THE CENTRAL-EUROPEAN SPACE WEATHER INITIATIVE (CESWI)

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ABSTRACT

In this work we briefly outline the Central European Space Weather Initiative (CESWI), which involves the participation of 11 CEI (2 EU and 9 non-EU) countries, and stress the scientific, applied, technological and social spin-offs of the related SPW activities in modeling, observing, predicting and popularizing, which are mutually synergetic.

1. INTRODUCTION

Space Weather (SpW) is a multi-disciplinary applied research field aimed to monitoring and forecasting perturbing phenomena originated by the Sun, which can be geo-effective, i.e., produce negative effects on human activities both in space and on the ground. Most of the Central European Initiative (CEI) member countries have a long tradition and excellence in the observation, analysis and modeling of solar and solar-terrestrial phenomena and already collaborate on relevant scientific projects. Such existing bilateral and multi-lateral collaborations can be fruitfully integrated in a common coordinated effort in the frame of a Central European Space Weather Initiative (CESWI). CESWI can play a relevant role in fully exploiting and developing the existing research facilities and resources in the light of the scientific and technological evolution propaedeutic to a successful participation in other European Community initiatives in the SpW field like the ones presently under consideration by ESA.

2. THE CENTRAL EUROPEAN INITIATIVE

To properly characterize the co-operation in the framework of the Central European Initiative (CEI), we include in this section a concise description of CEI and its activities as it was provided to the author by the relevant offices of the Italian Ministry for Foreign Affairs, which is gratefully acknowledged.

The Central European Initiative (CEI) is the oldest and largest of the regional co-operations in Central and Eastern Europe that emerged in 1989 and thereafter. At present it comprises 17 Member States (Figure 1): Albania, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Italy, Macedonia, Moldova, Poland, Romania, the Slovak Republic, Slovenia, Ukraine and the Federal Republic of Yugoslavia.

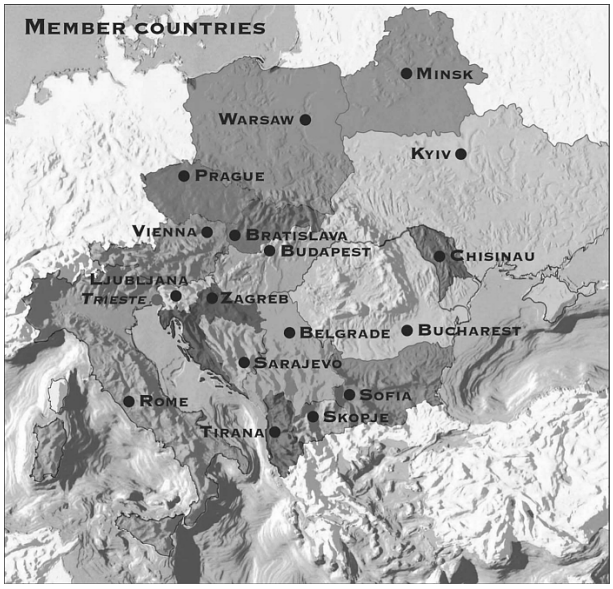

Figure 1. CEI Member States.

The CEI serves as a forum for regional co-operation as an element of stability and co-operation in Europe. Its primary strategic goals are twofold: the cohesion of the whole continent, a Europe without dividing lines, embracing all countries, peoples and citizens of Europe, and solidarity, focusing on strengthening the capacities of the Member countries falling behind in the process of transition and economic development. This strategy of cohesion and solidarity is being implemented by a variety of activities aiming at fostering co-operation among the Member States, furthering the participation of all member States in the process of European integration and accelerating the economic transformation of the countries in transition.

The organisational structure of the CEI is flexible and non-institutional. The CEI operates in holding annual meetings of the Heads of Government, the Ministers of Foreign Affairs and regular meetings of the Committee of National Co-ordinators. Auxiliary bodies of the CEI are Working Groups, meeting at senior official or ministerial level, the Secretariat for CEI projects at the European Bank for Reconstruction and Development, Trieste-London, and the CEI - Executive Secretariat in Trieste, headed by Amb. Dr. Paul Hartig, Director General.

At present the CEI comprises the following Working Groups: Agriculture, Civil Protection, Combating Organised Crime, Culture and Education, Energy, Environment, Environment and Transport (Subgroup), Human Dimension (Expert Group), Human Resource Development and Training, Information and Media, Migration, Minorities, Reconstruction and Rehabilitation of Bosnia-Herzegovina and Croatia, Science and Technology, Small and Medium Sized Enterprises, Tourism, Transport, Youth Affairs.

