

Simultaneous observations for MLT Neutral Winds by FPI and Meteor Radar at King Sejong Station(KSS), Antarctica: Brief report

Geonhwa Jee, Changsup Lee, Jeong-Han Kim

Korea Polar Research Institute (KOPRI), Incheon, Korea

Won-Seok Lee, Yongha Kim

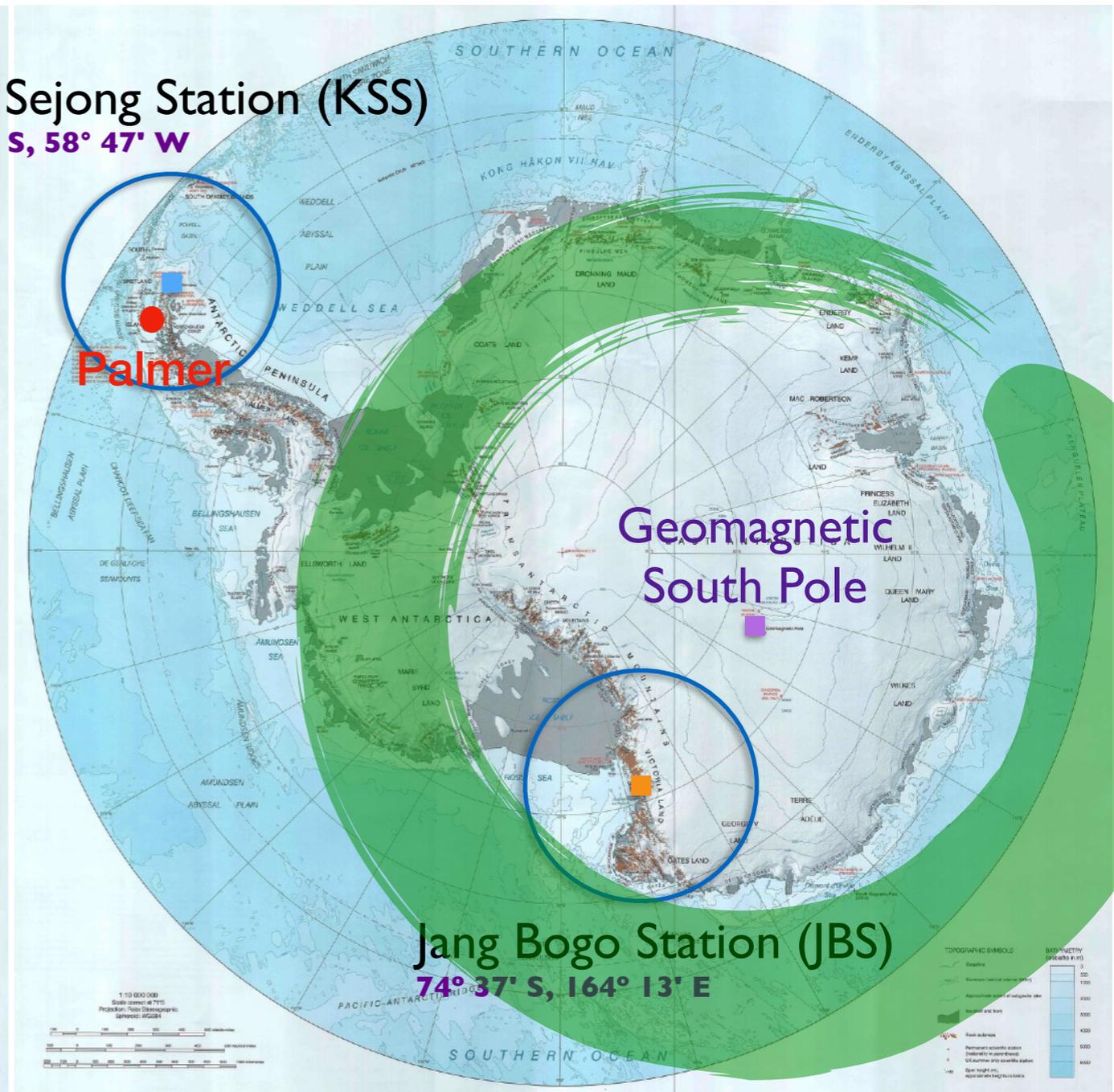
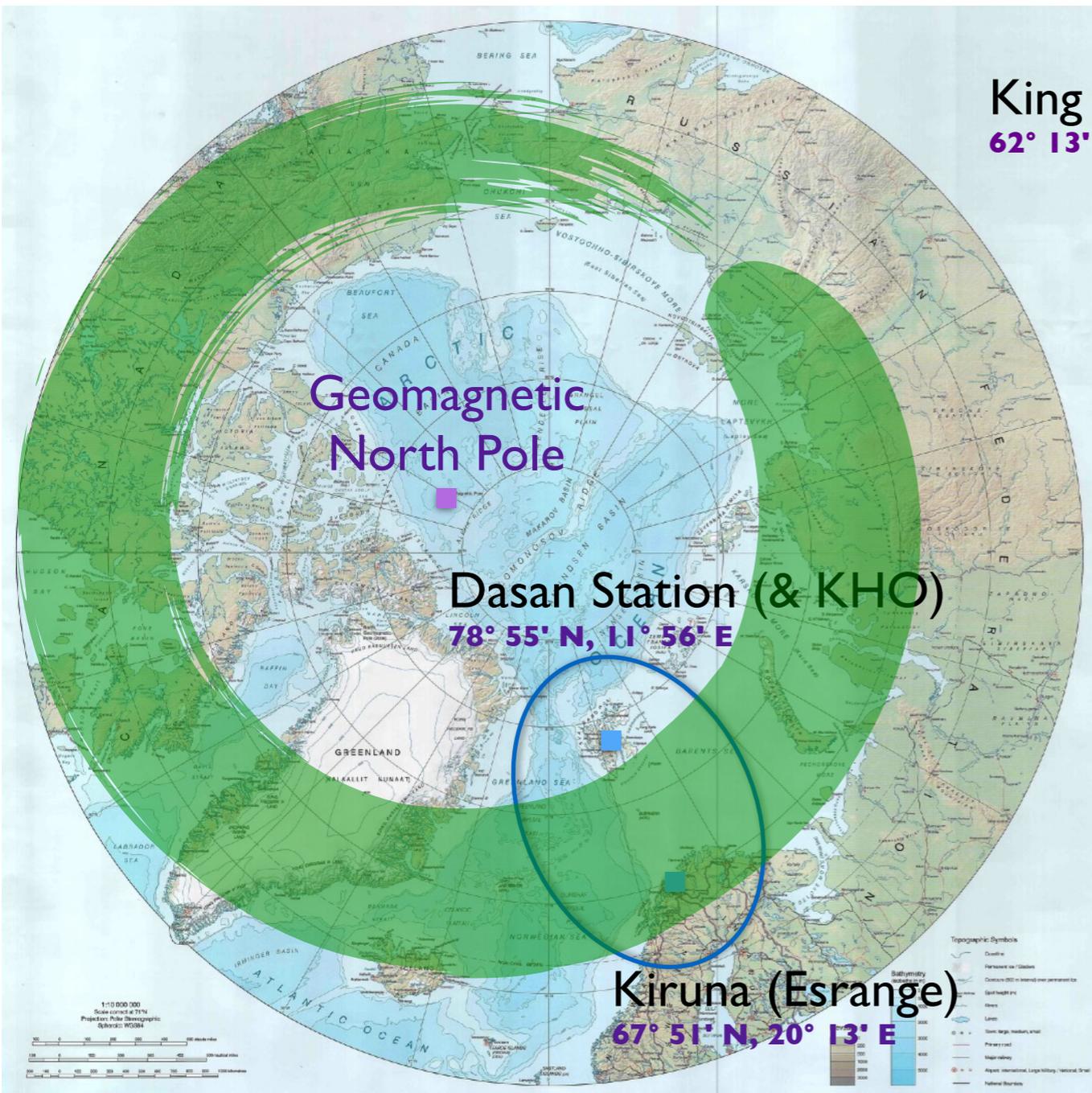
Chungnam National University, Daejeon, Korea

