2008 CEDAR Workshop Schedule

Monday, June 16, 2008

Tuesday, June 17, 2008

Wednesday, June 18, 2008

Thursday, June 19, 2008

Friday, June 20, 2008

Saturday, June 21, 2008

Sunday, June 22, 2008

Student Workshop - Space Weather Influences on the Ionosphere

Matterhorn, Monday, June 16, 2008, 9:00 am – 4:00 pm

Conveners:
Jonathan Fentzke, University of Colorado, Boulder
Romina Nikoukar, University of Illinois at Urbana-Champaign

09:00-09:05	Student Welcome from NSF	R. Behnke/R. Robinson (NSF)
09:05-09:20	From a CEDAR graduate student to the CEDAR Chair	J. Thayer (CSSC Chair)
09:20-09:30	Agenda information and organizational details	J. Fenzke and R. Nikoukar (CSSC student reps)
09:30-10:30	Keynote Speech #1: Space Weather Influences on the Ionosphere	T. Bogdan (NOAA SWPC)
10:30-10:45	--- Break ---	
10:45-11:45	Student Tutorial: Magnetosphere-Ionosphere-Thermosphere Coupling Processes	J. Huba (NRL)
11:45-12:15	Space Weather: Observational evidence for coupling and feedbacks involving the ITM	J. Kozyra (U Mich)
12:15-13:45	Lunch at nearby banquet room (pay own) or on own	
13:45-14:15	Brainstorming - Small Satellites	T. Moretto (NSF)
14:15-14:45	High Latitude Space Weather	A. Stromme (EISCAT Scientific Association)
14:45-15:00	--- Break ---	
15:00-15:30	Depletions, Extreme Gradients, and Structures: Space Weather in the Low- and Mid-Latitude Ionosphere	J. Makela (U IL)
15:30-16:00	Space Weather Interactive Demo	M. Kuznetsova (NASA GFSC)
16:00	Adjourn	

Geospace Response to Solar Minimum Drivers - All Solar Minima Are Not the Same

Matterhorn: 1300-1500 Tuesday 17 June and 1300-1500 Wednesday 18 June 2008

Conveners:
Janet Kozyra, University of Michigan
Larry Paxton, The Johns Hopkins University

The present solar minimum is unusually deep with monthly sunspot numbers dipping to values below those of the last 4 solar cycles and monthly magnetic activity at levels comparable to the quietest intervals over this same time period. During this time, it was expected that signatures of geomagnetic activity in the upper atmosphere would be at a minimum allowing a clearer view of the coupling with the lower atmospheric regions and raising the possibility of observing the ground-state of the Sun-Earth system. In fact this was the primary geospace science focus for the IHY Whole Heliosphere Interval (WHI) campaign that took place during 20 March - 16 April 2008, cosponsored by the Climate and Weather of the Sun-Earth System (CAWSES) program.

However, first results of WHI raise interesting questions about the standard picture of solar minimum drivers. In this standard picture, during the declining phase of the solar cycle, long-lived high-speed solar wind streams emanating from trans-equatorial coronal holes drive periodic auroral activity at Earth lasting up to 7 days or more and recurring over multiple solar rotations. Moving into solar minimum, these organized fast streams give way to slower solar wind in the ecliptic plane and magnetic activity at Earth decreases as coronal holes retreat to the polar regions on the Sun.

During WHI in 2008 observations showed that the nature and distribution of coronal holes near solar minimum had important differences from this simple picture - isolated, trans-equatorial coronal holes persisted throughout the solar minimum interval. The high speed solar wind that arrived at Earth originated from deep within the coronal holes and thus was exceptionally fast and long-lived. In contrast, in 1996 during Whole Sun Month (10 Aug - 08 Sept 1996) and the surrounding solar minimum interval, the Earth experienced wind from the equatorward extension of a polar coronal hole called the “Elephant’s Trunk". The resulting high speed streams, coming mostly from the edges of the narrow coronal hole extension, were weak and disorganized. Since the speed and duration of coronal hole winds have been shown to control the nature and severity of resulting geospace and atmospheric disturbances, the geospace response to solar minimum conditions must vary considerably between solar cycles 22 and 23. All solar minima are not the same.

The purpose of this workshop is to: (1) Take a first look at the upper atmosphere and geospace response to the persistent high speed solar wind driving during the current solar minimum interval with focus on the WHI 2008 campaign interval; (2) Compare to conditions during the last solar minimum in 1996 (where possible) with focus on the 1996 WSM interval; (3) Identify interesting Sun-to-Earth science questions from the ITM perspective as well as focus areas within the ITM system for continuing collaborations with the WHI campaign.

Arecibo Friends

Grindelwald: 1300-1500 Tuesday 17 June 2008 and Matterhorn: 1600-1800 Wednesday 18 June 2008

Conveners**:**
Pedrina Terra, Arecibo Observatory
Christiano Brum, Arecibo Observatory
Nestor Aponte, Arecibo Observatory
Sixto González Arecibo Observatory

This workshop will begin with a Arecibo Science Overview followed by a discussion of the status of Arecibo funding situation. After these introductory sections, we will proceed to hearing the highlights from the past year from our staff and users, starting with Mike Sulzer and the new HF facility.

