


Investigation of ULF pulsations using the SuperDARN Hokkaido HF radar

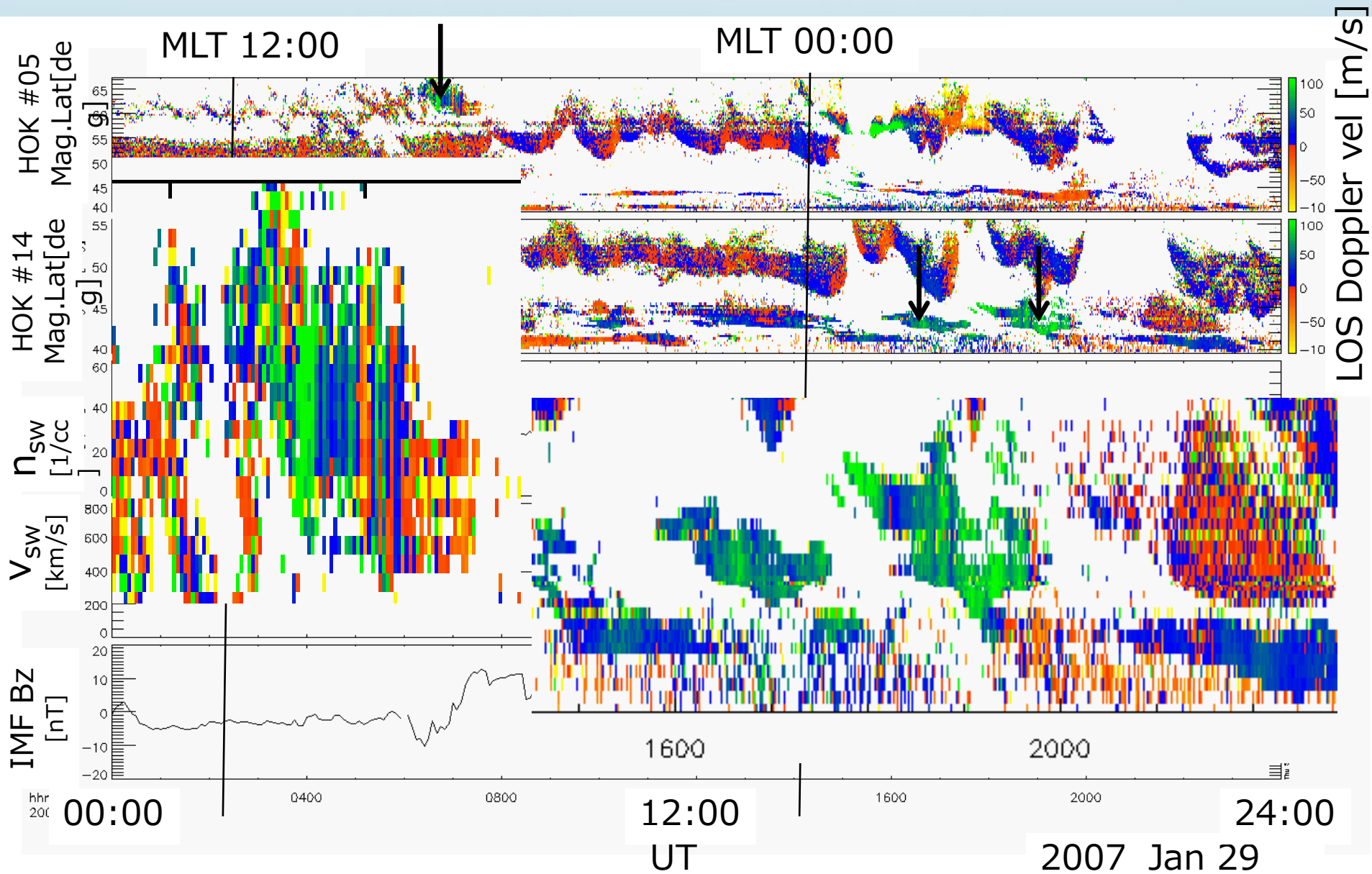


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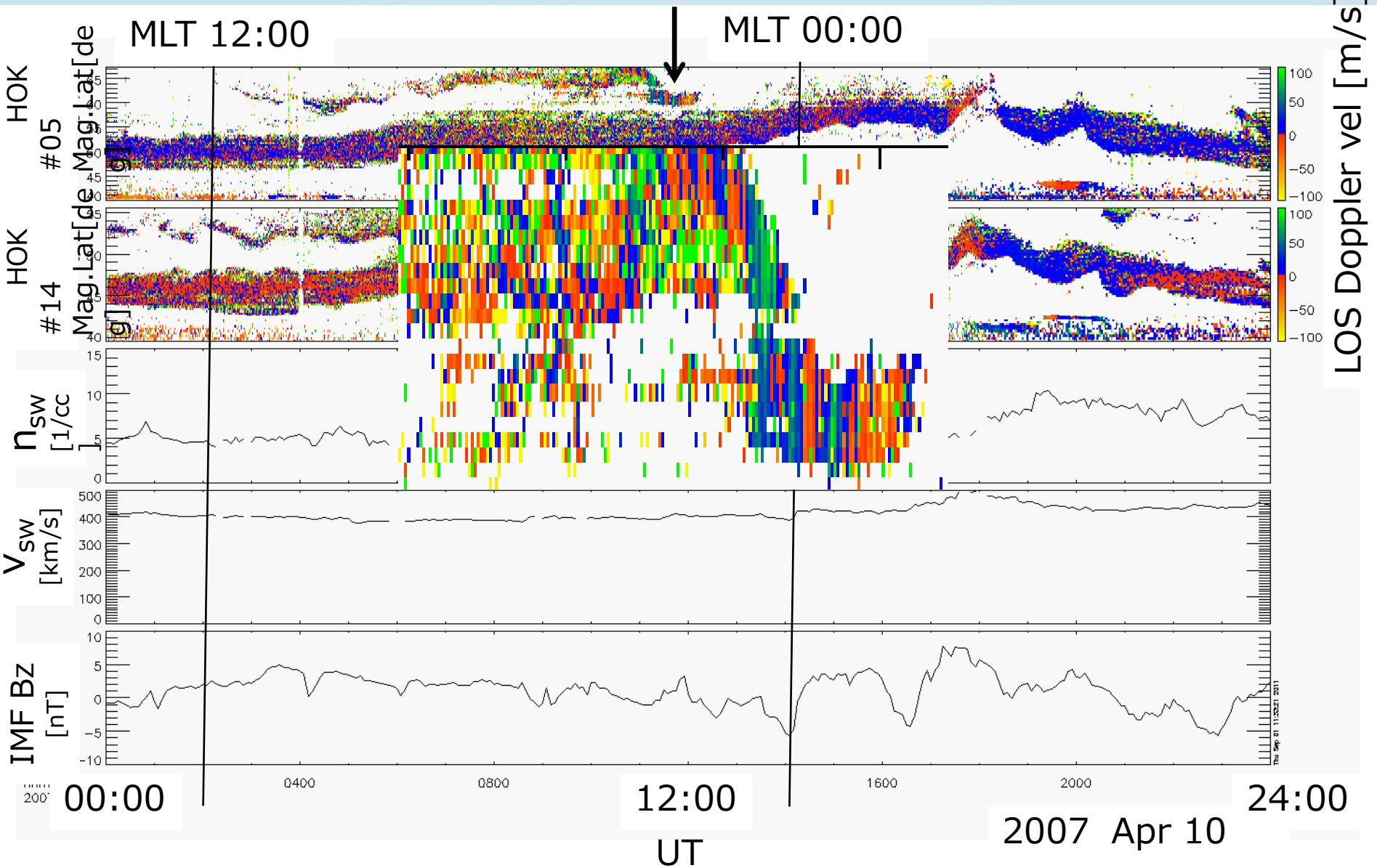
Introduction

- Background of the research:
 - Previous studies of ULF waves indicate that variation of the solar wind velocity and/or dynamic pressure is important drivers of magnetospheric Pc5 waves.
 - ULF waves in the inner magnetosphere have been considered to play an important role in acceleration/transport of radiation belt electrons.
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- Motivation:
 - How ULF waves propagate from the solar wind to inner magnetosphere (middle/low latitudes)?
 - What is the similarity and difference of middle-latitude ULF waves observed by SuperDARN radar and magnetometers?

