

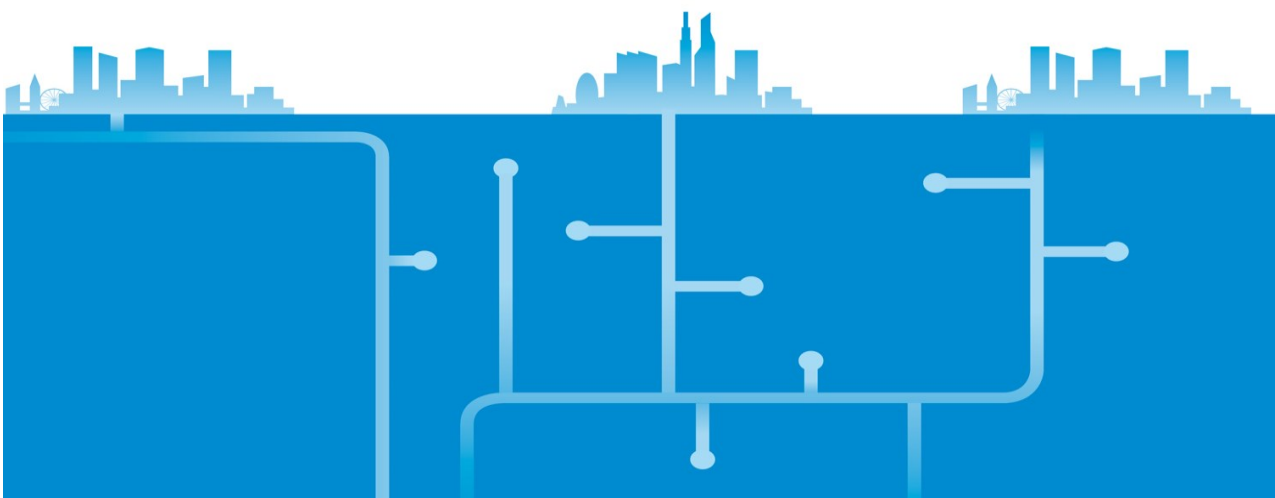


# ITU-WMO-UNESCO/IOC Joint Task Force

**2015 Annual Report**

Joint Task Force to investigate the potential of using SMART submarine telecommunication cables for ocean and climate monitoring and disaster warning (SMART = Science Monitoring And Resilient Telecommunications)

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## ACKNOWLEDGEMENT

This report was prepared on behalf of the ITU-WMO-UNESCO/IOC Joint Task Force (JTF) by Christopher R. Barnes (JTF Chair), with contributions from the JTF Executive Committee members and Hiroshi Ota (ITU).

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### 1. Introduction and background

The extent and impact of periodic destruction, loss of life and ecosystem and coastal modification by tsunamis and associated slope failures is a major mitigation issue. Ocean temperature and circulation are critical variables, particularly regarding climate change, sea level rise and ecosystem stress. These aspects of the health and status of marine environments could be monitored globally in real-time through a new generation of mini-observatories hosted on SMART submarine telecommunication cables (SMART = Science Monitoring And Resilient Telecommunications).

Three UN specialized agencies (**International Telecommunication Union (ITU)**, **World Meteorological Organization (WMO)** and **Intergovernmental Oceanographic Commission (IOC) of UNESCO**) jointly proposed the development of mini-observatories on trans-ocean submarine cables to measure key ocean seafloor observables, with the concept and applications being developed further through a **Joint Task Force (JTF)**. The latter was established in 2012 with a wide membership now including over 100 scientists, engineers, cable owners and operators, regulators and legal experts.

