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COST296 Action
Mitigation of Ionospheric Effects on Radio Systems

Year in Review
(February 2005 – April 2006)

Ljiljana R. Cander and Bruno Zolesi

MC meeting, DLR Neustrelitz, 27 -29 April 2006



Overview



Kick-off meeting (1st MC meeting)

WG and WP Leaders meeting, EGU 2005, Vienna

EGU 2005 Session related to COST271 and 296 actions

2nd MC meeting, ICTP, Trieste

TIST Annual Review Meeting (ARM)

Graz ITU-R meeting

Special issues of EGU 2003/2004 related to COST271

3rd MC meeting and ESWWII, ESA/ESTEC, Noordwijk

Presentations at international conferences

EGU 2006 Session related to COST296

4th MC meeting, DLR, Neustrelitz



*1st MC meeting, 4 February 2005,
COST Office, Brussels*



- *Kick-off meeting with **Total number of Signatories at date: 7***
- *General information on COST mechanism and the Annual Grant Scheme, Dr. Ferreira*
 - *Rules and procedures for implementing COST Actions*
 - *Financing of COST activities from the COST budget*
 - *Information Guide for the implementation of the scheme for Short Term Scientific Missions in the COST Framework*
- *Working plan for the implementation of the MoU, in particular: **Workplan for the period 5 February-30 June 2005***
- *Election of the officers of the Action.*



*WG and WP Leaders meeting, EGU ,
27 April 2005, Vienna*



Agenda:

- *Official status of the COST296 Action*
- *COST296 Budget till 30 June 2005*
- *Progress on Terms of References for each WP*
- *COST296 website and logo*
- *COSTT296 first annual report for TIST meeting*
- *Agenda for the 2nd MC meeting in Trieste*
- *The 2nd European Space Weather Week (joint action with COST274, ESA and E-STAR)*
- *COST296/724 Collaboration*
- *Any other business*



*2nd General Assembly of the EGU
2005 Session related to COST271 and
296 actions*



***ST10 Ionospheric monitoring and modelling for
advanced terrestrial and space-based systems***

Convener: Lj. R. Cander and Co-convener: J. Lastovicka

The main purpose of the symposium, to present new information and the latest progress related to ionospheric monitoring and advanced measuring techniques, on measurements' evaluation and interpretation, dissemination and archiving, on modelling and simulations, and on development of methods of ionospheric predictions (with emphasis to European area), including the final results obtained in the European project COST271, was covered with

- 3 solicited presentations,***
- 6 oral presentations,***
- 10 poster presentations.***



*2nd MC meeting at Abdus Salam
ICTP, 30 May - 1 June 2005,
Trieste (38 participants)*



- *Several applications from non-COST countries Institutes to join COST296: University of Lowell, USA; St Petersburg University, Russia; IZMIRAN, Russia; Polar Research Institute of China, China and China Research Institute of Radiowave Propagation, China;*
- *Chairman of the COST724 Action gave an introductory talk on different opportunities for collaboration between COST296 and COST724 Actions;*
- *The 2nd European Space Weather Week (joint Workshop COST296, COST724, ESA and E-STAR);*
- *Budget for the period July 1st 2005 to June 30th 2006: 72500€;*
- *Terms of Reference and List of Participants for each WP were discussed and defined.*



***TIST Annual Review Meeting (ARM)
29th June – 1st July 2005, Vitznau,
Switzerland***



COST Action 296 PROGRESS REPORT, Period: from February to May 2005 by Cander and Zolesi

Monitoring of Actions in progress is the second important task of the TC's that:

- Monitor the implementation of its COST Actions to ensure that the objectives as set out in their Memoranda of Understanding are met;*
- Ensure coordination and exchange of information, as required, as well as complementarity and synergy between its Actions as well as with relevant activities in other Technical Committees in COST, the EU R&D programmes, EUREKA, the ESF, other European cooperative research frameworks and standardisation bodies;*
- Take account of inter-disciplinarity within its domain and with other domains, and of new developments in its domain.*

The results of the monitoring of the Actions in progress will be taken into account by the TC in the allocation of the COST budget assigned to the Action.