Example of ULF event (1)



Example of ULF event (2)



Toward statistical analysis

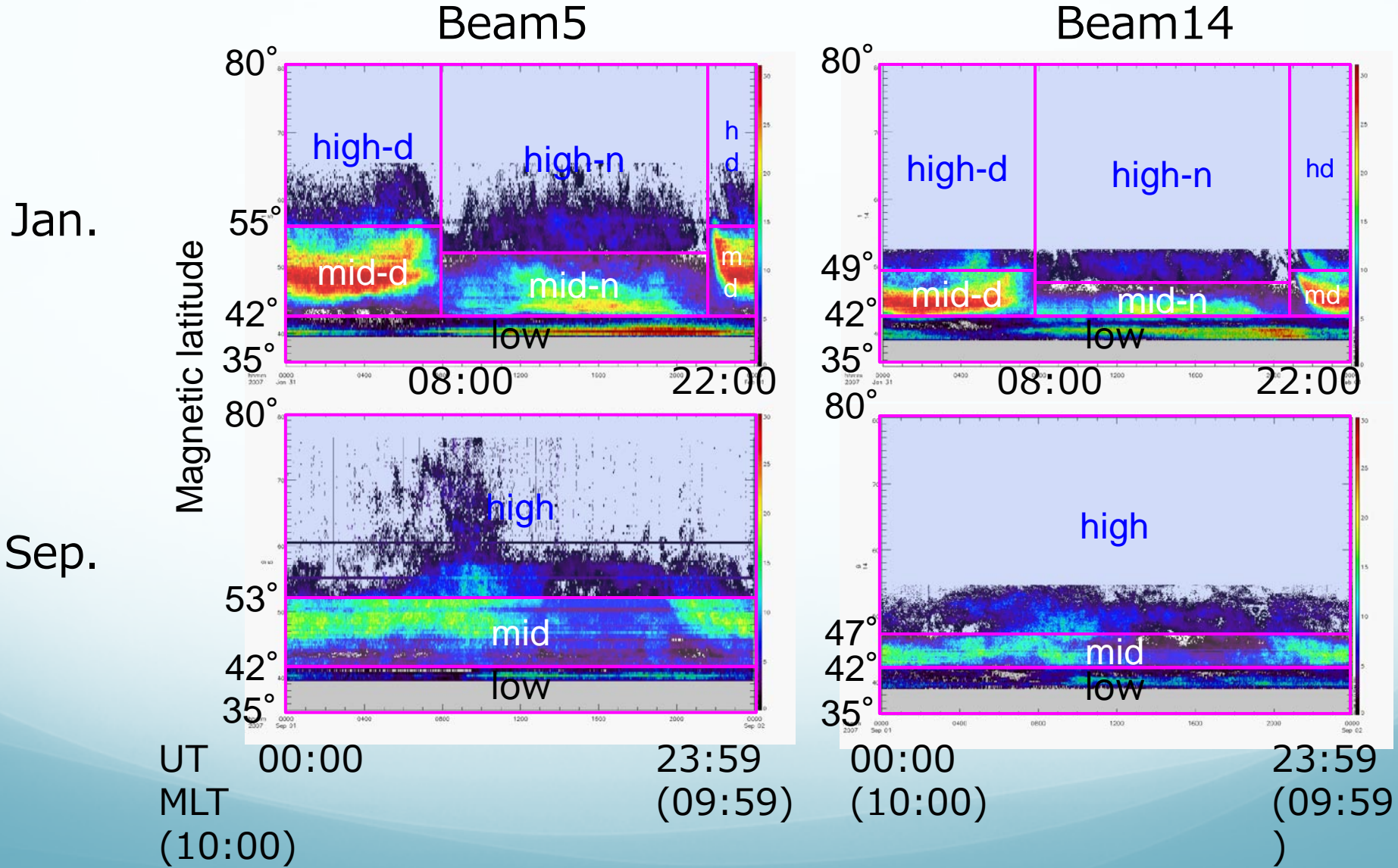
- Needs to create continuous time series of data and remove background trend.



- Data coverage of SuperDARN Hokkaido HF radar is investigated.

Data coverage of Hokkaido-Rikubetsu HF radar (2007)

Zoning for background trend calculation



Toward statistical analysis

- Needs to create continuous time series of data and remove background trend.



