Designing experiments at PFISR

Craig Heinselman and Anja Strømme

Today's exercise

We have 7 timeslots 1.5 hours each at the PFISR in Alaska.

Each group should :

- Discuss and decide on a science topic you want to study with PFISR.
- Decide on the what mode to run to accomplish your science goals.
- Write a request for radar time and send it to Craig.
- Get the request approved by Craig.
- Then Craig will submit the mode to the PFISR system, and wait for it to run...

For the rest of the week:

- Lectures before lunch
- Group work after lunch
  - Make sure to include everyone in your group
  - Make sure everyone has assigned tasks
- Group presentations Saturday morning
  - Everyone on every group have to participate!
  - One presentation, several presenters
  - All presentation need to be handed in before the first group starts

Time slots

POKER FLAT ISR OPERATIONS SCHEDULE FOR AUGUST 2012

	LDT	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16
	UT	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
We	1-Aug	ISR school																							
Th	2-Aug									PARS/lidar															
Fr	3-Aug							Themis												PL Cal					
Sa	4-Aug																								
Su	5-Aug																								
Mo	6-Aug									PARS/lidar															
Tu	7-Aug																								
We	8-Aug							Themis																	
Th	9-Aug									PARS/lidar															
Fr	10-Aug																								
Sa	11-Aug																								
Su	12-Aug																								
Mo	13-Aug																								
Tu	14-Aug	MS Winds / PMSE																							
We	15-Aug																								
Th	16-Aug							Themis																	
Fr	17-Aug																								
Sa	18-Aug																								
Su	19-Aug																								
Mo	20-Aug																			PL Cal					
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Mo	27-Aug																								
Tu	28-Aug																								
We	29-Aug																								
Th	30-Aug																								
Fr	31-Aug																								
	UT	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24
	ADT	16-17	17-18	18-19	19-20	20-21	21-22	22-23	23-24	00-01	01-02	02-03	03-04	04-05	05-06	06-07	07-08	08-09	09-10	10-11	11-12	12-13	13-14	14-15	15-16

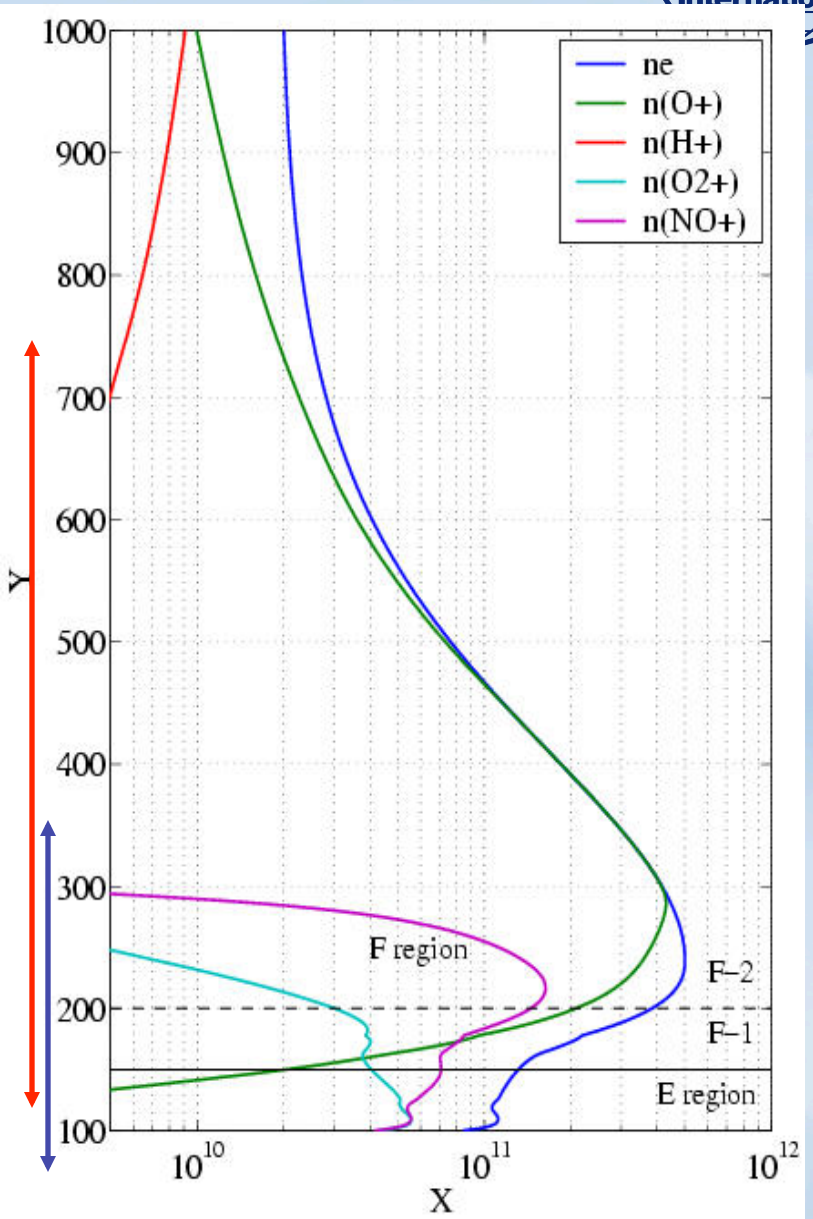
Experiment specifics:

Two different pulse schemes will be used:

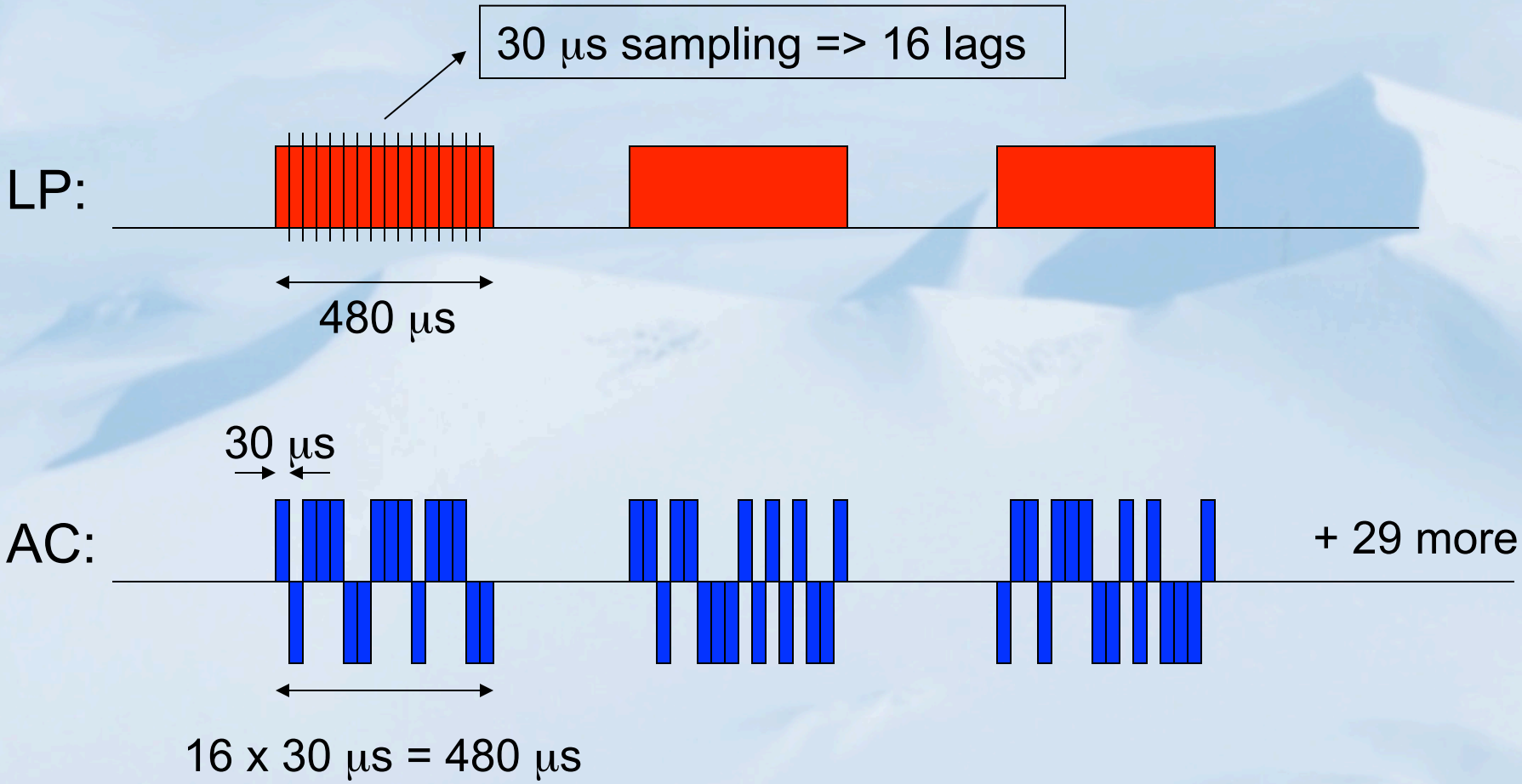
Long Pulses - LP-(480μs) resulting in 37 km resolution data between ~100-700 km

Alternating Codes - AC - (16 baud 30μs - 32 pulses) resulting in 4.5 km resolution between ~80-350 km

