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COST Action 724: the Italian contribution

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Abstract. COST Action 724, devoted to developing the scientific basis for monitoring, modelling and predicting Space Weather, is briefly outlined with emphasis to the contribution by Italian researchers of the solar and solar-terrestrial communities.

Key words. space weather – solar-terrestrial relations

1. Introduction

COST is the acronym of CO-operation in the field of Science and Technology, a program aimed at the coordination of European activities in science and technology funded by EU through the European Science Foundation (ESF). A set of Technical Committees (TC) is devoted to managing the approved Actions in the different fields such as e.g. Meteorology, Telecommunications, etc. All the aspects relevant to an approved Action are decided by a Management Committee (MC), whose members are two national representatives for each participating countries, coordinated by a Chairman and a Vice-Chairman elected by the MC members during the opening meeting, which formally defines the start of the Action. MC meetings are expected to be scheduled on an yearly basis. Funding is limited to activities related to coordination, i.e., Management Committee meetings, expert meetings, travels, and publications. No research activity is directly funded by the COST program and it is the responsibility of participants contributing to the COST Actions to find their own funding sources by submitting relevant projects to the national and international funding organizations. COST Actions can endorse research projects by stating the scientific excellence and international relevance. This can play a key role when COST Action participants submit a joint program as a consortium. Detailed information about the ESF/COST Program is available at *http://cost.cordis.lu*.

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2. COST Action 724

COST Action 724 (CA 724) is aimed at Space Weather in the framework of Meteorology and is headed as "Developing the scientific basis for monitoring, modelling and predicting Space Weather".

Objectives and organizational structure of CA 724 are detailed in the Memorandum of Understanding (MoU) document, available at the dedicated web site *http: //cost724.obs.ujf-grenoble.fr* or at the ESF/COST page *http: //cost.cordis.lu/src/action_detail.cfm?action=724*.

The general aims of the CA 724 are:

- To coordinate European research into modelling and prediction of Space Weather;
- To promote where necessary the deployment of new instrumentation to satisfy data requirements, and the development of new models;
- To educate potential users of Space Weather data;
- To gather feedback from users which may be used to improve services;
- To create a forum for exchanging best practice among users and providers of Space Weather services;
- To set standards on data exchange.

The main objectives are the development of the scientific basis of Space Weather applications in the European framework, and the exploration of methods for providing a comprehensive range of services to a variety of users, based on modelling and monitoring of the Sun-Earth system.

The general deliverables are scientific and technical reports and the development of web services as well as the formulation of specific recommendations to the national and European Ministries about Space Weather activities and services in Europe.

Twenty-three countries and four organizations (COST Action 296 "MIERS Mitigation of Ionospheric Effects on Radio Systems", ESA/ESTEC, ESA/ESOC, E-STAR) participate in the action, which will extend from November 2003 till November 2007.

J. Lilensten (Laboratoire de Planétologie, Grenoble, France) and A. Belehaki (National Observatory of Athens, Greece) were elected, respectively, Chairman and Vice-Chairwoman by the Management Committee.

M. Candidi (INAF-IFSI, Rome, Italy) and M. Messerotti (INAF-OATs, Trieste, Italy) are the national representatives for Italy appointed by the Ministry for Education, University and Research (MIUR).

2.1. Operational structure

The main goals of CA 724 are to be achieved through the collaborative work of 4 Working Groups (WG), each devoted to a specific task in the framework of solar-terrestrial relations as follows:

- WG 1 – Monitoring and predicting solar activity for Space Weather.
- WG 2 – The radiation environment of the Earth.
- WG 3 – Interaction of solar wind disturbances with the Earth.
- WG 4 – Space Weather observations and services.

The Management Committee elected M. Messerotti as leader of WG 1, and M. Candidi as co-leader of WG 4. Many Italian researchers are active members of WG 1–4.

2.2. Working Group 1

The objectives of WG 1 (*http://ca724wg1.ts.astro.it*) are respectively:

- to research the use of solar observations (eg. extreme ultraviolet images, X-ray observations, radio emissions) and models (eg. magneto-hydrodynamic models of flux tubes) for predicting energetic particle events;
- to research the use of solar observations and models (as above) for predicting coronal mass ejections;
- to research the modelling and prediction of solar extreme ultraviolet radiation (EUV) which affects atmospheric density and hence drag on satellites at low Earth orbit altitudes.
- to liaise with COST Action 296 where monitoring and modelling of solar activity is relevant to ionospheric radio propagation;
- to liaise with WG 4 to ensure relevant data and models are incorporated in a European Space Weather Network.

