

電離圏プラズマイレギュラリティの 出現特性から推測される 夕方側サブオーロラ帯の空間構造

細川敬祐 (電気通信大学 情報通信工学科)

Mark Lester (Univ. of Leicester, Dept. of Physics and Astronomy)

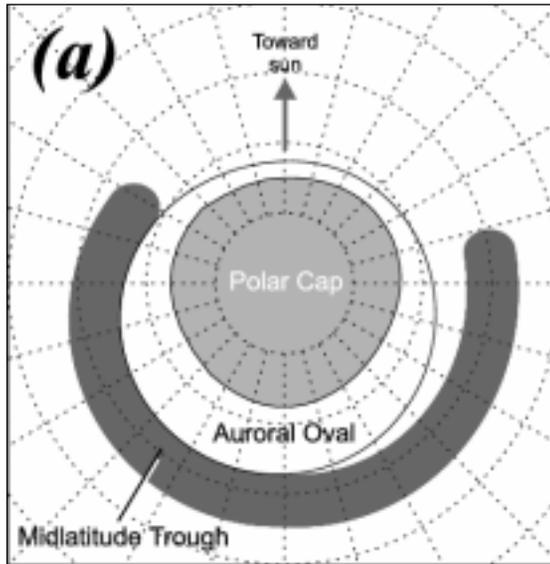
行松彰、佐藤夏雄 (国立極地研究所)

家森俊彦 (京都大学大学院 附属地磁気世界資料解析センター)

中緯度短波レーダー研究会

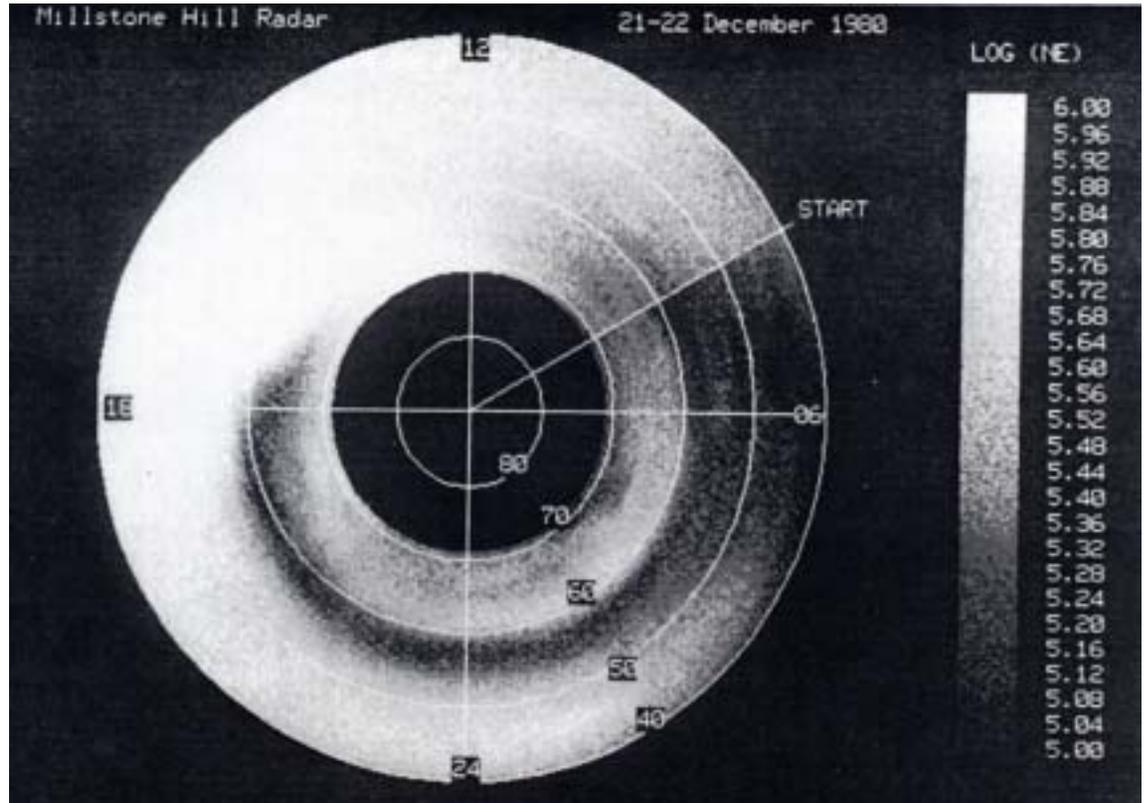
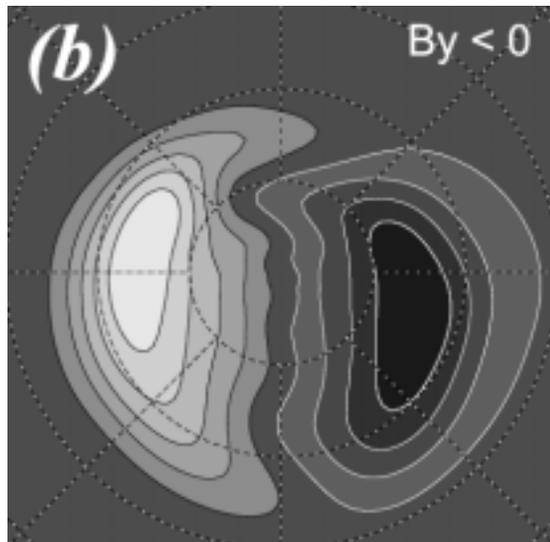
2003年9月19日 豊川