Lower-Upper Atmosphere Coupling

Interlaken: 1300-1500 Tuesday 17 June 2008

Conveners**:**
Dave Fritts, NWRA/CoRA
Mike Taylor, Utah State University

This workshop is being convened at the suggestion of the CEDAR Science Steering Committee in response to the intention of the NSF Aeronomy and a lower atmosphere dynamics division to jointly fund observational and modeling studies aimed at coupling between the lower and upper atmosphere. The anticipated joint program is likely to begin over the next year or so and last for at least an NSF grant cycle, and potentially longer if deemed successful. It is also hoped that several significant collaborative coupling studies will result. Information about lower atmosphere measurement facilities (including aircraft, radars, lidars, and various in situ sensors) that are available for such experiments can be found at http://www.eol.ucar.edu.

We anticipate an open discussion providing time for all participants to offer suggestions or proposals for possible coupling studies that would involve both Aeronomy and lower atmosphere measurement capabilities. Please plan to provide an indication of your interest and potential campaign suggestions to the conveners in advance of the workshop so that we organize the workshop discussion in the order that seems most appropriate.

Space Science Instrumentation

Davos: 1300-1500 Tuesday 17 June 2008

Conveners:
Frank Lind, MIT Haystack Observatory
Julio Urbina, The Pennsylvania State University

Instruments for measuring properties of the space environment are a fundamental component of progress in CEDAR related science. Remote sensing and in-situ techniques have complementary capabilities which provide insight into physical processes over a wide variety of scales in the atmosphere. This workshop will provide an opportunity to highlight instrument development, deployment, and calibration efforts. Appropriate topics include recent advances and efforts to develop and improve instrumentation and measurement techniques for both ground and satellite based systems. Many of the challenges faced in modern instrument design are common issues and there are patterns associated with their occurrence and solution. The overall intent of the workshop is to identify and share the common problems and solutions which we face in the development and calibration of instrumentation.

Speakers are asked to prepare short talks highlighting the latest developments in space science instrumentation (10-12 minutes ; 6 to 8 slides). As part of the presentation the speaker should identify a critical "pattern" associated with implementing or calibrating a space science instrument. A pattern consists of : a problem which arises, the context in which it occurs, a real or potential method(s) to solve the problem, and the implications of the pattern and solutions when they occur (i.e. what is the meaning for the larger context surrounding the problem). The speakers should attempt to identify patterns which have real significance and potentially broad or important implications. After each talk an extended discussion period (15 minutes) will allow for discussion of the pattern identified by the speaker. This discussion will elicit from the group other contexts where the identified pattern occurs, other potential solutions or approaches, and will attempt to identify if the pattern and solution is common to more than one class of instrument.

CEDAR Community Information and Data Access with the CEDAR wiki and VSTO Data Portal

Basel: 1300-1500 Tuesday 17 June 2008

Conveners:
Patrick West, NCAR HAO
Barbara Emery, NCAR HAO

This CEDAR Database workshop will include demonstrations on how to edit pages on a wiki. All the CEDAR community and workshop wiki pages are editable by participants at annual CEDAR workshops, by CEDAR Database users, and by anyone else who wants a legitimate webname. This highlights our transition from static web pages at http://cedarweb.hao.ucar.edu to our wiki web pages at http://cedarweb.hao.ucar.edu/wiki. We will first demonstrate various ways to edit pages and upload materials on the community and workshop sites, and then show how to access the CEDAR Database. All CEDAR Database users who have signed an access form have a login name that allows them to access the CEDAR Database through the Virtual Solar-Terrestrial Observatory (VSTO) portal that is linked to the wiki site. Other wiki users must sign an access form with 'Rules of the Road' to obtain CEDAR Database access. After the short demonstrations, participants will be given plenty of time to try their own editing of community and workshop wiki pages, as well as access to the CEDAR Database.

Ground-Space Models for Studying Atmospheric Coupling

Grindelwald: 1300-1500 and 1600-1800 Wednesday 18 June 2008

Conveners:
Han-Li Liu, NCAR HAO
Dave Siskind, Naval Research Laboratory
Bob Schunk, Utah State University

Understanding the coupling of lower and upper atmosphere is a key element of CEDAR research, and a new CEDAR initiative, Integrative Aeronomy, aims to focus specifically on the physics and chemistry of the upper atmosphere and its integrative role in planetary atmosphere-space systems. To understand the coupling mechanisms, address issues in integrative aeronomy, and to support the CEDAR community research, numerical models from the ground to the upper atmosphere have been developed in recent years. We feel it would be timely to have a workshop reviewing the current status of such models and to discuss model development, validation, model inter-comparison, research application of these models, and integration with the CEDAR observational community. Specific topics will include, but not limited to,

1. Determine major dynamics, physics, chemistry modules used in these models.
2. Climatological comparisons (temperature, winds, composition, tides, planetary and gravity waves, semi-annual oscillation, quasi-biennial oscillation) and long term trends.
3. Meteorological case studies
    a. CAWSES-related tidal studies,
    b. Stratospheric warmings and associated mesospheric coolings,
    c. Polar mesospheric clouds,
    d. Perturbations from solar activity/space weather effects
4. Error growth and data assimilation.
5. Coupling of the neutral atmosphere to the ionosphere.
6. Possible impacts on the middle and lower atmosphere by upper atmospheric processes.