The Plan of Action 2000-2001 adopted by the Summit meeting in Prague in November 1999 lists a variety of priority activities such as assistance to countries in special need, European integration process and economic transformation in countries in transition. In many cases CEI activities or projects are designed to complement the Workplan of the Stability Pact for South Eastern Europe and its three Working Tables or to reinforce strategic programmes pursued by other international or regional organisations with regard to countries of Central and Eastern Europe. To this end the CEI maintains strong links with the EC, other regional organisations, relevant UN organisations and international financial institutions, especially the EBRD.

In economic matters, the CEI is aiming at mobilising the economic and technological potential of Member States putting special emphasis on strengthening the private sector and small and medium enterprises in the context of project implementation. Financial resources consist of Austrian and Italian trust funds with the EBRD, bilateral co-operation funds as well as credits provided by relevant international institutions.

The CEI organises each year the Summit Economic Forum, held on the occasion of the Meeting of the Heads of Government (in November, in the capital city of the CEI Presidency).

The CEI-Parliamentary Assembly and Committee are the fora for the co-operation of the members of parliament of the Member States.

The CEI-Chambers of Commerce Presidents Conference (Central European Chambers of Commerce Initiative - CECCI) meets at least once a year on the occasion of the Summit Economic Forum.

CEI contacts are respectively:

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Via Genova 9, I-34121 Trieste, Italy
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3. THE CESWI PROJECT

As stressed in the introduction, the Space Weather is a multi-disciplinary applied research field aimed to monitoring and forecasting perturbing phenomena originated by the Sun, which can be geo-effective, i.e., produce negative effects on human activities both in space and on the ground, such as, e.g., solar radiation bursts and energetic particle rains, which are harmful for human extravehicular activities as well as for the spacecraft electronics and can produce a series of perturbations in the geomagnetic field and the ionosphere, heavily affecting the telecommunication and positioning systems even those based on satellites like the GPS.

The European Space Agency (ESA) is presently investigating about the possibility to organize in Europe an SPW system complementary to the one already operating in the United States by the NOAA (National Oceanic and Atmospheric Administration).

With regard to that, most Central European Initiative (CEI) member countries have a long tradition and excellence in the observation, analysis and modeling of solar and solar-terrestrial phenomena and already collaborate informally on relevant scientific projects.

Hence we propose to formally activate the Central European Space Weather Initiative (CESWI) under the CEI sponsorship to coordinate the activities in a common effort with the goal to fully exploit and develop the existing research facilities and resources in the light of the scientific and technological evolution towards the European Community, which is one of the primary aims of CEI, by providing the young scientists with the cultural and financial means not to leave their native countries and to constitute instead a scientific human capital for the future.

In the following sections we outline the main goals of CESWI and the global organization of the project, as it was presented at the meeting of the CEI Science and Technology Working Group in Trieste (27 September 2001).

3.1. Medium and Long-Term Aims

On the medium term, CESWI should establish a Space Weather study network through:

- Developing solar-terrestrial observations;
- Improving modeling of solar-terrestrial phenomena;
- Setting up forecasting of geo-effective events.

This activity is propedeutic to the establishment of a Central-European Space Weather Institute to act as a reference institution for the coordination of the relevant SpW activities in the participating countries.

3.2. Project Organization

The operational infrastructures to be set up are a set of interoperating facilities to deal with all the typical SpW-related activites, based on geographically-distributed resources in participating nations, such as:

- The Central-European Solar-Terrestrial Network (CESTNET);
- The Central-European Solar-Terrestrial Surveillance (CESTS);
- The Central-European Solar-Terrestrial Archive (CESTA).

3.3. General Interests in CESWI

Various aspects of CESWI can be of interest to a variety of partners involved in:

- Science (Scientific institutions aimed to basic research in Solar, Solar-Terrestrial and Earth Physics);
- Applied Science (Space Agencies, Telecommunication Companies);
- Technology (Software, Hardware, Networking and Telecommunication Companies);
- Education (Schools, Universities, Public Outreach Section of various institutions).

