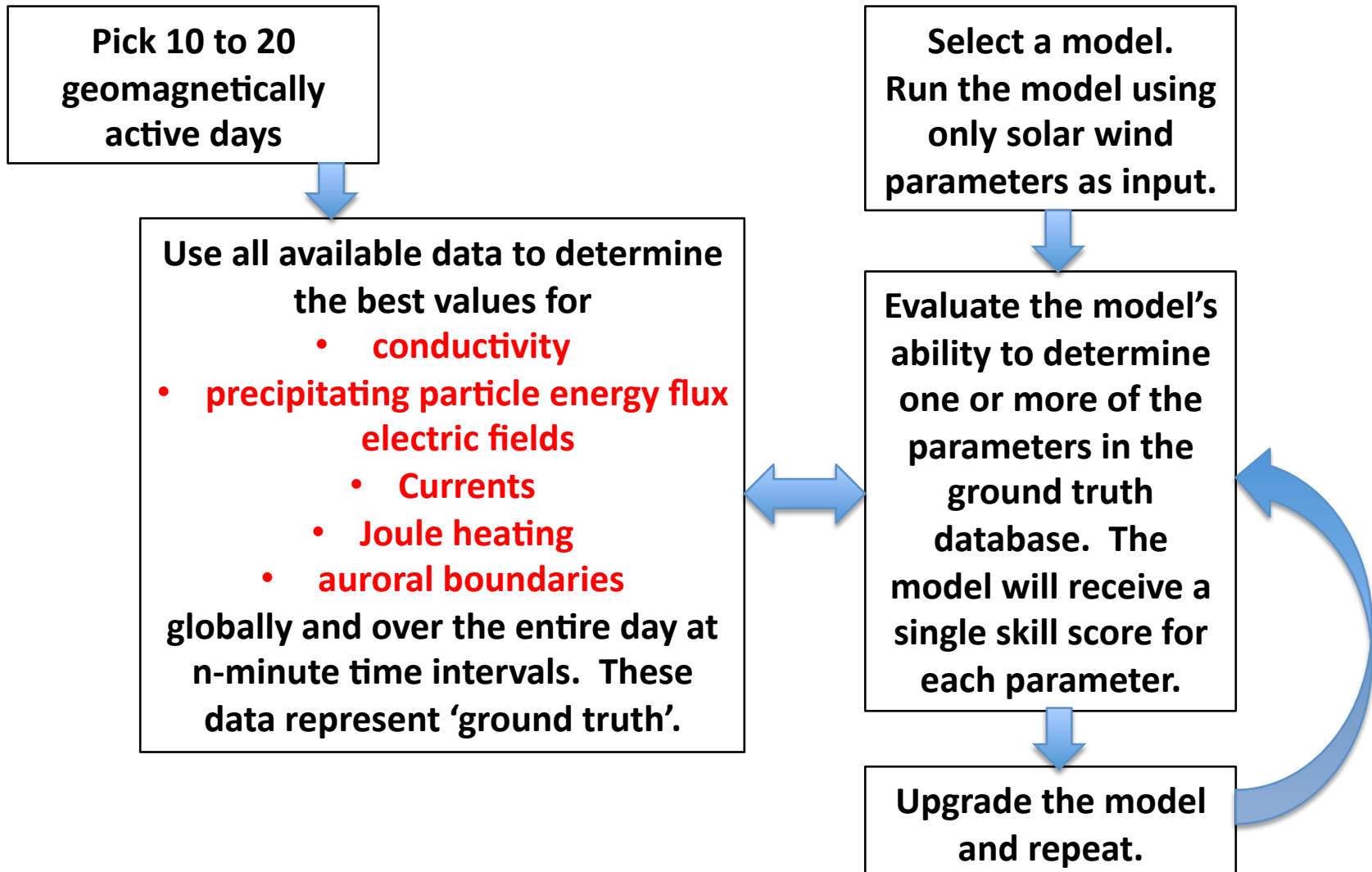
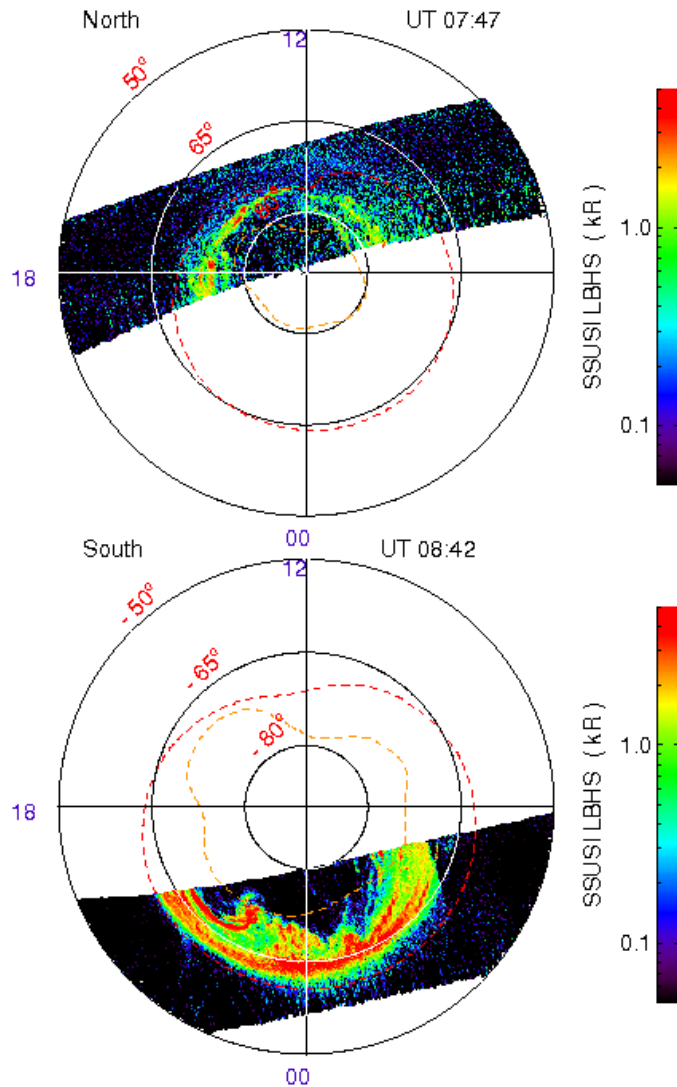