The unifying theme of the above topics is that they should consider the atmosphere from the troposphere into the thermosphere.

Description for Students
The upper atmosphere of the Earth responds to forcing from two external sources. The first, the solar wind, has been known for some time.. During geomagnetic storms, an increase in the solar wind speed acts to induce a large-scale current in the upper atmosphere. The energy that is deposited in the upper atmosphere at high latitudes not only leads to bright auroral displays, but acts to excite atmospheric gravity waves that propagate from high to low latitudes. In addition, during both quiet and disturbed times, it is now recognized that the upper atmosphere is affected by planetary, tidal, and gravity waves that propagate upwards from the lower and middle atmosphere (troposphere, stratosphere, and mesosphere), and they provide a significant source of momentum and energy for the upper atmosphere. The role that these waves play in the dynamics and energetics of the upper atmosphere is an exciting and relatively new area of research. An important part of this CEDAR Workshop will be devoted to understanding the coupling of the lower and upper atmosphere via waves and to the interaction of lower atmospheric waves with waves generated at high latitudes using newly developed numerical models.

MLT Science Involving Lidars

Interlaken: 1300-1500 and 1600-1800 Wednesday 18 June 2008

Conveners:
Dave Fritts, NWRA/CoRA
Gary Swenson, Univ. of Illinois at Urbana-Champaign
Joe She, Colorado State University
Xinzhao Chu, University of Colorado, Boulder

This workshop is intended to allow for presentation of new results employing lidars and correlative instruments contributing to MLT science and coupling of the MLT to lower and higher altitudes. Studies performed with lidar data alone or in combination with data from other instruments are encouraged. Possible topics include climatologies compiled with one or more instruments, mean or tidal structures and variability, gravity wave dynamics, ducted waves and bores, interactions between large and small scales, instabilities, coupling to other altitudes, sporadic layers, and minor species distributions and chemistry.

We anticipate contributions from a number of groups within the Consortium of Resonance and Rayleigh Lidars (CRRL), others not yet supported within the CRRL, and hopefully our foreign colleagues. Contributing lidar groups are expected to include CSU, CU, CoRA, AO, UAK, USU, IAP, and any others that may wish to participate.
We also anticipate an open structure and a discussion format. To assist us in organizing the workshop, we encourage speakers to notify the conveners of their intended topic(s) in advance of the deadline for final workshop descriptions if at all possible.

Meteors and the Upper Atmosphere

Davos: 1300-1500 Wednesday 18 June 2008

Conveners:
Lars Dyrud, Center for Remote Sensing
Diego Janches, NWRA/CoRA

Every year approximately 100,000 tons of meteoric material impacts Earth's atmosphere near 100 km altitude. However, many questions remain on this meteor mass and energy flux and the impact of this flux on upper atmospheric chemistry and ionization. For example, global yearly mass flux estimates are not constrained to within an order of magnitude. Of particular importance to the CEDAR community is that meteors account for all of the dust, metal neutral and ionized particles in the upper atmosphere (since there is no convection or diffusion of atoms or particles of this size from the ground all the way to 100 km). Further, meteoric dust is also thought to provide the condensation nuclei for polar mesospheric clouds PMC (high altitude clouds near 80 km), which is the focuses of a current NASA mission (AIM). Yet it remains unclear whether variability in meteor flux generates variability in PMC occurrence. Additionally, CEDAR researchers have used radar reflections from meteor trails to remotely sense winds and temperatures near the mesopause (a very difficult place to take meausurements, too high for lidar to low for fabry-perot measurements). With some success for winds but little success for temperatures. To address these issues, we invite presentations on the physics of meteors and their interaction with the atmosphere and ionosphere. Specific discussion is encouraged on the observation of meteors with NSF and CEDAR supported facilities, or the theoretical interpretation of such observations. We encourage contributions of research attempting to better understand meteors or general aeronomy via meteor observations, including upper atmospheric chemistry and metal layers. We also invite presentations of radar, Lidar and optical observations. Theoretical studies or simulations of the meteors and meteor trail interactions with the atmosphere/ionosphere are also invited.

It is expected that much discussion and presentations during this workshop will center on large radar observations of meteors including observations from Arecibo, Jicamarca, and AMISR, as CEDAR researchers have made serious contributions to the field of meteor science and meteor aeronomy using these radars over the past decade.

World Day Planning

Basel: 1300-1500 Wednesday 18 June 2008

Convener:
Wes Swartz, Cornell University

The URSI Incoherent Scatter Working Group (ISWG) will have its usual planning meeting at CEDAR to coordinate the World Day experiments involving the world's upper atmospheric observatories. The procedures for scheduling World Day observations are described at http://people.ece.cornell.edu/wes/URSI_ISWG/RequestingWD09.doc and the other links referenced therein which include a sample proposal. Written proposals are requested for meeting specific research needs using the World Day observations. These proposals should be submitted by May 28. The planning meeting is for the ISWG and UAF staffs to review all the proposals submitted and determine how the global network of ISRs can best satisfy the approved observational requests. The proposer's presence during this discussion is not required, but all are welcome, especially students.

