

A graphic element consisting of two thick, parallel red curved lines that sweep from the top right towards the center, arching over the text.

2010
CEDAR
25th ANNIVERSARY

25 Years of CEDAR History

CEDAR memories for you!

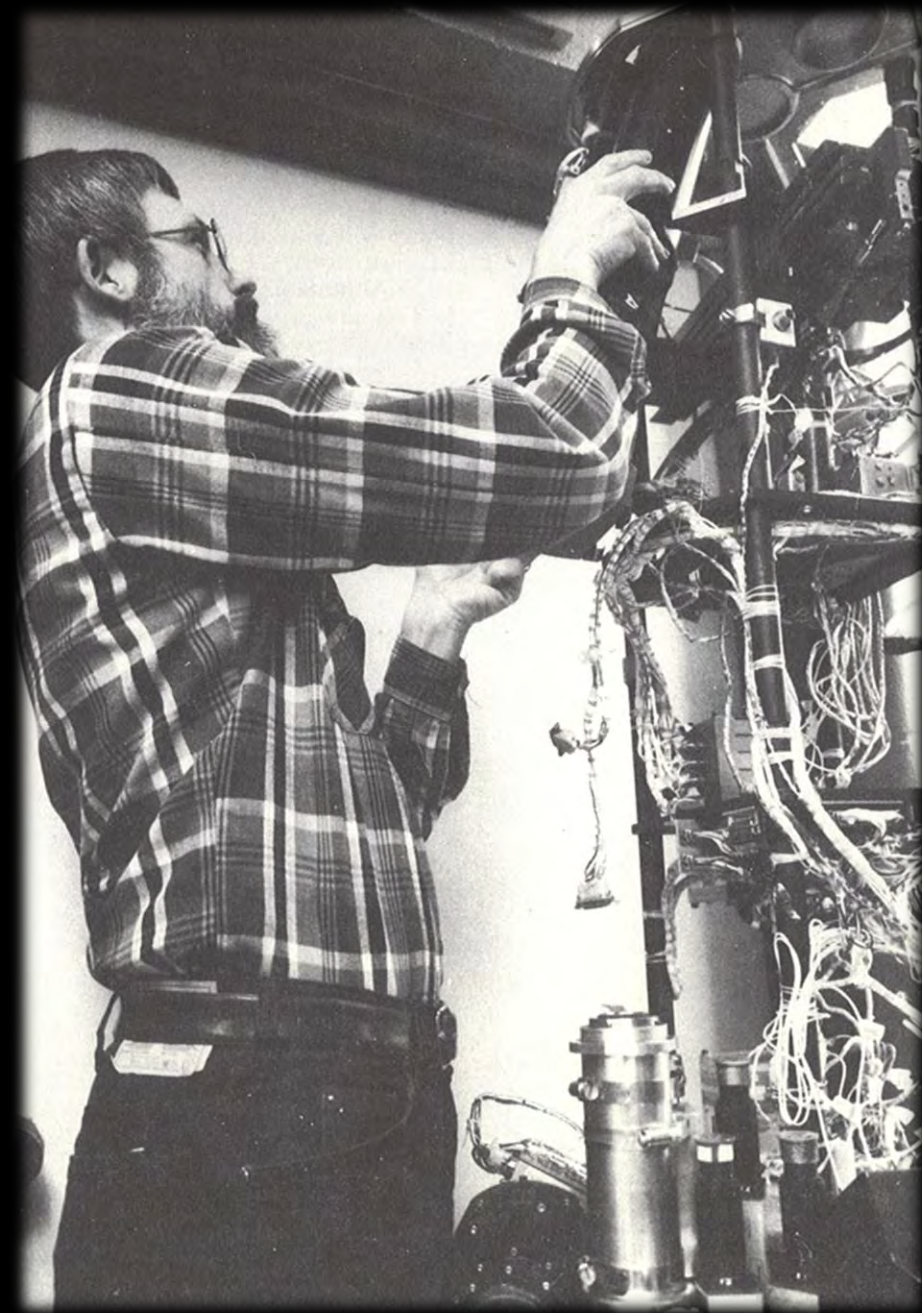


Pictures from:

The Research News University of Michigan

November-December 1982





William Sharp

Examining an observation instrument

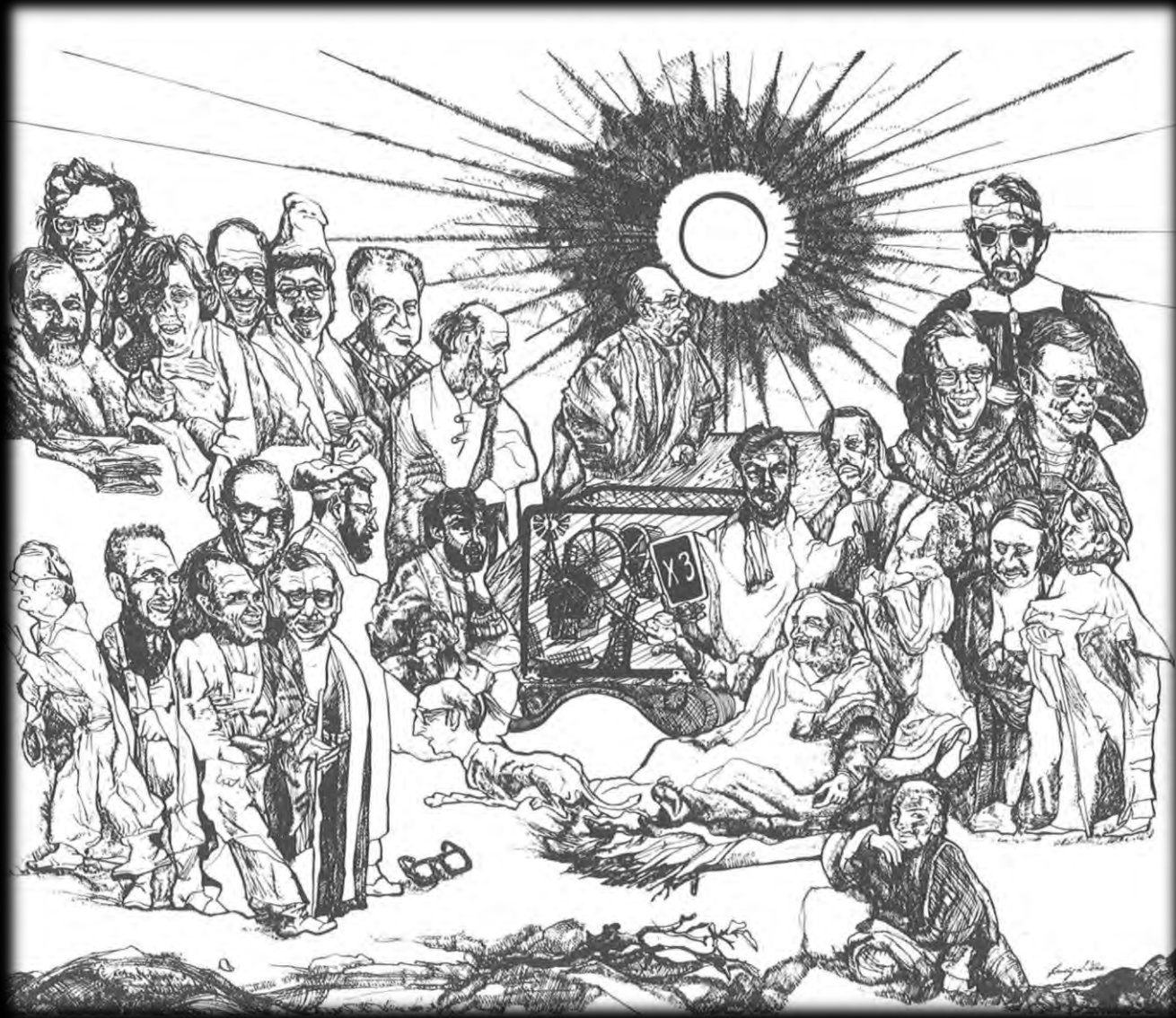
Paul Hays

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

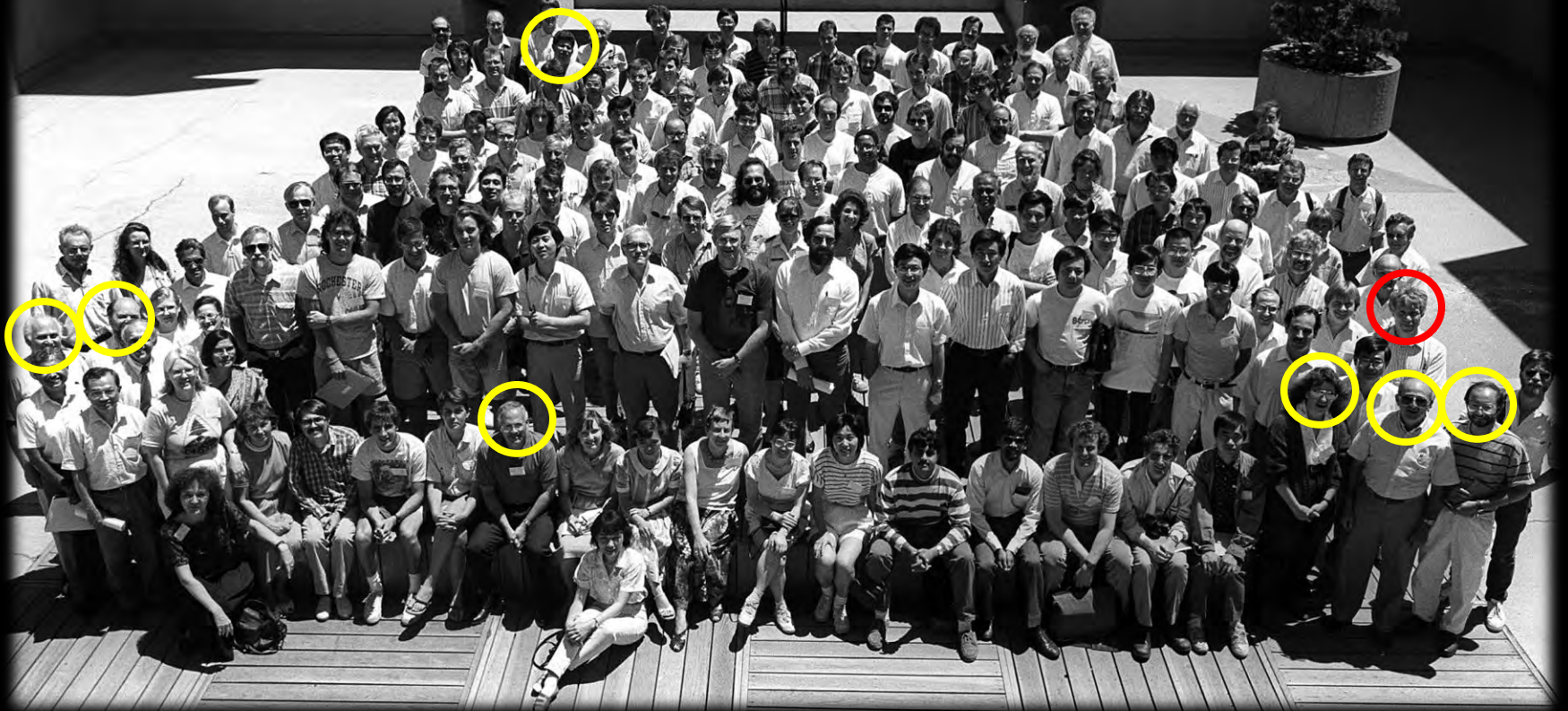


CEDAR CSSC Chair Awards



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





Doug Geiger, husband
of Barbara Emery



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

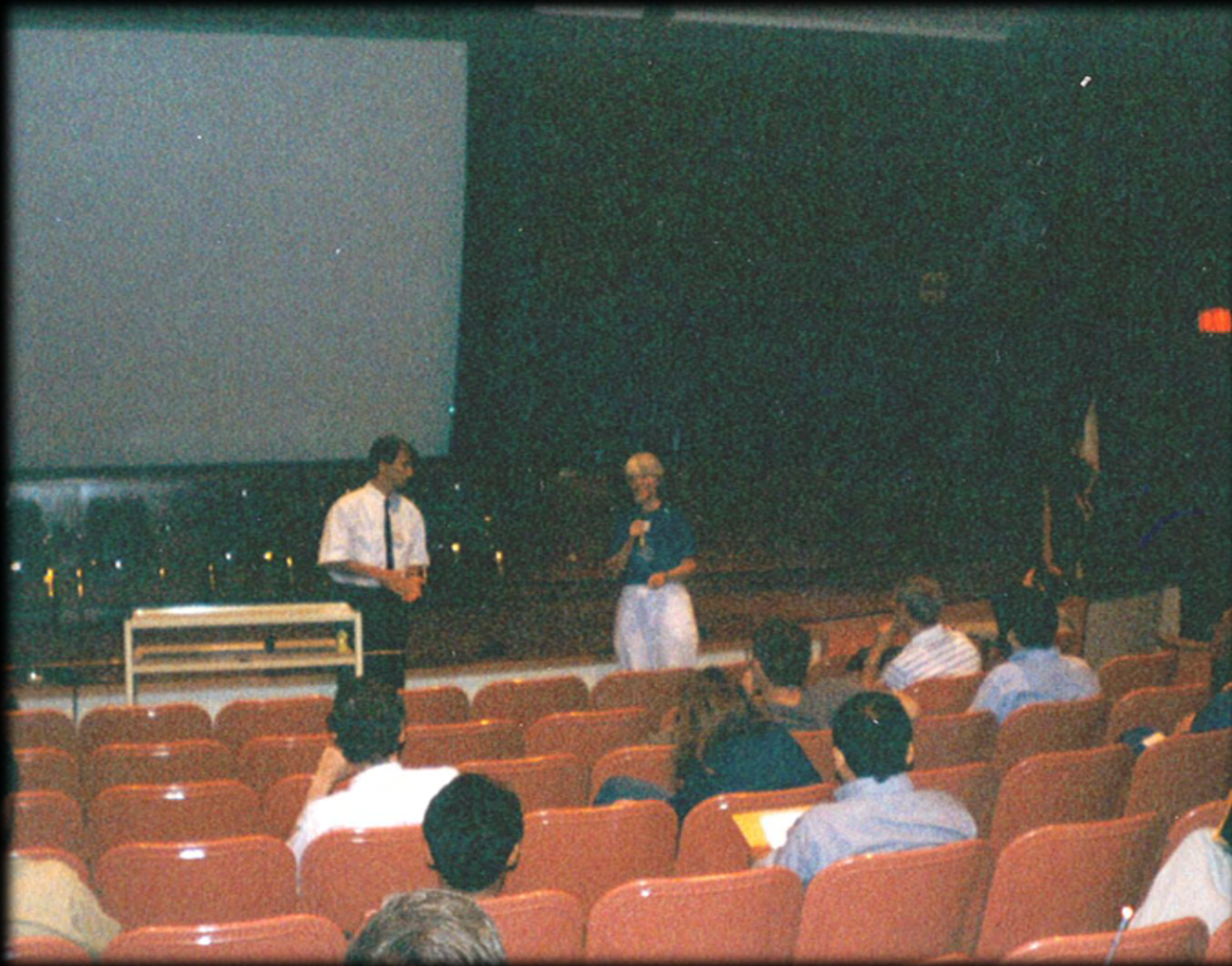


Phil Erickson, ?, Mike Sulzer



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





Dwight Sipler, John Foster ...



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, ?



Frank Lind



2003 CEDAR

Raintree Plaza Conference Center, Longmont, Colorado





Gary Bust is the cook at the Student Workshop.



Gerald Lehmacher, Craig Heinselman, Andrew Gerrard?



Licia Ray





Mick Denton





Mick Denton



Reception dinner at the Raintree Plaza Hotel.



Bill Bristow



Roger Smith, Tom Slinger, and Joe Grebowsky



Kathryn Fisher and Louise Beierle



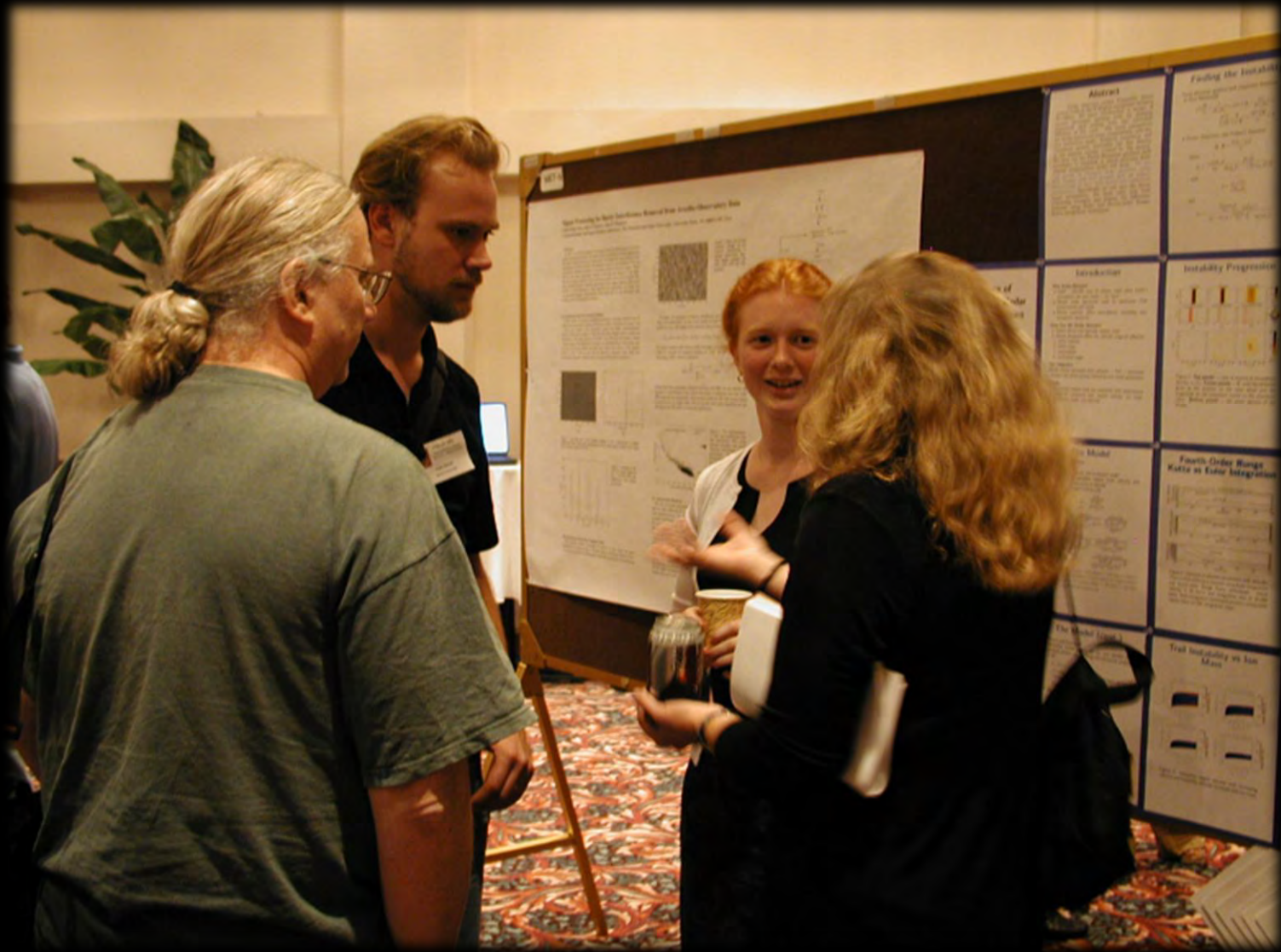
CSSC dinner at Hunter's in Longmont: Art Richmond, Lars Dyrud, Paul Bellaire, Rich Behnke, Phil Erickson, Marina Galand, Sixto Gozalez, Bob Robinson, waiter, Pamela Loughmiller, Robert Vincent, Roger Smith, Delores Knipp, Jan Sojka, Barbara Emery, and Josh Semeter.