Metric Steps



Ground-truth: Energetic Particle Precipitation

April 5, 2010 DOY:095 Orbit: 33346 (DMSP F16)

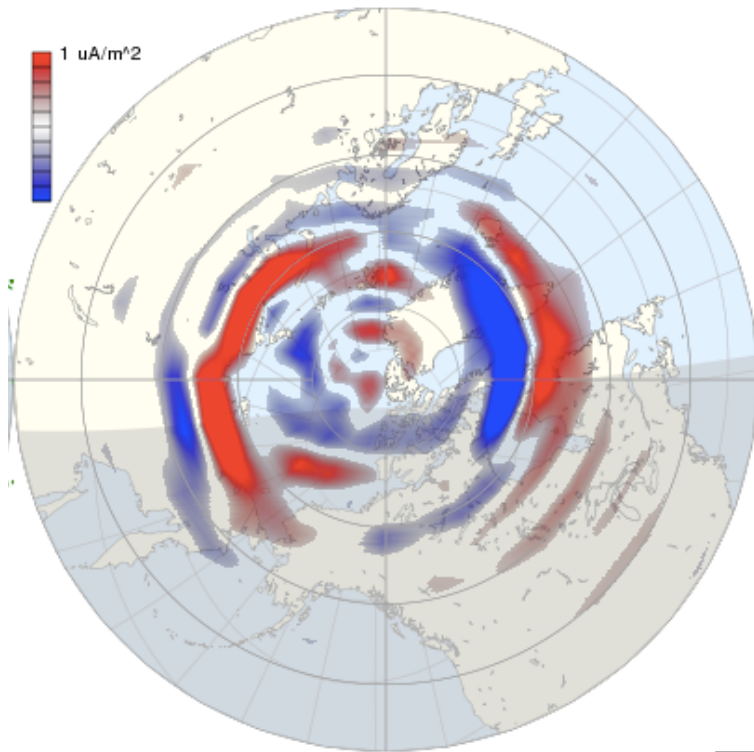


Use TIMED GUVI Far Ultraviolet observations to infer energy flux and mean energy of precipitating electrons and protons

Ground-truth: Conductivities

- Infer conductivities from the average energy and energy flux from GUVI observations
- Validate the conductivity values using incoherent scatter radar
- Develop an inversion methodology for conductivities produced by protons
- Validate conductivities with Ovation-Prime and ground-based magnetometer measurements