Analysis problems of Fabry-Perot interferometer imaging systems

Davos: 1600-1800 Wednesday 18 June 2008

Conveners:
John Meriwether, Clemson University
Jon Makela, University of Illinois at Urbana-Champaign

Fabry-Perot interferometer observatories in operation today are generally based upon the application of high quality CCD detectors. Analysis of these images is undertaken generally through the application of annular summing to convert the 2-D images to 1-D interferograms. Then the retrieval of Doppler shifts and Doppler broadenings as well as intensities is carried out through the Levinberg-Markquardt nonlinear least square analysis algorithm. This workshop is designed to review these steps and to share information by the individual CEDAR PIs as to how the analysis is conducted.

Space Weather Effects and Aeronomy Studies at the Plasmaspheric Boundary Layer

Basel: 1600-1800 Wednesday 18 June 2008

Conveners:
Anthea Coster, MIT Haystack Observatory
Mike Ruohoniemi, Virginia Tech

The plasmasphere boundary layer (PBL) [Carpenter, 2004] is the region characterized by dynamic interaction between the plasmas of the inner and outer (auroral) magnetosphere. It is also a region where significant magnetosphere-ionosphere (MI) coupling occurs. For example, during geomagnetic storms, the ionosphere plays a critical role in the development of fast, latitudinally narrow plasma flows into the plasmapause region. Some of the critical interactions that occur in this region include the development of electric fields which couple the ionosphere, plasmasphere, and magnetosphere, the structuring and redistribution of thermal plasmas, and the formation of different scale-sizes of irregularities.
Many significant mid-latitude space weather events are associated with the geophysics of the PBL region. These include the formation of the plume of ionization associated with storm enhanced density and the production of mid-latitude irregularities observed by the new mid-latitude SuperDARN HF radars. Understanding the nature of these effects, their magnitude, and their spatial and temporal characteristics is critical to characterizing the PBL region and its underlying geophysics. Such knowledge is required in order to forecast and nowcast mid-latitude space weather events.
The goal of this workshop is to begin to build a framework that can be used to understand this complex region and to interpret experimental observations. We hope to formulate several unsolved questions involving this interaction region and to identify the observations and investigations required to address them. With this objective, the workshop will begin with a few short tutorial talks, followed by a number of contributed talks. The goal is to have a forum which includes both modelers and experimenters interested in this dynamic region.

Short talks solicited for this workshop include those which describe models and experimental observations of PBL geophysical processes, including M-I coupling. Time will be allocated at the end of the workshop for group discussion.

Outstanding Issues in Global Ionosphere Thermosphere Research and the Techniques we can Use to Address Them

Matterhorn 1300-1500 Thursday 19 June and 1300-1500 Friday 20 June 2008

Conveners:
Bill Bristow, University of Alaska Fairbanks
Rick Doe, SRI International
Joe Huba, Naval Research Laboratory
Larry Paxton, The Johns Hopkins University
Aaron Ridley, University of Michigan

This workshop solicits contributions to address the combination of space- and ground-based observations and models and simulations to address global-scale ionosphere/thermosphere/mesosphere science questions. Three major global themes that have been suggested are: (1) Mass Exchange (including transport from high to low latitude, ion outflow, etc), (2) Electrodynamic Coupling (including conductance effects, the aurora, etc), and (3) Chemical Dynamical Coupling (including coupling from above and from below). Our goal is to articulate the principal outstanding issues in ionosphere-thermosphere-mesosphere research and define techniques and measurement programs we can use to address them. Combining observations from satellite instruments with those from ground-based instruments has been a very powerful method for the study of aeronomy. Since the early 1970s when all-sky camera data were used in conjunction with images of the aurora from the DMSP satellites, the strengths of the two techniques have been combined to gain a greater understanding than could be achieved by either observation in the absence of the other. The goal of this two part session is to examine specific coordinated satellite/ground-based research concepts to assist the NSF regarding possible future programs. It is clear that addressing the outstanding global science issues of aeronomy will require global-scale coordinated measurement programs. The first session will focus on the outstanding global issues and the observations required to address them. The second session will focus on the measurement techniques available for obtaining the observations on a global scale. We will specifically emphasize combining satellite missions with ground-based instruments to better understand the spatial-temporal aspect of the global system. While each has limitations and strengths, combining the two can greatly enhance the scientific return. Modeling can further assist in the synthesis and to develop a better understanding of the dominant physical processes apparent in the data. We also seek contributions from the modeling community specifically addressing their need for a better understanding of inputs and constraints on the models such as specification of boundary conditions in the models.

