

# Current Status of King Salmon HF Radar Observations

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# 2016/02/06-07 Maintenance Trip

- Tx. : Two Tx. (No.13, 15) was faulty. After maintenance, all Tx. was OK.
- Antenna : Replace No.7 of insulator. However, condition of VSWR does not improve significantly. We also found that some damage exists in an underground cable.
- Replace External HDD for recording IQ data



# 航空 - 極廻り航路への影響

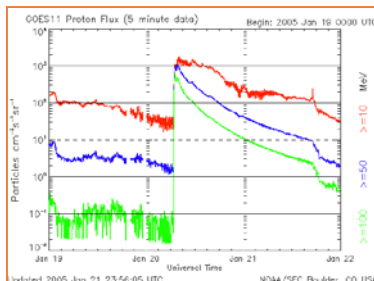
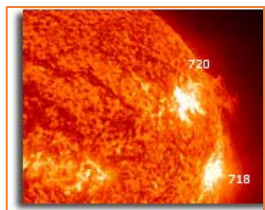
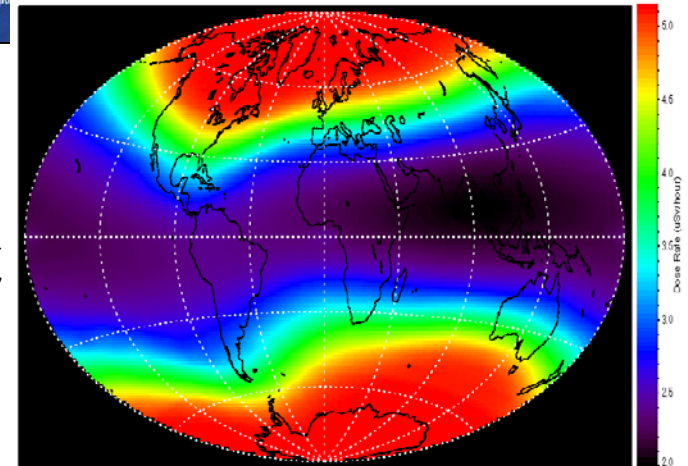
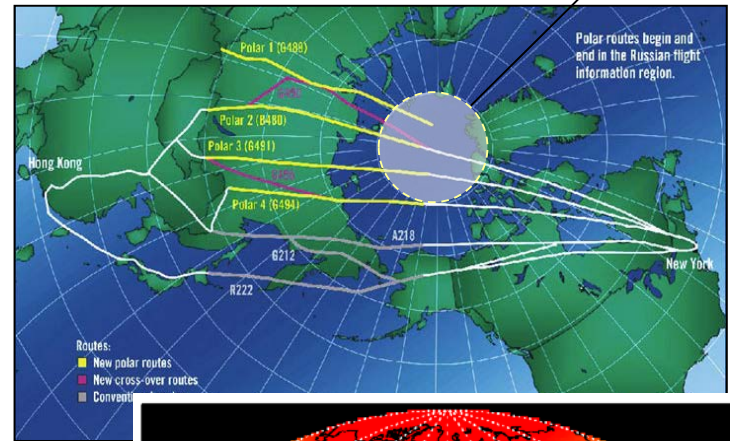
短波通信のみが可能な領域

## 通信

- 北極域の緯度82度以上の円内は、普段から衛星通信やVHF通信が使用出来ず、3~30MHzのHF通信が極廻り航路における唯一の通信手段。
- プロトン現象は、数日間に亘るHF通信途絶を引き起こす（極冠電波吸収）。

## 放射線被曝

- 宇宙線による極廻り航路での被曝レベルは通常1フライトで数十 $\mu$ SV程度。宇宙線は2種類。
  - 銀河宇宙線 (常に存在し、避けられない。)
  - プロトン現象[太陽宇宙線] (ごく稀に極めて被曝レベルが増加することがある。)
- 放射線量が増加したとき、航空会社は極廻り航路の利用を制限。



2005年1月 ユナイテッド航空： 太陽フレア（プロトン現象）の影響で26便が航路を変更

- シカゴー香港便 4日間連続アンカレッジ経由に変更。180分~210分の遅れ
- シカゴー北京便 18分~55分の遅れ
- 北京ーシカゴ便 55分~80分の遅れ

