

Memorandum of Understanding (MoU)

Between

Ocean Networks Canada Society
University of Victoria
PO Box 1700 STN CSC
Victoria, British Columbia V8W 2Y2
Canada
("ONC")

And

Istituto Nazionale di Geofisica e Vulcanologia
(National Institute of Geophysics and Volcanology)
Via di Vigna Murata, 605
00143 Roma
Italia
("INGV")

and

Consiglio Nazionale delle Ricerche
(National Research Council)
Piazzale Aldo Moro,7
00185 Roma,
Italia
("CNR")

Concerning

A Collaboration Agreement

ONC and INGV and CNR are hereinafter individually referred to as a "Party" and together referred to as the "Parties".

BACKGROUND

The development of the ocean technologies industries is heating up globally, spurred by drivers such as the recent catastrophic tsunami in Japan, the Gulf of Mexico oil spill disaster, increased concerns with security, understanding climate change, concerns about food supply, need to better predict

tsunamis, more emphasis on monitoring and protecting fragile marine ecosystems, ongoing energy supply concerns that push deeper exploration for hydrocarbon resources and innovation in ocean renewable energy technologies, changing shipping routes due to changes in global trade patterns, opening of the Arctic - all of these factors are driving the need for more and better technology with which to understand and work in the changing marine environment. World-wide, the overall ocean economy is estimated to be worth more than 1.1 trillion EUROS with the ocean technology sector a significant component.

Canada and Italy, both leading maritime nations have strong complementary capabilities in many areas of ocean science and innovation. Their close ties in foreign policy, trade, culture and scientific research make them ideal natural partners in this important sector in which Italian and Canadian clusters, companies, universities and research labs stand to benefit greatly from closer exchanges and cooperation.

In 2007, the Canadian Embassy in Italy and the Italian Ministry of Foreign Affairs launched the *Tavolo Canada* initiative, a joint program to promote new Canada-Italy research and innovation partnerships in priority technology sectors such as Health and Life Sciences, New Materials, ICT and Nanotechnology, Green Technologies and AgriFood. The *Tavolo Canada* has been very successful over the past five years and has resulted in many new R&D linkages and joint projects between major Italian and Canadian research institutes and universities, innovating companies and public and private sector labs in these sectors.

In December 2010, the Embassy and the Italian Ministry of Foreign Affairs signed a Letter of Intent (LoI) formalizing the *Tavolo Canada* initiative and establishing it as a framework and unifying brand guiding future Italy-Canada innovation partnering efforts.

In April 2011, following a first successful Italian ocean technology mission to British Columbia hosted by ONC and led by INGV, Ocean Technologies was officially launched as a new priority partnering sector under *Tavolo Canada* at a ceremony at the Italian Ministry of Education, Universities and Research (MIUR) in Rome. The launch was followed by a second visit by Italian marine research organizations and companies to leading marine technology clusters in Atlantic Canada. In April 2012, a large Italian delegation participated in the International Polar Year (IPY 2012) Conference in Montreal.

WHEREAS

INGV, CNR and ONC wish to strengthen their relationship and explore the potential for closer collaboration so as to further increase cooperation between Italy and Canada in the field of Ocean research and technological innovation,

THEREFORE

INGV, CNR and ONC have agreed to establish this Memorandum of Understanding, hereinafter referred to as "MOU" or "Agreement", with the aim of strengthening joint research, technology development and interoperability collaboration opportunities in Ocean Technologies and Science.

Priority areas of joint collaboration include areas such as

- applications of ocean observing systems themes of plate tectonics
- marine geohazards (such as tsunami)
- gas hydrates, crustal fluids
- ocean observing technologies.

FRAMEWORK OF COOPERATION

WHEREAS ONC is a not-for-profit society owned by the University of Victoria (“UVic”) responsible for the management, development, promotion, and commercialization of UVic's research assets, the VENUS and NEPTUNE Canada Networks of the ONC Observatory (the “Observatory”) and whereas ONC also has embedded within it a Centre of Excellence in Commercialization and Research, the ONC Centre for Enterprise and Engagement (“ONCCEE”), Canada’s Centre of Excellence in Ocean Observing Systems, which has a national mandate to generate socio-economic benefits to Canada through a series of commercial and educational programs related to Ocean Observing Systems.

