

Recent scientific findings based on high-resolution core plasma imaging of the ionosphere with Swarm and ePOP

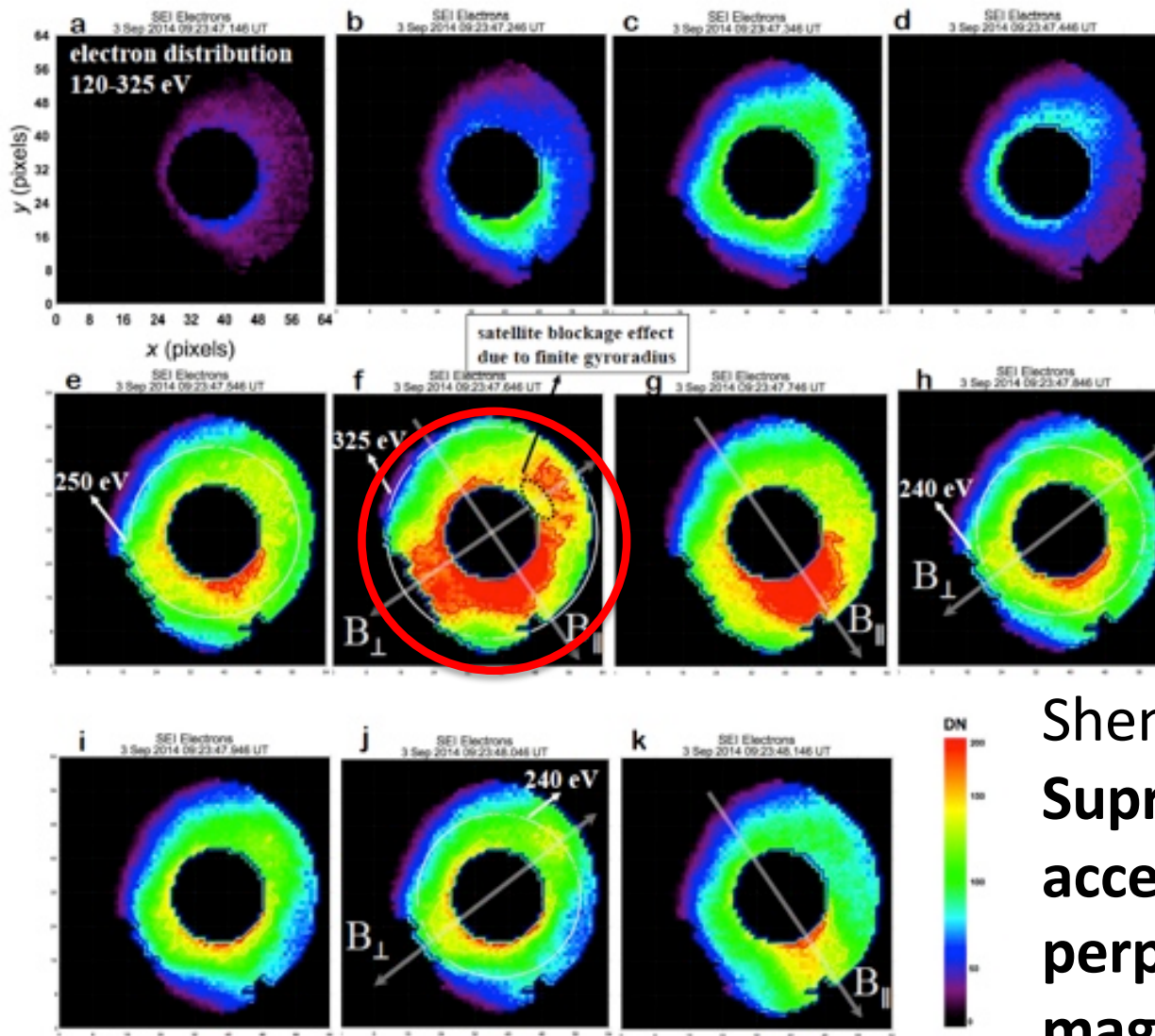


UNIVERSITY OF
CALGARY

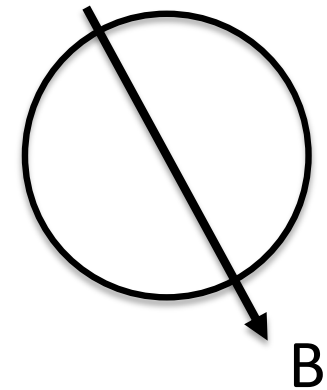
David Knudsen
6 May 2020
EGU Online