MLT Spatial and Temporal Variabilities: TIMED and CEDAR Collaboration

Grindelwald: 1300-1500 Thursday 19 June 2008

Conveners:
Jeng-Hwa Yee, JHU/APL
Elsayed R. Talaat, JHU/APL

The combination of ground-based and satellite observations under the TIMED/CEDAR program is providing unprecedented spatial and temporal coverage of the Mesosphere and Lower Thermosphere (MLT) region. The ground-based instruments provide measurements of MLT winds and temperatures at specific geographic locations over many local times and complement the TIMED instruments, which provide similar measurements globally at one or two local times on any given day. TIMED observations also provide pressure, density, and other geophysical parameters critical to understanding MLT energetics. When combined, these two data sets can provide true mean fields and a higher-time-resolution 3-D picture of atmospheric waves, especially tides, in order to understand the processes that govern MLT coupling to the lower and upper atmosphere and ionosphere. In addition, CEDAR investigators have collected MLT data

over almost two solar cycles with >5 years of coincident, continuous TIMED observational data. The focus of this workshop is to foster collaboration between satellite, ground-based, and modeling teams to study the MLT energetics and basic structure, including zonal mean, tides, and planetary waves and the causes of their temporal variabilities (on daily, seasonal, QBO, and solar cycle time scales). We encourage people to present recent observations and research findings that can lead to fruitful collaborations.

Research Opportunities at Millstone Hill Observatory

Interlaken: 1300-1500 Thursday 19 June 2008

Conveners:
Phil Erickson, MIT Haystack Observatory
Frank Lind, MIT Haystack Observatory
Anthea Coster, MIT Haystack Observatory

The Millstone Hill incoherent scatter radar (ISR) forms the core of Millstone Hill Observatory, an NSF Upper Atmospheric Facility located at MIT Haystack Observatory near Boston, Massachusetts. Located at 55 degrees geomagnetic latitude, the facility is well positioned for the study of mid-latitude and sub-auroral ionospheric processes. This includes excellent radar coverage of the complex and dynamic plasmasphere boundary layer region, with fields of view extending beyond 1500 km range for F-region observations. The Millstone Hill facility provides a range of capabilities including active radar, passive optics, global GPS TEC mapping, passive radar, and ionospheric sounding. These allow comprehensive plasmasphere and inner magnetosphere studies in areas of considerable and current interest within the space science research community. Examples include magnetosphere-ionosphere coupling, fundamental aeronomy, long term ionospheric trends, geomagnetic storm response, space weather effects, and the dynamics of thermosphere-ionosphere and lower-upper atmospheric coupling.

This workshop will focus on opportunities for the CEDAR and GEM communities to conduct high impact science using Millstone Hill's facilities. Using short organizing presentations, we will describe observatory capabilities now and into the upcoming solar maximum period. The bulk of time will be devoted to interactive, science discussions aimed at stimulating community ideas on the ways in which mid-latitude science can advance outstanding questions in upper atmospheric research, leading to a greater system-level understanding of the atmosphere-magnetosphere-ionosphere environment. We will also provide practical information on how to utilize Millstone Hill facilities, experiments, and data in ongoing research programs and interests. Overviews will be targeted at appropriate levels to accommodate the full range of CEDAR/GEM community members, from students to veteran researchers.

The Low-latitude Ionospheric Sensor Network (LISN)

Davos: 1300-1500 Thursday 19 June 2008

Conveners:
C. E. Valladares, Boston College
T. Bullett, CIRES
J. L. Chau, Instituto Geofisico del Peru
J. V. Eccles, Space Environment Corporation
E. Kudeki, University of Illinois at Urbana-Champaign
R. F. Woodman, Instituto Geofisico del Peru

In the first part of the worksop, we will report on the state of the instrument installations and will present early measurements of the first distributed observatory dedicated to study the low-latitude ionosphere and upper atmosphere. The LISN distributed observatory will be comprised of nearly 70 GPS receivers with the capability to measure Total Electron Content (TEC), amplitude and phase scintillation. The network will include 5 ionosondes able to measure nighttime E-region densities and 5 collocated magnetometers that will be placed along the same magnetic meridian. The LISN network is being complemented with an assimilative physics-based model that will provide a nowcast of the ionospheric electron density, conductivities, E×B plasma drifts, and neutral winds. The second part of this workshop will focus on community comments and suggestions about campaigns to be conducted in the next few months, operational

modes, Web displays, data formats, and additional instruments that may be included or may need logistical support from LISN.

Planning for Compact Echelle Spectrograph for Aeronomic Research (CESAR)

Basel: 1300-1500 Thursday 19 June 2008

Conveners:
Tom Slanger, SRI International
Elizabeth Kendall, SRI International

CESAR (Compact Echelle Spectrograph for Aeronomic Research) will be ready for use by the aeronomy community in 2011. The intention of the workshop is to introduce the concept to CEDAR. The instrument is a scaled-down version of the HIRES spectrograph on the Keck I telescope on Mauna Kea, which we have shown produces superlative nightglow spectra. CESAR will accumulate data rapidly, and simultaneously over a large wavelength region. Advantages to working with CESAR are that we will not have to rely on the astronomers' protocols and that the system will be re-locatable, with initial deployment scheduled for Alaska.

The Second AMISR Science Planning Meeting: PFISR I

Grindelwald: 1300-1500 Friday 20 June 2008

Convener:
Craig Heinselman, SRI International

This session will cover results from the first year of AMISR operations at Poker Flat Research Range (PFISR). AMISR (Advanced Modular Incoherent Scatter Radar) is a new incoherent scatter radar concept using phased array technology. Presentations on topics including International Polar Year (IPY) experiments, rocket launches, Polar Mesosphere Summer Echos (PMSE) gravity waves, Naturally Enhanced Ion Acoustic Lines (NEIALs), and auroral observations are welcome, and should be submitted though the CEDAR website.