Qian Wu

NCAR/HAO, Boulder, CO, USA



King Sejong Station (KSS)



King Sejong Station (KSS)

Optical Obs.
FPI & ASC



Meteor
Radar



KSS-Meteor Radar



KSS-Meteor Radar

- ATRAD meteor detection radar
- Continuously operated since March 2007
- Number of echo: 15,000~40,000 per day, which is more than twice of typical meteor radar observations
- Hourly mean neutral wind profiles (75~105 km) and daily mean temperature at around the meteor peak height (~ 90 km)

KSS-FPI

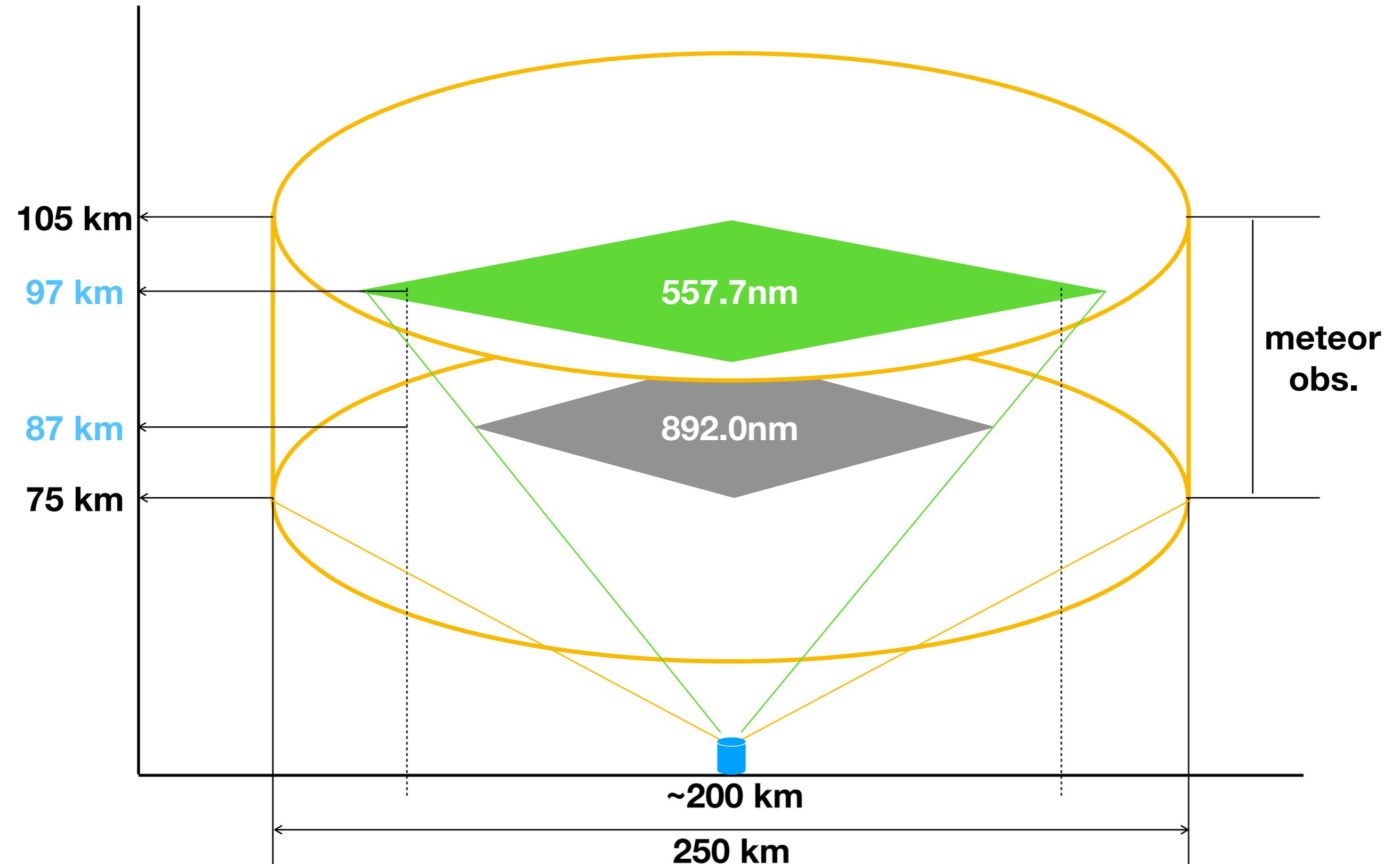


KSS-FPI

- It was operated by NCAR/HAO at US Palmer station, Antarctica
- Moved to KSS in Jan. 2017 in collaboration with NCAR/HAO
- Operates with three filters for 630.0 nm, 557.7 nm, 892.0 nm airglow emissions
- Snapshot winds for each filter with about 55 min. temporal resolution



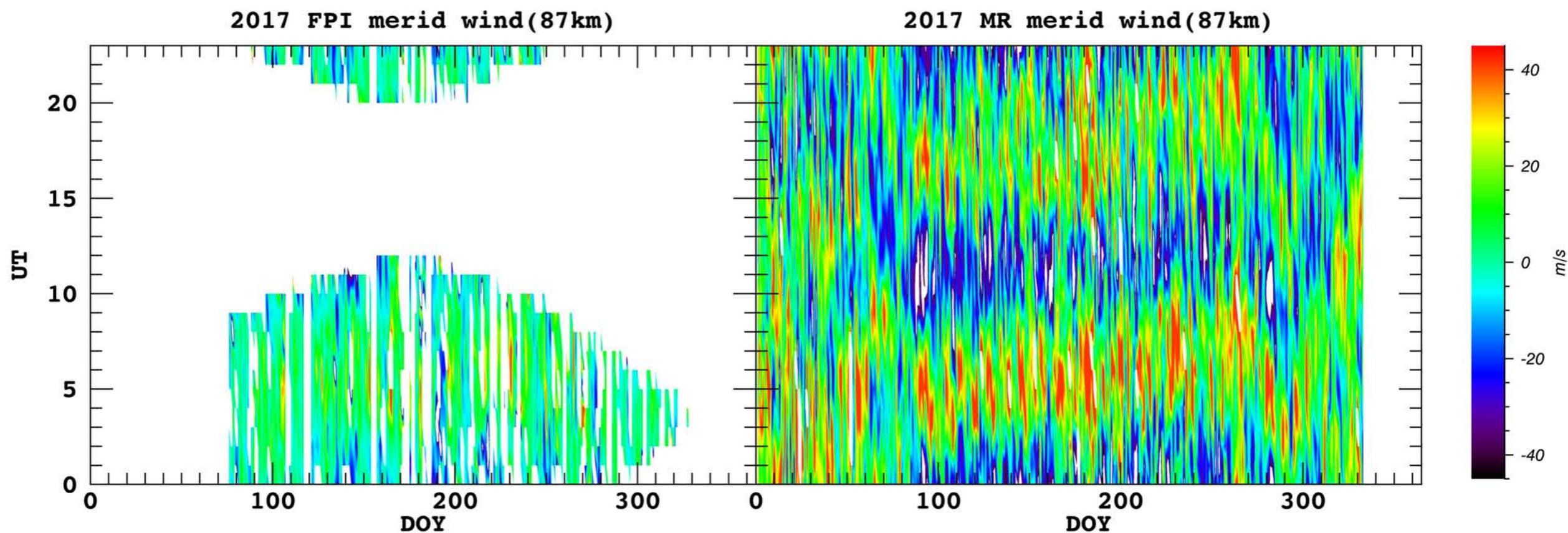
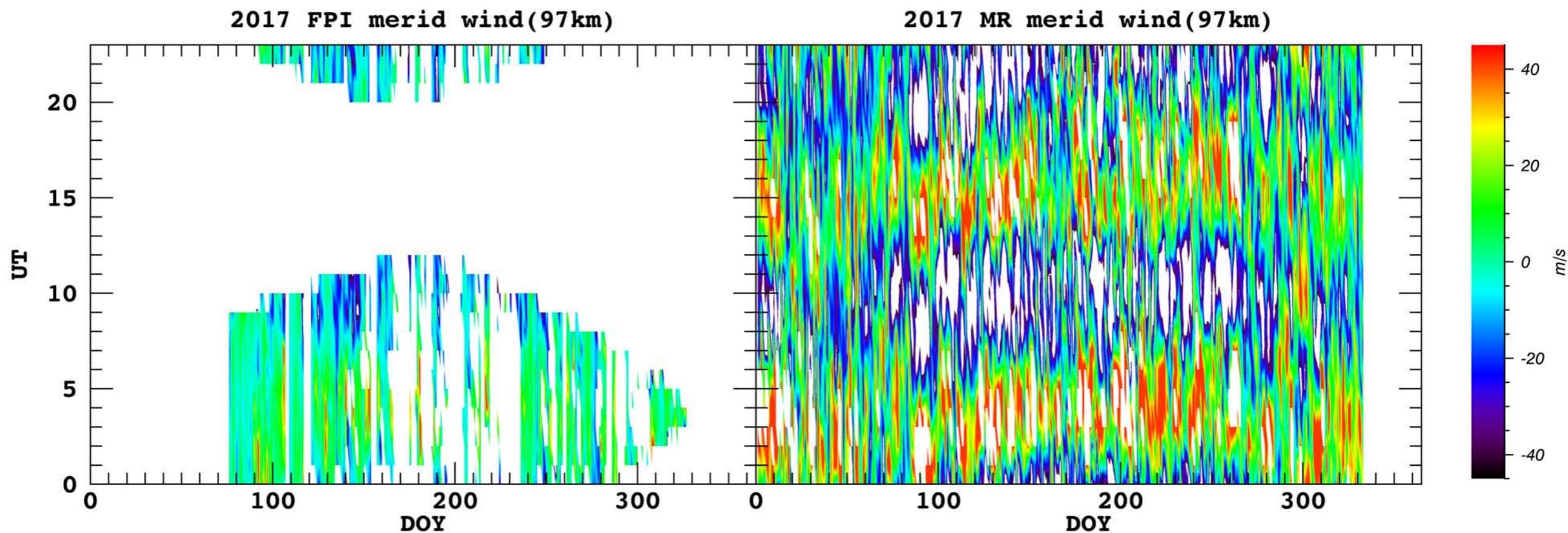
Spatial Coverage