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



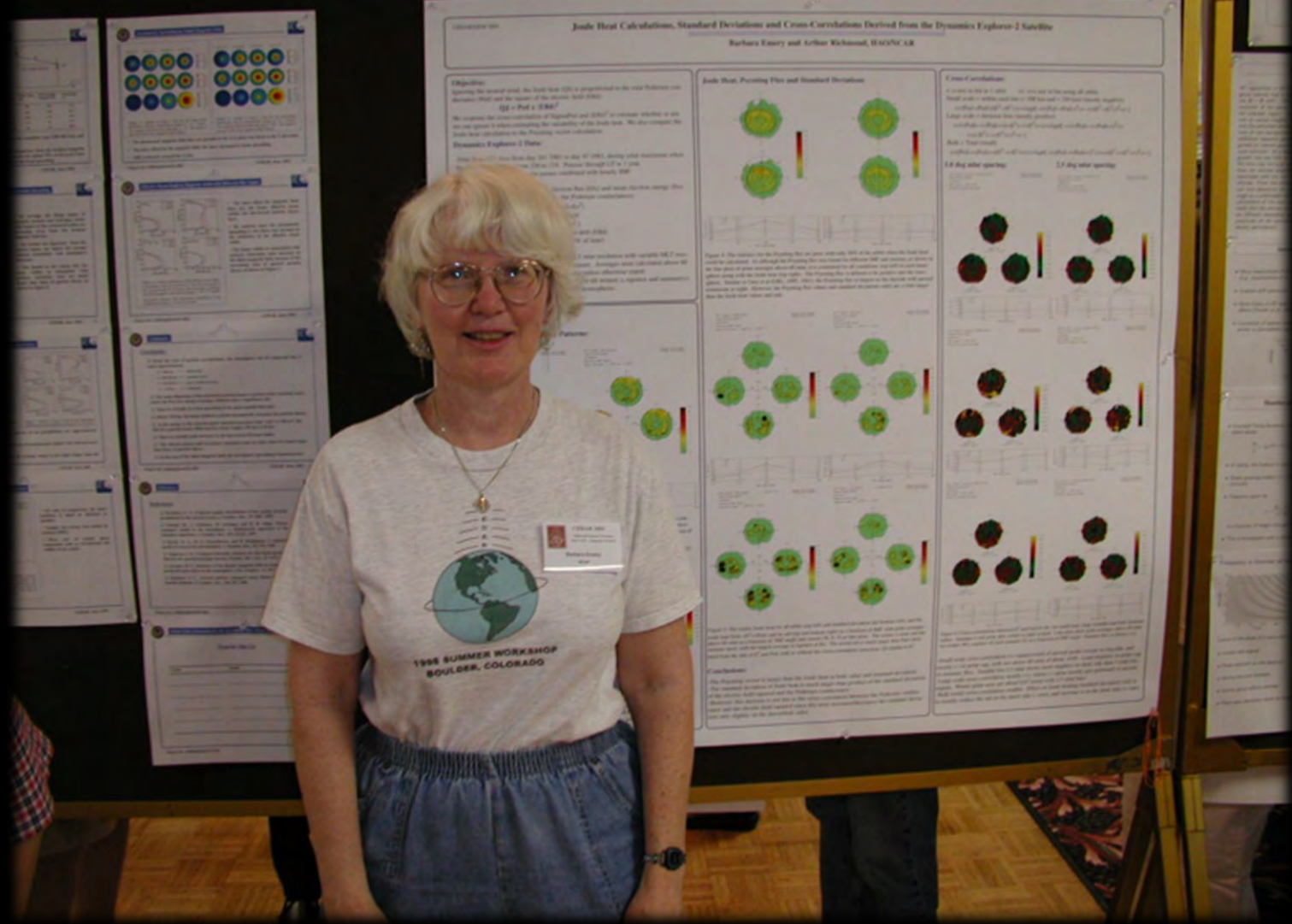
Gary Bust, Lars Dyrud, Licia Ray, Pamela Loughmiller



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



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



Barbara Emery



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



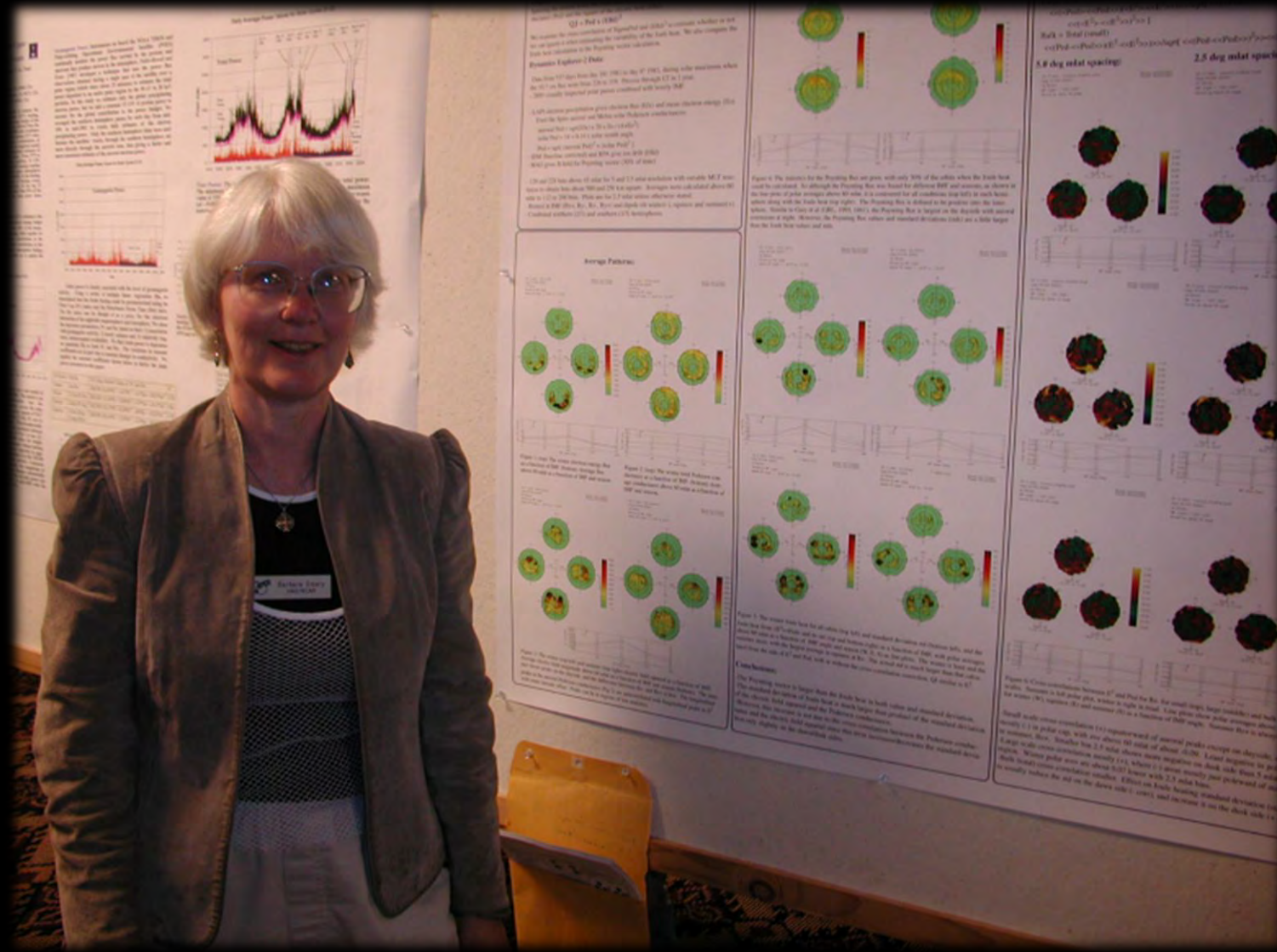
Roger Smith, Barbara Emery, Louise Beierle, Kathryn Fisher



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, ?



Delores Knipp

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

Karen Remick
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



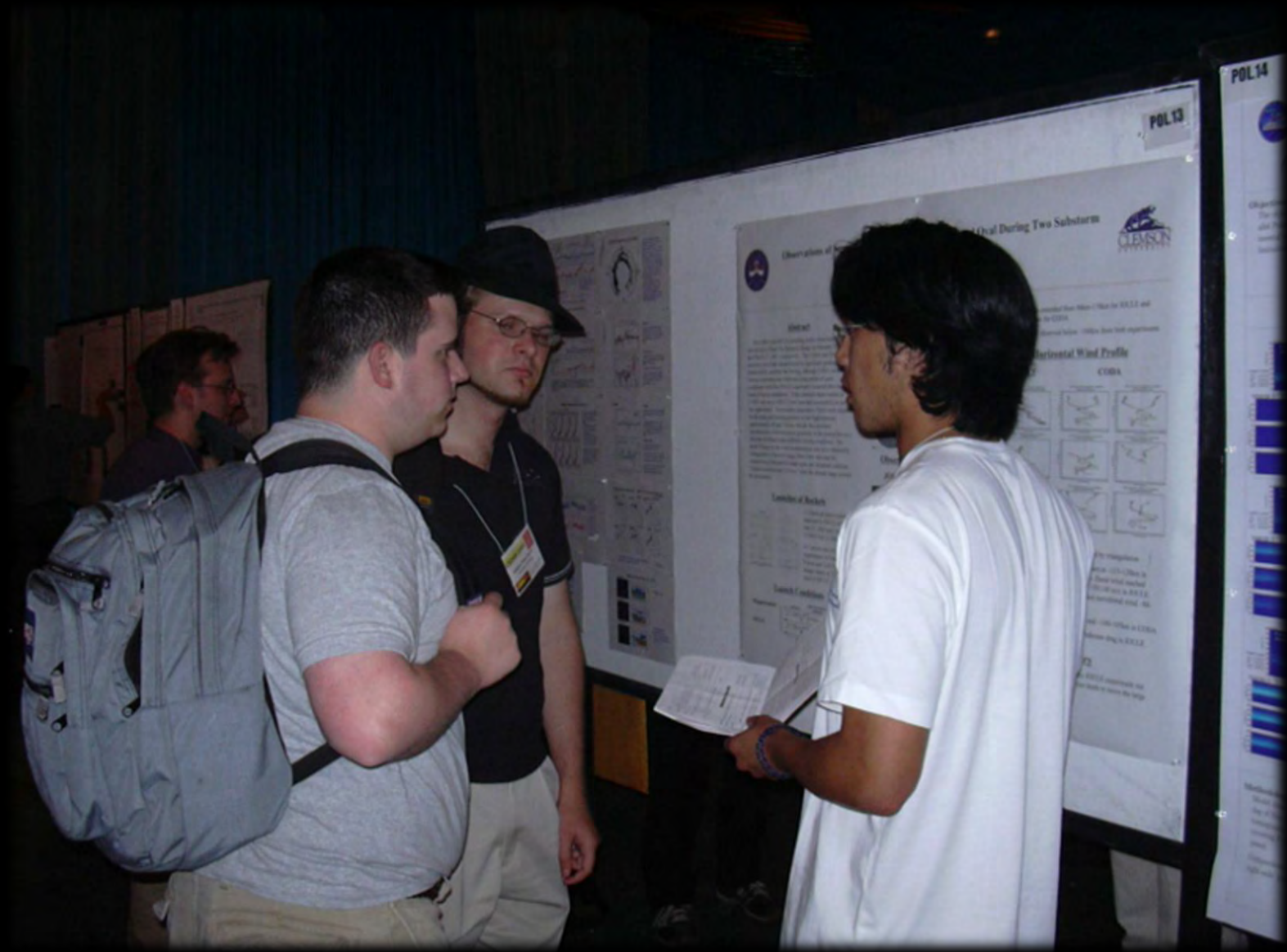
Setting out for Petroglyph walk through Cieneguilla: Ron Woodman
... Denise Thorsen, Rich and Norma Behnke, ... Maria Richmond



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.

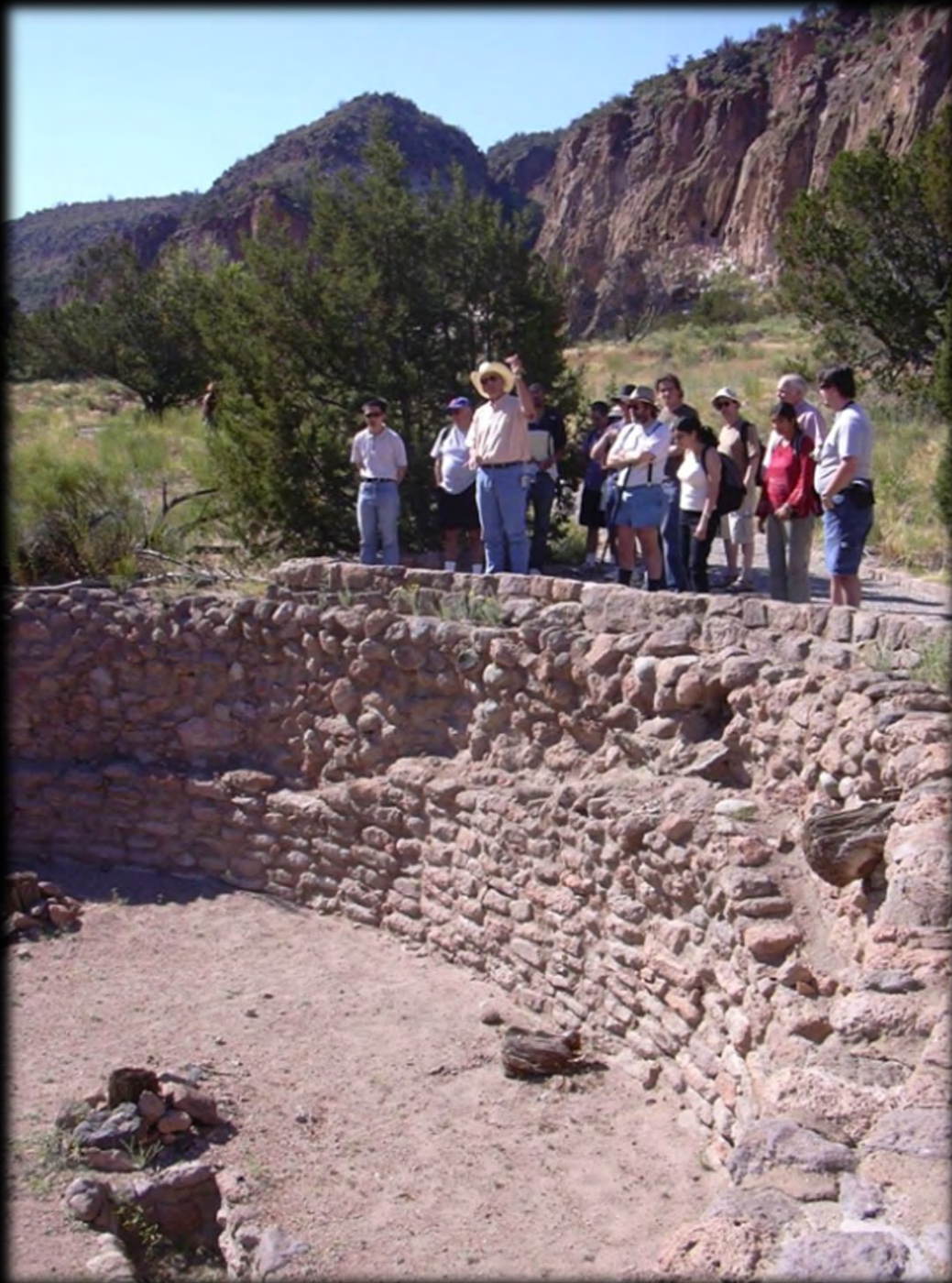
Opera Gala
decorations in
the Pavilion
after the
CEDAR Poster
sessions.