The ONC Observatory, consisting of the VENUS coastal and NEPTUNE Canada regional networks, supports a new generation of coastal and deep ocean research in the northeast Pacific off the west coast of Canada. ONC has recently achieved the status of a Major Science Initiative of the Canadian Foundation for Innovation, one of only five such large scale science programs in Canada. With a 25+ year operating design life, the ONC Observatory enables transformative ocean research and technology development through an innovative cabled infrastructure that supplies continuous power and Internet connectivity to a broad suite of subsea instruments in coastal and deep-ocean environments. Three cable arrays, together over 900 km in length, host several hundred sensors distributed within, on and above the seabed. They are strategically located to address key scientific and societal issues (e.g., subsea earthquakes and tsunamis, ocean acidification, marine biodiversity) within a wide range of environments (fiord, delta, and open coastal settings, continental slope, abyssal plain, and seafloor-spreading ridge).

The Observatory has over 60 scientific, technical and management staff supporting a national and international community of hundreds of researchers and end-users drawn from the academic, government and private sectors. Given the highly specialized nature of the subsea and communications infrastructure, the combined expertise of this group is unique in Canada.

After initial funding in 2003, NEPTUNE Canada developed requirements for deployments spanning diverse environments from exposed coast to hydrothermal vents. In 2005, Alcatel Submarine Networks (ASN; now Alcatel-Lucent Submarine Networks) began the design and build of the wet plant infrastructure, an 800 km backbone cable loop running westward from Vancouver Island across the continental shelf into the deep sea. Five observatory nodes were instrumented and are located at: inshore Folger Passage (20 and 100 m water depths), the continental slope sites of ODP (Ocean Drilling Program) 889 and Barkley Canyon, the mid-plate ODP 1027 site (2700 m deep), and the ocean ridge crest at the Endeavour Segment of the Juan de Fuca Ridge; a sixth site is cabled for future development. A shore station at Port Alberni sends data via fibre optic land cable to the University of Victoria connecting researchers to hundreds of sensors.

The VENUS network, operational since 2006, has focused more on coastal processes in the Salish Sea, which have global implications. These focus areas include hypoxia, sediment dynamics and mass slumping, event tracking, mammal communications, zooplankton and fish behaviour. The three primary nodes connected by an electro-optic cable, are located in Saanich Inlet and in the Strait of Georgia with a dedicated Delta Dynamics Laboratory to observe river delta dynamics at the mouth of the Fraser River. The nodes connect to shore stations in Patricia Bay and near Vancouver with dedicated fibre optic connections back to the University of Victoria.

The Observatory's Data Management and Archive System (DMAS) provides global users open access to real-time and archived data and an environment for users of all types to collaborate on projects and interact with instrumentation. Data from the ONC Observatory are available to researchers and the public free of charge.

AND WHEREAS INGV gathers all scientific and technical institutions operating in Geophysics and Volcanology to create a permanent scientific forum in the Earth Sciences. INGV cooperates with universities and other national public and private institutions, as well as with many research agencies worldwide. INGV is currently the largest European body dealing with research in Geophysics and Volcanology, has its headquarters in Rome and important facilities in Milano, Bologna, Pisa, Napoli, Catania and Palermo.

The main mission of INGV is the monitoring of geophysical phenomena in both the solid and fluid components of the Earth. INGV is devoted to 24-hour countrywide seismic surveillance, real-time volcanic monitoring, early warning and forecast activities. State-of-the-art networks of geophysical sensors deliver a continuous flow of observations to the acquisition centers of Rome, Naples and Catania, where the data are analyzed around the clock by specialized personnel. In addition to being analysed for research and civil defence purposes, the data supplied by numerous monitoring networks are regularly distributed to the public institutions concerned, to the scientific community and to the public.

INGV operates in close coordination with the Ministry of Education, University and Research (MIUR) and with Civil Protection authorities, both at national and local levels. INGV also cooperates with the Ministry of Environment, the Ministry of Education, the Ministry of Defense and the Ministry of Foreign Affairs in the framework of large research programs of national and international relevance.

INGV also has the role of coordinator for the European Multidisciplinary Seafloor and water column Observatory Preparatory Phase (EMSO-PP). EMSO is the European large-scale infrastructure composed of seafloor observatories for long-term monitoring of environmental processes related to ecosystems, climate change, and geohazards. This infrastructure is included in the European Strategy Forum on Research Infrastructures (ESFRI) Roadmap. EMSO nodes are placed in specific marine sites on the European Continental Margin from the Arctic to the Black Sea through the Mediterranean Basin. These sites were selected within European Community projects in 2002-2004 during the EC project European Seafloor Observatory NETWORK Concerted Action (ESONET-CA) and confirmed in 2007-2011 during the EC project European Seas Observatory Network of Excellence (ESONET-NoE). EMSO partnership signed a MoU and is going to start the procedure for the EMSO-ERIC (European Research Infrastructure Consortium) submission to the European Commission (EC). The ERIC is the legal entity coordinating all the efforts for the fixed point observations at the European level and coordinating the management of the scientific, technical, logistic and administrative components of

the infrastructure. In the meantime, MIUR declared to the other Countries its support to EMSO and its willingness to host the Secretariat, EMSO being a distributed infrastructure. In this process INGV is driving the Italian participation to EMSO.