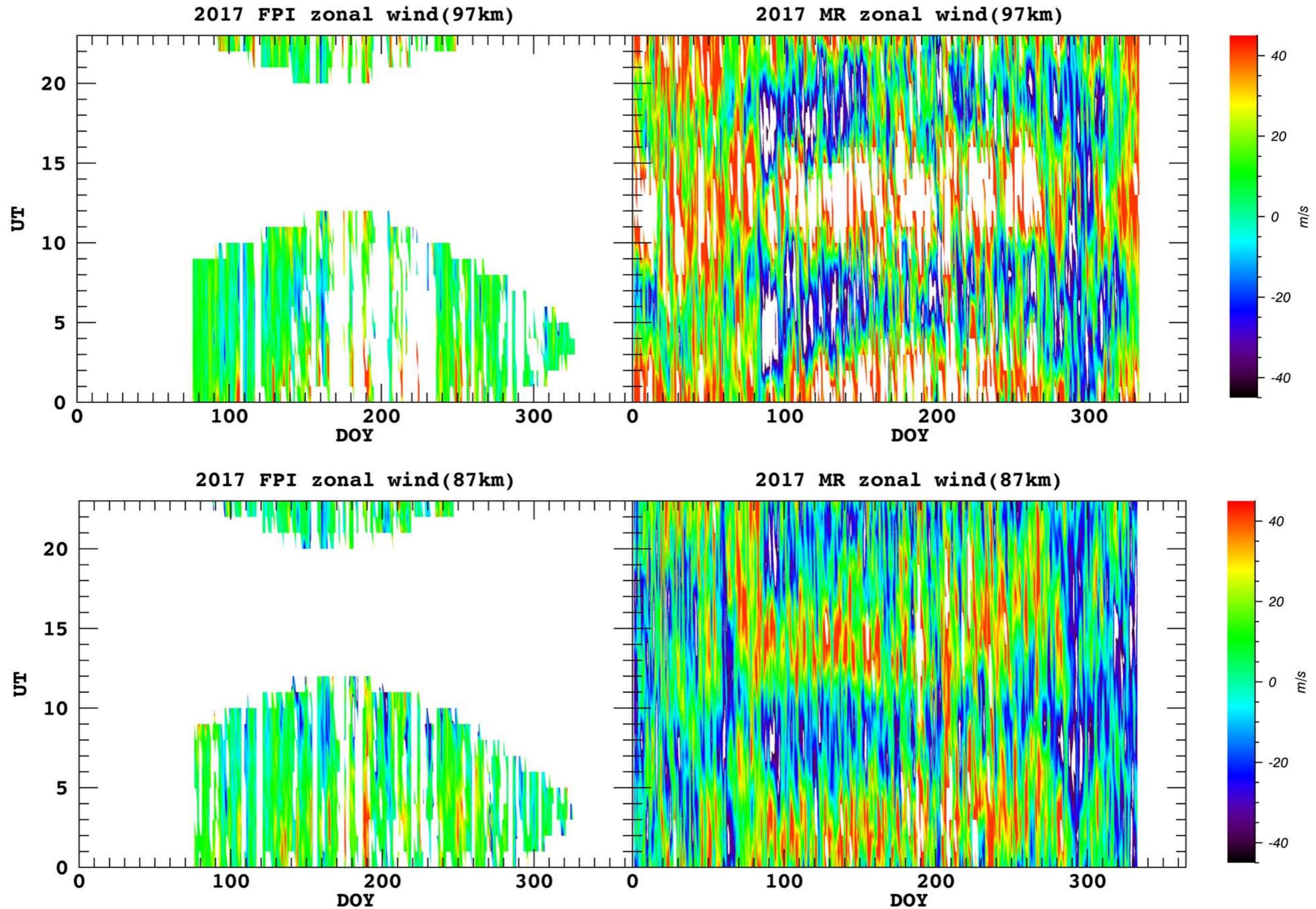
FPI vs. MR

	FPI winds	MR winds
Temporal resol.	55 min. (with 3 filters) :snap shot winds & temp. for each filter	1 hour :hourly mean winds & daily mean temp.
Spatial resol.	~200 km	~250 km
Height	87 km (OH 892.0 nm) 97 km (O 557.7 nm) 250 km (O 630.0 nm)	75~105 km (with 2 km step)

