



## Union Radio-Scientifique Internationale (URSI)

### Activity Report - Year 2019

**Prof. Carlo Carobbi**

#### 1. Introduction

The URSI ([www.ursi.org](http://www.ursi.org)) mission statement is as follows: “Radio science encompasses the knowledge and study of all aspects of electromagnetic fields and waves. The International Union of Radio Science (Union Radio-Scientifique Internationale), a non-governmental and non-profit organization under the International Council for Science, is responsible for stimulating and coordinating, on an international basis, studies, research, applications, scientific exchange, and communication in the fields of radio science.” Included within the objectives are the following:

- To encourage and promote international activity in radio science and its applications, for the benefit of humanity;
- To encourage the adoption of common methods of measurement, and the intercomparison and standardization of the measuring instruments used in scientific work;
- To stimulate and co-ordinate studies of:
  - o the scientific aspects of telecommunications using electromagnetic waves, guided and unguided;
  - o the generation, emission, radiation, propagation, reception, and detection of fields and waves, and the processing of the signals embedded in them.
- To represent radio science to the general public, and to public and private organizations.

The first General Assembly of URSI was held in July 1922 in Brussels. At that time, only four National Committees had been formed officially: Belgium, France, United Kingdom and the USA. However, the following new Committees adhered to the Union during the same year: Australia, Spain, Italy, Japan and the Netherlands. The Italian URSI Committee operates under the umbrella of the National Research Council (CNR) which pays the fee for Italian participation in URSI.

The range of scientific activities covered by URSI is reflected by the scope of its scientific commissions, namely

- Commission A: Electromagnetic Metrology
- Commission B: Fields and waves
- Commission C: Radiocommunication systems and signal processing
- Commission D: Electronics and photonics
- Commission E: Electromagnetic environment and interference
- Commission F: Wave propagation and remote sensing
- Commission G: Ionospheric radio and propagation
- Commission H: Waves in plasmas
- Commission J: Radio astronomy
- Commission K: Electromagnetics in biology and medicine

The CNR-URSI Committee has ten mirror commissions fully reflecting the scopes of the international URSI scientific commissions. Officers and their substitutes of the CNR-URSI scientific commissions can be found [here](#).

URSI organizes three flagship international conferences where all the scientific commissions are involved:

- The “General Assembly of the International Union of Radio Science” (URSI GASS)
- The “Atlantic Meeting on Radio Science” (URSI AT-RASC)
- The “Asia-Pacific Radio Science Conference” (URSI AP-RASC)

The three flagship conferences take place on a three-year basis (2017 URSI GASS, 2018 URSI AP-RASC, 2019 URSI AT-RASC, 2020 URSI GASS and so on).

## **2. Main activities carried out by URSI during 2019 relevant for Italy and for CNR**

During the URSI GASS 2017 Italy won the selection for the 2020 URSI GASS location. Hence the 2020 URSI GASS conference will take place in Rome<sup>1</sup> (within the premises of “La Sapienza” University from 29 August to 5 September). A large effort for the organization of this important event was undertaken in 2019. The conference is expected to attract more than 1500 radioscintists from all over the world<sup>2</sup>. Two meetings between the Local Organizing Committee members, members of the board of URSI and the Scientific Program Chair of the conference Prof. Alain Sibille took place in 2019. Namely, during the 2019 AP-RASC conference in New Delhi (India, 9-15 March 2019) and during the EuCAP 2019 conference in Krakow (Poland, 31 March-5 April). A meeting between the LOC and the URSI Board was also arranged in 2019. The meeting took place in Rome, at hotel Cinquecento on 2-3 February 2020.