Initial exploratory discussions were held at workshops in Rome (2011) and Paris (2012). Through subsequent annual workshops (Madrid, 19-20 September 2013, Singapore, 16-17 October 2014, and one in Dubai, 17-18 April 2016), and with ITU secretariat support, the JTF is developing a **strategy, roadmap and demonstrator project** with the aim of supporting industry to deploy modified SMART (also referred to as dual-purpose or green) submarine cable systems equipped with environmental sensors (temperature, pressure and three-axis acceleration) for climate monitoring and disaster risk reduction (particularly tsunamis and slope failures). If successful in gaining sustained and tangible support from industry and regulatory bodies, a network of mini-observatories could be established progressively across the world's ocean floors and continental slopes, accurately measuring these important parameters over several decades.

Following the Rome (2011) workshop, **three key reports** were commissioned by the agencies to provide a baseline of information from which to develop future plans. These 30-page reports, published by ITU in 2012, are available on the JTF website<sup>1</sup>:

- Rhett Butler (University of Hawaii) “*Using submarine cables for climate monitoring and disaster warning: strategy and roadmap*”
- Kent Bressie (Wiltshire & Grannis LLP) “*Using submarine cables for climate monitoring and disaster warning: opportunities and legal challenges*”
- Stephen Lentz and Peter Phibbs (Mallin Consultants) “*Using submarine cables for climate monitoring and disaster warning: engineering feasibility study*”

A fourth major report was published in 2014: “*The scientific and societal case for the integration of environmental sensors into new submarine telecommunication cables*” by Butler et al., October 2014, ITU, 34p. (24 co-authors and 12 other contributors), which is also available on the JTF website. These four publications were further supplemented by other documents noted later in this Annual Report.

The JTF initiative addresses two main needs: **a) increased reliability and integrity of the global tsunami warning network, and b) sustained climate-quality data from the sparsely observed deep oceans**. There are several potential links to new cabled observatories (such as ONC/Canada, OOI/US, ALOHA/US, DONET/Japan, and EMSO/Europe): many telecommunication cables do and will cross bordering oceans, the scientific and technology issues and real-time databases are complementary, and there is a potential to test systems/demonstrations/sensors on cabled observatories or industry facilities. A Wet Demonstrator project is being planned with the active involvement of cable industry owners, suppliers and ocean observatory researchers: this has been progressively developed through the Madrid (2013) and Singapore (2014) workshops and will be further advanced at the Dubai (2016) workshop.

The activities and documents produced by the JTF, and other material referred to in this **JTF Annual Report for 2015**, are available on the **JTF website**<sup>1</sup>.

## 2. JTF Objectives

The JTF is tasked with developing a strategy and roadmap that could lead to enabling the availability of submarine repeaters equipped with scientific sensors for ocean and climate monitoring and disaster risk reduction (tsunamis and slope failures). It will also analyze the potential renovation and relocation of retired out-of-service cables in this realm. **With the installation of new trans-ocean and regional telecommunication cable systems equipped with sensors, a global network could be established providing decadal real-time data for ocean climate monitoring and disaster mitigation (particularly for tsunamis).**

The discussions at the Rome (2011) workshop resulted in the following **Call to Action** statement that frames the current objectives of the JTF:

We, the participants at the ITU, UNESCO/IOC, WMO workshop on “Submarine Cables for Ocean/Climate Monitoring and Disaster Warning: Science, Engineering, Business and Law” in Rome, Italy from 8 to 9 September 2011 call upon the International Telecommunication Union (ITU), the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC) and the World Meteorological

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<sup>1</sup> The JTF website can be found at: <http://www.itu.int/go/ITU-T/greencable>

Organization (WMO) to establish and coordinate a joint task force composed of world-renowned experts from science, engineering, business and law, which will:

