1. **Definition of the requirement**

The purpose of this contract is to develop a prototype algorithm that estimates profiles of active sensor cloud-profiling measurements using conventional passive satellite imagery and model-based estimates of atmosphere-surface conditions; the latter two products being guaranteed owing to their current and essential roles in operational activities. Thus, the basic deliverables are:

   i) a rapid and accurate algorithm that establishes *meteorological proximity* of two profiles of standard meteorological variables. The algorithm needs to be robust and agile enough to be used in the operational context;

   ii) an algorithm that produces quality controlled profiles of active-sensor data for sections of atmosphere that lack active-sensor measurements yet have conventional passive-sensor data. The algorithm needs to be robust and agile enough to be used in the operational context;

   iii) a report on the assessment of these algorithms using at the very least A-Train satellite data.

2. **Criteria for assessment of the Statement of Capabilities (Minimum Essential Requirements)**

Any interested supplier must demonstrate by a written statement of capabilities that it can provide the required scientific methodology, including the algorithm coded into a computer program and the results of test analysis and quality control of the product generated, which meet the following requirements:

   1. Because of the scientific complexity of the methodology to be developed and because of the short timeframe on which the product is required to be produced, the vendor shall demonstrate experience (demonstrated by working level activities performed over at least 5 years in the last 10 years) on:

   2. Atmospheric physics: In order to begin conceptual development of the required algorithms it is essential that one have a solid grounding in atmospheric physics in general and atmospheric radiative transfer theory in particular. The contractor shall have experience working with active sensors retrieval of cloud properties.

3. Mathematics: Establishing phase 1 of this contract (meteorological proximity) will require intimate understand of the mathematics needed for singular-value decomposition, neural network methods, and information theory. The latter stages of the contract will require expert knowledge of radiative transfer theory and associated computational methods.

4. Computation: Once a mathematical "model" is established it has to be translated into a computer algorithm. For this project this requires knowledge of existing search algorithms and, possibly, development of new search-based algorithms. It also requires deep expertise in the area of computational radiative transfer. Moreover, adequate computational resources, provided by the contractor, are essential.

5. Algorithm development: This is a very innovative, and ambitious, project that will require sophisticated methodologies to be modified and merged with existing advanced scientific algorithms. It is essential that the contractor demonstrate experience with complex scientific computer model development and testing in the context of atmospheric science. Ultimately, the algorithms are expected to operate in near-real-time. Hence, they must be developed with this efficiency-condition in mind.

6. Experience shall be demonstrated by working in a science-based institution or environment. Evidence of productivity can be demonstrated by scientific publication or relevant scientific and technical reports.

7. Because the developed methodology shall be based on atmospheric parameters (cloud properties, brightness temperature at different wavelengths, etc) measured from space by active and passive remote sensing instruments on CloudSat, CALIPSO, AQUA, and GOES satellites, the vendor shall demonstrate strong expertise working with cloud parameters measured using at least one of the aforementioned satellites.

8. All of the computer programs developed for this project shall be written in FORTRAN and Matlab and shall be compatible with the Linux operating system. Therefore, the contractor shall demonstrate work experience (over 5 year of work on significant projects) with these computer languages and environment.

3. Applicability of the trade agreement(s) to the procurement

NAFTA and AIT apply to this procurement.

4. Justification for the Pre-Identified Supplier

We are active in the required areas of research and work nationally and internationally with numerous researchers. We have investigated potential collaborators and have identified Horizon Science and Technology as the only company who could develop the methodology we require within the time we required and within the budget we can allocate for this activity. Dr. Philip Gabriel is uniquely capable of satisfying all the requirements on Experience and Capability. While several vendors are capable of providing either the computational *or* the scientific expertise, Dr. Gabriel uniquely combines the scientific *and* computational expertise at advanced levels of maturity as required for this project given its timeframe of just one year and need for operational-level products. This is evidenced by his 25+ years as a Research Professor in Colorado State University's Atmospheric Science Department. He is an internationally recognized expert in atmospheric radiative transfer theory and modelling, and has additional expertise in hardware construction of cloud-profiling radars. He was also a key developer of algorithms used for the CloudSat satellite mission (whose data are central to the proposed study). Hence, given the complexity of the work needed for, and the time constraints on, this contract, there is, to the best of our understanding, no other potential candidate for this position residing within Canada. We are therefore requesting sole-source awarding of this contract.

5. Government Contracts Regulations Exception(s)

The following exception(s) to the *Government Contracts Regulations* is *(are)* invoked for this procurement under subsection 6(d) - "only one person is capable of performing the work".

6. Ownership of Intellectual Property

All IP generated from this contract will remain with the Crown.

7. Period of the proposed contract or delivery date

The proposed contract is for a period of contract award from date of signing to September 30, 2018. Either party will have the right to terminate the contract by giving at least 30 days notice in writing to the other party to expire at the end of the initial period or at any time after that.

8. Cost estimate of the proposed contract

The estimated value of the contract is up to $80,000.00 total and this is to be a firm price contract.

9. Name and address of the pre-identified supplier

Horizon Science and Technology
32 Bishop Avenue
Wolfville, NS
B4P 2L2
Attn: Phillip Gabriel (902-697-2032)

10. Suppliers' right to submit a statement of capabilities

Suppliers who consider themselves fully qualified and available to provide the goods, services or construction services described in the ACAN may submit a statement of capabilities in writing to the contact person identified in this notice on or before the closing date of this notice. The statement of capabilities must clearly demonstrate how the supplier meets the advertised requirements.

11. Closing date for a submission of a statement of capabilities

The closing date and time for accepting statements of capabilities is July 25, 2017 at 2:00pm EST.

12. Inquiries and submission of statements of capabilities

Inquiries and statements of capabilities are to be directed to:

Adam Cheung
Contracting Officer
NCR Materiel Management and Contracting
Corporate Services and Finance Branch
Environment Canada
200 Sacre-Coeur Blvd, Gatineau, QC K1A 0H3
Tel: 819.938.3840
Fax: 819.638.3843
E-Mail: adam.cheung@canada.ca