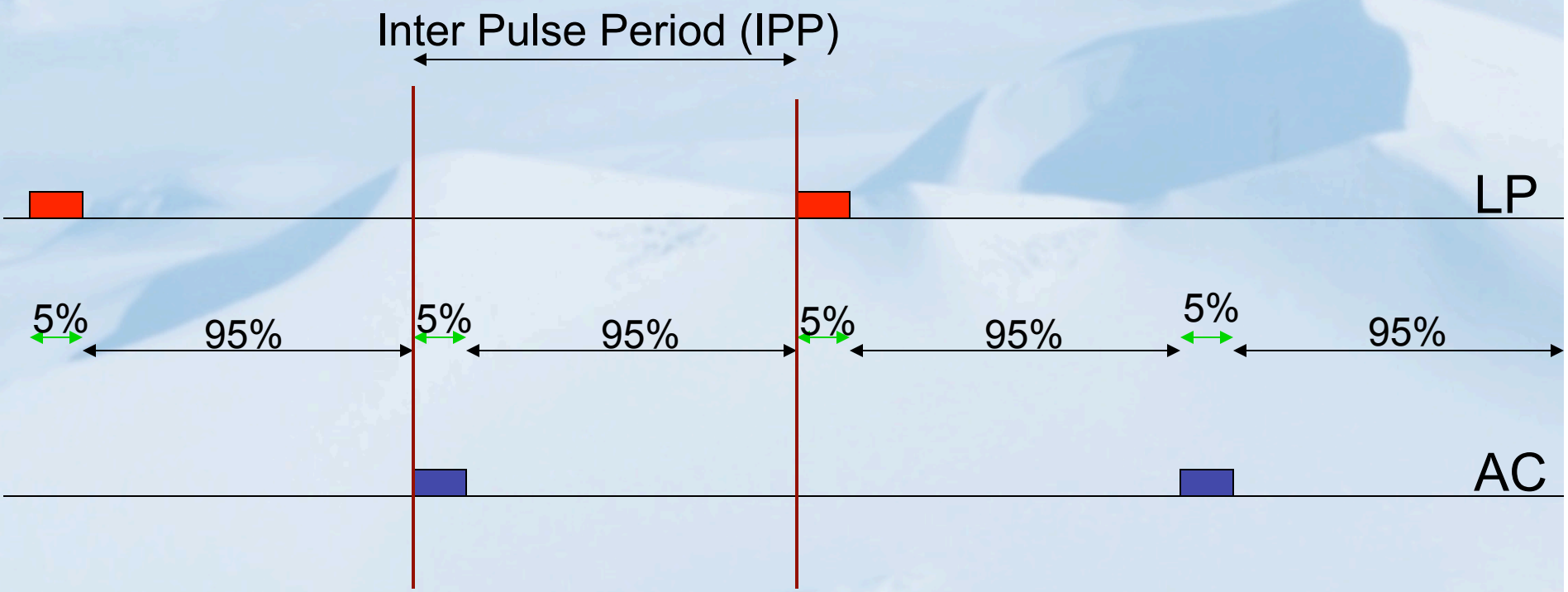
About 5% duty cycle



Cartoon of LP and AC



What 5% duty cycle means…



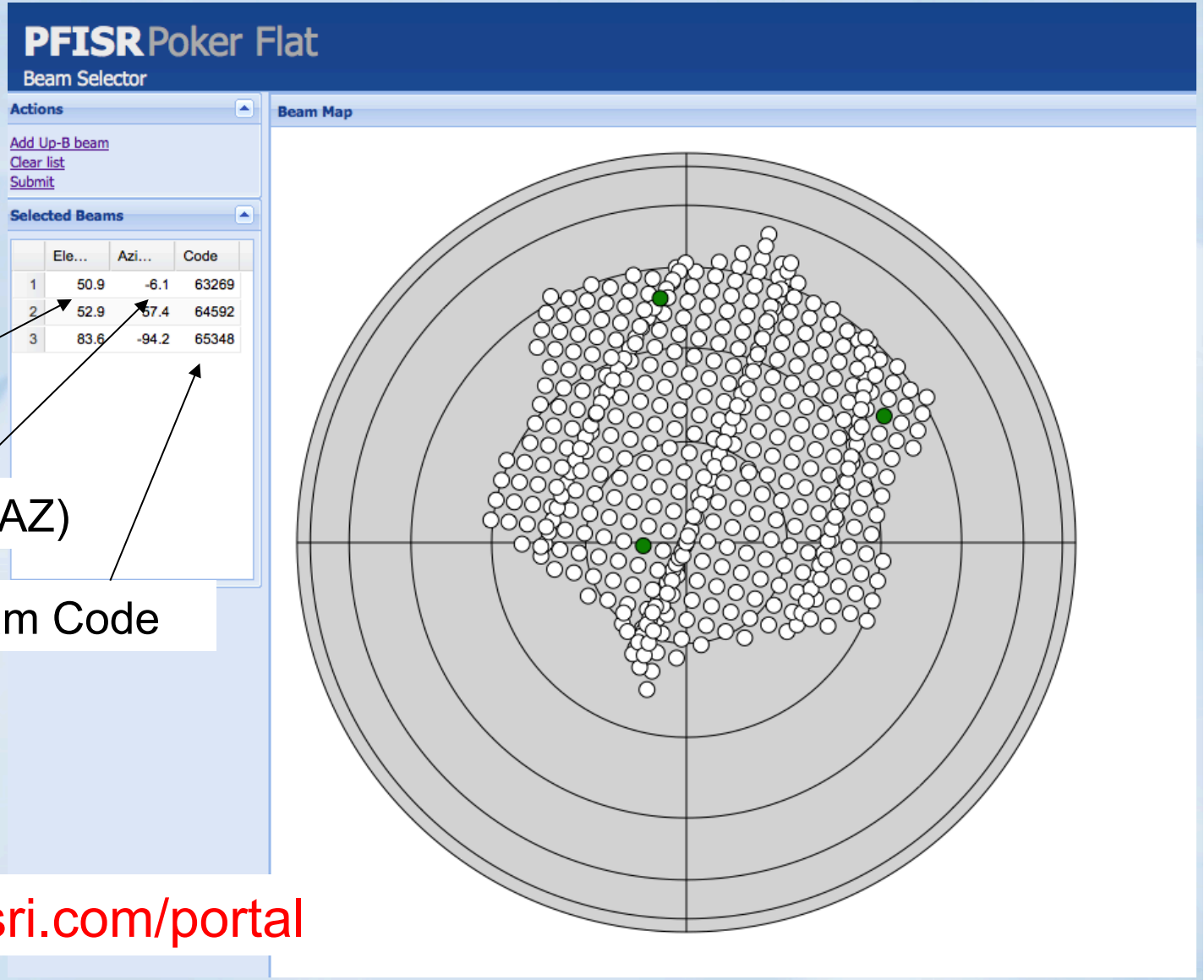
In the 95% of “non-transmitting” we do sample the signal, noise and calibration.

What can you actually “design” today?

- Number of beam positions
- Location of beam positions (out of ~475 possible)
- Timeslot (at least suggest timeslot)

The most important thing for you is identify an interesting science topic AND find the experiment setup most suitable to study it!

Available beam positions



Elevation (El)

Azimuth (AZ)

Beam Code

http:amisr.sri.com/portal

Special request for you

We would appreciate it if you submit your positions in the following format:

If you want positions

Pos1 = [az1, el1]

Pos2 = [az2, el2]

Posn = [azn, eln]

In the following form:

Az =[az1, az2, azn];

El = [el1, el2, eln];

Examples of previous PFISR experiments

Example….

Dear Craig and Mary,

I just got off the phone with Person1, and he seemed to think the best way for me to initiate an experiment with the PFISR is with a direct request. So here goes ...

We request PFISR time for observations to be made in concert with our coherent scatter radar in Anchorage in support of our ongoing CEDAR project. The local time of the observations should be from 2100-0400. The period of the experiments should be for 7-10 days, preferably in January before the start of classes here (Jan 21). Failing that, we would request observations during the moon-down period in February.

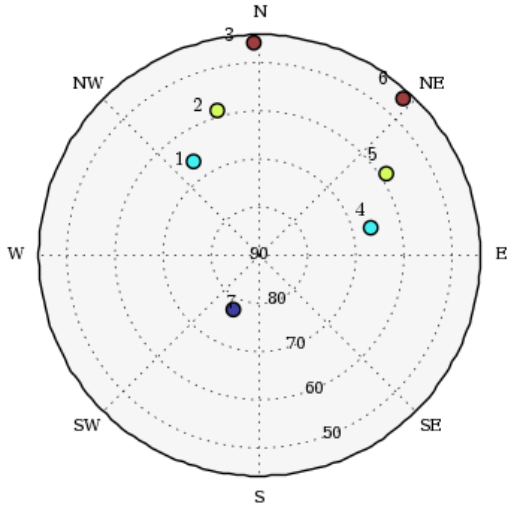
The mode I'm requesting is one being worked out by Mike Nicolls involving combined coded double pulses for high-res F region drifts interleaved with combined long and alternating coded pulses for E region temperatures. It is sufficient to store lagged products with a time resolution of a few seconds. The scientific objective here is to compare coherent scatter spectra with incoherent scatter-derived parameters (E-fields, drifts) in a common volume to better understand Farley Buneman waves and turbulence.

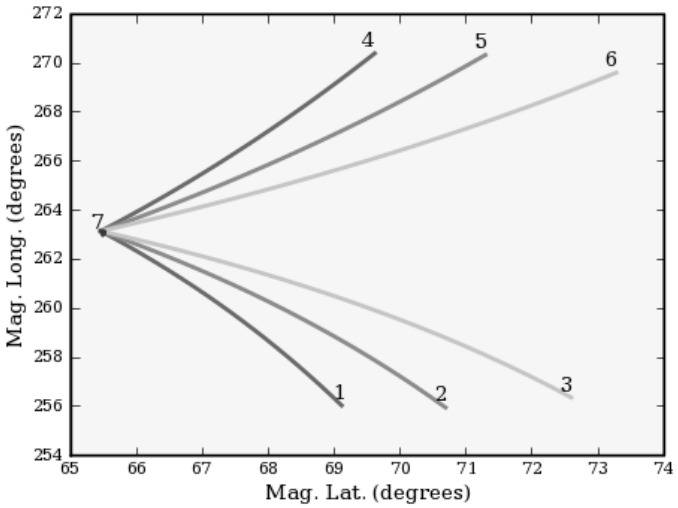
Rick and Russel would also like to run an experiment with support from the coherent scatter radar. Rather than interleaving their PFISR pulses with ours, which would cost us both in terms of statistics, or alternating days, which could well cause one of us to come home empty handed, I propose alternating their PFISR mode with ours on a regular basis - say in half-hour intervals. This way, we could both get what we want from a single substorm event, which is all we're really likely to get in a week of observations. The request isn't intended to make your life more difficult but rather to accommodate everyone's needs in a compact time interval.

Please let me know if you require more information. I hope what we're requesting will be possible.