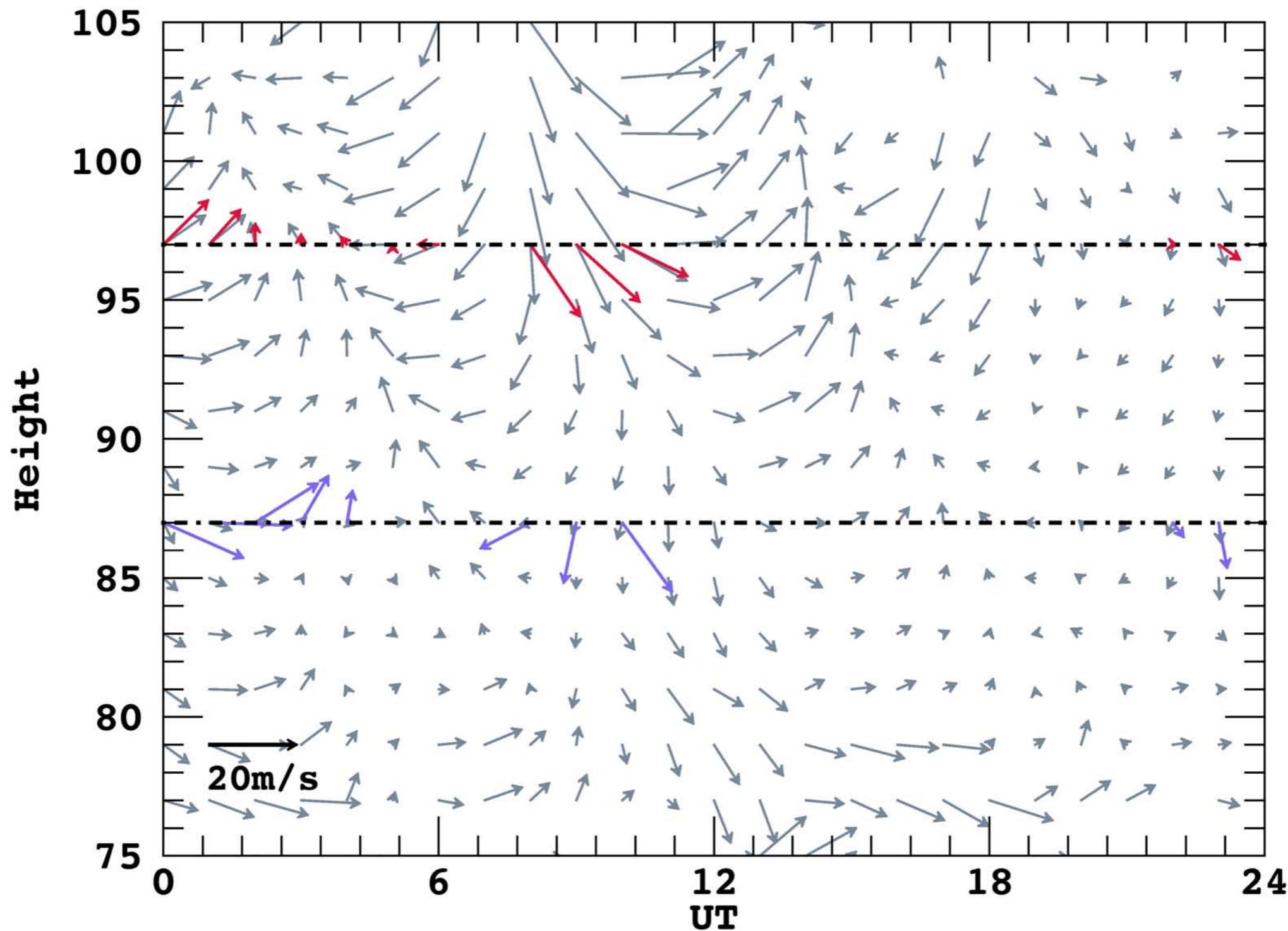
FPI & MR : Meridional winds



FPI & MR : Zonal winds



Comparison of wind vector measured by MR & FPI DOY:117

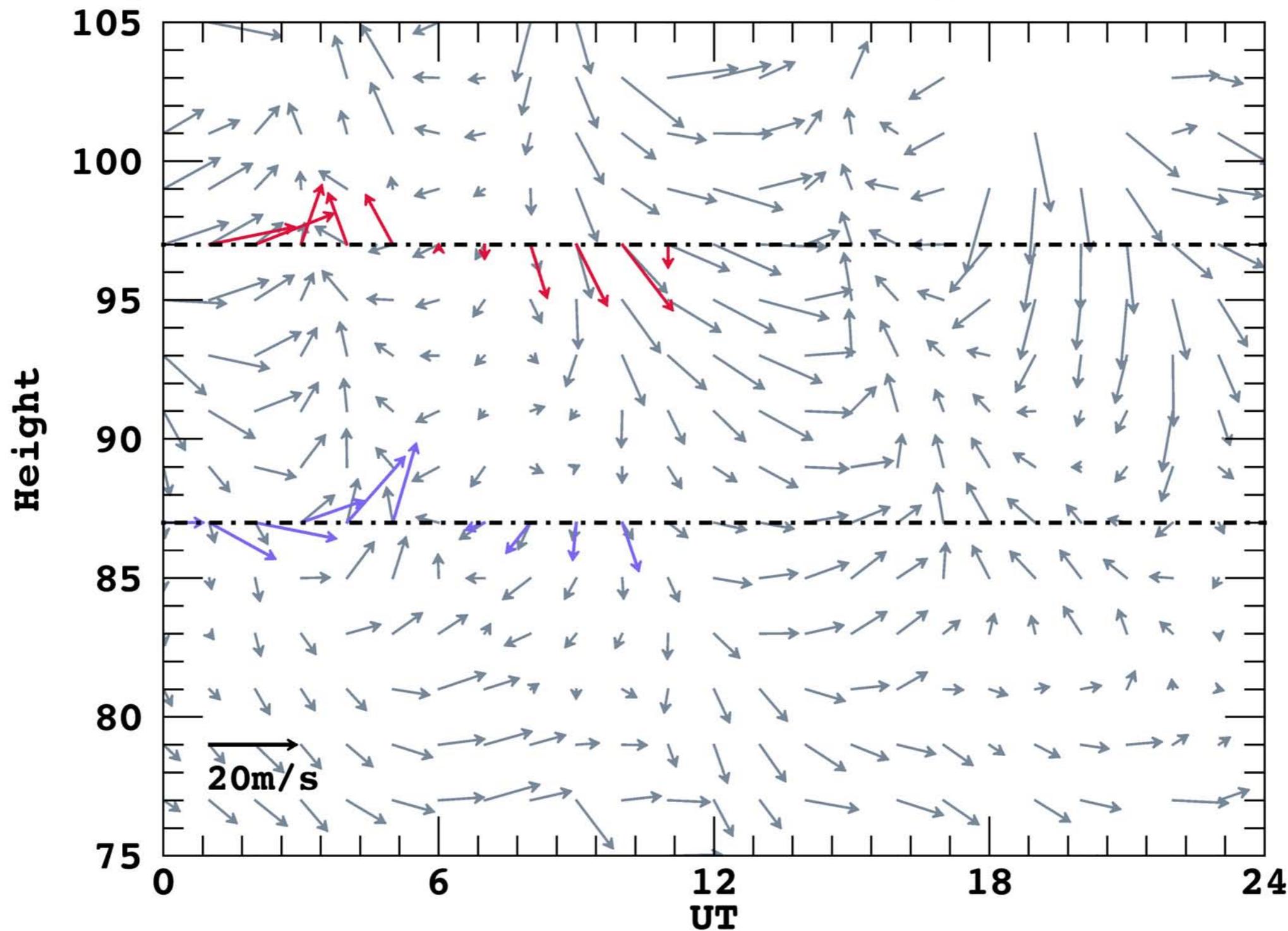


→ : OI 5577(97 km)

