Auroral Precipitation Models: A Potential Future Topic for GGCM Metrics and Validation

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All of you – the Audience

Image taken by Zoltan Kenwell
3 May 2010, Near St. Paul, Alberta, Canada

Existing Models

- Hardy model, Evans nowcast model, the Brautigam IMF-based model *Newell et al., 2010, space weather*
- Ovation model – Newell et al.

  CCMC is collaborating with AFWA in validating both of them (Hardy and Ovation)).
- Ovation Prime – Newell et al. (running at CCMC, run-on-request soon) JGR 2009; 2010
- Zhang and Paxton Auroral Model
- Combining a Global MHD and an inner magnetosphere model to determine the boundaries (one already running at CCMC)
- ....

Data for Validation

- DMSP particle data (not for the models which are based on the DMSP data)
- Auroral imaging data

  IMAGE/FUV, May 2000-Dec, 2005 Stephen Mende/Harald Frey

  POLAR/UVI, March, 1996-1999, 2007 Kan Liou

  DMSP/SUSSI, 2005 – present Larry Paxton/Yongliang Zhang

  TIMED/GUVI Feb. 2002 –Nov 2007 Larry Paxton/Yongliang Zhang

- Other data

  Particle data (local, better determination of boundaries) versus Imaging data (global, but compromises in boundary determination?) need both!

Potential events for contemplation

- One Quiet time
- One during Steady Magnetospheric Convection (SMC) period
- One during active substorm period
- One during superstorm time

Working with experts/you in selecting events

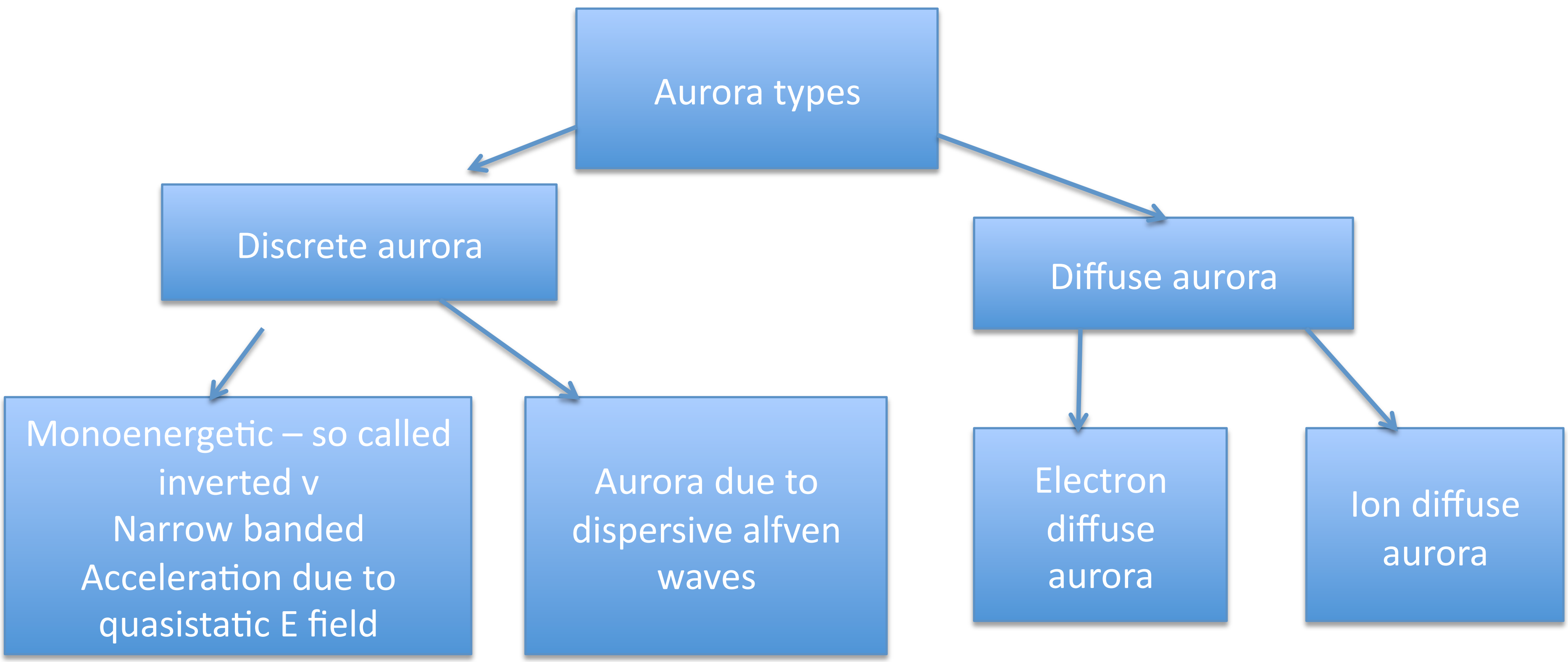
What to evaluate exactly

- Correlation coeff? Morphology?
- Characteristic energy (average energy) and energy flux of precipitating electrons – from those two, it is also easier to convert to conductance, which is very important to the dynamics of M-I coupling.
- Boundaries – equatorward and poleward boundaries, their definition needs to be agreed upon

