

Ground-Based Instrumentation for Solar Observations

Mauro Messerotti

INAF-Astronomical Observatory of Trieste, Italy
and
Department of Physics, University of Trieste, Italy
[messerotti@oats.inaf.it]

Abstract

The observation and analysis of photon and particle emissions from the Sun represent key tools for the characterisation and modelling of the physical phenomena that occur in the inner and outer plasma layers of the star. In particular, low- to medium-resolution diachronic observations from the ground track the evolution of solar activity manifestations, whereas high-resolution ones depict the evolution of details relevant to localised features and provide fundamental information for the physical modelling.

In this context, we will review a selection of ground-based solar instruments routinely used to remotely probe the Sun at different wavelengths by describing their characteristics and the related information output and emphasising their role in space weather applications.

Furthermore, we will present the next generation ones that are at the frontier of the instrumental development and promise to provide a significant step forward in solar research.

Date: Thursday 21 October 2010
Time: 14:00-15:00
Room: Informatics Laboratory @ Adriatico Guest House

Direct Effects of Solar Radio Weather

Mauro Messerotti

INAF-Astronomical Observatory of Trieste, Italy
and
Department of Physics, University of Trieste, Italy
[messerotti@oats.inaf.it]

Abstract

Solar radio weather is a neologism used to indicate the physical state of the radio Sun. In fact, according to the activity level the Sun can be nearly radio quiet and emit just a background level of radiation in the radio bands or it can be radio active and emit intense outbursts of broad and narrow band radio radiation. It has been known since the discovery of the high frequency solar radio emission in 1942 that it can interfere radio communications when certain threshold levels are overcome. In the recent years, experimental evidences have been found that intense solar radio bursts can interfere wireless communications and navigation systems like GPS as direct effects on the relevant receiving systems.

We will give an introduction on solar radio emissions by describing the phenomenology and the basic generation mechanisms. Then, we will concentrate on the series of effects that, under specific circumstances, solar radio bursts can determine in receiving systems such as e.g. the mobile phones and, in particular, the navigation systems. We will illustrate the existing observational evidences and we will consider the evaluation of the risk level for such interferences.

Date: Friday 29 October 2010
Time: 11:10-13:00
Room: Kastler Lecture Hall @ Adriatico Guest House

Mauro Messerotti has been staff researcher at the National Institute for Astrophysics-Astronomical Observatory of Trieste since 1987. He has been adjunct professor at the Department of Physics of the Trieste University since 2001 and was affiliated to the Department of Physics in 2005.

He is the head of the Solar Radio Physics and Space Meteorology Group and head of the Basovizza Observing Station in Trieste, where the Trieste Solar Radio System is operated as a node of the European Space Weather Network (SWENET) promoted by ESA (European Space Agency).

Member of IAU Commission 10, he is also member of the Space Weather Working Team of ESA, and of various working groups in the field as well as member of various national and international societies and organizations.

He has been visiting professor at the Karl-Franzens University in Graz (Austria) and co-director of three summer schools on solar physics organized by the Graz University in Austria in 1997, 1999 and 2003.

He was appointed National Representative for Italy in the European COST (Cooperation in Science and Technology) Action 724 on “Developing the Scientific Basis for Monitoring, Modeling and Predicting Space Weather” (2002-2007); in this framework, he has been leader of Working Group 1 aimed at the study of solar activity for Space Weather.

He has been co-director of the International Advanced School on Space Weather (2-19 May 2006, ICTP, Trieste, Italy) and co-director of the International Advanced School on Space Weather Modelling and Applications (18-29 October 2010, ICTP, Trieste, Italy), both co-funded by COST.

He has been elected vice-chair of the EC COST Action ES0803 “Developing Space Weather Products and Services in Europe” (2008-2013) and co-leader of WG3 on dissemination.

He has been co-chair of the eGY (electronic Geophysical Year) European Committee and chair of the eGY Italian Committee. In this context, he has actively promoted the development of Virtual Observatories for the Geosciences: after having co-ordinated the development of the Italian federation of solar archives (SOLARNET) and participated in the development of EGSO (European Grid for Solar Observations). Presently he has been national coordinator in the EC FP7 Project HELIO (Heliophysics Integrated Observatory).

Co-founder of the Earth and Space Science Division of the European Geosciences Union, he has been responsible for the organisation of the Space Weather Informatics interest group.

His main research field is Solar Radio Physics and its applications to Space Weather diagnostics, but he is also active in Bioastronomy and Life Sciences in the framework of Space Weather and in advanced data management techniques. Since the launch of SOHO, he is associate scientist to the UVCS experiment.

He has been the reference scientist in the AtmoCube project, carried out jointly by the University of Trieste, the INFN-Trieste Division and the INAF-Astronomical Observatory of Trieste; AtmoCube is a nanosatellite-class spacecraft aimed at probing the geospace environment that will be launched by an ESA Vega Maiden Flight.

Since 2007, he has been associated to the Italian National Institute for Nuclear Physics (INFN) research group on high energy emissions from solar flares observed by GLAST.

He is author and co-author of more than 180 publications (refereed, invited and contributed papers, and technical reports), co-editor of various books of proceedings, and referee for various journals on solar physics, astronomy and astrobiology. Active in the field of education and public outreach (EPO), he gave about 650 public lectures since 1980.