STCE Newsletter

29 Dec 2014 - 4 Jan 2015

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The Solar-Terrestrial Centre of Excellence (STCE) is a collaborative network of the Belgian Institute for Space Aeronomy, the Royal Observatory of Belgium and the Royal Meteorological Institute of Belgium.

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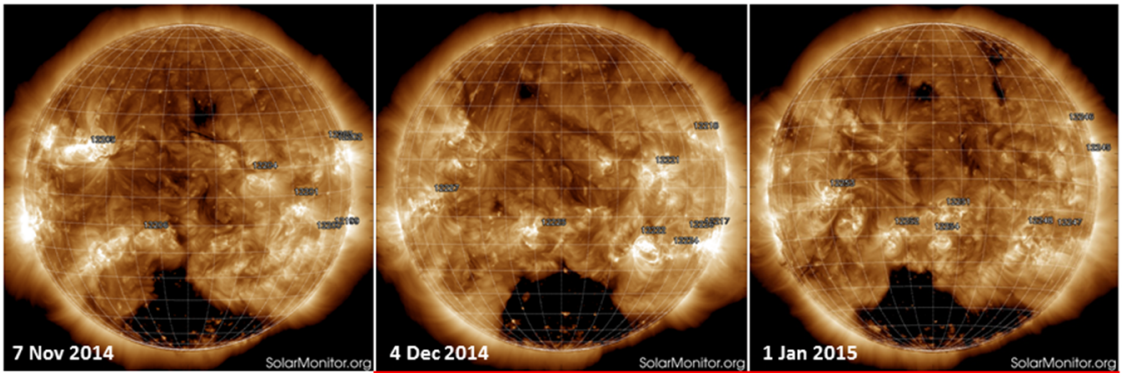
1. Fireworks in the sky!

Well, maybe it was a bit late to spectacularly launch the New Year, but at least in the northern part of the Netherlands some faint but colorful polar light could be seen low above the northern horizon on 4 January around 18:00UT. The aurora didn't last long, barely 10 minutes, but Vincent van Leijen (https://www.flickr.com/photos/fotovins/16017690757/in/photostream/) still managed to snap this great picture.

The source of the geomagnetic field disturbance was the high speed stream of a coronal hole that transited the south-central part of the solar disk just a few days before (see SDO-images underneath). Interestingly, this coronal hole was also responsible for a similar disturbance ("minor geomagnetic storm") during its previous transit early December.



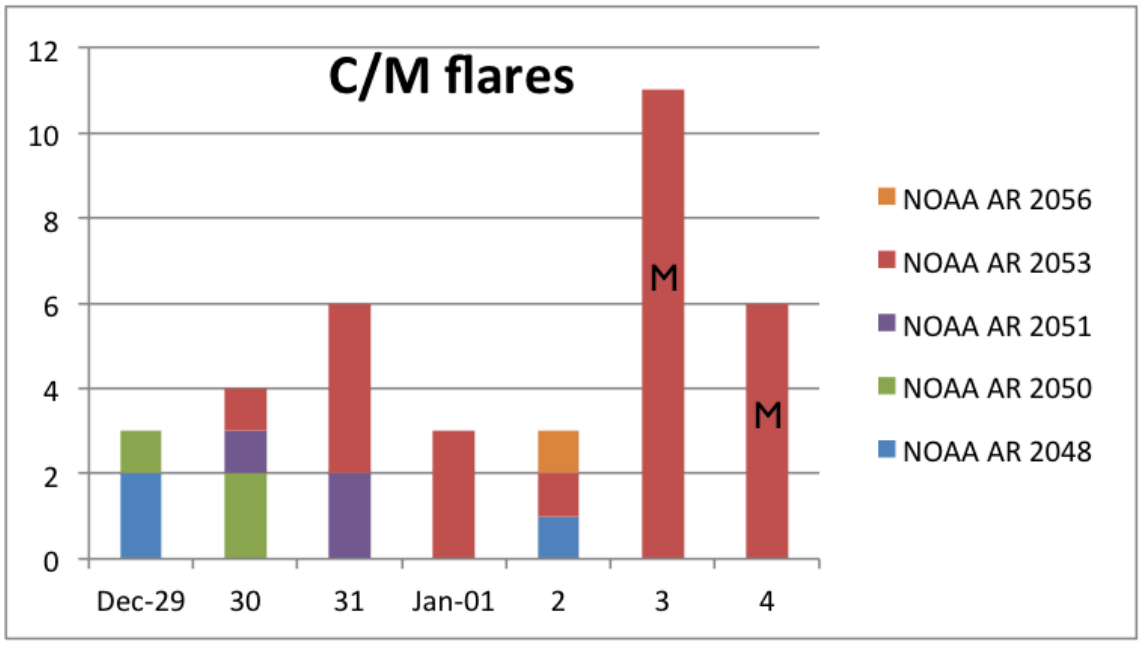
NO Geomagnetic Storm | Minor Geomagnetic Storm | Minor Geomagnetic Storm

