>Client Reference No. - N° de référence du client</b><br>F2402-170093  | <b>Date</b><br>2018-01-31  |
| <b>GETS Reference No. - N° de référence de SEAG</b><br>PW-\$WPG-209-10452  |  |
| <b>File No. - N° de dossier</b><br>WPG-7-40171 (209)   | <b>CCC No./N° CCC - FMS No./N° VME</b>                             |
| <b>Solicitation Closes - L'invitation prend fin</b><br><b>at - à 02:00 PM</b><br><b>on - le 2018-03-07</b>   | <b>Time Zone</b><br>Fuseau horaire<br>Central Standard Time<br>CST |
| <b>F.O.B. - F.A.B.</b><br><b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/> |  |
| <b>Address Enquiries to: - Adresser toutes questions à:</b><br>Allard, Ken   | <b>Buyer Id - Id de l'acheteur</b><br>wpg209                       |
| <b>Telephone No. - N° de téléphone</b><br>(204) 229-5423 ( )   | <b>FAX No. - N° de FAX</b><br>(204) 983-7796                       |
| <b>Destination - of Goods, Services, and Construction:</b><br><b>Destination - des biens, services et construction:</b>  |  |

**Instructions: See Herein**

**Instructions: Voir aux présentes**

|  |  |
|--|--|
| <b>Delivery Required - Livraison exigée</b>  | <b>Delivery Offered - Livraison proposée</b> |
| <b>Vendor/Firm Name and Address</b><br>Raison sociale et adresse du fournisseur/de l'entrepreneur  |  |
| <b>Telephone No. - N° de téléphone</b><br><b>Facsimile No. - N° de télécopieur</b>   |  |
| <b>Name and title of person authorized to sign on behalf of Vendor/Firm</b><br><b>(type or print)</b><br><b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b><br><b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b> |  |
| <b>Signature</b>   | <b>Date</b>                                  |

**THIS AMENDMENT IS RAISED TO ADDRESS THE FOLLOWING:**

**INSERT:**

**ANNEX A  
STATEMENT OF REQUIREMENT**

**1. Objective**

Fisheries and Oceans Canada, Freshwater Institute (FWI) wish to acquire an **autonomous long-term meteorological station** (met station) to be deployed in the high Arctic on thick (~3.5 m) multi-year sea ice within the Lincoln Sea. The meteorological station will be deployed during a campaign in ice-covered waters of the Lincoln Sea and left on the sea ice in order to acquire long-term meteorological observations.

**2. Context**

Fisheries and Oceans Canada FWI is purchasing an autonomous long-term meteorological station as part of an extensive research initiative to gain a better understanding of the sea ice habitat, biodiversity and ecosystem structure of the marine environment within the Last Ice Area. Meteorological observations are crucial in understanding the ecological responses to changes in the physical environment and thus are an essential component of our research program.

**3. Training**

The Contractor must provide a minimum of 1 day of hands on and theoretical training, in English, for 2 people to be conducted at the contractor's place of work. Training will ideally be conducted on the exact same meteorological station equipment that Fisheries and Oceans will acquire. The training should ideally be conducted before shipment to Fisheries and Oceans, Freshwater Institute in Winnipeg. The training should cover the entire mechanical setup, configuration, testing, and deployment of the met station.

**4. Mandatory Technical Specifications and Components**

The mandatory technical specifications and components listed in the tables below are, first and foremost, the minimum requirements and do not constitute an exhaustive list. Any technical specifications and components required for operation of the equipment and not described in the table below are an integral part of this annex and their cost is included in the firm lot price for the autonomous meteorological station.