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





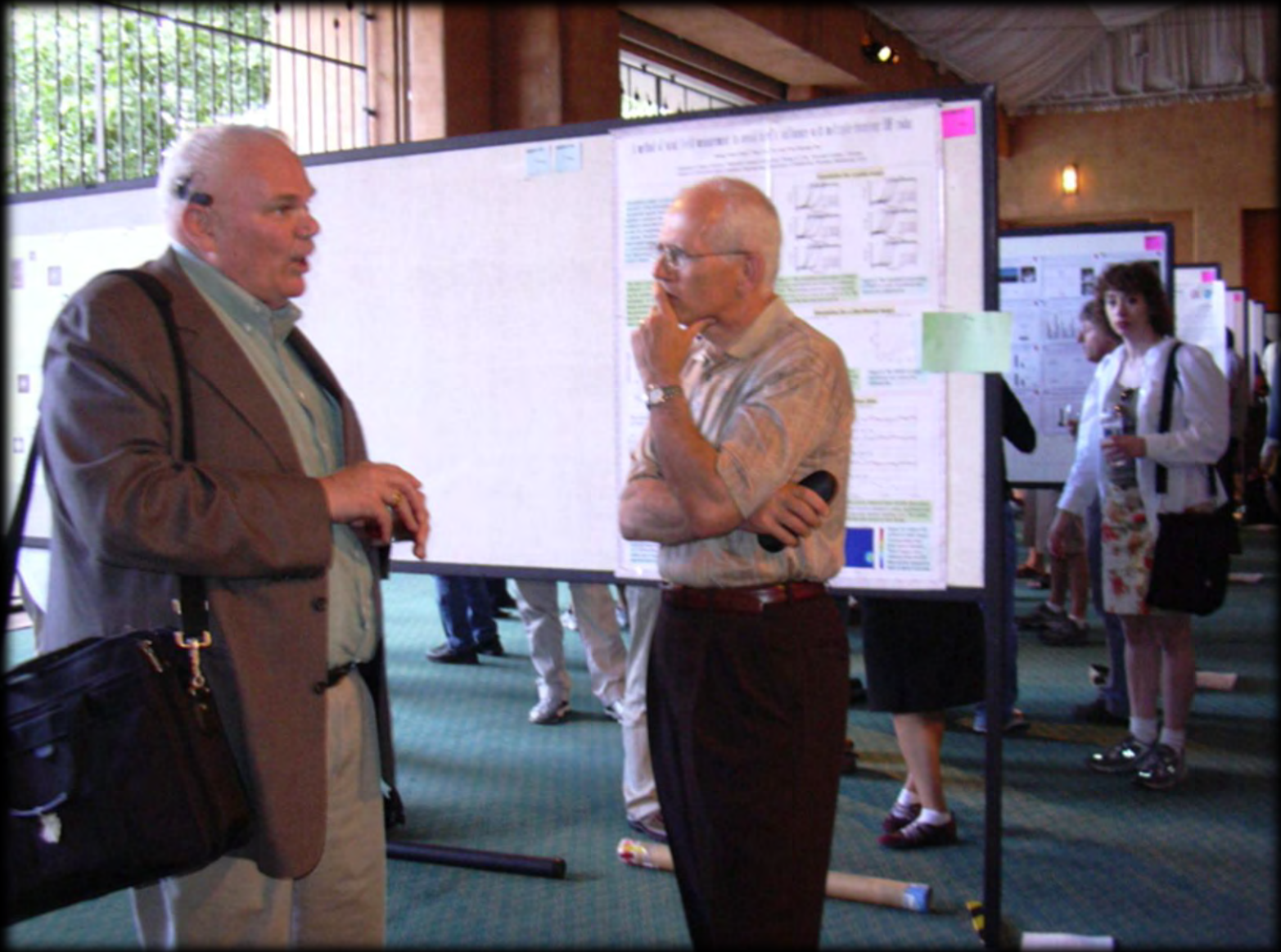
Barbara Emery hands out free T-shirts at the Student Workshop at La Fonda



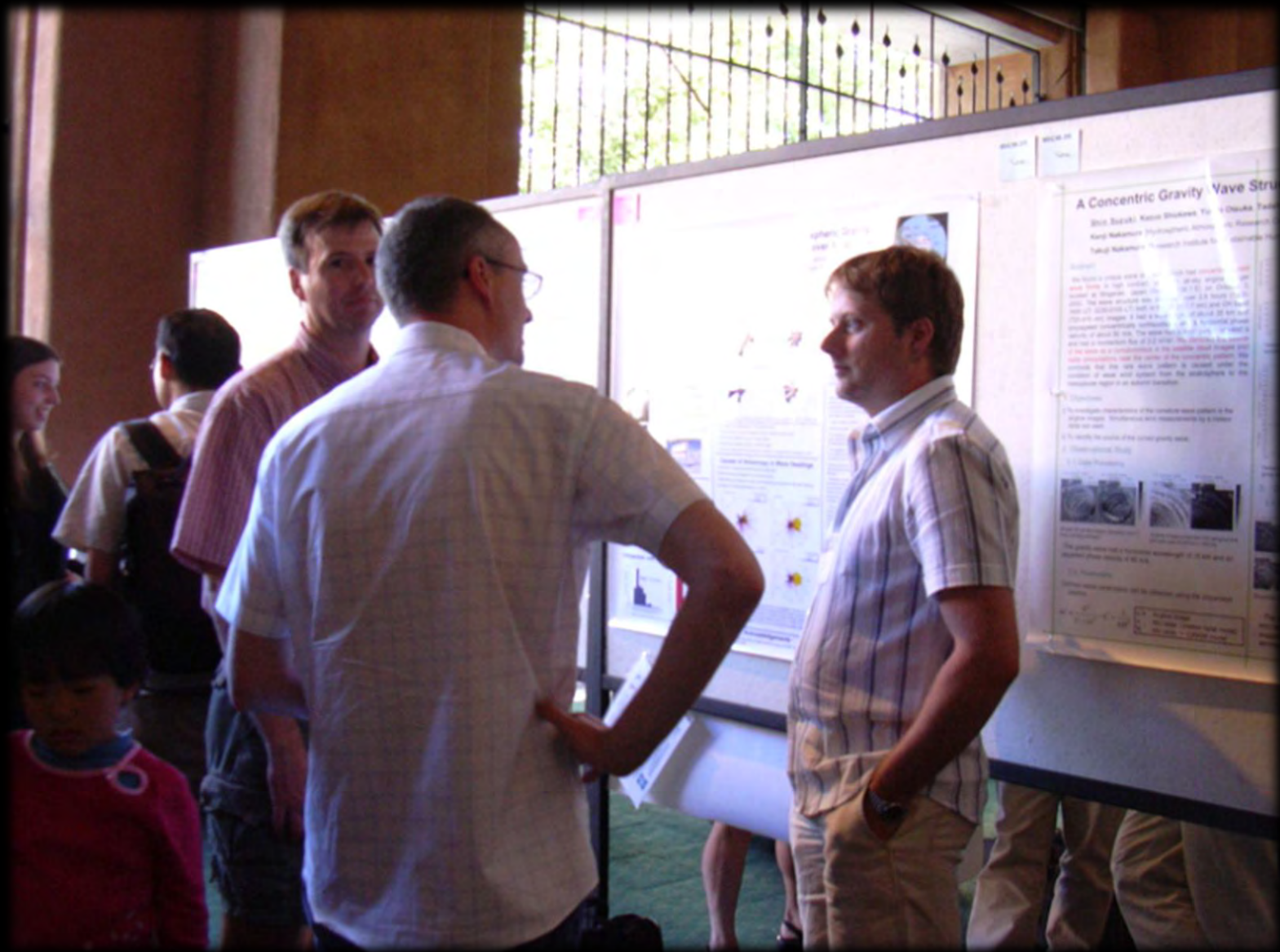
Sunday Reception at the Eldorado Hotel Anasazi Ballroom:
Delano Gobbi ,Tzu-Wei Fang , ... Pedrina Terra dos Santos



Carlos Martinis, student CSSC rep, sees students to bus for bowling.

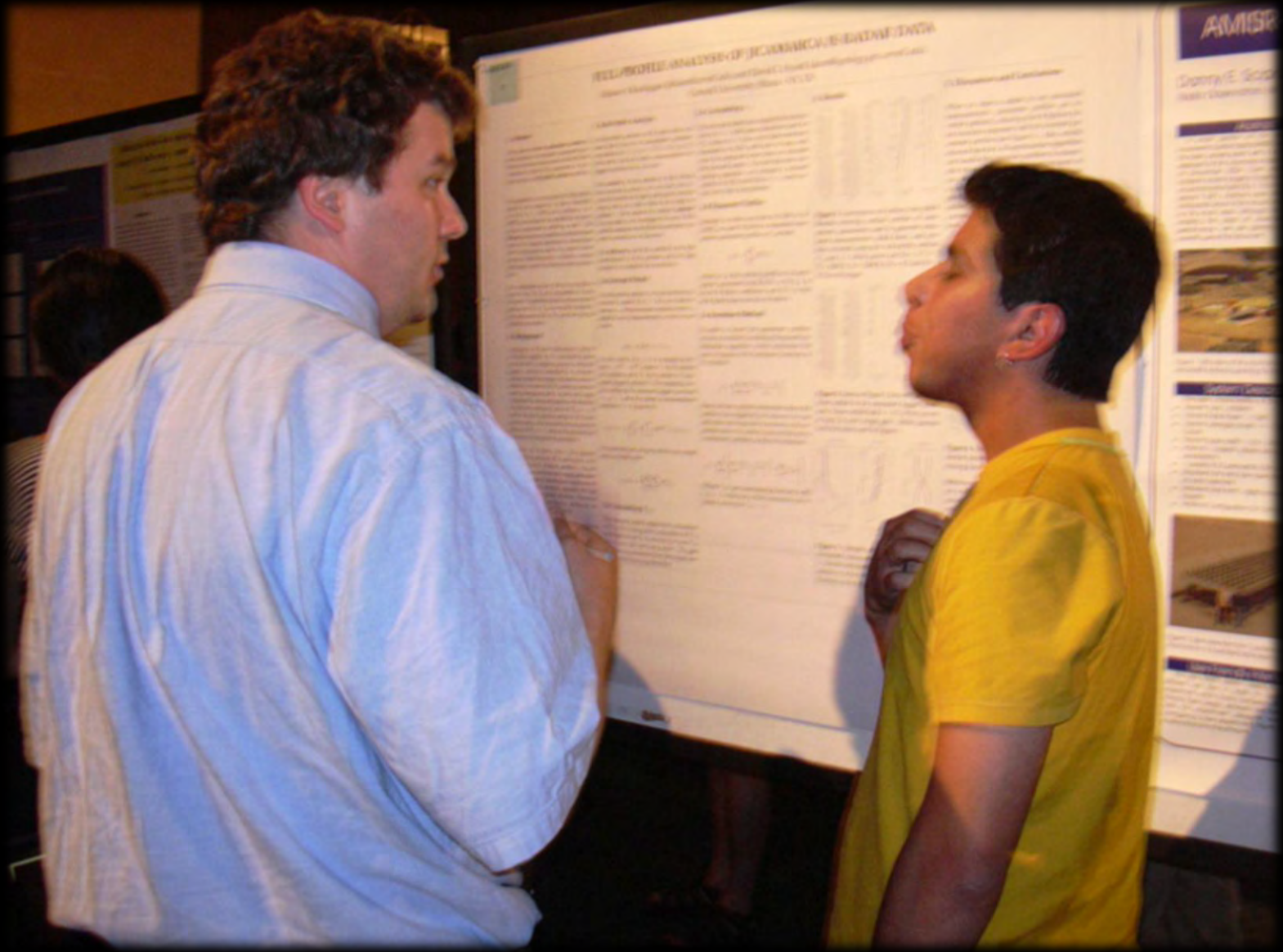


John Meriwether and Chet Gardner at the Monday MLT poster session in the Pavilion.





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



Wednesday morning break at La Fonda Hotel.



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

Outside Rancho del Chimayo, the favorite restaurant of CSSC member John Mathews of PSU.





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



The opera gala decorations in the Pavilion where 2 poster sessions were held previously.



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

Chimayo tour
on Friday
afternoon



Altar in the
Chimayo church





Larisa Goncharenko



Weaver near Chimayo on extra-curricular tour.



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



Free music Friday night at the Cafe Paris.



View from the top floor of the Eldorado Hotel looking over the tent of the Pavilion.



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





The CEDAR bus from Colorado at the back door of the Eldorado Hotel.





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





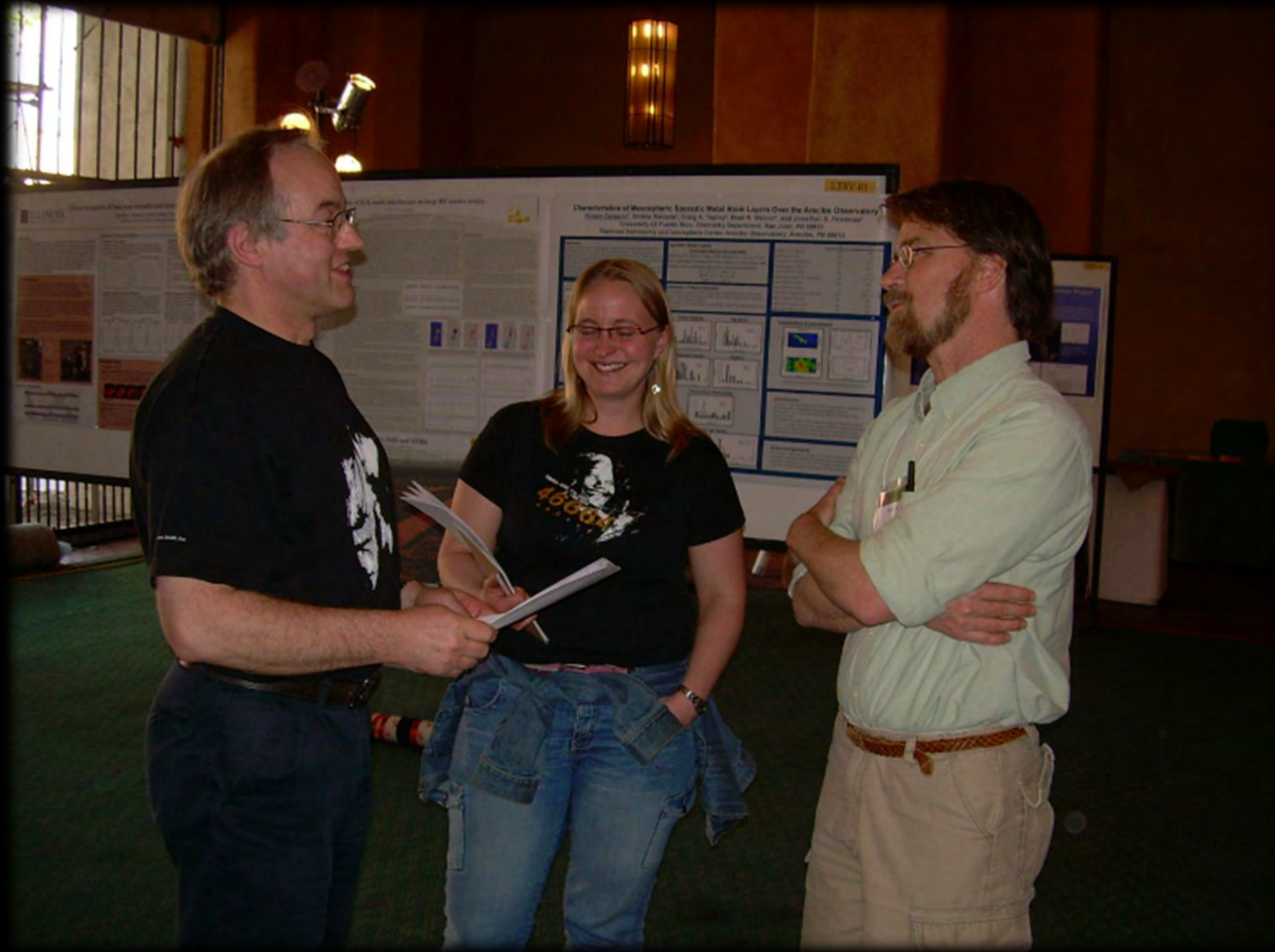
John Meriwether of Clemson asks the speaker Aaron Ridley of the University of Michigan questions at the Fabry-Perot Workshop in Zia.



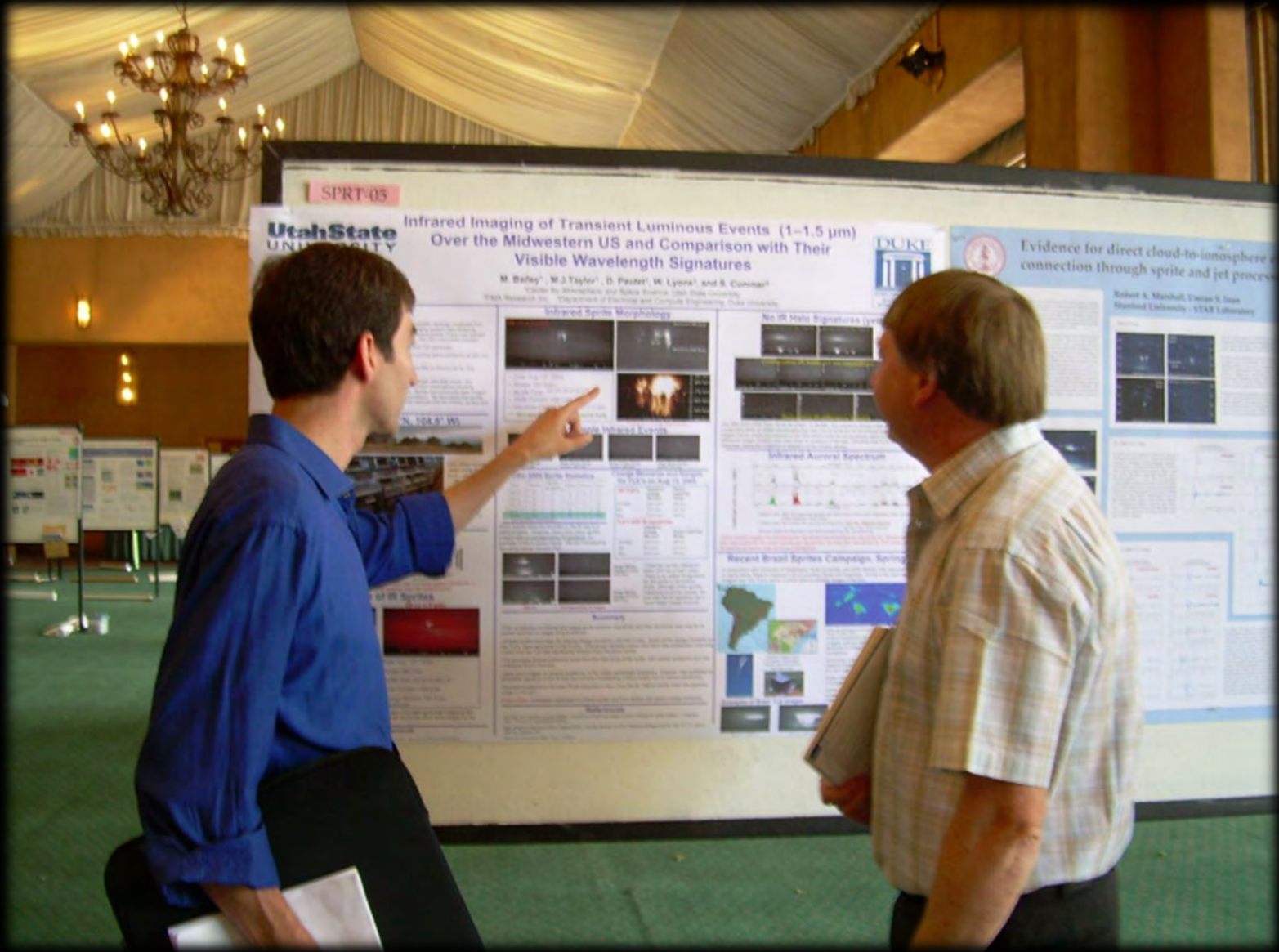
Abandoned Pueblo of Tsankawi: Joe Grebowsky, Doug Geiger,
and Gail Tepley



Guide to Tsankawi, ?, and ?