The design and development of the nodes depend upon: geographical location, scientific requirements, operational requirements, and available resources. Two basic models can be envisaged for the nodes: 1) stand-alone acoustically-linked observatories, and 2) cabled observatories. However, hybrid configurations could be adopted for site specific characteristics. The nodes will be equipped with a common set of sensors for basic measurements and additional sensors for specific purposes.

AND WHEREAS the Italian National Research Council (CNR), Italy's premier public research organization, has a mandate to carry out, promote, spread, transfer and improve research activities and their application in those areas of knowledge of benefit to the scientific, technological, economic and social development of the Country. To this end, CNR's activities are organized into macro areas of interdisciplinary scientific and technological research addressing a number of priority sectors: biotechnology, medicine, materials, environment and land, information and communications, advanced systems of production, judicial and socio-economic sciences, classical studies and arts. CNR has more than 8000 employees, over half of whom researchers, active in almost 100 Institutes spread throughout Italy.

CNR's Institute of Marine Sciences (ISMAR) is the largest public research organization in Italy devoted specifically to Ocean Science. ISMAR's permanent staff is comprised of 150 people (twice as many if one includes soft-money personnel and PhD-students) distributed in 7 geographic locations: Venice (where ISMAR has its headquarters), Trieste, Genoa, La Spezia, Bologna, Ancona and Lesina. ISMAR conducts multidisciplinary studies in all fields of marine sciences encompassing geological, biological and oceanographic research in the Mediterranean and in world oceans (Antarctica, Central Atlantic, Red Sea and the Indian Ocean). ISMAR acts as national lead in marine geological mapping, geologic and environmental risk assessment, collection of long-term oceanographic time series, oceanographic modeling and sustainable exploitation of marine resources.

The geology and geophysics research group of ISMAR investigates the dynamics of active plate boundaries, the accretion of oceanic crust and the evolution of the Mediterranean region. Particular attention is devoted to the study of mid-ocean ridges, transform faults, active tectonic structures and related geo-hazards within the Mediterranean region.

Over the last decade, ISMAR has coordinated numerous EU-funded international marine research projects, such as EURODELTA, EMMA, SARDONE and NEAREST. It has developed strong expertise on the subject of geo-hazards, particularly concerning tsunami hazards related to near-shore tsunamigenic sources and near field tsunami generation. Recently, ISMAR led the mapping of the tsunamigenic structure in the Gulf of Cadiz as part of the European Science Foundation (ESF) project SWIM. It also coordinated the implementation of the first European Tsunami Early Warning System prototype within the EU project NEAREST and developed advanced tsunami real time detection algorithms, a new tsunami generation model and a tsunami detector prototype.

THEREFORE the Parties agree as follows:

THE AGREEMENT

1. INTENT OF THE PARTIES.

- 1.1 The Parties will seek to engage each other in collaborative projects for mutual benefit linking European and Canadian initiatives. This would include research projects to which the parties agree to collaborate and notifications of meetings and workshops to which the other Parties would be invited.
- 1.2 This Agreement will seek to promote exchanges between scientists as well as stimulate new joint projects involving partners in private industry and technology clusters, and universities.
- 1.3 The parties will establish a Joint Monitoring Committee (JMC) within 3 (three) months following the signature of this MoU, for the implementation, control, monitoring, evaluation and communication of the envisaged actions of this MoU and other actions resulting from it.

Specifically, the JMC is responsible for the following tasks:

- Develop an action plan and identify specific research or technology development areas for collaboration.
- Propose and execute opportunities for collaboration through specific separate agreements.
- Monitoring all activities and resolving any query that may arise from the interpretation and execution of this MOU.

The JMC shall consist of 6 (six) members, 2 (two) from each Party, who will be selected by the respective entity, one representing science and one representing technology/business development. One member of the Committee will be selected as the Chair and the position will alternate between the Parties annually after the signing of the Agreement.

The members of the JMC will be designated within the first month following the signing of this MoU. The JMC will hold an ordinary meeting once a year and an extraordinary meeting as many times as it is deemed appropriate, at the request of any of the parties, either in person or via teleconference.