- Study and evaluate scientific, engineering, business, and societal benefits, opportunities, challenges and risks associated to the use of submarine telecommunication cables for ocean and climate monitoring and disaster warning, as well as legal aspects of such use;
- Develop a strategy and roadmap that could lead to enabling the availability of submarine repeaters equipped with scientific sensors for climate monitoring and disaster risk reduction such as pressure, temperature, salinity/conductivity, seismic, hydroacoustic and cable voltage in the near future;
- Analyze the development of projects that could include renovation and relocation of retired out-of-service cables for disaster warning, ocean and climate monitoring;
- Cooperate closely with the International Cable Protection Committee (ICPC) to investigate and report on the technical feasibility of incorporating the required scientific sensors into the design, manufacture, installation and operation of submarine repeaters in a safe manner without affecting cable systems and telecommunication signals, and avoiding risks that could affect the normal operation of the cables;
- Consider a business model of how sensor data from submarine cables could be provided and could be made available for scientific purposes and societal benefit;
- Identify financing models and opportunities to promote the development of ocean climate monitoring and disaster warning systems by the use of submarine cables;
- Consider ways to further promote the implementation of the legal regime, as reflected in the United Nations Convention on the Law of the Sea (UNCLOS) and other instruments, for the protection of submarine cables, including awareness building and mobilization of support at the national and global levels;
- Organize similar workshops to report on the progress;
- Ensure that the outcomes of the above efforts/activities take into account and are consistent with international law, as reflected in UNCLOS;
- Invite ITU to consider providing secretariat support for the joint task force.

We encourage ITU, UNESCO/IOC and WMO to bring this Call to Action to the attention of the United Nations Framework Convention on Climate Change (UNFCCC), the States Parties to UNCLOS and the United Nations Secretariat.

### **3. Organizational structure and meetings held in 2015**

Membership in the JTF is open to persons, or persons representing companies/agencies/institutions, who are interested in the work and objectives of the JTF; there is no membership fee. Interested

persons may contact the ITU Secretariat ([greenstandard@itu.int](mailto:greenstandard@itu.int)), and after consideration the new members are reported internally and added to the list of members that currently stands at over 100<sup>2</sup>.

The JTF has a committee structure appropriate to address its objectives in an effective and timely manner. The JTF's **Executive Committee** includes the Chair, Vice Chair and Committee Chairs, as well as representatives from the three UN agencies and supported by the **ITU Secretariat** staff. For 2015, the Executive Committee and Secretariat support were composed of the following members:

**Executive Committee**

Chair of the JTF	BARNES	Christopher
Vice-Chair of the JTF	MELDRUM	David
Chair of Science and Society Committee	BUTLER	Rhett
Co-Chairs of Engineering Committee	HOWE	Bruce
	DOYLE	Laurie
Co-Chairs of Business Model Committee	COSTIN	Michael
	MARIANO	John
Chair of Legal Committee	BRESSIE	Kent
Co-Chairs of Publicity, Outreach and Marketing Committee	BAYLIFF	Nigel
	PHIBBS	Peter

**Secretariat**

OTA	Hiroshi	International Telecommunication Union (ITU)
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**Staff**

AARUP	Thorkild	Intergovernmental Oceanographic Commission of UNESCO
CABRERA	Edgar	World Meteorological Organization (WMO)
DELJU	Amir H.	World Meteorological Organization (WMO)
FISCHER	Albert	Intergovernmental Oceanographic Commission of UNESCO
GROSS	Tom	Intergovernmental Oceanographic Commission of UNESCO
SCHOLL	Reinhard	International Telecommunication Union (ITU)

The other JTF committees are: **Science and Society, Engineering, Publicity, Outreach and Marketing, Business Model, and Legal committees.**

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<sup>2</sup> The list of JTF members is available at: [http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF\\_Members.pdf](http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF_Members.pdf)

**Executive teleconferences** are held approximately bimonthly usually alternating with the **JTF Plenary teleconferences** that are open to all members. Documents for discussion or consideration at such meetings are made available by email attachments or on an internal SharePoint site. For 2015, the following Executive and Plenary **teleconferences** were arranged:

<b>Plenary meetings/calls</b>	<b>Executive Committee meetings/calls</b>
	20 January
24 February	14 April
19 May	30 June
25 August	15 September
13 October	1 December

**Presentations** are made at relevant industry and science conferences and are detailed further in this annual report; major workshops are organized annually.