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

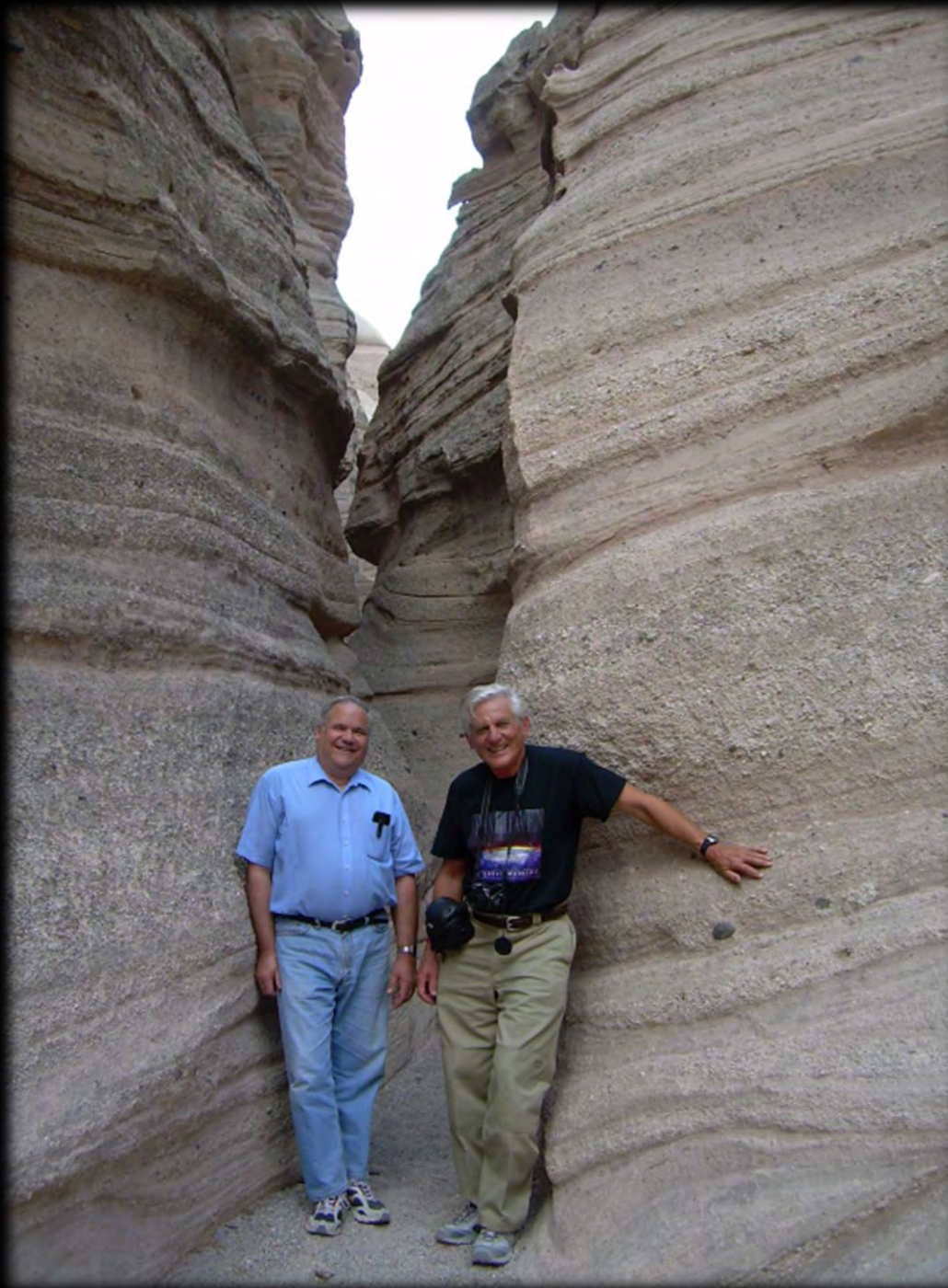
Tent Rocks: Our guide in red describes to Ron Woodman how to descend from where Chantal Lathuillere of Grenoble and Don Farley of Cornell are standing.



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



Boarding the bus at NCAR to drive to Santa Fe on Saturday June 23. Young-Sil Kwak and sons Jin and Seong; Janet (Zhen) Zeng and driver Andy H.





Boarding the bus at LASP at the University of Colorado in Boulder to drive to Santa Fe on Saturday June 23.



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).



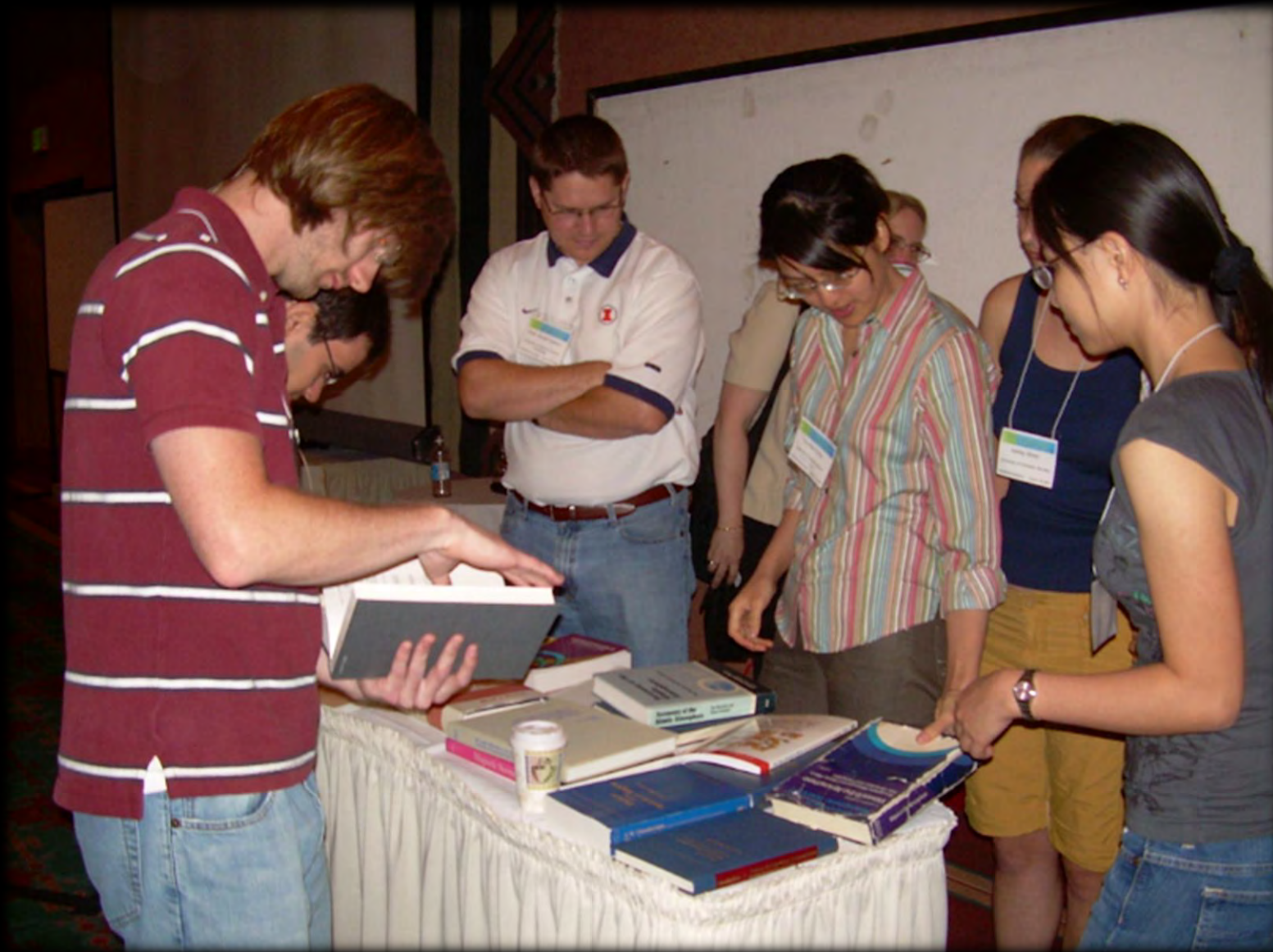
Video-con with Arecibo Observatory on 26 June with Part 1 of Arecibo Friends Workshop



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.



View from cliffs at White Rock by Los Alamos, New Mexico, 27 June 2007 on NM Sampler trip with Santa Fe Destinations.



View from cliffs at White Rock by Los Alamos, New Mexico, 27 June 2007 on NM Sampler trip with Santa Fe Destinations.



Chimayo church.



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.



The cathedral in Santa Fe.



Larisa Goncharenko at the Santa Fe plaza.



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

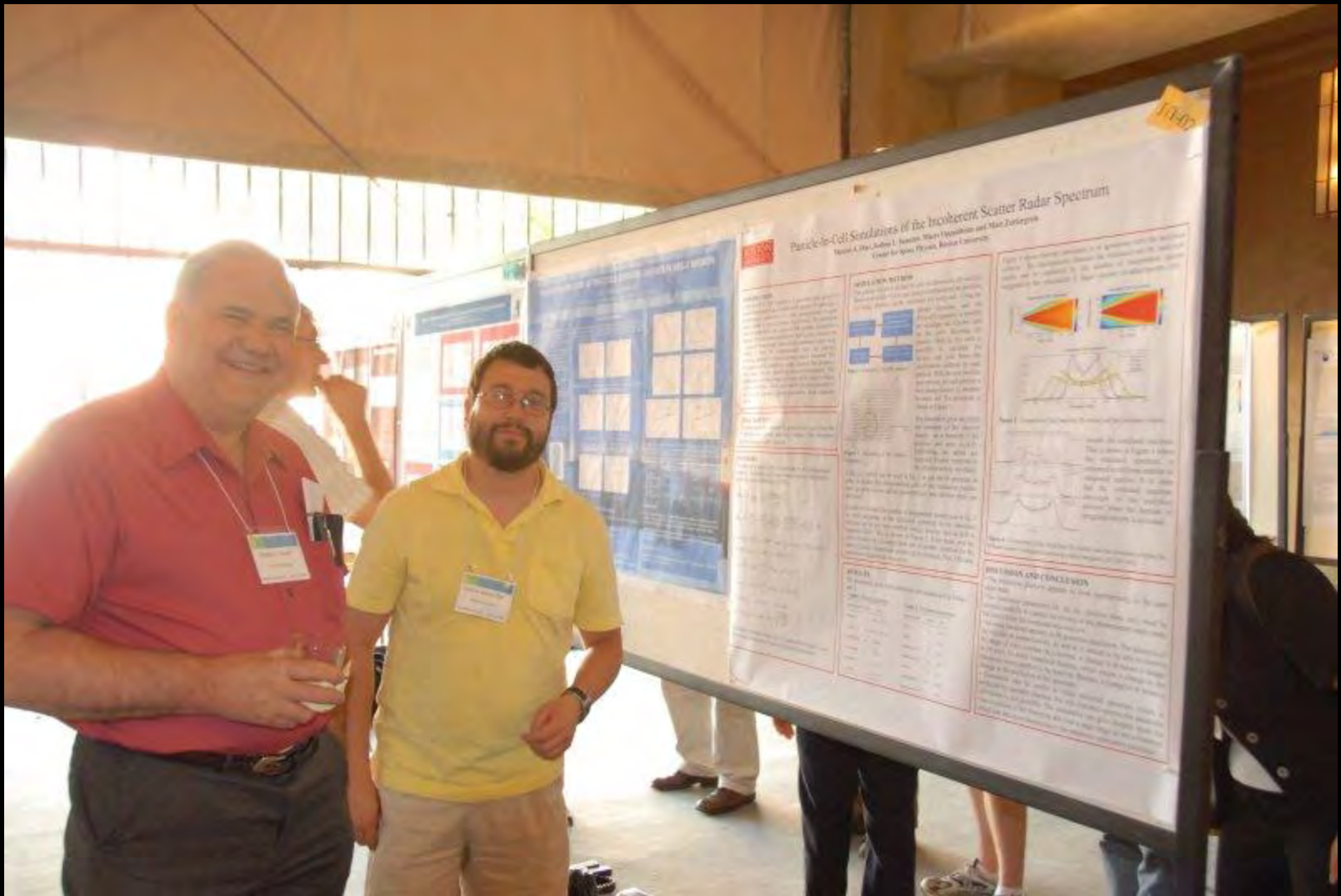
Eldorado Hotel, Santa Fe, New Mexico

Monday Poster Session

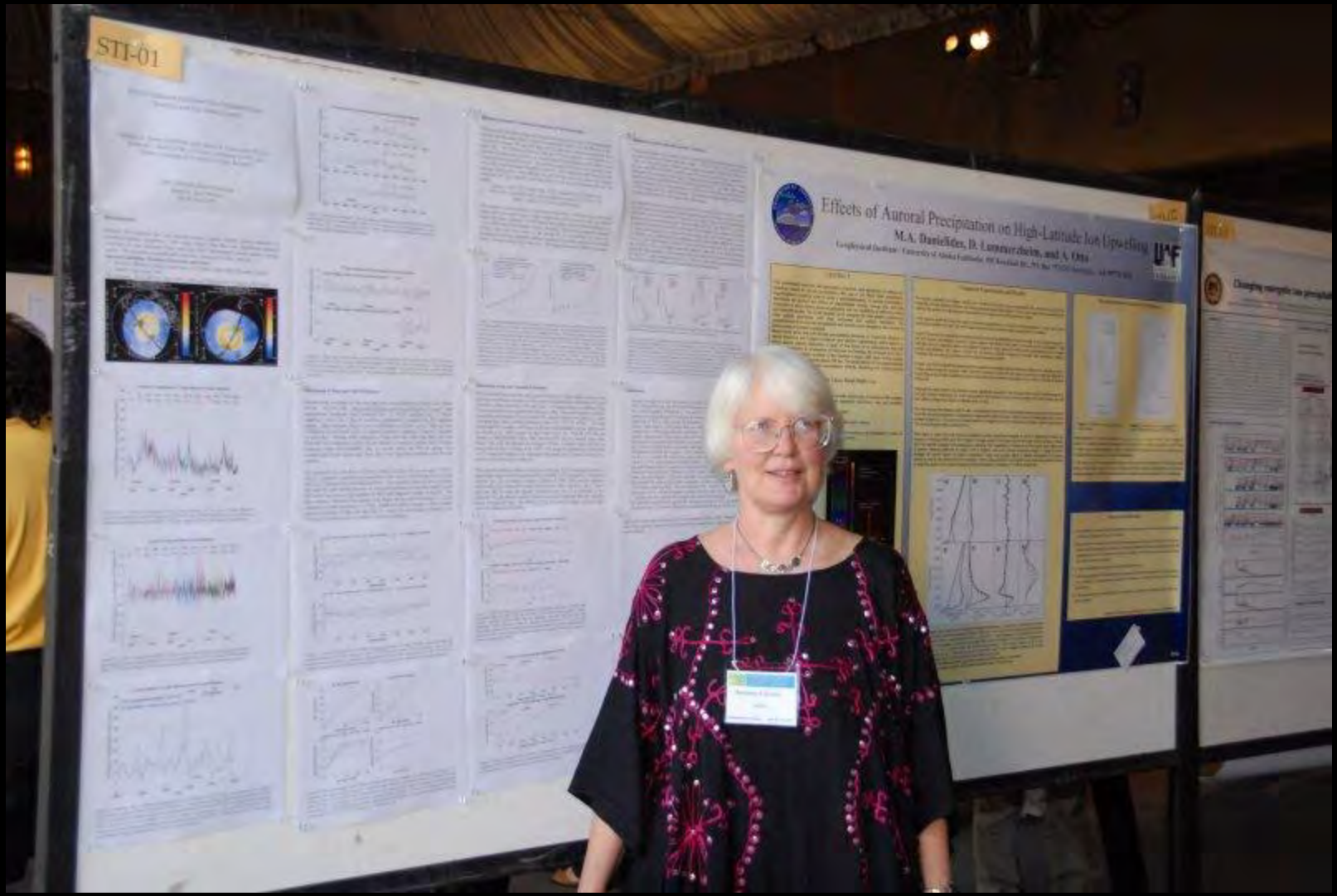




Monday Poster Session Everyone socializing: ? and ?; Pedrina Santos (Arecibo) and Amauri Medeiros (INPE/USU); Dwight Decker (AFRL) and Bob Schunk (USU); John Plane (U Leeds, UK).



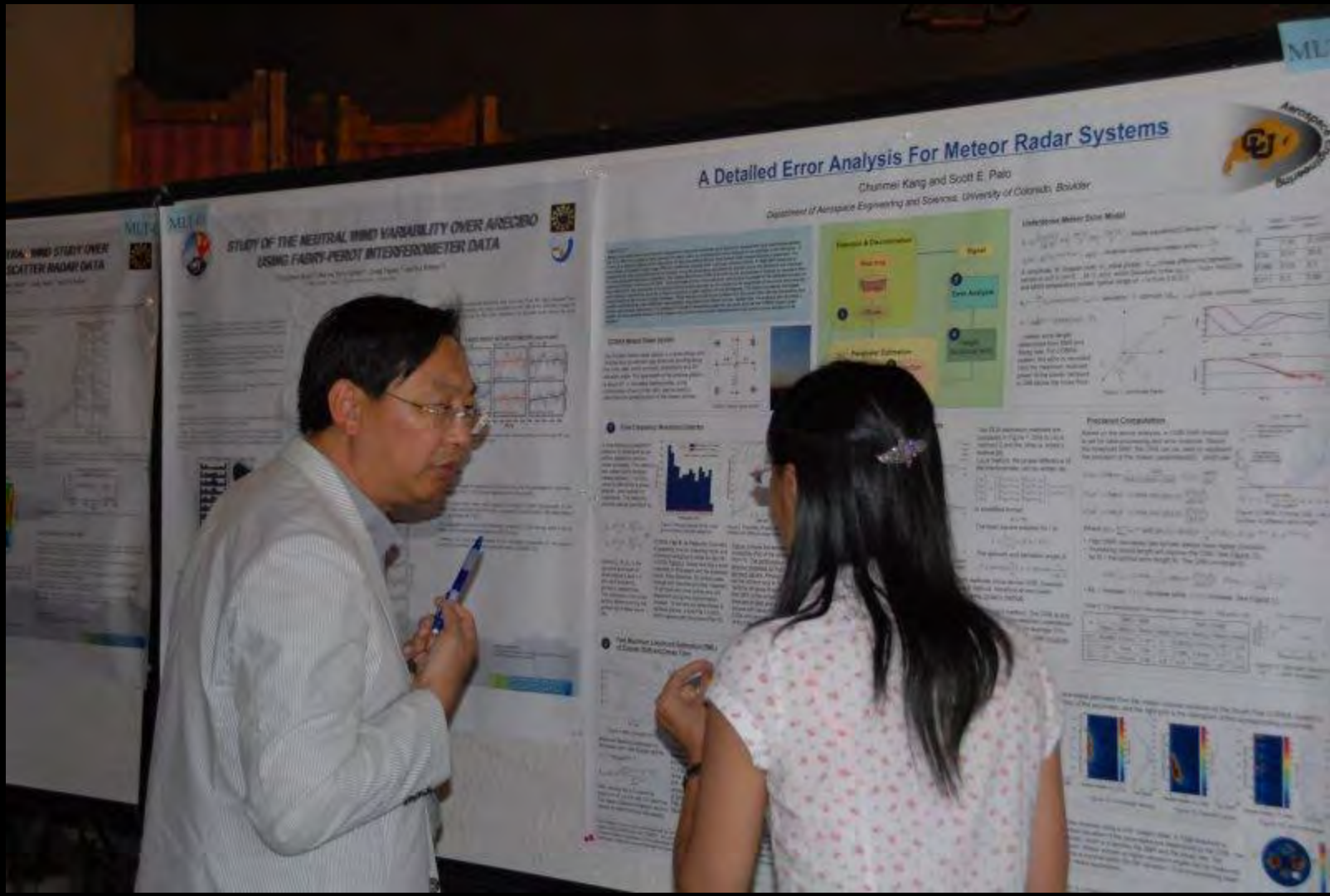
Monday Poster Session Wes Swartz (Cornell) and Marcos Diaz (BU, ITI-02)



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

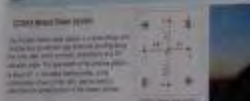


STUDY OF THE NEUTRAL WIND VARIABILITY OVER ARECIBO USING FABRY-PEROT INTERFEROMETER DATA

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. It provides information on the density, temperature, and composition of the atmosphere. The meteor radar system is used to study the neutral wind variability over Arecibo using Fabry-Pérot interferometer data.



