

A graphic element consisting of two thick, parallel red curved lines that sweep from the top right towards the bottom right, framing the text on the left.

2010
CEDAR
25th ANNIVERSARY

25 Years of CEDAR History

CEDAR memories for you!

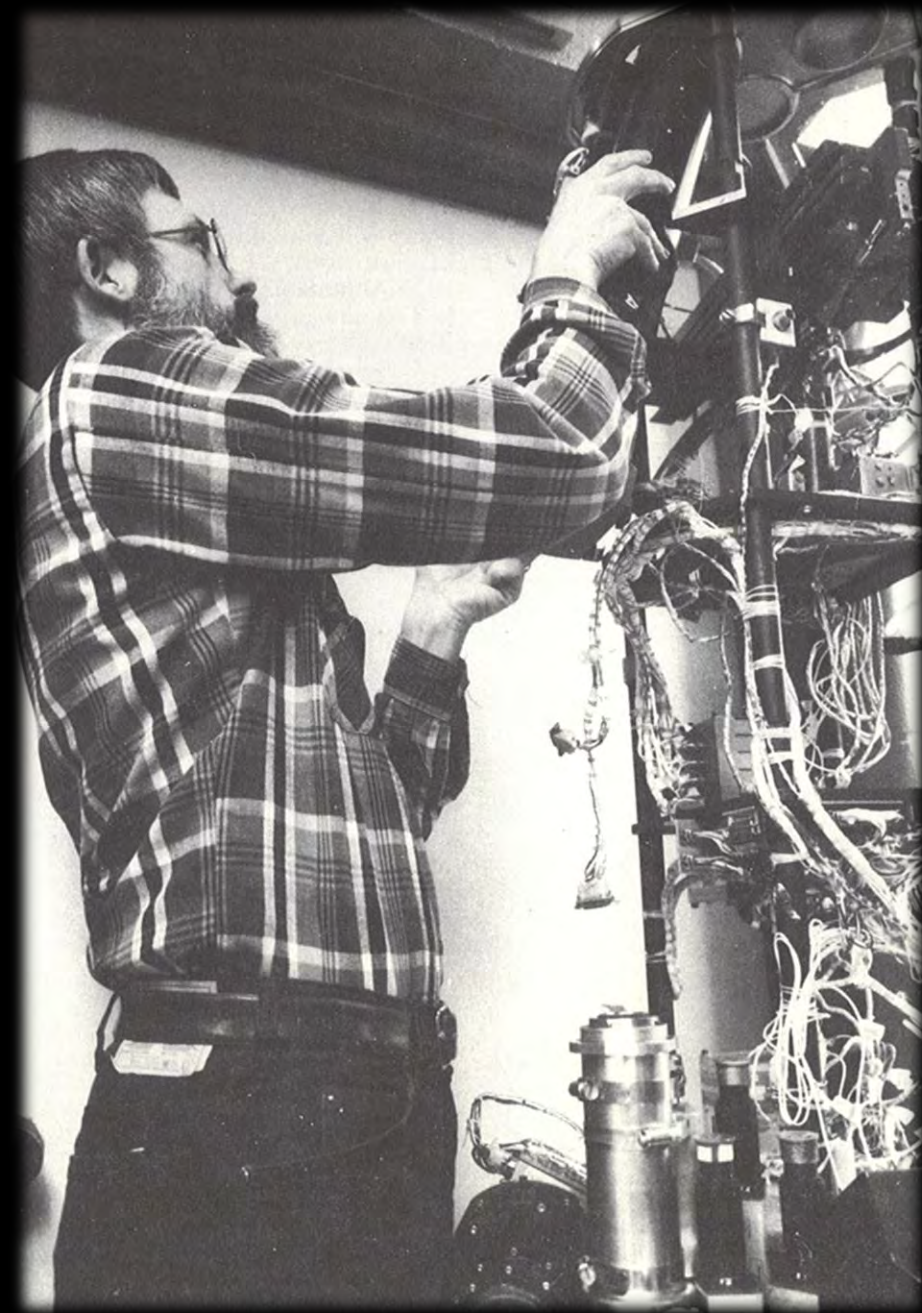


Pictures from:

The Research News University of Michigan

November-December 1982





William Sharp

Examining an observation instrument

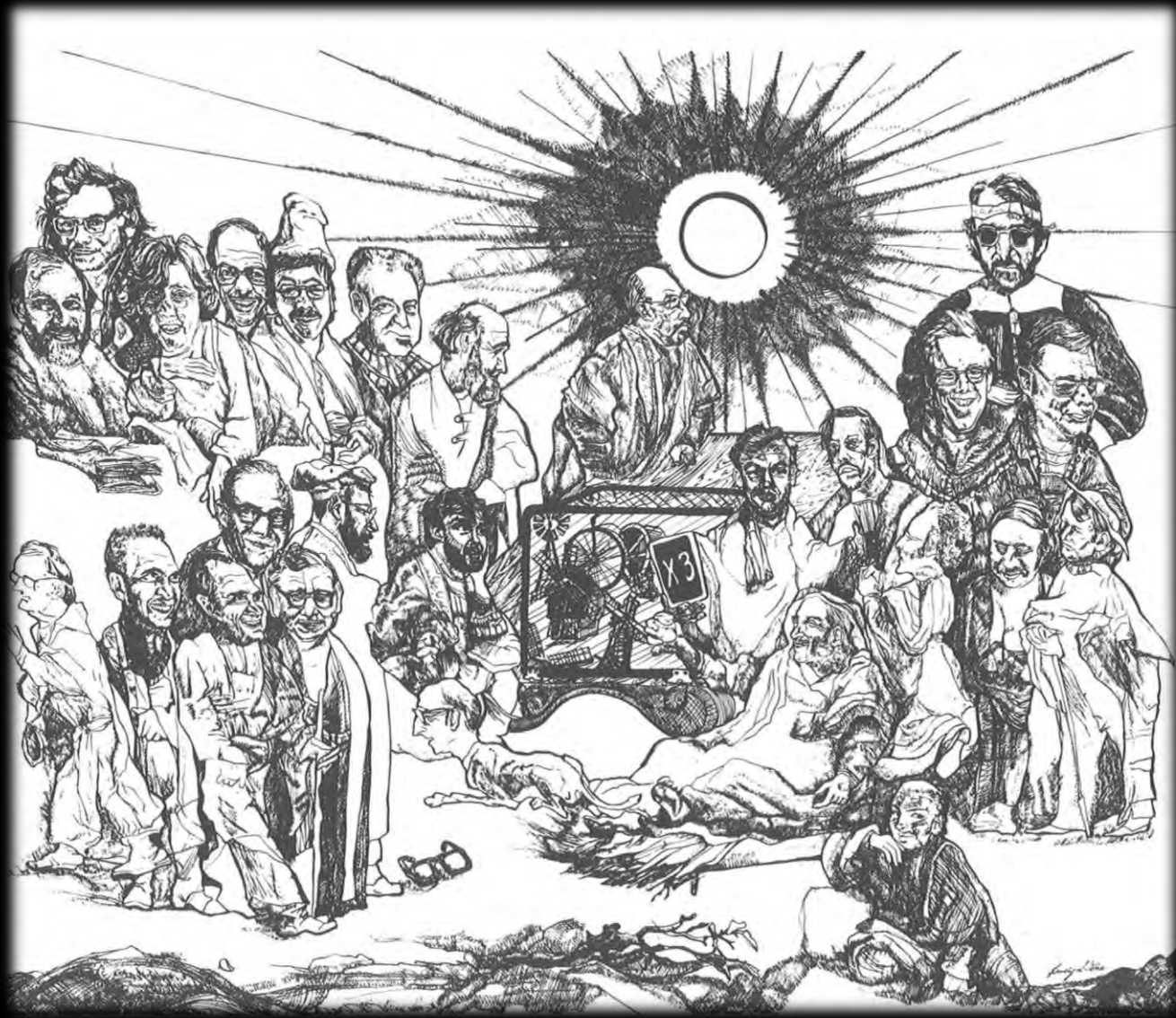
Paul Hays

Ron Theriault



Reviewing computer program that develops specs
for the triple etalon interferometer

Back row: Doug Torr,
George Victor, Marsha
Torr, George Carignan,
Paul Hays, Bill Hanson,
Alex Dalgarno, Hans
Hinterreger, Don Heath,
John Doering, Al Hedin,
Fred Rees, Skip Reber
Front row: Ken
Champion, John
Hoffman, Bob Hoffman,
Al Nier, Larry Brace, Jim
Walker, Ian Stewart ,
Mike McElroy (glasses –
often absent), Clyde
Freeman (dog – computer
head), Nelson Spencer,
Irwin Schmerling, Dave
Kayser, Henry Brinton.
Front right: Skip Potter



Rembrandt's One Hundred Guilder Print, illustrating the idiosyncrasies of men and women who directed the Atmosphere Explorer satellite experiments.

John Meriwether
Heinz Grassle



Checking an interferometer before its shipment to a
Greenland ground observation station.



Timothy Killeen

Preparing posters for the Annual AGU meeting.



1987

Second CEDAR Workshop

NCAR Mesa Lab
Boulder, CO





Barbara Emery and 3 others



Jeremy Winick

and

Rich Behnke

Bob Kerr and David Siskind



Kent Tobiska and Kathryn Drake

David (Dai) Rees and Larry Lyons





1989
CEDAR

NIST and NCAR, Boulder, Colorado

Poudre River Rafting





George Gerhab?, Rick Doe, Roger Smith, Ed Szuszczewicz, Ling Zhang,
Jim Sharber?, Greg Earle



?, Denise Thorsen, ?, Ed Szuszczewicz, Loretta Weiss, Roger Smith, Barbara Emery, Greg Earl, Wes Swift. Peter Sultan, Xiaoqing Pi, Jim Sharber?, Fahri Surucu?, Ling Zhang, ?, Rick Doe; Missing or ?: Mark Champion, Steven Franke, George Gerhab, David Gloss, Dan Nottingham, Elliot Palmer





1990 CEDAR

NIST and NCAR, Boulder, Colorado



CEDAR Perfect Attendance Award



CEDAR 1990

There are 4 out of 6 participants shown in this photo who managed to attend all 25 workshops!



Richard Behnke



Barbara Emery



Cassandra Fesen



John Holt [1997]





John Meriwether [1982]



Roger Smith



Richard Behnke



Barbara Emery



Cassandra Fesen



John Holt



John Meriwether



Roger Smith



CEDAR CSSC Chair Awards



CEDAR 1990

There are 12 CSSC Chairs, past and present
And 1 Future CSSC Chair.
8 are shown in this 1990 photo!



Gerald Romick

1987-1988



G. Chester Gardner

1990 - 1992



Michael Mendillo

1996 - 1997



Joseph Salah

1997 - 1999



Cassandra Fesen

1999 - 2001



Roger Smith

2001 - 2003



Sixto González

2003 - 2005



John Foster
Future Chair





Gerald Romick [1987-1988]



Timothy Killeen [1988-1990]



Chester Gardner [1990-1992]



Michael Kelley [1992-1994]



Jeffrey Forbes [1994-1996]



Michael Mendillo [1996-1997]

A circular portrait of Joseph Salah, an older man with white hair and glasses, wearing a white shirt and a dark tie.

Joseph Salah [1997-1999]

A circular portrait of Cassandra Fesen, a woman with long dark hair, shown in profile.

Cassandra Fesen [1999-2001]

A circular portrait of Roger Smith, a man with a beard and glasses, speaking into a microphone.

Roger Smith [2001-2003]

A circular portrait of Sixto González, a man with dark hair and a goatee.

Sixto González [2003-2005]

A circular portrait of Jan Sojka, a man with glasses, wearing a white shirt and a dark tie.

Jan Sojka [2005-2007]

A circular portrait of Jeffrey Thayer, a man with short brown hair, smiling.

Jeffrey Thayer [2007-2010]



John Foster 2010 Future Chair





1990 CEDAR

NIST and NCAR, Boulder, Colorado

Horseback Trail Ride





Marie-Louise Duboin



guide?, Marie-Louise Duboin, Mazaher?, Munira, and Mohommed? Sivjee, ?, ?, ?, John Sahr, ?, Barbara Emery; Missing or ? : Ken Kendall, Paivio Pollari, Theodore Ballard, Peter Citrone, Thomas Frooninckz



1991 CEDAR

NIST and NCAR, Boulder, Colorado

Georgetown Loop Railroad & Mine Tour



Dwight Sipler and Bill Wright





Barbara Emery

1991 NCAR Cafe

John Holt,
Michael
Buonsanto,
Dwight Sipler





1994 CEDAR

University of Colorado, Boulder, Colorado

Lecture Hall



Barbara Emery and Jeff Forbes?



Bela Fejer



1995 CEDAR

NIST and NCAR, Boulder, Colorado



NCAR Mesa Lab Cafeteria

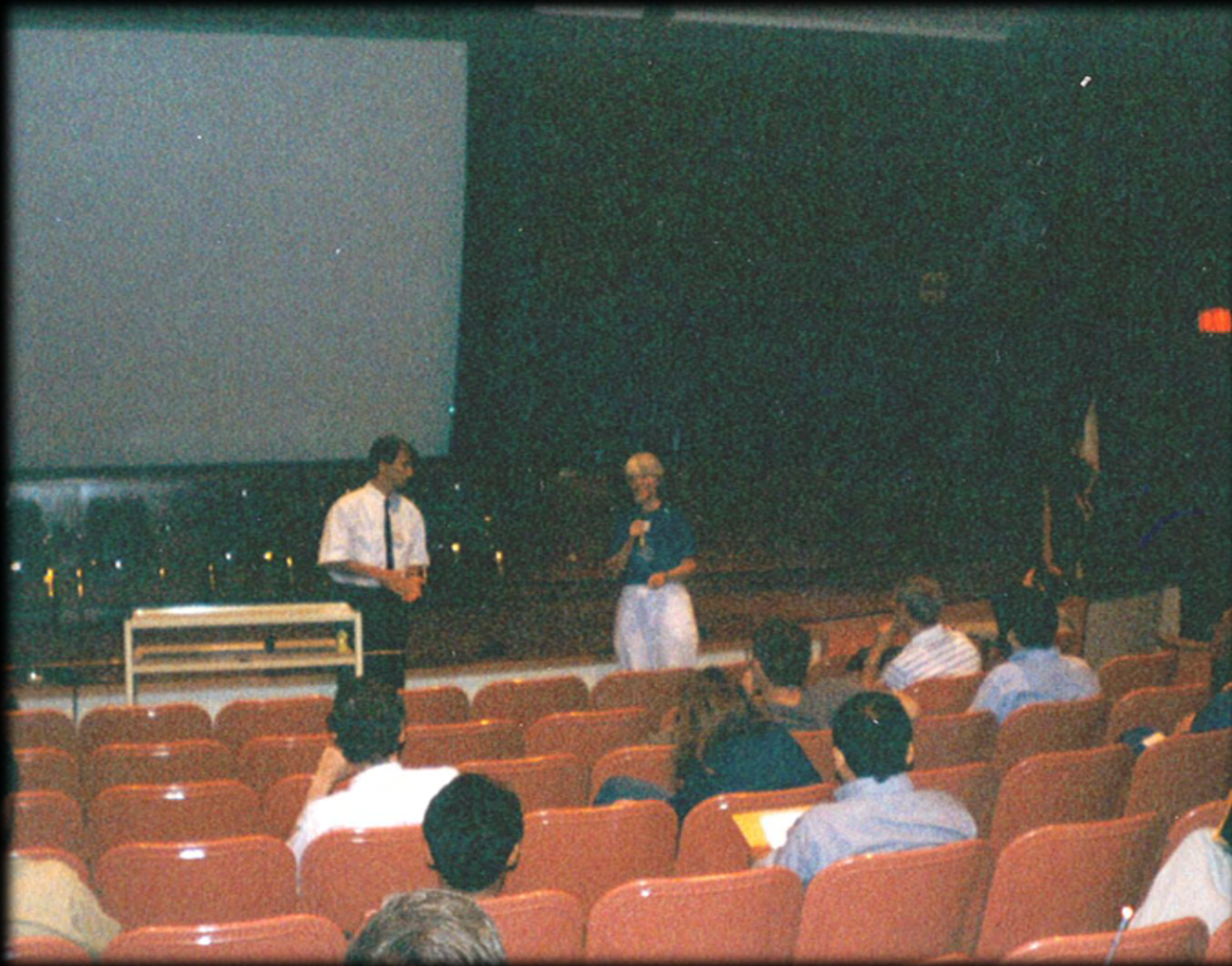


Phil Erickson, ?, Mike Sulzer



Barbara
Emery

Jeff Thayer and Barbara Emery





Louise Beierle, Will Golesorkhi, and Joe Isler



Will Golesorkhi, NCAR student assistant who video-taped the tutorial lectures



1997 CEDAR

University of Colorado, Boulder, Colorado

Flagstaff Picnic, Model Railroad & Celestial Seasonings Tour





John Kelly, John Holt, Tony van Eyken



Wes Swift, ?, ?, ?, and Doug Geiger (husband of Barbara Emery) at the Granite Mountain Railway in their basement.

Mayra Martinez, ?, John Leko, ?, **Henry Rishbeth**, Wes Swartz, ?





Alan Peterson, ?, ?, Wes Swift



Barbara Emery and Henry Rishbeth



1998 CEDAR

University of Colorado, Boulder, Colorado

Butterfly Pavilion Tour





Louise Beierle



Barbara Emery



Richard Balthazor



1999 CEDAR

University of Colorado, Boulder, Colorado

Walker Ranch Hike





Guide? and Doug Geiger in back



John Foster



2002

CEDAR

Raintree Plaza Conference Center, Longmont, Colorado

Student Social at Hover Acres Park







Carlos
Marinis and
Steve Smith



Karen Remick





Karen Remick, Art Richmond, Fernanda Sao-Sabbas, Anja Stromme, ..



2002 CEDAR

Raintree Plaza Conference Center, Longmont, Colorado



Tim Killeen





Santimay Basu, Bill Wright, Tim Killeen, ...



Roger Smith, CSSC Chair



Amy Bauer (Moore) and Bob Lowe



CSSC Dinner in Lucile's Creole Café in Longmont: Sunanda Basu, Delores Knipp, Roger Smith, Art Richmond, John Kelly, Barbara Emery, Pamela Loughmiller, John Foster, Rich Behnke, Erhan Kudeki, Bob Robinson.

Peter Fox leads a Database Workshop





Sam Yee leads a TIMED-CEDAR Workshop



?, Roy Barnes, Joe Salah, Steve Smith, ?, Ron Clark, ?



Louise Beierle and Liz Hoswell



Louise Beierle and Barbara Emery



Louise Beierle, Roger Smith CSSC Chair and Barbara Emery



Jens Oberheide, Maura Hagan, Rich Behnke, Sunanda Basu, ..



Dwight Sipler, Rich Behnke, Maura Hagan, Sunanda Basu



Tomoko Matsuo, ???, Odile de la Beaujardiere, Eva Robles, ?



2003 CEDAR

Raintree Plaza Conference Center, Longmont, Colorado







Mick Denton



Reception dinner at the Raintree Plaza Hotel.



Roger Smith, Tom Slinger, and Joe Grebowsky



Kathryn Fisher and Louise Beierle



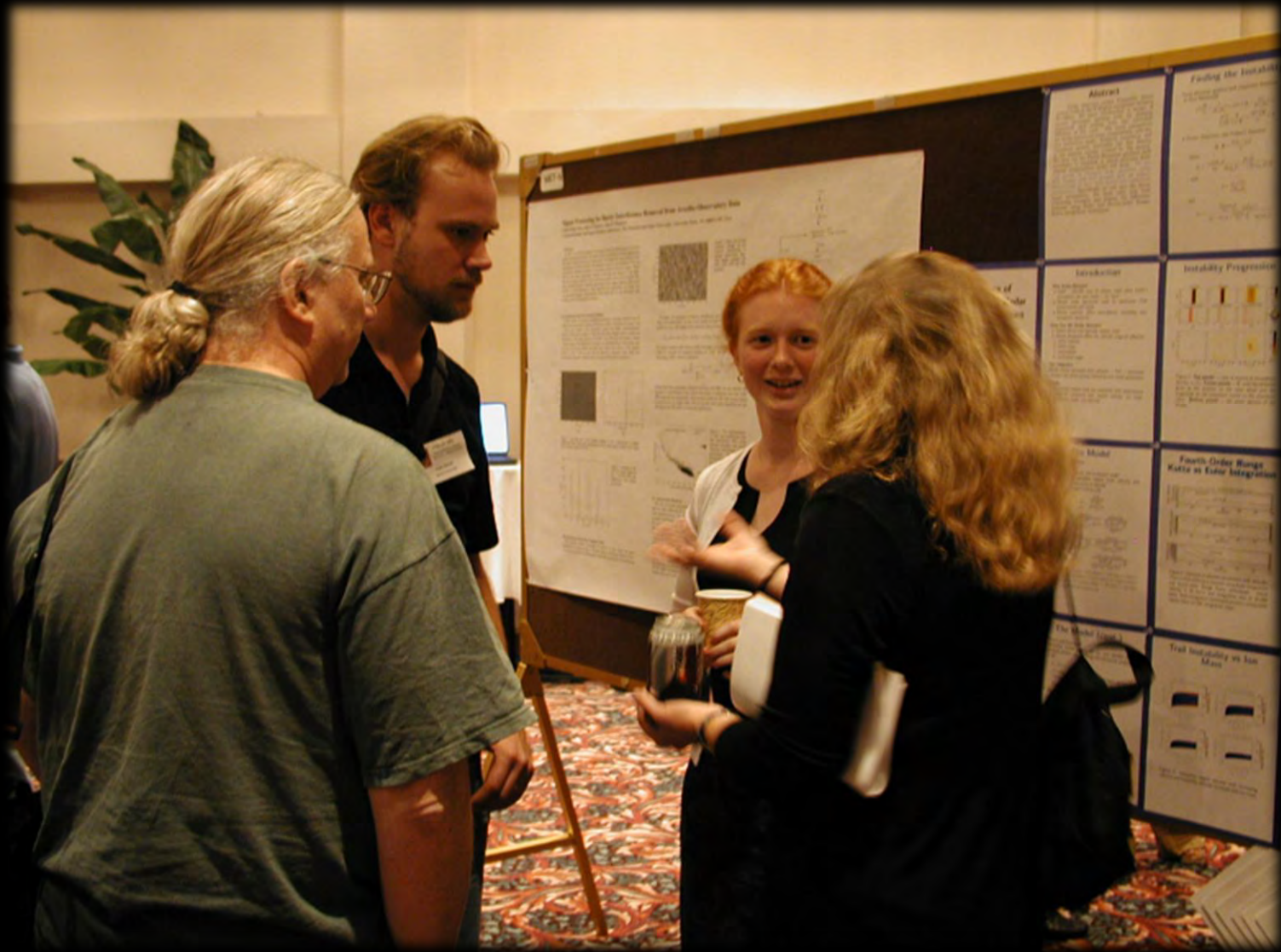
CSSC dinner at Hunter's in Longmont: Art Richmond, Lars Dyrud, Paul Bellaire, Rich Behnke, Phil Erickson, Marina Galand, Sixto Gozalez, Bob Robinson, waiter, Pamela Loughmiller, Robert Vincent, Roger Smith, Delores Knipp, Jan Sojka, Barbara Emery, and Josh Semeter.