→ : OH 8920(87 km)

→ : meteor radar(75 ~ 105km, 2km bin)

Comparison of wind vector measured by MR & FPI DOY:119

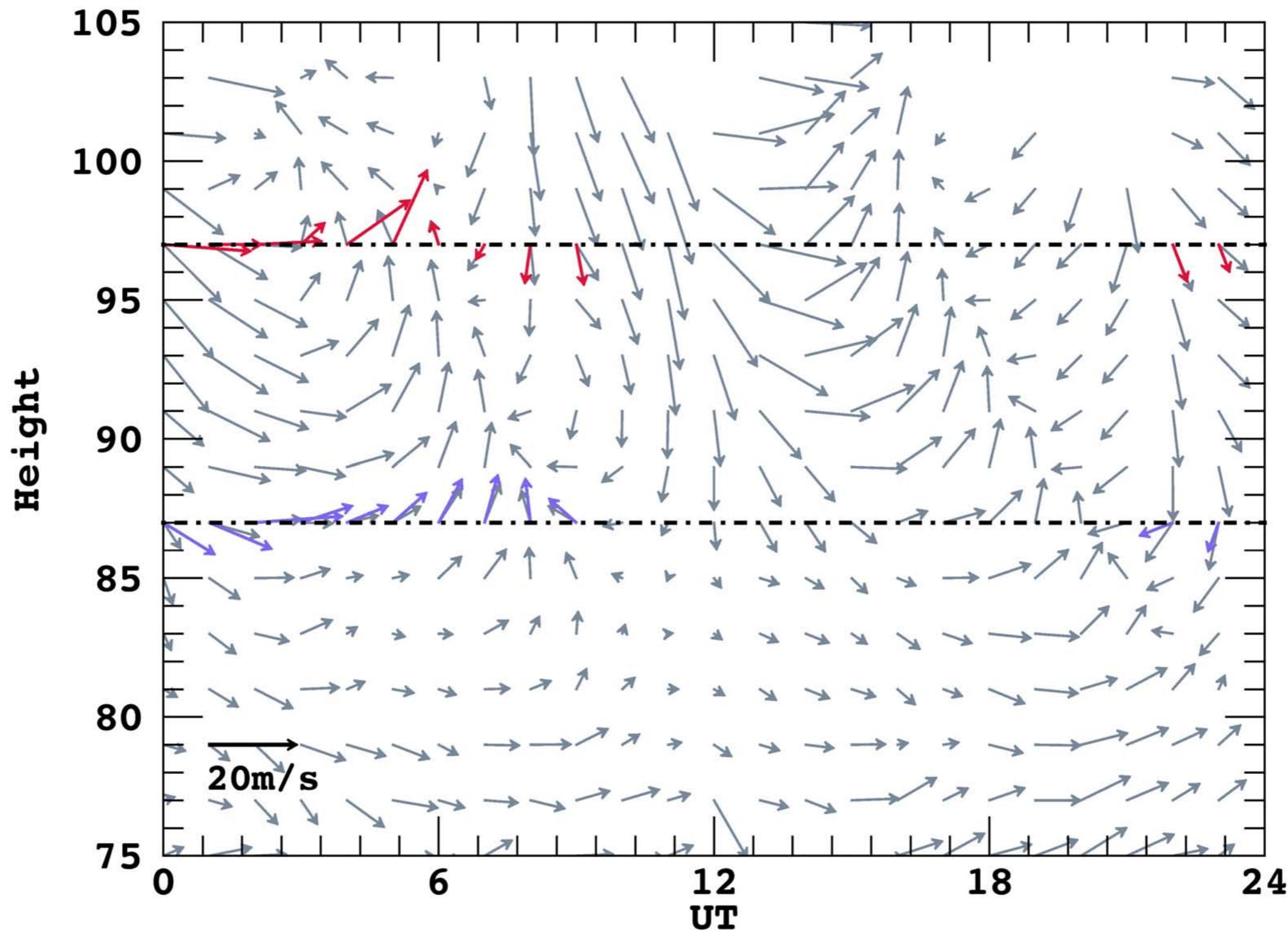


→ : OI 5577(97 km)

→ : OH 8920(87 km)

→ : meteor radar(75 ~ 105km, 2km bin)