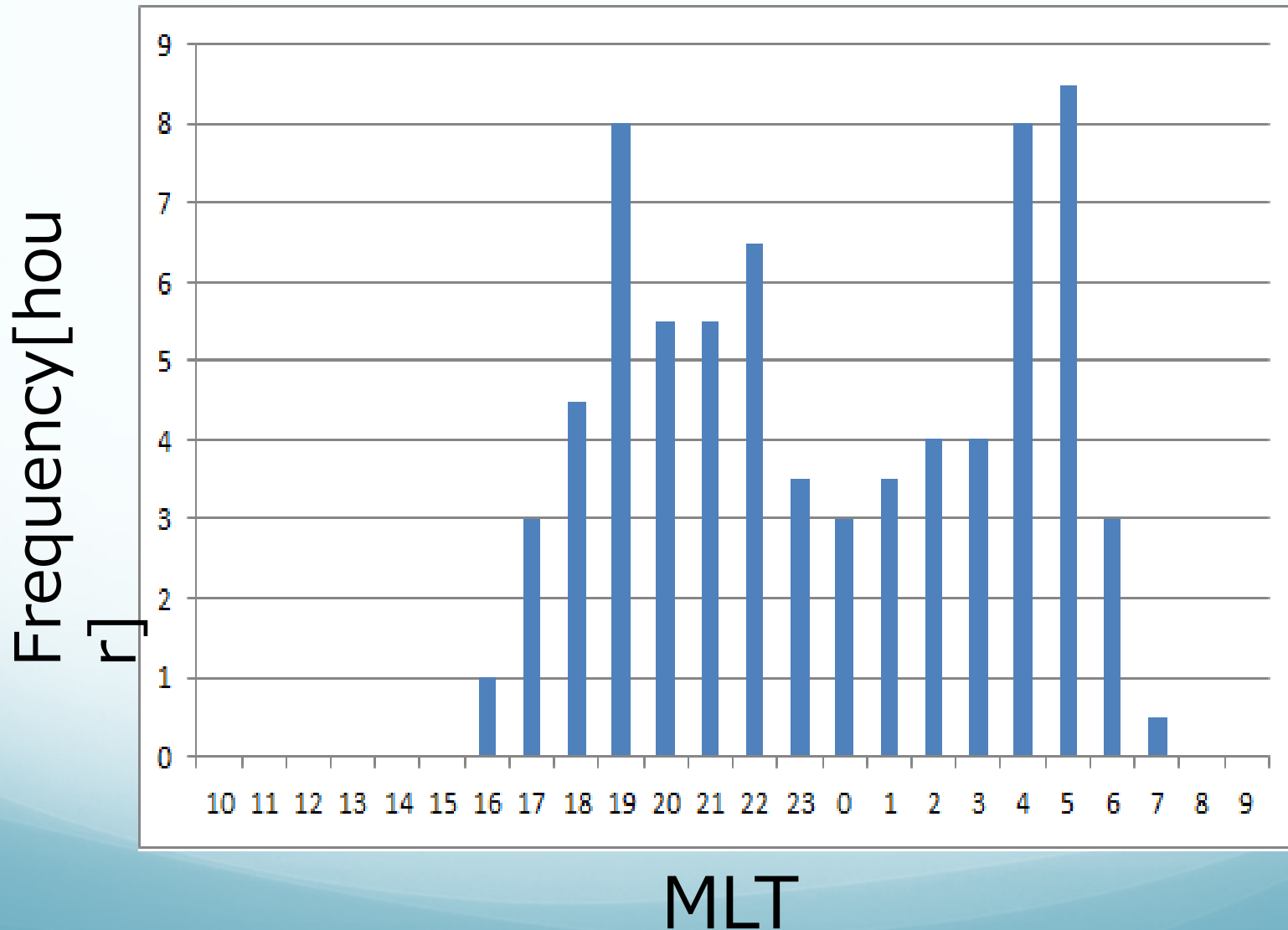
- Strategy:
 - Divide the range to high, middle, and low latitude zones based on data coverage of the HF radar.
 - Calculate background trend in each zone and subtract it from each range-gate data in the zone.
 - In order to interpolate missing echo data, several ranges should be averaged to create continuous time-series data.
 - Conducting frequency analysis of the time-series data, automatically select ULF events.