Ionospheric Electron heating to $> 10^6$ K



Outer radius:
325 eV e^{-}



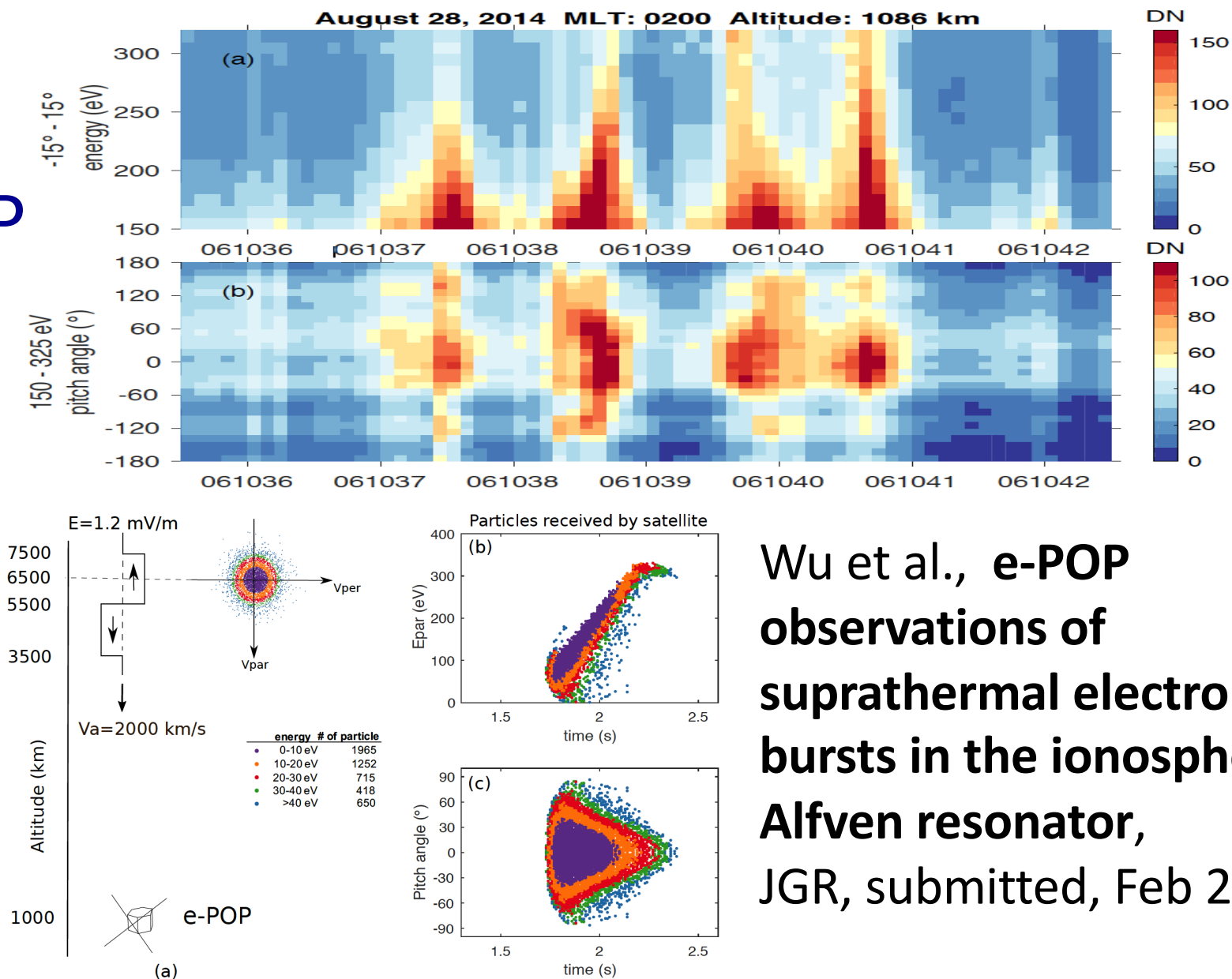
Shen and Knudsen,
**Suprathermal electron
acceleration
perpendicular to the
magnetic field in the
topside ionosphere, JGR,**
published, Feb 2020