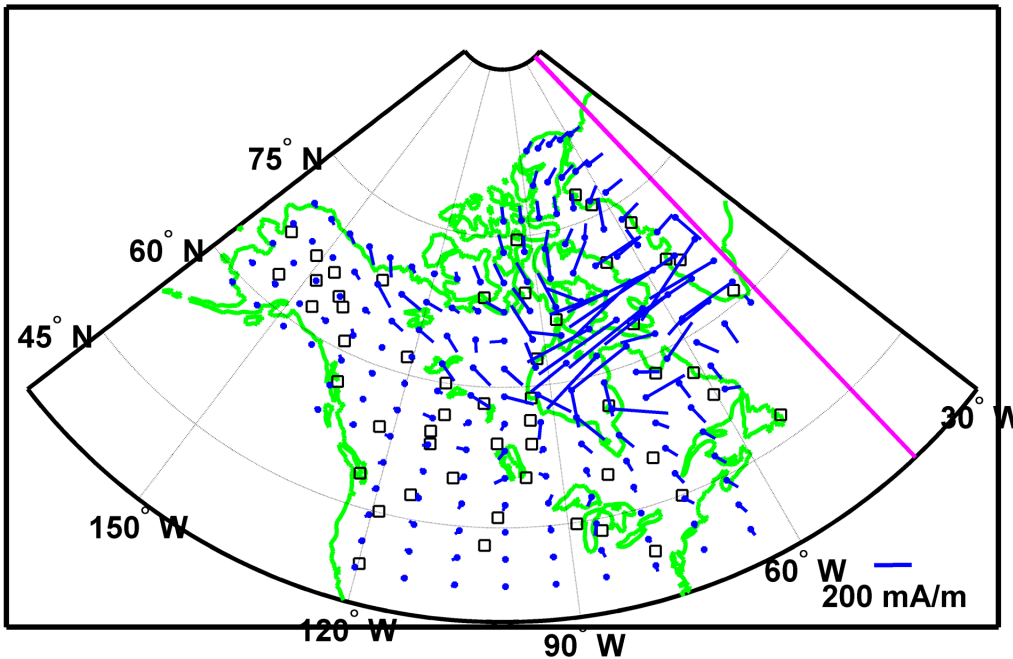
Ground-truth: Electric fields



- Combine conductivities with field-aligned currents to solve for electrostatic potential
- Use incoherent scatter radars and SuperDARN to validate electric fields