ICAOが航空運用に宇宙天気情報の導入を準備中。

# Submitting Information Paper to MISD/ICAO



METP-WG/MISD/2-SN/10  
10/06/16

## MEETING OF THE METEOROLOGY PANEL (METP) METEOROLOGICAL INFORMATION AND SERVICE DEVELOPMENT WORKING GROUP (WG-MISD)

SECOND MEETING

Montreal, Canada, 11 to 13 July 2016

Agenda Item 5: Matters Relating to WG-MISD Space Weather Work Stream  
5.1: Review and Discuss Space Weather Work Stream Deliverables

**SUPER DUAL AURORAL RADAR NETWORK AND ITS POTENTIAL CONTRIBUTION FOR  
MONITORING OF HF RADIO WAVE PROPAGATION**

(Presented by Mamoru Iishi)

### SUMMARY

This paper presents the overview of the Super Dual Auroral Radar Network (SuperDARN) and its potential contribution for monitoring of HF radio wave propagation that would be useful for operational space weather forecasting and for HF communications.

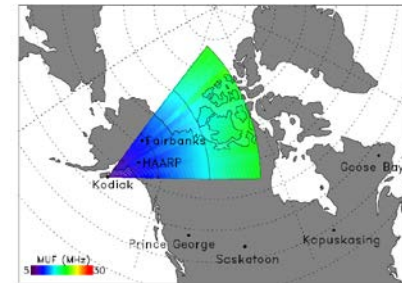


Fig. 2. Maximum usable frequency as a function of ground range over the Kodiak SuperDARN radar field-of-view obtained using ground-scatter data recorded on 23 June 2001 from 22:59–22:55 UT. For any point in the field-of-view, the color scale indicates the best-fit value of MUF for HF communications between that location and the Kodiak radar site.

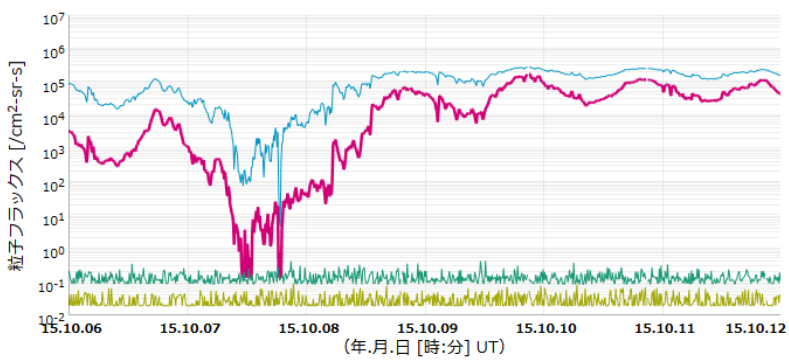
[ Hughes et al., 2002 ]

# Number of ST-APOG mode for KSR

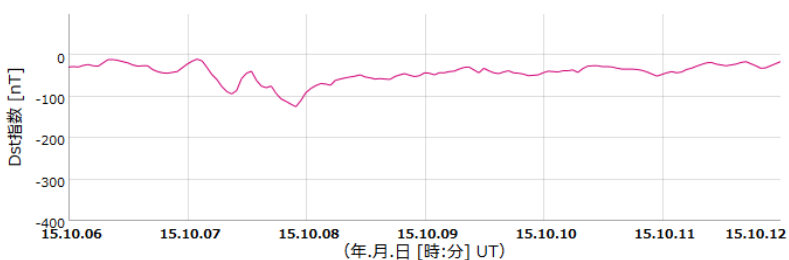
- 2015/01: 3
- 2015/02: 5
- 2015/03: 5
- 2015/04: 9
- 2015/05: 7
- 2015/06: 7
- 2015/07: 2
- 2015/08: 3
- 2015/09: 4
- 2015/10: 0
- 2015/11: 2
- 2015/12: 0
- 2016/01: 0
- 2016/02: 4
- 2016/03: 5
- 2016/04: 6
- 2016/05: 2
- 2016/06: 7
- 2016/07: 0

# Extreme RB electron Enhancement (2015/10/06-11)

☰ ▼ ⚡ 静止軌道粒子データ(GOES衛星/Secondary)