**INSERT: Mandatory Technical Compliance Matrix**

| <b>Mandatory Technical Compliance Matrix</b> |  |                         |
|--|--|-------------------------|
| <b>Item</b>                                  | <b>TECHNICAL SPECIFICATION DESCRIPTION</b>   | <b>COMPLIANT YES/NO</b> |
| 1.1  | Must acquire observations of precipitation of all types (e.g., snow and rain) and must be operational at temperatures in the range -40 °C to +20 °C. Precipitation observations must have an accuracy of +/- 0.05 mm over a 60 minute collection time.   |                         |
| 1.2  | Must acquire observations of temperature in the range -40 °C to +20 °C and relative humidity in the range 0 to 100 %, and have to be mounted at 1.4 m height above the surface and with best available exposure to wind from all directions. Temperature observations should have an accuracy of +/- 0.1 °C and relative humidity should have an accuracy of +/- 0.8%  |                         |
| 1.3  | Must acquire observations of barometric pressure with accuracy smaller than or equal to 0.5 mB at 20 °C, and be operational within a temperature range of -40 °C and +20 °C.   |                         |
| 1.4  | Must acquire observations of wind speed and direction within a wind speed range of 0 to 100 m/s and accuracy of +/- 0.3 m/s, and a wind direction accuracy of +/- 3 degrees.   |                         |
| 1.5  | Must include two (2) Licor photosynthetically active radiation 2pi (PAR) sensors. One upward looking (e.g., incoming PAR) and one downward looking (e.g., reflected PAR from the snow and ice surface). The sensors should be mounted on a horizontal pole so that the downward looking PAR sensor is a minimum of 1.5 m away from the main tripod to minimize self-shading and reflectance from other station components. |                         |
| 1.6  | Must include one (1) Licor underwater quantum 2pi (PAR) sensor and sensor wiper. A custom sensor suspension line must include a tripod, lowering frame, cable and ballast weight so that the sensor will be suspended 1 m below the sea ice with a maximum ice thickness of 4.5 m. The power and data cable should be water proof with a minimum length of 10 m.   |                         |
| 1.7  | The tripods must have large feet to distribute the load on the ice and reduce sinking through the ice.   |                         |
| 1.8  | Must have capability to acquire observations at a 5 minute interval and store data on the datalogger. For real time data transmission via satellite to the web host, the   |                         |

|       |  |  |
|-------|--|--|
|       | observations should be averaged over one hour intervals and include statistics, with standard deviation, minimum and maximum values.   |  |
| 1.9   | Must be able to transmit data in real time for at least a full year (12 months) in the typical environmental conditions to be encountered in the Lincoln Sea (e.g., below -40 °C and complete darkness for several months in winter);  |  |
| 1.10  | Must include datalogger system with 2-way iridium short burst data transceiver, external antenna with connection cable of a minimum length of 4 m cable, and mounting kit.   |  |
| 1.11  | Must include system integration and testing, including: telemetry configuration, datalogger configuration, web hosting configuration, sensor wire preparation, document package preparation, system start-up support.  |  |
| 1.12. | Must include all necessary mounting equipment and tools to deploy the sensors in optimal operational configurations on sea ice, including tripod, poles, brackets, nuts, bolts, ice anchors with guy wire adaptors for tripod, etc.  |  |
| 1.13  | Must include a web-based data hosting system where the data are transmitted to via satellite in real-time and provides secure real-time data access.   |  |
| 1.14  | Data transmittance via satellite should be done at least once per day.   |  |
| 1.15  | Data transmittance requirements and power consumption should be calculated by the contractor in order to meet the listed observation requirements for each sensor.   |  |
| 1.16  | Must include a solar panel system with a minimum of 3 30 Watt solar panels connected to rechargeable insulated battery pack. The battery pack includes a minimum of 4 12V 125Ahr batteries and is capable of supporting the calculated power consumption and data transmission requirements of the entire system at this high latitude between 82 and 85 °N. |  |

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File No. - N° du dossier  
WPG-7-40171

CCC No./N° CCC - FMS No./N° VME

**INSERT: ANNEX B**

**TABLE 1: BASIS OF PAYMENT – Firm Lot Price.**

| <b>Item</b> | <b>Description</b>   | <b>Qty<br/>(A)</b> | <b>Unit of<br/>Issue</b> | <b>Unit Price<br/>(CAD only)<br/>(B)</b> | <b>Lot Price<br/>(CAD only)<br/>(A x B)</b> |
|-------------|--|--------------------|--------------------------|--|---|
| <b>1</b>    | Autonomous long-term meteorological station<br>All-inclusive pricing to meet Annex A criteria.<br>Make: _____<br>Model # _____ | 1                  | <b>each</b>              | \$ _____                                 | \$ _____                                    |
| <b>2</b>    | <b>Delivery:</b> Shipping and handling charges, including off-loading charges, FOB<br>Destination                              |                    |                          |  | \$ _____                                    |
|             |  |                    |                          | <b>SUB-TOTAL:</b>                        | \$ _____                                    |
|             |  |                    |                          | <b>Taxes (as applicable):</b>            | \$ _____                                    |
|             |  |                    |                          | <b>TOTAL:</b>                            | \$ _____                                    |

**DELETE:**

## **ANNEX A**

### **STATEMENT OF REQUIREMENT**

#### **1. Objective**

Fisheries and Oceans Canada, Freshwater Institute (FWI) wish to acquire an **ice-tethered oceanographic vertical profiler** with iridium data telemetry for long-term observational time-series of ocean conditions. The ice-tethered oceanographic vertical profiler will be deployed in the high Arctic tethered to and directly under multi-year sea ice within the Lincoln Sea.