Summary

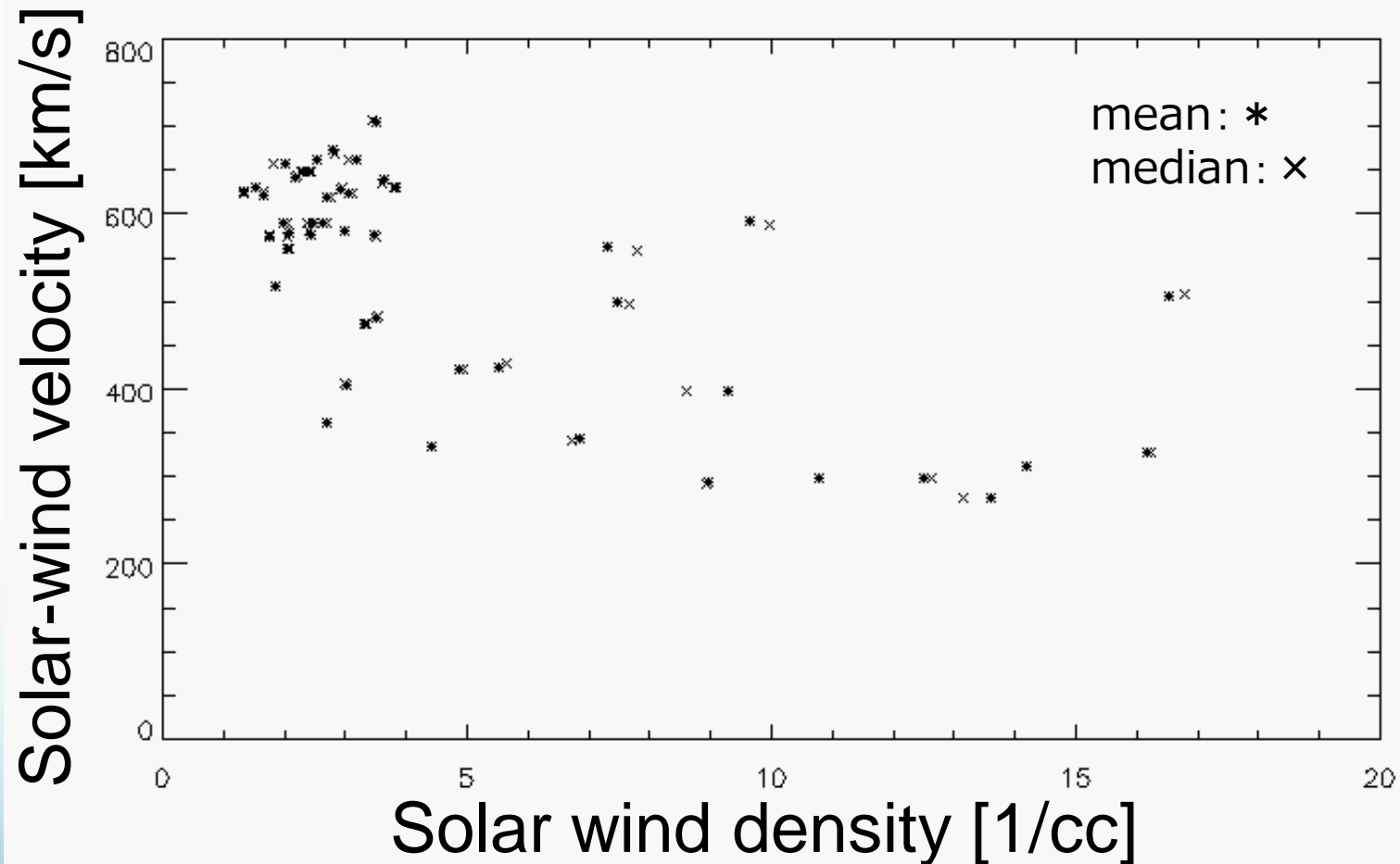
- To create a time-series data required to perform frequency analysis of ULF events, we investigated monthly data coverage of SuperDARN Hokkaido HF radar during 2007.
- Results show:
 - Data coverage changes with season and local time.
 - Most beams in the same month show the similar pattern, except for latitudinal scales of the pattern.
 - The range-LT diagram can be roughly divided into 3 or 5 zones depending on season.
- Strategy to perform the statistical analysis of ULF events based on the data coverage is presented.

Preliminary analysis for 2007:

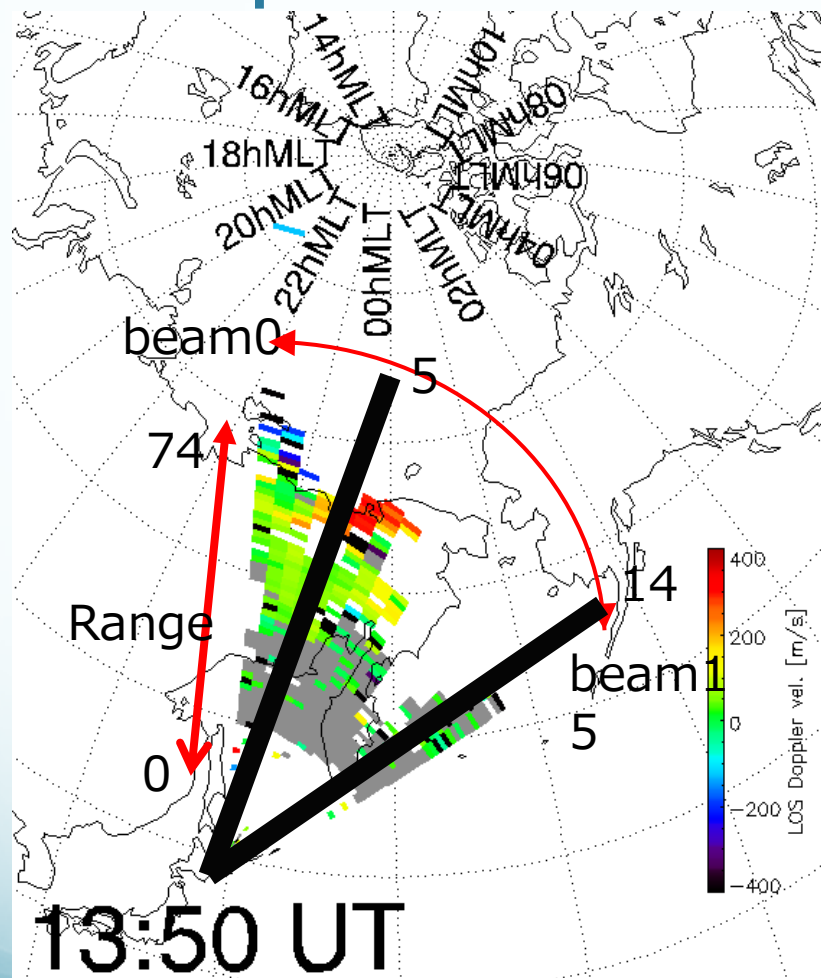
Dependence of MLT



Relation between solar wind density and velocity

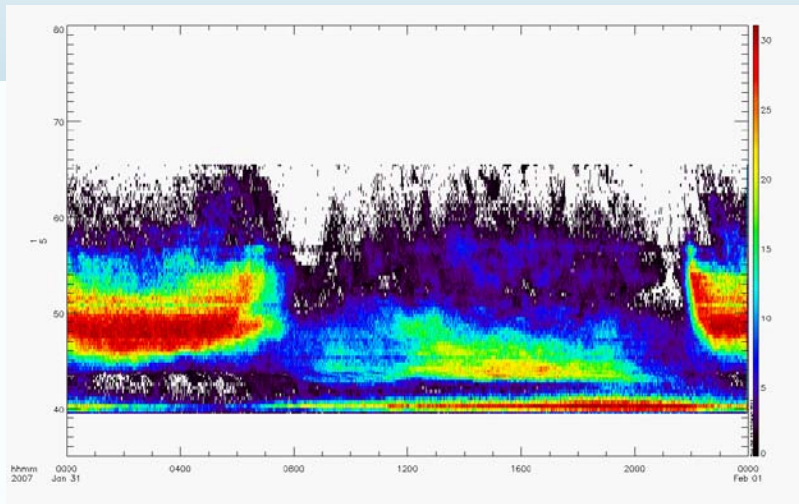


SuperDARN Hokkaido HF radar

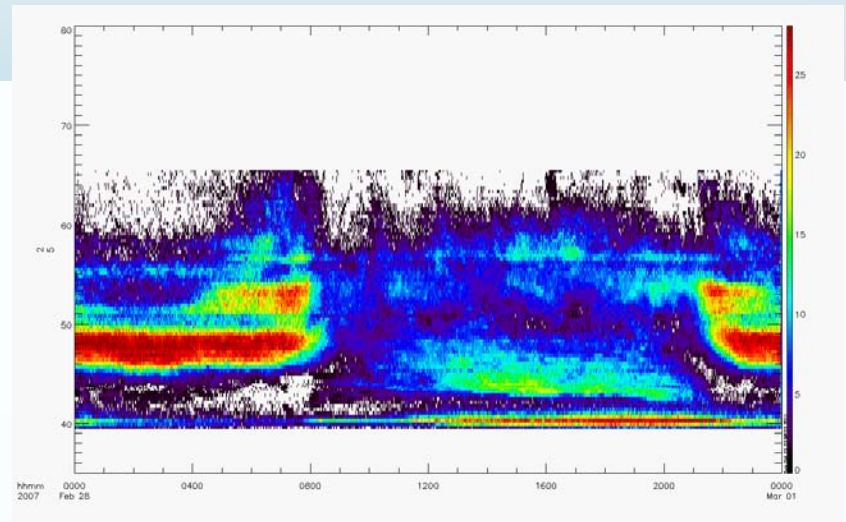


- Data set:
 - From January 1, 2007
Until 31 December
2007
 - Include Ground scatter