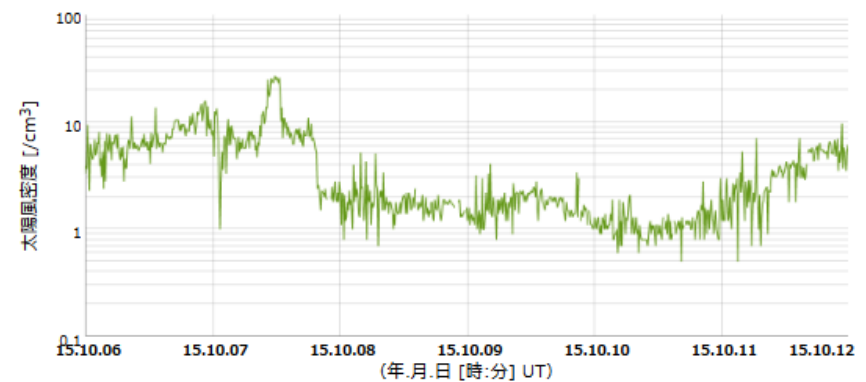
☰ ▼ ■ 地磁気データ (Dst指数)



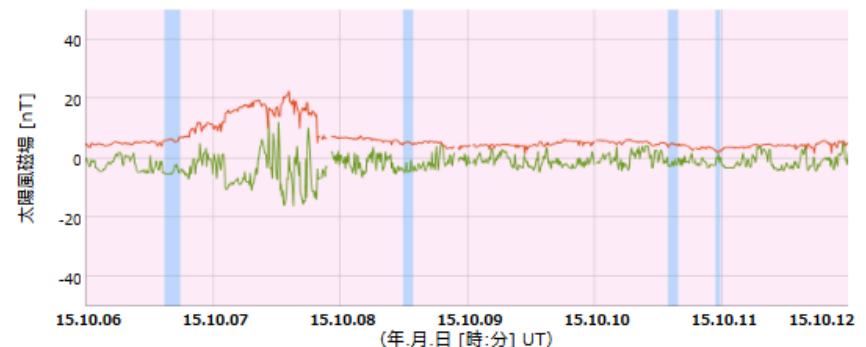
☰ ▼ ■ 太陽風速度データ(ACE衛星)



☰ ▼ ■ 太陽風密度データ(ACE衛星)

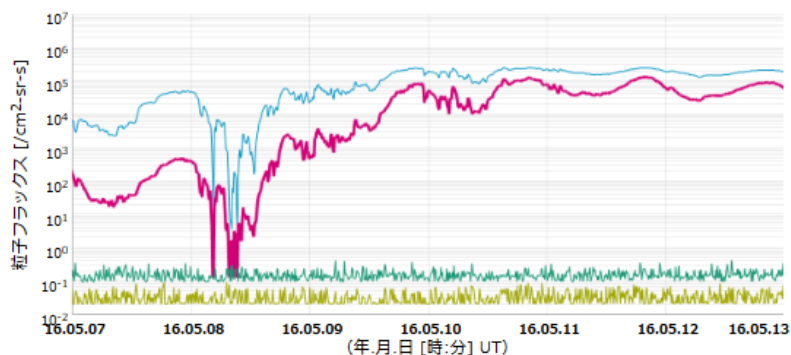


☰ ▼ ■ 太陽風磁場データ(ACE衛星)