#### **4. Committee reports**

##### **4.1 Science and Society Committee (Rhett Butler, Chair)**

In February of 2015, the Science and Society Committee held an international teleconference teleconference to bring members up to date on activities and to seek guidance for the coming year. Members were asked to utilize the growing numbers of reports and slides for presentations in their respective countries. The German Research Centre for Geosciences (GFZ-Potsdam) has proposed to IOC a SMART cable workshop focused on tsunamis, to be held in Europe in late 2016. Observing System Simulation Experiments (OSSE) were discussed in a EU proposal regarding Cables in the Arctic—INTARCTOS. Jérôme Aucan reported discussions with Office des Postes et Telecommunication de Nouvelle Calédonie regarding prospective plans for two new cables: Nouméa-Mare Island and Mare Island-Vanuatu (Port Vila), and potential collaboration on the JTF Wet Demonstrator initiative. An abstract was accepted for the 2016 AGU Ocean Science to be held in New Orleans, USA. Discussions were held with Fiber Sense Pty Ltd regarding direct sensing of acceleration in fibers. The EU Horizon 2020/Marine and Atlantic Action Plan requested the Science and Society Committee White Paper be distributed to the Canadian Embassy in Spain for participants in a working session held in Barcelona in November 2015. The Chair of Science and Society Committee reported on the activities of the JTF on the use of submarine cables for environmental monitoring and hazards warning to the UNESCO-IOC Intergovernmental Coordination Group of the Pacific Tsunami Warning and Mitigation System (ICG/PTWS) meeting in Hawaii in April. The Chair of the Science and Society Committee discussed and reviewed the JTF initiative with Dr. Joan Gomberg of USGS in the context of a proposed subduction zone monitoring system. The Committee apprised the new Director of the NOAA Pacific Marine Environmental Laboratory Center for Tsunami Research, Diego Arcas, regarding the JTF SMART cable initiative. The Science and Society Committee continued engagement with US Congressional staff regarding Tsunami Warning, Education, and Research Act Of 2015 (H.R.34), and the potential for using SMART cables.

The University of Hawaii installed a Paroscientific nano-resolution pressure sensor—proposed as a sensory component of SMART cables—at the ALOHA Cabled Observatory for testing. The University of Hawaii approached TE SubCom to consider more fully the possibility of a joint effort between University of Hawaii and TE SubCom, with the focus on the SMART cable system

demonstration project for the National Science Foundation Prediction of and Resilience against Extreme EVENTS (PREEVENTS) program to meet one of the PREEVENTS goals: ‘(3) enable development of new tools to enhance societal preparedness and resilience against such impacts.’

The Committee reviewed its chairmanship. Dr. Butler was requested by members to continue as Chair. New members were added to the Committee: Ikuko Wada (Tohoku University), Joan Gomberg (USGS), Frederik Tilmann and Maik Thomas (GFZ).

#### **4.2 Engineering Committee (Bruce Howe and Laurie Doyle, Co-Chairs)**

Two documents were developed in 2014 and were finally released from embargo in May, 2015 and published on the JTF website:

- Functional Requirements of “green” submarine cable systems
- Scope document and budgetary cost estimate for a wet test, described as a “Wet Demonstrator”.

The first is intended to facilitate the development of system architectures and physical, optical, and power systems design and allow trade studies to be conducted, the results of which can be fed back to the Science and Society Committee to iterate on the high-level sensing requirements as necessary.

The second provided high level requirements for a Wet Demonstrator and cost estimates for such a project, ranging from about \$US 4.5M (low estimate) to about \$US 13M (high estimate).

At the initiative of the Chair, an invitation for Expressions of Interest in supporting a Wet Demonstrator project has been widely distributed to industry CEOs and cabled ocean observatories by Dr. Chaesub Lee (Director, TSB) in early 2015. No firm commitment was received from industry CEOs but three observatories responded positively: EMSO (Europe), ALOHA Cabled Observatory (ACO) in Hawaii and Ocean Networks Canada.