Cubesats - Science and Systems Workshop

Interlaken: 1300-1500 Friday 20 June 2008

Conveners:
Dave Klumpar, Montana State University
Gary Swenson, University of Illinois at Urbana-Champaign

NSF has initiated a small satellite program that offers a new platform for Space Weather investigations. Our CEDAR community now has an opportunity to exchange ideas to capitalize and optimize the scientific return through strategy and innovation with our extensive ground based infrastructure.

This workshop will involve two topics, including 1) science and missions and 2) community systems.
1) Science. It is well understood the large spacecraft associated with NASA and other agencies offer missions and investigations from space that are exciting and innovative. Small satellites offer in-situ and limited remote sensing capabilities that can augment larger programs and scientific goals. Considering ‘dipper’, or ‘sampling from spinning’, and ‘multiple –formations of’ satellites offer the possibilities for new explorations. The plan for the workshop is to explore scientific problems and methods for evolving the utility of this new tool within our community.
2) Systems. It is also well understood that with small satellites, there is value in community infrastructure in a number of areas. NASA and DOD have satellite communication systems and standards that constitute infrastructure essential to their mission needs. Small satellite communication for example, currently incorporates Amateur Radio bands and technology.

The plan for the workshop is to identify and prioritize infrastructure elements that will enhance the community-wide capabilities of this new platform.

CEDAR Science in Latin America

Davos: 1300-1500 Friday 20 June 2008

Conveners:
Carlos Martinis, Boston University
Diego Janches, NWRA/CoRA

This workshop will tackle relevant science issues related to CEDAR in the Latin-american sector. Understanding the energy transfer between regions is crucial for accurate prediction of the ionospheric response to Space Weather as is the understanding of the energy transfer from below to above via gravity, tidal and planetary waves. Distinctive features in the region affecting the overall behavior of the upper thermosphere/ionosphere are the presence of the south atlantic anomaly (SAA) and the equatorial ionization anomaly (EIA). Geometrically, is also the region in which the magnetic equator has the maximum departure from the geographic equator, contributing to the complexity of the aeronomic processes occuring there. The southern tip of South America is one of the most dynamically and chemically active regions of the planet. An increasing deployement of ground-based instrumentation in the region as well as new satellites measuring ionospheric parameters is helping to identify and understand key issues in the equatorial and low latitude ionosphere. The proposed workshop will focus on describing existing, planned and foster research opportunities in Latin America.

The Second AMISR Science Planning Meeting: PFISR II

Grindelwald: 1600-1800 Friday 20 June 2008

Convener:
Josh Semeter, Boston University

The workshop continues with presentations from the first year of Poker Flat AMISR (PFISR) results. Planning for future PFISR operations will also be discussed.

Lightning Effects on the Upper Atmosphere

Interlaken: 1600-1800 Friday 20 June 2008

Conveners:
Ningyu Liu, Florida Institute of Technology
Mark Stanley
Mike Taylor, Utah State University

This workshop will focus on the effects of lightning discharges on the mesospheric and lower ionospheric regions. Results from observational, theoretical and modeling studies regarding the energetic coupling of lightning with the upper atmosphere will be presented. Of particular interest are contributions on thermal, chemical and electrical effects of lightning on the upper atmosphere. Electromagnetic energy provided by lightning discharges in these regions is converted to other forms of energy though heating of ambient electrons. Excitation, dissociation and ionization of neutral molecules during this process modifies the atmospheric environment. Transient luminous events (TLEs-sprites, sprite halos, jets, elves) are a direct manifestation of this modification. New results from experimental and theoretical studies of these phenomena and their related effects will be discussed. New techniques and advances in remote sensing of the upper atmosphere with lightning will also be examined. The workshop will be consisting of scheduled short presentations. Students are strongly encouraged to contribute to this workshop. Anyone interested in giving a contributed talk should email the conveners at the email addresses listed above.

Coupling of atmospheric regions during stratospheric sudden warmings

Davos: 1600-1800 Friday 20 June 2008

Conveners:
Larisa Goncharenko, MIT Haystack Observatory
Han-Li Liu, NCAR HAO

Recent research advances present new evidence of strong vertical coupling between different atmospheric regions. Multiple reports show variations in the mesosphere-thermosphere-ionosphere system related to such disparate phenomena as earthquakes, tsunami, thunderstorms or stratospheric sudden warmings. The goal of the workshop is to examine most recent experimental and modeling results related to such coupling, with particular emphasis on coupling during stratospheric sudden warmings.

A stratospheric sudden warming (SSW) is a dramatic large-scale event in the winter middle atmosphere lasting several days or weeks. It involves profound changes in temperature and wind system, with > 15 K warming at stratospheric altitudes and 20-50 K cooling at mesospheric altitudes. Simulations of SSW events predict 20-30 K warming in the lower thermosphere. Currently there is very little experimental evidence of variations in the thermosphere or ionosphere, though significant part of day-to-day variability in thermospheric and ionospheric parameters is thought to be related to coupling from lower altitudes. In order to extend studies of SSW effects to higher altitudes, a specially designated ISR World Day campaign was arranged during a very large SSW event in January 2008, when warming at stratospheric heights has reached or exceeded a 30-year record. This workshop will provide a forum where researchers can present their experimental and modeling results and address the SSW coupling challenges.