CSSC dinner at Hunter's in Longmont: Larry Paxton, Art Richmond, Lars Dyrud, Paul Bellaire, Rich Behnke, Phil Erickson, Marina Galand, Sixto Gozalez, Bob Robinson, Pamela Loughmiller, and Robert Vincent.



Bill Wright, ?, Don McEwen, Joe She (CEDAR Prize Lecture) ...
Roger Smith



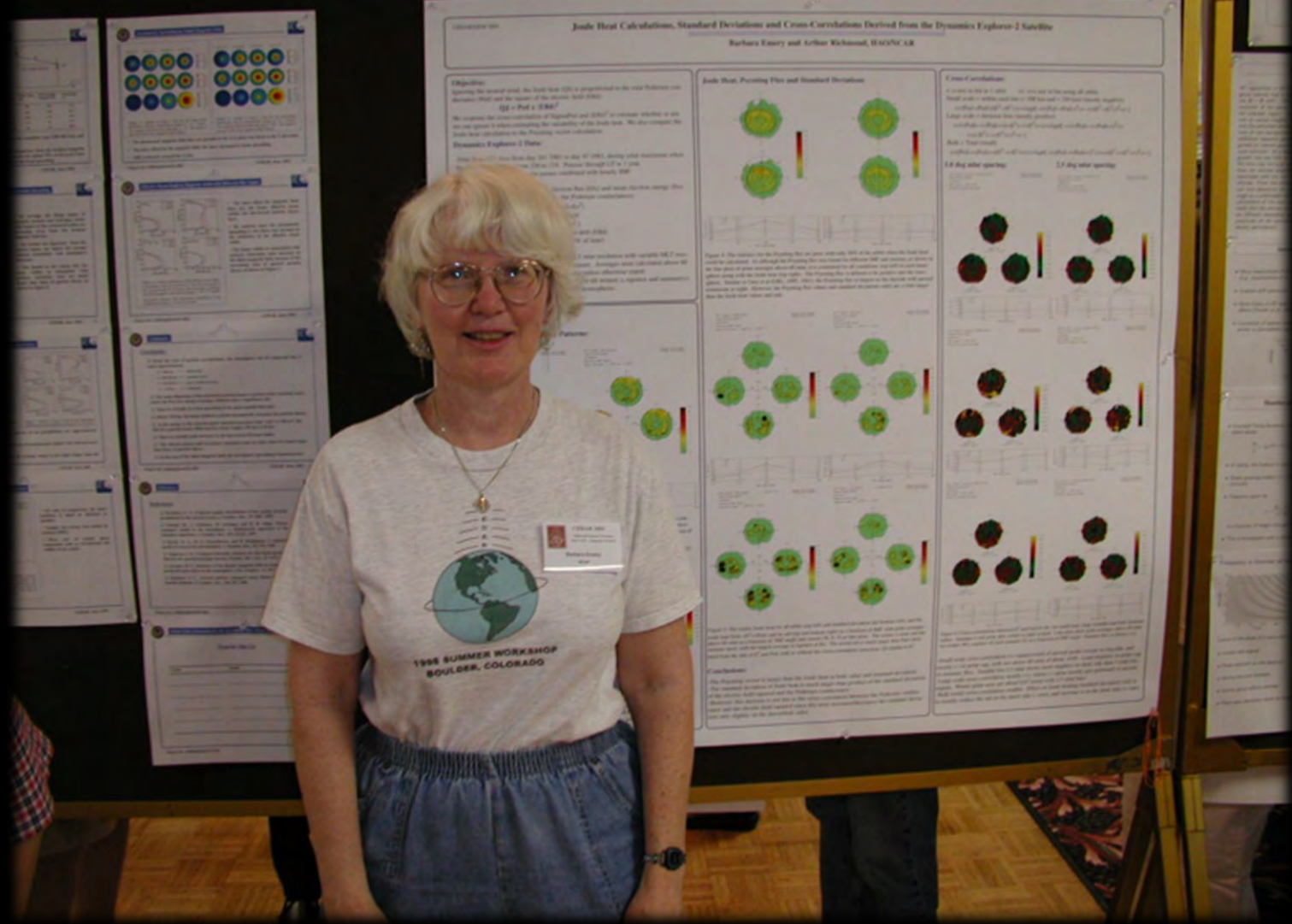
Gary Bust, Lars Dyrud, Licia Ray, Pamela Loughmiller



Frank Lind, Cassandra Fesen, Art Richmond (back), Jan Sojka, Gary Bust



Tomoko Matsuo?, Astrid Maute, Art Richmond, John Meriwether, Ed Mierkiewicz



Barbara Emery



2003 Student Competition Winners

Wednesday Night

Honorable Mention:

Luke Moore, Photochemical Modeling of Global Variations and Ring Shadowing in Saturn's Ionosphere

Winners:

Carlos Martins, Post-Sunset Equatorial Irregularities and Magnetic Storms

Josef Drexler, Convective Behavior and Growth of E-Region HF Irregularities

Phil Erickson, chief judge, describes the results of the Student Poster Competition.



CSSC lunch: Larry Paxton, Bob Vincent, Don McEwen, Sixto Gonzalez, Rich Behnke



Workshop speaker Ludger Scherliess, with Cassandra Fesen in front.



Visiting Joe She's lidar facility at CSU in Fort Collins: Joe She (CSU) and former student Jonathan Friedman (Arecibo Observatory).



Field Trip to Joe She's Lidar Lab in Ft. Collins At CSU: Jonathan Friedman. The lidar lab moved to USU in 2010 with Titus Yuan after Joe She's retirement.



Plane belonging to CSU retired professor outside the lidar lab with REU CEDAR student.



Roger Smith, CSSC Chair



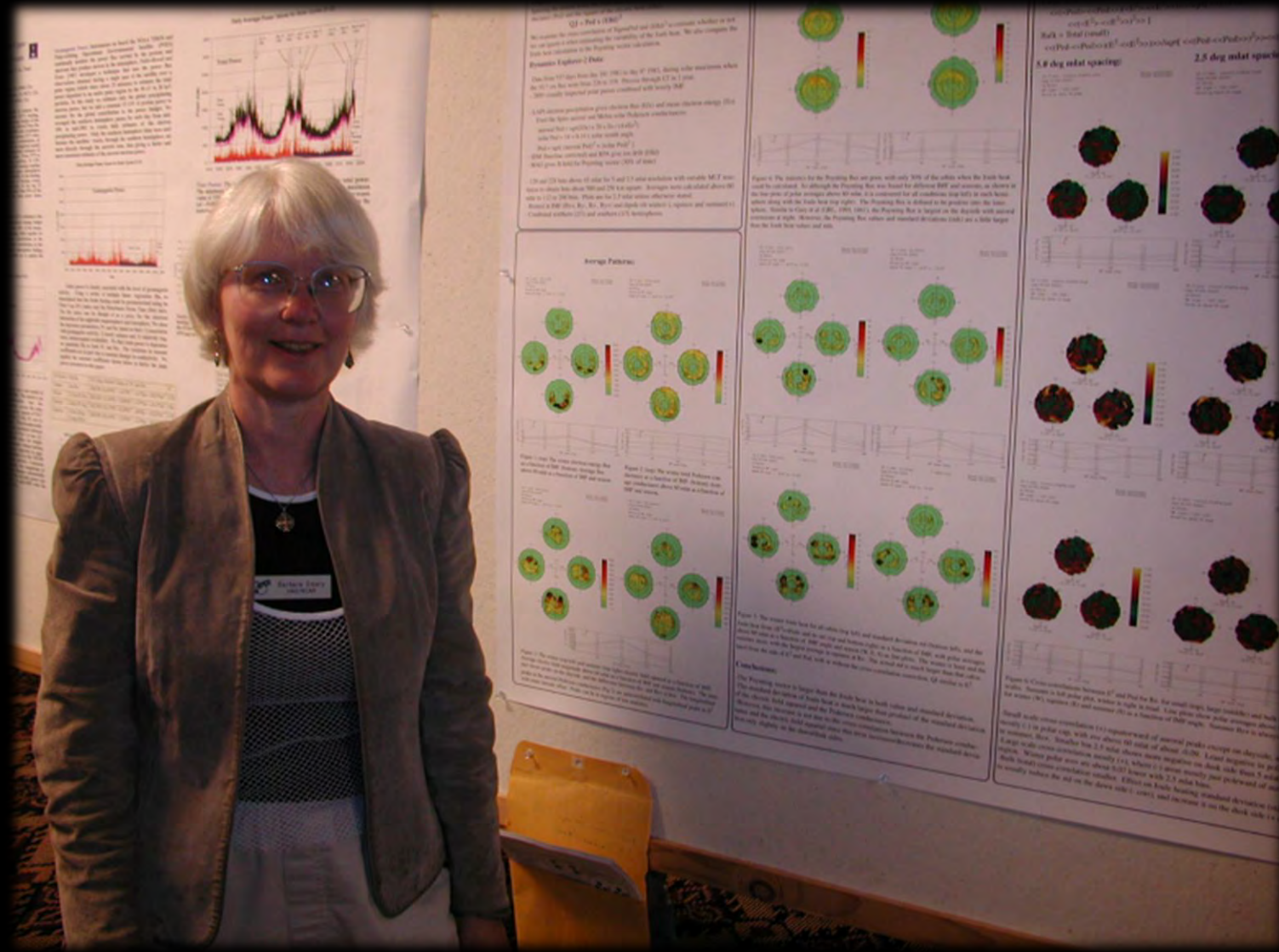
Roger Smith, Barbara Emery, Louise Beierle, Kathryn Fisher



2003
GEM (sister program to CEDAR)

Snowmass, Colorado





Barbara Emery, same poster at GEM and at CEDAR



Umbe Cantu



Socializing at GEM: Katie Garcia, ?, Mike Schultz, Dennis Papadopolos, Bill Matthews, Stan Sayzykin, Dick Wolf, ?

GEM Flood

A water main breaks . . . and floods the Wildwood hotel where GEM participants stay









2004 CEDAR

Eldorado Hotel, Santa Fe, New Mexico





Farzad Kamalabadi, Steve Englander (A/V for Eldorado), Barbara Emery



Biff Williams, Doug Geiger, Barbara Emery(-Geiger), Susan Nossal, Young-Sil Kwak by Blue Corn Cafe



Young-Sil Kwak at Fort Marcy Suites for students



Kathryn Fisher and Louise Beierle behind the CEDAR Registration desk in the Eldorado Hotel.



HAO/NCAR dinner: Stan Solomon, Astrid Maute, Maura Hagan



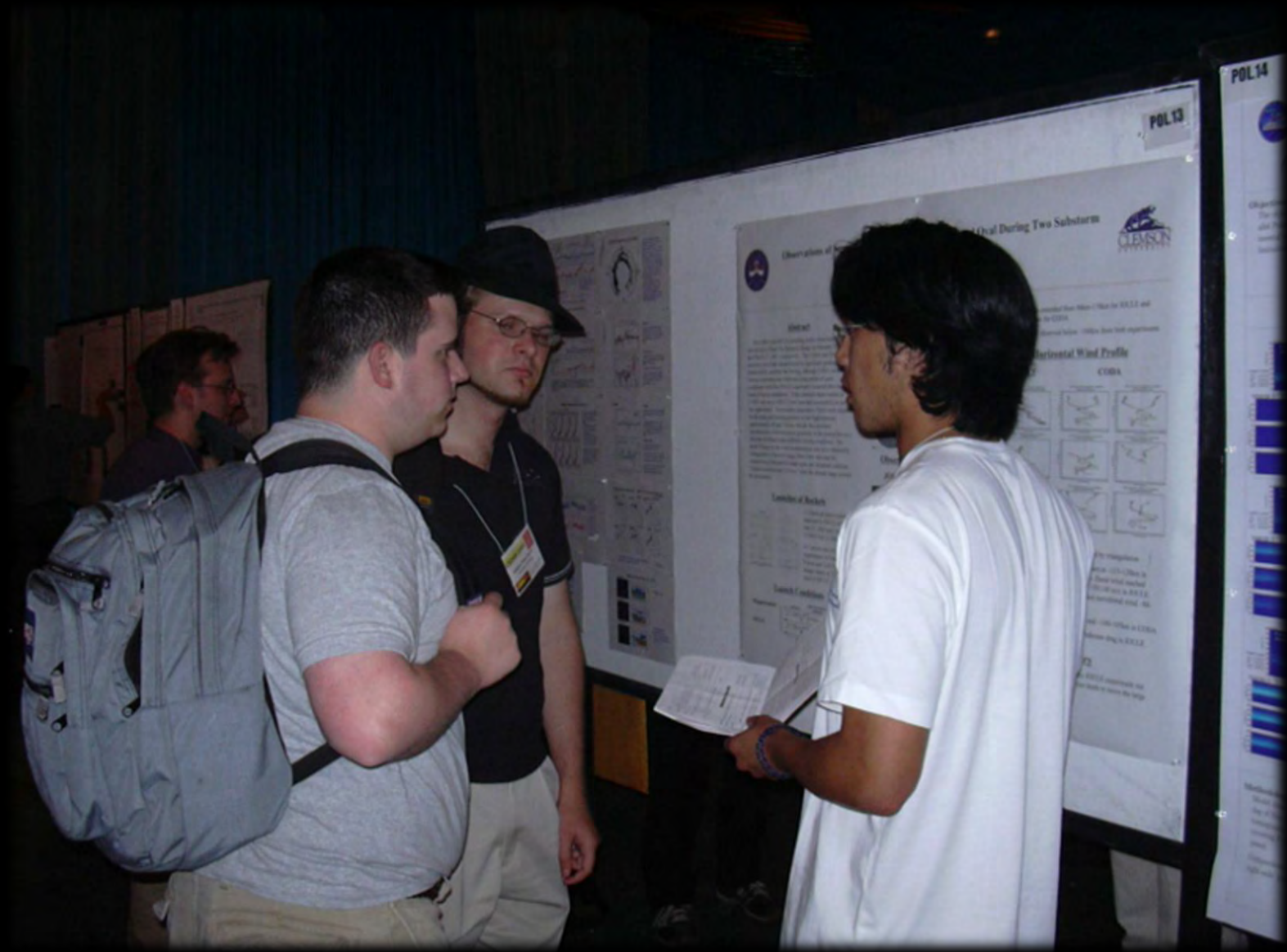
Setting out for Petroglyph walk through Cieneguilla: Ron Woodman
... Denise Thorsen, Rich and Norma Behnke, ... Maria Richmond



Petroglyph walk: Anthea Coster, ?, Rich Behnke,..., Romina Nikoukar, ?, tour leader Dennis Slifer with walking stick, Ronald Woodman, Norma Behnke



Petroglyphs: ? And Doug Geiger



Tianyu Zhan of Clemson University describes his poster to interested Clemson undergraduates Bailes Brown (left) and Andy Owens (middle).

Mike Taylor
with bird in
the Pavilion
poster room.

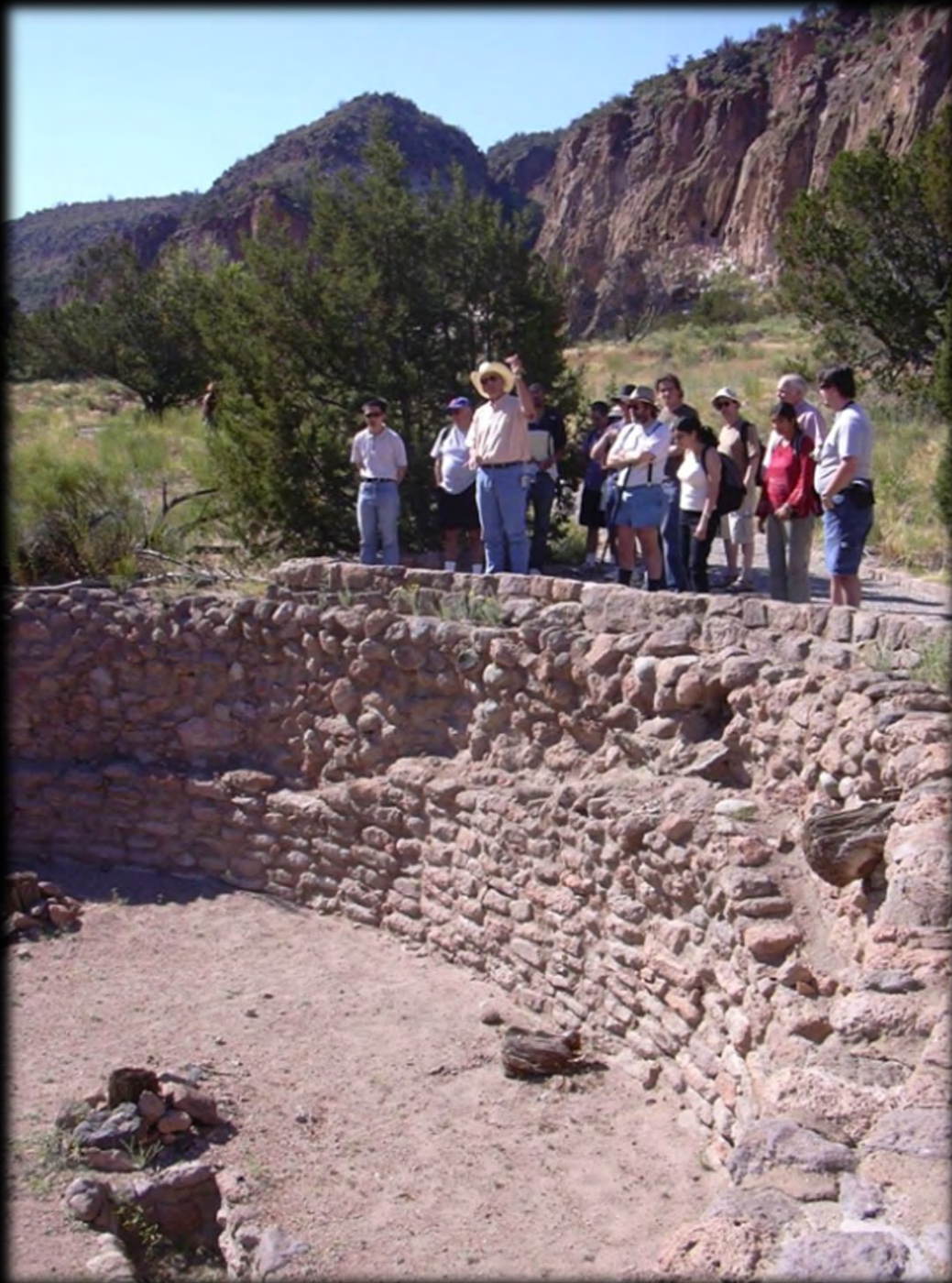




Larisa Goncharenko of MIT explains her data experiences at the Integrated Data Environment Workshop.



CEDAR group with John Meriwether at Bandolier National Monument with tour guide Robin in the white cowboy hat.