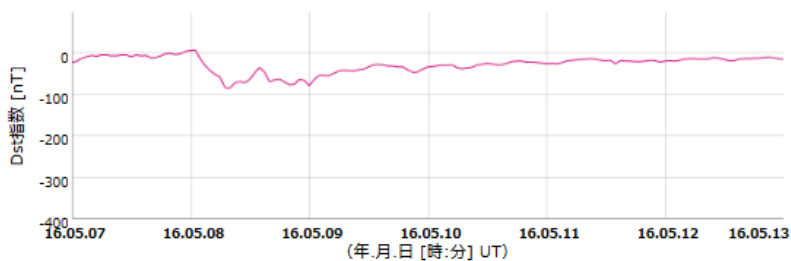


# Extreme RB electron Enhancement (2016/05/07-12)

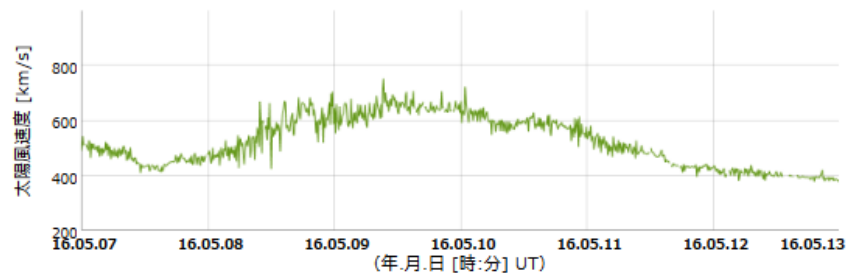
▼ 静止軌道粒子データ(GOES衛星/Secondary)



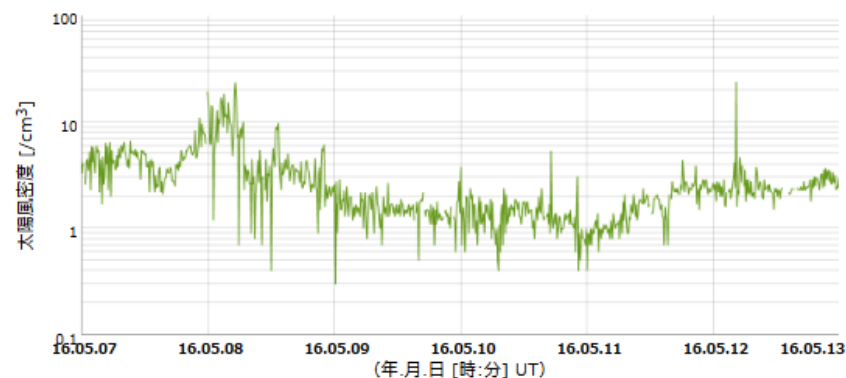
▼ 地磁気データ (Dst指数)



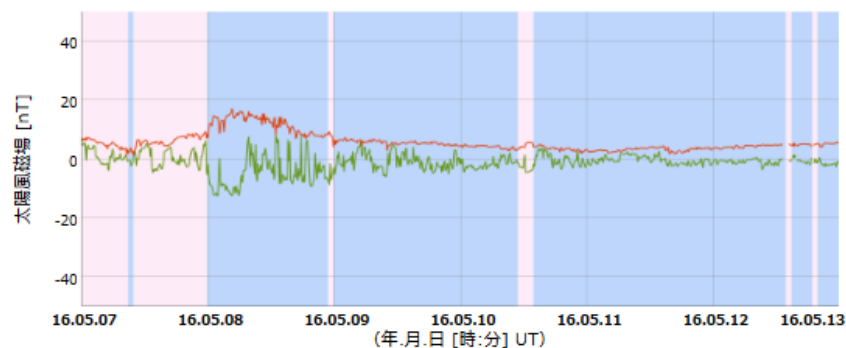
▼ 太陽風速度データ(ACE衛星)



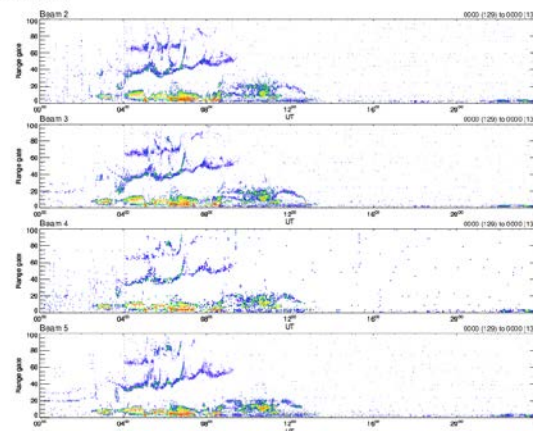
▼ 太陽風密度データ(ACE衛星)



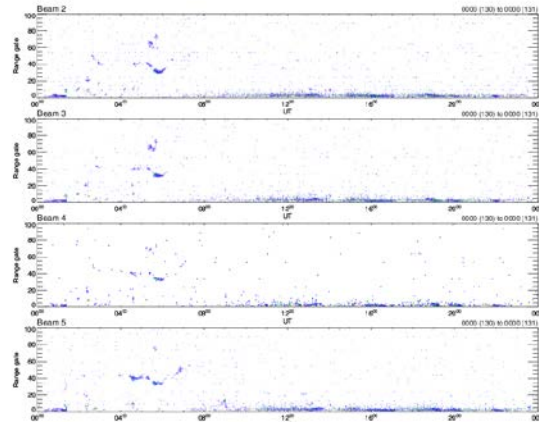
▼ 太陽風磁場データ(ACE衛星)