**EPOP SEI: First direct observation of
electron heating perpendicular to B
to 100's eV ($> 10^6$ K)**

Electron acceleration in the IAR

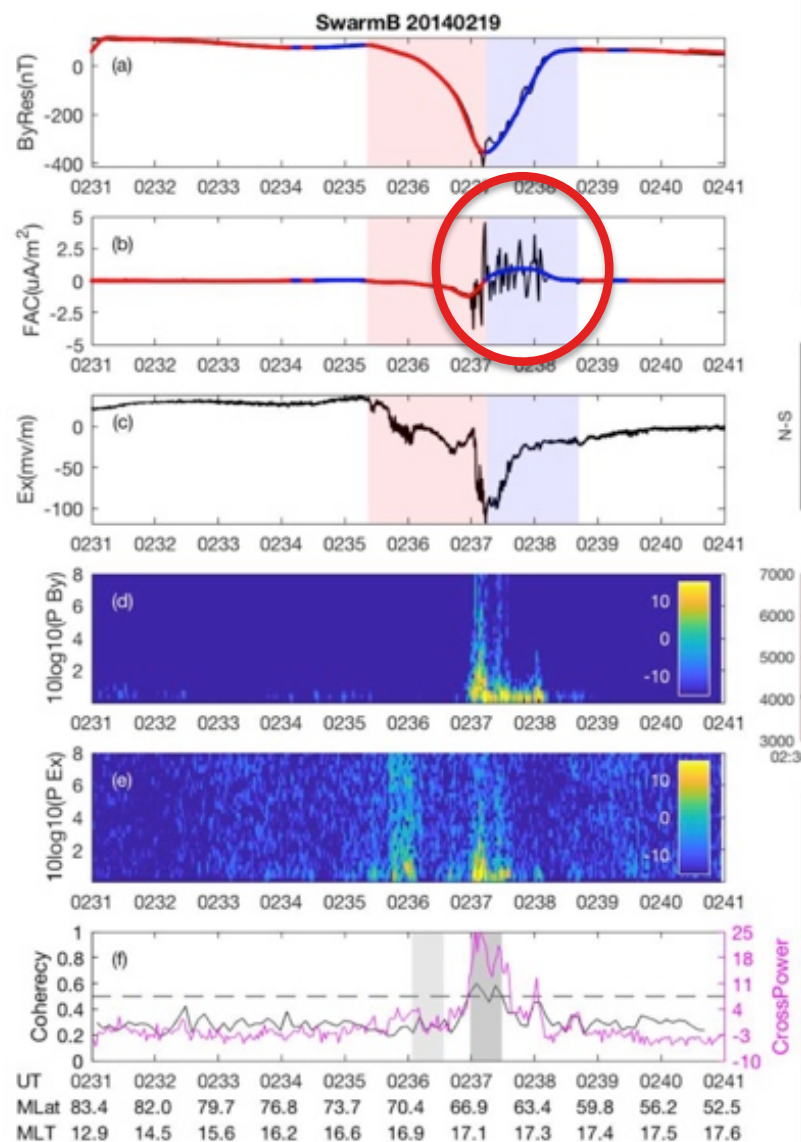
ePOP
SEI

Model



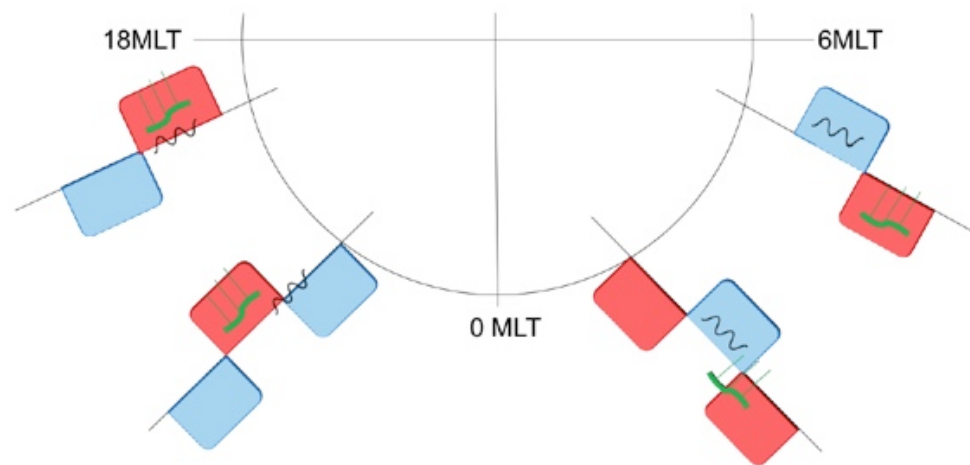
Wu et al., e-POP
observations of
suprathermal electron
bursts in the ionospheric
Alfven resonator,
JGR, submitted, Feb 2020