Barbara Emery and
Sawako Maeda





Anthea Coster, Barbara Emery, Doug Geiger, son, Norma and Rich Behnke



2005 CEDAR-GEM

Eldorado and La Fonda Hotels, Santa Fe, New Mexico

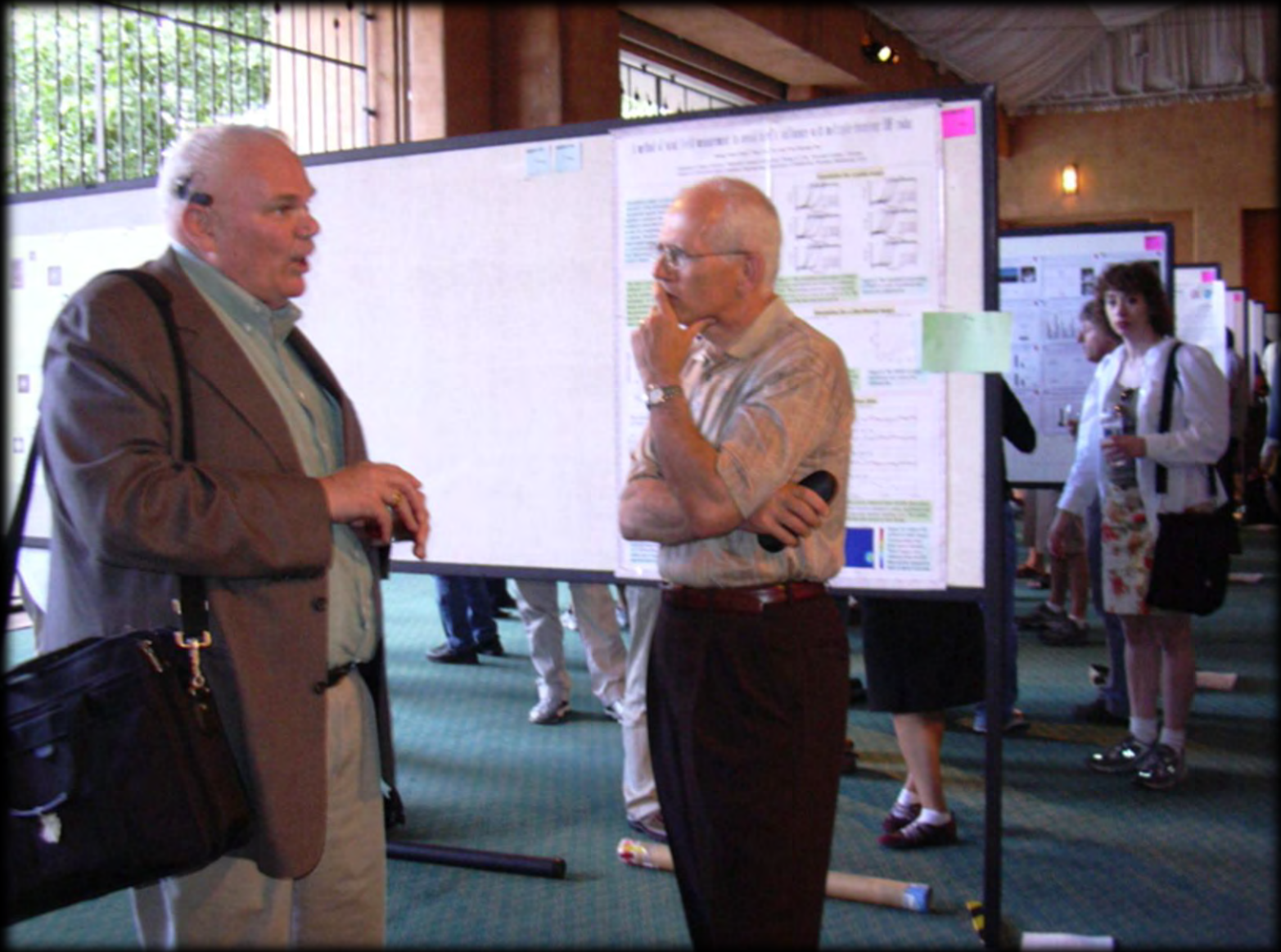




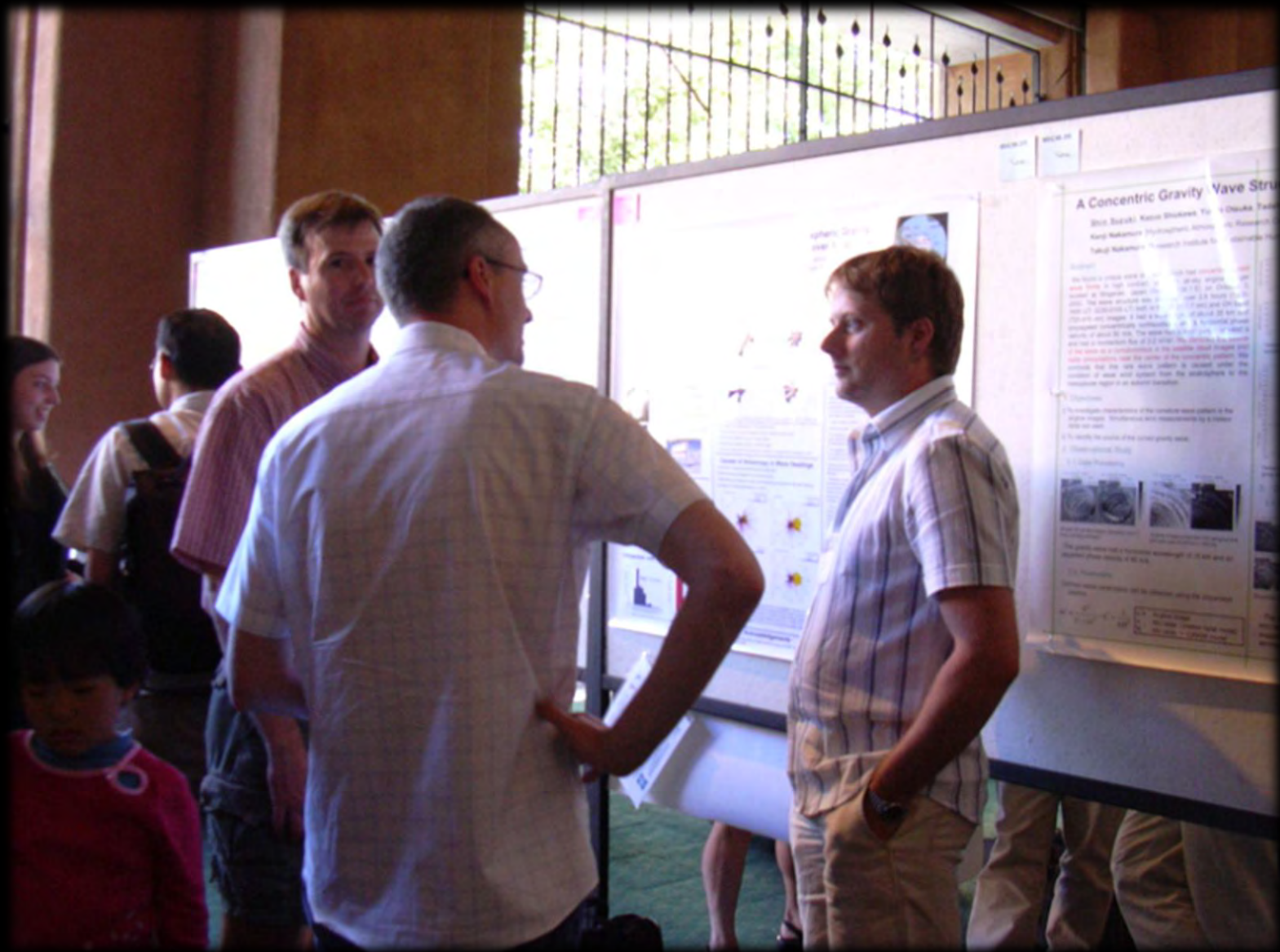
Barbara Emery hands out free T-shirts at the Student Workshop at La Fonda



Sunday Reception at the Eldorado Hotel Anasazi Ballroom:
Delano Gobbi ,Tzu-Wei Fang , ... Pedrina Terra dos Santos



John Meriwether and Chet Gardner at the Monday MLT poster session in the Pavilion.





Delano Gobbi, Joachim Fechine and Pedrina Morais Terra dos Santos



Fabiano Rodrigues of Cornell explains his winning poster to Phil Erickson, chief judge.



Barbara Emery, Dirk Lummerzheim, Doug Geiger, Odile de la Beaujardiere, Marina Galand



Josh Semeter of BU is co-chair of the Auroral Boundaries joint workshop.



A huge crowd in the La Fonda Ballroom for the joint banquet Wednesday evening.



CEDAR student tutorial speaker Rod Heelis of UTD tells incoming CSSC chair Jan Sojka of USU what he can expect in his term.



At the joint CEDAR and GEM steering committee lunch Thursday at La Terrazza in La Fonda. Front table: ?, ?, Brian Fraser, Vania Jordanova, Mike Liemohn. Back table: Sixto Gonzalez, Carlos Martinis, Phil Erickson, Koki Chau, Mike Nicolls, ?, Bob Robinson. Middle table: ?, Bob Kerr, Rick Doe, Farzad Kamalabadi, Don McEwen, Unni Pia Lovhaug?. In back Rod Heelis and Eric Donovan.



Eric Donovan, Gang Lu, Josh Semeter, Howard Singer, and Rich Behnke at joint SSC lunch

Marina Galand
and Louise
Beierle.
Outgoing
member Marina
Galand of BU
gives the joint
CEDAR and
GEM steering
committees her
observations
about the joint
workshop.





Back: John Mathews, Bob Kerr, Eric Donovan, Rod Heelis, Josh Semeter, Gang Lu, Howard Singer, Rich Behnke. Front: Bob Strangeway GEM chair, Umbe Cantu, Louise Beierle, and Marina Galand (standing).

The organizers
on the La Fonda
Terrace
overlooking the
Cathedral:
Umbe Cantu of
Rice for GEM,
and Barbara
Emery and
Louise Beierle of
NCAR for
CEDAR.





Jorge (Koki) Chau and Barbara Emery



Eva Robles and Sixto Gonazalez of Arecibo dance at the impromptu party organized by CEDAR student representative Carlos Martinis at the Eldorado Thursday evening.



Incoming CSSC chair Jan Sojka of USU gives outgoing CSSC chair Sixto Gonzalez of Arecibo a book.



Free marimba music in one of the many small shopping squares in Santa Fe.



2006 CEDAR

Eldorado Hotel, Santa Fe, New Mexico





This is the pre-conference meeting of the Eldorado staff and the CEDAR Workshop staff (left to right: Ellen Martinez VSP/NCAR, Mara Saubers Eldorado Conference Services, Susan Baltuch VSP/NCAR, Anthony Martinez Eldorado Front Desk, Eduardo Vasquez Eldorado Banquets, Shawna Johnson USU, Barbara Emery HAO/NCAR, and Antoinette Eugenio Eldorado Concierge)

Susan Baltuch





Ilgin Seker of PSU leads the class in salsa dancing in the Sunset room on Tuesday night.

Koki Chau and
Eva Robles at
the Salsa dance



Pedrina Terra
dos Santos
and Sixto
Gonzalez





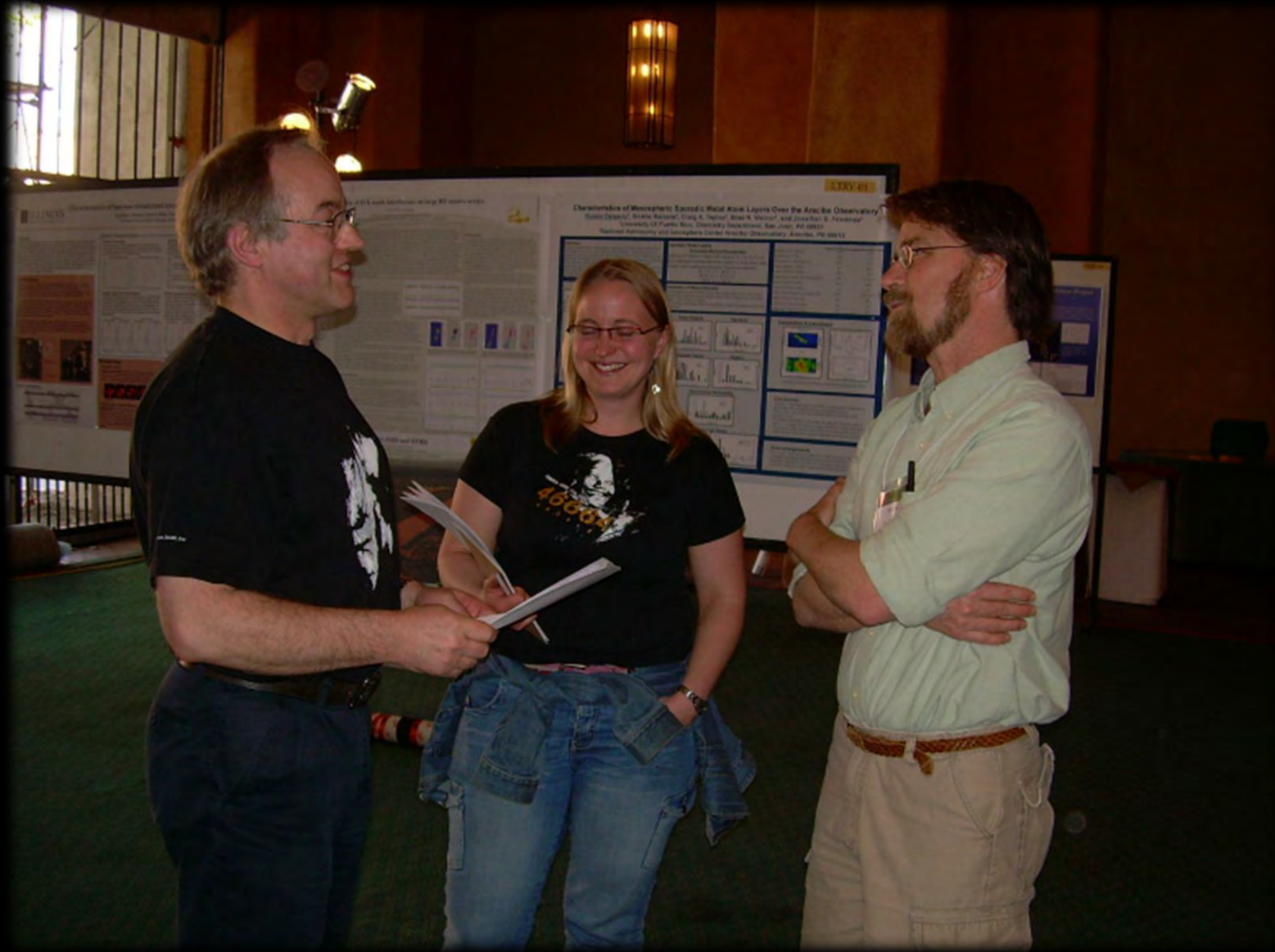
Sigrid Close speaks at the meteor workshop in Anasazi South.



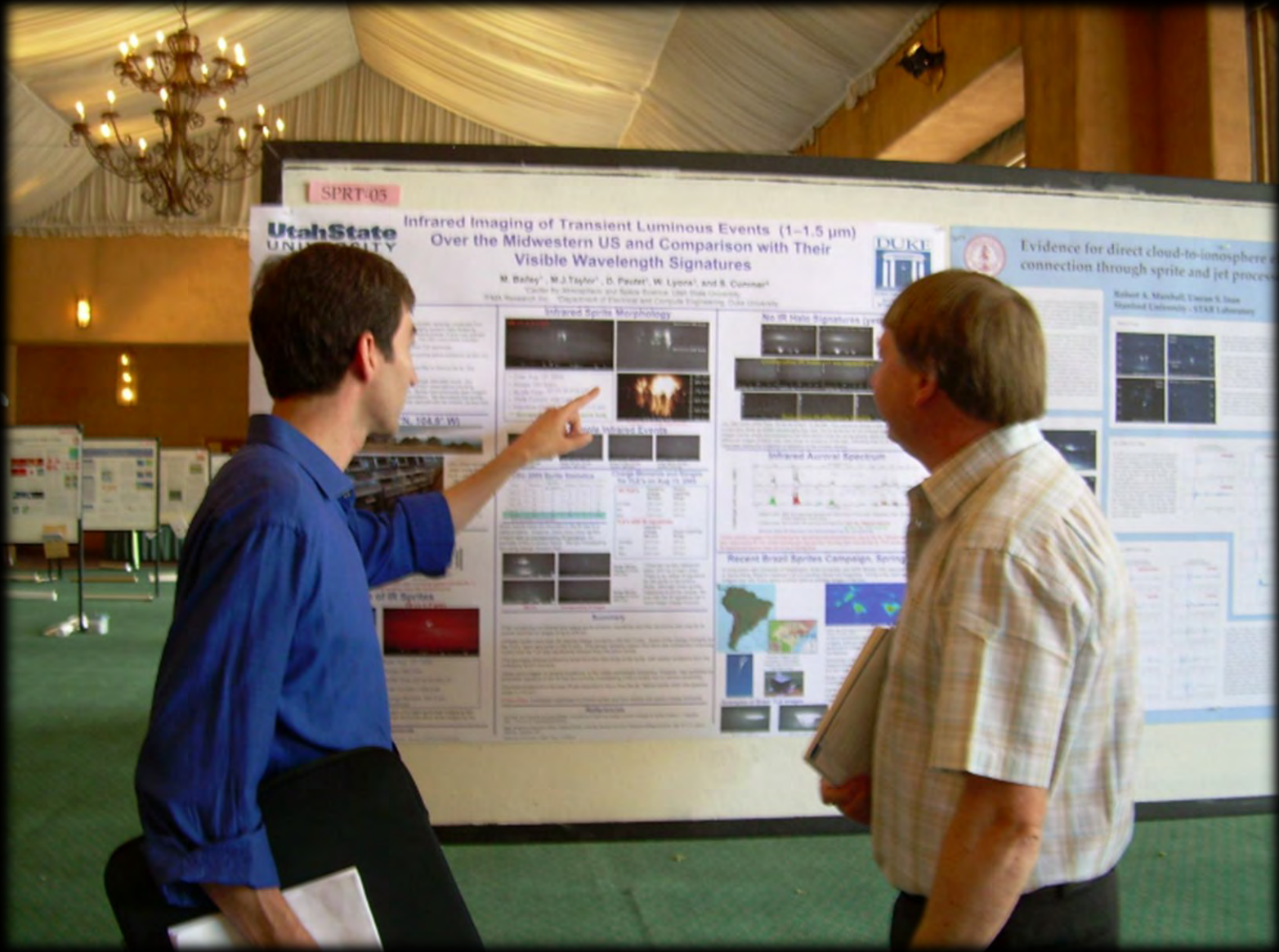
John Meriwether of Clemson asks the speaker Aaron Ridley of the University of Michigan questions at the Fabry-Perot Workshop in Zia.



Abandoned Pueblo of Tsankawi: Joe Grebowsky, Doug Geiger,
and Gail Tepley



Rick Doe of SRI, the poster chair (on the right), discusses strategy with two of his judges, Tony van Eyken and Anja Stromme of EISCAT.



Farzad Kamalabadi of U IL is asking Mike Taylor of USU about his student's poster.



Dirk Lummerzheim, Roger Smith, Tony van Eyken, Chantal Lathuillere,
and Doug Geiger

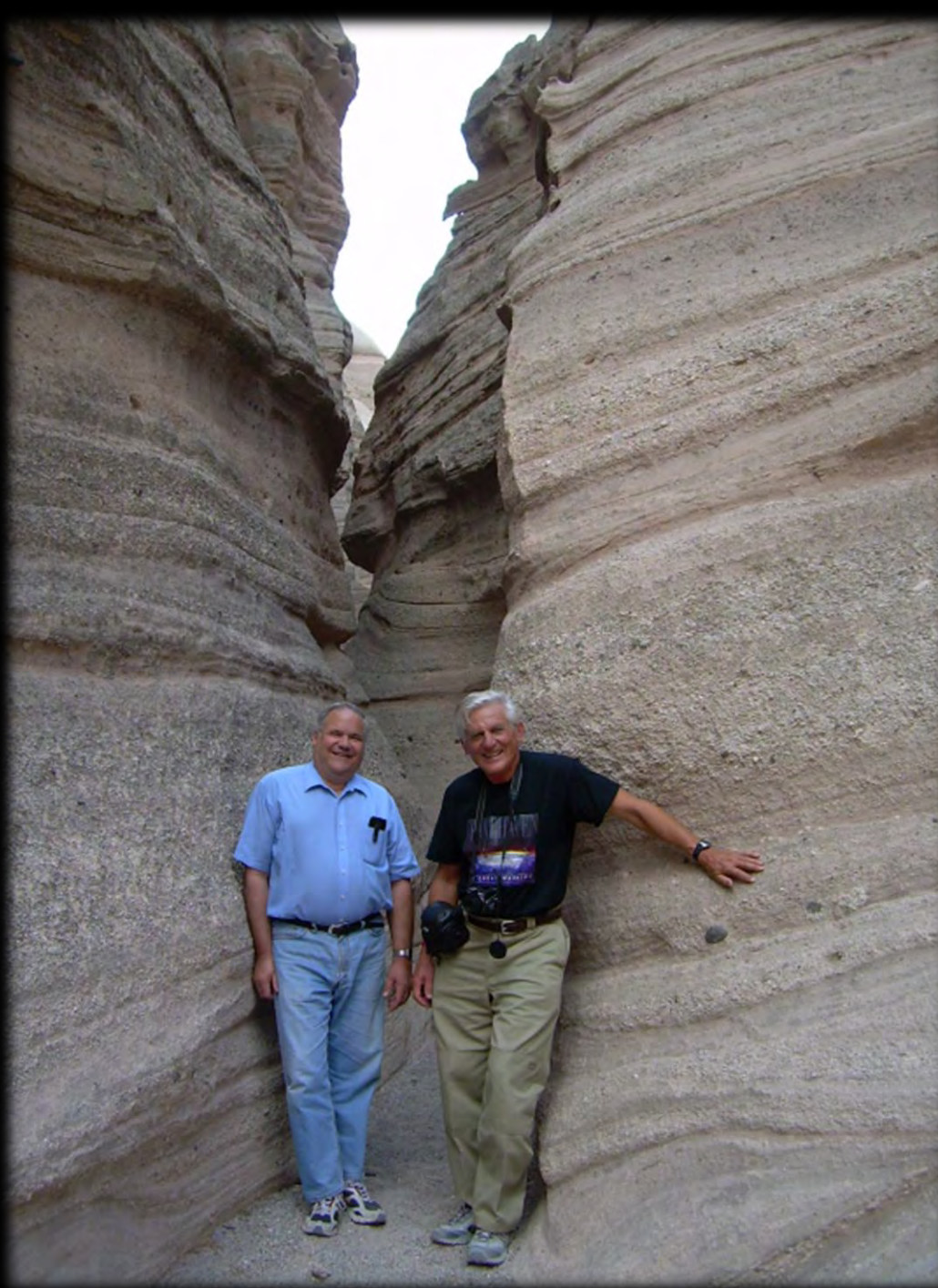
Tent Rocks: Our guide in red describes to Ron Woodman how to descend from where Chantal Lathuillere of Grenoble and Don Farley of Cornell are standing.