Structures in the Subauroral Ionosphere



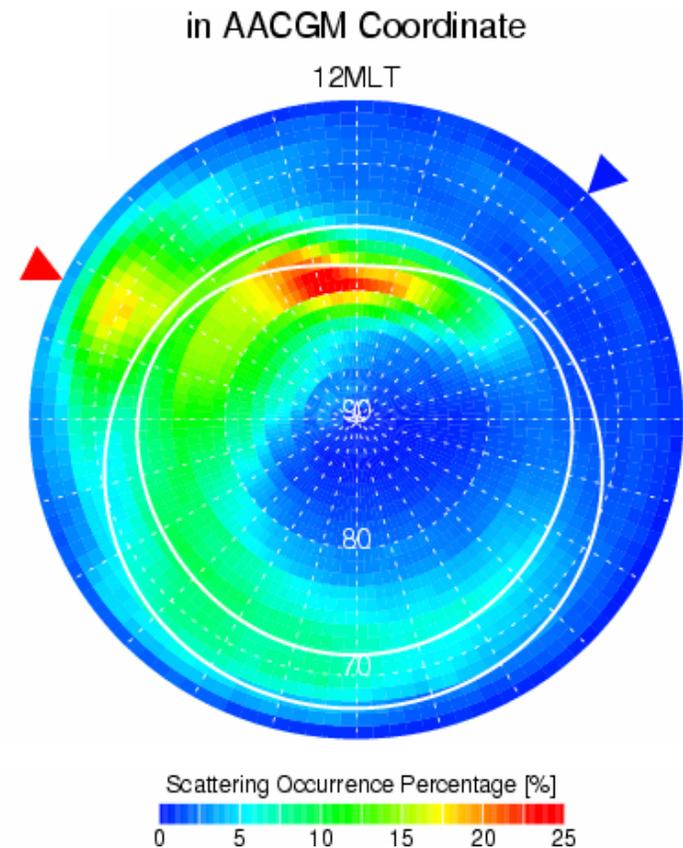
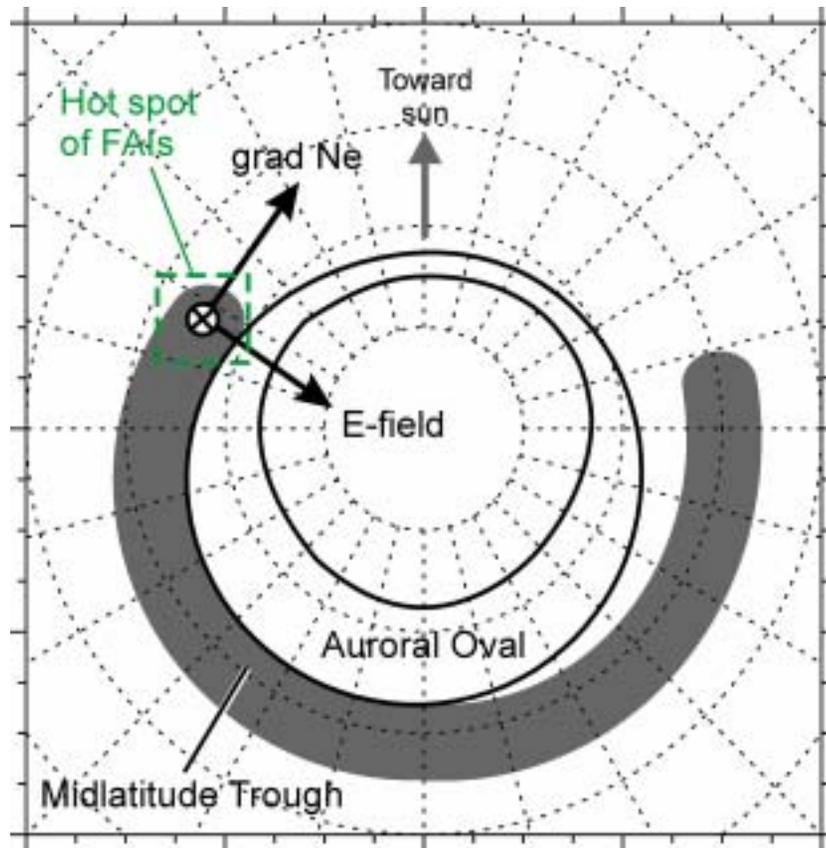
- midlatitude trough : 電子密度空間構造
- zonal convection (poleward E-field) : 電場(ドリフト)

Millstone Hill レーダーによる12月の観測: Holt et al. (1984, Radio Sci.)