Thanks for your consideration,
Person2

E-fields with AMISR

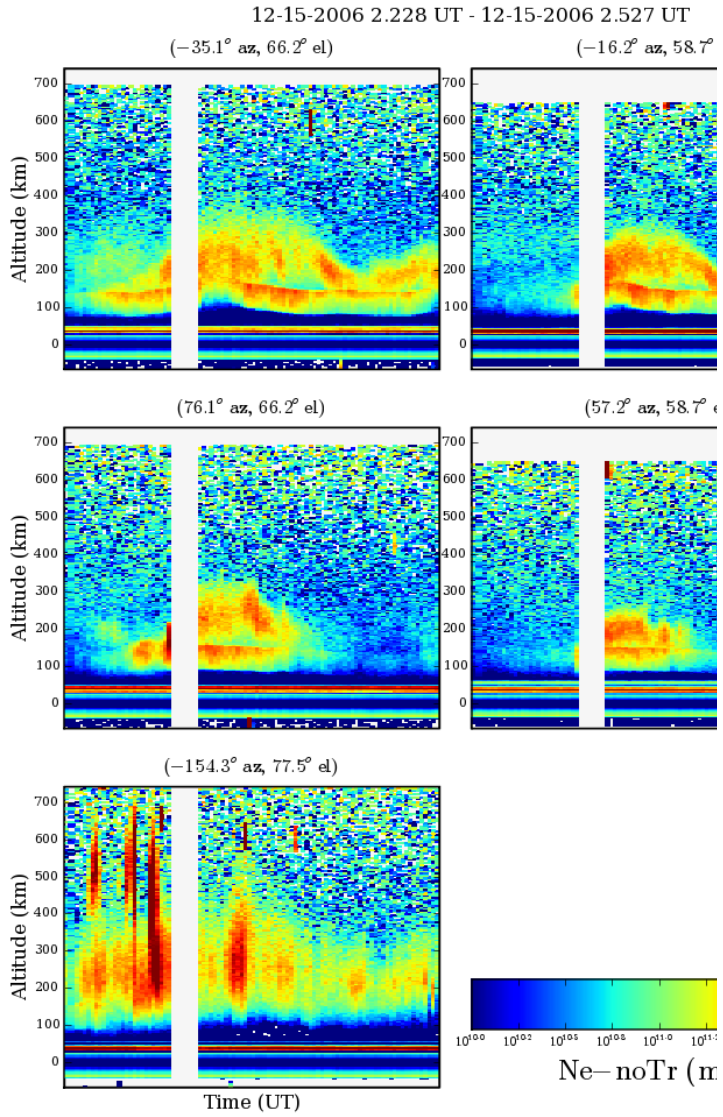


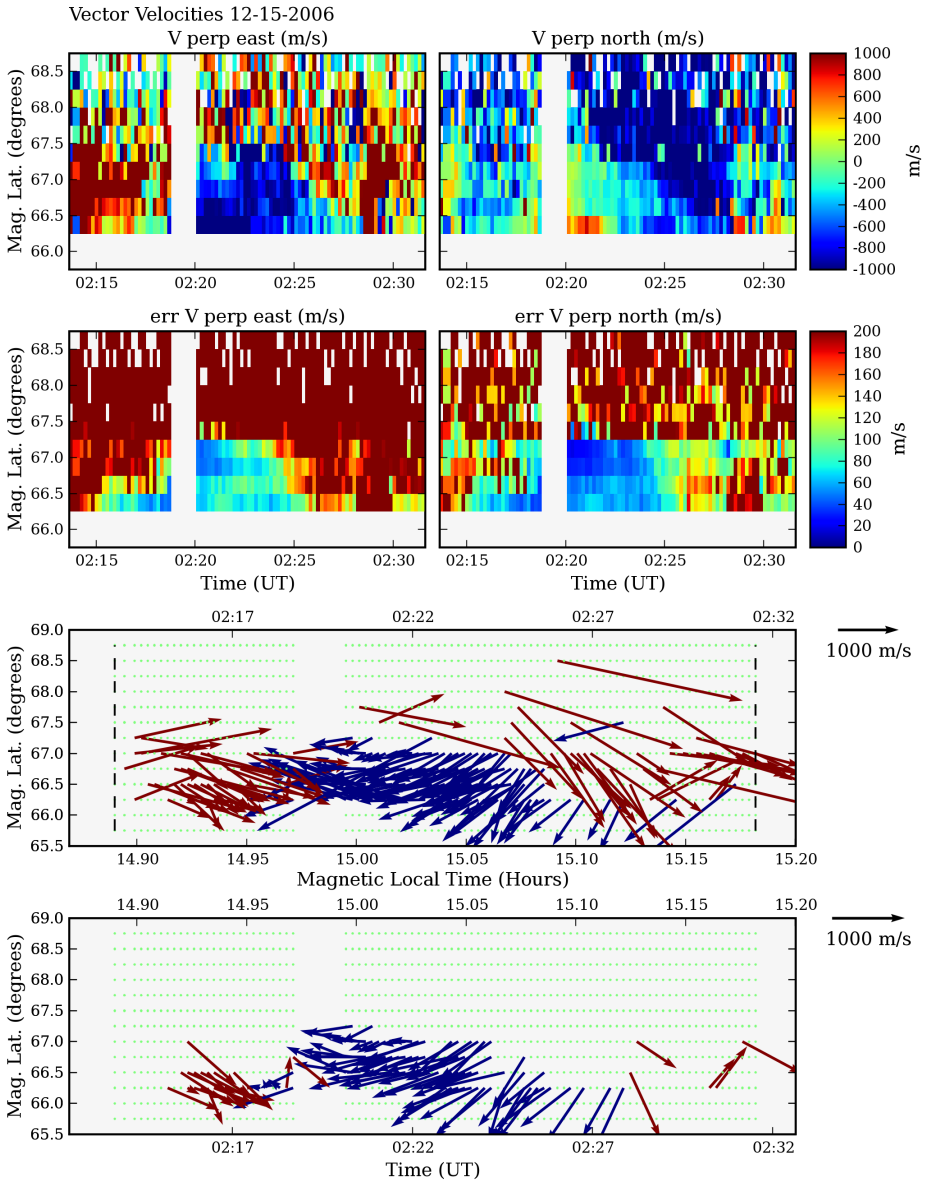


7 positions (one up B)

Pre-integration ~11 s

Standard Parameters and resolved velocities



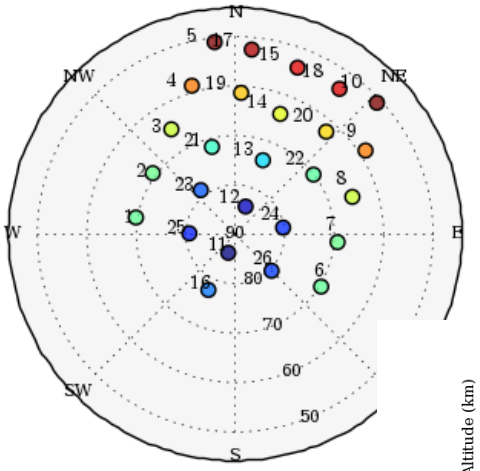


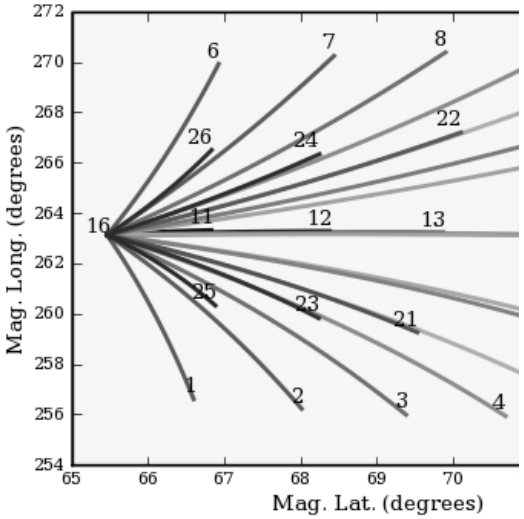
Imaging - PMSE?

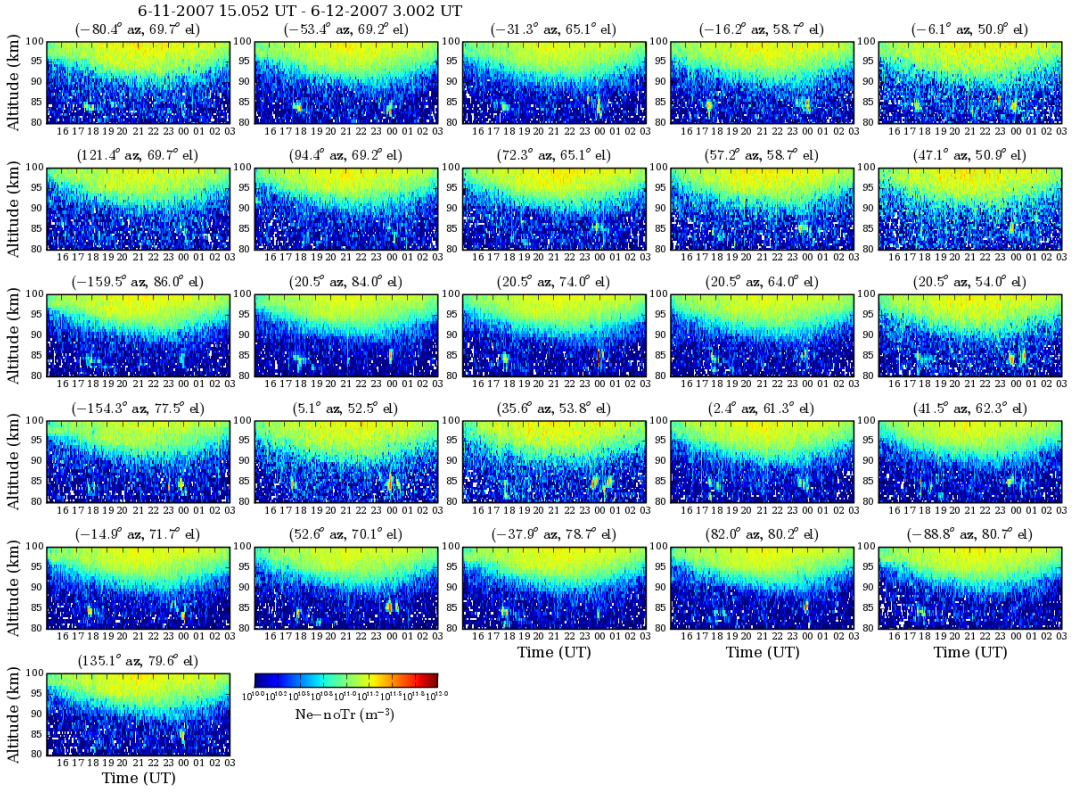
ospheric Summer Echoes)