#### **2. Context**

Fisheries and Oceans Canada FWI is purchasing an ice-tethered oceanographic vertical profiler as part of an extensive research initiative to gain a better understanding of the under-ice vertical structure and oceanographic properties within the Last Ice Area. Time series of vertical oceanographic profiles are crucial in understanding potential ecological responses to changes in the physical marine environment and thus are an essential component of our research program.

#### **3. Training**

The Contractor must provide a minimum of 1 day of hands on and theoretical training, in English, for 2 people to be conducted at the contractor's place of work. Training will ideally be conducted on the exact same ice-tethered bio-oceanographic mooring equipment that Fisheries and Oceans will acquire. The training should be conducted before the mooring is shipped to Fisheries and Oceans, Freshwater Institute. The training should cover the entire mechanical setup, configuration, testing, and deployment protocol for the mooring, as well as near real-time data access and initial processing.

#### **4. Mandatory Technical Specifications and Components**

The mandatory technical specifications and components listed in the tables below are, first and foremost, the minimum requirements and do not constitute an exhaustive list. Any technical specifications and components required for operation of the equipment and not described in the table below are an integral part of this annex and their cost is included in the firm lot price for the autonomous long-term ice-tethered bio-oceanographic mooring.

The ice-tethered oceanographic vertical profiler will consist of two integrated units:

1. The Surface unit to be deployed on the sea ice surface: will acquire observations of meteorological parameters; acquire GPS coordinates; communicate, schedule and acquire profile data from profiler; format all acquired data and transmit over iridium data telemetry; receive remote commands through iridium telemetry and implement those commands; and log acquired data onto a data logger.
2. The Profiler and profiling line: the profiler will be mounted on an oceanographic cable, which is interfaced into the surface unit. The profiler will measure conductivity (salinity), temperature and depth (CTD) down to a depth of 250 m. The cable will have a heavy terminal weight to keep the cable in near-vertical alignment.

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## **5. Mandatory Technical Criteria and Operational Requirements:**

**5.1** Completion of this Compliance Matrix is mandatory to be considered responsive.

- a) Bidders must record whether they meet (YES) or not meet (NO) each of the specifications.
- b) Bidders must provide documentation to demonstrate compliance to each mandatory criterion as identified.
- c) Bidders must cross reference where in their technical bid, the technical specification is located.
- d) Where you have indicated compliant, provide the specification being offered which meets or exceeds and cross-reference as to where the supporting documentation is found within your proposal. If there is insufficient space in the table, assign SIR # (Supplementary Information Reference) and provide the appropriate details on a separate page in your proposal. Where published supporting documentation is not available in the form of brochures, technical data sheets etc., mark in the table "certification by signature"

**5.2** Mandatory Specifications: Failure to meet any of the mandatory requirements addressed below will result in your proposal being deemed non-responsive and it will be given no further consideration in the evaluation process.