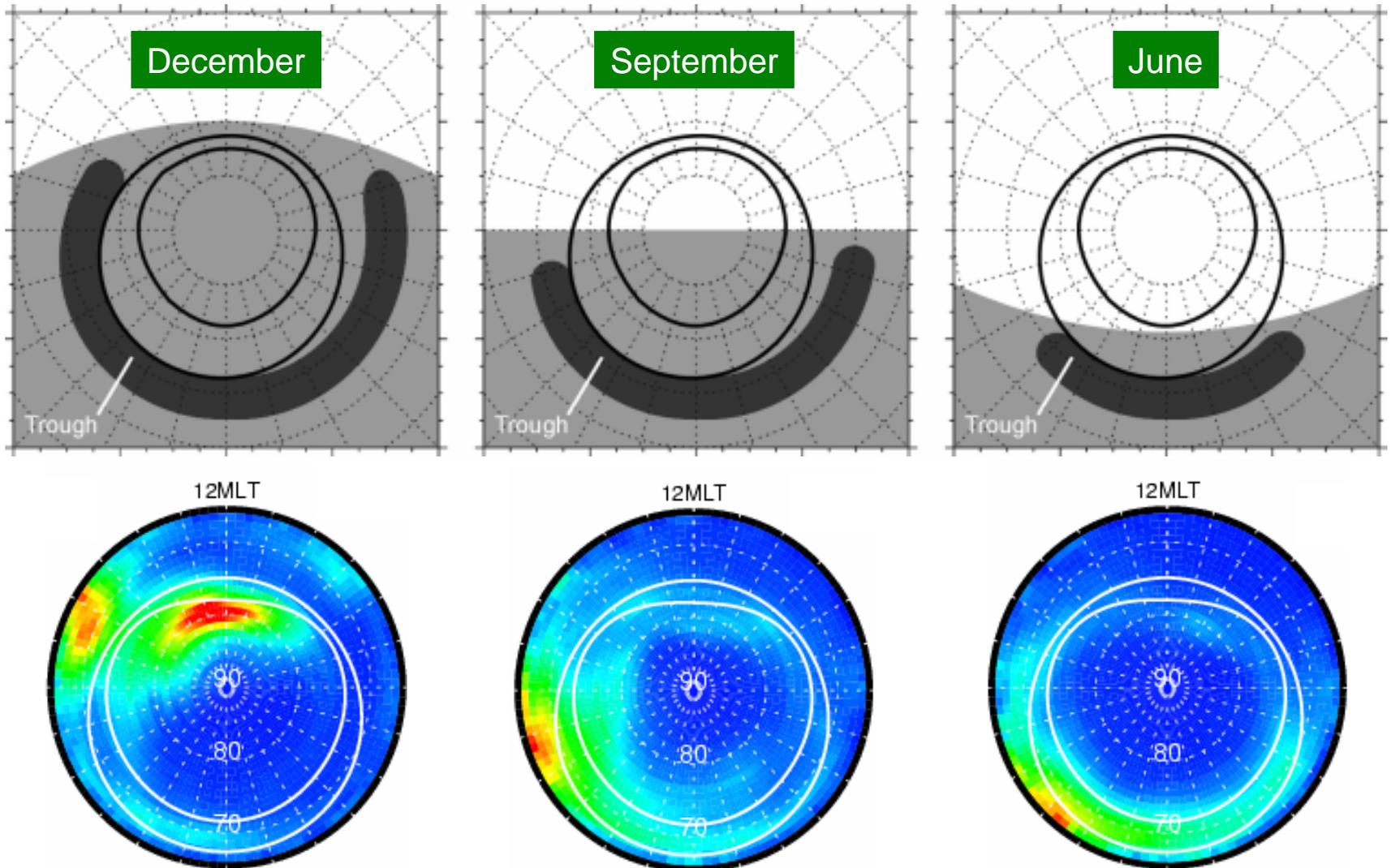
Hotspot of Subauroral FAIs

Gradient-drift instability を仮定して、subauroral FAIs の発生を予想してみる



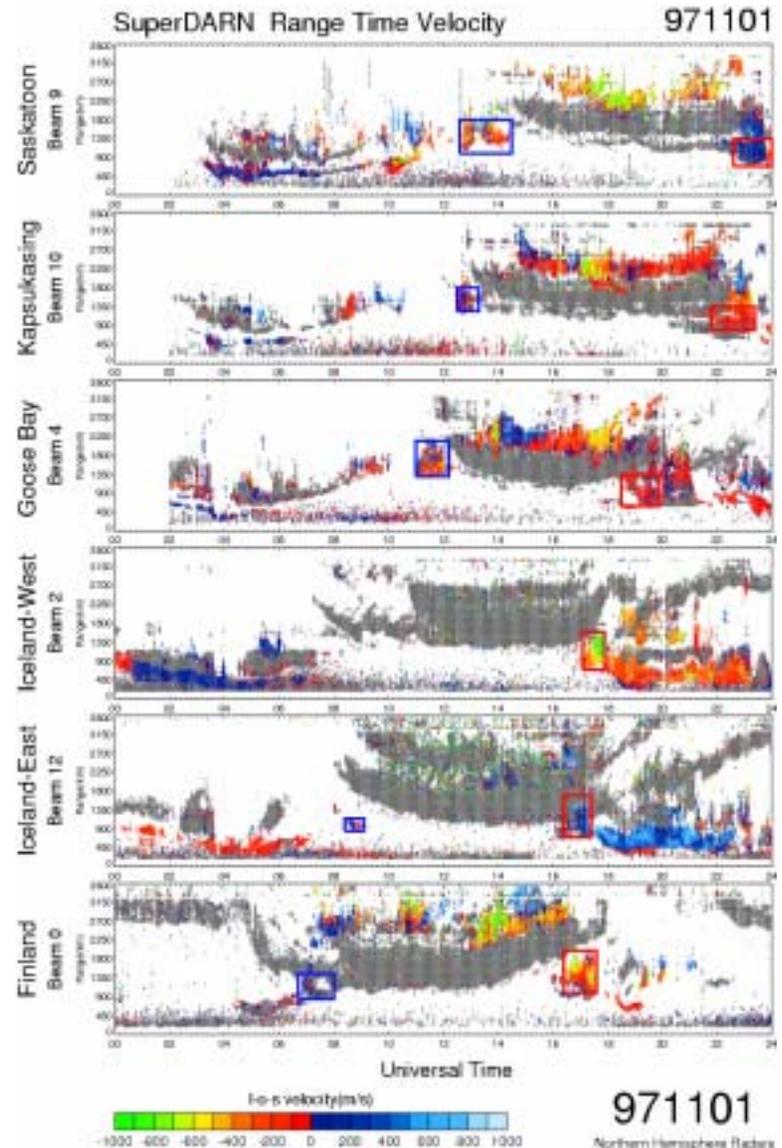
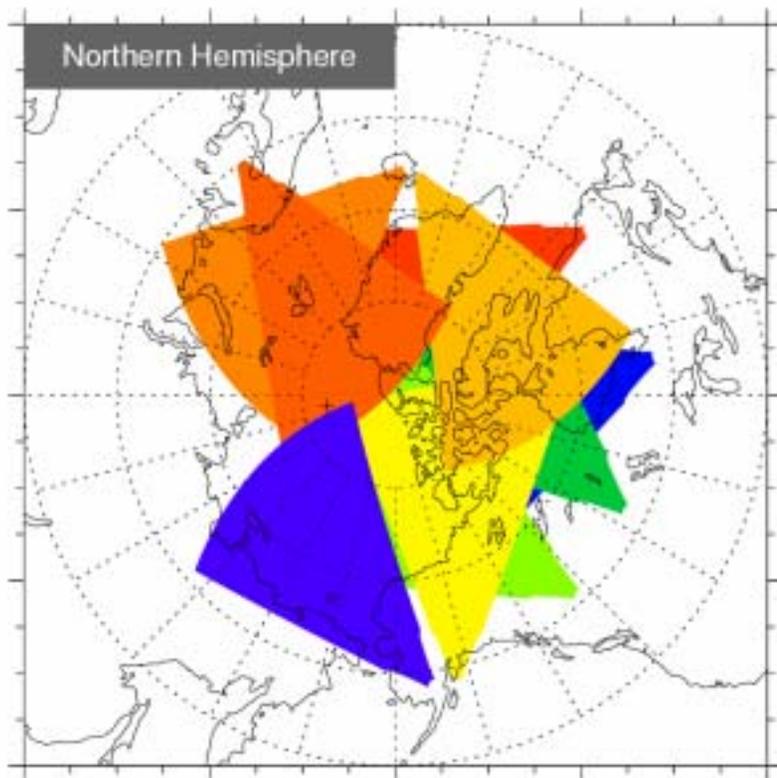
Seasonal Variation of the Trough and the Hotspot