26 positions (one up B)

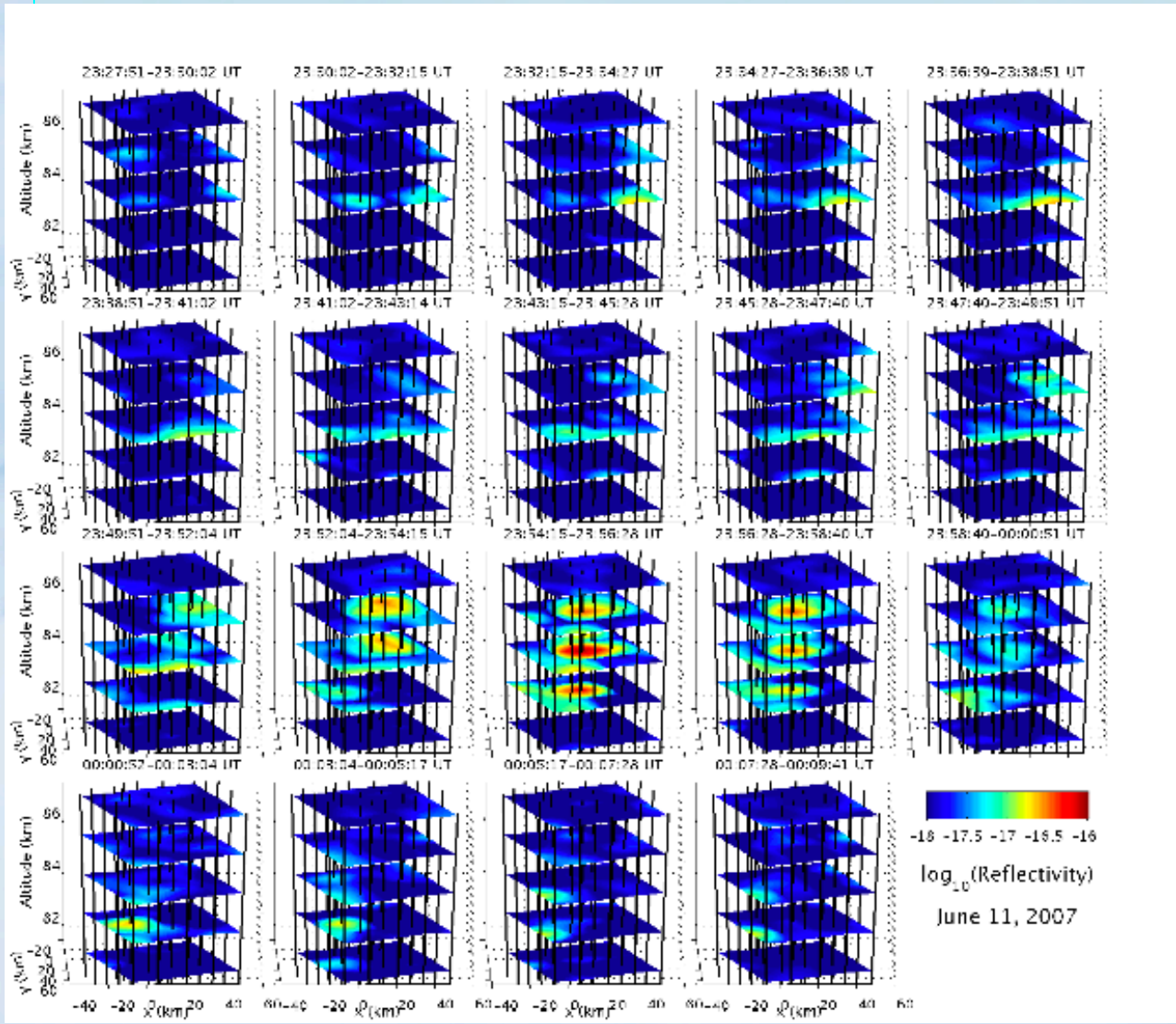
Pre-integration ~11 s





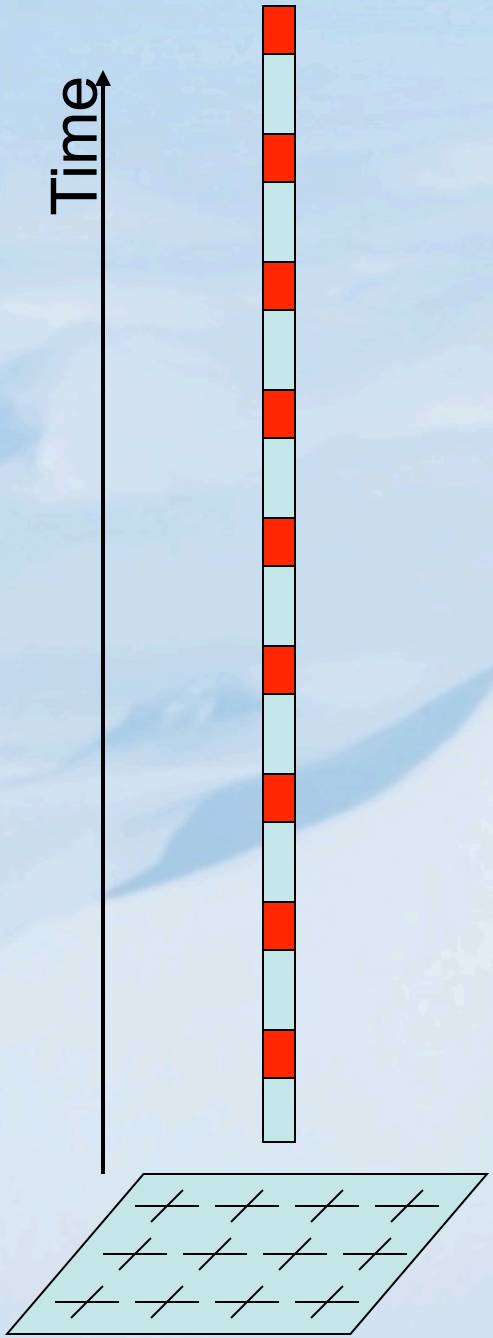


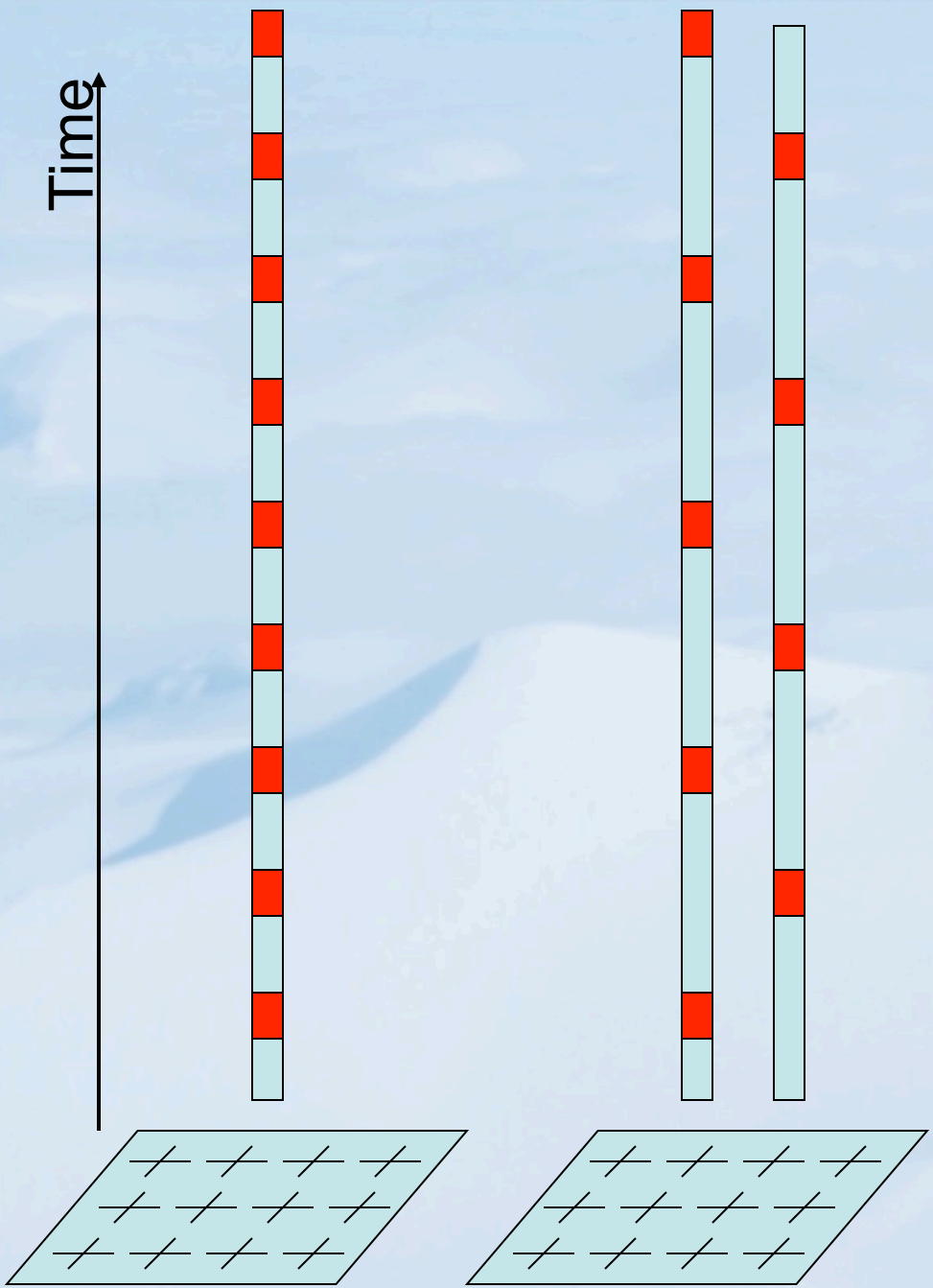
Imaging PMSE over Poker Flat