The Second AMISR Science Planning Meeting: Tutorial I

Matterhorn: 0800-1000 Saturday 21 June 2008

Conveners:
Phil Erickson, MIT Haystack Observatory

In this session a tutorial on incoherent scatter radar techniques will be presented, with special emphasis on AMISR technology. The intended audience is graduate students and scientists new to the field.

Jicamarca and C/NOFS Amigos

Grindelwald: 0800-1000 and 1030-1230 Saturday 21 June 2008

Conveners:
Odile De La Beaujardiere, Air Force Research Laboratory
Koki Chau, Instituto Geofisico del Peru
Dave Hysell, Cornell University
Doug Rowland

Users and friends of the Jicamarca Radio Observatory will hold a workshop to review activities from the past year and to prepare for the next one. Important, new opportunities for research at Jicamarca and elsewhere are afforded by the recent launch of the C/NOFS satellite. Launched in April, the C/NOFS satellite occupies a 13 degrees inclination, 400 x 800 km orbit. The mission of the satellite is to forecast ionospheric densities, irregularities and scintillation. Its instruments measure plasma parameters, electric & magnetic fields (AC and DC), density fluctuations, and neutral winds in situ. It also has a GPS receiver and an RF beacon. Ground-based instruments and models, as well as space weather products are

integral parts of the mission. Full utilization of this instrumentation for CEDAR science will require close integration with activities at Jicamarca and other field sites.

Forecasting the properties of the equatorial ionosphere and the irregularities within are objectives shared by C/NOFS and Jicamarca. This workshop will address the forecast problem and the challenges it entails. The launch of the satellite poses logistical as well as scientific challenges. C/NOFS joins other long-term projects including COSMIC and LISN requiring Jicamarca support, and the integration of the various, related science goals and observing activities needs to be discussed and planned. Support from Jicamarca will involve a number of new observing modes and some relatively new hardware like the AMISR-7, the SOUSY radar, the bistatic Jicamarca-Paracas link, and SOFDI. Status reports regarding new radar modes and new ground-based instrumentation at Jicamarca and other equatorial stations will therefore accompany reports on C/NOFS satellite status.

The status of educational activities like the visiting scientist program and the intern program at Jicamarca will also be reviewed. Finally, science highlights in equatorial aeronomy from the past year will be presented.
Individuals interested in making a short presentation should email the session organizers.

New Understanding of Thermospheric Density and Composition Structure and Variability

Interlaken: 0800-1000 and 1030-1230 Saturday 21 June 2008

Conveners:
Jeff Thayer, University of Colorado, Boulder
Art Richmond, NCAR HAO

New data on thermospheric density has become available from the CHAMP and GRACE satellites, while new studies of seasonal and long-term trends of satellite drag have advanced our understanding of these changes. Coordinated research programs involving several agencies are being conducted to further our knowledge of the causes of variability of thermospheric density and composition on a wide range of temporal and spatial scales, and to improve our ability to model and forecast this variability. The intent of this workshop is to gather the collective activities of these programs, present new results, and discuss plans for future studies.

Extended Description: This workshop seeks to increase collaboration among researchers studying thermosphere neutral density and composition structure and variability. New thermosphere data sets, such as CHAMP and GRACE, and funded research activities have generated a resurgence in studying the thermosphere on daily, seasonal and long-term time scales. The neutral properties of the thermosphere are the least known in our upper atmosphere and their mass, composition and motion impact the ionosphere strongly. This workshop solicits participation through presentations of new observations, new modeling studies, and new findings related to thermosphere density and composition structure and variability. It will also be of interest to have presentations indicting the impact of these thermosphere properties on the ionosphere.
There will be two sessions, each 2-hours in duration. The anticipated outcome of the workshop is to improve awareness and collaboration among participating research groups and to advance future plans and ideas on how to tackle the challenging problem of adequately describing the spatial and temporal response of the thermosphere to various forces and their impact on the geospace system.

The Second AMISR Science Planning Meeting: Tutorial II

Matterhorn: 1030-1230 Saturday 21 June 2008

Conveners:
Elizabeth Kendall, MIT Haystack Observatory
Anthea Coster, MIT Haystack Observatory

This session will discuss user access to AMISR data starting with the proposal process and experiment set up, and continuing to science data manipulation using the Madrigal database.

I-T Challenges Based on Continuous Observations Through the IPY (or PRIMO II)

Davos: 1030-1230 Saturday 21 June 2008

Conveners:
Jan Sojka, Utah State University
Tony van Eyken, EISCAT Scientific Association
Craig Heinselman, SRI International
John Holt, MIT

The International Polar Year (IPY) began on 1 March 2007. Starting on that day was an extremely aggressive ISR observational campaign whose objective was to run the European EISCAT Svalbard Radar (ESR) and the NSF Poker Flat ISR (PFISR) continuously while ISRs at both Sondrestrom (Greenland) and Millstone Hill (Massachusetts) would run twice per month for 32 hours on each occasion. With the first year of observations completed, the stage is set for a particularly exciting community-wide, observation-model-theory challenge.