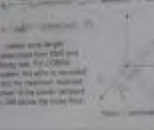
The meteor radar system is used to study the neutral wind variability over Arecibo using Fabry-Pérot interferometer data. The data shows that the wind variability is highest during the summer months.

The meteor radar system is used to study the neutral wind variability over Arecibo using Fabry-Pérot interferometer data. The data shows that the wind variability is highest during the summer months.



Unleashed Meteor Data Model

The meteor radar system is used to study the neutral wind variability over Arecibo using Fabry-Pérot interferometer data. The data shows that the wind variability is highest during the summer months.



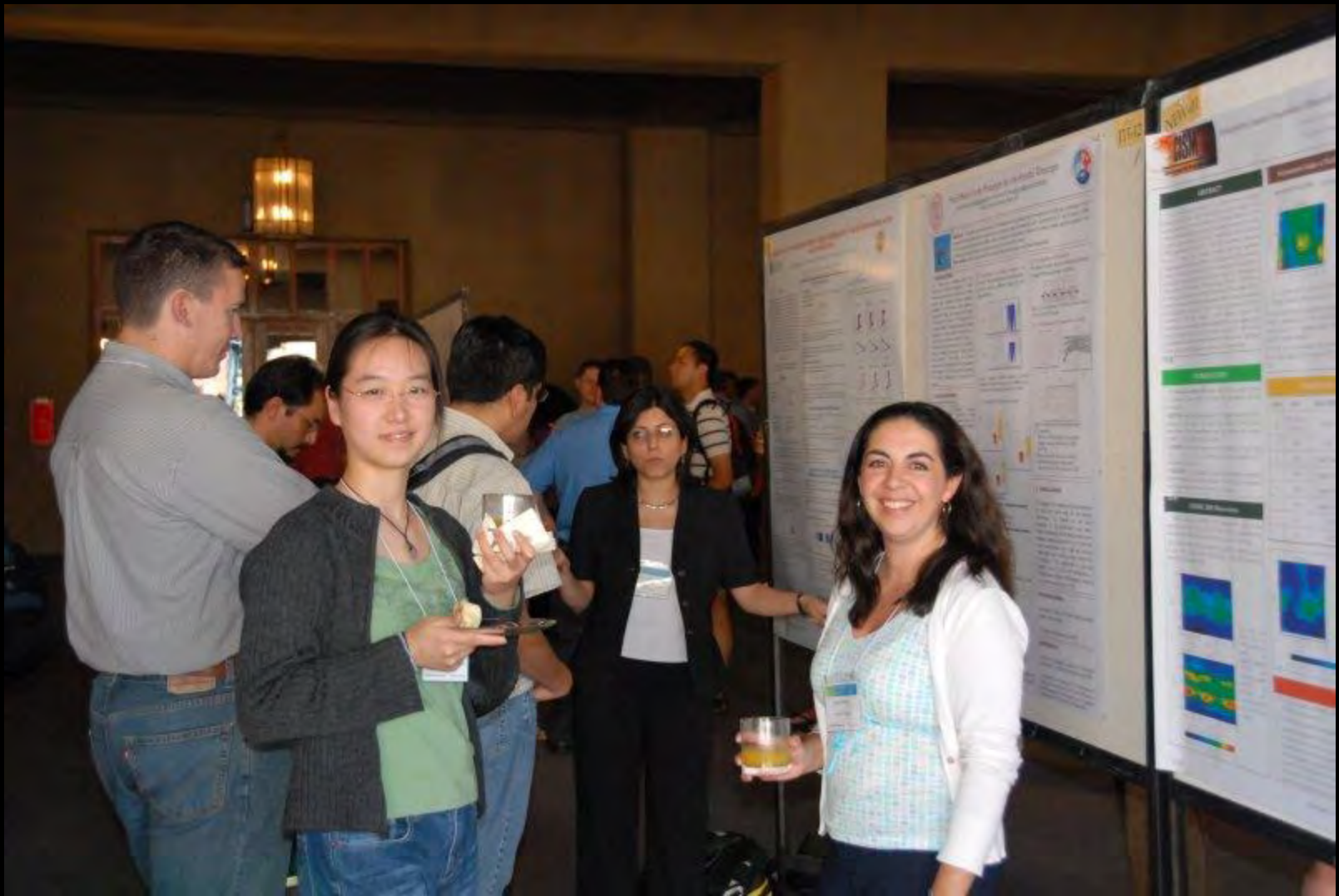
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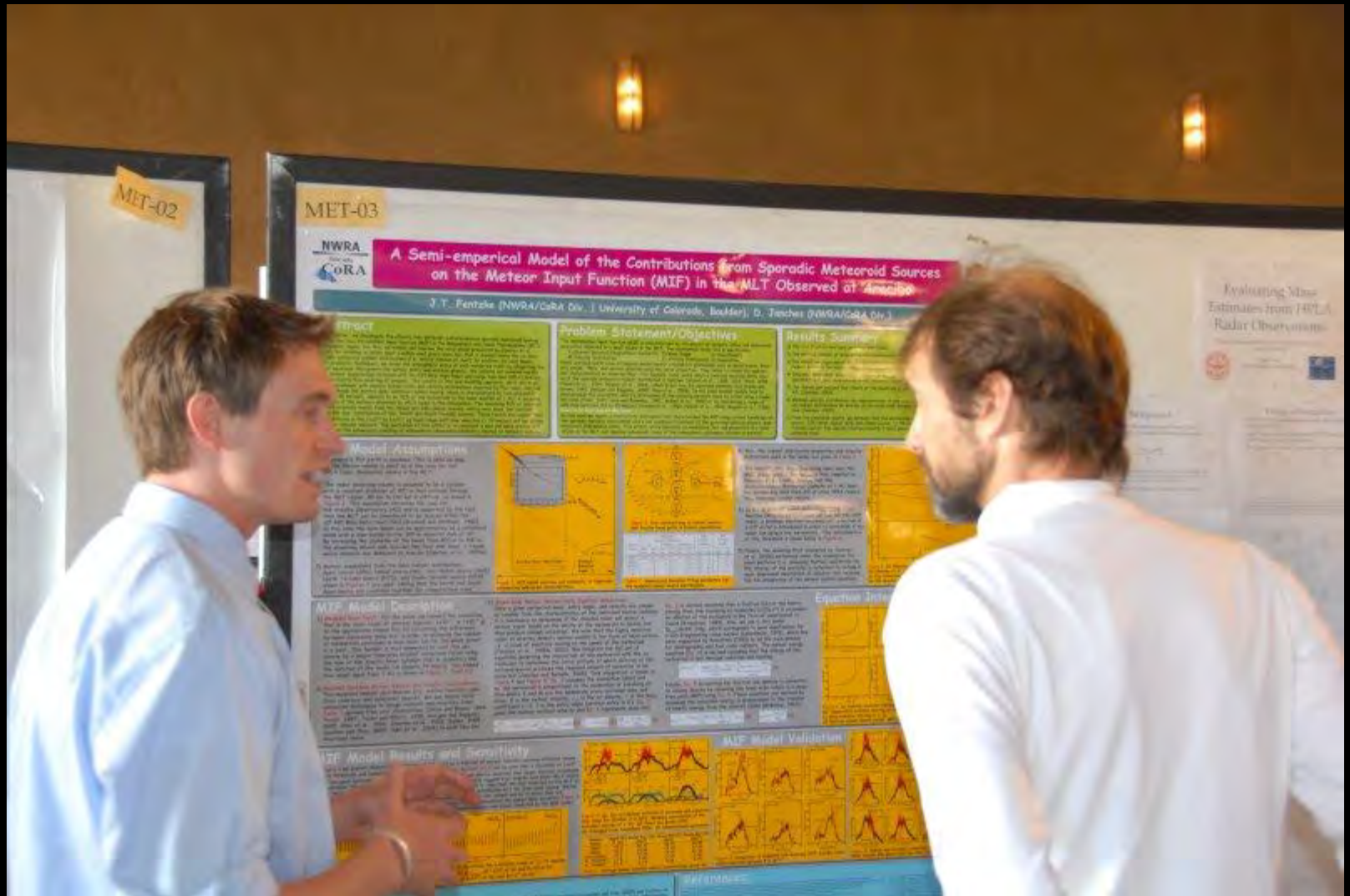
The meteor radar system is used to study the neutral wind variability over Arecibo using Fabry-Pérot interferometer data. The data shows that the wind variability is highest during the summer months.



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 Avenue, Boston, MA 02215, USA; ² Center for Space Physics, Boston University, 7 University Avenue, Boston, MA 02215, USA; ³ Center for Space Physics, Boston University, 7 University Avenue, Boston, MA 02215, 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 density structure along lengths of the meridian, from 30°N to 30°S. The data are analyzed in terms of the density 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.

Observations:

Year	# of Events (Images)	# of Images (Images)	# of Images (Images)
2004	10	10	10
2005	10	10	10
2006	10	10	10

Further Experiments:

Figure 1 shows several examples of airglow images that exhibit a structured appearance. The images are arranged in a grid, showing different views of the airglow structure.

Summary:

- This study has looked at 21 events during 2004 and 2005 with airglow structures, and compared the density structure changes from CHAMP measurements to the related brightness from images observed in situ by the CHAMP satellite.
- Density variations of about 1% to 2% are observed, which are consistent with airglow structures. No consistent pattern of correlation with density changes is observed.
- The goal is to extend the study to include more cases during 2006 and 2007.

Analysis of thermospheric response to magnetospheric activity

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

¹ Center for Space Physics, Boston University, 7 University Avenue, Boston, MA 02215, USA; ² Center for Space Physics, Boston University, 7 University Avenue, Boston, MA 02215, USA; ³ Center for Space Physics, Boston University, 7 University Avenue, Boston, MA 02215, USA

Abstract:

The thermosphere is highly sensitive to magnetospheric activity. This study analyzes the response of the thermosphere to magnetospheric activity using data from the CHAMP satellite and ground-based observations.

Method:

The study uses data from the CHAMP satellite and ground-based observations to analyze the response of the thermosphere to magnetospheric activity. The data are analyzed in terms of the density 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.

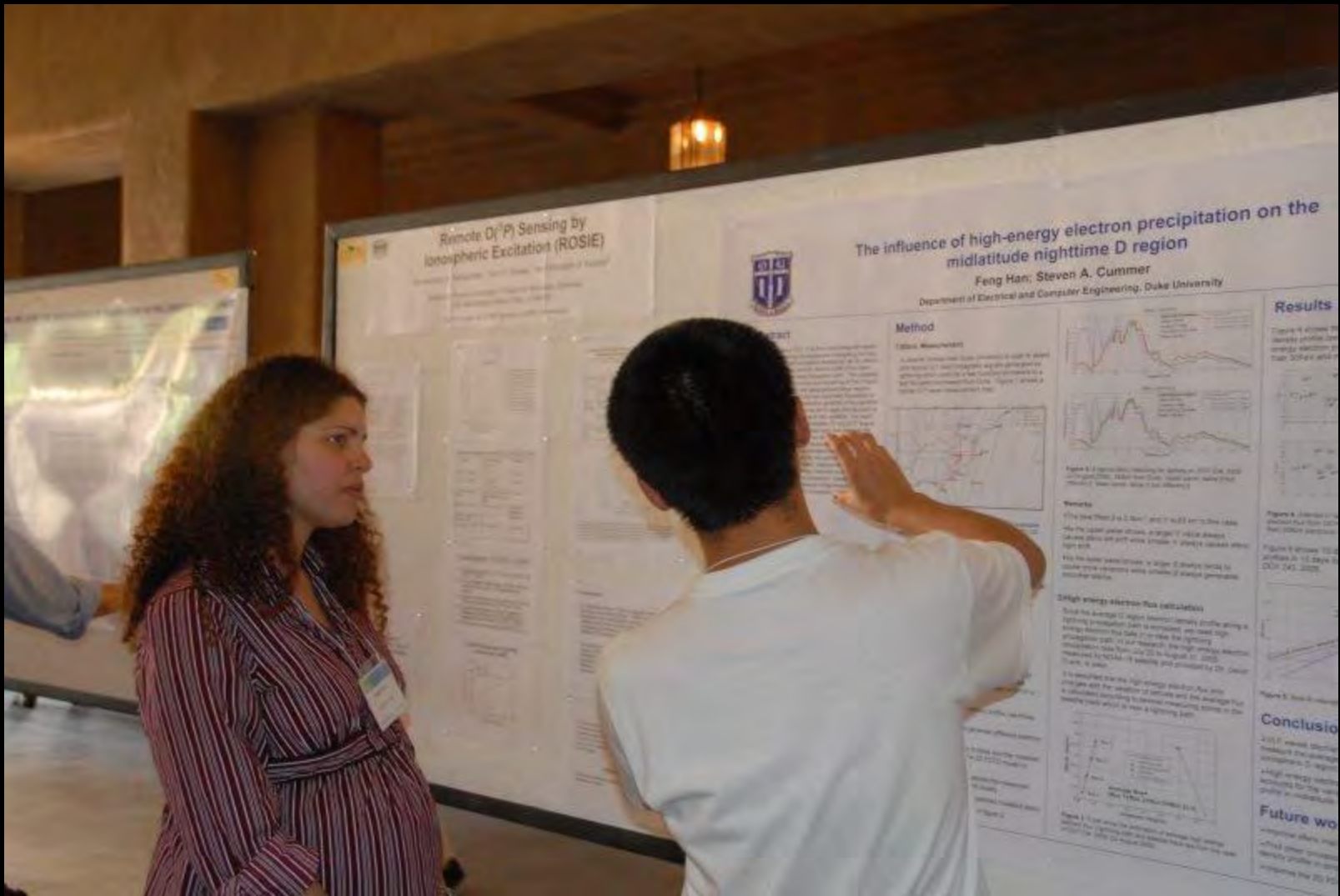
Observations:

Figure 1 shows several examples of airglow images that exhibit a structured appearance. The images are arranged in a grid, showing different views of the airglow structure.

Summary:

- This study has looked at 21 events during 2004 and 2005 with airglow structures, and compared the density structure changes from CHAMP measurements to the related brightness from images observed in situ by the CHAMP satellite.
- Density variations of about 1% to 2% are observed, which are consistent with airglow structures. No consistent pattern of correlation with density changes is observed.
- The goal is to extend the study to include more cases during 2006 and 2007.

