

# AMISR Users Guide

*Elizabeth Kendall and Mary McCready*  
*SRI International*



# Outline

- Introduction
- Time allocation
- AMISR users
- Proposal submission
- Data collection
- Experiment example
- Publications

# Introduction

- PFISR operations began January 2007 in support of rocket launches.
- This is a new system and the “Users Guide” is in flux and constantly improving.
- Feedback appreciated.
- The emphasis is on individualized products. SRI works with each user’s needs



# Time Allocation

Organization	2007					2008										Totals
	Mar	Apr	May	Jun	Jul	Aug	Sep*	Oct*	Nov	Dec	Jan	Feb	Mar	Apr	May	
World Days	118		32	86			29.5			183	233			47		729
IPY - full power					5	60	20	86	37	29	26	58	46	45		412
Multiple Users						8	26		23	26	11	24	24	24	24	190
Aerospace Corporation		16								10						26
Boston University	59								67		35					161
Cornell University					34	119					28					181
EISCAT Scientific Association	13															13
Geophysical Institute of Peru						20					17	9				46
Lancaster University, UK	31															31
Millstone Hill, MIT												44	47	38	42	171
Northwest Res. Associates				24				3								27
Penn State U., Northwest Res. Associates, U. of Wisconsin	24			24			30			24						102
Pennsylvania State University														23		23
Southwest Research Institute												14	23			37
SRI International			12	23	22	22	24	23	23	24	51	23	23	22	22	314
SRI and Others				7		14	14	14	14	24		24	24	24	24	183
University Centre in Svalbard										34	16					50
University of Alaska, Fairbanks		74				4			3	4	4	65	4			158
University of California, Berkeley							15									15
University of California, LA	35	8	49	42	31	23	24	33	43	54	58	84	79	52	69	684
University of Colorado, Boulder			10	24	35	12	12									93
University of Tromsø, Norway													11			11
Utah State University					22	39										61
calibration								15				5		11	11	42
testing	2		2		3	1		7	1	1		1		1	8	27
Totals	282	98	105	230	152	322	195	181	211	413	479	351	281	287	200	3787
low duty cycle IPY	328	425	549	425	362	365	206	275	421	279	209	290	374	405	488	5401

\*maintenance & upgrades: 19 Sept - 11 Oct





# Time Allocation

- PFISR has been operating 83% of the time since it turned on in March 2007
- This includes 3 weeks of down time last autumn for scheduled maintenance
- 34% at full duty cycle (dedicated runs) and 49% at low duty cycle (IPY runs)

# AMISR Users

PFISR experimenters, January 2007 through February 2008

Affiliation	Experimenter
Aerospace Corporation	James Hecht
Boston University	Thomas Butler*, Marco Diaz*, Joshua Semeter
Clemson University	Russell Hedden**, Miguel Larsen, John Meriwether
Cornell University	Asti Bhatt*, Rudolfo Cuevas, David Hysell, Mike Kelley, Gabriel Micchue*, Roger Varney**
Dartmouth College	James LaBelle, Robert Michell*
EISCAT Scientific Association	Anja Strømme, Anthony van Eyken
Geophysical Institute of Peru	Jorge Chau, Freddy Galindo*
Haystack Observatory, MIT	Anthea Coster, Phil Erickson, John Foster, Larisa Goncharenko, Shun-Rong Zhang
Lancaster University, UK	Mike Kosch
Nagoya University, Japan	Takuya Tsugawa
Northwest Research Associates	David Fritts, Diego Janches
Pennsylvania State University	Stan Briczinski, Dorey Livneh*, Alex Mathews **, John Mathews
Southwest Research Institute	Robert Michell, Marilia Samara
SRI International	Hasan Bahcivan, Russell Cosgrove, Rick Doe, Craig Heinselman, Mike Nicolls, Anja Strømme
University Centre in Svalbard, Norway	Dag Lorentzen
University of Alaska, Fairbanks	Bill Bristow, Richard Collins, John Craven, Chris Fallen*, Nick Spartz*, Brent Watkins
University of California, Berkeley	Stephen Mende
University of California, Los Angeles	Vassilis Angelopoulos, Larry Lyons, Al Wong, Shasha
University of Colorado, Boulder	Jonathan Fentzke*, Jonathan Sparks**, Jeffrey Thayer, Ashley Wiren*
University of New Hampshire	Sarah Jones*, Marc Lessard
University of Wisconsin	Stan Briczinski
Utah State University	Jan Sojka, Mike Taylor, Jodie Tvedtnes**
University of Tromsø, Norway	Bjorn Gustavsson

\* denotes graduate student, \*\* denotes undergraduate



# AMISR Student Users

PFISR graduate student experimenters

January 2007 through May 2008

Affiliation	Experimenter
Boston University	Thomas Butler Marco Diaz
Clemson University	Russell Hedden**
Cornell University	Asti Bhatt Rudolfo Cuevas Gabriel Micchue Roger Varney**
Dartmouth College	Robert Michell
Geophysical Institute of Peru	Freddy Galindo
Pennsylvania State University	Dorey Livneh, Alex Mathews**
University of Alaska, Fairbanks	Chris Fallen Nick Spartz
University of California, Los Angeles	Shasha Zou
University of Colorado, Boulder	Jonathan Fentzke Jonathan Sparks**
University of New Hampshire	Ashley Wiren
Utah State University	Sarah Jones Jodie Tvedtnes**