3.4. CESWI Spin-offs

The accomplishment of the project results in a set of major *scientific spin-offs*:

- Advancements in Solar Physics;
- Advancement in Solar-Terrestrial Physics;
- Advancement in Terrestrial Physics.

as well as in a set of relevant *applied spin-offs*:

- The set-up of methodologies to observe the Sun and the Solar-Terrestrial Environment;
- The construction and set-up of previsional models for the Solar-Terrestrial phenomenology;
- The development of an information system interconnected via a geographical network for the distributed management of near-real-time observations;
- The development of a modern system for data archiving and distribution via Internet, accessible through WWW via a Graphical User Interface (GUI).

in a set of fundamental *technological spin-offs* like the:

- Updating of the instrumentation for near-real-time observations;
- Updating of basic computing facilities;
- Application of networking technologies;
- Application of technologies for information archiving and retrieval;
- Application of technologies for remote collaboration and data sharing in geographically distributed environments through advanced networking;
- Application of technologies for the real-time publication of scientific data on Internet;
- Application of security technologies in networking.

and last but not least in a set of valuable *social spin-offs* such as to:

- Provide the young scientists with the cultural and financial means not to leave their native countries and to constitute instead a scientific human capital for the future;
- Augment the scientific education at all levels.

4. STATUS OF THE CESWI PROJECT

At the time of this writing, the project is in a preliminary phase and requires an initial financial support for starting up and fully entering Phase A by organizing Working Group and joint scientific meetings,

by giving diploma, PhD and post-doc fellowships and by identifying industrial partners.

To date 19 scientific institutions located in 11 CEI-member countries expressed their interest in participating in CESWI (Figures 2 and 3). Among such countries, two of them are EU members (Austria and Italy) and nine are non-EU members (Czech Republic, Croatia, Hungary, Poland, Romania, Slovakia, Slovenia, Ukraine, Yugoslavia).

5. CONCLUSIONS

A project for the coordination of SpW-related activities was conceived in the framework of the Central European Initiative, which stimulates collaborative efforts on a regional basis among the 17 CEI-member states, and was presented at the meeting of the CEI Science and Technology Working Group in Trieste (27 September 2001).

The main aim of this project, the Central European Space Weather Initiative, is the foundation and coordination of an operational network in Central Europe capable to exploiting the expertise and resources of the participating scientific institutions as well as to allowing them to fully participate in other SpW initiatives organized at the European level.

The project is in pre-Phase A and the general organization is currently under discussion by the scientific institutions in 11 CEI-member countries, which expressed their interest in participating.

As CEI is not directly financing any projects, but instead is aimed to promote the relevant synergies among the potential funding institutions and the proposers, the next step in the project development is the identification of possible supporting organizations.

ACKNOWLEDGMENTS

This work was partially funded by ASI and MIUR.

The Italian Ministry for Foreign Affairs and the CEI Executive Secretariat in Trieste are acknowledged for the prompt collaboration in providing all the relevant information.

In particular, we thank Dr. Bellelli for the kind invitation to participate in the S-T Working Group Meeting in Trieste and Dr. Cicognani for the active collaboration in retrieving and distributing the information, which allowed to conceive this project.

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ITALY	Trieste Astronomical Observatory National Institute for Astrophysics Basovizza Observing Station Loc. Basovizza n. 302 34012 Trieste, Italy **http://radiosun.ts.astro.it**	**Dr. Mauro Messerotti** Tel. +39 040 226176 Fax +39 040 226630 **messerotti@ts.astro.it**
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Figure 2. CESWI participating institutions - List A.

CEI MEMBER COUNTRY	OTHER PARTICIPATING INSTITUTIONS / DEPARTMENTS	CONTACT PERSON
AUSTRIA	**Sonnenobservatorium Kanzelhöhe** Institut für Geophysik, Astrophysik und Meteorologie Karl-Franzens Universität **A-9521 Treffen, Austria** **http://solobskh.ac.at**	**Dr. Wolfgang Otruba** Tel. +43 4248 271721 Fax +43 4248 271715 **otruba@solobskh.ac.at**
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UKRAINE	UKRAINIAN SUN'S PATROL PROJECT **Solar Physics Laboratory** Crimean Astrophysical Observatory **http://www.crao.crimea.ua** **Astronomical Observatory** **of the Kharkov University** http://khassm.virtualave.net **Astronomical Observatory** **of the Kiev University** **Astronomical Observatory** **of the Lviv University** **Crimean Scientific Center** **of the National Academy of Science**	 **Dr. Nataly Stepanyan (Head)** **nataly@crao.crimea.ua** **Dr. Leonid Akimov (Head)** **akimov@astron.kharkov.ua** **Dr. Victor Korokhin (PI)** **wk@astron.kharkov.ua** **Dr. Vladimir Efimenko** efim@aoku.freenet.kiev.ua **Dr. Miroslav Stodilka** sun@astro.franko.lviv.ua **Dr. Boris Vladimirsky** **Dr. Victor Martynyuk** csc@tnu.crimea.ua mavis@crimeainfo.com
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Figure 3. CESWI participating institutions - List B.