Chantal
Lathuillere,
Don Farley,
and our guide
to Tent Rocks.



Wes Swartz
and Ronald
Woodman.





Chantal Lathuillere, Don Farley, Ron Woodman and Wes Swartz.

Wes Swartz





At the Plaza Cafe from left to right: Pamela Loughmiller of Embry-Riddle, Ron Woodman from Jicamarca, Don Farley of Cornell, Barbara Emery of NCAR, Doug Geiger (husband of Barbara), and Wes Swartz of Cornell.



Barbara Emery of NCAR at the Pecos site with a kiva and church in the background with other members of our group.

Larisa
Goncharenko





2007 CEDAR

Eldorado Hotel, Santa Fe, New Mexico

General Pictures





Sunday 24 June 2007 CEDAR Student Workshop, Tutorial by Jeff Forbes (U CO).



Sunday 24 June 2007 CEDAR Student Workshop, Tutorial by Jeff Forbes (U CO).



Sunday 24 June 2007 CEDAR Student Workshop, Tutorial by Jeff Forbes (U CO)



The Sunday June 24 reception at the Eldorado: Don and Susan? Rice (USU), Doug Geiger, Barbara Emery (-Geiger, NCAR), and Matthew Hei (BC).



CEDAR Prize Lecturer John Plane (U Leeds, UK, right) receives his certificate from CEDAR Science Steering Committee Chair Jan Sojka (USU, left).



Video-con with Arecibo Observatory on 26 June with Part 1 of Arecibo Friends Workshop. Front row: Mike Sulzer (Arecibo Obs), Laura Waldrop (U IL), Farzad Kamalabadi (U IL), ?Rick Doe (SRI). Second row: Steve Watchorn (Sci-Sol) and John Noto (Sci Sol).



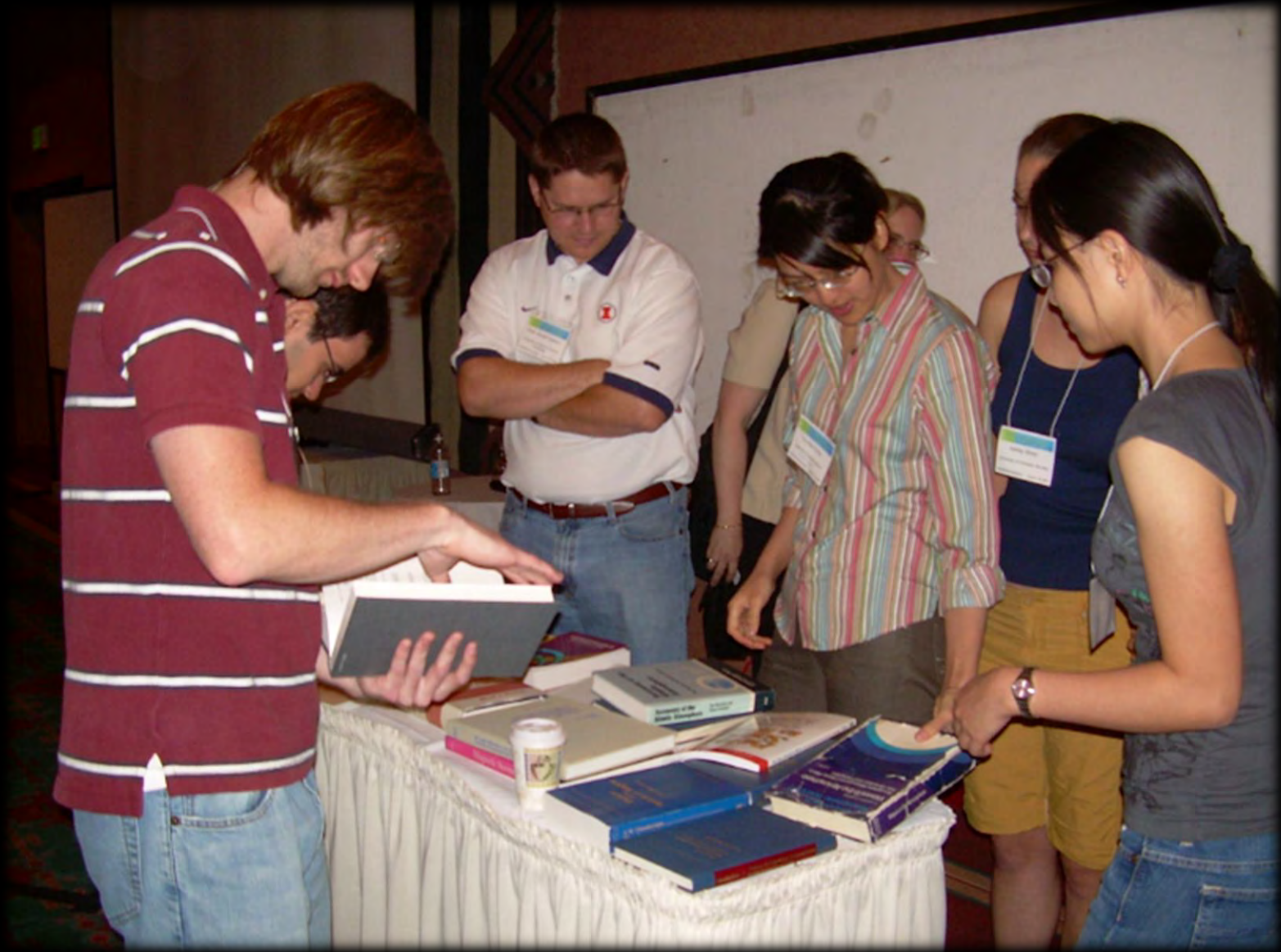
Video-con with Arecibo Observatory on 26 June with Part 1 of Arecibo Friends Workshop



John and Barbara Holt, ? Van Eyken, Roger Smith, Doug Geiger, and Barbara Emery(-Geiger).



Student poster prize winners: Ashley Wiren (2nd, U CO), Alexander Hassiotis (hon, PSU), Chunmei Kang (hon, U CO), Matthew Zettergren (1st, BU), Chad Carlson (2nd, U IL), Shasha Zou (hon, UCLA), Tzu-Wei (Vicky) Fang (hon, NCU/TW and NCAR), Roger Varney (undergrad, Cornell), and Jeremy Rioussset (1st, PSU).



Student poster prize winners choosing books: Alexander Hassiotis (PSU), Matthew Zettergren (BU), Chad Carlson (U IL), Anthea Coster (judge), Vicky Fang (NCU/TW), Ashley Wiren (U CO) and Chunmei Kang (U CO).



Barbara Emery, Wes Swartz, Doug Geiger, and Frank Mulligan.



John Plane, CEDAR Prize Lecturer, buys a wall hanging as a souvenir from a Chimayo weaver.



Rancho del Chimayo restaurant: Mitch and Susan Baltuch, Barbara Emery, and Frank Mulligan.



Frank Mulligan, Susan and Mitch Baltuch, and Barbara Emery.



Mike Ruohoniemi, Doug Geiger, and Barbara Emery at the antique car display on the Plaza.



2007 CEDAR

Eldorado Hotel, Santa Fe, New Mexico

Sunday Soccer Game at Fort Marcy Park















2007 CEDAR

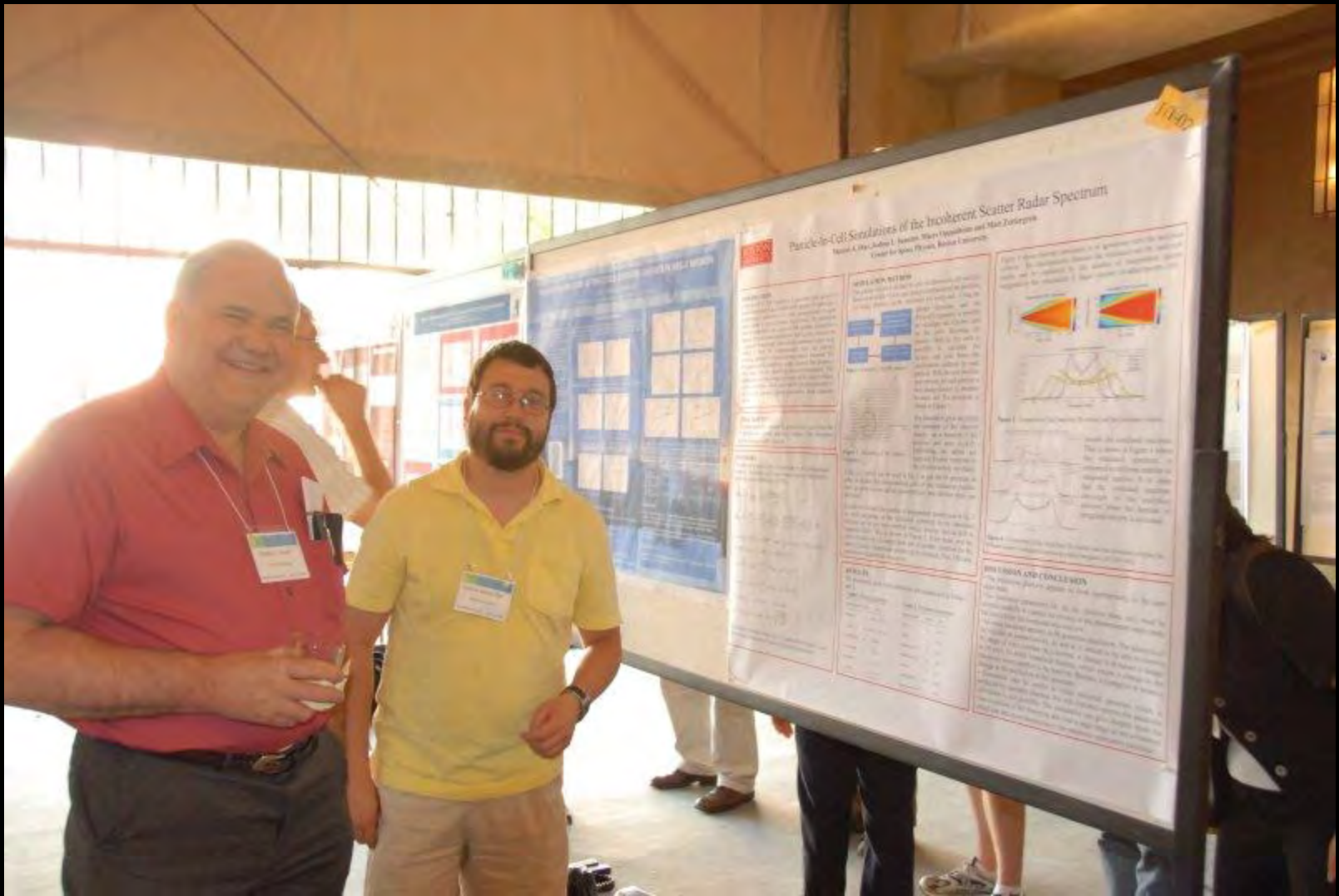
Eldorado Hotel, Santa Fe, New Mexico

Monday Poster Session

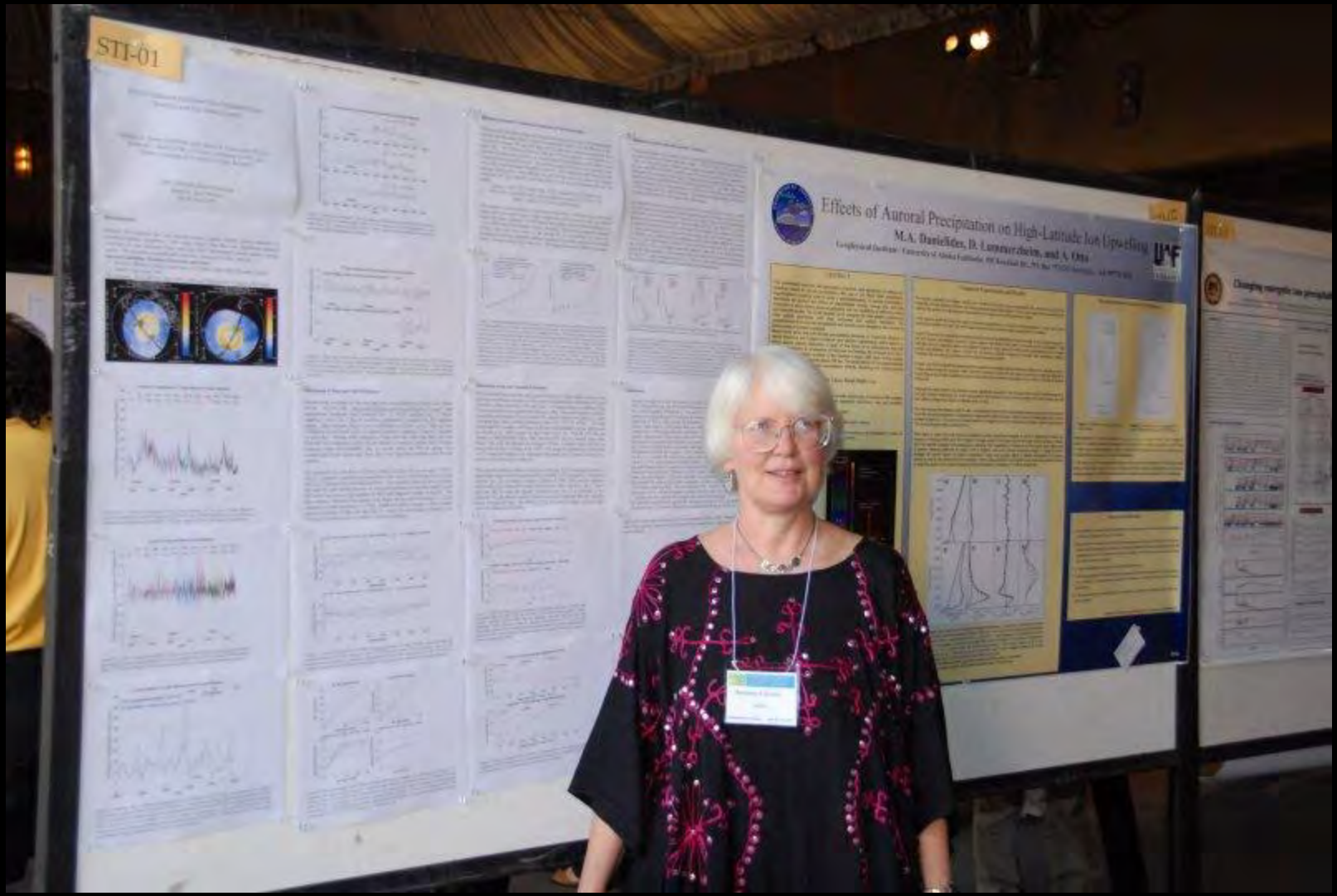




Monday Poster Session Everyone socializing: ? and ?; Pedrina Santos (Arecibo) and Amauri Medeiros (INPE/USU); Dwight Decker (AFRL) and Bob Schunk (USU); John Plane (U Leeds, UK).



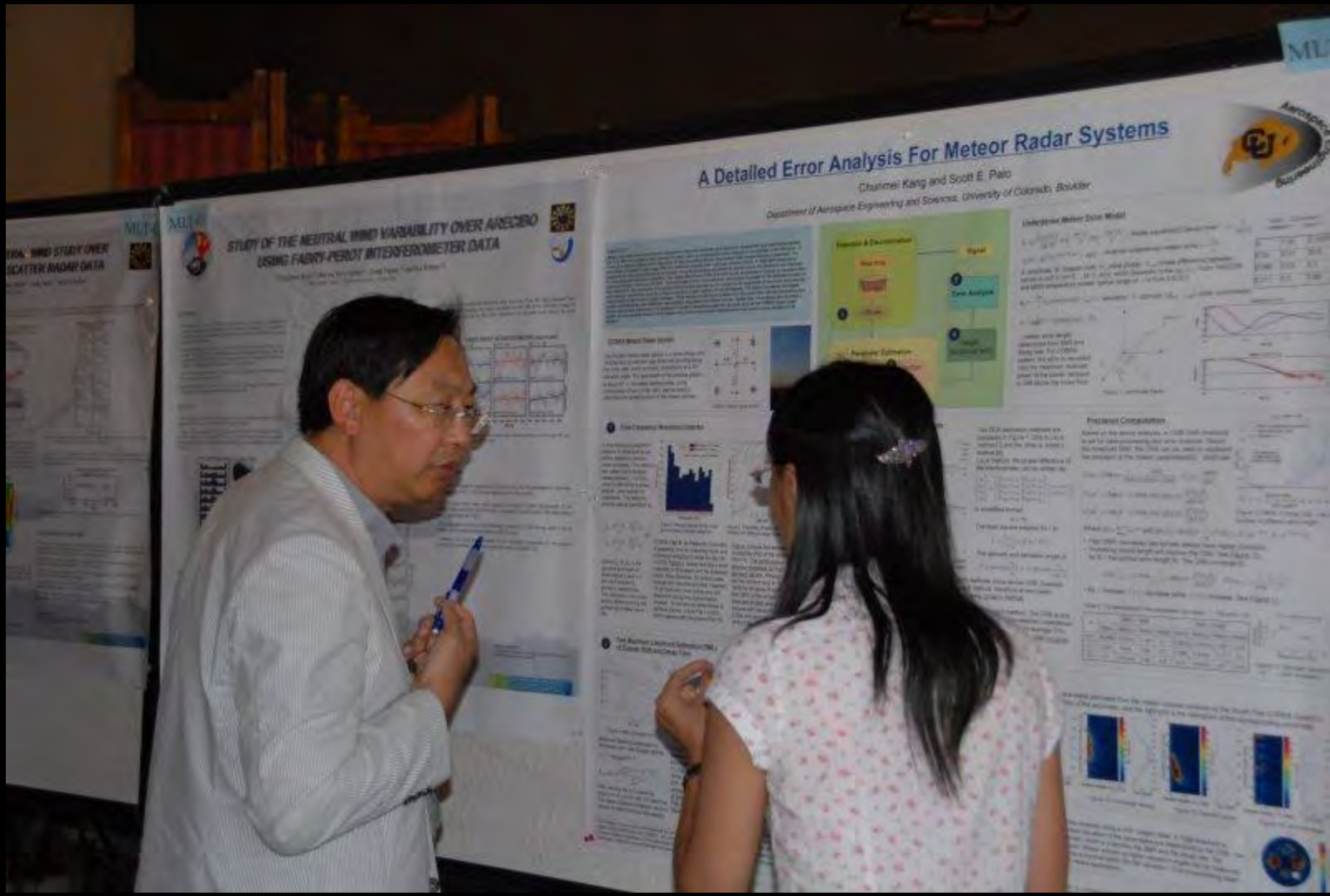
Monday Poster Session Wes Swartz (Cornell) and Marcos Diaz (BU, ITI-02)



Monday Poster Session Barbara Emery (NCAR, STI-01).



Monday Poster Session Everyone talking: Dave Anderson (NOAA); Tao Yuan (?, CSU?, LEE-01) and Larisa Goncharenko (? MIT); Narayan Chapagain (USU, EQU-04) and Durga Kafle (?, USU); ? and Chunmei Kang (U CO, MLT-04).



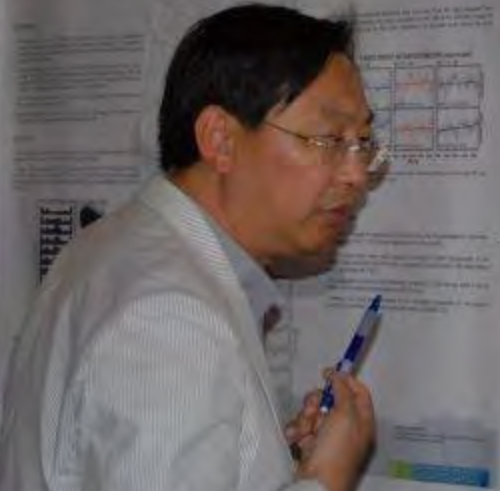
A Detailed Error Analysis For Meteor Radar Systems

Chunmei Kang and Scott E. Palo
Department of Aerospace Engineering and Sciences, University of Colorado, Boulder

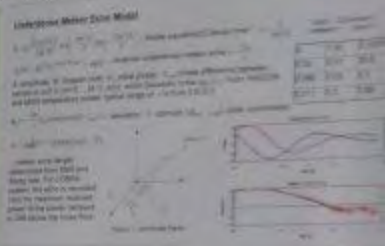
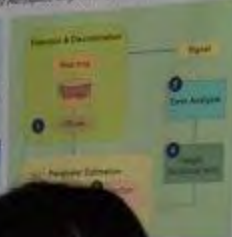


STUDY OF THE NEUTRAL WIND VARIABILITY OVER ARECIBO USING FABRY-PEROT INTERFEROMETER DATA

Chunmei Kang, Scott E. Palo, and David H. Stenflo
Department of Aerospace Engineering and Sciences, University of Colorado, Boulder



The meteor radar system is a key tool for studying the upper atmosphere. This paper presents a detailed error analysis for meteor radar systems, focusing on the impact of various error sources on the derived meteor parameters.