Comparison of wind vector measured by MR & FPI DOY:144

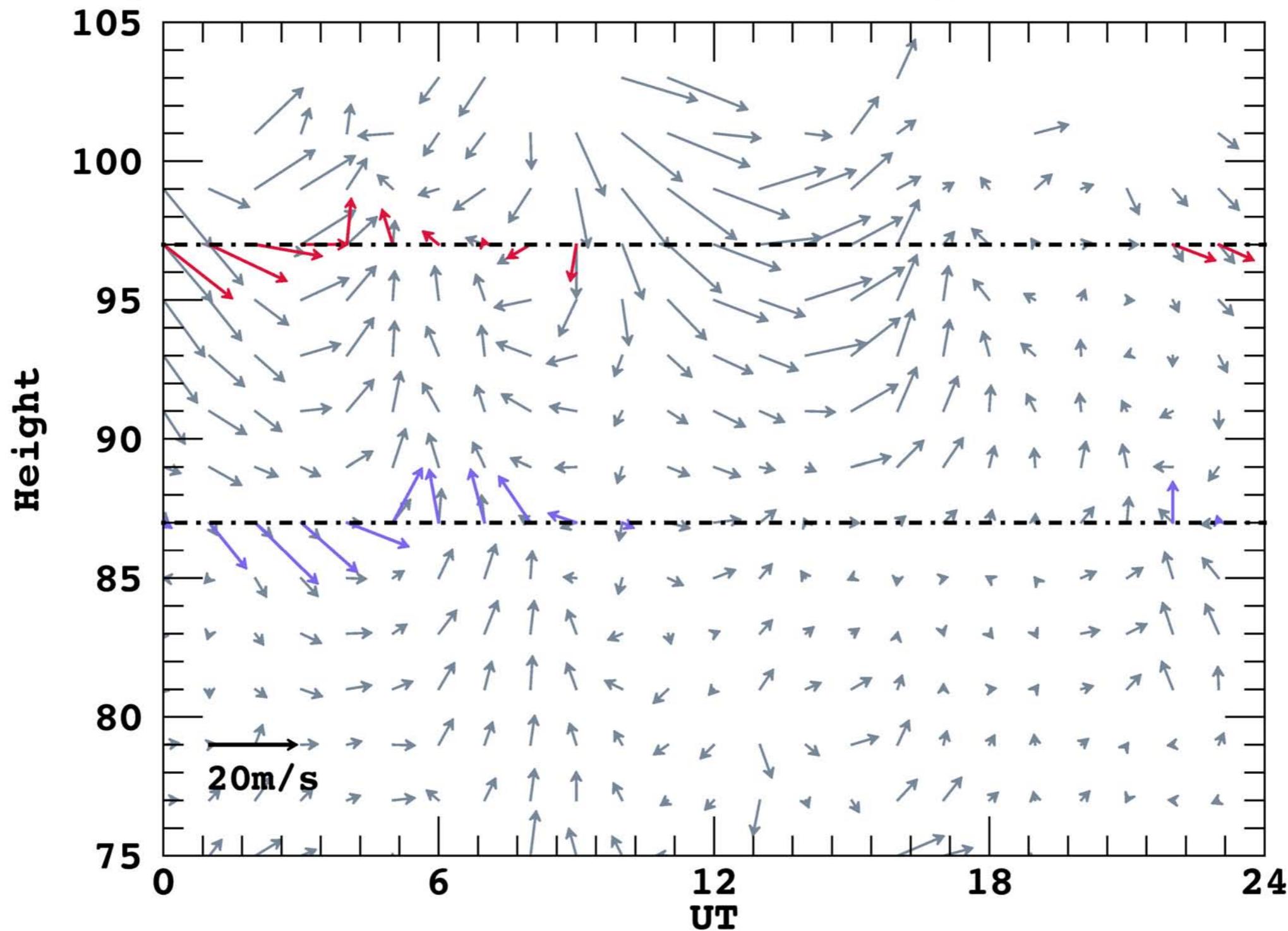


→ : OI 5577(97 km)

→ : OH 8920(87 km)

→ : meteor radar(75 ~ 105km, 2km bin)

Comparison of wind vector measured by MR & FPI DOY:249



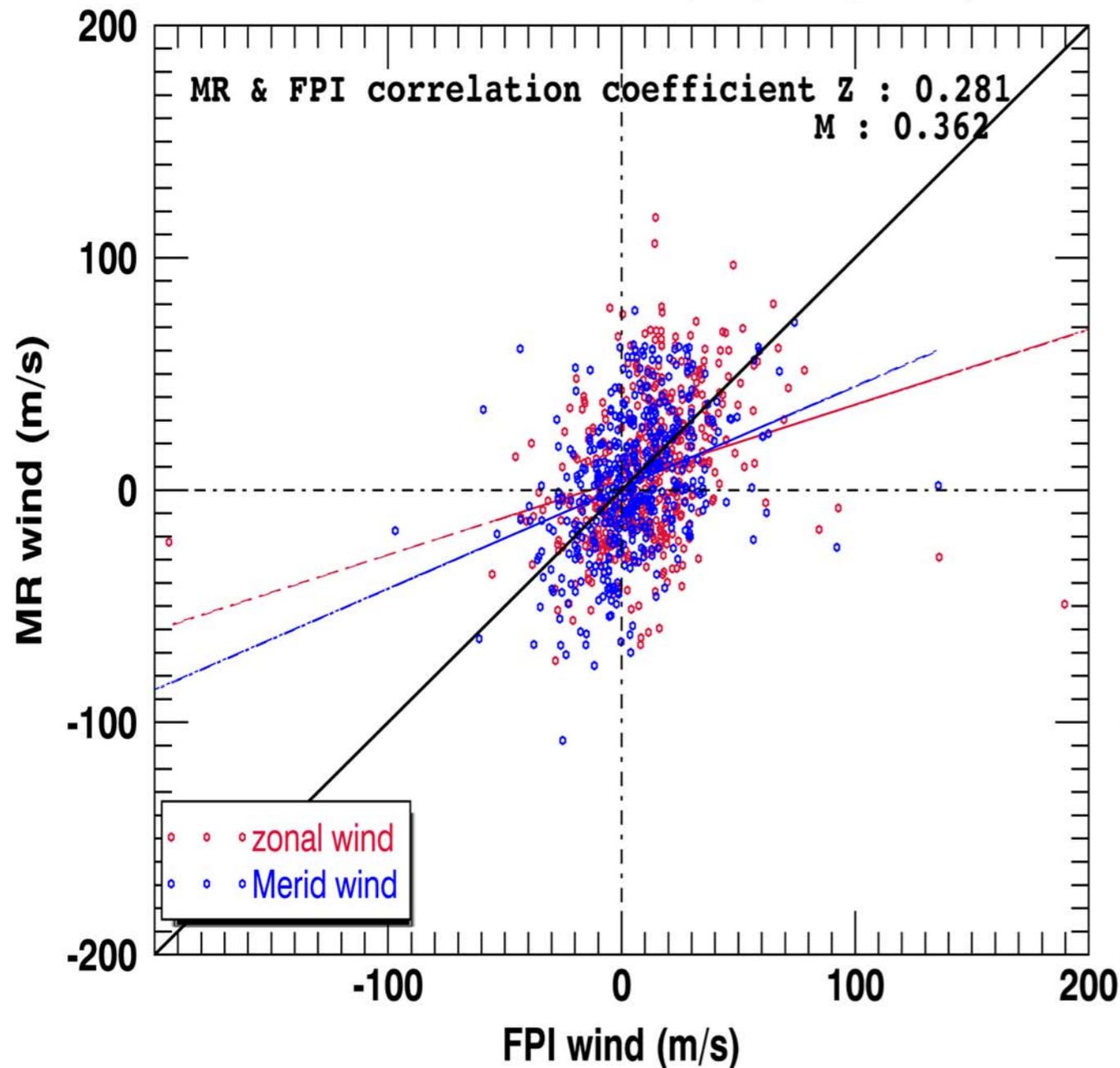
→ : OI 5577(97 km)