静穏時 trough の統計モデル (Halcrow and Nisbet, 1977 Radio Sci.) との比較

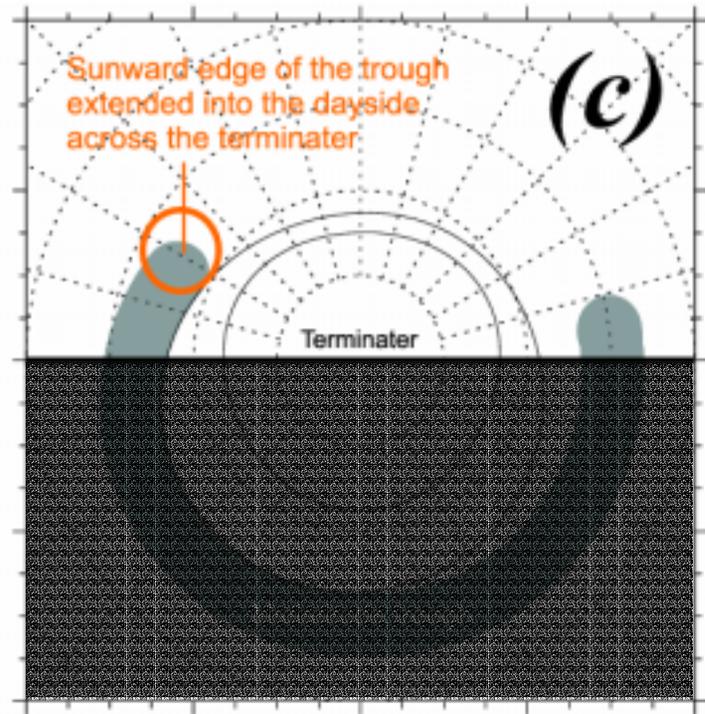
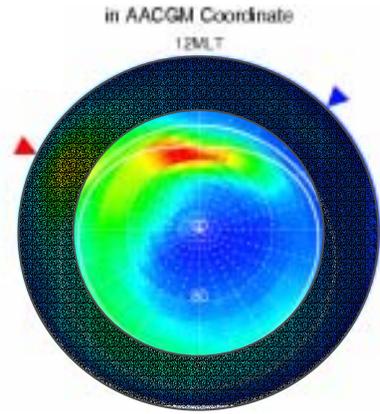
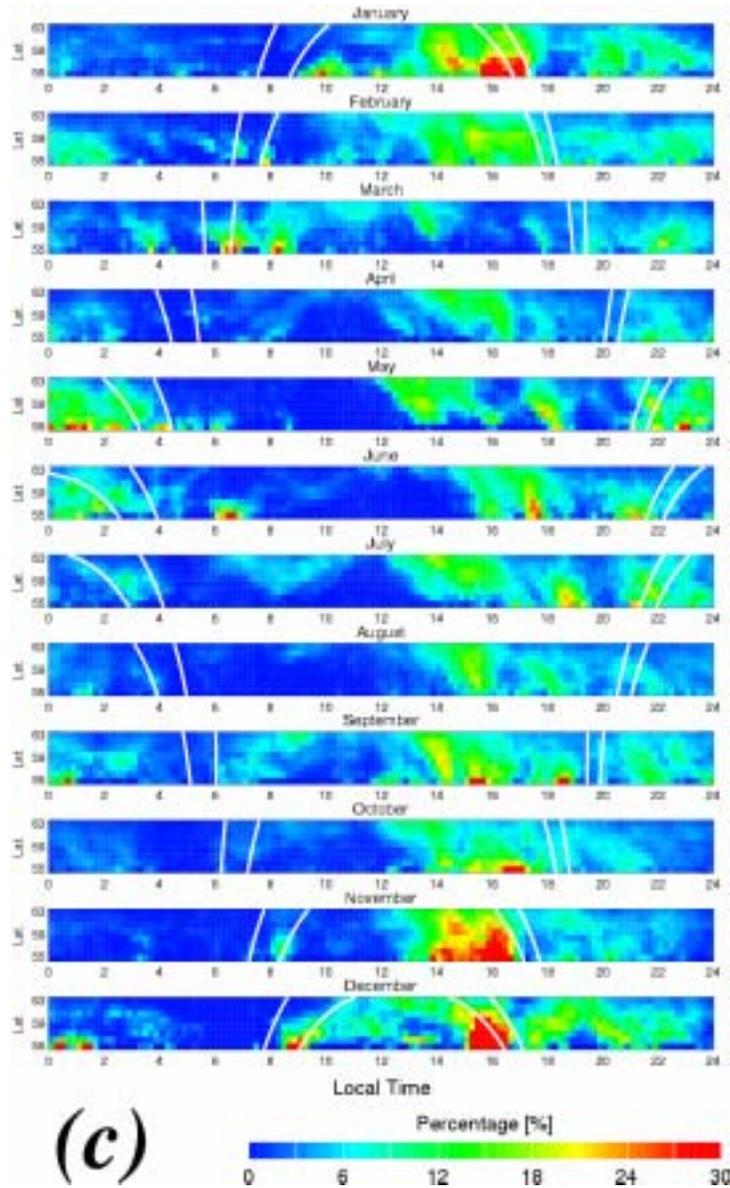