COST296 Seminar on ITU-R SG3L, 4 to 5 July 2005 at IGAM, University of Graz



- *Introduction by L. Barclay on ITU and ITU-R Study Groups*
- *NeQuick for ITU-R*
- *Data banks*
- *New Maps for NmF2 and hmF2 to be derived*
- *Advantages and disadvantages of “grid point maps” to replace the “algorithmic maps”*
- *Submission plans*

2. Generation of input:

Nr	TITLE	Resp.	Date
1	Update NeQuick to V2 (include Faraday calc?) [Rec P.531]	R.L.	2005
2	Update GISM to V2 [Rec P.531]	Y.B.	2005
3	Produce report on the models (based on NeQuick and GISM)	R.L.&Y.B.	2005
4	New Maps: NmF2, hmF2, MODIP	R.L.	2005
5	Ionospheric properties for HF- Skywave [Rec P.533]	L.B.	2006
6	HF Channel simulator [Rec F.1487]	L.B.	2006
7	Model of ionospheric Trough for HF propagation.	R.L. & L.C.	2006
8	Model of ionospheric dynamics (based on slab thickness) [Rec P.531]	S.K.	2006
9	Short term forecasting	L.C. & L.B.	2005

A. Casimiro: How do we motivate people to work on ITU?



Special issues of EGU 2003 and 2004 related to COST271



- *Annals of Geophysics, Vol. 48, June 2005* collects the contributions presented at the Solar-Terrestrial Sciences session ST17 on "Effects of the Ionosphere on Terrestrial and Earth-Space Communications", held during the European Geophysical Society, American Geophysical Union and European Union of Geosciences Joint Assembly, Nice, France, 6 – 11 April, 2003.
- *Journal of Atmospheric and Solar-Terrestrial Physics, Vol. 67, August 2005* collects the oral contributions presented at the Solar-Terrestrial Sciences session ST14 on "Space weather and RF communications: monitoring and modelling", held during the 1st General Assembly of the European Geosciences Union, Nice, France, 25 – 30 April, 2004.



*3rd MC meeting and ESWWII,
14 – 18 November 2005,
ESA/ESTEC, Noordwijk*



Invited talk:

B. Arbesser-Rastburg: 'Opportunities for introducing the conclusions of the COST296 Action into the studies of the ITU-R'
R. Letinger 'Current status of the ITU-R 3L documents relevant to the COST296 Action'

Progress reports of Working Group Leaders (Annex of the Minutes)

WG 1: Ionospheric monitoring and modelling

WG 2: Advanced terrestrial systems

WG 3: Space based systems

17 COST296 signatories by 11 November 2005:

Austria, Belgium, Bulgaria, The Czech Republic, Cyprus, Finland, France, Germany, Greece, Hungary, Italy, Poland, Portugal, Romania, Spain, Turkey and the UK.

Institutions from non-COST countries: *University of Massachusetts Lowell, USA; St Petersburg State University, St Petersburg, Russia; IZMIRAN, Moscow, Russia; Polar Research Institute of China, Shanghai and China Research Institute of Radiowave Propagation, Beijing, China, and Geomagnetic Laboratory, Ottawa, Canada and in the process Universiti Kebangsaan (UKM), Malaysia.*



*3rd MC meeting and ESWWII,
14 – 18 November 2005,
ESA/ESTEC, Noordwijk*



Session 3A *Ionosphere / positioning and telecommunication*

Wednesday, 16 November

09.00	<i>Manifestation Of Strong Geomagnetic Storms In The Ionosphere Above Europe Buresova, D.</i>
09.30	<i>New Improvements In HF Ionospheric Communication And Direction Finding Systems Bertel, L.</i>
10.00	<i>Space Weather influence on satellite based navigation and precise positioning Warnant, R.</i>
10.30	<i>Coffee Break</i>

Session 3B

11.00	<i>Short-term (1-24 h) foF2 forecast: Present day state of art Mikhailov, A.</i>
11.30	<i>Effects of Ionospheric Scintillations in GNSS Operation Beniguel, Y.</i>



ESWWIII

13 – 17 November 2006, Brussels



	Monday	Tuesday	Wednesday	Thursday	Friday
09:00		1	3	2	8
10:00		coffee	coffee	coffee	coffee
11:00		1	3	2	8
12:00		posters	posters	posters	Round Table
13:00	registration	lunch	lunch	lunch	close
14:00	welcome	splinters	splinters	splinters	<u>SWWT splinter</u>
15:00	Session 4				
16:00		5	7	6	close
17:00	4	5	7	6	
18:00	reception?				
18:30	↓	end sessions	end sessions ↓	end sessions	

Proposal:

1. Space Weather Modelling: from science to applications
2. science underpinning space weather
3. GIOVE-A and Galileo: Effects and Applications
4. Hot topics in space weather science and applications
5. IXY, Virtual Observatories, Data Bases and new Tools.
6. Space Weather Challenges for Planetary Exploration
7. Methods used in Meteorology Applied to Space Weather
8. Agencies Activities and Programmatics