\*\* denotes undergraduate student



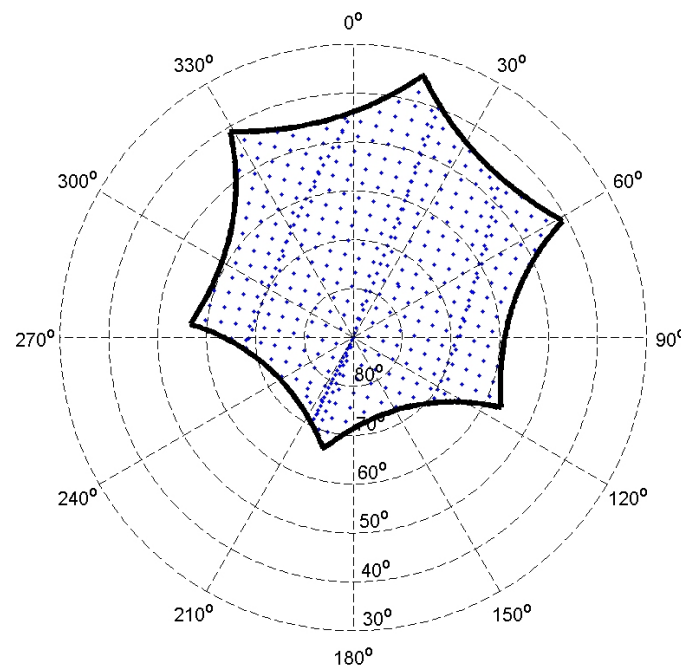
# Proposal Submission

- Email submitted to Craig Heinselman and/or Mary McCready
- Email should include: scientific goal, dates/times requested, geophysical conditions needed, radar parameters needed (if known), special data collection desired, collaboration with other instruments/satellites
- Anyone can submit proposal
- Proposals are approved by the AMISR Project Office.
- Iterative approach to achieve optimal experiment for each scientist
- Schedule is finalized before the first of the month
- Number of operating hours is not known but there are many solutions to ensure time for everyone (e.g. lower duty cycle, experiment sharing)



# Proposal Submission

- Several radar parameters must be specified in order to develop a new experiment mode: look angle, pulse length, pulse coding, etc
- This figure shows the current look positions available. The more positions chosen, the longer the integration time that is required.
- Modes should be developed in close coordination with SRI staff in order to optimize AMISR performance and produce quality data results.