## **3. Activities carried out by Prof. Sorrentino within URSI during 2019 and the impact on the Italian scientific community**

In 2017, during the URSI GASS in Montreal, Prof. Sorrentino successfully supported the candidacy of Italy for hosting the 2020 URSI GASS, with the cooperation of Prof. Guglielmo D’Inzeo (General Chair of URSI GASS 2020). Further, Prof. Sorrentino was also active in establishing relationships between the CNR-URSI Committee and other European national URSI Committees for the purpose of reinforcing the European leadership within URSI in view of the 2020 URSI GASS conference. During the URSI Italy Special Session jointly held in Cagliari with RiNEm (Riunione Nazionale di Elettromagnetismo, organized by the Italian Electromagnetic Society, SIEm, every two years) on 5 September 2018, Prof. Alain Sibille (LTCl, Telecom ParisTech), Prof. Ludger Klinkenbusch (Kiel University) and Prof. Gabriele Gradoni (University of Nottingham) were invited to give a talk. In 2019, Prof. Manara was invited by the German URSI Member Committee to give a plenary talk during the URSI conference “Kleinheubacher Tagung” - the annual meeting of the German URSI Member Committee. The conference took place on September 23-25, 2019 in Miltenberg. Also Prof. Carobbi attended the conference, presented a contribution and learned about the internal organization of the German URSI Member Committee, probably a model that should inspire also the Italian URSI Member Committee.

Prof. Sorrentino, Prof. Manara and Prof. Carobbi organized the URSI Italy Special Session in the framework of the IEEE RFID-TA International conference, held in Pisa on September 25-27, 2019. A contribution to the URSI Radio Science Bulletin devoted to the 2019 URSI Italy Special Session is going to be published reporting a comprehensive description of the event. Some essential information is provided here below.

The Special Session was held on September 26 and it was attended by more than thirty researchers working in universities and research institutes. The meeting offered a joint plenary session co-organized with the parallel conference IEEE RFID-TA and a URSI Special Session with two tutorials exemplifying scientific activities in the framework of two specific URSI Commissions. Moreover, another URSI Session was organized as the final of the 2019 Best Paper Young Scientist Award, delivered by the URSI Italian National Committee. The final was centered on the presentations of the selected three best papers submitted to the Italian URSI National Committee 2019 Best Paper Young Scientist Award.

The joint plenary session with the IEEE RFID-TA Conference was delivered by Prof. Smail Tedjini, Université Grenoble Alpes, Grenoble-INP/LCIS Laboratory, Valence, France. This joint plenary session was chaired by Prof. Paolo Nepa (University of Pisa), General Chair of IEEE RFID-TA, and by Prof. Giuliano Manara (University of Pisa), Chair of the IEEE RFID-TA Technical Program Committee and Member of the Italian URSI National Committee. The title of the presentation of Prof. Smail Tedjini was “Advances in RFIDs”. It was devoted to highlight the main features and differences between conventional RFID (with chip) and chipless RFID. The last part of the presentation was dedicated to standardization issues and to review the impact of RF regulations on RFID.

The URSI Special Session, composed by a couple of tutorials contributed by two specific URSI Commissions, was chaired by Prof. Carlo Carobbi (University of Florence), Secretary of the URSI Italian Committee, which shortly illustrated URSI activities in Italy and worldwide as an introduction to the session. The first tutorial was a contribution from Commission G (Ionospheric Radio and Propagation), titled “Pre-earthquake signatures in ionosphere as detected by Swarm satellites.” The tutorial was presented by Dr. Angelo De Santis (Istituto Nazionale di Geofisica e Vulcanologia, Italy). The presentation was describing electron density and magnetic data observed by a swarm of three-satellites, for almost five years after their launch. The objective was to look

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<sup>1</sup> Due to the COVID-19 pandemic, a few days before the writing of this report, it was decided to postpone the conference to August-September 2021.

<sup>2</sup> About 1900 scientific contributions were submitted by the deadline, on 10 February 2020.

for possible earthquake related ionospheric anomalies. The second tutorial was a contribution from Commission K (Electromagnetics in Biology and Medicine). The title of the presentation was “A portable microwave imaging device for brain stroke monitoring”. It was given by Dr. Lorenzo Crocco (Istituto per il Rilevamento Elettromagnetico dell’Ambiente, CNR-IREA, Italy). The presentation reviewed the recent efforts carried out by the author and his colleagues in the development of an innovative microwave imaging (MWI) device properly designed for brain stroke monitoring with the requirement of making the system architecture as simple as possible. The talk described the overall development, from the design stage to the realization of the systems components and the prototype, as well as the initial controlled experiments demonstrating the device capabilities.

The final of the Italian URSI National Committee 2019 Young Scientist Best Paper Award was also chaired by Prof. Carobbi. In this context, the three finalists presented their papers. The judging committee was composed by Dr. Giorgia De Franceschi (URSI Commission G), Dr. Simonetta Paloscia (URSI Commission F), Prof. Giuliano Manara (URSI Commission B) and Prof. Carlo Carobbi (URSI Commission E).

In particular, the 2019 Italian URSI Committee Young Scientist Best Paper Award was assigned to Dr. Valentina Palazzi (University of Perugia), for the paper “Phase-Controlled Beamforming Network Intended for Conformal Arrays.” Honorary mentions were given to the other two finalists: Dr. Giuseppe Torrisi, for the paper “RF Design and Experimental Test for a Quadrupole-Free X-Band TM01 Mode Launcher,” and Dr. Davide Comite, for the paper “Electromagnetic Modeling of Scattered Signals of Opportunity.” The URSI award and the honorary mentions were announced at the Italian URSI National Meeting 2019 and IEEE RFID-TA 2019 gala dinner. The dinner was organized at the Grand Hotel “Principe di Piemonte,” in the city of Viareggio, 30 Km far from Pisa.

Since the papers submitted to the 2019 Italian URSI Committee Young Scientist Best Paper Award were of a high-quality standard, the Committee offered to the Young Scientists who did not have access to the final the possibility of presenting a paper in an URSI Poster Session, which was organized in parallel to the IEEE RFID-TA poster session. To the Young Scientists who presented their papers in the URSI poster session were delivered certificates of participation by the Italian URSI National Committee. The certificates were delivered by Dr. Giorgia De Franceschi and by Prof. Carlo Carobbi, as members of the judging committee of the 2019 Italian URSI Committee Young Scientist Best Paper Award.

#### **4. Evaluation of the participation in terms of benefits and membership cost**

Participation in URSI has, up to now, permitted to provide visibility to Italian radioscience. The organization of the 2020 URSI GASS conference in Rome is a great opportunity to strengthen existing international relationships as well as to establish new ones. Several Individual Membership applications to URSI were submitted by Italian radioscience that participated in AT-RASC 2018 in Gran Canaria and AP-RASC 2019 in New Delhi (India). Several Italian radioscience are expected to be charged with important roles in URSI during URSI GASS 2020 in Rome. In particular, Prof. Giuliano Manara (vice-representative of Commission B of Italy) applied for the Vice President position of URSI. The four positions of Vice President of URSI are renewed every three years during the General Assembly<sup>3</sup>. Prof. Francesca Apollonio (representative of Commission K of Italy) and Prof. Carlo Carobbi (representative of Commission E of Italy) applied for the Vice Chair positions of the International Commissions K and E, respectively<sup>4</sup>. Finally, two Italian Young Scientists applied for Early Career Representatives of Commission D and Commission G<sup>5</sup>.

#### **5. Evaluation of Italian attendance and how to improve interest and involvement**

The 2019 URSI AP-RASC conference in New Delhi (India) was attended by more than 15 Italian delegates that participated in the meeting organized by Prof. Carobbi (Secretary of the CNR-URSI Committee) in order to inform about the activities of the CNR-URSI Committee. The participation of Italian radioscience in international events is strong but, at the same time, we have to note that Italian radioscience do not reach a proportional number of apical positions within URSI. The involvement of young Italian radioscience should also be increased. Actions have been undertaken to promote URSI in Italy through information about the advantages deriving from individual membership. Indeed, the Young Scientists competition that took place during the URSI Italy Special Session held in Pisa on September 26, 2019, in the framework of the IEEE RFID-TA conference stimulated some of the Italian Young Scientists to apply as Early Career Representatives (ECRs) of URSI International during the next URSI GASS 2020 in Rome (see §5).

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<sup>3</sup> Applications have been postponed to 2021, due to the COVID-19 pandemic.

<sup>4</sup> Applications have been postponed to 2021, due to the COVID-19 pandemic.

<sup>5</sup> Applications have been postponed to 2021, due to the COVID-19 pandemic.

## **6. Italian experts with important roles within the Union or within related Commissions and Programs (if known)**

In the triennium from 2017 to 2020, Italy has no international Commission Chairs, but has:

- Commission G Vice Chair: Giorgiana De Franceschi (INGV)
- Commission B Early Career Representative (ECR): Andrea Michel (University of Pisa)

Due to the coronavirus pandemic De Franceschi and Michel will remain in office until the next GASS 2021.

## **7. Short summary of the 2019 CNR Commission activities**

The CNR-URSI Committee met on January 31, May 7, July 12, and November 28. The minutes of these meetings are available on the website of the CNR-URSI Committee <http://www.ursi.cnr.it>. According to the tradition of the latest years, the CNR-URSI Committee organized a special session within an international event. As mentioned above the 2019 URSI Italy Special Session took place during the IEEE RFID-TA conference in Pisa, on September 26. A Young Scientists Award was also granted by the Italian URSI Member Committee. The invited presentations given by the Italian radio-scientists are available through the CNR-URSI Committee website (<http://www.ursi.cnr.it/News.html>).

## **8. The passing of the president of the CNR URSI Committee, Prof. Roberto Sorrentino**

The CNR URSI Committee was shocked by the passing of its President, Prof. Roberto Sorrentino on March 3, 2020 at age 72. Prof. d'Inzeo, Prof. Manara and Prof. Carobbi attended the funeral of Prof. Sorrentino for the last farewell and for presenting condolences of the CNR-URSI Committee to the wife Linda. Prof. Manara, Prof. d'Inzeo, Prof. Mazzarella (President of SIEm) and Prof. Carobbi, wrote an obituary that will be published in the Radio Science Bulletin where some of the outstanding scientific and professional achievements of Roberto are remembered. We just mention here that in January 2020, Roberto was awarded the prestigious honor of the Grand Officer of the Order of Merit of the Italian Republic for his commitment in research. The award was conferred by the Head of State, Sergio Mattarella, on the proposal of the Prime Minister Giuseppe Conte.

## **9. Conclusions**

The CNR-URSI Committee is active in promoting scientific activities within URSI. A great achievement and opportunity obtained in 2017 is the responsibility for the organization of the next 2020 URSI GASS conference in Rome. The CNR-URSI Committee has to strengthen international relationships with other national URSI committees, in particular European committees. This is important for the success of the 2020 URSI GASS conference and for improving visibility of Italian radioscintists. Networking is also essential in order to increase the number of apical positions within URSI held by Italian radioscintists. Some significant activities have been carried out for this purpose in 2018 and 2019 through exchange of researchers during the National Committee Member Meetings of Italy and Germany and through invited presentations at the Italian Member Committee Meeting given by French and British radioscintists. Prof. Sorrentino had a fundamental role in the achievement of the URSI GASS conference in Rome and in the promotion of international relationships of the CNR-URSI Committee with other European URSI Member Committees. Prof. Sorrentino passed away on March 2, 2020. This was a tremendous loss for the CNR-URSI Committee which, however, will do its best to honor his memory and implement the plans of development of the commission's activities which he had undertaken with great vision and foresight.

Pistoia, 26<sup>th</sup> April 2020

Prof. Carlo Carobbi



(in cooperation with Prof. Giuliano Manara)