END

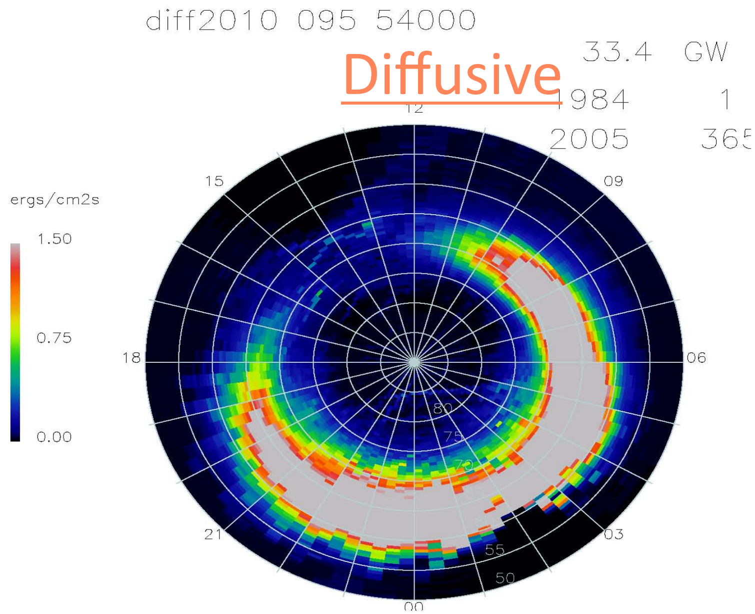
Ovation Prime

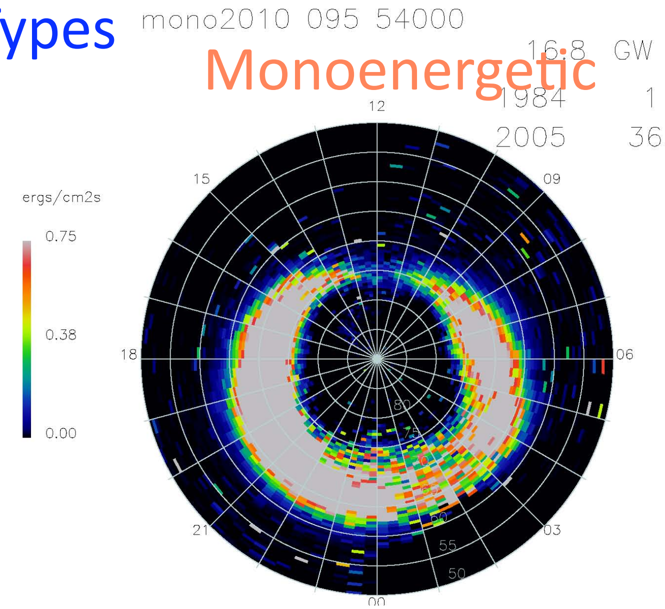
- Not just higher resolution than Ovation
- Parameterized by solar wind coupling functions, not just Kp
- Four types of aurora, including seasonal dependence