The IPY occurs during a period of possibly weak geomagnetic activity; hence, the conditions are ideal to investigate how coupling from the lower atmospheric regions affects the ionosphere and thermosphere (I-T). This is an invitation for all I-T modelers to get involved in modeling the IPY, forecasting the remaining IPY period, and comparing their results with others, both models and observations. In fact, the first year geomagnetic records confirm there were no major storms, but that there was almost continuous low-level geomagnetic activity!

This workshop will promote a "PRIMO" format in that all modelers and observers including, but not limited to, the above-mentioned ISRs are relevant participants. At this workshop the observing community will provide an overview of the first 12 months of IPY including an exposé of the unexpected. The modelers will be given the opportunity to present their early analysis of the IPY year-long observations. The open workshop format is then to take input and debate from those present. Although focused on the unique high latitude IPY aspect, the relevance to eGY and IHY is appreciated and not excluded. To get involved and get a "quick look" format of the ISR data sets, contact Jan Sojka at sojka@cass.usu.edu or one of the other organizers.

The Second AMISR Science Planning Meeting: RISR I (Post-CEDAR Meeting)

Matterhorn: 1400-1600 Saturday 21 June 2008

Convener:
Eric Donovan, University of Calgary

The workshop will conclude with two sessions discussing the planned Resolute Bay AMISR (RISR) facility. Presentations are solicited covering proposed experiments and science goals for RISR. These abstracts are to be submitted through the CEDAR website.

The Second AMISR Science Planning Meeting: RISR II (Post-CEDAR Meeting)

Matterhorn: 1630-1830 Saturday 21 June 2008

Convener:
Jean-Pierre St. Maurice

This portion of the workshop will provide a forum for discussions concerning the use of the new Resolute Bay AMISR (RISR) facility. The community will be encouraged to brainstorm possible science goals for RISR and also provide feedback to the AMISR Project Office on desired capabilities for the instrument.

Community Models Workshop (Post-CEDAR Meeting)

Matterhorn: 0800 - 1700 22 Sunday June 2008

Conveners:
Terry Onsager (chair)
Tim Fuller-Rowell (CEDAR)
Joe Huba (CEDAR)
Aaron Ridley (GEM)
Mike Wiltberger (GEM)
Jon Linker (SHINE)
Chris Russell (SHINE)

This workshop has been organized at the request of NSF to examine what we need in a broad space weather modeling program to maintain the momentum that has been made over the last decade and to carry us forward into the future.

Questions that will be addressed include: Is a community space weather modeling program desirable? Is it the right time to start such a program? Are space weather models conducive to the community modeling approach? What is the right balance of elements needed for a community-based space weather modeling program: a grants program, a steering committee, periodic workshops, mechanisms for dealing with issues such as interagency coordination, input/output standards, data standards, validation activities, metrics, model transitioning, version control, model access, etc. If there is a role for a center or centers in these activities, what would be the mechanism for establishing and supporting such a center?

Other questions include: What is the level of effort required? How large a grants program should there be? How much additional cost would be associated with support for a steering committee, workshops, a center, students, visiting scientists, etc? What are the steps ahead? Should there be other workshops, workshop reports, strategic and implementation plans?

The workshop has been organized as series of panels to encourage open discussion and to hear the perspectives of modelers, model users, leaders of group modeling activities, and program organizers.

Agenda

9:00 – 9:15 Opening Comments
– Goals for this workshop and beyond - Bob Robinson (NSF)

9:15 – 10:15 Panel on Lessons Learned From Existing Community Programs
Moderator: Bob Robinson (NSF)
- CEDAR – Rich Behnke (NSF), GEM – Bill Lotko (Dartmouth College), SHINE – Vic Pizzo (NOAA)

10:15 – 10:45 Break

10:45 – 12:00 Panel on Lessons Learned From Current Modeling Activities
Moderator: Paul Bellaire (NSF)
- Center for Integrated Space Weather Modeling - Jeff Hughes (Boston University)
- Multidisciplinary University Research Initiative - George Fisher (UC Berkeley)
- Multidisciplinary University Research Initiative - Brian Wilson (JPL)
- Center for Space Environment Modeling - Tamas Gombosi (University of Michigan)
- Community Coordinated Modeling Center - Michael Hesse (NASA)

12:00 – 1:30 Lunch

1:30 – 2:30 Modeler Panel – Moderator: Nick Arge (AFRL)
- Stan Solomon (NCAR)
- Jimmy Raeder (University of New Hampshire)
- Jon Linker (SAIC)
- Bob Schunk (Utah State University)
- Nick Omidi (Solana Scientific Inc.)

2:30 – 3:00 Break

3:00 – 4:00 User Community Panel – Moderator: Joe Borovsky (LANL)
- Janet Luhmann (University of California, Berkeley)
- Rod Heelis (University of Texas, Dallas)
- Bob McCoy (NRL)
- Howard Singer (NOAA)
- Kent Tobiska (Space Environment Technologies)

4:00 – 5:00 Where do we go from here?
- Open Discussion