Modeling the Trough by Using Subauroral FAls

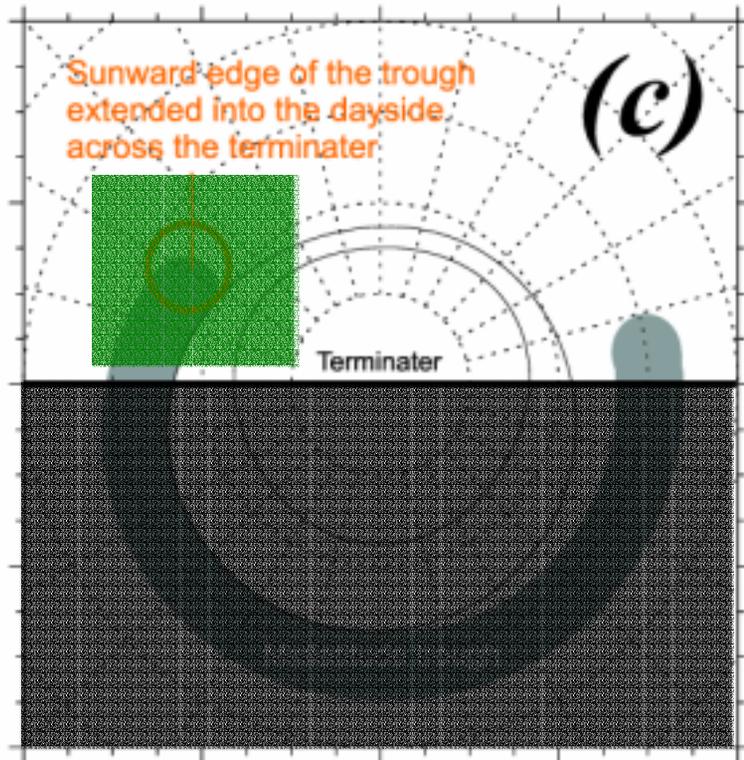
- Subauroral FAls の出現特性
trough の経度方向の広がりを見積もる際に診断的なツールになる
- 擾乱時に trough の形状が変化するか?



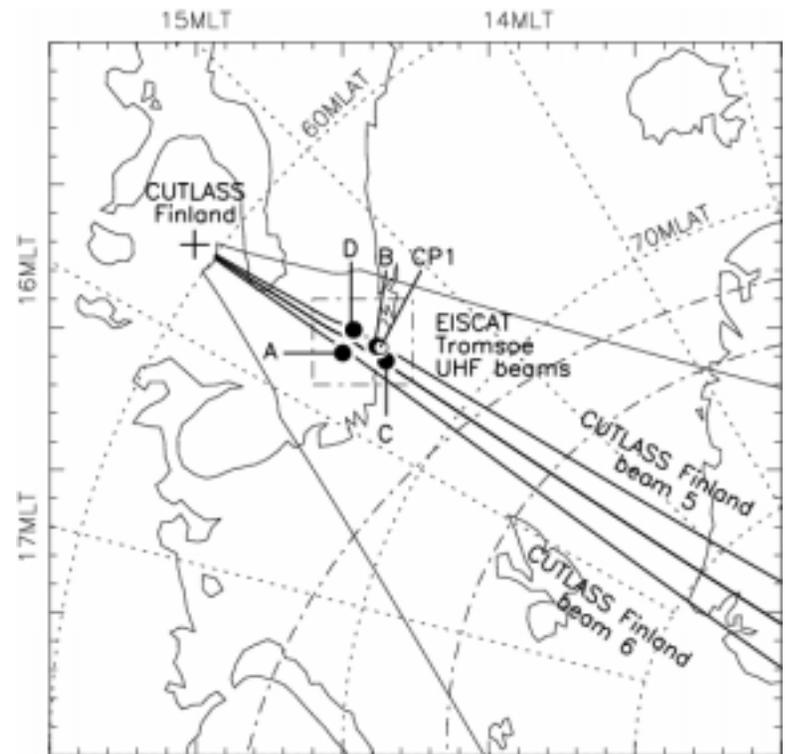
Dayside Extension of the Hotspot



Confirmation of the Proposed Model



SuperDARN vs EISCAT
(coherent) vs (incoherent)