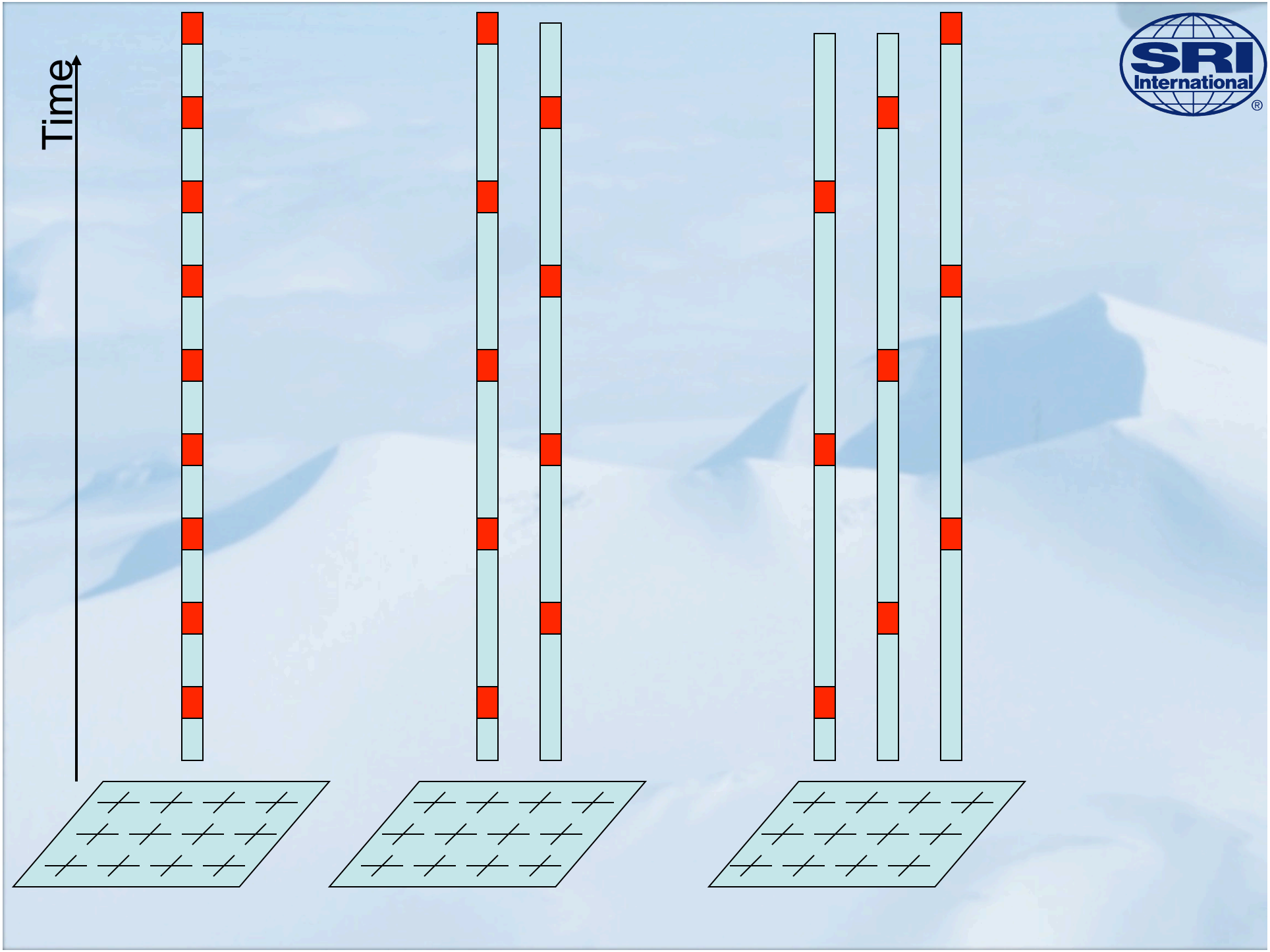


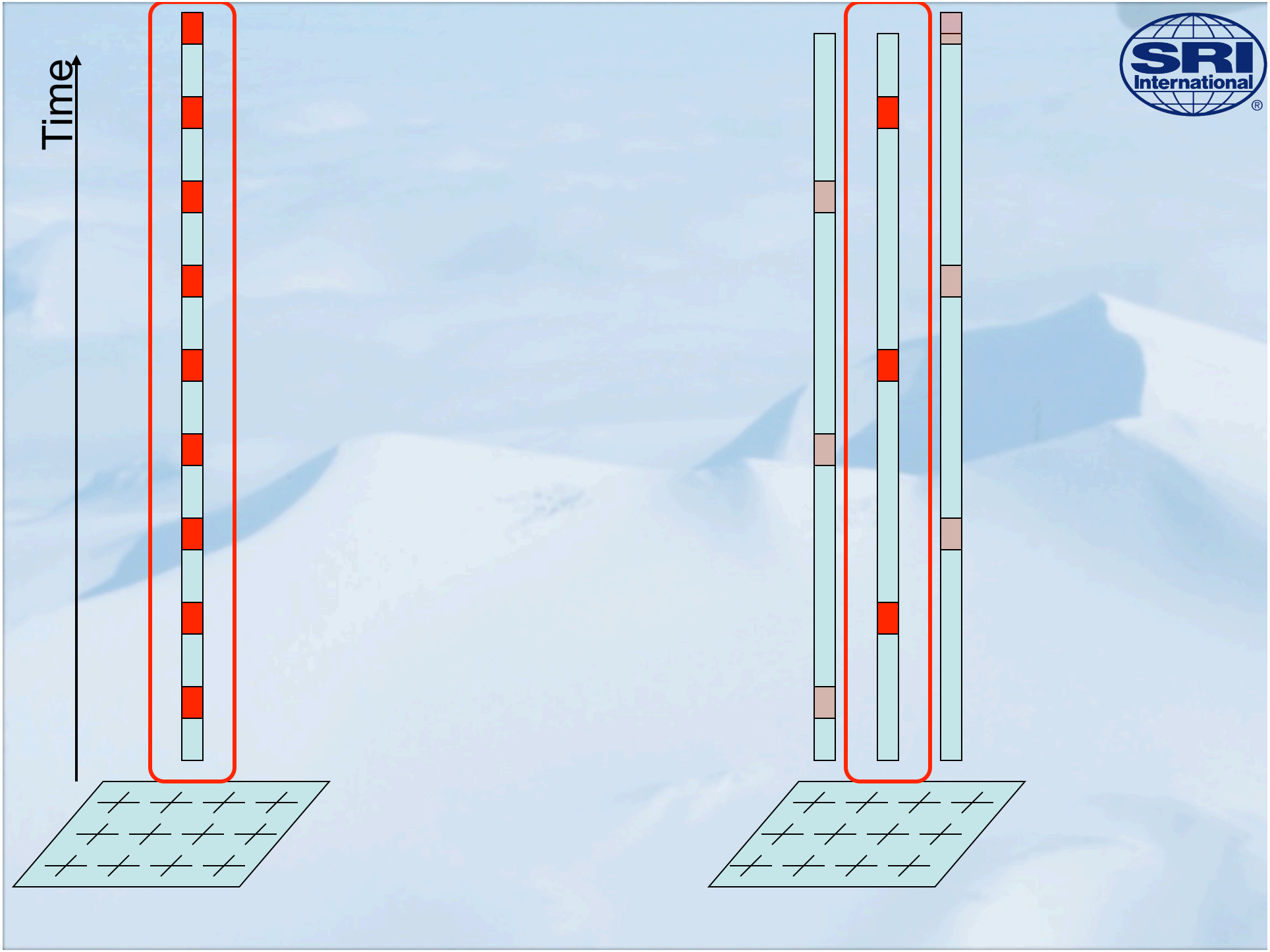
Word of warning!

As all other things in life - designing PFISR experiments is a game of tradeoffs….