The Engineering Committee has been requested by the Chair to assist with the development of requirements for a Wet Demonstrator project by preparing a white paper and to establish a subcommittee to review the Functional Requirements and Wet Demonstrator studies, combining these as necessary with information from the Expressions of Interest from industry and observatories into a final Wet Demonstrator Program, suitable to assist in securing funding and to issue an RFP for implementation.

These activities are ongoing and the recently released Green Cables Funding Study will feed into this activity.

To move ahead with a Wet Demonstrator project, more definitive commitments will be sought from each of the observatories in terms of in-kind support, funding and schedule.

Alternatives to working with an existing cabled observatory have also been considered. These include:

- A development in partnership with a new localized commercial cable between 2 island states (e.g. in Western Pacific) or in North Alaska;
- A development by one or more commercial companies as a commercial enterprise;
- An intermediate phase of simulation and modelling.

These have yet to produce positive results.

Some highlights of interactions with relevant agencies in 2015:



- Bruce Howe attended and presented the JTF program to a meeting involving all/most of an Interagency Working Group (IWG/OP), NSF, BOEM, NASA, USGS, ONR, NOAA, USGS, FWS, US Coast Guard and others in Washington DC on 14 July, 2015. At a follow-up meeting in August, BOEM (Bureau of Ocean Energy Management) showed particular interest in the SMART cable concept and agreed to put on their internal agenda for discussion a “potential program – defining a demonstration project with industry/agency partnership.”
- Bruce Howe led the 2nd NASA Workshop at University of Hawaii held on 26-28 May 2015 (From space to the deep seafloor: Using “SMART” submarine cable systems in the ocean observing system). This workshop was a follow-up to the one at the California Institute of Technology held in October 2014. The report, summary presentation, and subsequent posters are available at [www.soest.hawaii.edu/NASA\\_SMART\\_Cables](http://www.soest.hawaii.edu/NASA_SMART_Cables). These workshops emphasized the climate and ocean observing aspects. SMART cables will be a first order addition to the ocean observing system, with unique contributions, strengthening and complementing satellite and other in situ systems. This report provides more context and guidance for refining engineering requirements. This effort has catalysed a proposal to NASA for initial ocean model simulation work. In addition, a subsequent workshop emphasizing the tsunami and earthquake aspects will be organized by the GFZ, as mentioned above.
- A new member was added to the Engineering Committee, Katsuyoshi Kawaguchi representing JAMSTEC and the DONET project (Dense Oceanfloor Network System for Earthquakes and Tsunamis).

#### **4.3 Publicity, Outreach and Marketing Committee (Nigel Bayliff and Peter Phibbs, Co-chairs)**

The POM committee continues to seek new members to add to their ranks, which would assist in enabling further outreach and coordination of the messages across all aspects of the JTF programme.

Additional content continues to be added to the website, including the papers which have served their embargo time and also presentations given by key members at related events.

A LinkedIn group has been established and opened, following authorisation from the three sponsoring agencies: this is expected to help increase engagement and discussion with a wide group of industry contacts.

The POM committee facilitated the production of a document intended to form the outline structure of a recommendation under the ITU-T G.series, covering submarine cable infrastructure. This was submitted as a liaison statement to Study Group 15 of the Telecommunication Standardization Bureau and the POM committee prepared presentation material to be used in educating and advising the Study Group on the work of the JTF.

The POM committee also opened an avenue of cooperation with the UN Global Compact, briefing senior delegates of the JTF work and synergy with other UN efforts on Corporate Social Responsibility, particularly in the fields of Climate and Environmental awareness and protection.