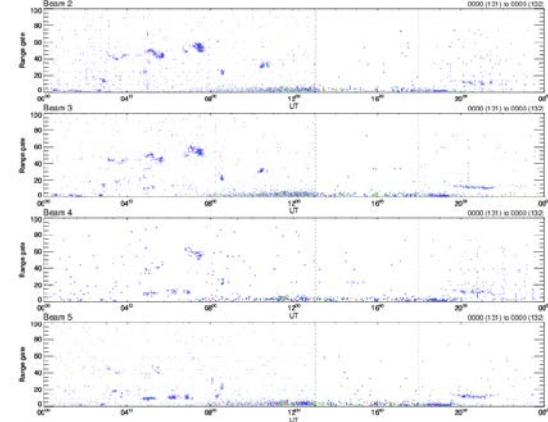
SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



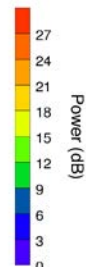
8 M SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



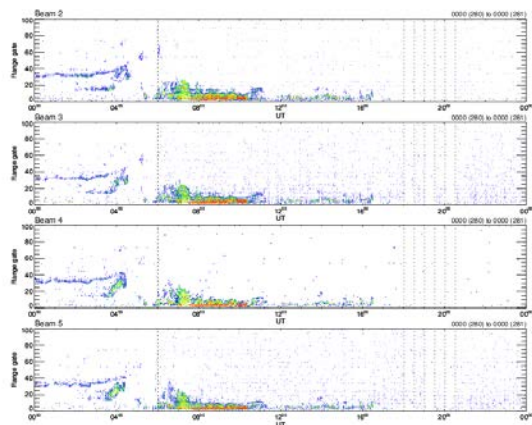
9 M SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



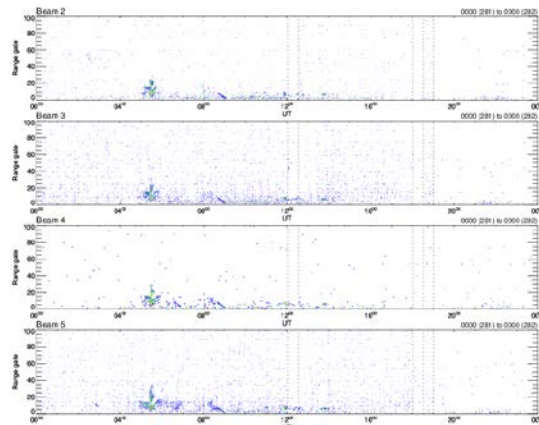
10 May 2016<sup>(131)</sup>  
unknown scan mode (200)



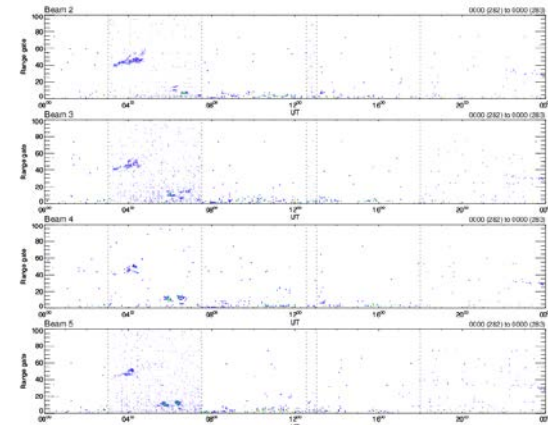
SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



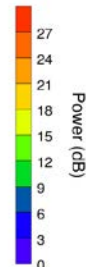
7 Oct SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



8 Oct SUPERDARN PARAMETER PLOT  
King Salmon: pwr\_1



9 Oct 2015<sup>(202)</sup>  
unknown scan mode (3300)



Although CT-TRIG mode was operating during this period, there was almost no echo!