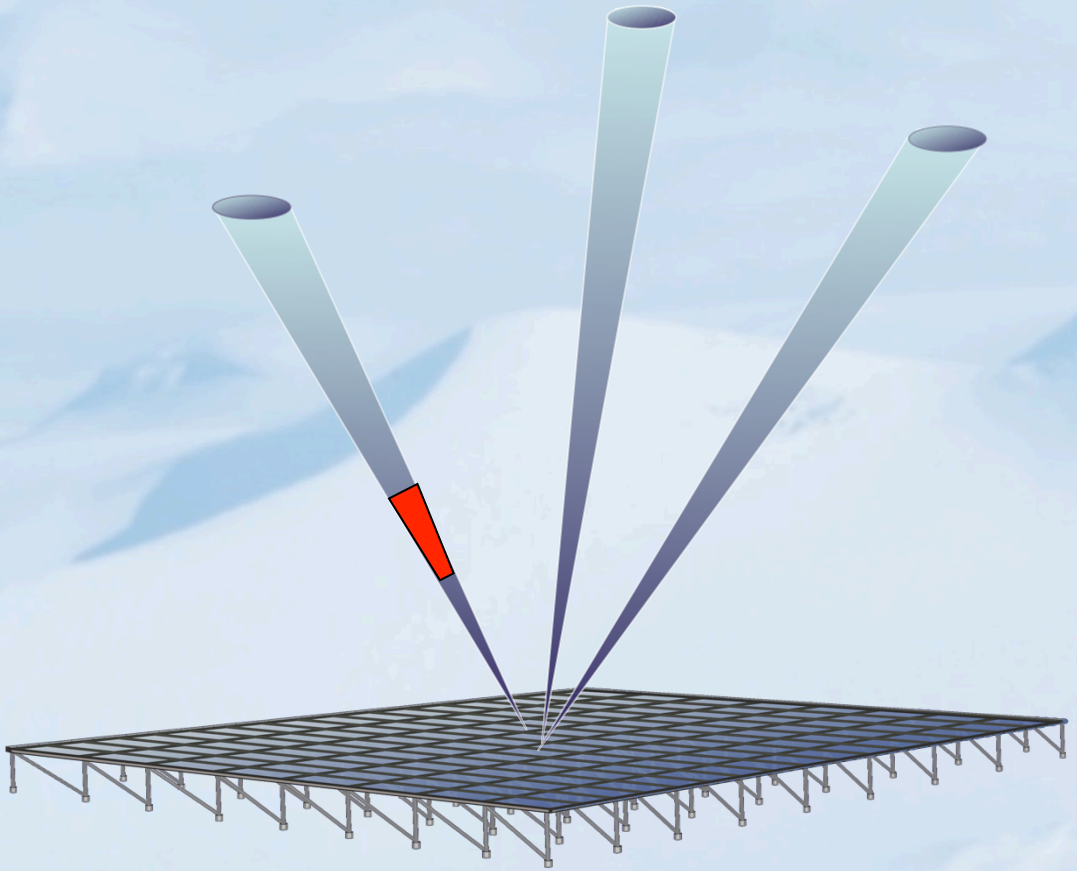

Time


Time

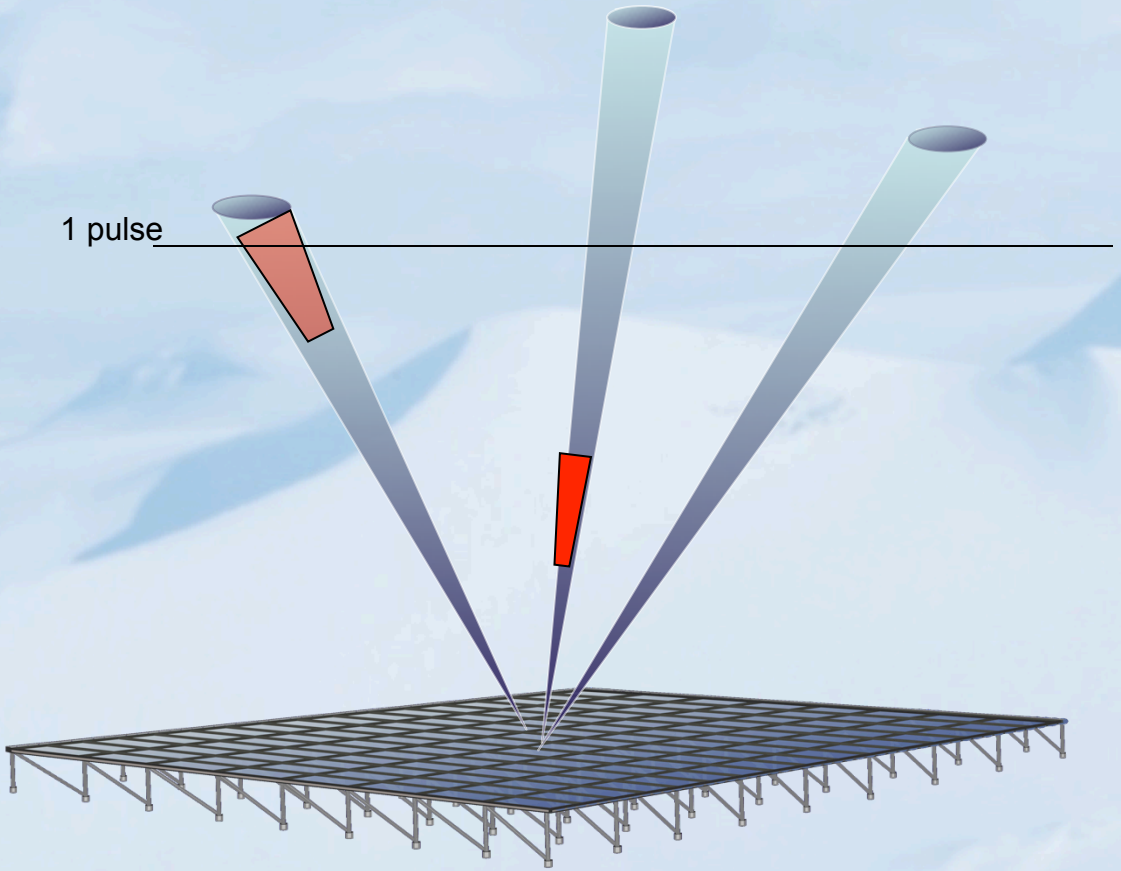

Time


Time

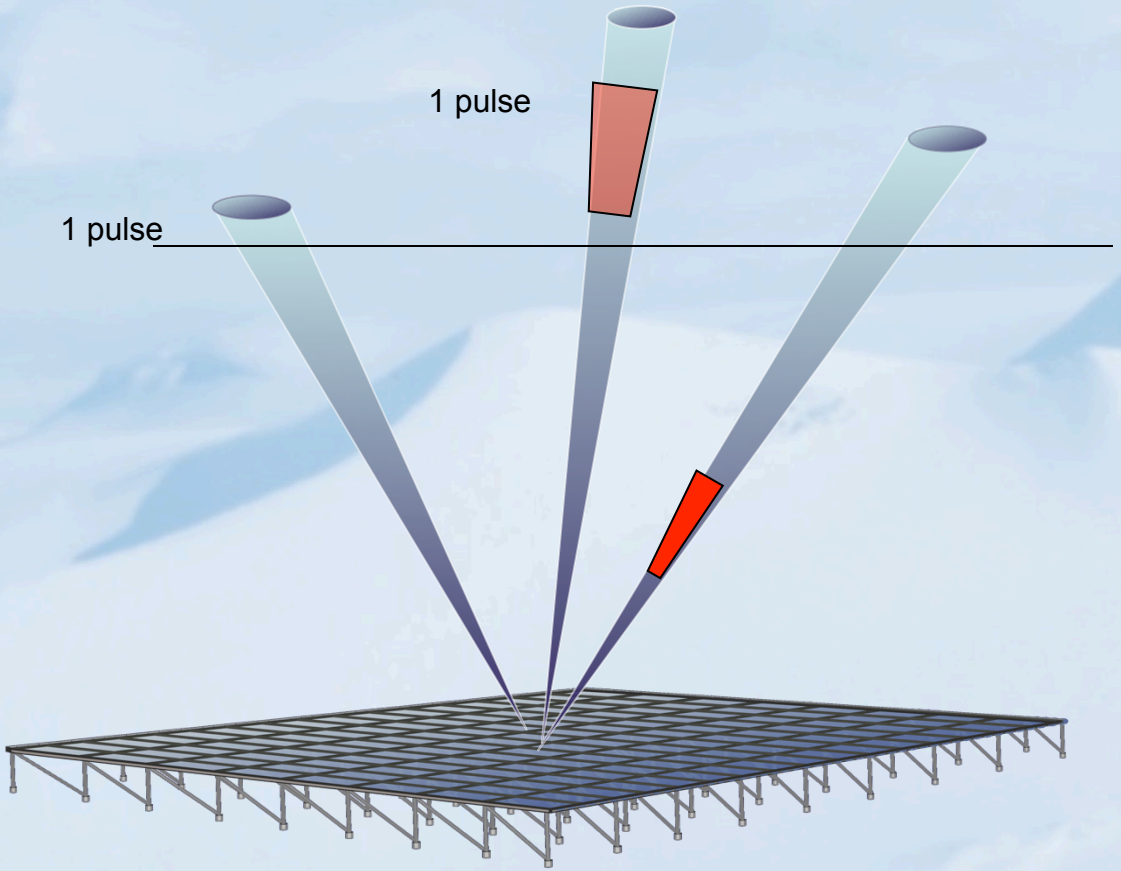
Imaging with AMISR



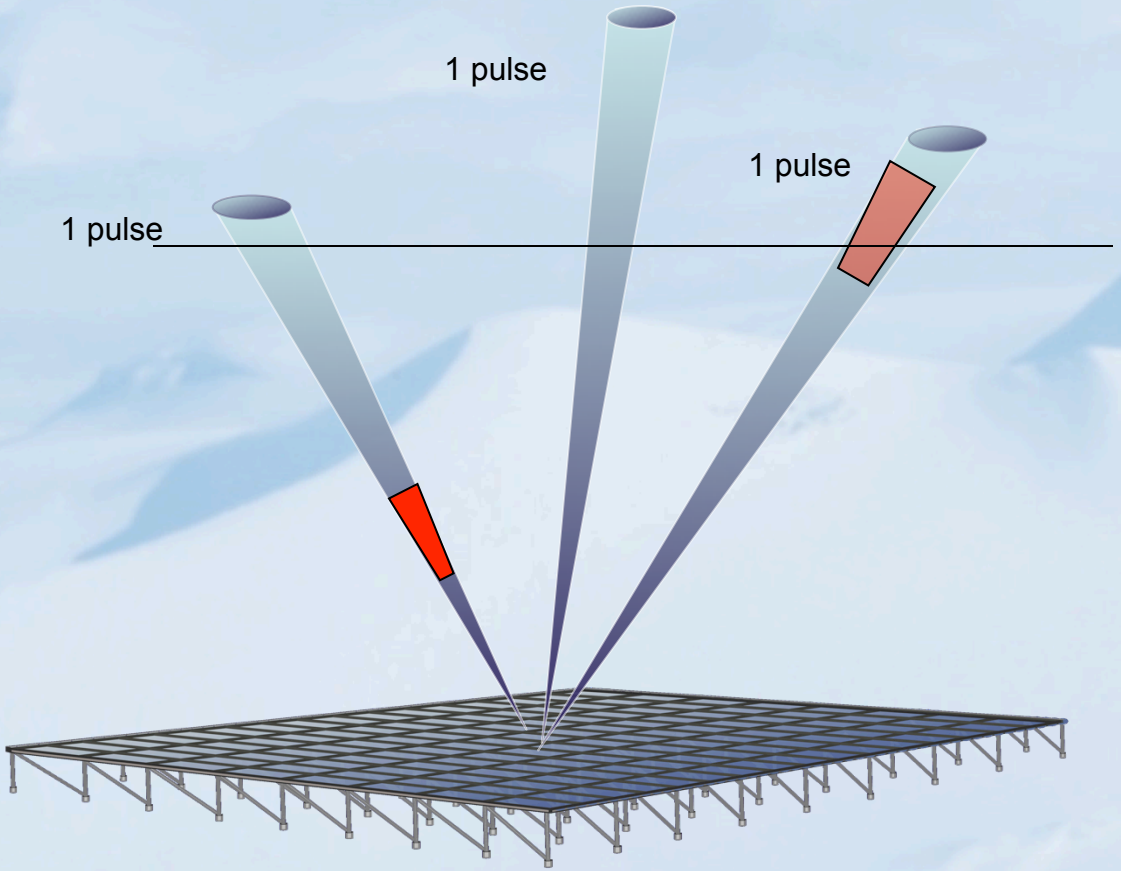
Imaging with AMISR



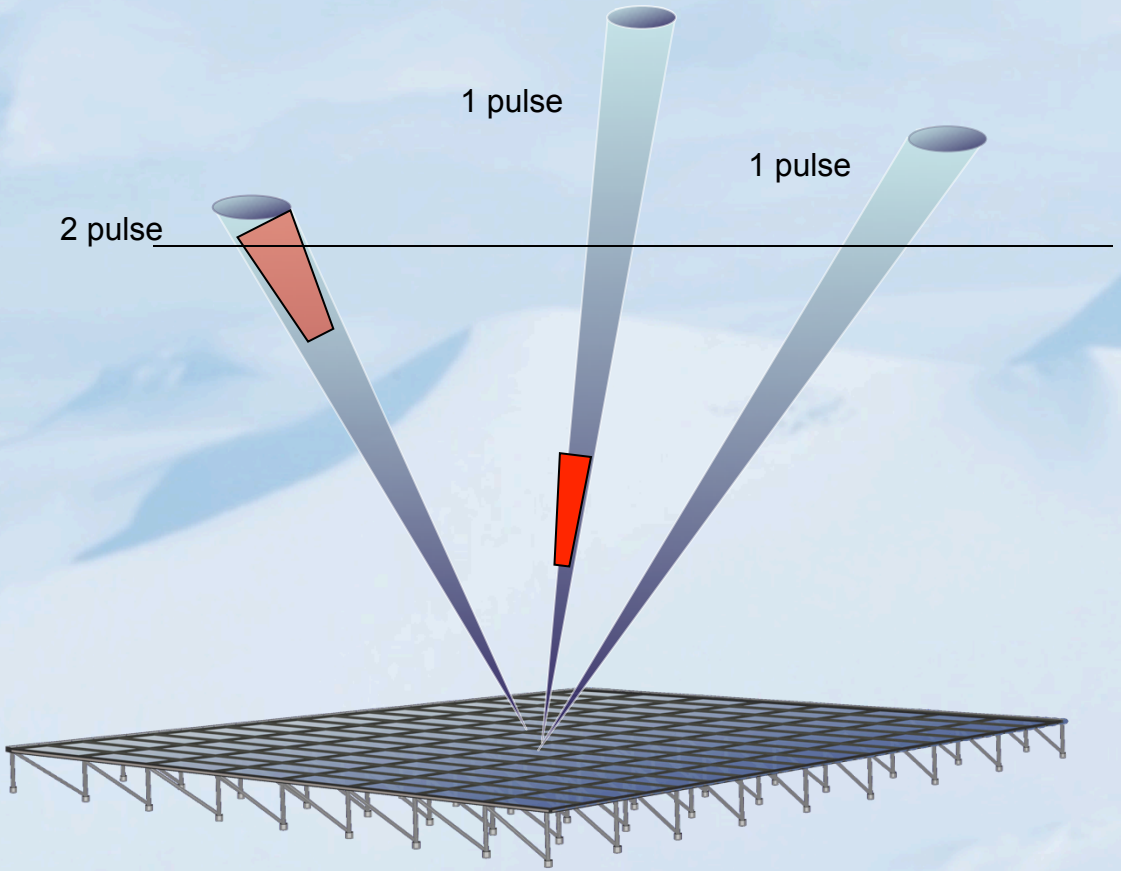
Imaging with AMISR



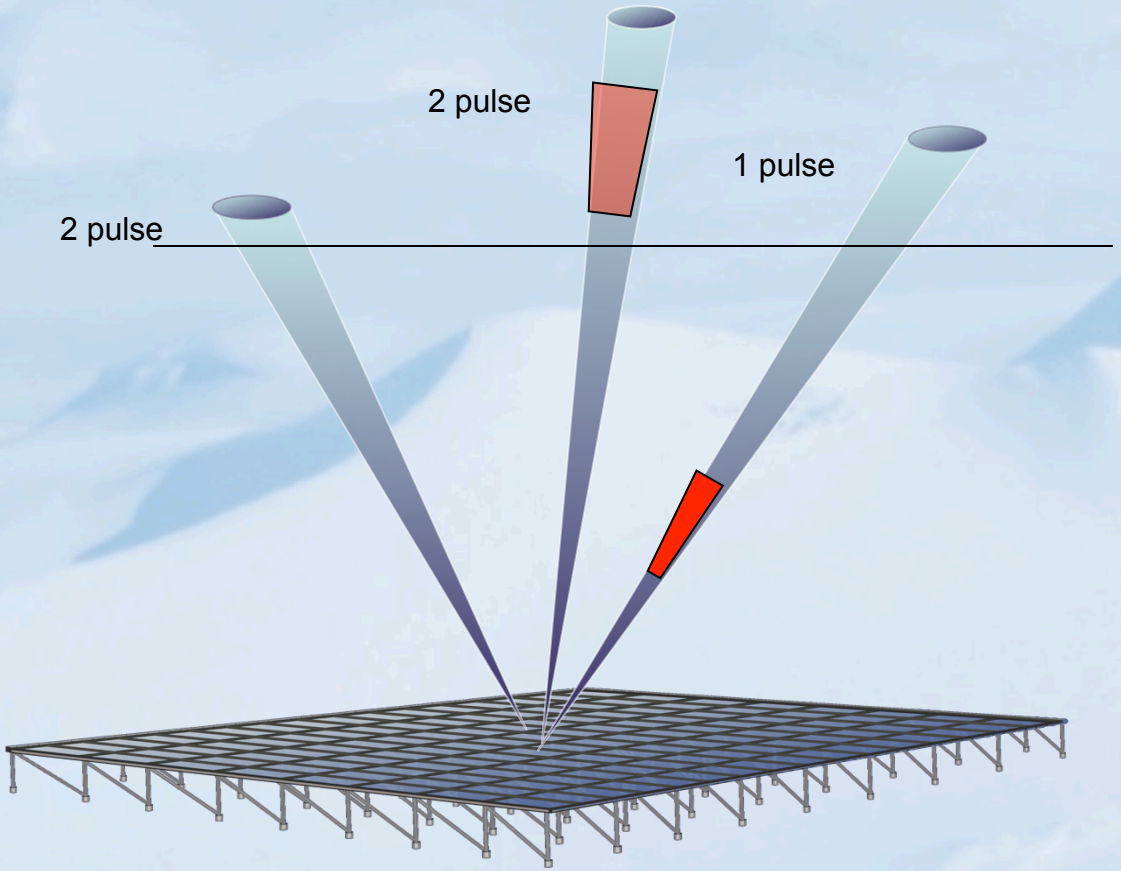
Imaging with AMISR



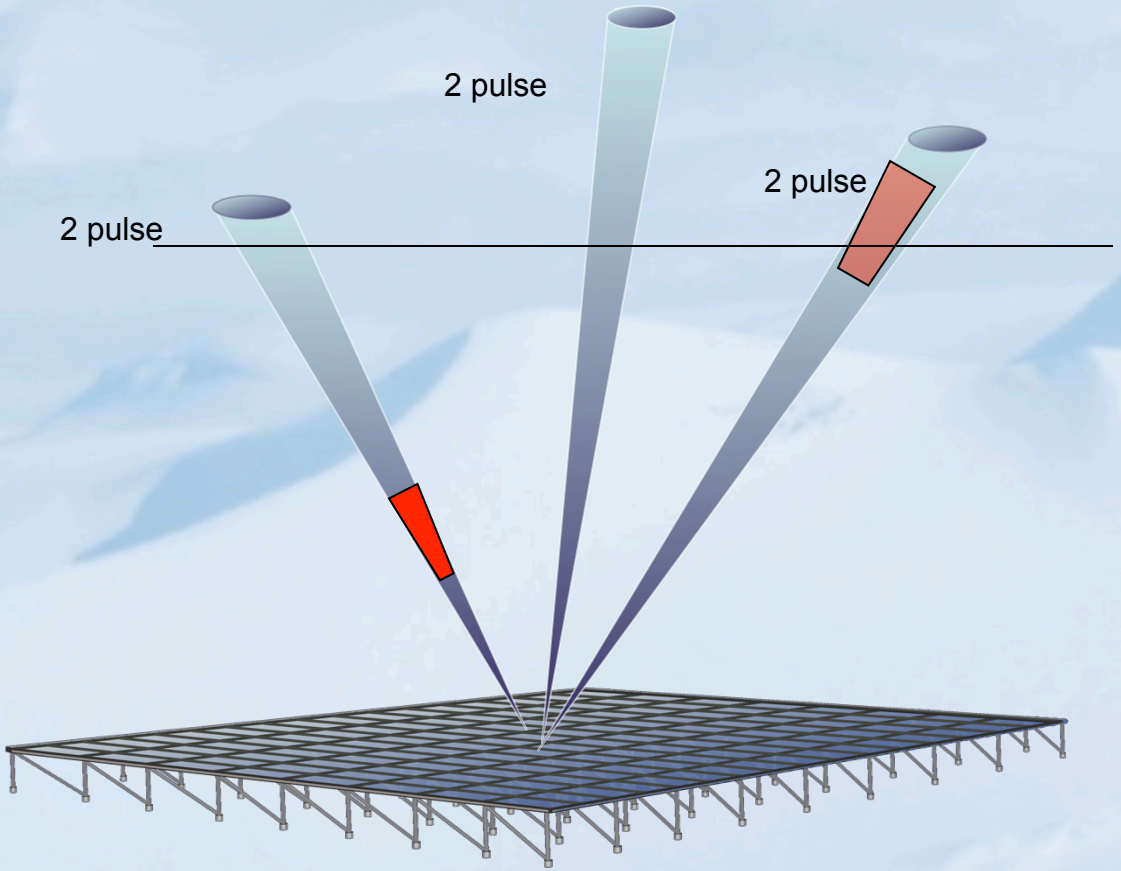
Imaging with AMISR



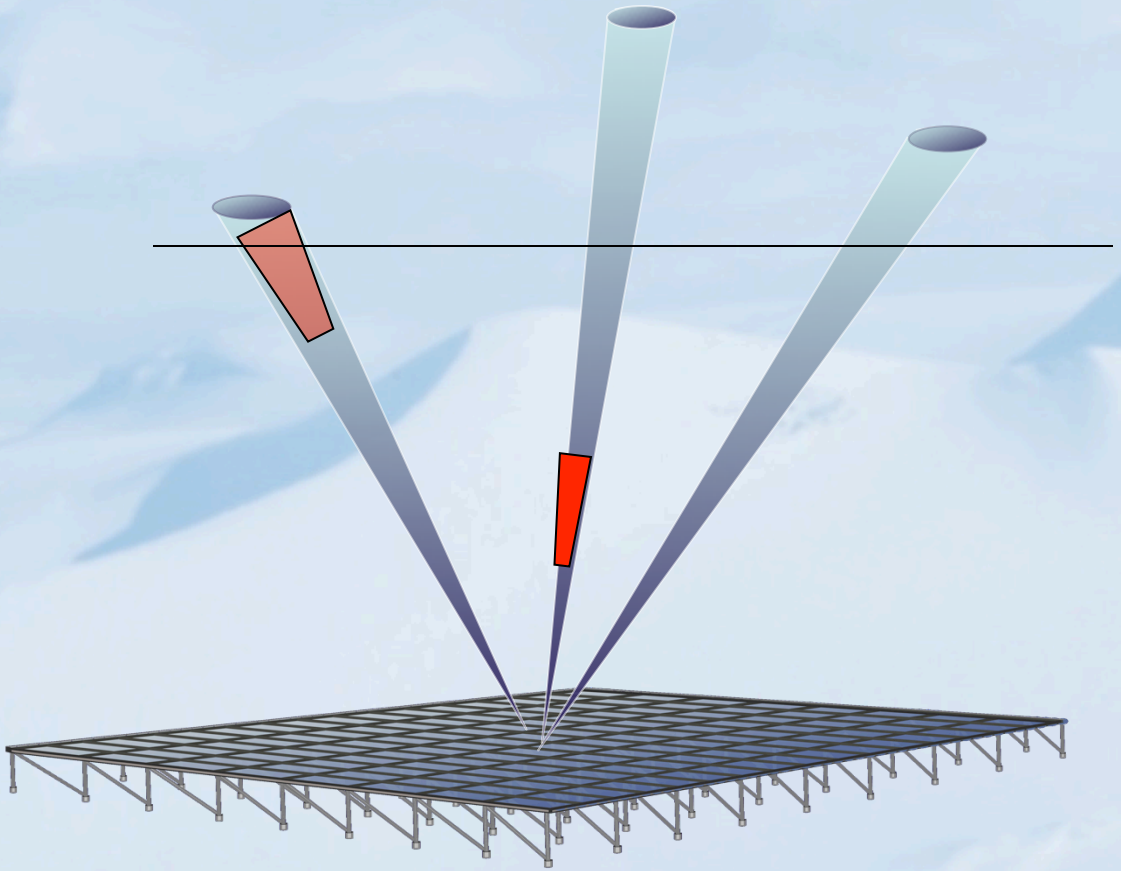
Imaging with AMISR



Imaging with AMISR

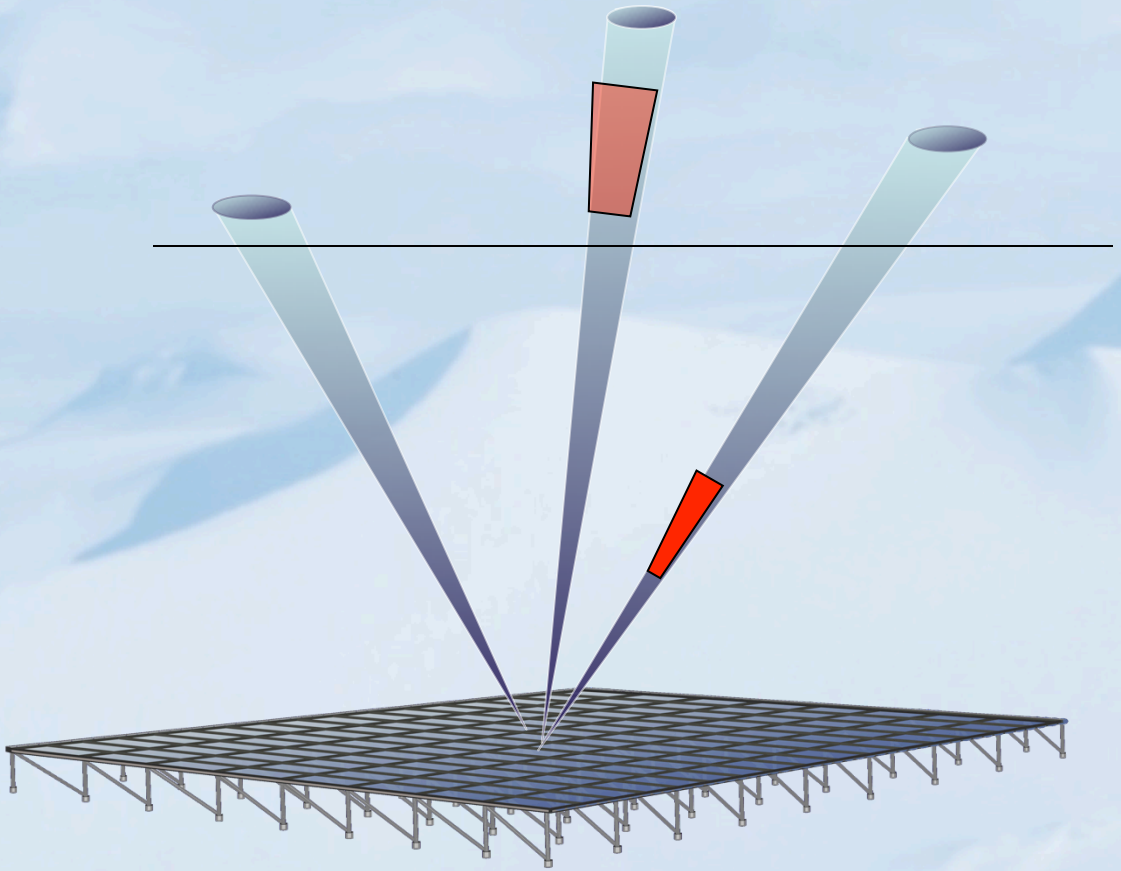


Imaging with AMISR



…until “enough” pulses in each direction

Imaging with AMISR



Remember:

- The request for radar time should contain:
  - Science goals
  - Desired time slot (between 00:30-11:00 UT)
  - Number of Beams
  - Az and El vectors
  - Desired Data Product (density, temperature, velocity etc)
  - Submit to:

craig.heinselman@sri.com

Other radars providing data tonight:

- Millstone Hill
- A vertical profiling mode covering both E and F regions with a 2-4 minute time resolution will be scheduled for 00:30 – 11:00 UT on 01 August (actually already running!). Processed data will be available in real time on Madrigal as well as batch analyzed as soon as the run ends.
- Sondrestrom