There are several reasons why the polar light in this picture seems rather faint, for example when compared to a similar display on 12 September 2014 (see this news item at http://stce.be/news/268/

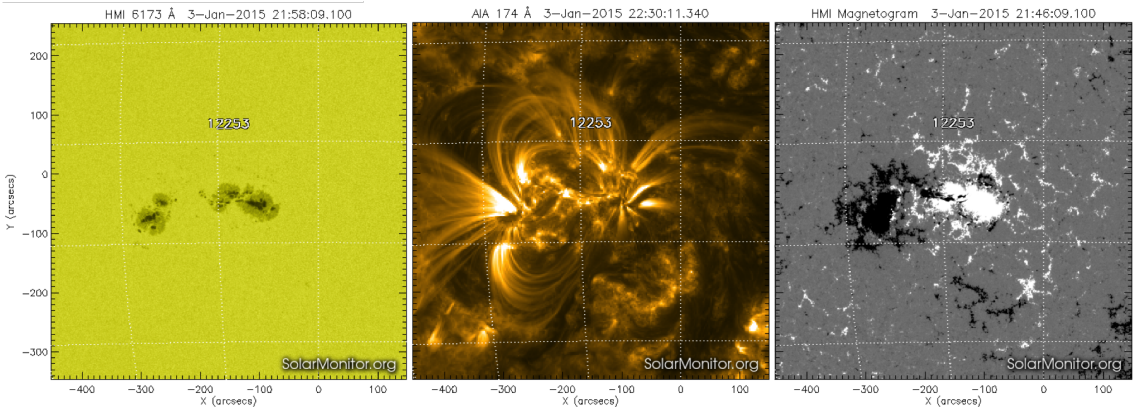
welcome.html). At that time, it concerned a major geomagnetic storm (one of the strongest of 2014), so significantly more intense than the 4 January display. More importantly, the 4 January picture was taken early evening, when it was not yet completely dark. Last but not least, there was also a Full Moon around those days, resulting in even more unwanted bleach on the picture.

2. Review of solar activity

A total of 34 C- and 2 M-class flares were recorded over the period.



NOAA 2253 was the most prominent region of the week, containing a delta structure in its leading portion from 01 till 04 January. The picture below the photospheric (HMI instrument onboard SDO), coronal (SDO/AIA) and magnetic (SDO/HMI magnetogram) semblance of NOAA 2253 on 03 January. It was the source of 25 C-class flares and also the two M1 flares, resp. on 03 January peaking at 09:47UT (M1.1) and on 04 January at 15:36UT (M1.3).



Active regions NOAA 2248, NOAA 2250 and NOAA 2251 contributed each with 3 low-level C-class flares.

The greater than 10 MeV proton flux was at nominal levels. No significant or earth-directed CMEs were observed over the entire week.

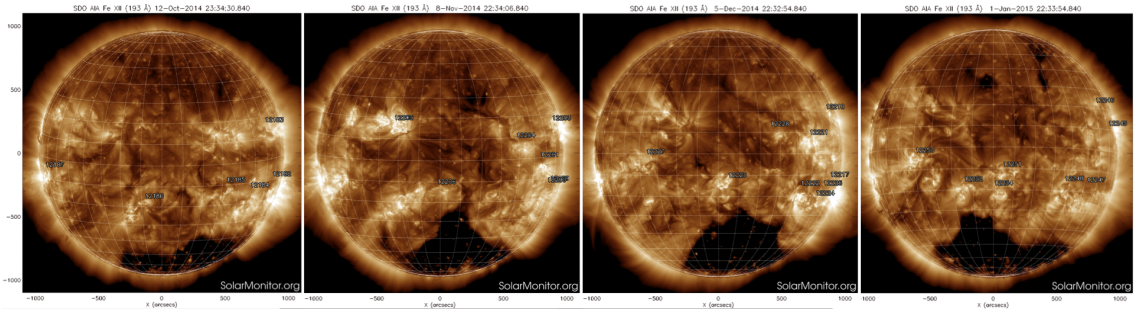
3. Noticeable Solar Events (29 Dec 2014 - 4 Jan 2015)

DAY	BEGIN	MAX	END	LOC	XRAY	OP	10CM	TYPE	Cat	NOAA
03	0940	0947	0950	S4E17	M1.1	1N	57			2253
04	1518	1536	1553	S7E2	M1.3	2N				2253

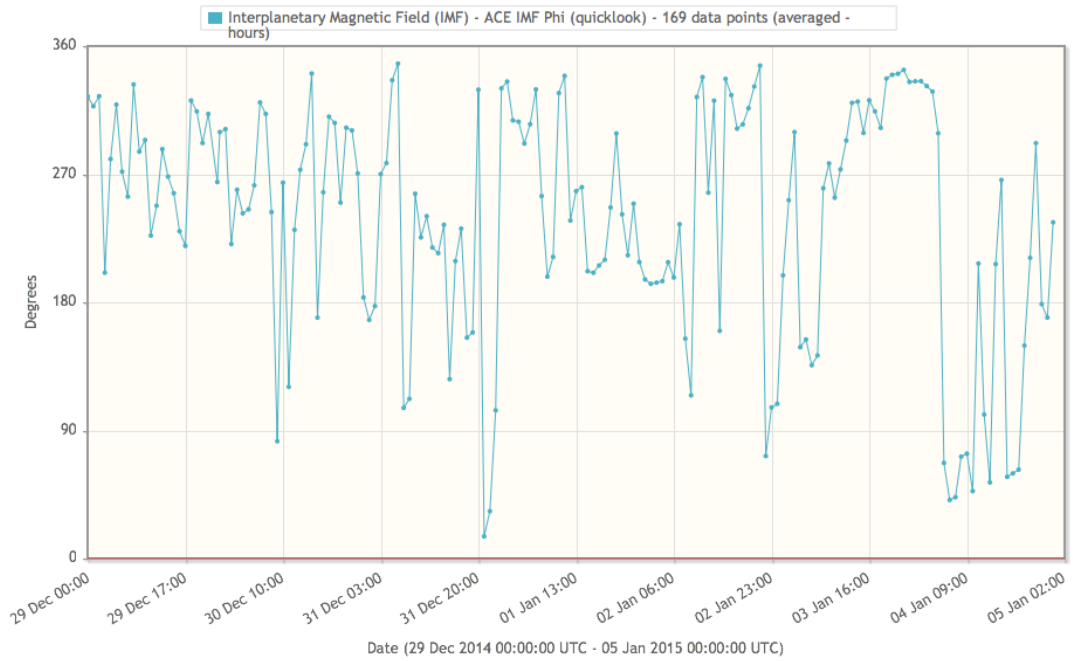
LOC: approximate heliographic location
XRAY: X-ray flare class
OP: optical flare class
10CM: peak 10 cm radio flux
TYPE: radio burst type
Cat: Catania sunspot group number
NOAA: NOAA active region number

4. Review of geomagnetic activity

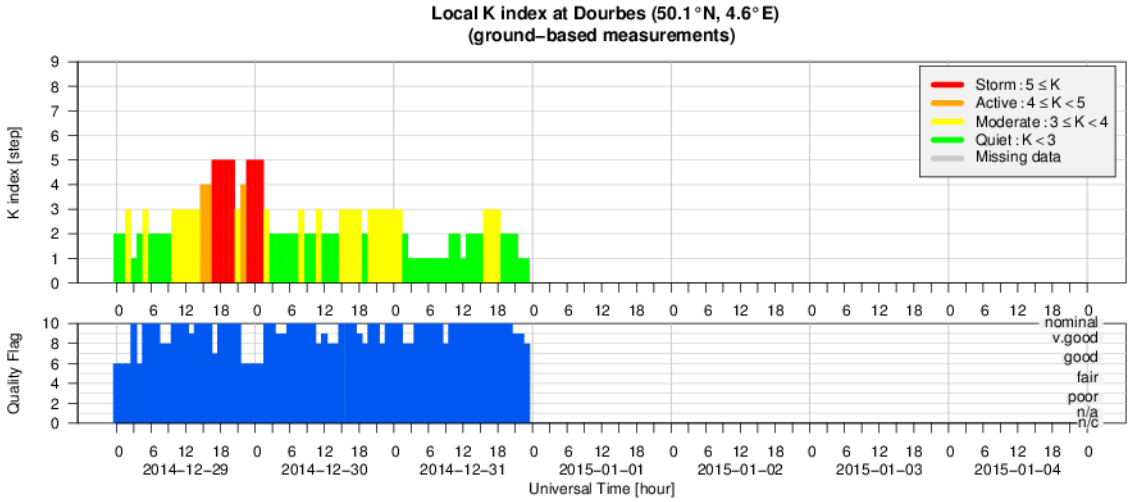
High Speed Streams (HSS) from various coronal holes influenced the geomagnetic field. This resulted in minor geomagnetic storming on 29-30 December and again on 04-05 January.
During the first period, solar wind speed reached values near 750 km/s, with Bz wildly fluctuating between -11 and +11 nT.
The second period saw the recurring effects from the extension of a southern polar coronal hole that was also responsible for a minor geomagnetic storm during its previous transit early December. The pictures below is taken by SDO/AIA and shows the southern polar coronal hole on 01 October 2014, 08 November 2014, 05 December 2014 and 01 January 2015.



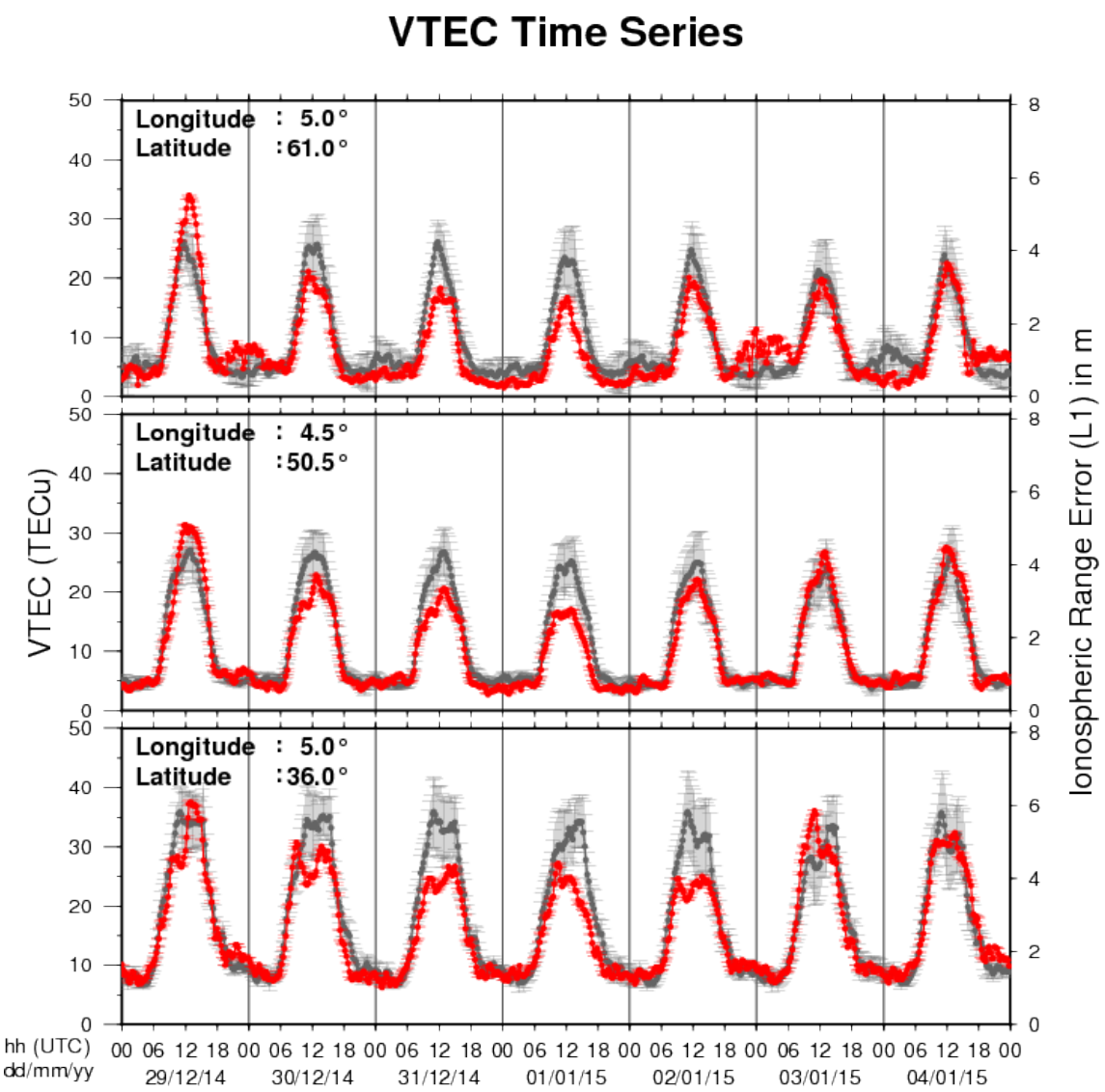
Solar wind speed gradually increased to values around 550 km/s, preceded by a sustained period of negative Bz up to -10 nT. Geomagnetic conditions were quiet to unsettled for the rest of the week, with the exception of a brief active episode at Dourbes late on 02 and early on 03 January (est. Kp at minor storm level). The IMF was directed towards the Sun until 01 January, after which periods of "towards" oriented IMF alternated with episodes of "away" orientation. The pointing of the IMF "Towards" or "Away" is measured by ACE IMF Phi, i.e. the angle of the IMF in the XY plane. If Phi is between 270 and 360 degrees, the IMF points "Towards", if Phi is between 90 and 180 degrees, the IMF points "Away".