2. **INTELLECTUAL PROPERTY (IP) OWNERSHIP.** The Parties acknowledge and agree that IP developed by one or more of the Parties or arising from projects undertaken by one or more of the Parties may be subject to terms and conditions of funding terms or contracts applicable to such research or projects. The Parties, therefore, agree that the following provisions shall be subject to the terms and conditions of applicable agreements or funding terms.

- 2.1. The Parties acknowledge and agree that IP owned by a Party will remain sole property of the Party.

2.2. The Parties agree that they are responsible for maintaining confidentiality of any information provided by another Party that is designated in writing as confidential or is given orally or by inspection of products or samples, or otherwise, shall be identified as confidential at the time of disclosure and confirmed in writing as confidential within 15 days after such disclosure, provided that this obligation will not apply to (a) information that is publicly available (through no act of the Party receiving such information) at the time of disclosure; (b) information that is disclosed to a Party by a third party which did not disclose it in violation of a duty of confidentiality; (c) information that was known to the Party receiving such information before such information was provided to them or their representatives by or on behalf of the Party disclosing such information; (d) information that was developed by an employee, agent or contractor of a Party independent of (and without any knowledge of) any disclosure to such Party or any of or its representatives by or on behalf of the Party disclosing such information; or (e) disclosures that are required to be made by a Party under legal process by subpoena or other court order or pursuant to other applicable laws or regulations (provided that such Party makes reasonable efforts to provide copies of such information to or informs the other Party before or at the time of disclosure or as soon as possible thereafter).

3. COMMUNICATIONS.

3.1. No Party shall issue any press release or other public announcement related to this MoU, written or oral, without the prior written consent of the other parties whose consent shall not be unreasonably withheld, conditioned, or delayed.

4. AGREEMENT MANAGEMENT

4.1. Nothing in this MoU shall be construed as creating any legal relationship between the Parties and the Parties agree that this MoU is not enforceable in law or equity, except for the provisions of articles 2 and 3, which may be enforced in accordance with their terms.

4.2. No financial or resource obligations are implied by this MoU. Specific activities that may be mutually agreeable, that may require a proposal to a third party, or funds and/or resources from one of the Parties will be considered on its own merits. Each such activity would require a separate agreement.

4.3. Cooperation between the Parties under this MoU is subject to the availability of funds to each of the Parties, and is subject to the limitations of laws applicable to each of the Parties.

4.4. This MoU will be in effect for five years after the signing date. Any Party may withdraw from the agreement upon 90 days written notice to the other Parties. The term of the MoU may be extended upon mutual agreement by of the Parties.

4.5. This MOU is the entire agreement between the parties with respect to its subject matter.

This MoU may be amended with the written consent of the Parties.

4.6. Notifications and communications regarding this MoU shall be made with the designated contact persons indicated (or their successors):

For ONC:

Dr. Kate Moran
President and CEO
Ocean Networks Canada Society
University of Victoria
TE130 – 2300 McKenzie Ave., PO Box STN CSC, Victoria, BC V8W 2Y2, Canada
Phone: +1.250.472.5350 Email: kmoran@uvic.ca

For Istituto Nazionale di Geofisica e Vulcanologia:

Prof. Stefano Gresta
President
Istituto Nazionale di Geofisica e Vulcanologia (INGV)
Via di Vigna Murata, 605 - 00143 Roma, Italy
Phone: +39.06.51860.462 Email: presidente@ingv.it

For Consiglio Nazionale delle Ricerche

Prof. Luigi Nicolais
President
Consiglio Nazionale delle Ricerche
Piazzale Aldo Moro, 7 - 00185 Roma, Italy
Phone: +39.06.4993.3200,+39. 06.4993.3246 Email: presidenza@cnr.it

On behalf of:

Ocean Networks Canada Society

Signature:  _____

Name: Dr. Kate Moran

Title: ONC President and CEO

Date: 12 Feb 2013

On behalf of:

Istituto Nazionale di Geofisica e
Vulcanologia

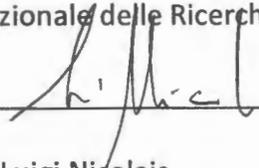
Signature:  _____

Name: Prof. Stefano Gresta

Title: INGV President

Date: 26 FEB 2013

On behalf of:
Consiglio Nazionale delle Ricerche

Signature:  _____

Name: Prof. Luigi Nicolais
Title: CNR President

Date: 23/03/2013 _____