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The First CCMC Space Weather School in India and Plausible Future Initiatives



cessi

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The CCMC Space Weather School in India

The Genesis of the School

SCIENCE FOR SPACE WEATHER

24-29 January, 2016
Goa, India

SOC

Robert Wimmer-Schweingruber	Chair, Univ. Kiel, Germany
Anil Bhardwaj	ISRO, India
Jörg Büchner	MPS, Germany
Ioannis Daglis	Univ. Athens, Greece
Philippe Escoubet	ESA, The Netherlands
Alexi Glover	ESA, Germany
Nat Gopalswamy	NASA/GSFC, USA
Manuel Grande	Univ. Aberystwyth, UK
Madhulika Guhathakurta	NASA, USA
Don Hassler	IAS, France and SwRI, USA
David Jackson	Met Office, UK
Masha Kuznetsova	GSFC/NASA, USA
Cristina Mandrini	IAFE, Argentina
Arnaud Masson	ESA/ESAC Spain
Tsutomu Nagatsuma	NICT, Japan
Dibyendu Nandi	CESSI/IISER Kolkata, India
Paul O'Brien	Aerospace Corp., USA
Terry Onsager	NOAA, USA
Hermann Opgenoorth	IRFU, Sweden
Manuela Temmer	Univ. Graz, Austria
Chi Wang	NSSC, China
William Ward	Univ. Brunswick, Canada



Advantages of Association with a Conference

- Access to international experts who are attending the conference
- Students access to basic tutorials and state-of-the-art research
- Logistics simpler, can be handled by the LOC freeing up CCMC staff
- Leveraging of Funding: For example, for this CCMC school funding was leveraged from CESSI, SCOSTEP-VarSITI, COSPAR, ILWS and ISRO

Planning and Logistics

- Important to get together a set of instructors early on and have them finalize their tutorials/problem sets for distribution before the school; CCMC (led by Masha) was on top of this
- Students were instructed to bring their own laptops with compatible operating systems
- The Internet Bottleneck: Not all places are well connected! CCMC and CESSI computer system staff put their heads together to design a local network which sourced materials for demos and tutorials from a local storage device; in principle, the same design can now be implemented in remote places with limited network access
- Important: Figure out customs formalities and have documentation and letters in place for passage of hard drives and networking equipment

Introduction to Space Weather: Concepts and Tools



Structure

- Sunday: Tutorial lectures all day
- Tuesday Afternoon: CCMC Integrated Space Weather Analysis tool
- Thursday Afternoon: CCM Runs-on-Request Systems

Participant Impact



- Target: Undergraduate /graduate students (space/atmospheric sciences)
- Registration fees waived, local hospitality provided to all
- Had to stay the whole week
- Student statistics: 26 (From 20 organizations. 5 countries)

“I know that Masha is looking for some positive criticism, but I am sorry to say that I don't have any” – a student participant

Thanks Again!



Future Initiatives

Based on our very positive experience with the CCMC Team, the Center of Excellence in Space Sciences India (CESSI) would like to move forward with more such schools in the Indian and Asian Region...

Space Weather Beyond Borders: Why?

- India has a rapidly expanding space program; it's first solar space observatory *Aditya* scheduled to launch in 2020
- About 15 educational/research organizations involved in space science related research; growing solar physics/space weather community
- Grass-roots level exchange of knowledge (targeting students) will create trained human resource for furthering space weather sciences globally
- May seed mutually beneficial cooperation in space weather sciences

How?

- Finding local partner organizations important for logistics and support
—CESSI is willing to do this within India
- Commitment to partnering with CCMC to hold a school once every two years in the Indian/South-East Asian region
- Sending student trainees to CCMC – who commit to specific support work for CCMC following their training
- Developing research linkages with CCMC scientific personnel which may help transition science models to operational forecasting models
- Possible Sponsors
 - CESSI, MHRD, DST, ISRO
 - COSPAR, SCOSTEP, ILWS-NASA, NSF, IUSSTF, AOARD

Science-to-Operational Models for Space Weather

Solar Magnetic Fields (Interior and Atmosphere)