**DELETE:**

| <b>Mandatory Technical Compliance Matrix</b> |  |                         |
|--|--|-------------------------|
| <b>Item</b>                                  | <b>TECHNICAL SPECIFICATION DESCRIPTION</b>   | <b>COMPLIANT YES/NO</b> |
| 1.1  | The surface unit must acquire measurements of GPS coordinates (with coverage everywhere on Earth), barometric pressure, sea surface temperature and air temperature.   |                         |
| 1.2  | The barometric pressure sensor must work in a temperature range of at least -40°C to +60°C; must have an accuracy better than or equal to +/- 0.35 mbar at 20°C; must have a measurement reporting resolution of less than or equal to 0.15 mbar.  |                         |
| 1.3  | The air temperature and sea surface or ice temperature sensors must operate in a temperature range of at least -50°C to +60°C; must have an accuracy better than or equal to +/- 0.15°C; and must have a measurement reporting resolution of less than or equal to 0.1°C.  |                         |
| 1.4  | The oceanographic profiler must acquire vertical profiles of ocean conductivity (salinity), temperature and depth over a vertical profile depth range of 0 to 500 m.   |                         |
| 1.5  | The oceanographic profiler must be SeaBird Technology, compatible with the profiling floats of the Argo ocean observing system, with observations of:<br>a) Ocean water salinity with a minimum range of 0 to 40 PSU, with an initial accuracy better than or equal to +/- 0.004 PSU, and an observed sensor drift of less than or equal to 0.02 PSU per five years.<br>b) Ocean water temperature with a minimum range of -5°C to +35°C, with an initial accuracy better than or equal to +/- 0.003 °C, and an observed sensor drift of less than or equal to 0.003 °C per five years.<br>c) Ocean water pressure with a minimum range of 0 dbar to 2100 dbar, with an initial accuracy better than or equal to +/- 2.5 dbar, and an observed sensor drift of less than or equal to 5 dbar per five years.<br>d) Sampling interval of 1Hz and measurement spacing interval of 50 cm or less over the entire vertical profile. |                         |
| 1.6  | Observations from the surface unit must be acquired at a minimum of 3-hour intervals.  |                         |
| 1.7  | The profiler must be capable of ascending and descending in the water column in order to accomplish vertical profile missions acquiring measurements of conductivity, temperature and depth along the profile (0 to 250 m).  |                         |
| 1.8  | The profiler must be capable of acquiring one full vertical profile mission per day.   |                         |
| 1.9  | Communication between the surface unit and profiler must be accomplished through inductive modem technology.   |                         |
| 1.10   | Transmitted profile data must include diagnostic and profile mission information.  |                         |
| 1.11   | All data must be transmitted at least once per day.  |                         |
| 1.12.  | The system must be able to acquire all measurements and transmit all data for at least a full year (12 months) in the typical environmental conditions to be encountered in the Lincoln Sea: the surface unit will be exposed to below -40°C and complete darkness for several months in winter; and the under ice vertical profiler will be exposed to near freezing water temperatures of -1.8°C during most of the deployment period.   |                         |
| 1.13   | Must come with a heavy (minimum 40 kg) terminal weight to be mounted at the bottom of the profile cable to maintain a near-vertical position in the water column.  |                         |

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|------|---|--|
| 1.14 | Must include a data logger and bi-directional iridium data communication. Bi-directional iridium data communication must include the capability to receive remote commands to change sampling intervals for both the profiler and the surface unit. |  |
| 1.15 | Must include system integration and testing, including: telemetry configuration, data logger configuration, web hosting (cloud) configuration, document package preparation, system start-up support.   |  |
| 1.16 | Must include all necessary mounting equipment to deploy the surface unit and profiler in optimal operational configurations, including brackets, nuts, bolts, shackles, cables, wires, etc.   |  |
| 1.17 | Must include a web-based data hosting system where the data are transmitted to via iridium communication and provide secure near real-time data access.   |  |
| 1.18 | The battery pack must be capable of supporting the calculated power consumption and data transmission requirements of the entire system as described above at a high latitude of 82 °N  |  |
| 1.19 | Delivery must be received on or before <b>March 31, 2018</b>  |  |

**DELETE: ANNEX B**

**TABLE 1: BASIS OF PAYMENT – Firm Lot Price.**

| Item                          | Description   | Qty<br>(A) | Unit of<br>Issue | Unit Price<br>(CAD only)<br>(B) | Lot Price<br>(CAD only)<br>(A x B) |
|-------------------------------|---|------------|------------------|---------------------------------|------------------------------------|
| 1                             | Ice-tethered bio-oceanographic mooring with integrated near real-time data transmission and power system<br><br>All-inclusive pricing to meet Annex A criteria.<br><br>Make: _____<br><br>Model # _____ | 1          | each             | \$ _____                        | \$ _____                           |
| 2                             | <b>Training:</b> minimum of 1 day of hands on and theoretical training  |            |                  |                                 | \$                                 |
| 3                             | <b>Delivery:</b> Shipping and handling charges, including off-loading charges, FOB Destination  |            |                  |                                 | \$                                 |
| <b>SUB-TOTAL:</b>             |   |            |                  |                                 | \$                                 |
| <b>Taxes (as applicable):</b> |   |            |                  |                                 | \$                                 |
| <b>TOTAL:</b>                 |   |            |                  |                                 | \$                                 |

**ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED**