



Commission Triennial Report

Commission F

During the triennium 2017-2021 Commission F has been involved with the organization of three major meetings and some topical meetings: the second triennial URSI Atlantic Radio Science Conference (AT-RASC) in Gran Canaria (Spain), 28 May – 1 June, 2018, the URSI Asia-Pacific Radio Science Conference (AP-RASC) in New Delhi, India, from 9 to 15 March 2019 and the URSI general Assembly which was postponed from 2020 to 2021. Another meetings held in this triennium was the 16th specialist meeting on Microwave Radiometry and Remote Sensing of Environment, held the virtually in Florence, Italy in Nov 16-20, 2020.

Of course, this triennium has been a challenging period. Commission F also participated in contributing to the URSI Centennial volume.

1. Officers of Commission F

During the period 2017-2021 the officers of Commission F are as follows:

Chair: Prof. Venkata Chandrasekar, Colorado State University, USA

Vice Chair: Prof. Tullio Tanzi, Télécom Paris, France

Early Career Representatives:

Dr. Mehmet Kurum, Turkey

Dr. Sasaki Motoharu, Japan

2. Terms of Reference

The Commission encourages :

The study of all frequencies in a non-ionised environment :

- wave propagation through planetary, neutral atmospheres and surfaces;
- wave interaction with the planetary surfaces (including land, ocean and ice), and subsurfaces;
- characterisation of the environment as it affects wave phenomena;

The application of the results of these studies, particularly in the areas of remote sensing and communications;

The appropriate co-operation with other URSI Commissions and other relevant organisations



3. Commission F Working Groups

3.1 Overview

F.1	Education and Training in Remote Sensing and Related Aspects of Propagation/Next-Generation Radar Remote Sensing	Chair: M. Chandra (Germany); co-Chair: T. Tanzi (France); Members: A. Danklmayer (Germany), S. Paloscia (Italy), T. Rommel (Germany)
FGHJ	RFI Mitigation and Characterization	Chairs for Commission F: A.K. Mishra (South Africa), D. Le Vine (USA) Chair for Commission G: T. Bullett (USA) Chair for Commission H: H. Rothkaehl (Poland) Chairs for Commission J: R. Bradley (USA), W. Baan (Netherlands)
GF	Middle Atmosphere	Co-Chair for Commission G: J. Roettger (Germany) Co-Chair for Commission F: C.H. Liu (China, SRS);
GJFEH	Interdisciplinary Space Weather	Co-Chair for G: I. Stanislawski (Poland) Co-Chair for J: R. Fallows (Netherlands)

3.2 New WG F.2 on Remote Sensing of precipitation

Chair: Dr Luca Baldini (Chair)
Co-Chair: Prof Tomoo Ushio (CO-Chair)

Steering committee members:

Dr. Animesh Maitra (India)
Dr. Sanghun Lim (South Korea)
Dr. Renzo Bechini (Italy)
V. Chandrasekar (USA)

The group was very active in the last triennium, actively organizing sessions in all the three conferences namely GASS, AT-RASC and AP-RASC. In addition there were numerous in country activities on various topics such as

- a) Estimating precipitation through signals of opportunity
- b) Characterization of precipitation microphysics



- c) Validation of satellite precipitation estimates
- d) Mediterranean precipitation
- e) Atmospheric Electricity
- f) Radar Group at X band
- g) Microphysical characterization of precipitation from disdrometer measurements.
- h) Development of a nowcasting methods of precipitation.
- i) Blending of forecast and nowcast.
- j) Estimation of rain rate based on differential phase measurements
- k) Radar Calibration

In addition, this group members contributed to short courses and tutorials in the commission sessions. A detailed list of sessions is available on request, but it will be self-evident looking at the program.

4. Commission F related International Activities – URSI Flagship Meetings

AT-RASC in Gran Canaria (Spain), 28 May -1 June, 2018

The 1st URSI Atlantic Radio Science Conference (URSI AT-RASC) was held from 28 May to 1, June, at the ExpoMeloneras Convention Centre, in the magnificent scenario of Gran Canaria. This was the second edition of the newly established triennial URSI Atlantic Radio Science.

There was a total of five general lectures, covering a wide variety of topics from graphene to magnetic field effects on biological systems, meta materials, space weather and satellites and 5G communications.

Commission F had a very active participation in this conference, with a total of 9 sessions by the commission and three joint sessions with commissions C, E, A F and J papers.

Commission F conducted sessions in the following topics namely

- Propagation measurement / models for mobile Links
- Remote sensing of earth and planets
- Propagation and remote sensing in complex and random media
- Remote sensing of precipitation
- Microwave remote sensing of vegetated and snow-covered soils
- Propagation measurements and models
- Remote sensing from nanosatellites
- Multipath and its mitigation
- Communication in Urban Environments
- Spectrum Management and Utilization

In addition, commission F conducted a special half day workshop on "Advanced weather radar technologies for civil aviation and greener operations" organized by Drs Cucoli and Baldini.



AP-RASC in New Delhi, India , March 09-15, 2019

The 2019 URSI Asia-Pacific Radio Science Conference was held in New Delhi India, at the India Habitat Center. Commission F had a large presence there with a total of 20 sessions as listed below:

- F1 Current Trends in Wave Propagation and Remote Sensing
- F2 Propagation Measurements over Earth Space and Terrestrial Links
- F3 Remote Sensing of Climate Change
- F4 Propagation Modelling for Indoor/Outdoor Channels and 5G
- F05 Remote Sensing of Earth and Planetary Atmospheres
- F6 Propagation Modelling and Remote Sensing in Complex and Random Media (1)
- F7 Radar Remote Sensing of Severe Weather Conditions and Disaster Mitigation (1)
- F8 Microwave and MM Wave Remote Sensing including Interferometry, SAR and RFI (1)
- F9 Satellite Based Remote Sensing Including Nanosatellites
- F10 Propagation Modelling and Remote Sensing in Complex and Random Media (2)
- F11 Radar Remote Sensing of Severe Weather Conditions and Disaster Mitigation (2)
- F12 Microwave and MM Wave Remote Sensing including Interferometry, SAR, RFI and NISAR
- F13 Remote Sensing of Atmosphere, Precipitation and Aerosols
- F14 Microwave and MM Wave Remote Sensing including Interferometry, SAR and RFI (3)
- F15 Remote Sensing of Atmosphere, Precipitation and Aerosols (2)
- F16 Microwave and MM Wave Remote Sensing including Interferometry, SAR and RFI
- F17 Remote Sensing of Atmosphere, Precipitation and Aerosols (3)
- F18 Microwave and MM Wave Remote Sensing including Interferometry, SAR and RFI (5)
- F19 Remote Sensing of Land, Vegetation, Soil Moisture and Sea Surfaces
- F020: Poster session
- It was a well-attended successful conference

URSI General Assembly and Scientific Symposium

To be held in Rome, Italy, August 28-4 Sept 2021

The XXXIV General Assembly and Scientific Symposium (GASS) of the International Union of Radio Science will be in Rome, Italy. The XXXII GASS will have a scientific program organized around the ten Commissions of URSI, including oral sessions, poster sessions, plenary and public lectures, and tutorials, with both invited and contributed papers. In addition, there will be workshops, short courses, special programs for young scientists, a student paper competition, programs for accompanying persons, and industrial exhibits. More than 1,500 scientists from more than 50 countries are expected to participate. It will be a hybrid conference with a combination of remote and in-person presentations.

Commission F has 145 accepted oral and poster papers. The tutorial will be given on Friday, Sept 3 by Dr. Luca Baldini of the Institute of Atmosphere and Climate of National Research Council of Bologna (Italy): "Remote Sensing of the Earth using Radio Waves". Commission F has a total of 14 sessions and 3 joint sessions. These sessions represent a good balance between a wide variety of topics.

The session titles are:

- Remote Sensing of Earth and Planetary Atmosphere



- Microwave Remote Sensing of Vegetation
- Microwave Remote Sensing of Terrestrial Snow
- Microwave remote sensing of Soil Moisture
- Millimeter-Wave Propagation and Remote Sensing
- Microwave propagation and wireless communications
- Propagation and modeling for Aerospace Applications
- Remote Sensing from Nano Satellites
- Propagation and remote Sensing in Complex and Random media
- Remote Sensing of Precipitation
- Deep Learning in Radar Image and remote Sensing
- RFI issues in Microwave Remote Sensing
- AI for Weather Radars
- Opportunistic Remote Sensing of Atmospheric Parameters (FC1)
- Advanced RF components for cm and mm wave remote sensing (FCD)
- Measurement and modelling of Body Area Networks (FCK)

This is a brief summary of the activities of Commission J and the developments in radio astronomy during this triennium. This report covers four years due to the COVID-19 worldwide pandemic that forced the postponement of URSI GASS 2020 until 2021. All officers agreed to serve an additional year of their terms.

5. Other Commission F related International Activities

MicroRad Symposium 2020, Florence, Italy

16th Specialist Meeting on Microwave Radiometry and Remote Sensing of the Environment (MicroRad 2020) took place in Florence, Italy, virtually.

MicroRad, represents a unique gathering where the microwave radiometry community has an opportunity to present new missions, research results, technological advances and innovations in the field of passive microwave remote sensing. It is jointly sponsored by the IFAC-CNR Italy and the IEEE Geoscience and Remote Sensing Society (GRSS), and co-sponsored by the URSI Commission F.