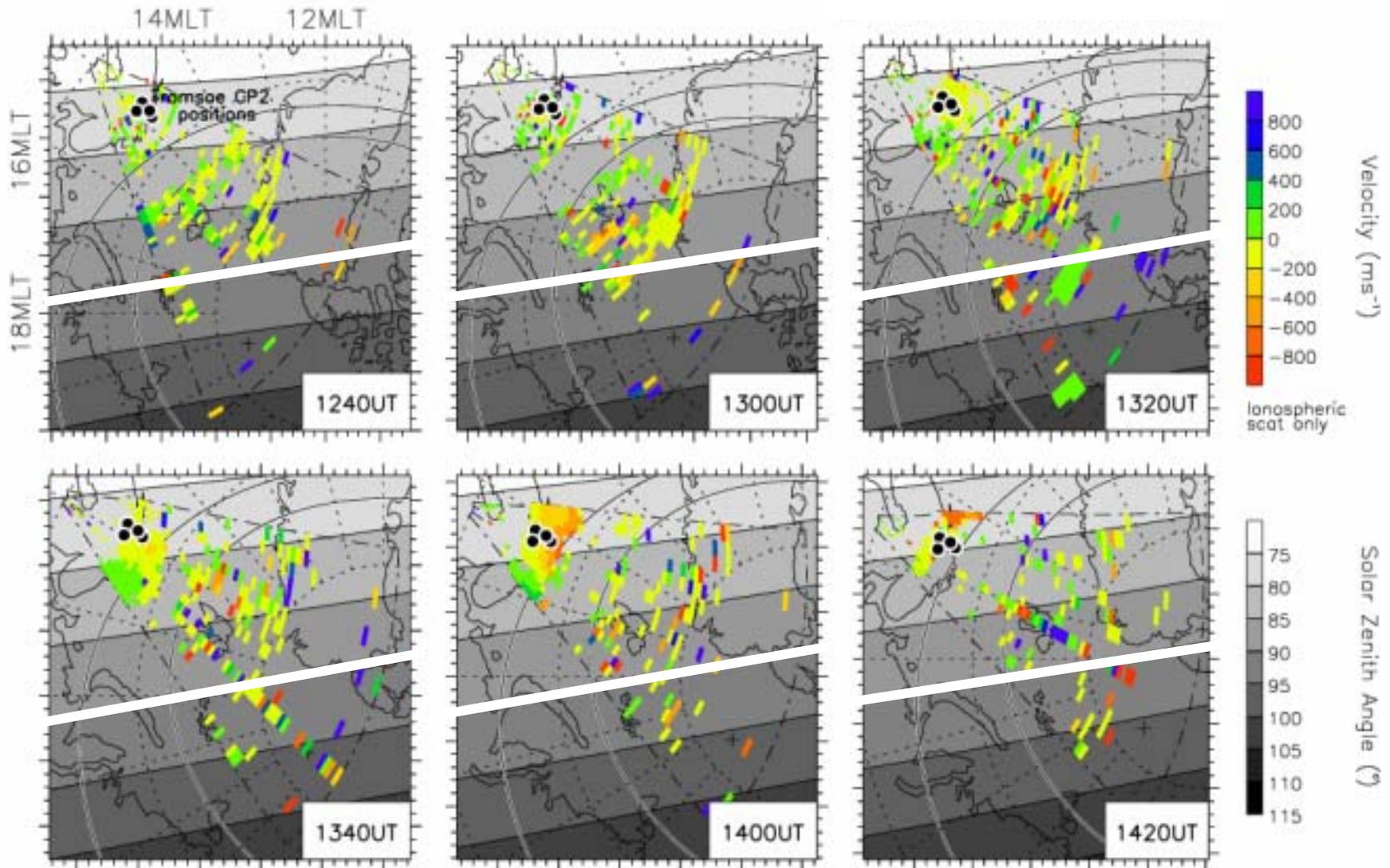


- 実際に subauroral FAIs の背景に密度勾配はあるのか？
- 日照領域で電子密度をどうやって減らす？

電離圏レベルで働いている物理プロセスは何？

Subauroral FAs on October 12th, 1996

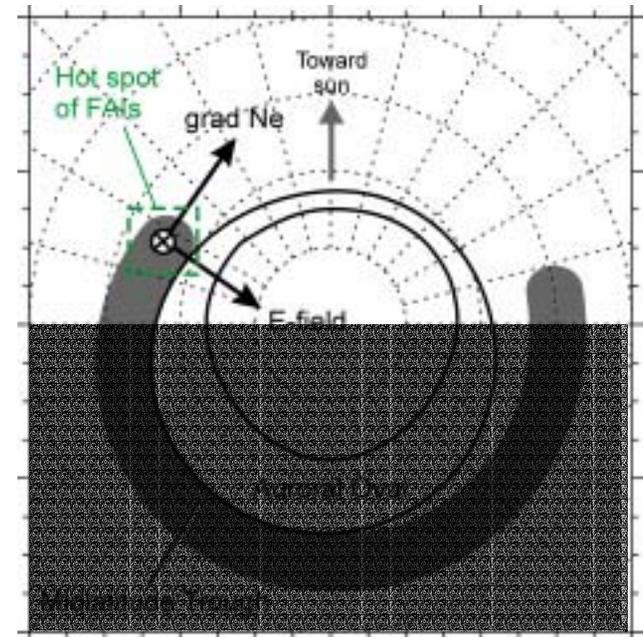
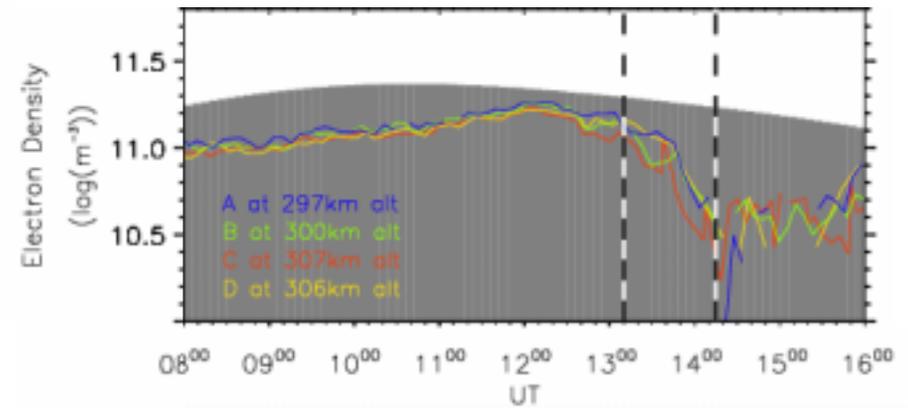
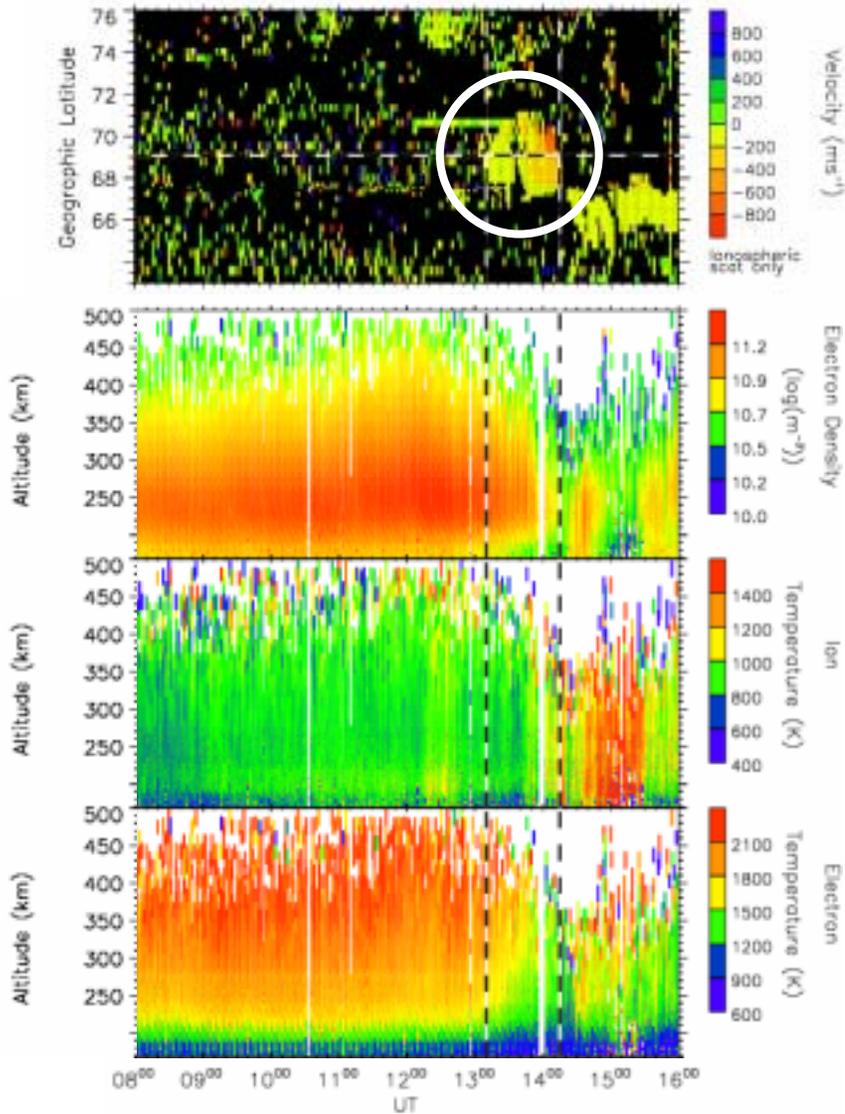
SuperDARN Finland レーダーによる subauroral FAs の観測