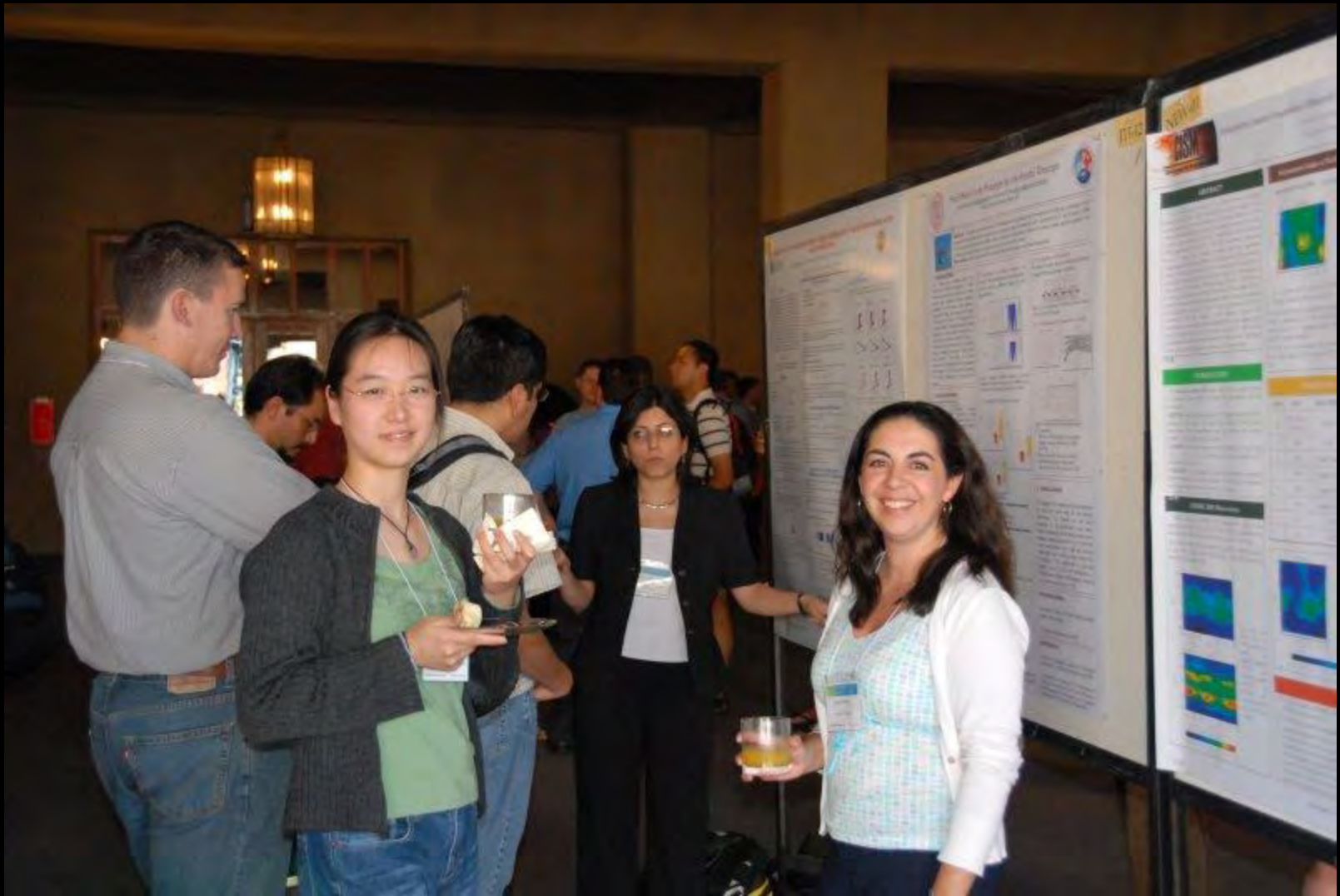


The error analysis is performed using a Monte Carlo simulation. The results show that the largest source of error is the uncertainty in the meteor velocity. The error analysis is performed using a Monte Carlo simulation. The results show that the largest source of error is the uncertainty in the meteor velocity.

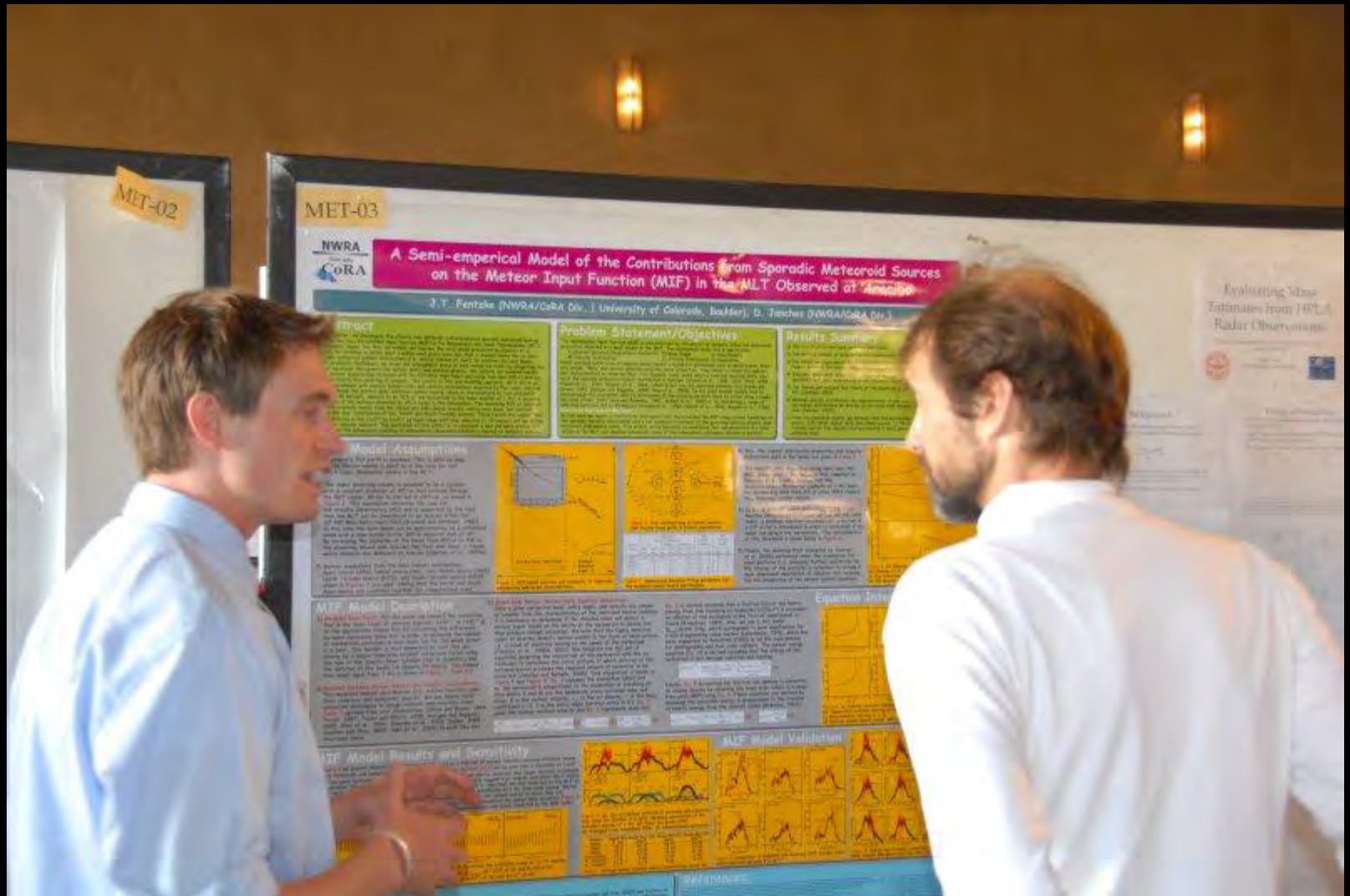
The error analysis is performed using a Monte Carlo simulation. The results show that the largest source of error is the uncertainty in the meteor velocity. The error analysis is performed using a Monte Carlo simulation. The results show that the largest source of error is the uncertainty in the meteor velocity.



Monday Poster Session ? and Chunmei Kang (MLT-04).



Monday Poster Session Janet (Zhen) Zeng (NCAR), Romina Nikoukar (in back, U IL) and Eliana Nossa (Cornell, ITI-12).



Monday Poster Session Jonathan Fentzke (U CO, MET-03) and ?.

Case Study of Thermospheric Neutral Densities and Airglow Structures

Clara Narvaez¹, Carlos Martínez¹, Jeff Porten², Sean Brumaker³, Michael Mendillo³

¹ Center for Space Physics, Boston University, 7 University Circle, Boston, MA 02215, USA; ² Center for Space and Earth Science, University of Colorado, Boulder, CO 80508, USA; ³ Center for Space and Earth Science, University of Colorado, Boulder, CO 80508, USA

Abstract:

In 2011 observations of upper atmospheric neutral densities by the STAR accelerometer on the CHAMP satellite are compared to optical all-sky imaging data from the Airglow Observatory in Puerto Rico (18.2° N, 66.7° W). The 6300 Å airglow images that diagnose atmospheric structure, and the corresponding density measurements from STAR, are analyzed in order to see if a relationship exists between density changes and appearance of structure.

Goal:

Airglow at 6300 Å arises from photochemistry between O⁺ ions and O₂ molecules. Structured emission can arise from structured plasma (e.g. local downwellings) or from a structured thermosphere (e.g. gravity waves). Plasma processes (e.g. instabilities) might also affect thermospheric densities in small ways. The pilot study addresses the question: "Is the thermosphere "smooth" or "structured" on nights when 6300 Å patterns (airglow "depletions" and/or "beards") occur?"

Method:

All-sky images for 70 nights were used to measure the structure of airglow emission. Images were taken using a 0.5 m diameter telescope at the Airglow Observatory in Puerto Rico. The data were analyzed to determine the structure of the airglow emission. The structure of the airglow emission was determined by comparing the structure of the airglow emission to the structure of the thermosphere. The structure of the thermosphere was determined by comparing the structure of the thermosphere to the structure of the airglow emission.

Observations:

| Year | # of Events (Structure) | # of Events (Density) | # of Events (Both) |
|------|-------------------------|-----------------------|--------------------|
| 2004 | 10 | 10 | 10 |
| 2005 | 10 | 10 | 10 |
| 2006 | 10 | 10 | 10 |

Further Explorations:

Figure 1 shows several examples of airglow images that exhibit structure. The structure of the airglow emission is determined by comparing the structure of the airglow emission to the structure of the thermosphere. The structure of the thermosphere is determined by comparing the structure of the thermosphere to the structure of the airglow emission.

Summary:

- This study has looked at 21 events during 2004 and 2005 with airglow structures, and compared the density percent changes from CHAMP measurements to the relative brightness from images obtained in look 0 for CHAMP yields.
- Density variations of about 1% to 2% are generally seen with airglow structures. No consistent pattern of correlation with trend content due to sampling effects.
- The goal is to extend the study to include more cases during 2006 and 2007.

Analysis of thermospheric response to magnetospheric ionospheric storms

Clara Narvaez¹, Carlos Martínez¹, Jeff Porten², Sean Brumaker³, Michael Mendillo³

¹ Center for Space Physics, Boston University, 7 University Circle, Boston, MA 02215, USA; ² Center for Space and Earth Science, University of Colorado, Boulder, CO 80508, USA; ³ Center for Space and Earth Science, University of Colorado, Boulder, CO 80508, USA

Abstract:

The thermosphere is a highly variable region of the atmosphere. It is affected by a variety of processes, including solar wind, magnetospheric storms, and ionospheric storms. The purpose of this study is to analyze the response of the thermosphere to magnetospheric ionospheric storms. The study uses data from the CHAMP satellite and the Airglow Observatory in Puerto Rico. The structure of the thermosphere is determined by comparing the structure of the thermosphere to the structure of the airglow emission.

Method:

The structure of the thermosphere is determined by comparing the structure of the thermosphere to the structure of the airglow emission. The structure of the airglow emission is determined by comparing the structure of the airglow emission to the structure of the thermosphere.

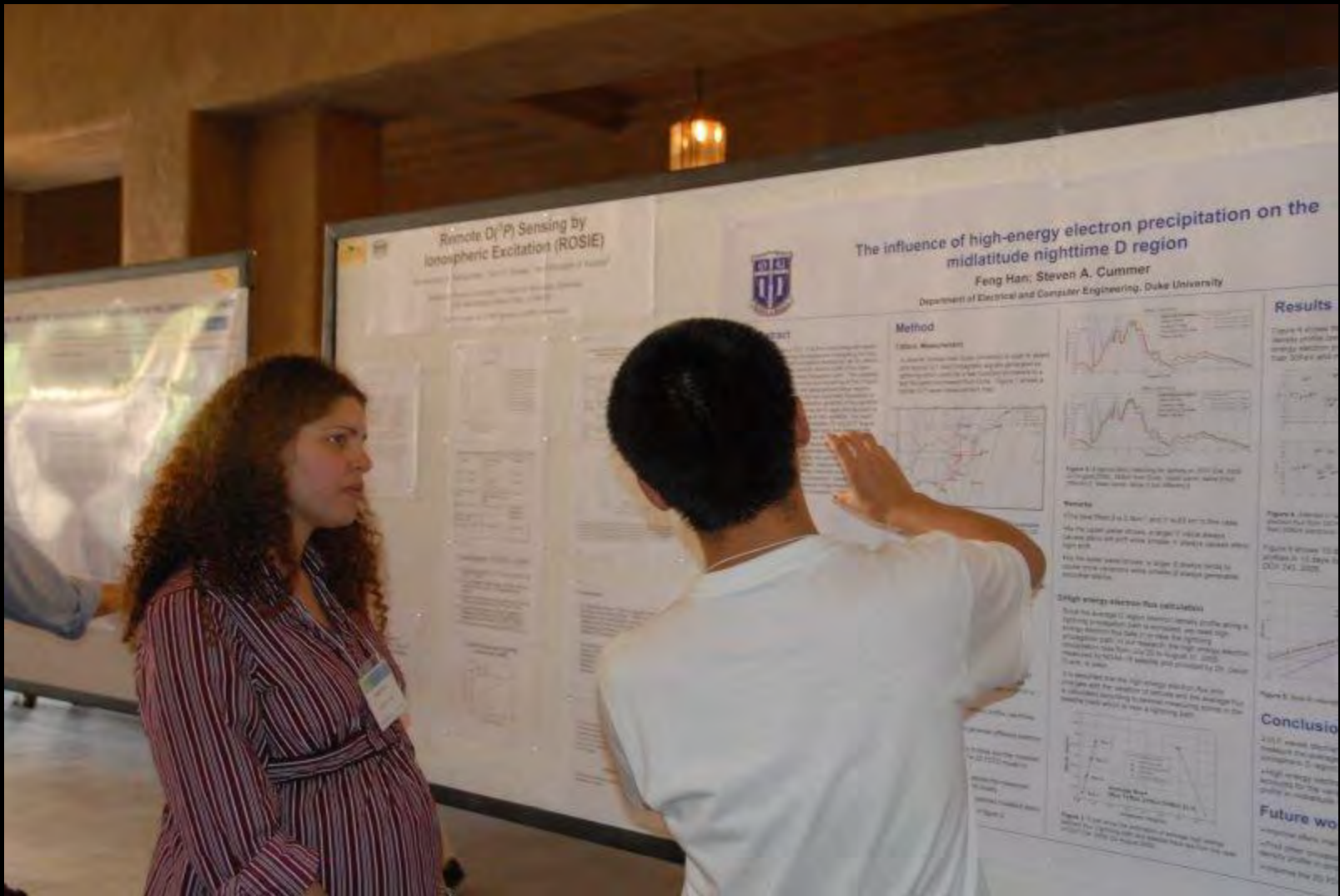
Results:

The results show that the thermosphere is highly variable and that its structure is affected by a variety of processes. The structure of the thermosphere is determined by comparing the structure of the thermosphere to the structure of the airglow emission.

Summary:

- The thermosphere is a highly variable region of the atmosphere.
- It is affected by a variety of processes, including solar wind, magnetospheric storms, and ionospheric storms.
- The purpose of this study is to analyze the response of the thermosphere to magnetospheric ionospheric storms.
- The study uses data from the CHAMP satellite and the Airglow Observatory in Puerto Rico.
- The structure of the thermosphere is determined by comparing the structure of the thermosphere to the structure of the airglow emission.
- The structure of the airglow emission is determined by comparing the structure of the airglow emission to the structure of the thermosphere.

Monday Poster Session Clara Narvaez (BU, STI-06).



Monday Poster Session Feng Han (Duke, ITI-06) explains his poster to Madj Matta (BU).