5. Geomagnetic Observations at Dourbes (29 Dec 2014 - 4 Jan 2015)



6. Review of ionospheric activity (29 Dec 2014 - 4 Jan 2015)



The figure shows the time evolution of the Vertical Total Electron Content (VTEC) (in red) during the last week at three locations:
a) in the northern part of Europe(N61°, 5°E)
b) above Brussels(N50.5°, 4.5°E)
c) in the southern part of Europe(N36°, 5°E)
This figure also shows (in grey) the normal ionospheric behaviour expected based on the median VTEC from the 15 previous days.

The VTEC is expressed in TECu (with TECu=10^16 electrons per square meter) and is directly related to the signal propagation delay due to the ionosphere (in figure: delay on GPS L1 frequency).
The Sun's radiation ionizes the Earth's upper atmosphere, the ionosphere, located from about 60km to 1000km above the Earth's surface.The ionization process in the ionosphere produces ions and free electrons. These electrons perturb the propagation of the GNSS (Global Navigation Satellite System) signals by inducing a so-called ionospheric delay.

See http://stce.be/newsletter/GNSS_final.pdf for some more explanations ; for detailed information, see http://gnss.be/ionosphere_tutorial.php

7. Future Events

For more details, see http://www.spaceweather.eu/en/event/future

Conference on Sun-Climate Connections (SCC 2015) in Kiel, Germany

Start : 2015-03-16 - End : 2015-03-19
This international conference will provide an overview of our current understanding of Sun-Climate Connections starting at processes on the Sun itself over space weather and solar wind towards solar influence on the upper atmosphere down to the ocean. It will also provide insights into the heatedly debated role of the Sun in climate change. In four sessions the various contributions of solar variability influence on Earth's climate will be presented and discussed by bringing together solar physicists, space scientists, atmospheric scientists, climate modellers, and paleoclimatologists.
We expect contributions from scientists participating in SCOSTEP/ROSMIC, SPARC-SOLARIS/HEPPA, the EU cost network TOSCA, as well as any other interested scientists. The conference will last three full days, beginning Monday morning, 16 March 2013. The programme will consist of invited and keynote lectures, a few contributed oral presentations and ample time dedicated to poster sessions. The fourth day will be devoted to public outreach activities as well as panel discussions.
Website: http://scc.geomar.de/