- Full comp-scans will be run from 00:30-11:00 UT on 01 August. This will give convection vs latitude with 5-minute resolution, in addition to standard parameters. The data will be posted in Madrigal, but may make not make the 20 UT deadline due to the slow Greenland internet . These data could augment, the SuperDARN convection data.
- Jicamarca
- A vertical drift mode will be scheduled for 00:30 to 11:00 UT on 01 August. The processed data (Drifts) will be put in Madrigal as soon as the run ends.

Last slide with what you need to remember:

Timeslots available:

- 00:30 – 02:00 UT
- 02:00 – 03:30 UT
- 03:30 – 05:00 UT
- 05:00 – 06:30 UT
- 06:30 – 08:00 UT
- 08:00 – 09:30 UT
- 09:30 – 11:00 UT

Where to go:

- KC206 group 4
- KC208 group 5
- KC210 group 6
- Corner1 group 1
- Corner2 group 7
- “On_your_own1” group 2
- “On_your_own2” group 3

Format of requested positions:

Az=[az1, az2, az3];
El =[el1,el2,el3];

Collaborate!!!

The man:
craig.heinselman@sri.com

Proposal should contain:

- Science objective
- Pointing directions matching science objective
- Az and El vector of pointing directrions
- (suggested) timeslot

Pointing position map:

- http://amisr.sri.com/portal/monitor

Absolute deadline for submission:
18:15 LT (06:15pm) TODAY

Where to be when

	KC206	KC208	KC210	B1	B2	Other	Other	
Mon	1	2	3	4	5	6	7	
Tue	4	5	6	7	1	2	3	
Wed	7	1	2	3	4	5	6	