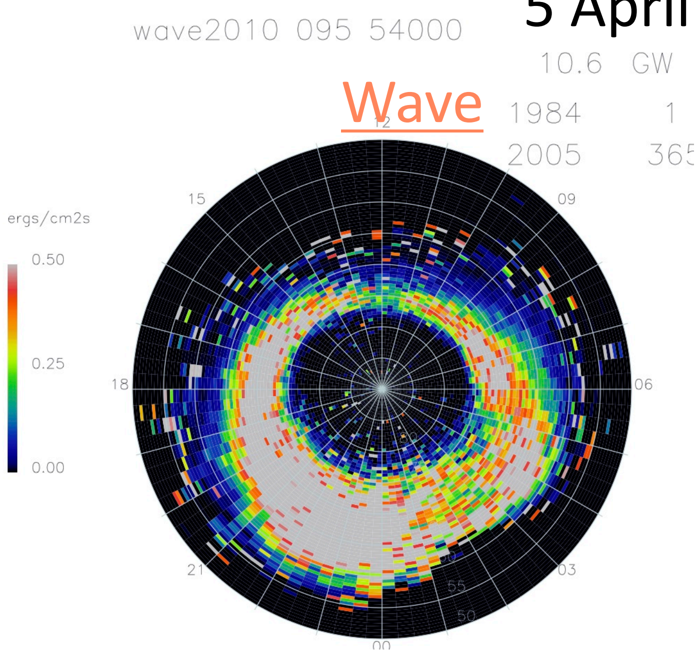
Results from Ovation Prime

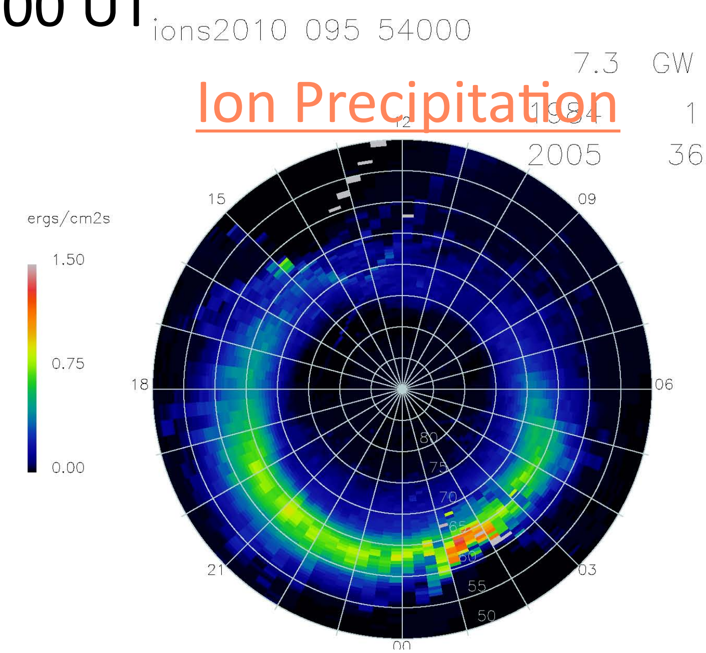
Four Types



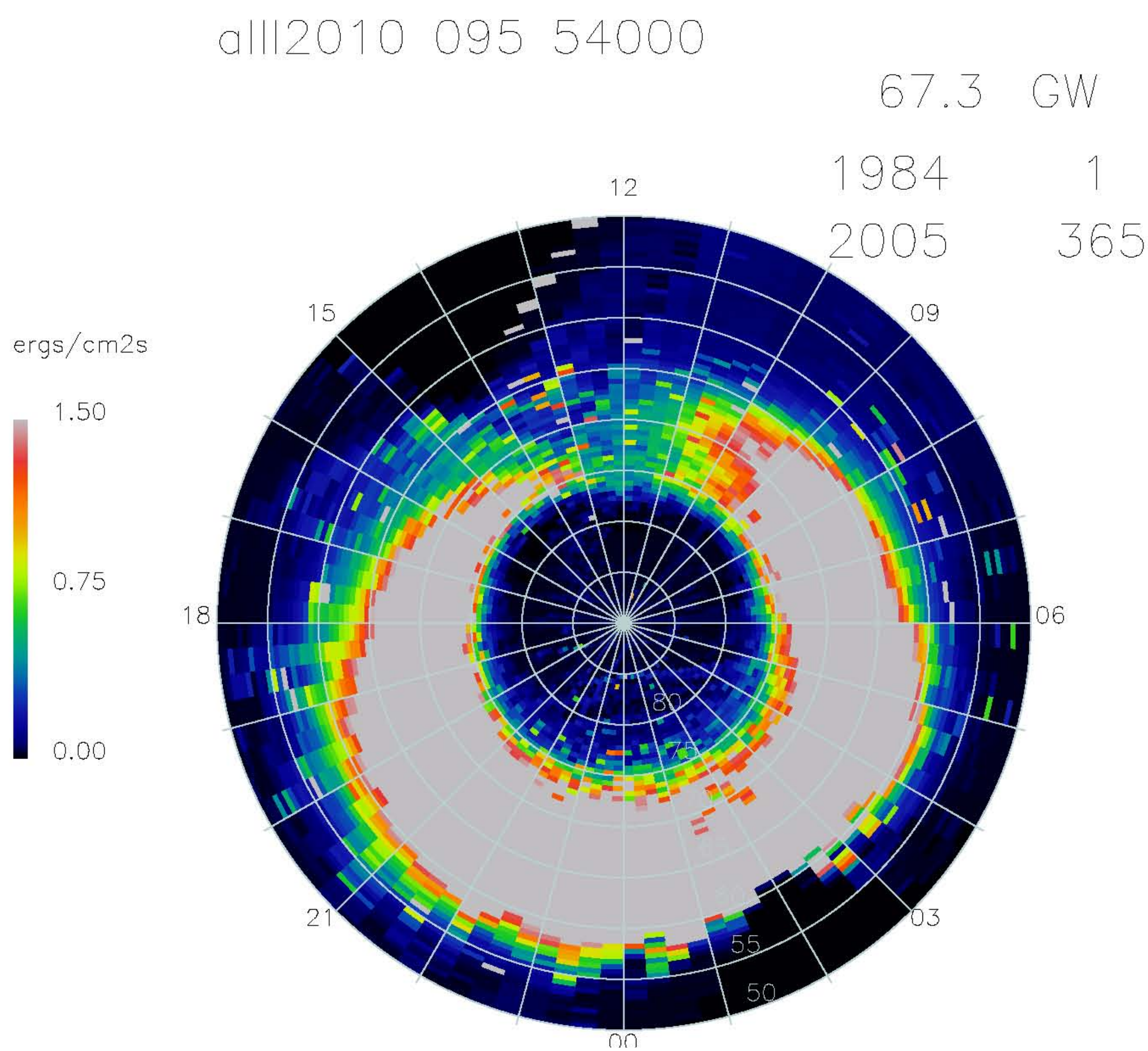


5 April 2010 @ 1500 UT





Results from Ovation Prime
Sum of all four types



Main References

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