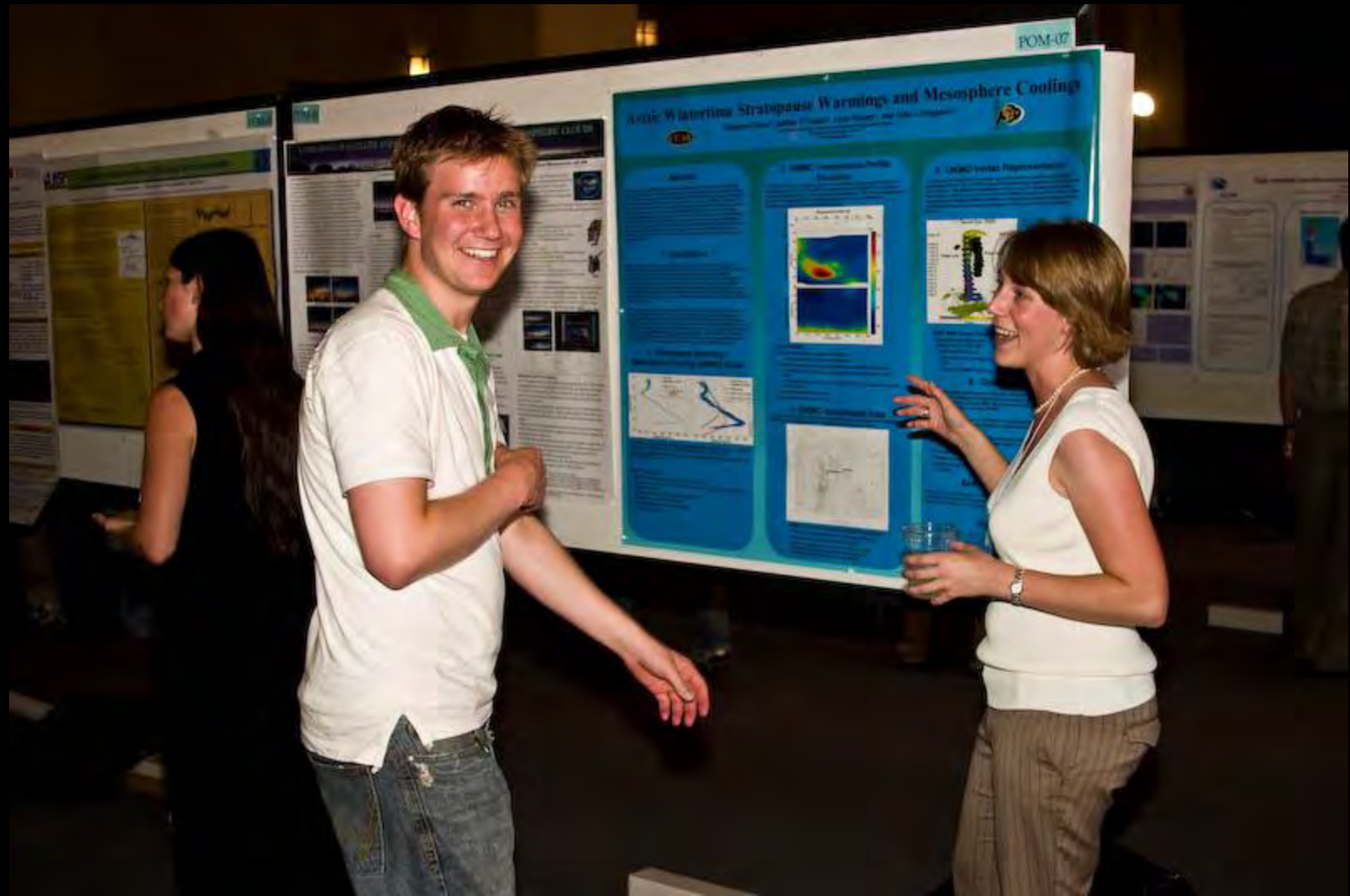


2007 CEDAR

Eldorado Hotel, Santa Fe, New Mexico

Tuesday Poster Session

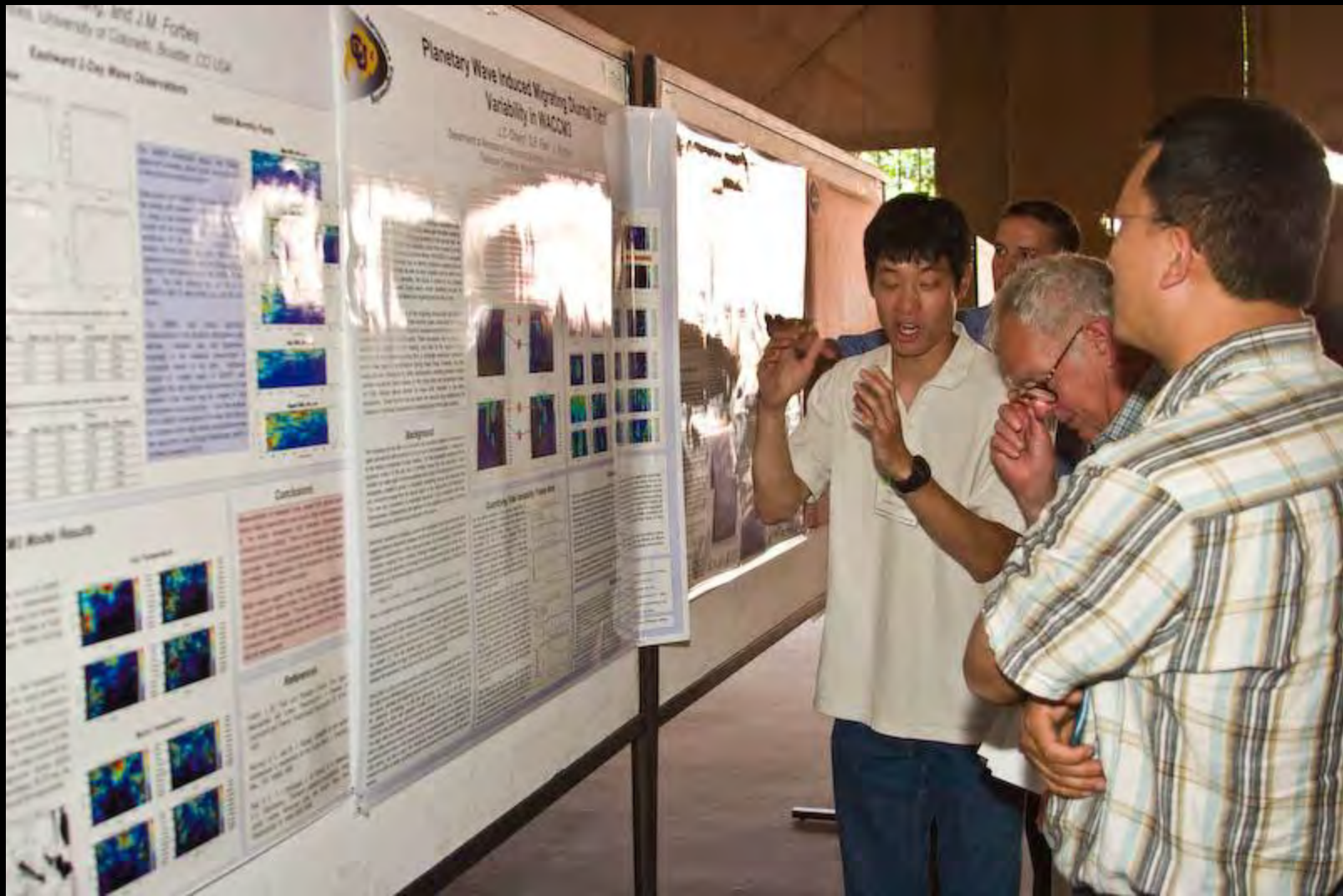




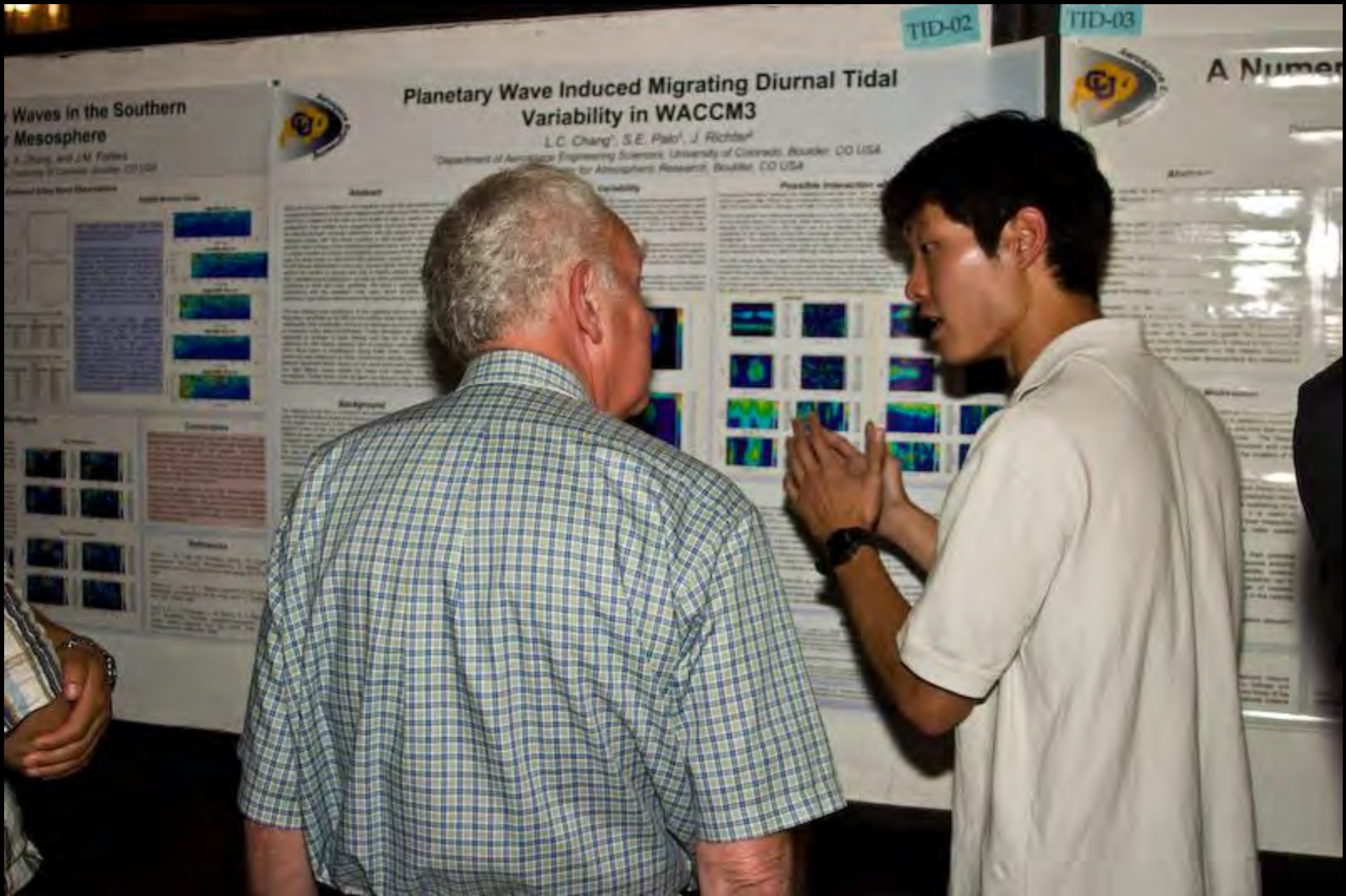
Katelynn Greer (U CO undergrad) explains her poster.



Jeremy Riouset (PSU, 1st place winner) explains his poster to the judges (Dan Marsh) with green folders.



Loren Change (U CO) explains his poster.



Loren Change (U CO) explains his poster to David Anderson (NOAA).



Kyle Johnson (U CO) explains his poster.

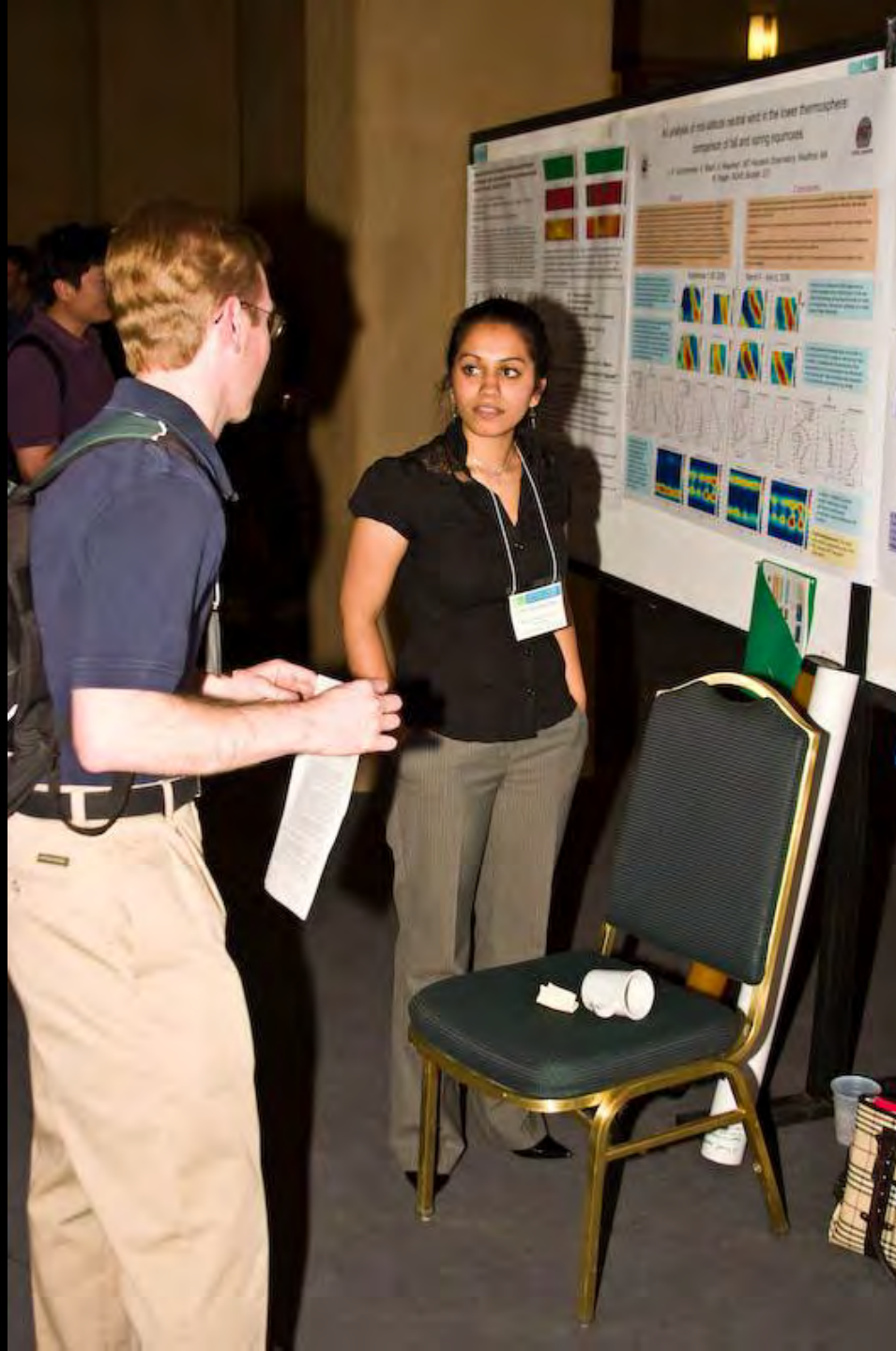
Jeff Thayer
(CSSC incoming
chair, U CO) in
front of his
student Laura
Brower's poster
(U CO).

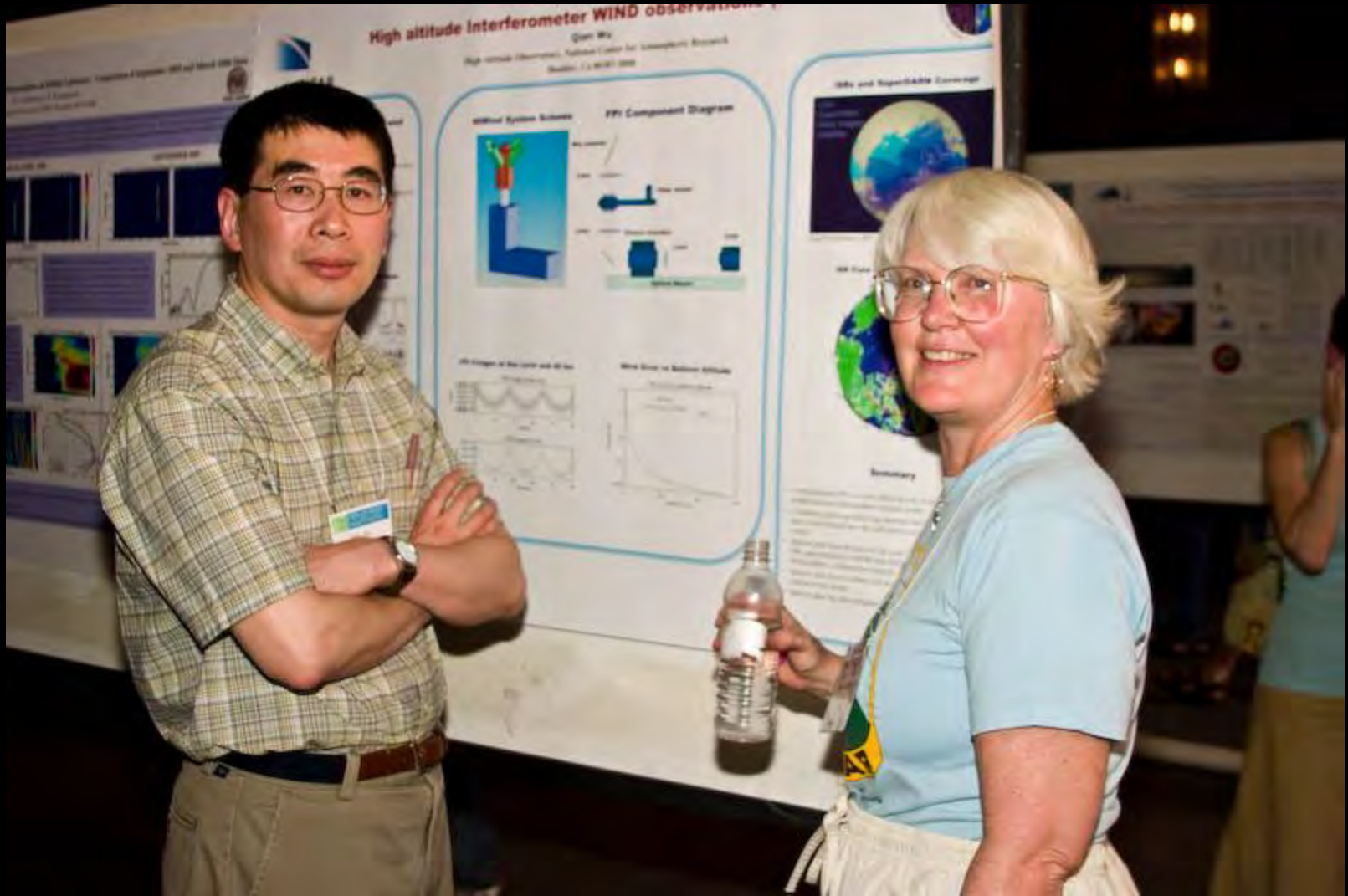


Jonathan Snively,
Jonathan Fentzke
and others talking
at the poster
session.

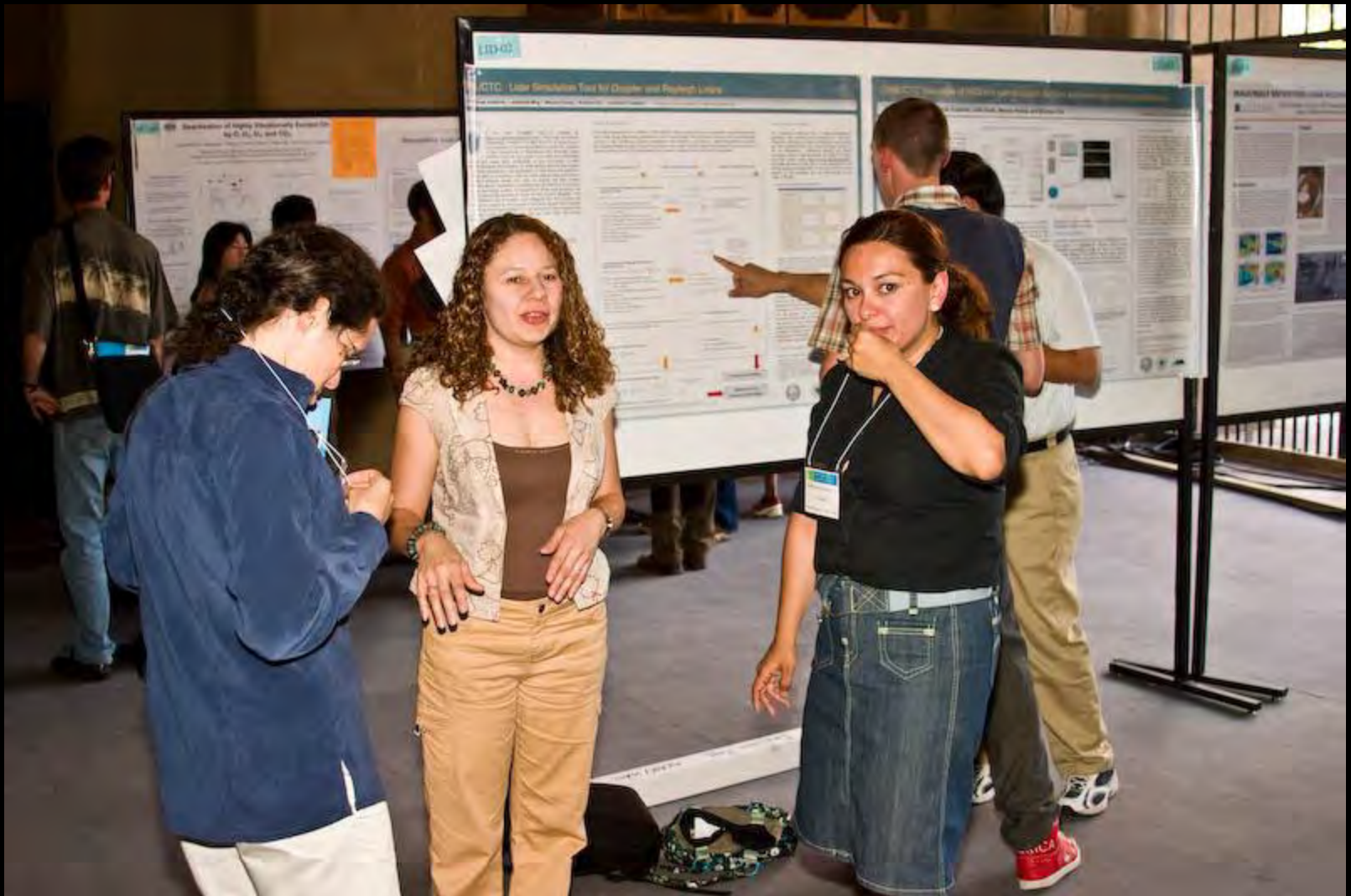


Amrita Masurkar (undergrad, MIT REU) describes the posters she did with her advisor Larisa Goncharenko to John Emmert (NRL).

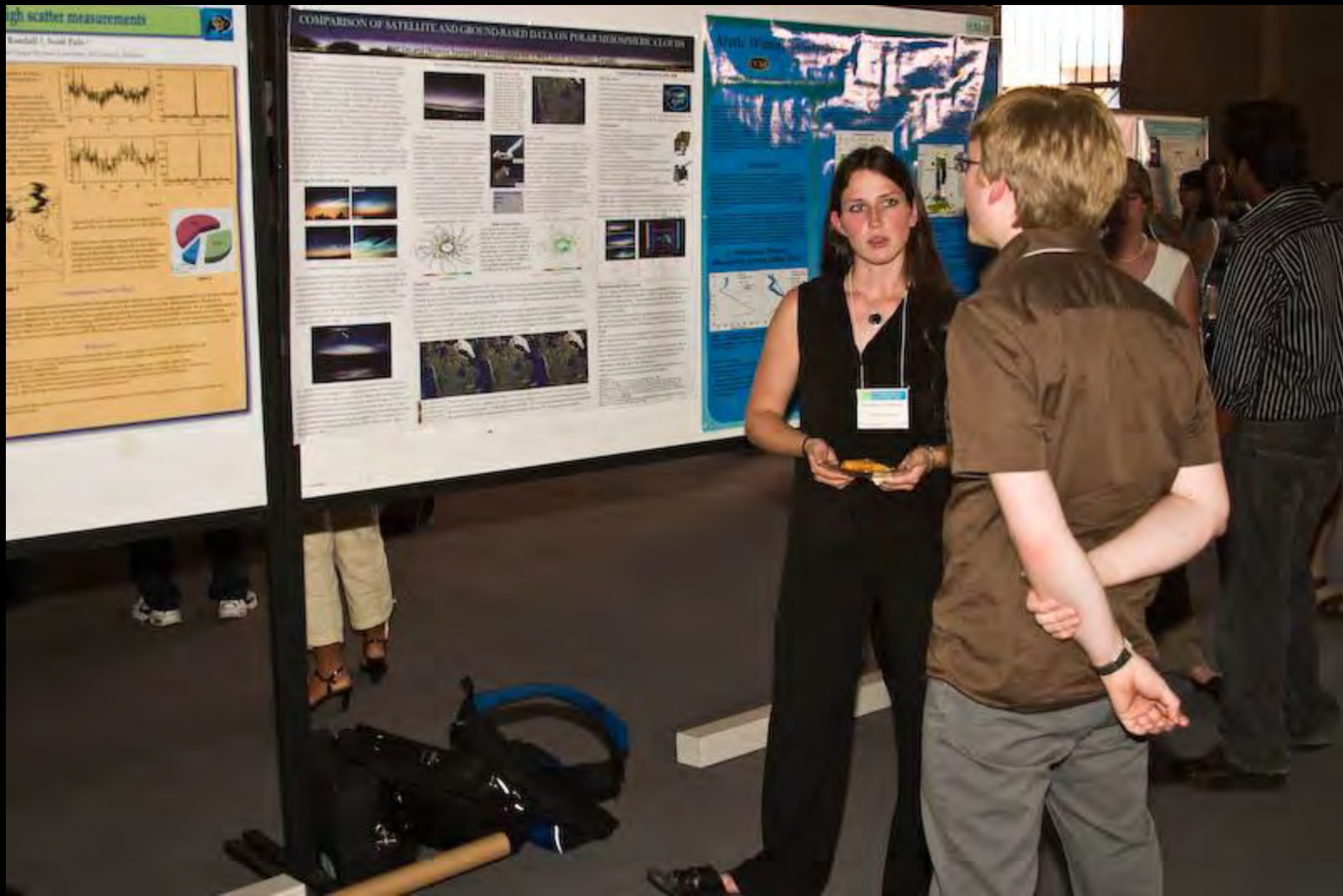




Qian Wu (NCAR) explains his poster to Barbara Emery (NCAR).