Presentations at international conferences



EUROPEAN CONFERENCE PROPAGATION & SYSTEMS, March 2005, France:
Evaluation and mitigation of ionospheric effects on radio systems, COST 271 and follow-on actions by Cander, Zolesi and Bourdillon

Space Environment Center Space Weather Week, April 2005, USA:
COST 296 MIERS - 'Mitigation of Ionospheric Effects on Radio Systems' new European COST Action by Cander, Stanislawska and Zolesi

EGU, April 2005, Austria:
From COST271 EACOS (Effects of the Upper Atmosphere on Terrestrial and Earth-space Communications) to COST 296 MIERS (Mitigation of Ionospheric Effects on Radio Systems): two European union projects on ionospheric physics and radiopropagation by Zolesi and Cander

IES 2005, May 2005, USA:
Highlights from COST-271 and the future with COST-296 by Warrington

IRI Workshop, July 2005, Spain:
From COST 271 to 296 EU actions on ionospheric monitoring and modelling for terrestrial and Earth-space radio systems by Zolesi, Cander and Altadill

URSI General assembly, October 2006, India:
From COST271_ EACOS (Effects of the Uupper Aatmosphere on Tterrestrial and Eearth-space Ccommunications) to COST 296 MIERS (Mitigation of Ionospheric Effects on Radio Systems): two European Union projects on Ionospheric Physics and Radiopropagation by Zolesi and Cander



*Measuring campaign on the occasion
of the solar eclipse on 3 October 2005
(90% occultation over Spain)*



with:

- Coordinated measurements by a maximum of sounding facilities available in Europe to get a comprehensive view on the ionosphere and to study the impact on radio systems (ionosondes, GPS facilities of COST 296 members, IGS and others, EISCAT, satellites);*
- Creation of a special data bank that collects all original and value added data that are available with free access to all COST 296 participants;*
- Initiation of joint studies, e.g. related to the response of ionospheric ionization with respect to the occultation function, occurrence of wave phenomena – **INVITED TALK AT EGU 2006***

Short-Term Scientific Missions

- Mr. Murat Özgür Sarı from METU (Turkey) to Leicester University (UK);*



*EGU 2006 Session related to
COST296 , 2 – April 2006, Vienna*



***ST5.7 Measurements of ionospheric parameters
influencing radio systems***

Convener: J. Lastovicka and Co-convener: Lj. R. Cander

The main purpose of the Symposium was to present new information on ionospheric measurements and advanced measuring techniques, on measurement evaluation, interpretation, dissemination and archiving, on development of methods of ionospheric predictions, forecasting and nowcasting (with emphasis to European area but including results from other areas, as well), including the results obtained in the projects COST271 and COST296. Papers on related on modelling and simulations are accepted, as well.

- 4 solicited presentations,***
- 9 oral presentations,***
- 15 poster presentations.***



*4th MC meeting, DLR Neustrelitz,
27 -29 April 2006*



Invited talks:

- Dr. S. Hawlitschka: "Investigations of the effect of ionospheric heterogeneities on direction finding"*
- Dr. A. Belehaki: "DIAS: The European System for ionospheric specification and forecasting"*
- Mr. J. Rueffer: "On the use of ionospheric information in precise positioning and navigation"*



Mitigation of Ionospheric Effects on Radio Systems (MIERS)

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The COST296 Action is structured in three Working Groups:

WG 1 - Ionospheric monitoring and modelling:

Dr J. Laštovička and Dr I. Stanislawska

- *Near Earth space plasma monitoring: Dr D. Altadill and Mr R. Stamper*
- *Data ingestion and assimilation in ionospheric models: Dr D. Buresova and Dr B. Nava*
- *Near Earth space plasma modelling and forecasting: Prof I. Kutiev and Dr H.J. Strangeways*
- *Climate of the upper atmosphere: Dr J. Bremer and Dr E. Turunen*



Mitigation of Ionospheric Effects on Radio Systems (MIERS)

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WG 2 - Advanced terrestrial systems:

Prof A. Bourdillon and Prof E. Tulunay

- *Radar and radiolocation:* *Dr C. Bianchi and Dr M. Warrington*
- *HF/MF communications:* *Prof J. M. Andujar and Dr P. Lassudrie-Duchesne*
- *Spectrum management:* *Prof L. W. Barclay and Prof A. M. Casimiro*

WG 3 - Space-based systems:

Dr N. Jakowski and Prof R. Leitinger

- *Space plasma effects:* *Prof S. Radicella and Dr P. Sauli*
- *Special mitigation techniques:* *Dr U. Foelsche and Prof R. Warnant*
- *Scintillation monitoring and modelling:* *Dr Y. Beniguel and Dr V. Romano*