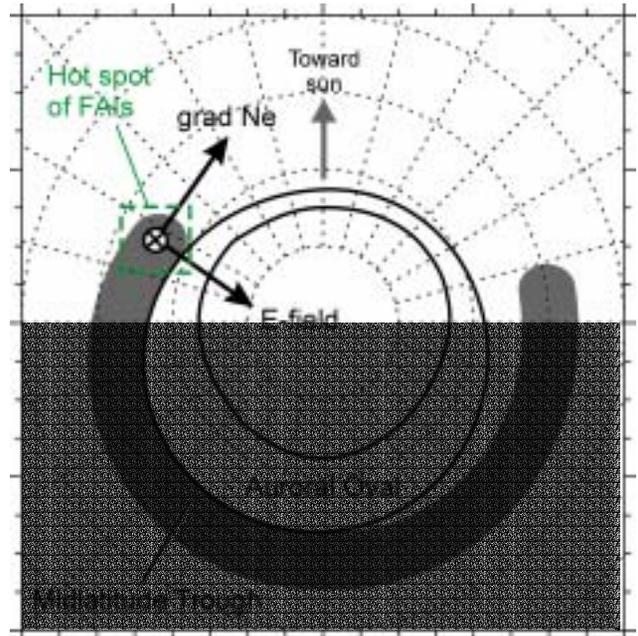
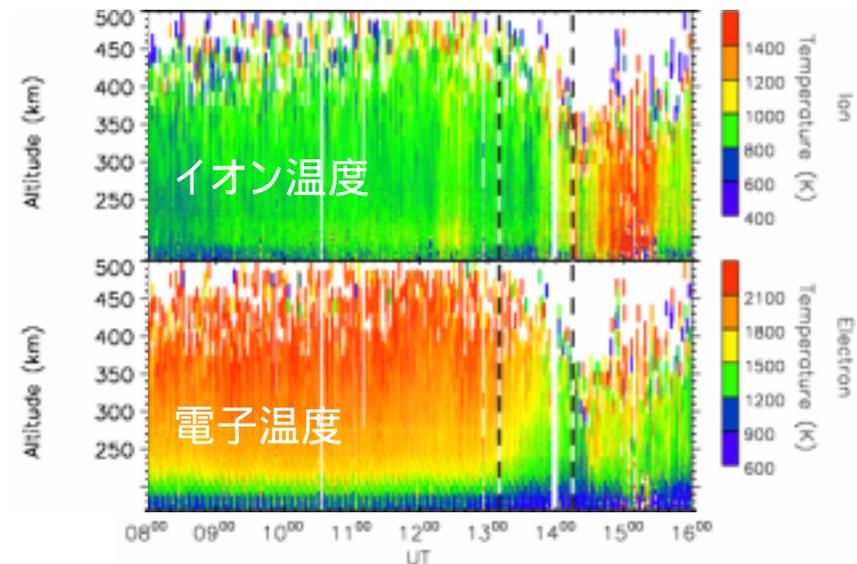
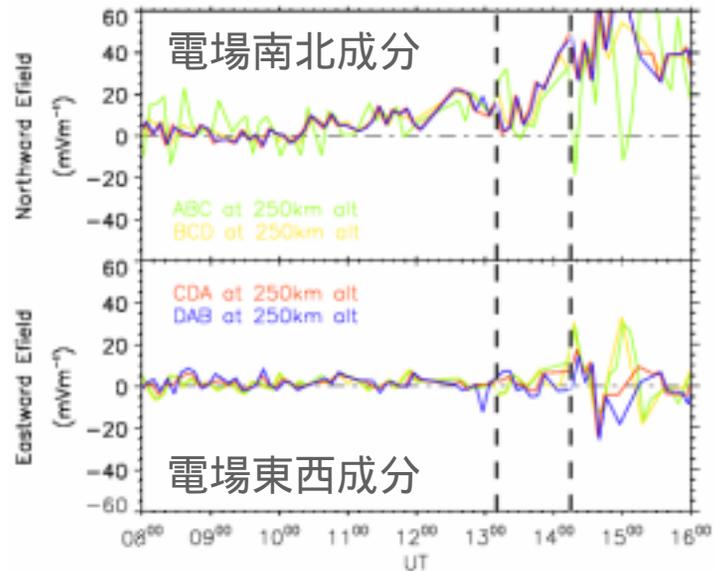
Background Parameters Obtained from the EISCAT

Subauroral FAls が観測された時間帯

F領域高度における電子密度の時間変化



Why does the Trough Extend into the Dayside ?