Swarm survey of Alfvenic Fluctuations



Wu et al., Swarm survey of
Alfvenic fluctuations and their
relation to nightside field-aligned
current and auroral arcs systems,
JGR, Feb 2020

<https://doi.org/10.1029/2019JA027220>

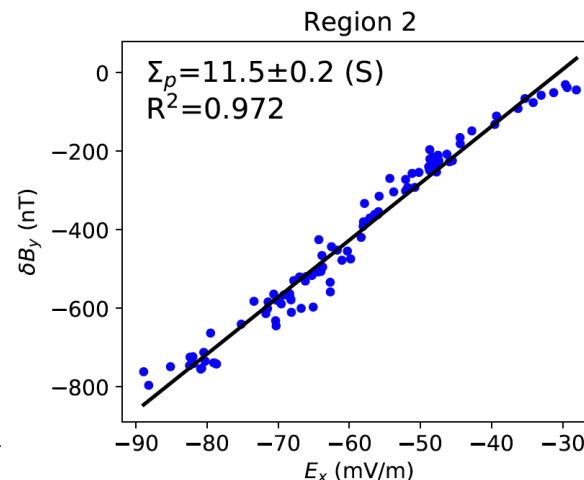
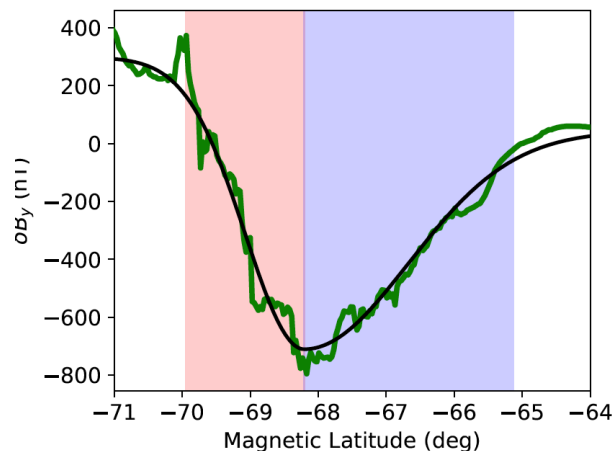
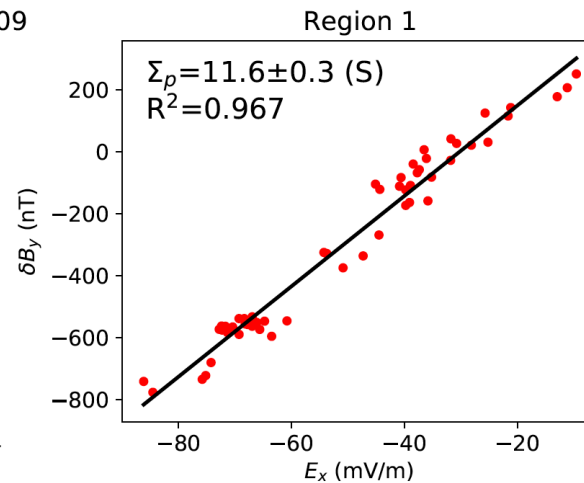
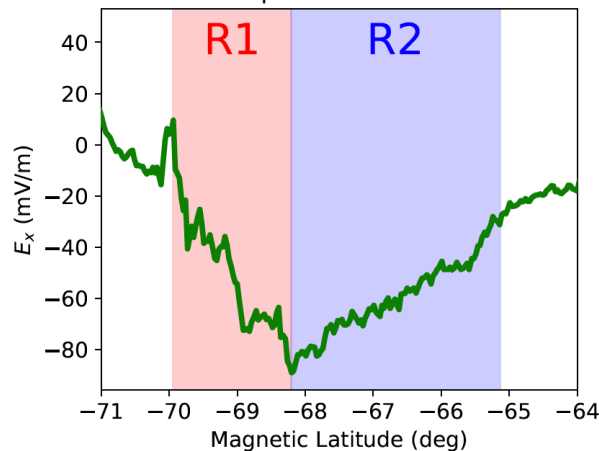