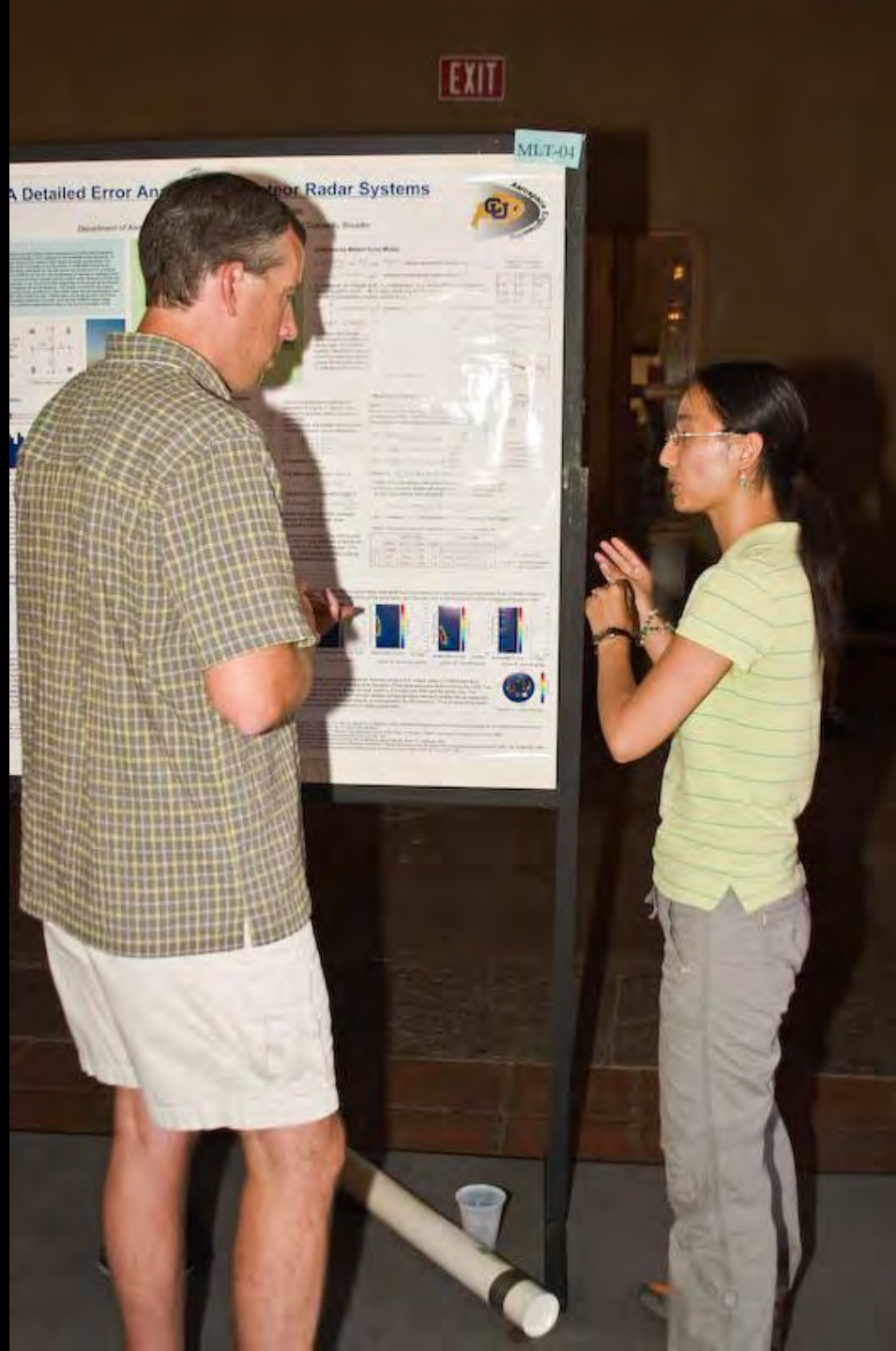


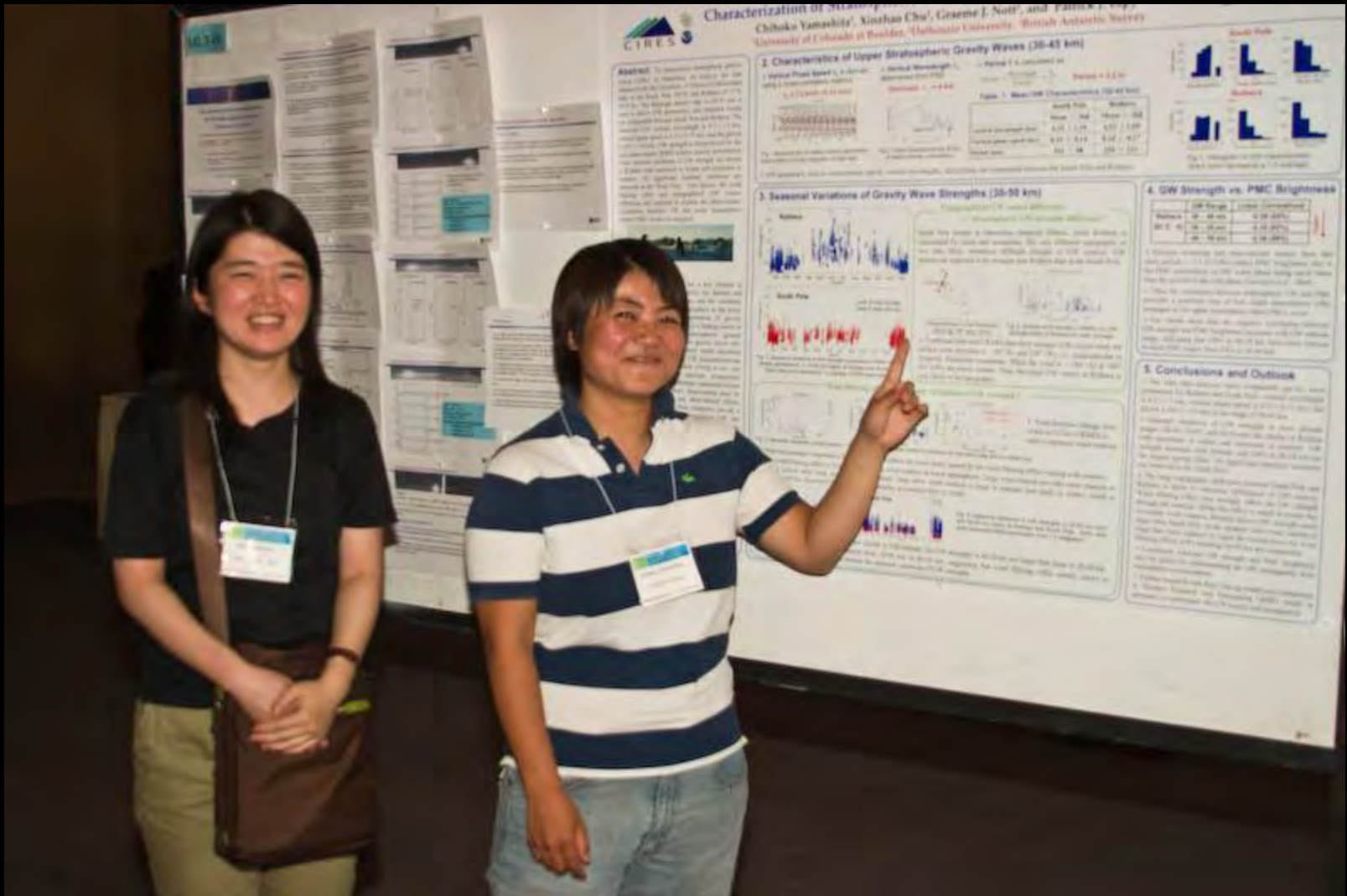
Talking with others.



Jodie Barker (undergraduate USU) explains her poster to Jonathan Snively (PSU).

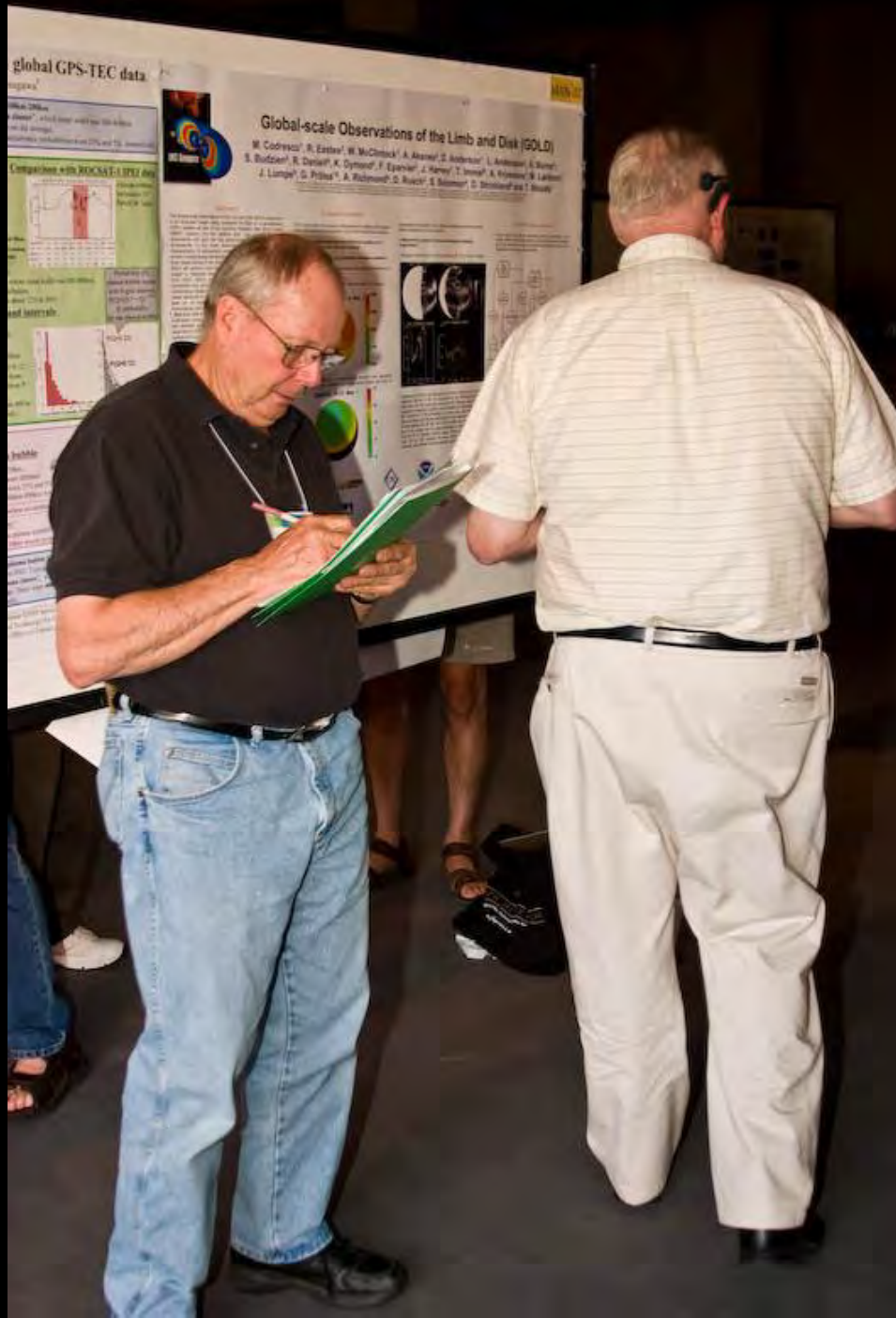
Chunmei Kang
(honorable
mention, U CO)
and her advisor,
Scott Palo (U CO)
discuss her poster.





Chihoko Yamashita (U CO) on the right points out her poster with friend ?.

Judge Gary Swenson (U IL) makes marks in his green judge's folder with John Meriwether (Clemson) in the background.





?Sean Harrel (CSU) explains his poster to Shikha Raizada (Arecibo Obs) and Rich Collins (U AK).

Jeff Thayer
(CSSC
incoming
chair, U CO).





2008 CEDAR

Zermatt Resort, Midway, Utah



Zermatt
hostess and
Susan Baltuch



Vince Wickwar (USU)

Rich Behnke (NSF)



Courtesy of Jonathan Friedman 2008



Susan Nossal and Nikoloz Gudadze.



Doug Geiger, Barbara Emery, Dirk Lummerzheim, Roger Smith, Susan and Jan Sojka.



At the CSSC lunch: Mike Ruohoniemi, Doug Geiger, Jeff Thayer, Hanli Liu.



Poster judges: Diego Janches, Rick Doe, and Simon Shepherd.



Poster judges: Simon Shepherd, Rick Doe, and Diego Janches.

THANK YOU
(AGAIN)!!

Judges

Barbara Emery
Susan Baltuch

Students



Poster Winners, graduate students and undergraduates (Allen Kummer, (PSU) Katherine Roach (U MD/NRL) Jonathan Sparks (U CO), Nicholas Pedatella (U CO), Tzu-Wei Fang (NCAR/NCU TW), Kathrin Haeusler (NCAR/GFZ DE) and Sarah Broadley (U Leeds, UK)).



Poster judges in 'uniform' (Rick Doe, Diego Janches, Simon Shepherd), and Poster Winners, graduate students and undergraduates (Allen Kummer, Nicholas Pedatella, Katherine Roach, Jonathan Sparks, Tzu-Wei Fang, Kathrin Haeusler, and Sarah Broadley).



Doug Geiger and Barbara Emery at Utah Olympic Park June 20



Barbara Emery and Doug Geiger on the train of the Heber Valley Railroad.



Marc Hairston, Janet Kozyra, Barbara Emery, Doug Geiger, Rod and Jackie Heelis, Becky and Roberto Hairston.



Barbara Emery meets with her co-author, Ian Richardson of SHINE.



Discussing science: Delores Knipp?, Marc Hairston, Barbara Emery, Janet Kozyra, Rod Heelis, and Ian Richardson (back).



Terry Onsager, ?, and Mike Wiltberger at the Sunday June 22 NSF Workshop on Space Weather Models with CEDAR, GEM and SHINE.



Barbara Emery, George Fisher, and Kent Tobiska.



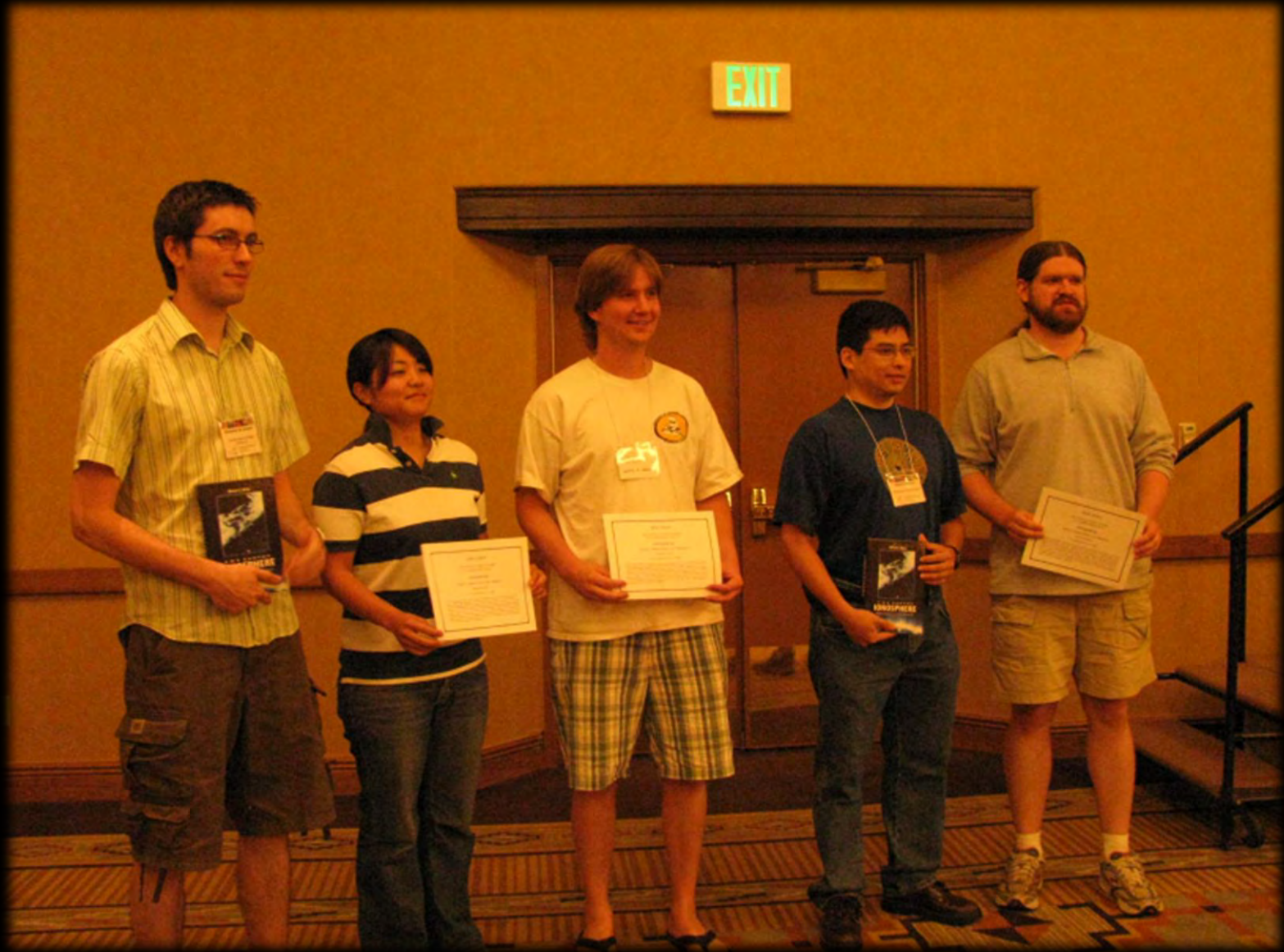
2009 CEDAR

Eldorado Hotel, Santa Fe, New Mexico





The plenary session on Wednesday July 1 in the Anasazi Ballroom.



5 of the 6 poster winners: Sebastien de Larquier (PSU), Chihoko Yamashita (U CO), Jonathan Sparks (U CO), Edgardo Pacheco (UTD), and Richard Todd Parris (U AK) .

INT-26

Estimation of Langmuir Probe Currents in the event of Surface Potential Variations

Dr. Charles M. Swenson, charles.swenson@usu.edu



I. Overview

Langmuir probe and Retarding Potential Scopes (RPS) are two measurements of plasma parameters in the laboratory. In order to be used effectively, a probe or the RPS must be calibrated. The calibration process involves comparing the measured current to the known current of a probe or the known potential of an RPS. This process is often done by comparing the measured current to the known current of a probe or the known potential of an RPS. This process is often done by comparing the measured current to the known current of a probe or the known potential of an RPS.

II. Background

The Langmuir probe and Retarding Potential Scopes (RPS) are two measurements of plasma parameters in the laboratory. In order to be used effectively, a probe or the RPS must be calibrated. The calibration process involves comparing the measured current to the known current of a probe or the known potential of an RPS. This process is often done by comparing the measured current to the known current of a probe or the known potential of an RPS.

IV. Work Function Variations

The work function of a probe or RPS can vary due to surface potential variations. This variation can be caused by surface potential variations. This variation can be caused by surface potential variations. This variation can be caused by surface potential variations.

Results to Evaluate the Effect on the Determination of Plasma Parameters

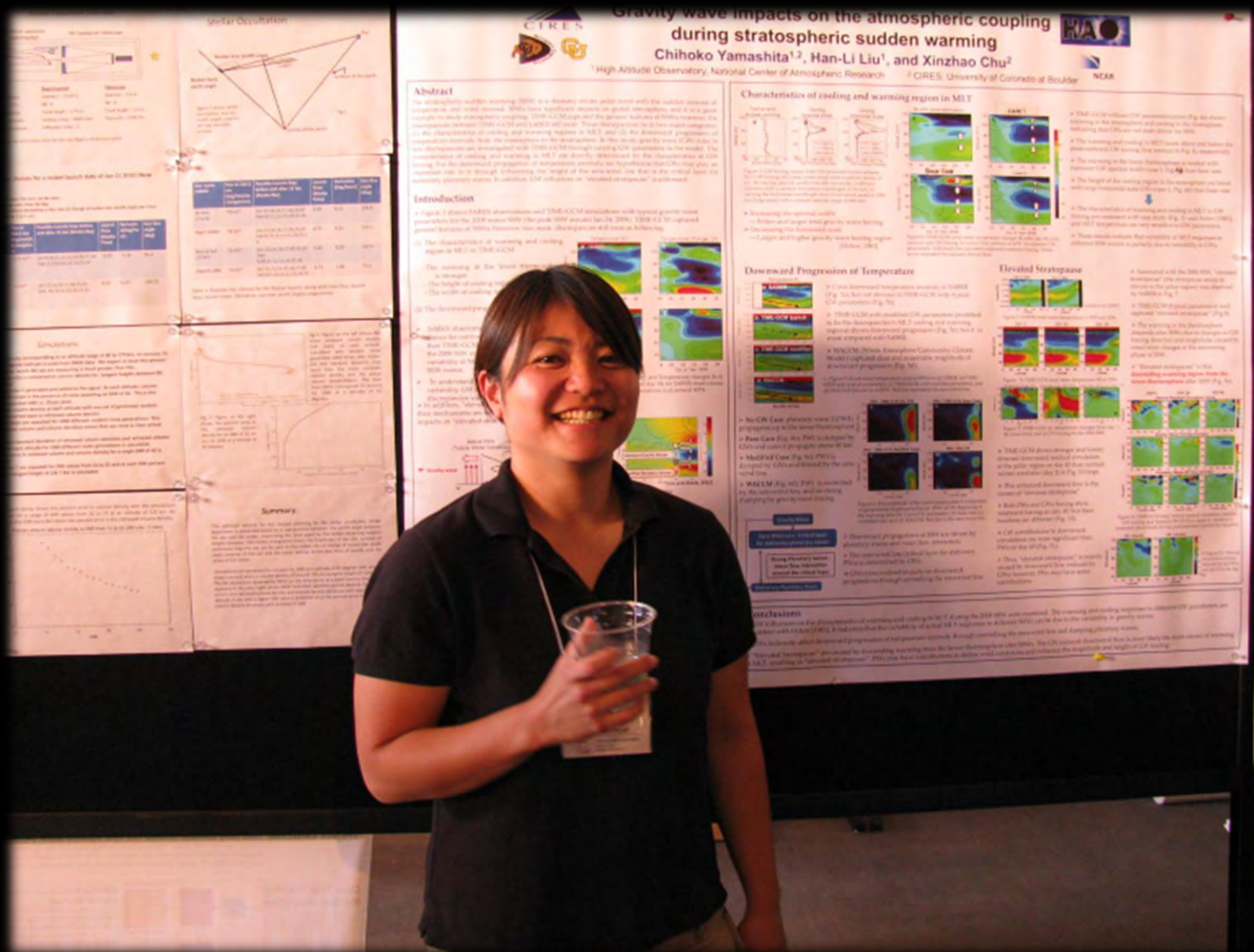
The effect of surface potential variations on the determination of plasma parameters is evaluated. This evaluation is done by comparing the measured current to the known current of a probe or the known potential of an RPS. This evaluation is done by comparing the measured current to the known current of a probe or the known potential of an RPS.