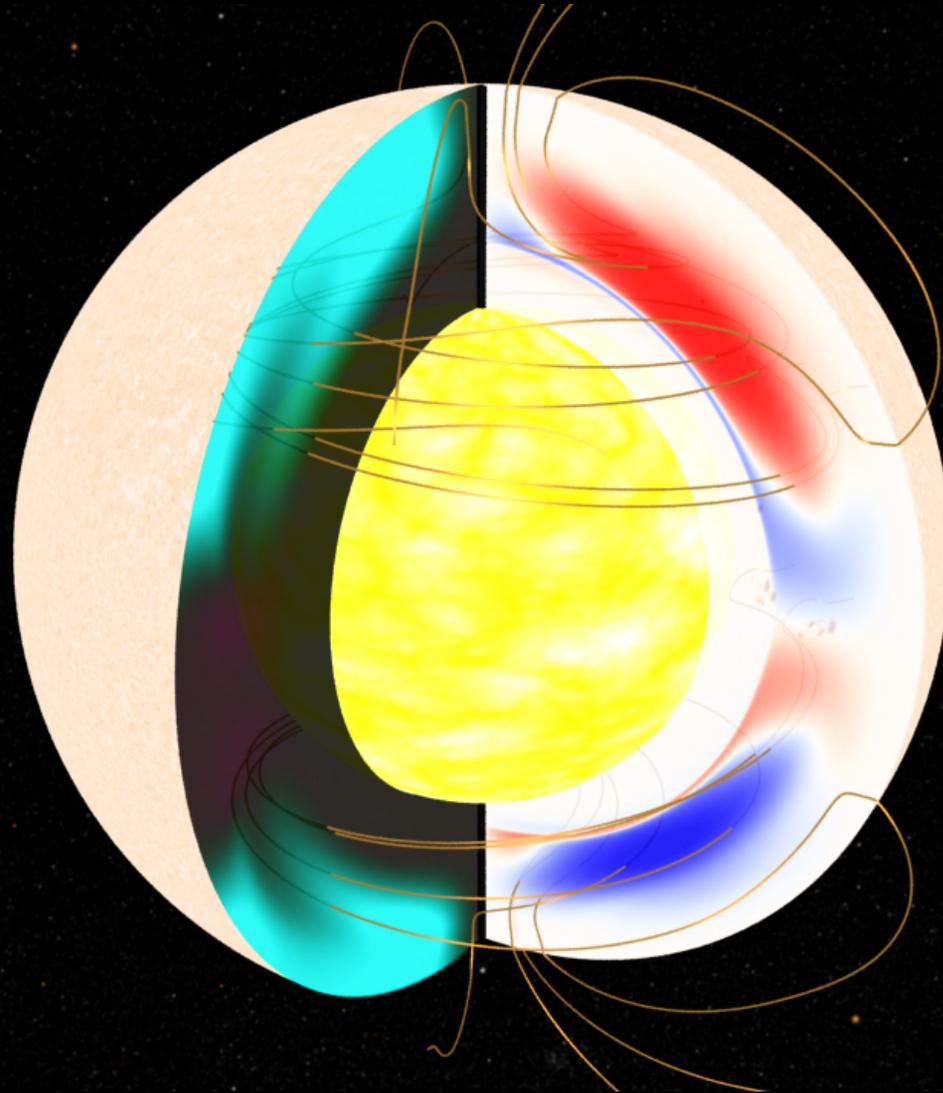
Solar Storms

Solar Wind Conditions

Solar Particle Fluxes

Solar Radiation Spectrum

Solar Dynamo Model



- We can contribute a well-studied and robust, solar dynamo model which can be adapted and added to the CCMC resources

Concluding Remarks

- It was privilege to be associated with CCMC and supporting their first school in India, intellectually, logistically and financially!
- The success of the school, the positive response from students and the obvious advantages such school have in furthering international capacity building in space weather sciences motivates future initiatives
- CESSI is ready to partner with CCMC for coordinating schools and education initiatives in India and the South-East Asian region
- Support from local and international organizations to be leveraged following our recent, successful model
- A white paper for International Research, Education and Development Initiative (IREDI) would be an ideal first step following today's panel discussion.....