#### **4.4 Business Model Committee (Michael Costin and John Mariano, Co-Chairs)**

In late 2014, a report entitled ITU Joint Task Force on Green Cables Funding Study was completed. After review and the embargo period, this report was released for publication in January 2016. This report examined the potential to get required development effort and a field trial of a green cable funded by several different classes of funding sources including: International Development Agencies (e.g. The World Bank), Foundations (e.g. The Bill and Melinda Gates Foundation),

Governmental Agencies (e.g. U.S. NOAA), and private companies (e.g. Google). The most promising potential funding sources were identified and recommendations were made as to how to pursue this effort going forward. Suffice it to say that given the amount of funds needed and because the request is somewhat atypical, it will not be easy to get funded and may require multiple sources.

What has become clear is the need for the Wet Demonstrator, a proposed industry demonstration of the capabilities and product suite that can be reliability applied to a commercial system. Without this Wet Demonstrator, or a supplier performing its own qualification of SMART application, the acceptance of this new technology on any new commercial system will not be likely.

Regarding the Business Model that would be implemented by a system owner, system owners that would implement SMART into their commercial systems would first need to seek a source of funding to offset the original CAPEX but also to identify a recipient of the data willing to support the operating costs for data reduction and repackaging. The efforts this year have not identified new system developers willing to introduce SMART without having a clear understanding of costs, impact on their business case, and understanding of the ultimate return on such an investment.

Previously identified potential commercial SMART projects in the South Pacific appear to remain in a developmental phase, noting however that there are now other new project proponents vying for funding that may be open to the SMART concept because of their planned connectivity with South Pacific island communities.

#### **4.5 Legal Committee (Kent Bressie, Chair)**

In 2015, the Legal Committee continued to focus principally on supporting the tasks of the JTF's other committees. Given the unsettled nature of the law regarding hybrid telecom-marine data cables, the JTF continues to believe that the Legal Committee best serves the JTF by addressing particular legal questions or issues arising from the work of those other committees. The Committee's chair also continues to engage in various public fora, such as the Submarine Networks World conference, with interested parties expressing views and concerns about legal and regulatory issues with the JTF's work and green cables generally.

### **5. External communications, presentations, publications and activities held in 2015**

The JTF is preparing new or updated publications (or White Papers), building on the three earlier publications (2012) referred to in Section 1 of this Annual Report and the one completed (2014) from the Science and Society Committee, with leadership from the Chair, Rhett Butler: **“The scientific and societal case for the integration of environmental sensors into new submarine telecommunication cables”**, available on the website<sup>3</sup>.

The successful 4<sup>th</sup> JTF Workshop (16-17 October 2014) was strategically arranged to immediately follow the Submarine Networks World conference in Singapore. The theme was **“Green Cable Systems: new developments and demonstrator project”**. Details of the programme's summary and eight sessions, brief biographies of the speakers, and many of the PowerPoint presentations are provided on the JTF website<sup>4</sup>. Given that this 4<sup>th</sup> JTF Workshop was held late in 2014 and the desire to hold the next one early in 2016 immediately before the SubOptic2016 conference in Dubai, UAE, it was agreed not to hold a JTF workshop during 2015. Thus, the 5<sup>th</sup> Workshop titled

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<sup>3</sup> Please visit: [http://www.itu.int/dms\\_pub/itu-t/opb/tut/T-TUT-ICT-2014-03-PDF-E.pdf](http://www.itu.int/dms_pub/itu-t/opb/tut/T-TUT-ICT-2014-03-PDF-E.pdf)

<sup>4</sup> Please visit: <http://www.itu.int/en/ITU-T/Workshops-and-Seminars/jtf-itu-wmo-unesco-ioc/Pages/default.aspx>

<sup>5</sup> Please visit: [http://www.soest.hawaii.edu/NASA\\_SMART\\_Cables/](http://www.soest.hawaii.edu/NASA_SMART_Cables/)

“SMART Cable Systems: latest developments and designing the Wet Demonstrator project” will be held on 17-18 April 2016 in Dubai.

The JTF collaborated with NASA in convening two successful workshops in 2014 and 2015, which resulted in a comprehensive Final Report<sup>4</sup> available on the JTF website: Howe, B. M., and Workshop Participants (2015), **From space to the deep seafloor: Using SMART submarine cable systems in the ocean observing system**, Report of NASA Workshops, 9–10 October 2014, Caltech, Pasadena, CA, and 26–28 May 2015, Honolulu, Hawaii (SOEST Contribution 9549).