➔ No single source region evident; no
consistent relation with auroral arcs

Ionospheric Conductances from E and dB

Olifer, L., C. Feltman, R. Ghaffari, S. Henderson, D. Huyghebaert, J. Burchill, A. Jaynes, D. Knudsen, K. McWilliams, J. Moen, A. Spicher, J. Wu, **Swarm Observations of Dawn-Dusk Asymmetries Between Pedersen Conductance in Upward and Downward Field-Aligned Current Regions**, submitted to Earth and Space Science, March 2020

Southern Hemisphere 20160120 MLT: 14.09



Canada-Norway-US PhD
school, Kananaskis, Alberta,
Canada June/July 2019.

Earth and Space Science

March 2019

RESEARCH ARTICLE

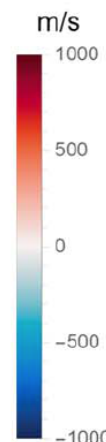
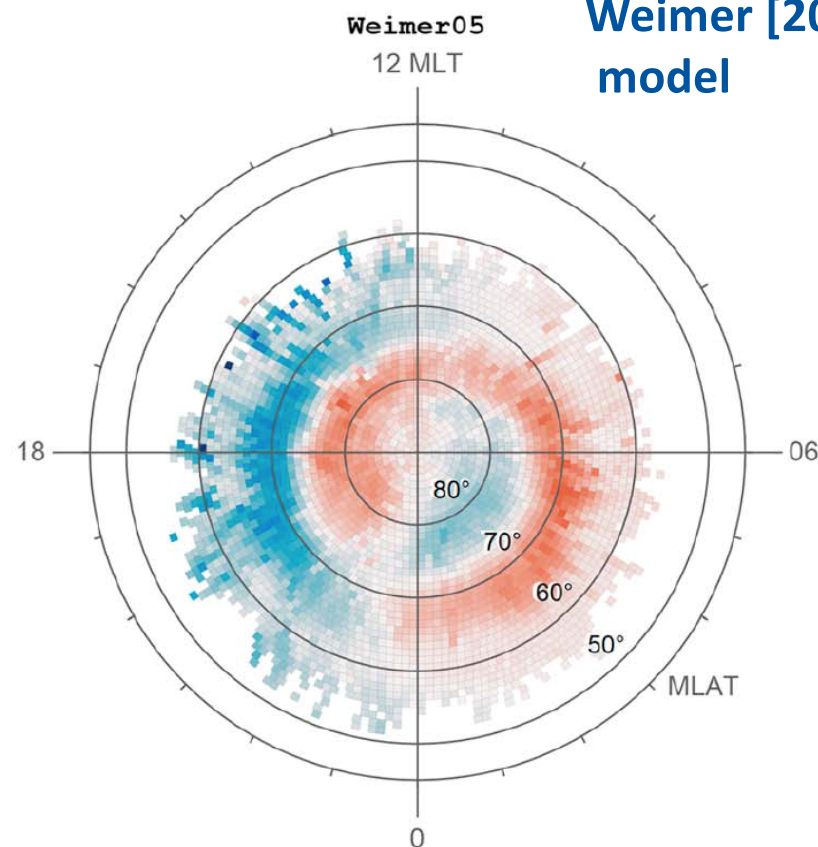
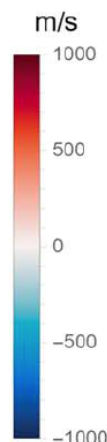
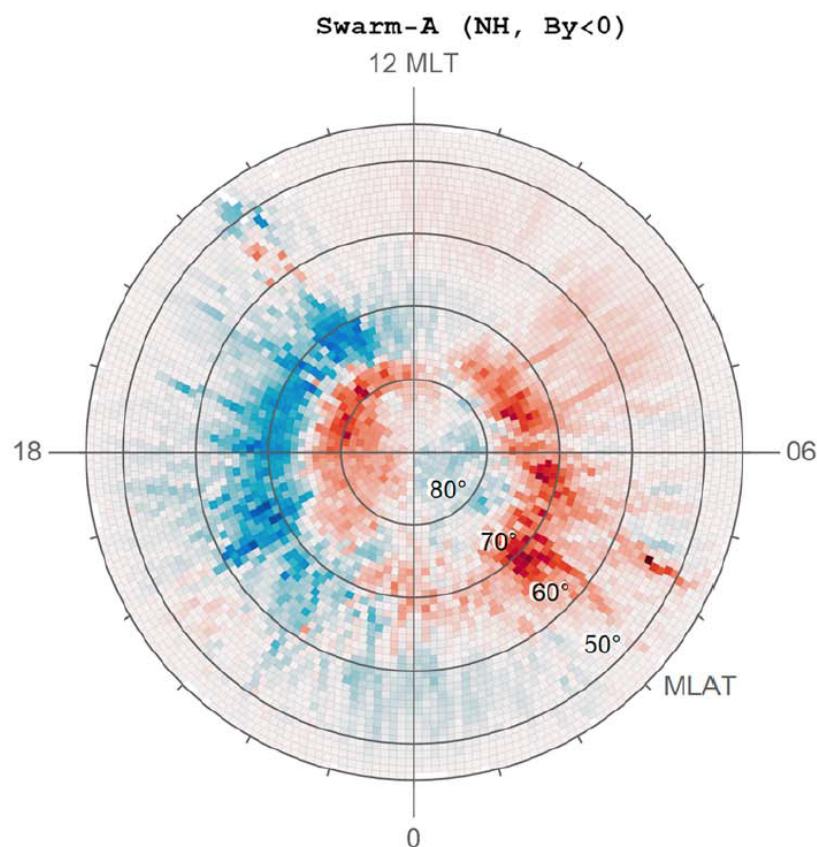
10.1029/2018EA000546

Key Points:

- Swarm ion drift climatology is compared to the Weimer 2005 model for different seasons and times

Validity Study of the Swarm Horizontal Cross-Track Ion Drift Velocities in the High-Latitude Ionosphere

Levan Lomidze^{1,2} , Johnathan K. Burchill¹ , David J. Knudsen¹ , Alexei Kouznetsov¹ , and Daniel R. Weimer³ 



Weimer [2005]
model

Cross-track flow velocity data

New release (Feb 2020):

- Dec 2013 – Dec 2019

➔ See esa.int/Swarm

Thanks to:

Johnathan Burchill/UC

Alexei Kouznetsov/UC

Levan Lomidze/UC

ESA and ARB board

ePOP Team/UC

Swarm EFI Science Discussion Group

Canadian Space Agency

Swarm A EXPT cross-track
horizontal ion flow
University of Calgary

14:15:14—14:37:54 UT
21 May 2016