1 km/s (50 mV/m) を越えるドリフト



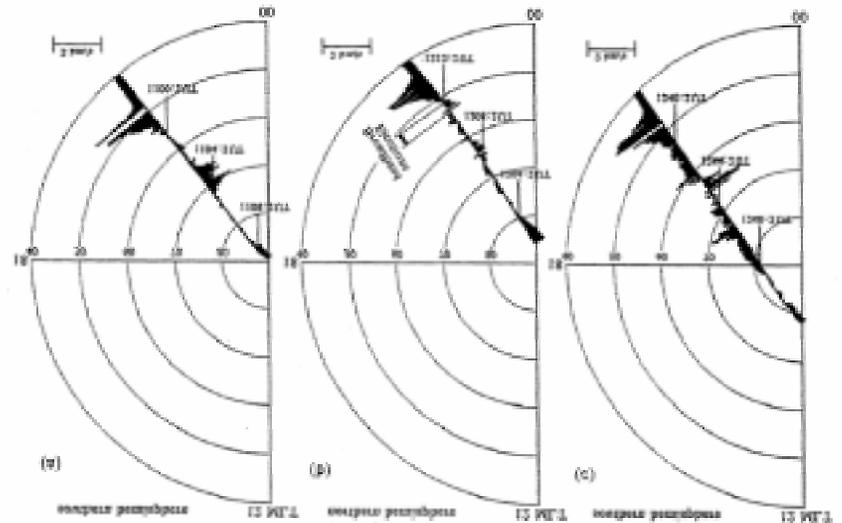
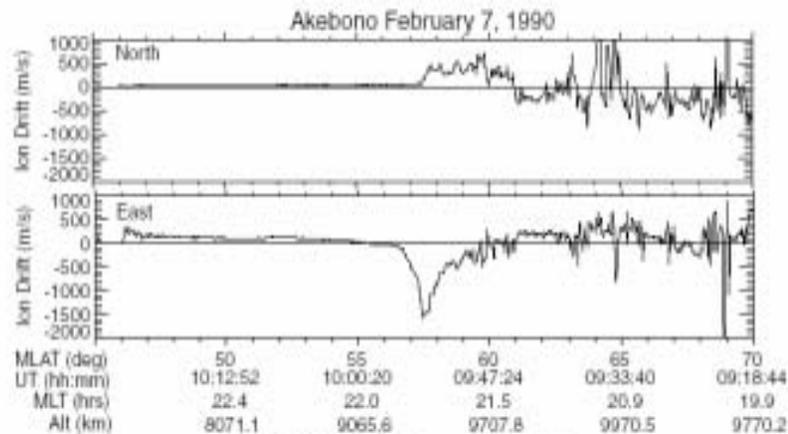
イオン温度上昇 (frictional heating)



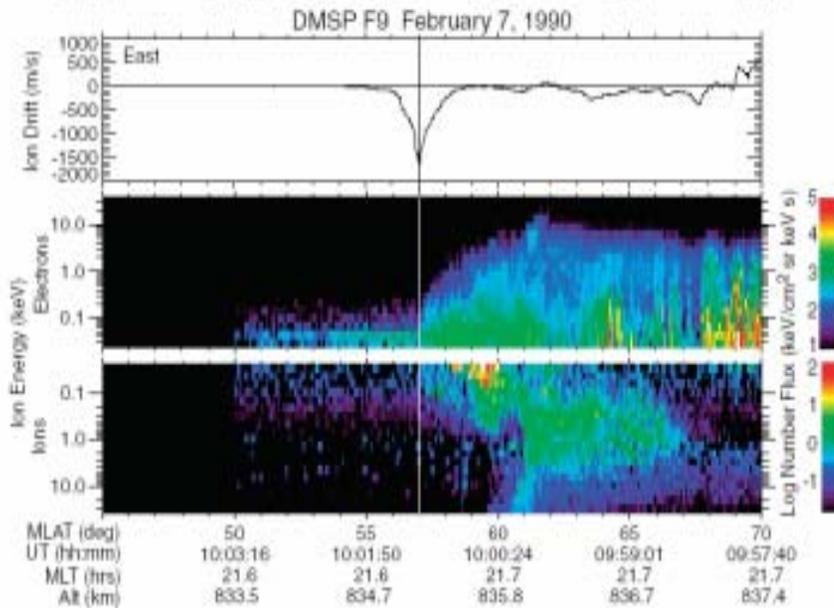
再結合率が増加し、電子密度減少

Origin of the Intense Subauroral Electric Field

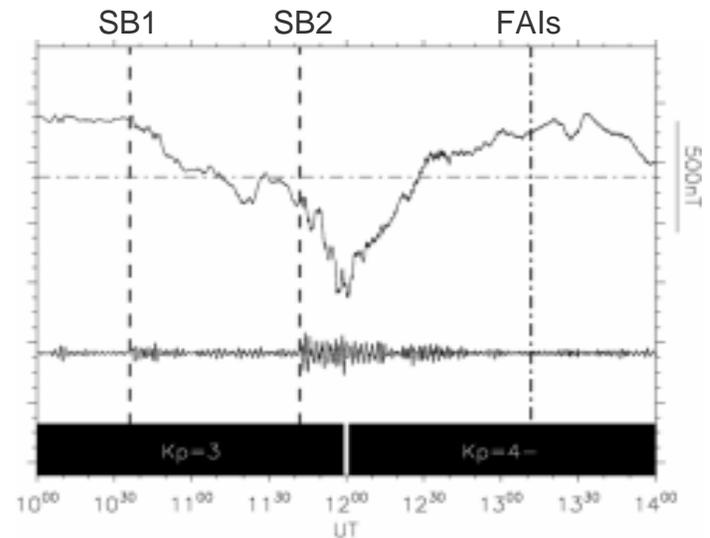
Subauroral Ion Drift (SAID)



taken from Shiokawa et al. (1997, JGR)



taken from Anderson et al. (2001, JGR)



Summary

- SuperDARN が観測する FAIs の出現特性 **subauroral 領域空間構造の診断的ツール**
(midlatitude trough の時間変動モニター可能)
- Substorm 時 trough の dayside extension **SAID とと思われる強い電場による密度減少?**
(frictional heating、内部磁気圏構造との関連)
- 磁気嵐の時の観測は現在の SuperDARN のセットアップでは不可能 **北海道ならいける?**