The following relevant **conference or workshop presentations** were given as either oral or poster contributions in 2015 (listed in date sequence):

- Butler, R. 2015. Scientific Monitoring And Reliable Telecommunication (SMART) SubSea Cable Systems. Twenty-sixth Session of the Intergovernmental Coordination Group for the Pacific Ocean Tsunami Warning and Mitigation System (ICG/PTWS-XXVI), preceded by PTWS International Tsunami Symposium. 20-23 April 2015, Honolulu, Hawaii.
- Barnes, C.R. 2015. Towards a new technical and business model for Green (dual-use) Submarine Telecommunication Cable Systems. International Cable Protection Committee (ICPC) Plenary Conference, 28-30 April 2015, Hong Kong. Program with Abstracts. PPT posted on JTF website<sup>1</sup>.
- Aucan, J. 2015. New Caledonia’s Ocean Observing System and ITU/WMO/IOC Green Cables Initiative. First DBCP's First Pacific Islands Training Workshop on Ocean Observations and Data Applications. 4-7 May 2015, Palau.
- Barnes, C.R., Meldrum, D.T., and Campilongo, E. 2015. Ocean Climate Change, Sea Level Increase and Tsunami Hazard Monitored in Real Time over Decades by Sensors on Submarine Telecommunication Cables. AGU-GAC-MAC-CGU Joint Assembly, Montreal, 5-7 May 2015. Program with Abstracts.
- Howe, B.M. 2015. Review of the Green cable system concept. NASA Workshop: From space to the deep seafloor: Using “Green” submarine cable systems in the ocean observing system. 26 – 28 May 2015, University of Hawai‘i at Mānoa, Honolulu, Hawaii.
- Howe, B.M. 2015. ‘Green’ submarine telecommunication cables to monitor global change and tsunamis in the deep ocean: acoustical oceanography possibilities. 3rd International Conference and Exhibition on Underwater Acoustics, 21-26 June 2015, Crete. Program with Abstracts, p. 92
- Howe, B.M. 2015. SMART subsea cables in the ocean observing system. Interagency Working Group on Ocean Partnerships (IWG-OP), National Ocean Partnership Program (NOPP). 14 July 2015, Washington DC.
- Meldrum, D.T., Barnes, C.R., Bayliff, N., and Ota, H. 2015. Submarine Communications Cables: a new tool for disaster warning and climate change monitoring. Marine Alliance for Science and Technology (Scotland), Plenary Meeting, Glasgow, September 2015.
- Barnes, C.R. 2015. Two short presentations on JTF at Workshop (Horizon 2020/Marine and Atlantic Action Plan: ocean cooperation with Canada related to ocean observatory science and technologies and funding opportunities), 4-6 November 2015, Barcelona.
- Rolin, J-F., Crawford, W., and Beranzolli, L. 2015. Science Monitoring And Reliable Telecommunication (SMART) Subsea Cable Systems for Ocean/Climate Monitoring and Disaster Warning. Poster presented at H2020 ENVRIplus Workshop, 16-20 November, Prague.
- Rolin, J-F., Crawford, W., and Beranzolli, L. 2015. Science Monitoring And Reliable Telecommunication (SMART) Subsea Cable Systems for Ocean/Climate Monitoring and Disaster Warning. Poster presented at UN Climate Summit (UNFCCC COP21), 30 November-11 December 2015, Paris.

- Howe, B. M., and Workshop Participants. 2015. From space to the deep seafloor: Using SMART submarine cable systems in the ocean observing system. Report of NASA Workshops, 9–10 October 2014, CalTech, Pasadena, CA, and 26–28 May 2015, University of Hawai‘i at Mānoa, Honolulu, Hawaii (SOEST Contribution 9549), 62p.
- Howe, B.M. 2015. From space to the deep seafloor: Using SMART submarine cable systems in the ocean observing system. Poster at American Geophysical Union, 14-18 December 2015, San Francisco. Program with Abstracts.