Thur	3	4	5	6	7	1	2	
Fri	6	7	1	2	3	4	5	

GO	Mills	2012-07-31 12:00:00	2012-08-01 20:15:00	Millstone Hill IS Ra	30	Zenith Profiler
GO	JRO	2012-07-31 12:50:00	2012-08-01 05:00:00	Jicamarca IS Radar	10	Drifts
GO	SRI	2012-07-31 15:51:36	2012-07-31 17:20:12	Poker Flat IS Radar	61	Student1 - Auroral and convection measurements
GO	SRI	2012-08-01 00:02:07	2012-08-01 11:01:42	Sondrestrom IS Radar	80	ISR school - plasma convection
GO	SRI	2012-08-01 00:31:47	2012-08-01 02:00:02	Poker Flat IS Radar	61	Student1 - Auroral and convection measurements
GO	SRI	2012-08-01 02:00:55	2012-08-01 03:30:01	Poker Flat IS Radar	61	Student2 - Auroral and convection measurements
GO	SRI	2012-08-01 03:30:49	2012-08-01 04:59:55	Poker Flat IS Radar	61	Student3 - Auroral and convection measurements
GO	JRO	2012-08-01 05:00:00	2012-08-01 13:00:00	Jicamarca IS Radar	10	Drifts
GO	SRI	2012-08-01 05:01:20	2012-08-01 06:29:56	Poker Flat IS Radar	61	Student4 - Auroral and convection measurements
GO	SRI	2012-08-01 06:31:09	2012-08-01 07:59:57	Poker Flat IS Radar	61	Student5 - Auroral and convection measurements
GO	SRI	2012-08-01 08:01:26	2012-08-01 09:29:57	Poker Flat IS Radar	61	Student6 - Auroral and convection measurements
GO	SRI	2012-08-01 09:31:11	2012-08-01 10:59:55	Poker Flat IS Radar	61	Student7 - Auroral and convection measurements