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



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

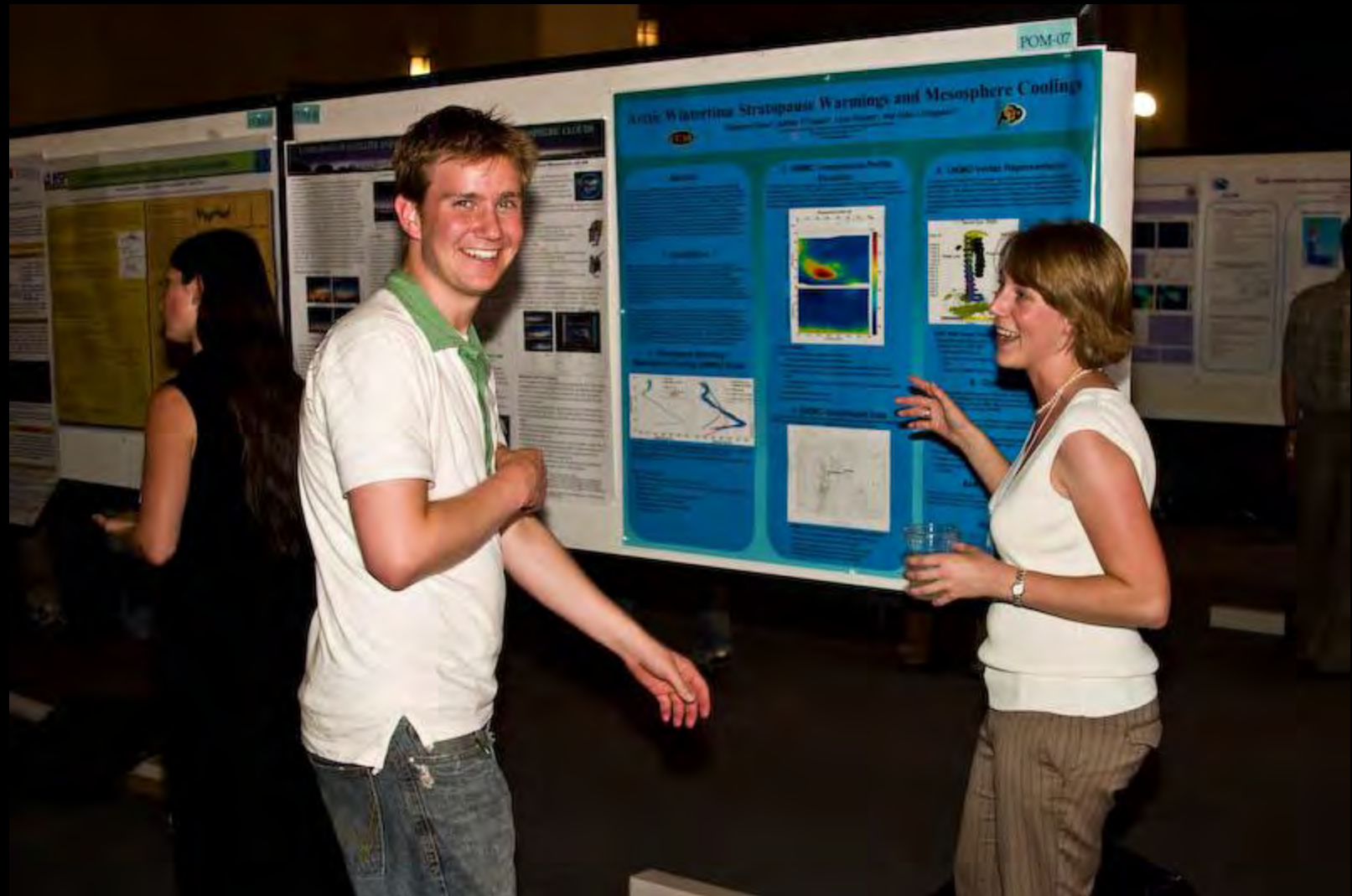


2007 CEDAR

Eldorado Hotel, Santa Fe, New Mexico

Tuesday Poster Session

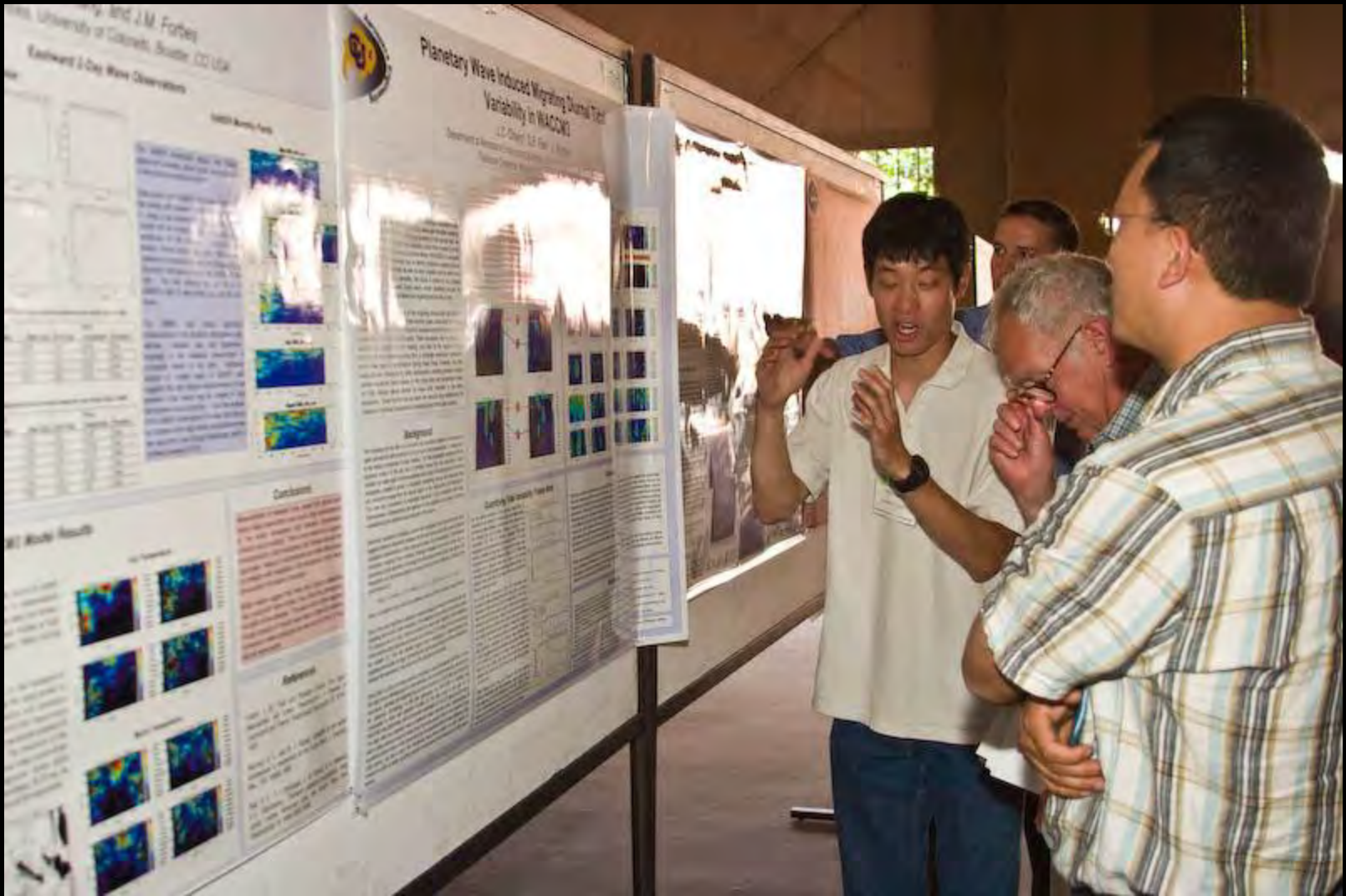




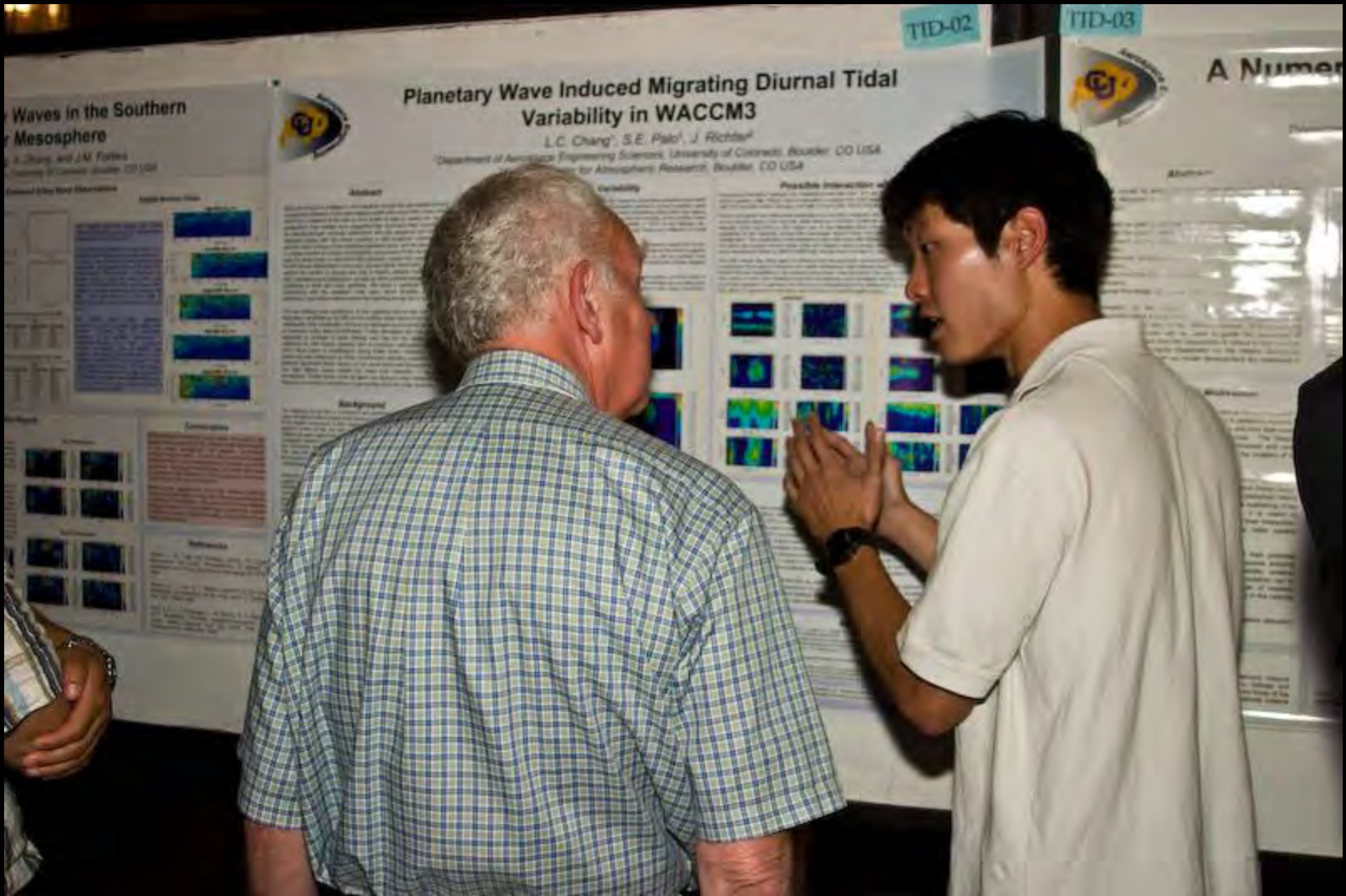
Katelynn Greer (U CO undergrad) explains her poster.



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.

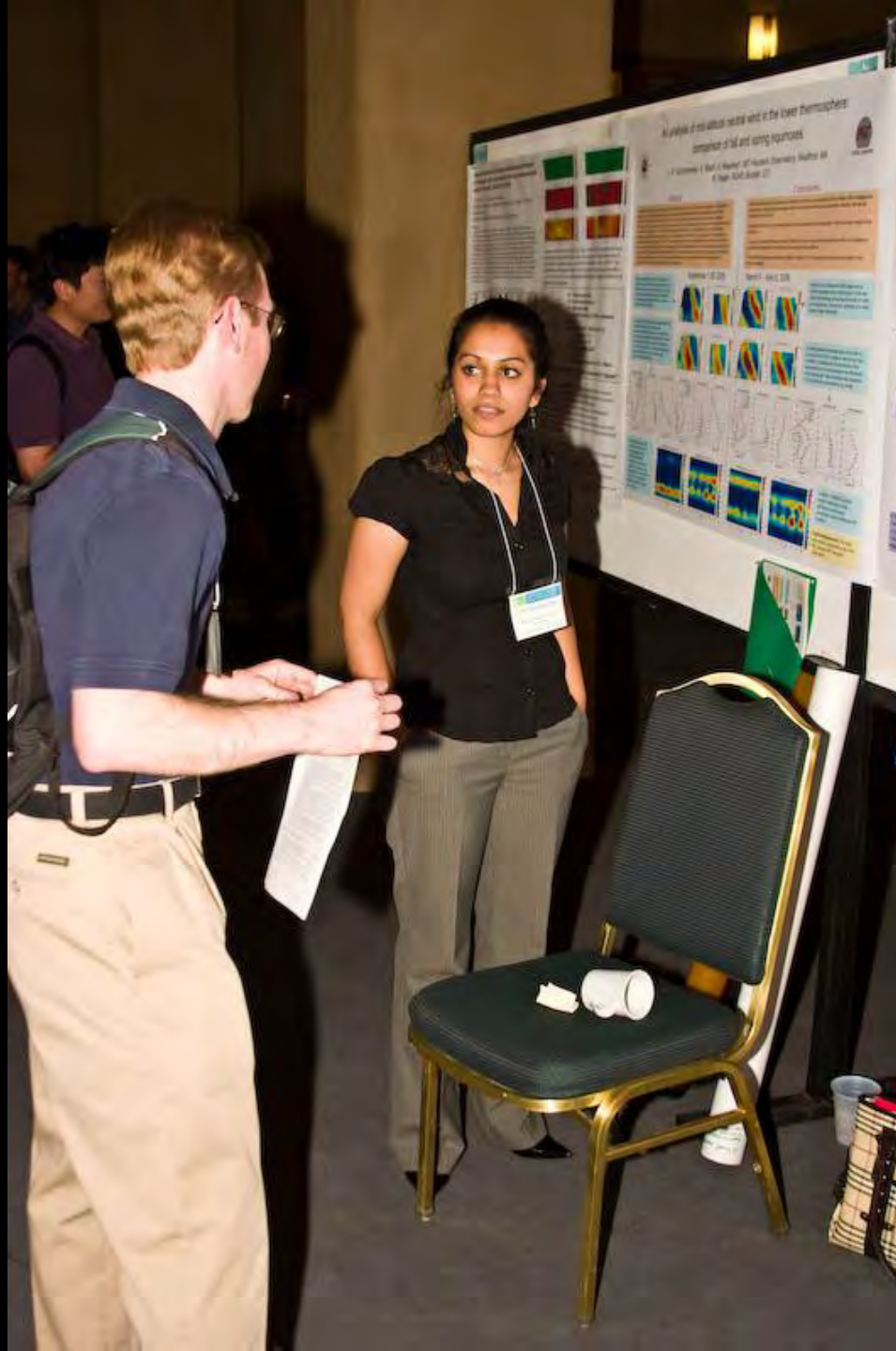
Jeff Thayer
(CSSC incoming
chair, U CO) in
front of his
student Laura
Brower's poster
(U CO).

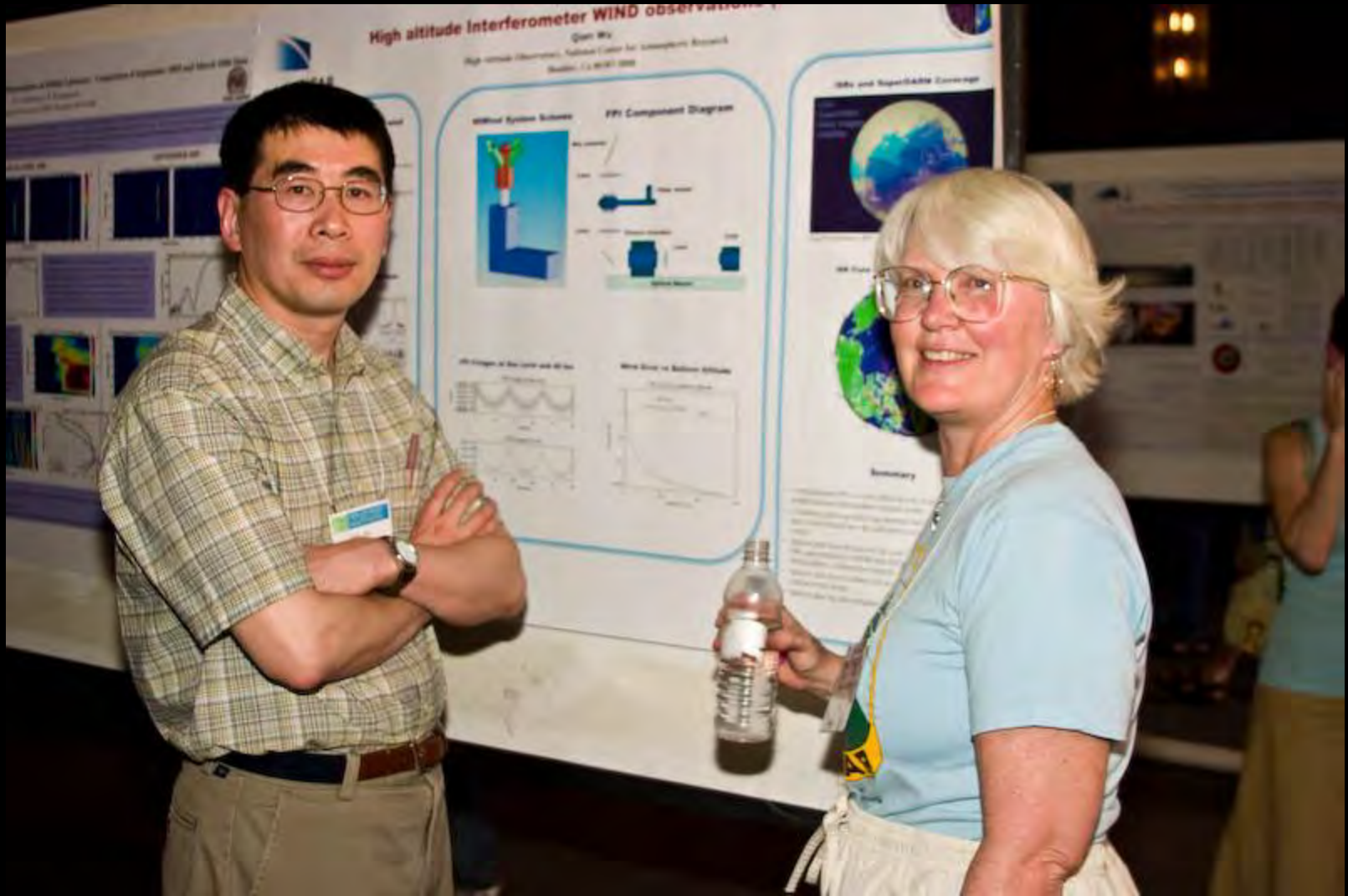


Jonathan Snively,
Jonathan Fentzke
and others talking
at the poster
session.



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).