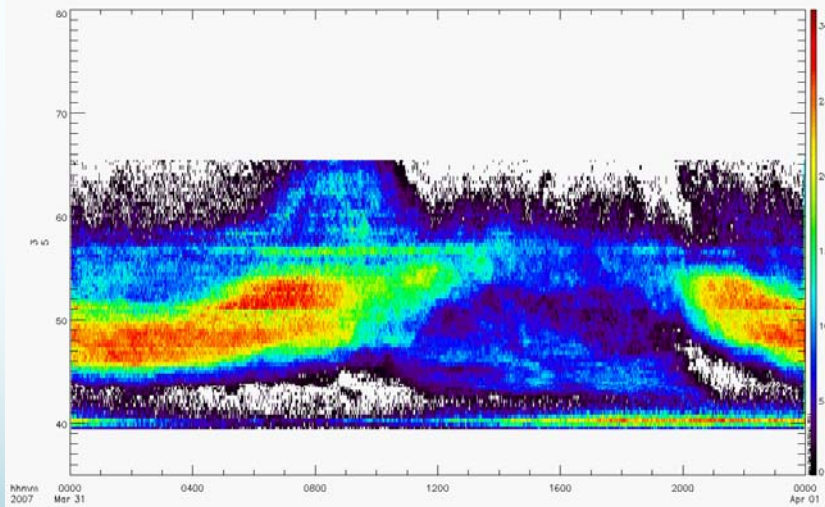
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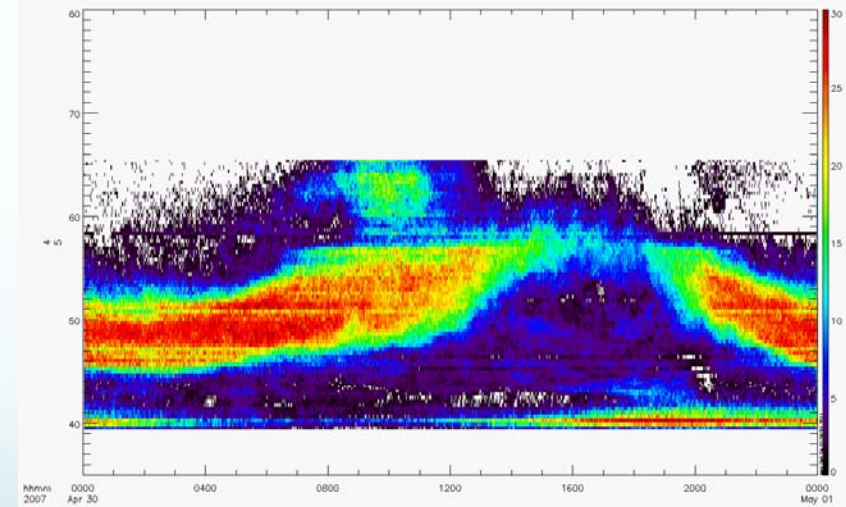
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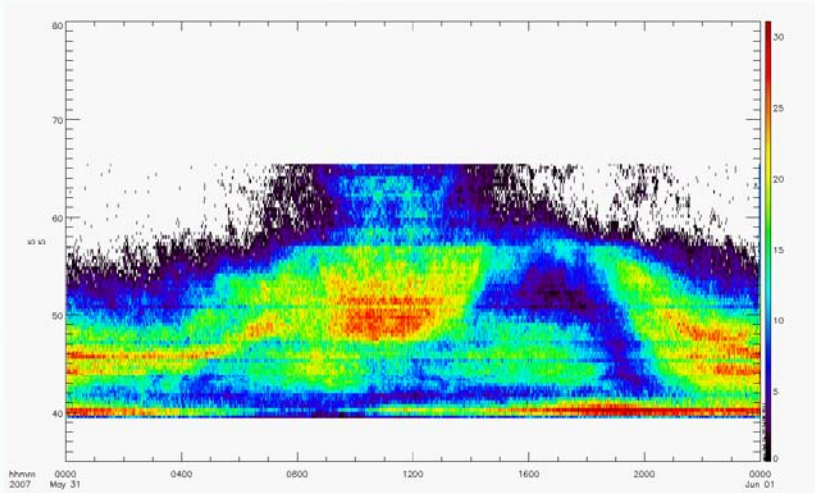