Ground-truth: Currents

THEMIS EICs: 16-Feb-2008 02:47:00



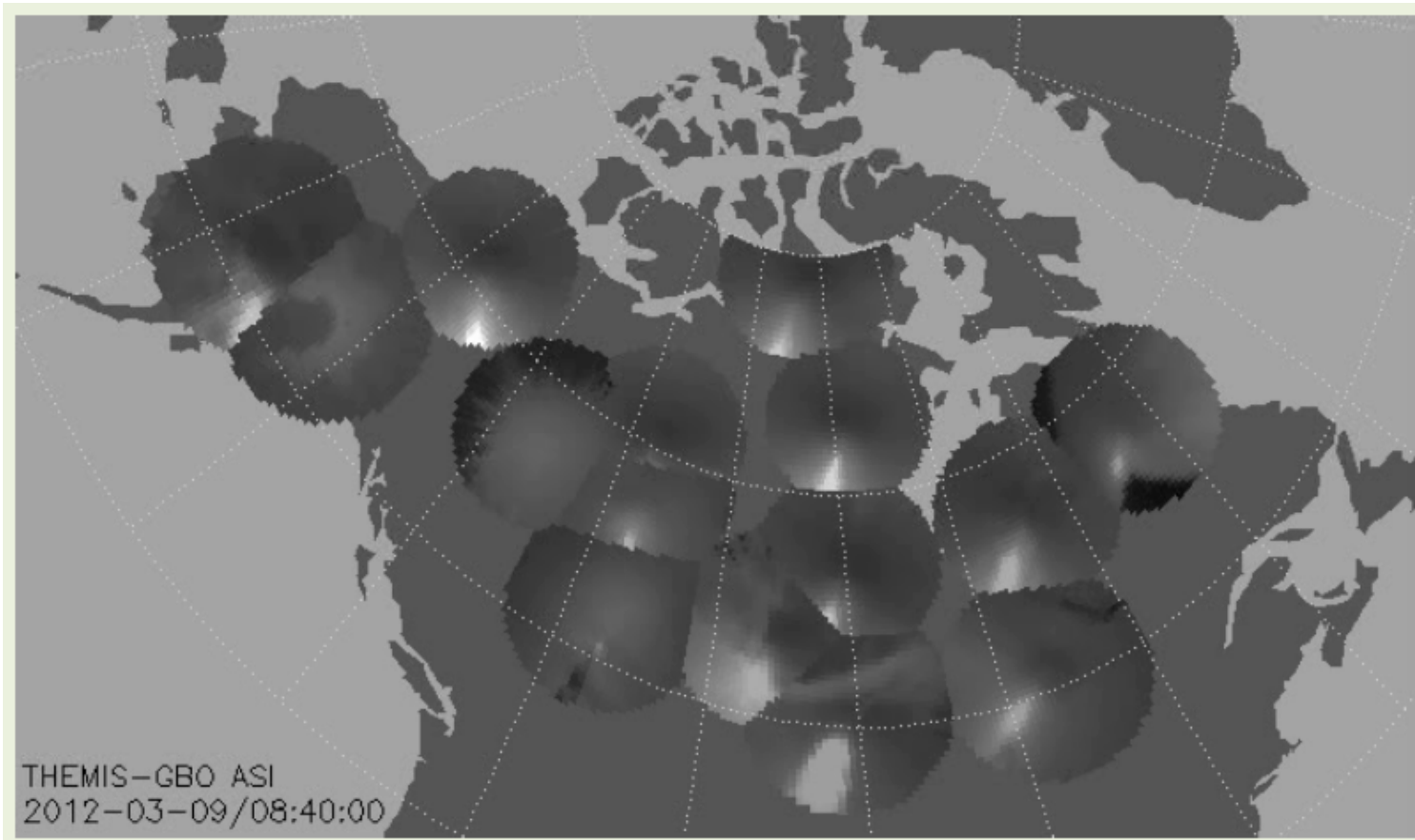
- Use electric fields and conductivities to calculate horizontal ionospheric currents
- Validate currents using ground-based magnetometer measurements

Ground-truth: Joule heating

- Use validated electric field and conductivities
- Use validated currents and electric fields
- Validate and selected locations using incoherent scatter radar

Ground-truth: Auroral Boundaries

- Use GUVI imaging data, ground-based optical images, AMPERE, ground-based magnetometers, Aurorasaurus, and Ovation-Prime



How to Evaluate Auroral Model Output

Property	One-D Form	Two-D Form
Auroral Conductivities	HPI	Map
Energy Flux from Precipitating Particles	HPI	Map
Electric Fields	CPCP	Map
Currents	AE	Map
Joule Heating	JHPI	Map
Auroral Boundaries	RMS difference summed at 24 MLTs	N/A

How quantitative assessments against ground-truth values will be done

- Calculate either one-D or two-D correlation coefficient
- Shift in time and space to account for spatial or temporal shifts
- Assessment should only be done on validated ground-truth data over the regions where the data are valid
- Or: Use OTS Pattern Recognition Software
- All groups should use the same methodology for metrics-based validation assessment

EVENT SELECTION

- So far based on events identified in GEM conductance challenge
- Three in common with events selected by Geomagnetic Index Group
- Availability of ground-truth data sets has not been looked at yet

The SWPC events:

Oct 29-31, 2003

15-Dec-06

31-Aug-01

31-Aug-05

5-Apr-10

8/5/2011 (GEM event also)

Plus:

3/17/2013 (GEM event also)

3/17/2015 (GEM event also)

November 9-10, 2004

April 6-7, 2000

July 22-27, 2004

17-Sep-11

9-Mar-12

1-Mar-11

31-Mar-01

14-May-05

Other GEM Conductance Challenge Days

2016 Oct 13-15

2010 Apr 4-6

2015 Jun 21-24

2015 Dec 19-21

2016 Jan 20

2016 Mar 6-8

2016 May 7-8

2016 Oct 13-15

2011 April 27-May 4

2012 May 7-14

Next Steps

- Further event selection taking into account data availability
- Select one event to test methodology for creating a ground-truth database
- Select a model for testing the test procedure
- Run the model and assess the output using standardized, quantitative comparison methodologies
- Write up the results