V. Summary and Future Work

The results of this study show that surface potential variations can significantly affect the determination of plasma parameters. Future work should focus on developing methods to minimize these effects.



Padmashri Suresh (USU), honorable mention for her IT poster.



Gravity wave impacts on the atmospheric coupling during stratospheric sudden warming

Chihoko Yamashita^{1,2}, Han-Li Liu¹, and Xinzhao Chu²

¹High Altitude Observatory, National Center of Atmospheric Research ²CIRES, University of Colorado at Boulder

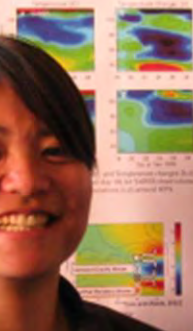


Abstract

The stratospheric sudden warming (SSW) is a transient winter polar event with the sudden increase of temperature and wind reversal. SSWs have significant impacts on global atmosphere, and it is a great challenge to study atmospheric coupling. This study uses the general circulation of 30Pa to investigate the atmospheric behavior (SSW) in the HAPO and HAPO-2010. These observations are in two major parameters: (1) the characteristics of cooling and warming regions in MLT and (2) the downward progression of temperature anomaly from the tropopause to the stratosphere. In this study, gravity wave (GW) is used to investigate the downward progression of temperature anomaly through a GW parameter, as the result. The characteristics of cooling and warming in MLT are directly influenced by the characteristics of GW cooling that the downward progression of temperature anomaly is hypothesized that GW cooling plays an important role in through influencing the height of the subsonic low that is the critical level for the secondary gravity waves. In addition, GW influences on "elevated stratosphere" is discussed.

Introduction

- Figure 1 shows NARR observations and TMI-GCM simulations with typical gravity wave parameters for the SSW event 2009 (the peak SSW anomaly Jan 24, 2009). TMI-GCM is captured general features of SSWs, however, some small discrepancies still exist as following:
 - The distribution of warming and cooling region in MLT in TMI-GCM
 - The downward progression of temperature anomaly in TMI-GCM
 - The timing of the lower stratospheric temperature
 - The height of cooling in TMI-GCM
- The downward progression of temperature anomaly in TMI-GCM
- The timing of the lower stratospheric temperature
- The height of cooling in TMI-GCM



Characteristics of cooling and warming region in MLT

- Figure 2 shows the characteristics of cooling and warming regions in MLT. The cooling and warming regions are shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N). The cooling and warming regions are shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N). The cooling and warming regions are shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N).

Downward Progression of Temperature

- Figure 3 shows the downward progression of temperature anomaly in NARR and TMI-GCM. The downward progression of temperature anomaly is shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N). The downward progression of temperature anomaly is shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N).

Elevated Stratosphere

- Figure 4 shows the elevated stratosphere in NARR and TMI-GCM. The elevated stratosphere is shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N). The elevated stratosphere is shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N).

Conclusions

The characteristics of cooling and warming in MLT during the SSW event 2009 were investigated. The cooling and warming regions are shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N). The cooling and warming regions are shown in the cross-section of temperature anomaly (K) versus pressure (hPa) and latitude (°N).

Chihoko Yamashita (U CO): Second place for her MLT poster.

METR-03

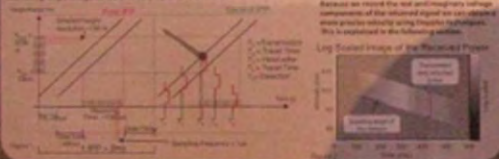
Latitudinal dependence of the variability of the micrometeor altitude distribution

Jonathan Sparks (1,2), Diego Janches (1)

We present a study of the diurnal behavior of the observed meteor altitude distribution at different seasons and latitudes using radar observations from the 430 MHz Altitude Observatory (AO) located at the Poker Flat Research Range near Hawthorne, Nevada (39.5°N, 103.8°W) and the 630 MHz Poker Flat Observatory (PFO) located at the Poker Flat Research Range near Hawthorne, Nevada (39.5°N, 103.8°W). The meteor altitude distribution provides an indication of where the meteoric mass deposition occurs in the mesosphere and lower thermosphere (MLT). This can be used to accurately understand the chemistry of this region. We show that the observed altitude distributions have distinct variability at each latitude, while at tropical latitudes the opposite behavior is observed. We explain these results by correlating them with the astronomical and seasonal influences that these results have on the metal chemistry and ionosphere of this atmospheric region.

Experiment and Set Up

For this work, we utilized meteor radar observations from the AO and PFO at different seasons and latitudes. These radars utilize coherent Doppler radar technology for the 430 MHz Altitude Observatory (AO) located at the Poker Flat Research Range near Hawthorne, Nevada (39.5°N, 103.8°W) and the 630 MHz Poker Flat Observatory (PFO) located at the Poker Flat Research Range near Hawthorne, Nevada (39.5°N, 103.8°W). The meteor altitude distribution provides an indication of where the meteoric mass deposition occurs in the mesosphere and lower thermosphere (MLT). This can be used to accurately understand the chemistry of this region. We show that the observed altitude distributions have distinct variability at each latitude, while at tropical latitudes the opposite behavior is observed. We explain these results by correlating them with the astronomical and seasonal influences that these results have on the metal chemistry and ionosphere of this atmospheric region.



Observational Results



Figures 1-4 show the analysis of a single meteor event and its corresponding altitude distribution. Figure 1 shows the meteor altitude distribution at a specific time and latitude. Figure 2 shows the meteor altitude distribution at a different time and latitude. Figure 3 shows the meteor altitude distribution at a third time and latitude. Figure 4 shows the meteor altitude distribution at a fourth time and latitude. The plots show the meteor altitude distribution at different seasons and latitudes, highlighting the distinct variability at each latitude.

By performing the same analysis described above for a larger number of meteor events, we can determine the seasonal and latitudinal dependence of the meteor altitude distribution. This is shown in Figures 5 and 6, where the meteor altitude distribution is plotted against season and latitude. The plots show that the meteor altitude distribution has a distinct seasonal and latitudinal dependence, with higher altitudes observed at higher latitudes and during certain seasons.

The seasonal and latitudinal dependence of the meteor altitude distribution is further explored in Figures 7 and 8. Figure 7 shows the meteor altitude distribution at different times of day, and Figure 8 shows the meteor altitude distribution at different times of year. The plots show that the meteor altitude distribution is also dependent on the time of day and time of year, with higher altitudes observed during certain times of day and certain times of year.

The results of this study have important implications for our understanding of the meteoric mass deposition in the mesosphere and lower thermosphere. The distinct seasonal and latitudinal dependence of the meteor altitude distribution suggests that the meteoric mass deposition is also dependent on season and latitude. This information is crucial for understanding the chemistry and ionosphere of this atmospheric region.

This work was supported by the National Science Foundation (NSF) under grant number ATM-08-05473. We thank the staff of the Poker Flat Research Range for their assistance during the observations. We also thank the anonymous reviewers for their helpful comments.



Estimation of M

Jingbo

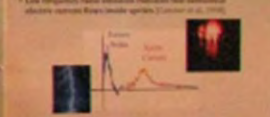
Department of E

Abstract

Low frequency radio emission spectra have been observed from the Earth's ionosphere. These emissions are thought to be produced by the interaction of the Earth's magnetic field with the ionosphere. The emissions are observed at different frequencies and altitudes, and their characteristics are used to study the ionosphere. In this paper, we present a method for estimating the magnetic field strength from the observed emission spectra. The method is based on the relationship between the emission frequency and the magnetic field strength. The results show that the method is effective in estimating the magnetic field strength from the observed emission spectra.

Introduction

Low frequency radio emission spectra have been observed from the Earth's ionosphere. These emissions are thought to be produced by the interaction of the Earth's magnetic field with the ionosphere. The emissions are observed at different frequencies and altitudes, and their characteristics are used to study the ionosphere. In this paper, we present a method for estimating the magnetic field strength from the observed emission spectra. The method is based on the relationship between the emission frequency and the magnetic field strength. The results show that the method is effective in estimating the magnetic field strength from the observed emission spectra.

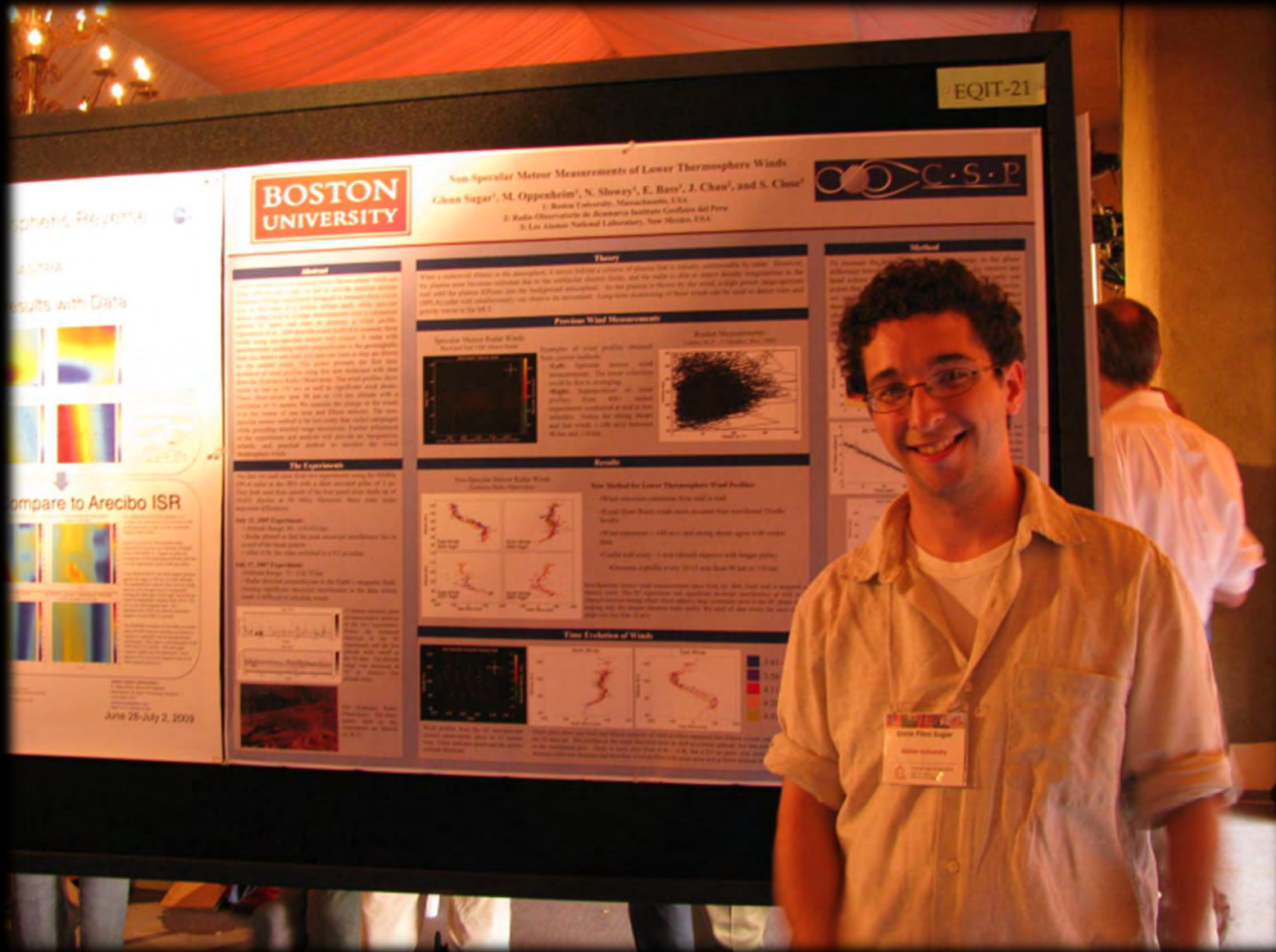


- Emission spectra are observed from the Earth's ionosphere and are used to study the ionosphere.
- The relationship between the emission frequency and the magnetic field strength is used to estimate the magnetic field strength.
- The results show that the method is effective in estimating the magnetic field strength from the observed emission spectra.

Experiment Setup

The experiment setup for this study involves the use of a radio receiver and a computer. The radio receiver is used to receive the low frequency radio emission spectra from the Earth's ionosphere. The computer is used to process the received spectra and estimate the magnetic field strength. The results show that the method is effective in estimating the magnetic field strength from the observed emission spectra.

Jonathan Sparks (U CO) honorable mention for his MLT poster (although he is also an undergraduate).



Glenn Sugar (BU), received 1 or 3 undergrad honorable mentions.

Ionospheric Detection System (RAIDS):
 Atmospheric and Space Thermospheric Science
 (creativity@psu.edu) and Scott Bradford
 Division, Naval Research Laboratory
 (scottb@nrlssc.navy.mil) and James Hecht
 Aerospace Corporation

Abstract: RAIDS will leverage emerging technologies to create a new generation of ionospheric detection systems. It will provide a new generation of ionospheric detection systems that are more accurate, more reliable, and more capable than current systems. RAIDS will provide a new generation of ionospheric detection systems that are more accurate, more reliable, and more capable than current systems.

Primary Science Goal: RAIDS will provide a new generation of ionospheric detection systems that are more accurate, more reliable, and more capable than current systems.

Secondary Goal: RAIDS will provide a new generation of ionospheric detection systems that are more accurate, more reliable, and more capable than current systems.

RAIDS will provide a new generation of ionospheric detection systems that are more accurate, more reliable, and more capable than current systems.

PENN STATE **ITT-24**

Design of a Digital Pulsed Radar Receiver

Increasing Aeronomy Observation Bandwidth at Arecibo Observatory
 Authors: Matthew Sunderland¹, Julio Urbina¹, Mike Sulzer², Sixto González²
 1. The Pennsylvania State University, 2. NASA, Arecibo Observatory

Abstract: Digital receivers have demonstrated advantages and rapid prototyping capabilities. The receiver used an existing 100 MHz ADC and FPGA to receive aeronomy signals. This paper presents the design of a digital receiver that is capable of receiving aeronomy signals at a bandwidth of 100 MHz. The receiver is designed to receive aeronomy signals at a bandwidth of 100 MHz. The receiver is designed to receive aeronomy signals at a bandwidth of 100 MHz.


First Results: The receiver was tested at the Arecibo Observatory. The results show that the receiver is capable of receiving aeronomy signals at a bandwidth of 100 MHz. The receiver is designed to receive aeronomy signals at a bandwidth of 100 MHz.


New Capabilities: The receiver is capable of receiving aeronomy signals at a bandwidth of 100 MHz. The receiver is designed to receive aeronomy signals at a bandwidth of 100 MHz.

Host PC Software: The receiver is controlled by a host PC. The software is written in C++ and runs on a Windows operating system. The software is designed to receive aeronomy signals at a bandwidth of 100 MHz.

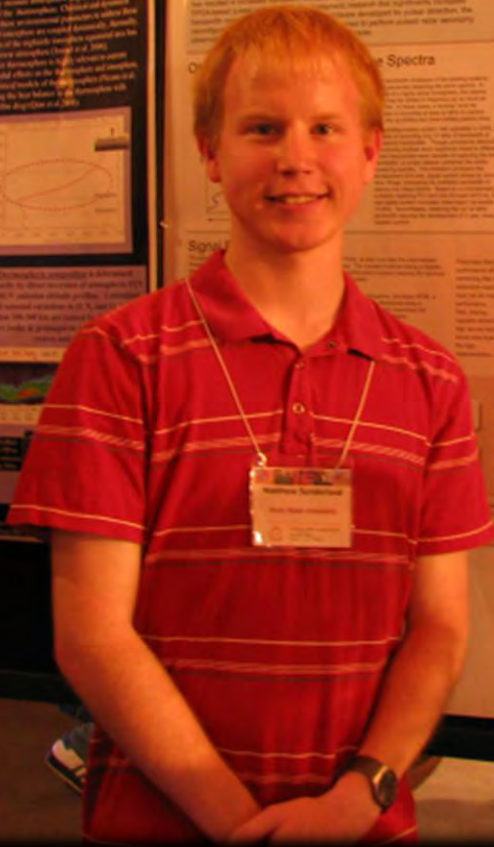
FPGA: The receiver is implemented on a Xilinx Virtex-5 FPGA. The FPGA is configured to receive aeronomy signals at a bandwidth of 100 MHz.

PowerPC: The receiver is implemented on a PowerPC processor. The processor is configured to receive aeronomy signals at a bandwidth of 100 MHz.

54 MHz Wide Frequency Spectrum


Close-up of Center Frequency


Block Diagram: A detailed block diagram showing the signal flow from the antenna through the ADC, FPGA, and PowerPC, and finally to the Host PC Software.



Matthew Sunderland (PSU) received 1 of 3 undergraduate mentions.

ENTRANCE
ROOMS

Tool for the Assessment of Ionospheric Models

Jonathan Thompson, Václav Ešler, Jan Sejkla (Space Environment Corporation, Providence, UT, USA)
Hector Sáez González (Jacobs Observatory, Arecibo, Puerto Rico)

Abstract

The ionosphere is a key part of the atmosphere and one of the upper atmosphere layers. It is the part of the atmosphere that contains the highest density of free electrons and ions. The ionosphere is a dynamic and complex environment that is affected by a variety of factors, including solar activity, geomagnetic activity, and human-made radio frequency interference. The ionosphere is a key part of the space weather environment and is a critical component of the Earth's magnetic field. The ionosphere is a dynamic and complex environment that is affected by a variety of factors, including solar activity, geomagnetic activity, and human-made radio frequency interference. The ionosphere is a key part of the space weather environment and is a critical component of the Earth's magnetic field.

Methodology

The methodology used in this study is based on the analysis of ionospheric data from the Arecibo Observatory. The data is analyzed using a variety of techniques, including spectral analysis, wavelet analysis, and machine learning. The results of the analysis are compared to the results of ionospheric models. The methodology used in this study is based on the analysis of ionospheric data from the Arecibo Observatory. The data is analyzed using a variety of techniques, including spectral analysis, wavelet analysis, and machine learning. The results of the analysis are compared to the results of ionospheric models.

Metrics

The metrics used in this study are based on the analysis of ionospheric data. The metrics include the critical frequency of the ordinary wave (foF2), the virtual height of the ordinary wave (h'pF2), and the virtual height of the extraordinary wave (h'pF2E). The metrics are compared to the results of ionospheric models. The metrics used in this study are based on the analysis of ionospheric data. The metrics include the critical frequency of the ordinary wave (foF2), the virtual height of the ordinary wave (h'pF2), and the virtual height of the extraordinary wave (h'pF2E). The metrics are compared to the results of ionospheric models.

Assessment Results

The assessment results are based on the analysis of ionospheric data. The results show that the ionospheric models are able to accurately predict the critical frequency of the ordinary wave (foF2) and the virtual height of the ordinary wave (h'pF2). The results also show that the ionospheric models are able to accurately predict the virtual height of the extraordinary wave (h'pF2E). The assessment results are based on the analysis of ionospheric data. The results show that the ionospheric models are able to accurately predict the critical frequency of the ordinary wave (foF2) and the virtual height of the ordinary wave (h'pF2). The results also show that the ionospheric models are able to accurately predict the virtual height of the extraordinary wave (h'pF2E).

Summary

The summary of the study is based on the analysis of ionospheric data. The study shows that the ionospheric models are able to accurately predict the critical frequency of the ordinary wave (foF2) and the virtual height of the ordinary wave (h'pF2). The study also shows that the ionospheric models are able to accurately predict the virtual height of the extraordinary wave (h'pF2E). The summary of the study is based on the analysis of ionospheric data. The study shows that the ionospheric models are able to accurately predict the critical frequency of the ordinary wave (foF2) and the virtual height of the ordinary wave (h'pF2). The study also shows that the ionospheric models are able to accurately predict the virtual height of the extraordinary wave (h'pF2E).

Acknowledgement

We wish to acknowledge the support of the National Space Weather Program. This work was performed under grant A178017777.

Jonathan Thompson (USU) received 1 of 3 undergrad honorable mentions.



James Carpenter, undergraduate REU student of Wenbin Wang of NCAR at Bandolier National Monument.



This historical package will be available on the CEDAR Website.

If you can contribute to naming unidentified people,
please contact Barbara Emery.

Thank you!





The End

