Influences of the equatorward SuperDARN* expansion on data coverage and measured parameters

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Motivation
- SuperDARN* was built to study high latitude ionospheric convection
- Radio signals are backscattered by magnetic field-aligned ionospheric irregularities
- Doppler shift is used to calculate ionospheric convection velocities
- SuperDARN's addition of mid-latitude radars allows us to study the effects of additional data on the high-latitude ionospheric convection pattern
- What effect do the mid-latitude radars have on e.g. data coverage?
- What effect does an updated baseline model have (i.e. a model with mid-latitude radars vs one without)?

Method
- A large dataset (2 min cadence, 2012-2018) allows us to statistically study the impacts of adding mid-latitude data & changing the background convection model
- We create 3 versions of the SuperDARN* maps and statistically compare the differences:
  1. Ruohoniemi & Greenwald (1996) background model without mid-latitude data
  2. Ruohoniemi & Greenwald (1996) background model with mid-latitude data
  3. Thomas & Shepherd (2018) background model with mid-latitude data

Results I:
- Number of backscatter echoes:
  - More likely to see increase in n for maps with low scatter
  - Changing the background model has no impact on n

Cross Polar Cap Potential (CPCP):
- Model has a bigger impact on the fitted potentials than extra data (globally)
- Differences are small

Results II:
- High-latitude ionospheric convection morphologies change with expanded radar network*:
  - Adding mid-latitude data does not change overall convection strength, but expands convection pattern

Supporting Information:
- SuperDARN* coverage, Jan. 2018:
  - Adding mid-latitude data moves convection cells equatorward
  - Changing model can shrink or expand convection cells

Data and background models as a function of solar cycles:

*Super Dual Auroral Radar Network (SuperDARN)