URSI AT-RASC 2015 in Gran Canaria, Spain

Start : 2015-05-18 - End : 2015-05-22
URSI AT-RASC 2015 will be the first edition of the newly established triennial URSI Atlantic Radio Science Conference as one of the URSI Flagship Conferences. AT-RASC 2015 will have an open scientific program composed of submitted papers within the domains covered by all ten Commissions of URSI.
Website: http://www.at-rasc.com/

Los Alamos Space Weather Summer School, in Los Alamos, NM, USA

Start : 2015-06-01 - End : 2015-07-24
The Space Weather Summer School at Los Alamos National Laboratory, established in 2011 under the founding Director Josef Koller, is dedicated to space weather, space science and applications. Every year we solicit applications for the Los Alamos Space Weather Summer School. This summer school is sponsored and supported by a number or organizations at LANL. This year our top sponsors include the Los Alamos Institute of Geophysics, Planetary Physics and Signatures (IGPPS) and the Laboratory Directed Research and Development Office (LDRD). The summer school brings together top space science students with internationally recognized researchers at LANL in an educational and collaborative atmosphere.
Website:
http://www.swx-school.lanl.gov/

Loops7: Heating of the Magnetically Closed Corona in Cambridge, UK

Start : 2015-07-21 - End : 2015-07-23
The conference will review past and recent achievements, as well as future challenges in the field of solar coronal loop physics.
Website:
http://www.damtp.cam.ac.uk/user/astro/cl7/index.html

Heliophysics Summer Schoool 2015: Seasons in Space: Cycles of variability of Sun-Planet systems, in Boulder, CO, USA

Start : 2015-07-28 - End : 2015-08-04
Heliophysics is all of the science common to the field of the Sun-Earth connections. This fast-developing field of research covers many traditional sub-disciplines of space physics, astrophysics, and climate studies. The NASA Living with a Star program, with its focus on the basic science underlying all aspects of space weather, acts as a catalyst to bring the many research disciplines together to deepen our understanding of the system of systems formed by the Sun-Earth connection.
Website:
http://www.heliophysics.ucar.edu/

34th International Cosmic Ray Conference (ICRC) in The Hague, The Netherlands

Start : 2015-07-30 - End : 2015-08-06
The 34th International Cosmic Ray Conference (ICRC) will be held from July 30 to August 6, 2015, in The Hague, The Netherlands. It is an important and large conference in the field of Astroparticle Physics. The ICRC covers: cosmic-ray physics, solar and heliospheric physics, gamma-ray astronomy, neutrino astronomy, and dark matter physics.
Website: http://icrc2015.nl

Ground-based Solar Observations in the Space Instrumentation Era in Coimbra, Portugal

Start : 2015-10-05 - End : 2015-10-09
This CSPM-2015 scientific meeting will cover various aspects of solar dynamic and magnetic phenomena which are observed over the entire electromagnetic spectrum: white-light, Hα, Ca II, and radio from ground and in a variety of other wavelengths (white light, UV and EUV, and X-rays) from space. Emphasis will also be placed on instrumentation, observing techniques, and solar image processing techniques, as well as theory and modelling through detailed radiative transfer in increasingly realistic MHD models. The long-term (cyclic) evolution of solar magnetism and its consequence for the solar atmosphere, eruptive phenomena, solar irradiation variations, and space weather, will be in focus. Here, special attention will be devoted to the long-term observations made in Coimbra and also to the results of the SPRING / SOLARNET and SCOSTEP VarSITI studies. In particular, the weak solar activity during the current solar maximum will be discussed. Finally, since this meeting is organised around the 90th anniversary of performing the first spectroheliographic observations in Coimbra, a session will be specially dedicated to new solar instruments (both ground-based and space-borne) that will give access to unexplored solar atmospheric features and dynamic phenomena over the coming years.
Website:
http://www.mat.uc.pt/~cspm2015/

41st COSPAR Scientific Assembly in Istanbul, Turkey

Start : 2016-07-30 - End : 2016-08-07
The 41st COSPAR Scientific Assembly will be held in Istanbul, Turkey from 30 July - 7 August 2016. This Assembly is open to all bona fide scientists.
Website:
https://www.cospar-assembly.org/