The use of solar observations and models to predict solar activity is investigated by topical Work Packages (WP) aimed at carrying out the analysis of: - solar magnetic activity (WP 11000); - solar electromagnetic radiation (WP 12000); - solar particle emission (WP 13000); - Coronal Mass Ejections (WP 14000).

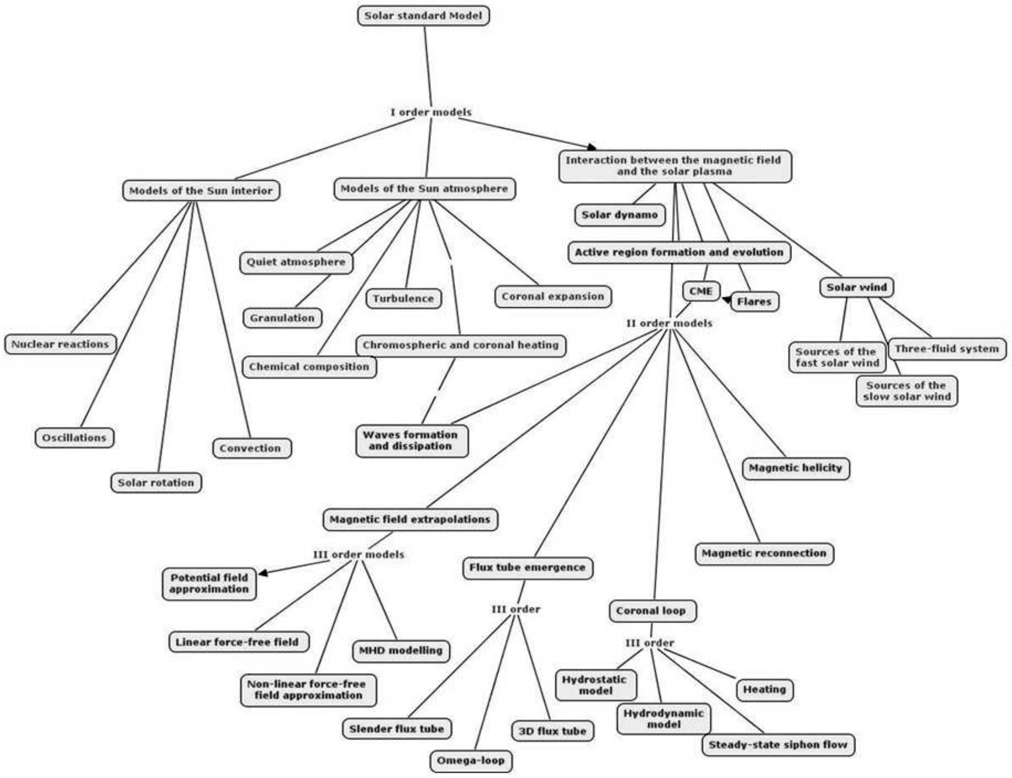

Fig. 1. Concept map prepared by F. Zuccarello to summarize solar models and their interrelationships.

WP 12000 is led by F. Zuccarello (University of Catania, Italy) and WP 13000 is led by M. Storini (INAF-IFSI, Rome, Italy).

Based on a previous review of solar and solar-terrestrial scientific models carried out by Lathuillère et al. (2002), a detailed and updated analysis is in progress in the framework of the above WPs (see Fig. 1). The relevant results will be indexed in a dedicated data base accessible via web as input to WG 4.

2.3. Working Group 4

WG 4 has the key role to homogenize and to exploit the scientific results on models and predictions achieved by WG 1, WG 2 and WG 3 as well as to promote the CA 724 achievements among both the scientific community and the public. Such complex activities are performed by 19 specific Work Packages aimed at:

– coordinating a network of European web sites relevant to data, models, prediction and public outreach;
– developing methods and standards for data exchange to enable coupling of different space weather models (eg. using Spacegrid) and to disseminate relevant information to users;
– liaising with COST Action 296 to let COST 296 benefit from space weather model development and to incorporate COST 296 output where it will be of benefit to other Space Weather services;
– maintaining databases of users and statistics about the service.

References

Lathuillère, C., et al. 2002, Ann. Geophys., 20, 1081