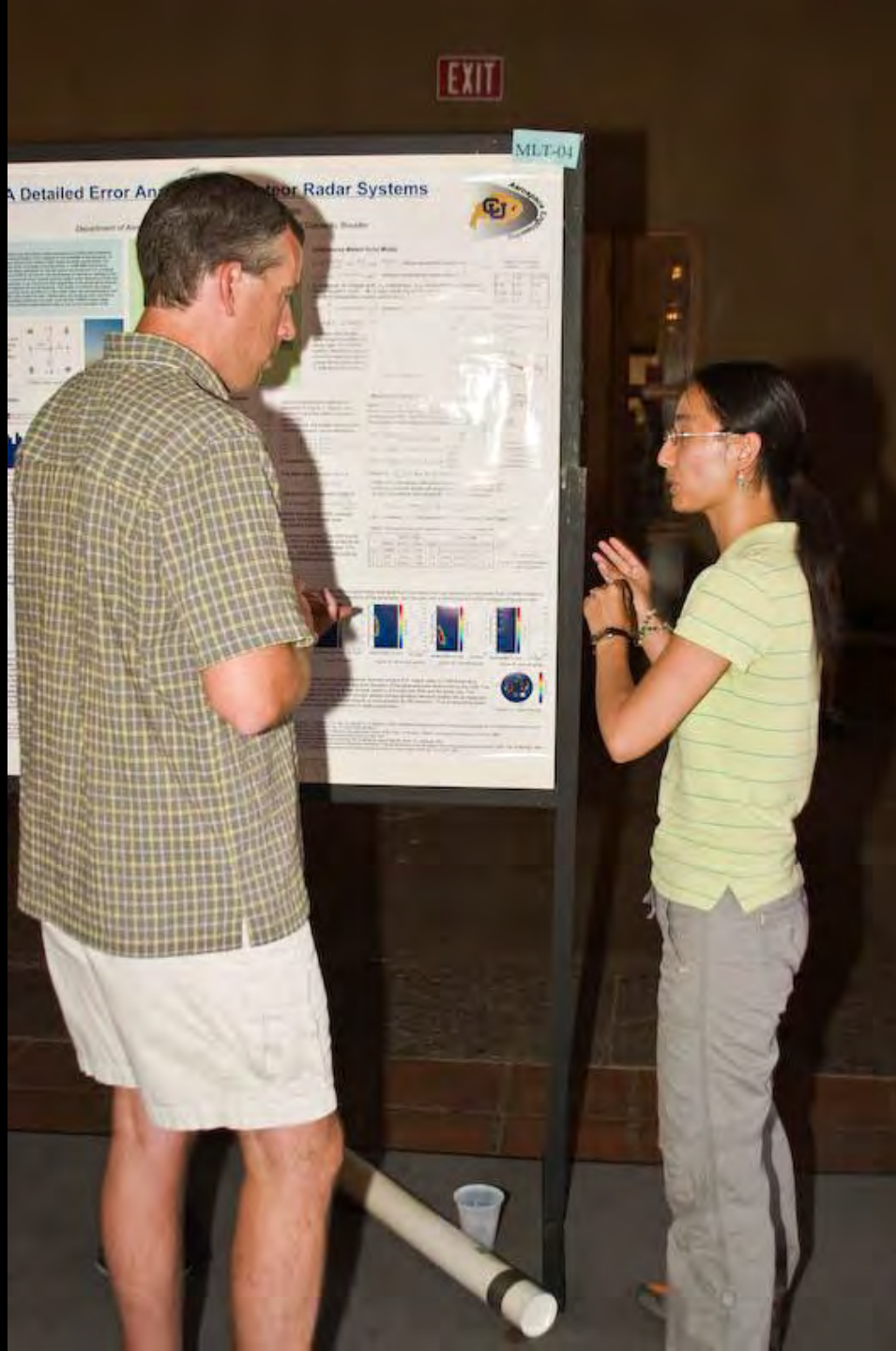


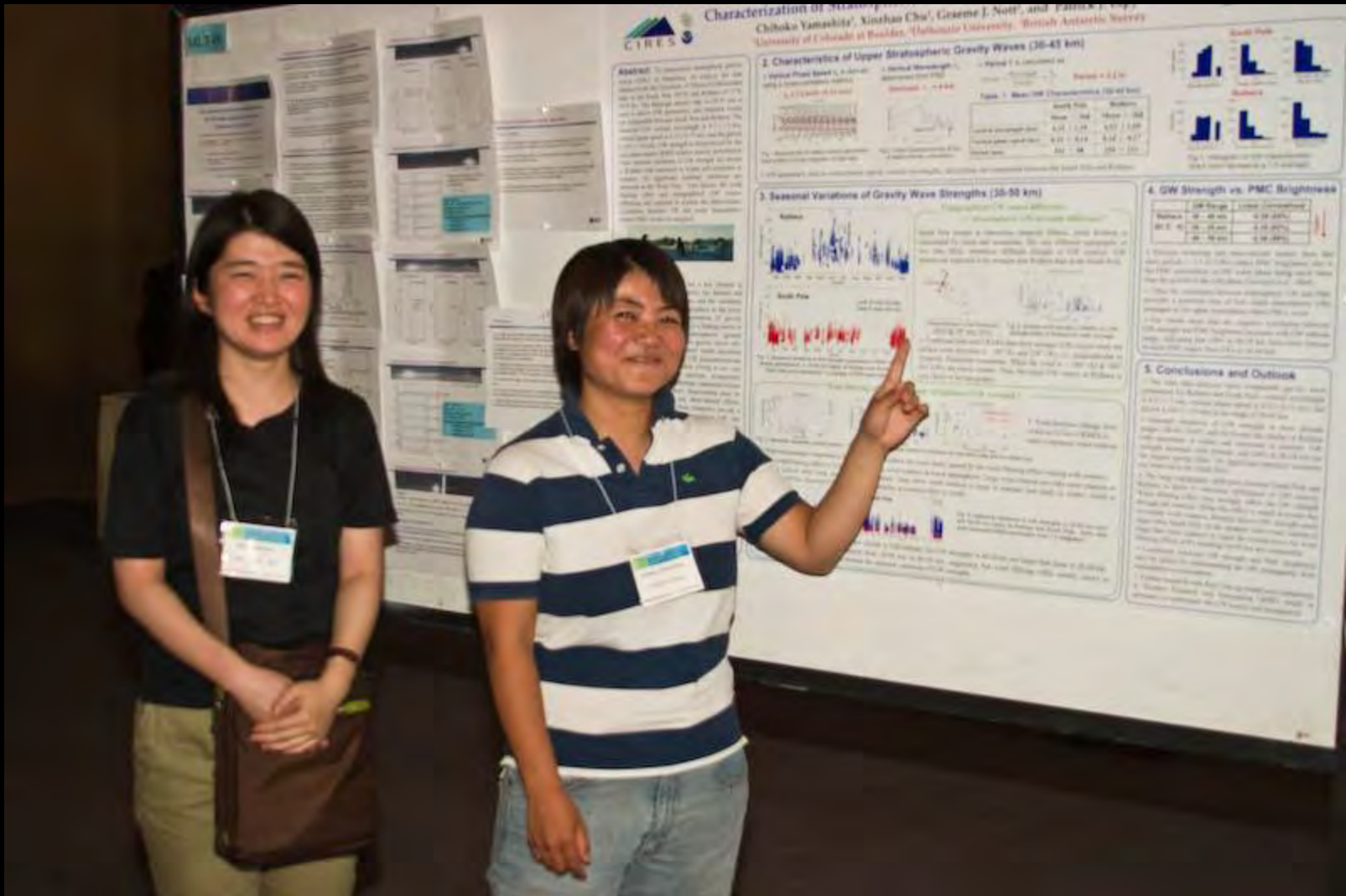
Talking with others.



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

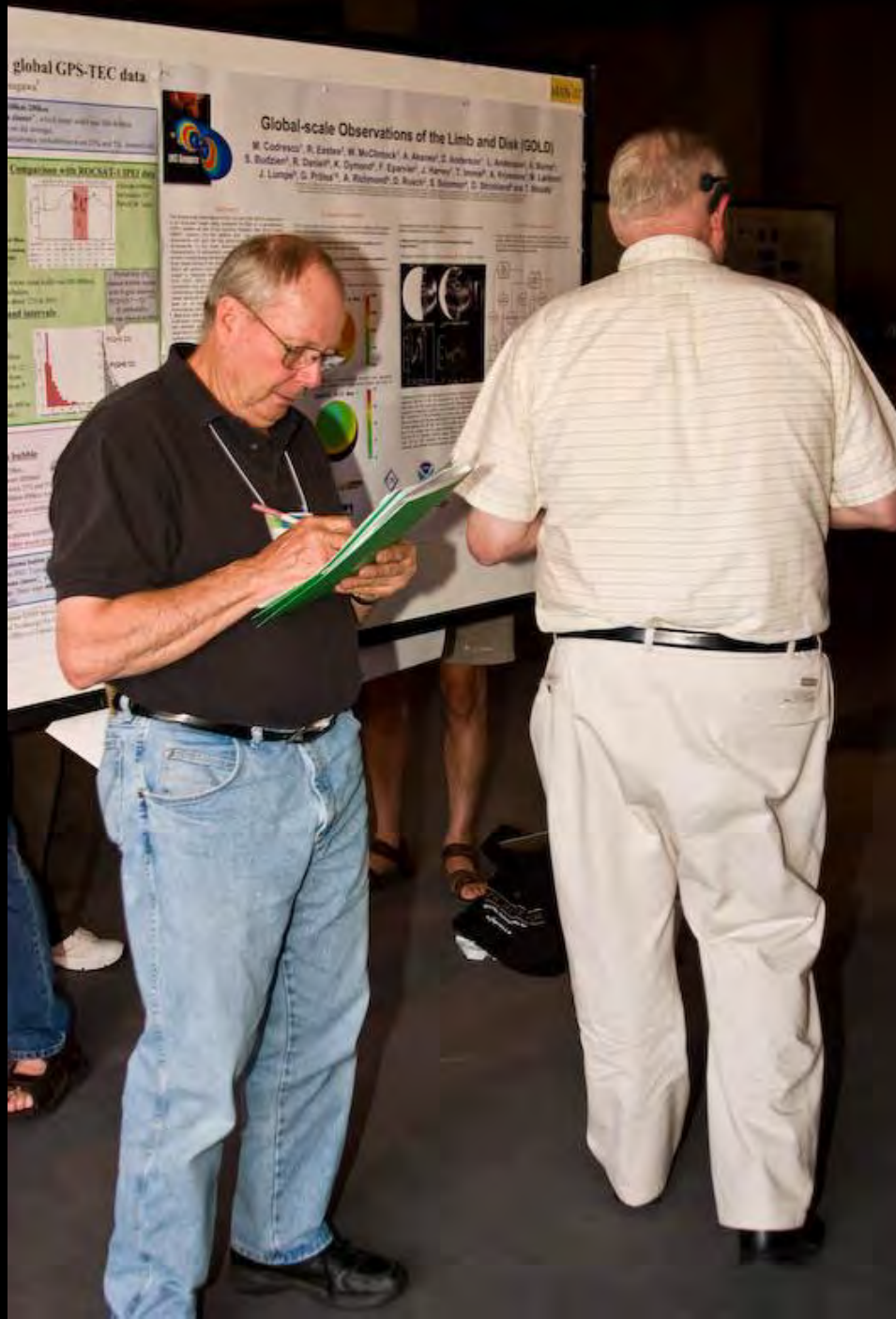
Chunmei Kang
(honorable
mention, U CO)
and her advisor,
Scott Palo (U CO)
discuss her poster.





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.



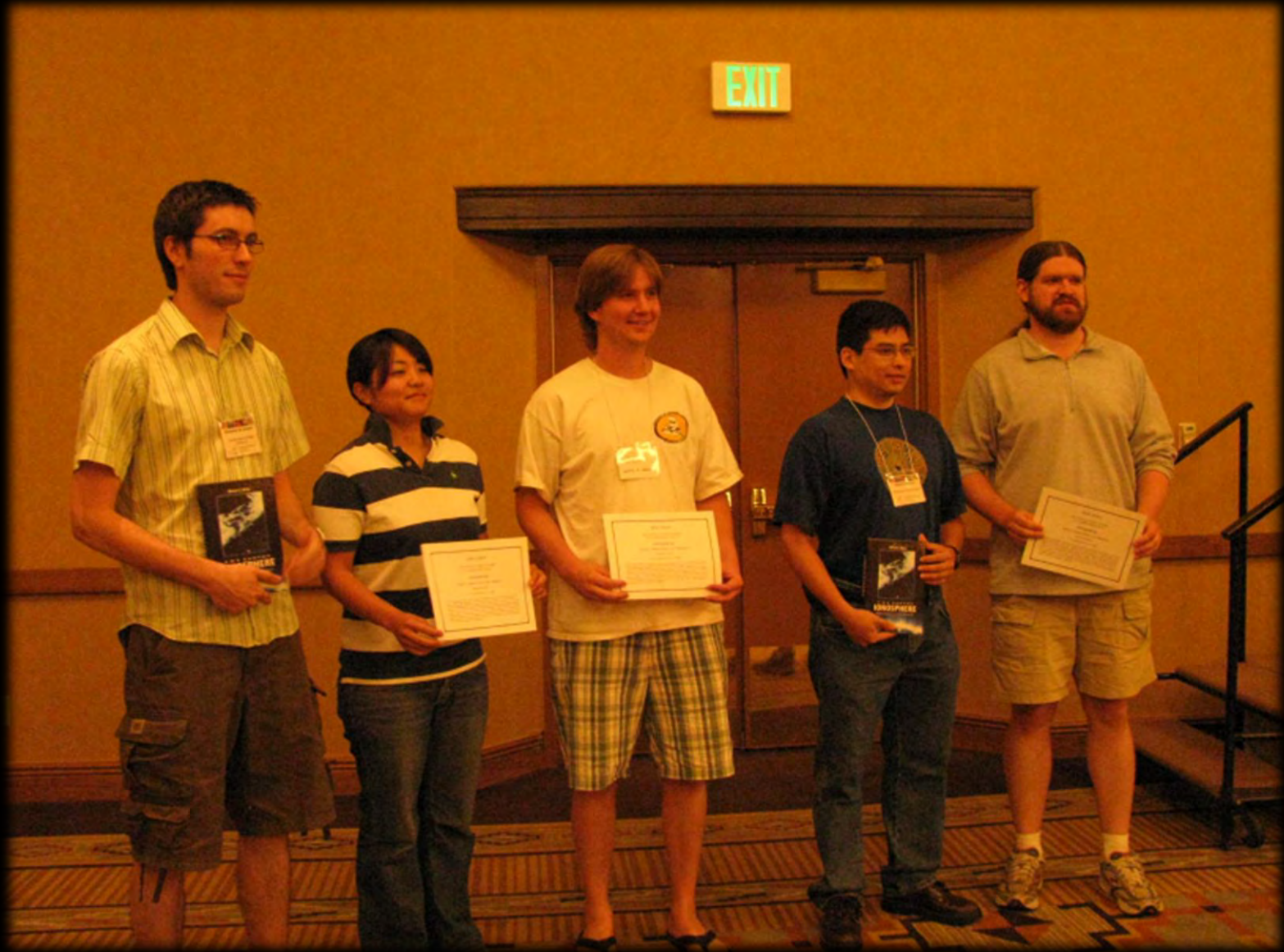
2009 CEDAR

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 (LP) diagnostics, which yield some measurements of plasma parameters in the event of a plasma, are the most commonly used for the study of the plasma. However, the accuracy of the probe measurements is affected by the presence of surface potential variations. In this paper, we present a method for the estimation of the probe currents in the event of surface potential variations. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner.

II. Background

The Langmuir probe (LP) is a diagnostic tool used to measure the electron density, temperature, and other parameters of a plasma. It consists of a thin wire (the probe) that is inserted into the plasma. The probe is biased with a voltage, and the current flowing through it is measured. The current is a function of the probe voltage and the plasma parameters. The probe current is affected by the surface potential variations. The surface potential variations are caused by the presence of surface charges. The surface charges are caused by the presence of surface potential variations. The surface potential variations are caused by the presence of surface charges.

IV. Work Function Variations

The work function of a probe is the energy required to remove an electron from the probe. The work function is affected by the surface potential variations. The surface potential variations are caused by the presence of surface charges. The surface potential variations are caused by the presence of surface charges. The surface potential variations are caused by the presence of surface charges.

Results to Illustrate the Effect on the Determination of Plasma Parameters

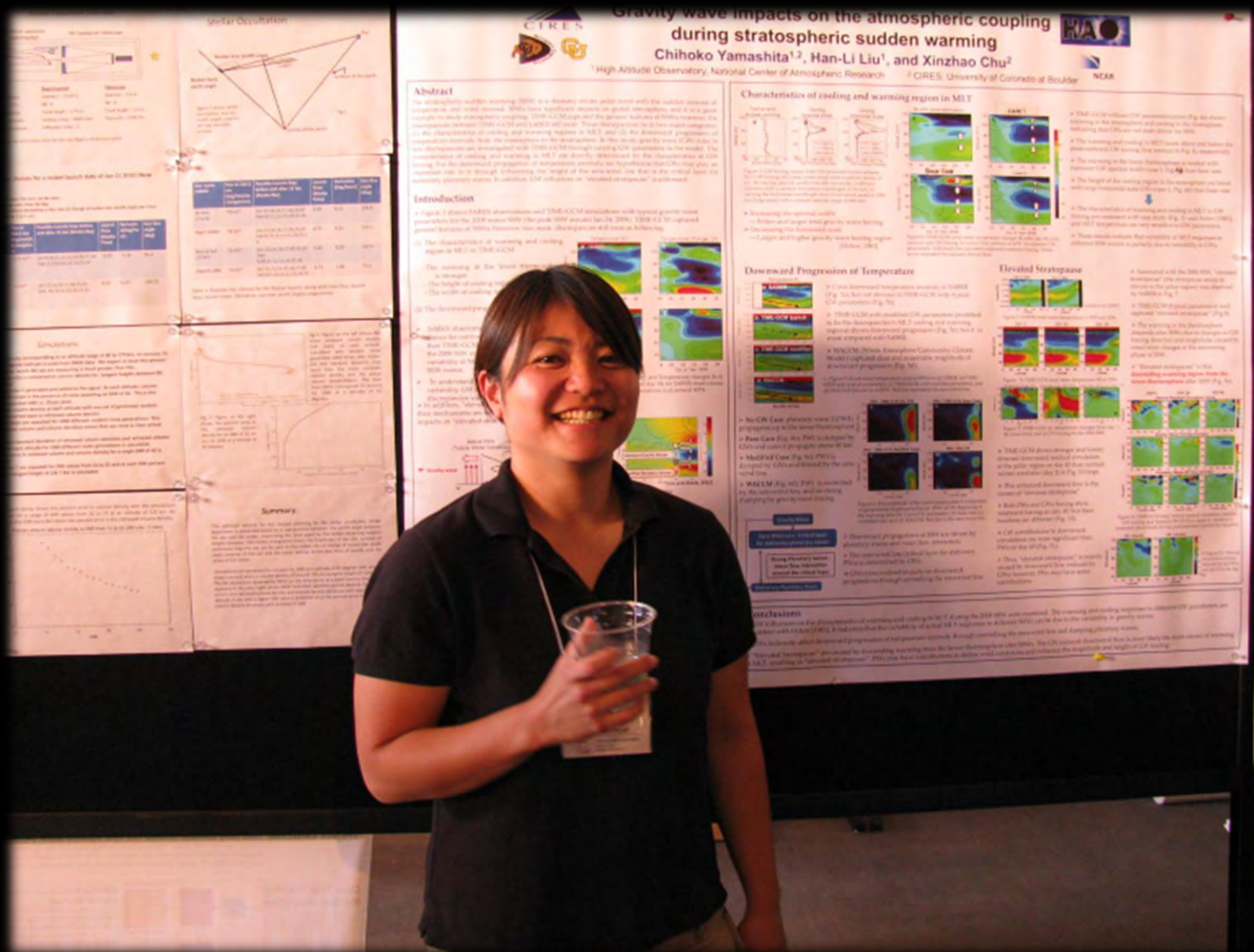
The effect of surface potential variations on the determination of plasma parameters is illustrated in the following figure. The figure shows the probe current as a function of the probe voltage for different surface potential variations. The probe current is affected by the surface potential variations. The surface potential variations are caused by the presence of surface charges. The surface potential variations are caused by the presence of surface charges.

V. Summary and Future Work

The method presented in this paper provides a means for the estimation of the probe currents in the event of surface potential variations. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner. The method is based on the assumption that the probe currents are affected by the surface potential variations in a predictable manner.



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



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

METR-03

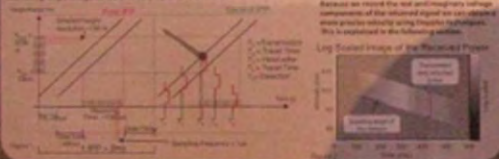
Latitudinal dependence of the variability of the micrometeor altitude distribution

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 Fairbanks, Alaska (66°15'N, 147°2'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 ionometry of this atmospheric region.

Experiment and Set Up

For this work, we utilized meteor radar observations from the AO at Poker Flat, Alaska, representing most of the season. These radar observations were collected using the 430 MHz Altitude Observatory (AO) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W). The AO consists of two radar receivers (Polaris and Polaris) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W). The AO consists of two radar receivers (Polaris and Polaris) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W). The AO consists of two radar receivers (Polaris and Polaris) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W).



Observational Results

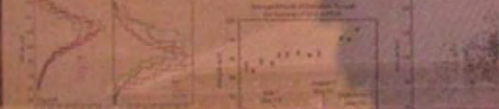


Figure 1 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Figure 2 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Figure 3 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Figure 4 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Figure 5 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Figure 6 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.



Estimation of M

Jingb

Department of E

Abstract

Low frequency radio emission spectra have been observed from the Poker Flat Research Range near Fairbanks, Alaska. These observations provide 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 ionometry of this atmospheric region.