Formal links continued with **three other ITU groups**:

- On behalf of the JTF Executive Committee in December 2015, Nigel Bayliff and Stephen Lentz submitted a Liaison Statement (17p.) on general requirements of sensor-enabled submarine cable systems, which could be used as a basis for a Recommendation (G.97x series) the ITU-T SG15: Networks, Technologies and Infrastructures for Transport, Access and Home. These requirements identify the minimum performance capabilities of fibre optic submarine cable systems equipped to measure temperature, absolute pressure, and three axis acceleration at regular intervals along the cable. Bayliff will present this Liaison Statement to Study Group 15 in Geneva, 23 February 2016 (within ITU’s Telecommunication Standardization Sector).
- David Faulkner is the Liaison Rapporteur from ITU-T Study Group 5 to JTF (ITU-T SG5 is responsible for studying ICT environmental aspects of electromagnetic phenomena and climate change.).
- Sang Ziqin is the Liaison Rapporteur for the JTF and the ITU Focus Group on Smart Sustainable Cities (FG-SSC) to share information on disaster warning activities.

Several of the JTF initiatives were promoted through various external communications, including the **pull-up display unit**, **fold-out JTF flyer**<sup>6</sup>, **JTF Blog**<sup>7</sup>, **FAQs**<sup>8</sup>, and particularly the **JTF website**<sup>9</sup>, which is available in all ITU official languages.

## 6. Funding support and initiatives

The UN agencies (ITU-WMO-UNESCO/IOC) supporting JTF provide some financial and in-kind support for operational activities, although their own budgets have little flexibility to support such new initiatives.

In 2014, ITU made a solicitation to six companies to support the cost of conducting three studies by consultants (**Functional Requirements for the green cable sensors**<sup>10</sup>; **Technical Specifications for the Wet Demonstrator**<sup>11</sup>; **Marketing and Business Plan for the Wet Demonstrator Project**<sup>12</sup>). Three companies kindly provided the support requested and JTF gratefully

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<sup>6</sup>Please visit: <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF-flyer.pdf>

<sup>7</sup>Please visit: <https://itu4u.wordpress.com/2014/07/01/green-cables-for-climate-monitoring-and-disaster-warning/>

<sup>8</sup>Please visit: [http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF\\_FAQs.pdf](http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF_FAQs.pdf)

<sup>9</sup>Please visit: <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Pages/default.aspx>

<sup>10</sup>Please visit: <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/Functional-requirements-2015-05.pdf>

<sup>11</sup>Please visit: <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/Wet-demonstrator-requirements-2015-05.pdf>

<sup>12</sup>Please visit: <http://www.itu.int/en/ITU-T/climatechange/task-force-sc/Documents/JTF%20Report%20Green%20Cable%20Funding%20Study.pdf>

acknowledges the financial support provided by Huawei Marine Networks, Nexus, and Xtera. UNESCO's Intergovernmental Oceanographic Commission (IOC) also contributed some funding. The three studies were contracted by ITU to consultants: the first two studies to Mallin Consultants (undertaken by Stephen Lentz and Peter Phibbs) and the third to the David Ross Group (undertaken by John Mariano and Jerry Tourgee). All three studies were received and then sent out to groups of specialists for external review, followed by some revisions to produce the final documents. The latter, by contractual agreement with the three supporting companies, underwent a six-month embargo before being made publically available on the website in mid-2015. The study on the Marketing and Business Plan for the Wet Demonstrator Project was completed in mid 2015 and released after the embargo on 15 January 2016.

JTF plans to use the publications, White Papers, the four study documents, and workshop discussions to move forward with the Wet Demonstrator Project in 2016 and beyond and through developing industry-academia-JTF/agencies partnerships for the project.

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