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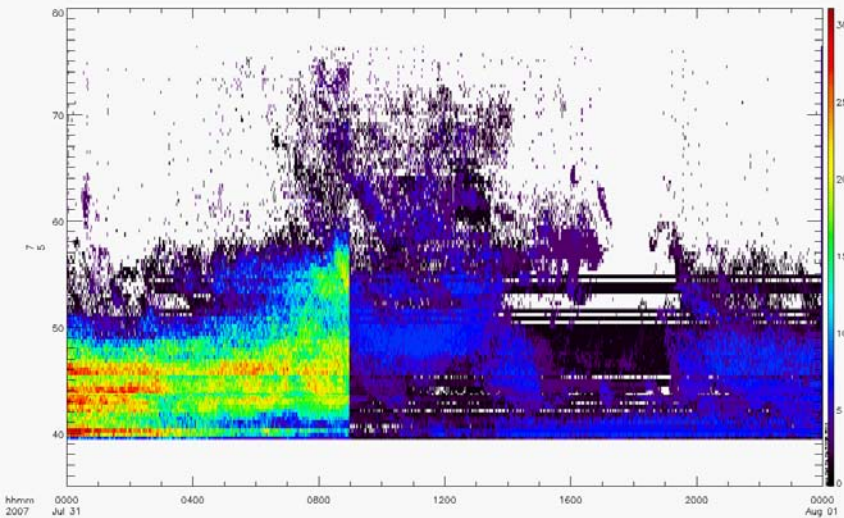
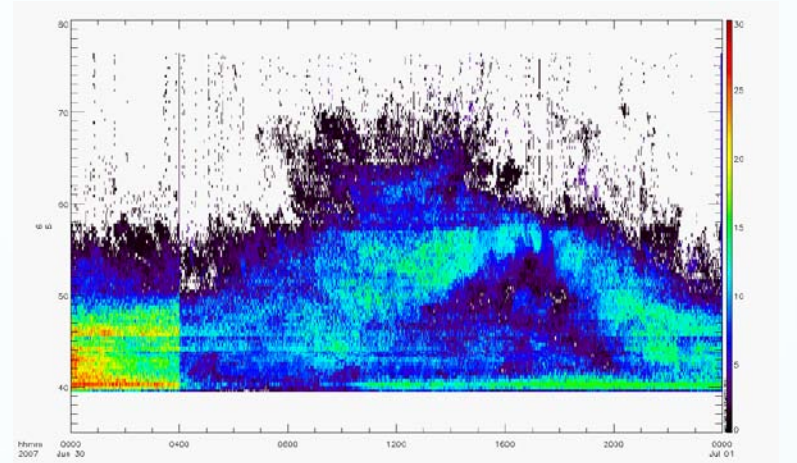
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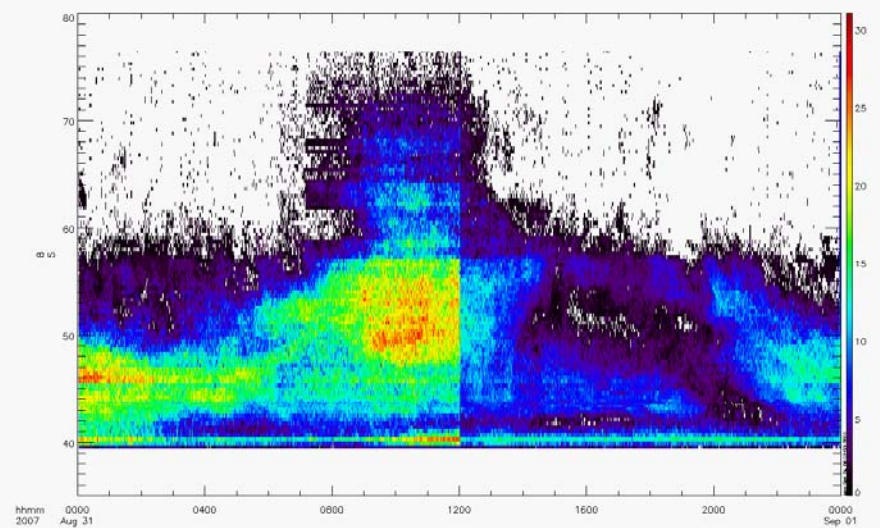
May



Jun



Jul



Aug