Introduction

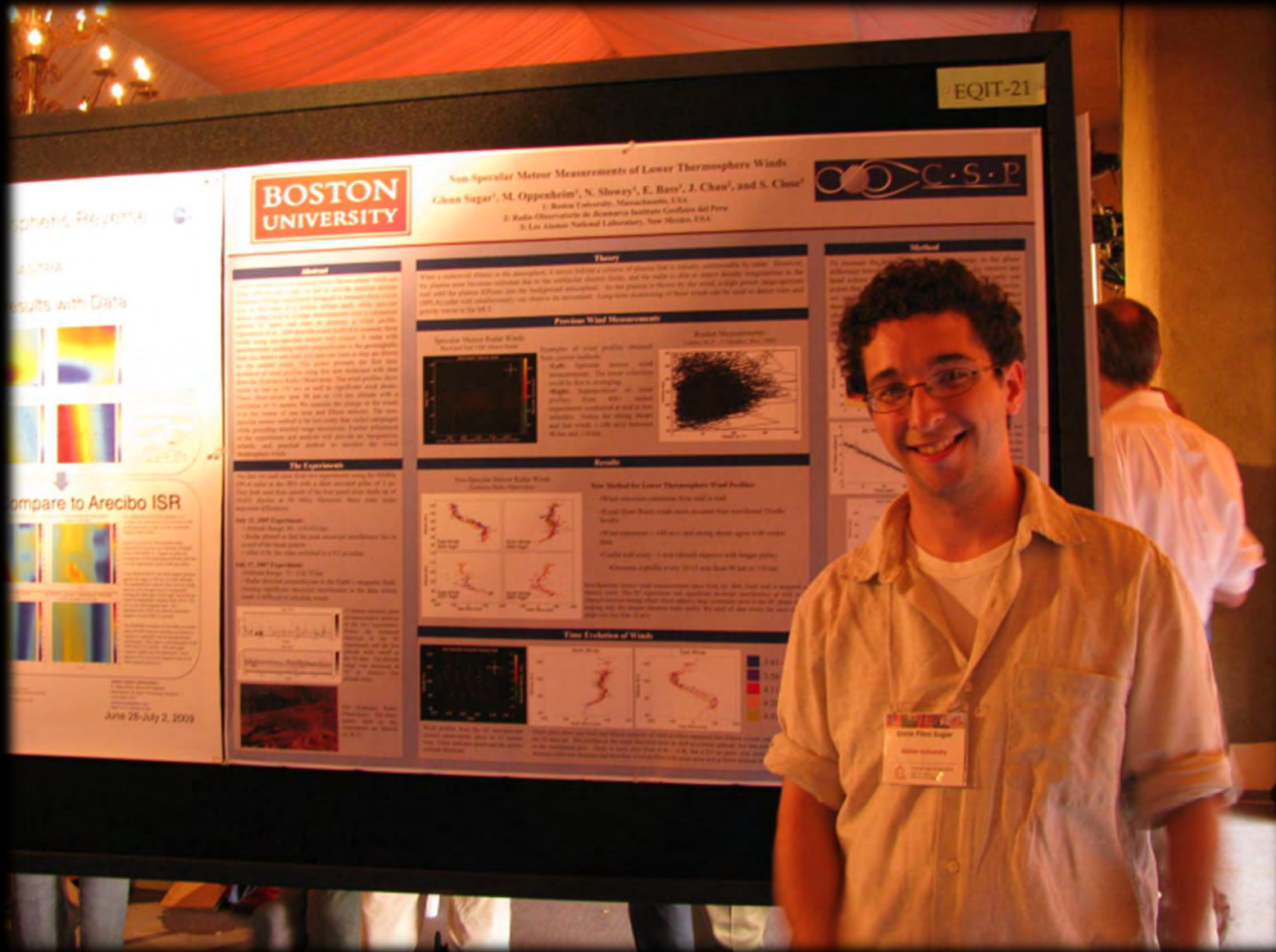
Figure 1 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.

- Estimated diurnal variation and presented in the figure as a function of time.
- Figure 2 shows the analysis of a single meteor trail. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time. The meteor altitude distribution is shown as a function of time.
- No meteoric mass deposition has been reported for the range between 80 and 120 km. This is the altitude range where the meteoric mass deposition is expected to occur.

Experiment Setup

For this work, we utilized meteor radar observations from the AO at Poker Flat, Alaska, representing most of the season. These radar observations were collected using the 430 MHz Altitude Observatory (AO) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W). The AO consists of two radar receivers (Polaris and Polaris) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W). The AO consists of two radar receivers (Polaris and Polaris) located at the Poker Flat Research Range near Fairbanks, Alaska (66°15'N, 147°2'W).

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
 Matthew Sunderland and Scott Bedford
 University of Pennsylvania
 Authors: Andrew Christensen, and James Hecht
 Aerospace Corporation

Abstract: RAIDS will leverage emerging technologies to provide a new generation of ionospheric observation capabilities. It will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities. It will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities.

Primary Science Goal: RAIDS will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities. It will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities.

Secondary Goal: RAIDS will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities. It will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities.

RAIDS will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities. It will provide a new generation of ionospheric observation capabilities, providing a new generation of ionospheric observation capabilities.

PENN STATE **IIIT-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 can receive 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 has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals.

New Capabilities: The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals.

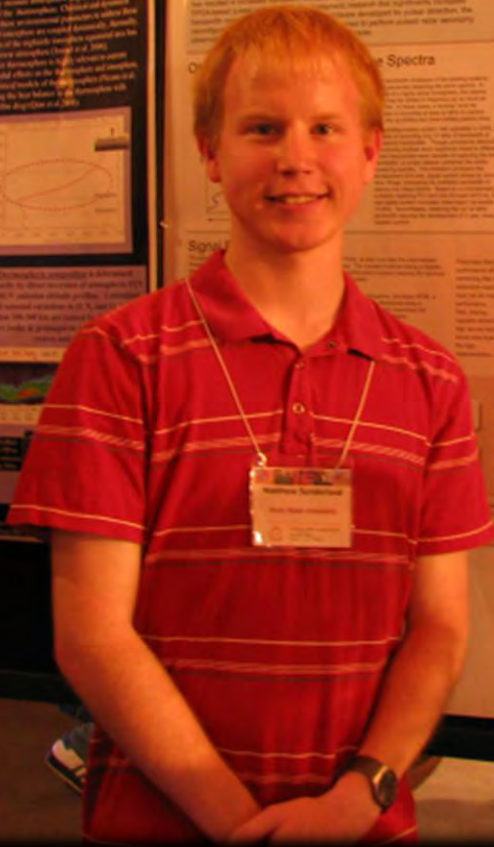
Host PC Software: The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals.

FPGA: The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals.

PowerPC: The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals. The receiver has been successfully demonstrated and is capable of receiving aeronomy signals.

54 MHz Wide Frequency Spectrum
Close-up of Center Frequency

Block Diagram: The receiver consists of an antenna, a pre-amplifier, an ADC, an FPGA, and a PowerPC. The antenna is connected to the pre-amplifier, which is connected to the ADC. The ADC is connected to the FPGA, which is connected to the PowerPC. The PowerPC is connected 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 Eškol, Jan Sejkla (Space Environment Corporation, Providence, UT, USA)
Héctor V. Soto González (Jacobs Observatory, Arecibo, Puerto Rico)

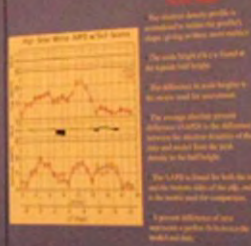
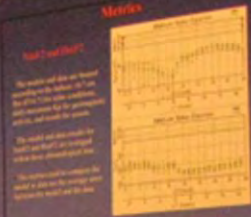


Abstract

The ionosphere is a layer of the atmosphere and one of the upper atmosphere layers. It is the part of the atmosphere that contains the highest density of ionized particles. It is the layer of the atmosphere that is most affected by solar activity and is the layer that is most responsible for the propagation of radio waves. The ionosphere is a complex system and its behavior is not fully understood. This tool is designed to assess the performance of ionospheric models and to provide a quantitative measure of their accuracy. The tool is based on a comparison of model results with ground-based observations and satellite data. The tool is designed to be used by researchers and students alike. It is a powerful tool for the assessment of ionospheric models and for the study of the ionosphere. It is a valuable resource for the study of the ionosphere and for the development of ionospheric models.

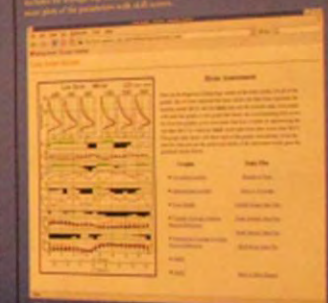
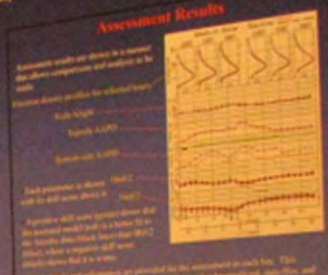
Assessment of Ionospheric Models (AIM)

The AIM tool is designed to assess the performance of ionospheric models and to provide a quantitative measure of their accuracy. The tool is based on a comparison of model results with ground-based observations and satellite data. The tool is designed to be used by researchers and students alike. It is a powerful tool for the assessment of ionospheric models and for the study of the ionosphere. It is a valuable resource for the study of the ionosphere and for the development of ionospheric models.



Model Scores

All scores are based on the model accuracy. The scores are based on the model accuracy. The scores are based on the model accuracy. The scores are based on the model accuracy.



Summary

By using various metrics and AIM scores we are able to provide accurate assessment of ionospheric models. This assessment will be of great benefit to the community. This assessment will be of great benefit to the community. This assessment will be of great benefit to the community.

Acknowledgement

We wish to acknowledge the support of NSF National Space Weather Program. This work was performed under grant AT1801777.

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



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



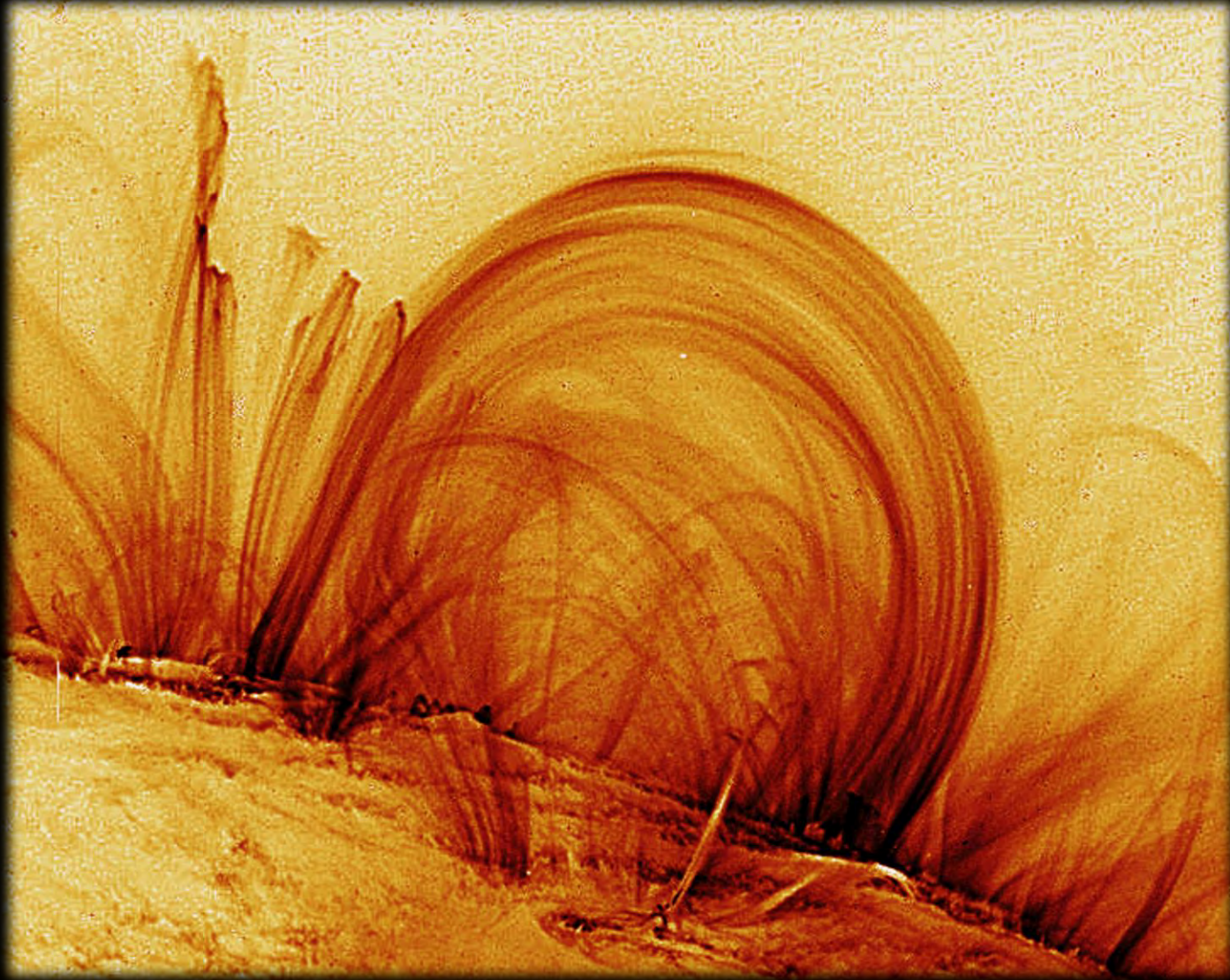
2010 CEDAR

University of Colorado, Boulder, Colorado

Pictures for Anniversary Cakes



TRACE (Transition Region and Coronal Explorer) Coronal Loop



Aurora above the Mesa Lab, Nov. 20, 2003



November 20, 2003
Courtesy of Stan Solomon

Incoherent Scatter Radar (ISR) dish at Sondrestrom





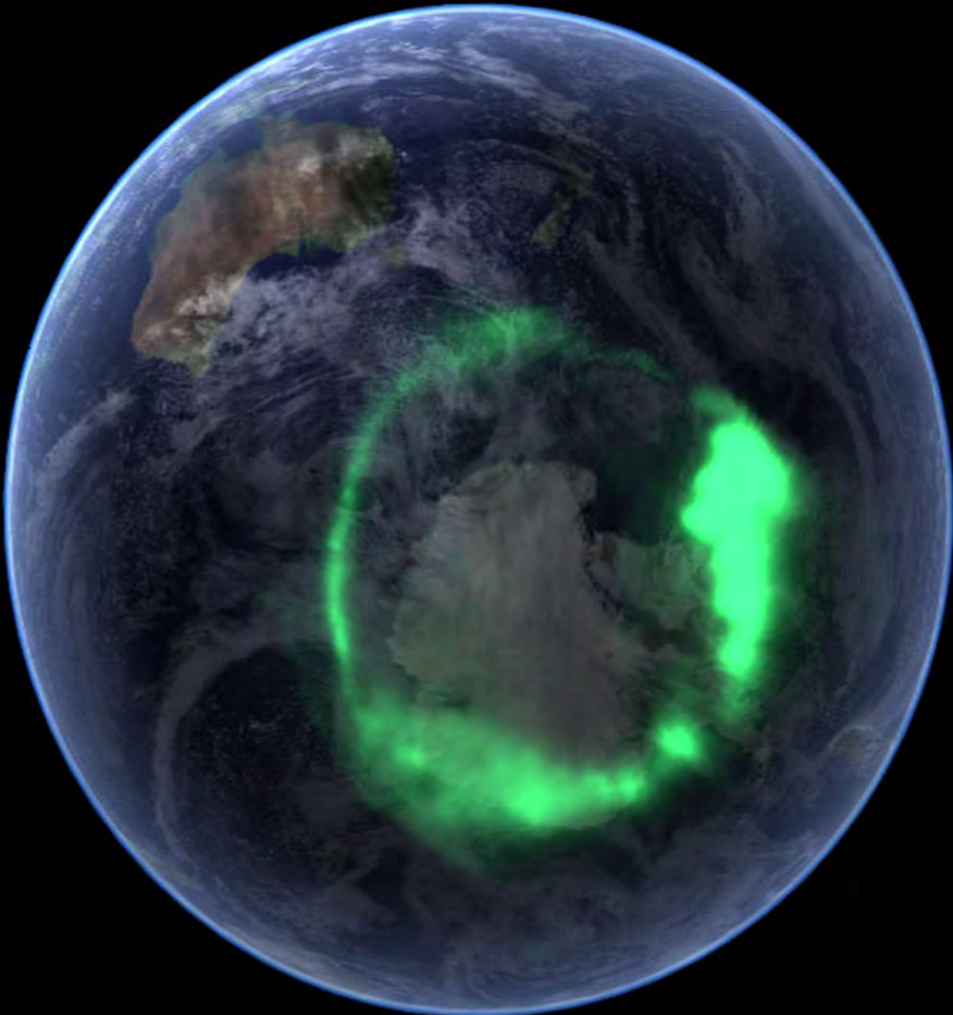
Aurora over Alaska

Courtesy of Joshua Strang, USAF

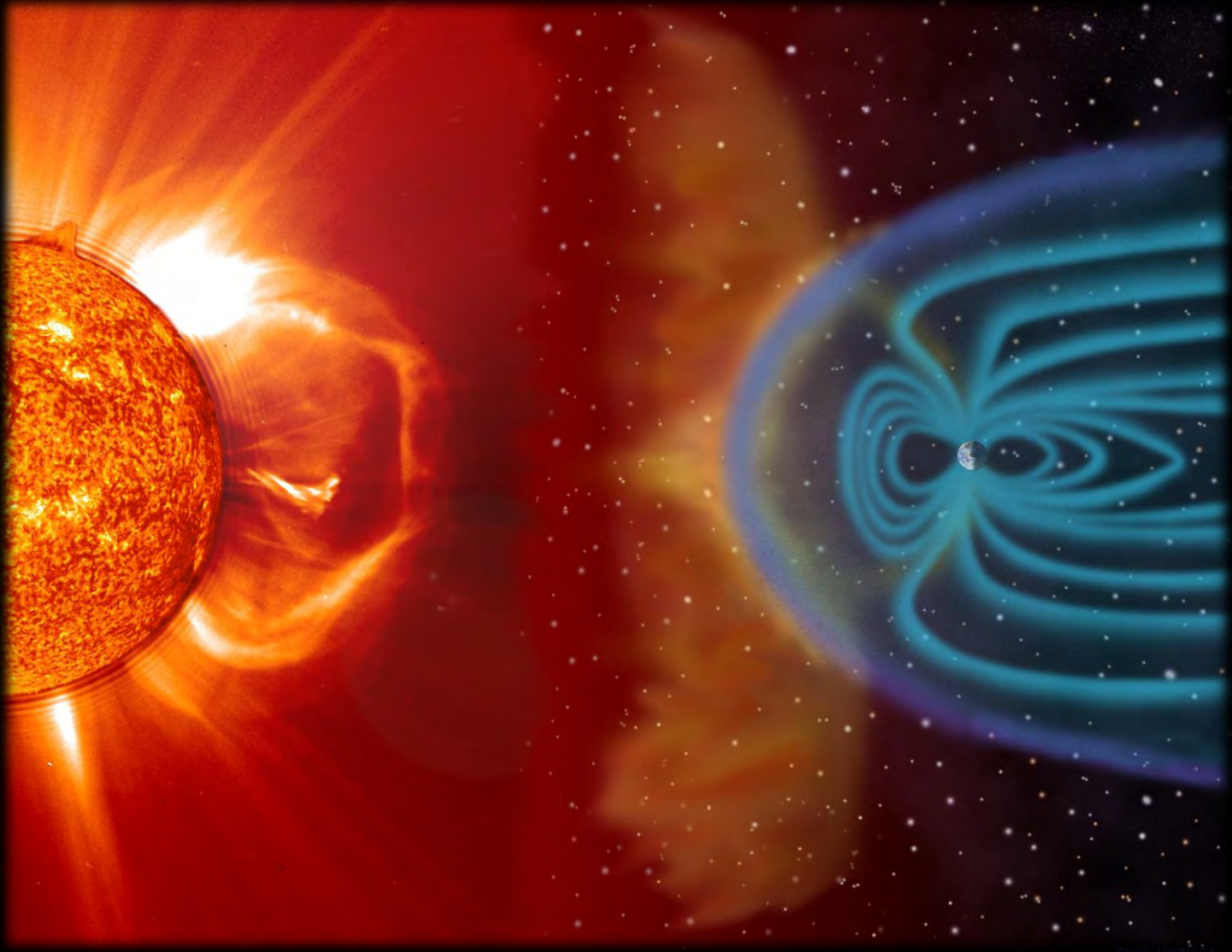
View of the Northern Lights from Space



Aurora Australis from Outer Space



Sun with artist's impression of Earth's magnetosphere





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