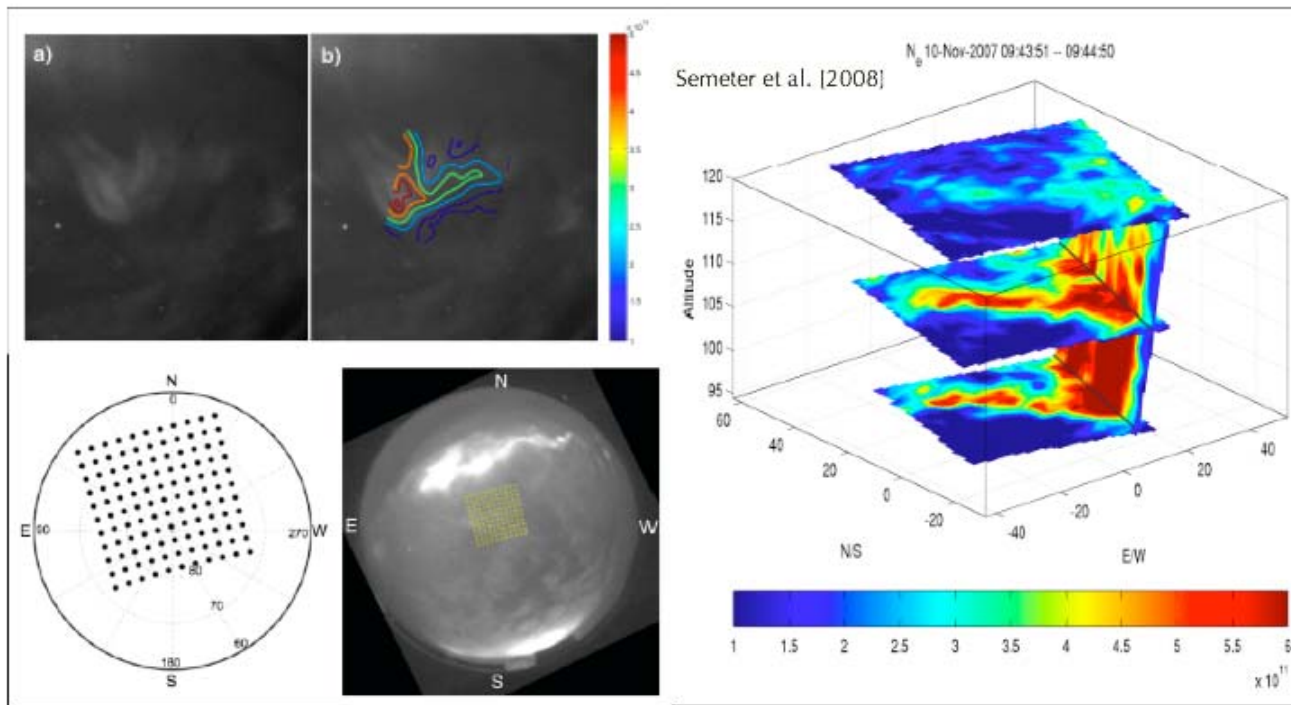
# Data Collection

- Data is integrated at Poker Flat and sent to SRI over the internet where it is then processed and delivered to the user in HDF5 format (this can happen within days).
- Raw voltages available only if requested ahead of time and if the user provides a hard disk for data storage
- SRI will assist in data processing to whatever extent desired by the user
- Anyone can access PFISR derived plasma parameters in the Madrigal database (next talk)



# Experiment Example

- Auroral observations coordinated between optics and ISR
- AMISR mode selected to optimize E-region performance within the field of view of the camera



- Due to auroral stability, the auroral structure was “imaged” by AMISR and electron density features were aligned with the camera image in post-processing

# AMISR Publications

- Many publications and presentations from PFISR data
- At least 11 articles have been accepted to journals and another 16 have been submitted
- 14 articles were submitted to a special JASTP volume on PFISR results
- At least 2 PhD theses have been completed using PFISR data and many more are in progress

# AMISR Web Site: [www.amisr.com](http://www.amisr.com)

**AMISR** Advanced Modular Incoherent Scatter Radar

### PFISR OPERATIONS

Requests for operations with **Poker Flat AMISR (PFISR)** should be emailed to PI [craig.heinselman@sri.com](mailto:craig.heinselman@sri.com) (CC [mary.mccready@sri.com](mailto:mary.mccready@sri.com)) as early as possible. Include experiment purpose, scientific objectives, relevant operating details (dates, hours, optical or geophysical conditions, etc.), and collaborators. If more time is requested than the operating budget allows, these details will help us combine operating modes and share windows to satisfy as many users as possible. A web-based request process is planned for the future.

[DOWNLOAD PFISR OPERATIONS SCHEDULE 2007-2008](#) (Actual operations may vary from scheduled and will be posted as available.)

### AMISR NEWS

**JUNE 2008**  
**2ND AMISR Science Planning Workshop**  
[amisr.com/meetings/2008](http://amisr.com/meetings/2008)

**JULY 2008**  
**PFISR Student Workshop**  
[www.haystack.mif.edu/edu/workshop](http://www.haystack.mif.edu/edu/workshop)

AMISR is a modular, mobile radar facility that will be used by scientists and students from around the world to conduct studies of the upper atmosphere and to observe space weather events.

**SRI International**, under a grant from the [National Science Foundation](#), is leading a collaborative effort in the development of AMISR, whose novel modular configuration is designed to allow relative ease of relocation for studying upper atmospheric activity around the globe. Remote operation and electronic beam steering will allow researchers operate and position the radar beam instantaneously to accurately measure rapidly changing space weather events.

When completed, AMISR will consist of three separate radar faces, with each face comprised of 128 building block-like panels over a 30 x 30 meter roughly square surface. AMISR is being constructed in two stages: the first face in Poker Flat, Alaska, has been completed and is already being used for scientific investigations. The remaining two faces are under construction in Resolute Bay, Nunavut, Canada. Future AMISR locations will be

**FEB 2008**  
PFISR completes year-long International Polar Year (IPY) run. When not running for other experiments, PFISR has operated almost continuously since 01 March 2007 in a low-duty cycle mode. The resulting large dataset, combined with that from the year-long full-power [EISCAT Svalbard radar](#) and the biweekly 30 hr runs of the [EISCAT Tromsø](#), [Sondrestrom](#) and [Millstone Hill](#) radars, provides an unprecedented volume of high-latitude measurements during the IPY.

**DEC 2007**  
Two special sessions on PFISR initial results at the Fall AGU, including 7 talks and 11 posters with PFISR data.

**OCT 2007**  
Remaining panels are placed on PFISR, bringing it to full population. Still awaiting word from USAF on transmission testing, so transmitting with only 96 panels while receiving on all 128.

**JUNE 2007**  
CEDAR Workshop in Santa Fe has special PFISR session, "Poker Flat AMISR: The first six months," as well as "Poker Flat 2007 Winter Campaign" session.

**JAN 2007**  
Poker Flat AMISR operated 105 hours over 18 nights in support of JOULE II and ROPA rockets. At night, a TMA trail released by 1 of 4 JOULE II rockets in the early morning of 19 January. Real-time AMISR data show the strong auroral precipitation and large eastward ion flow that met launch criteria. [MORE](#)

**OCT 2007**— PFISR, all 128 panels in place.

**JAN 2007**—TMA trail of JOULE II rocket at Poker Flat, 19 January.