→ : OH 8920(87 km)

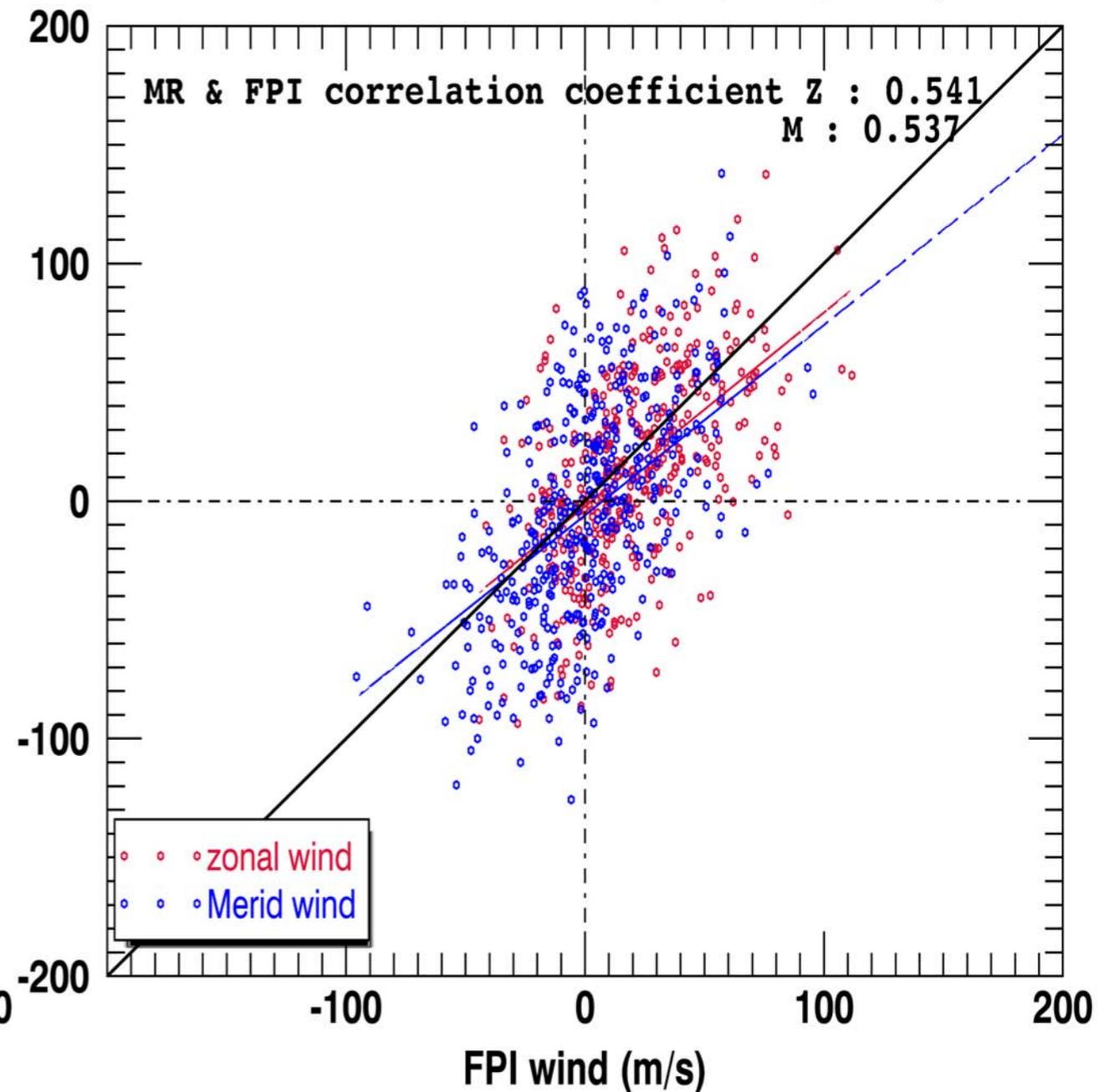
→ : meteor radar(75 ~ 105km, 2km bin)

Correlation btw MR and FPI winds

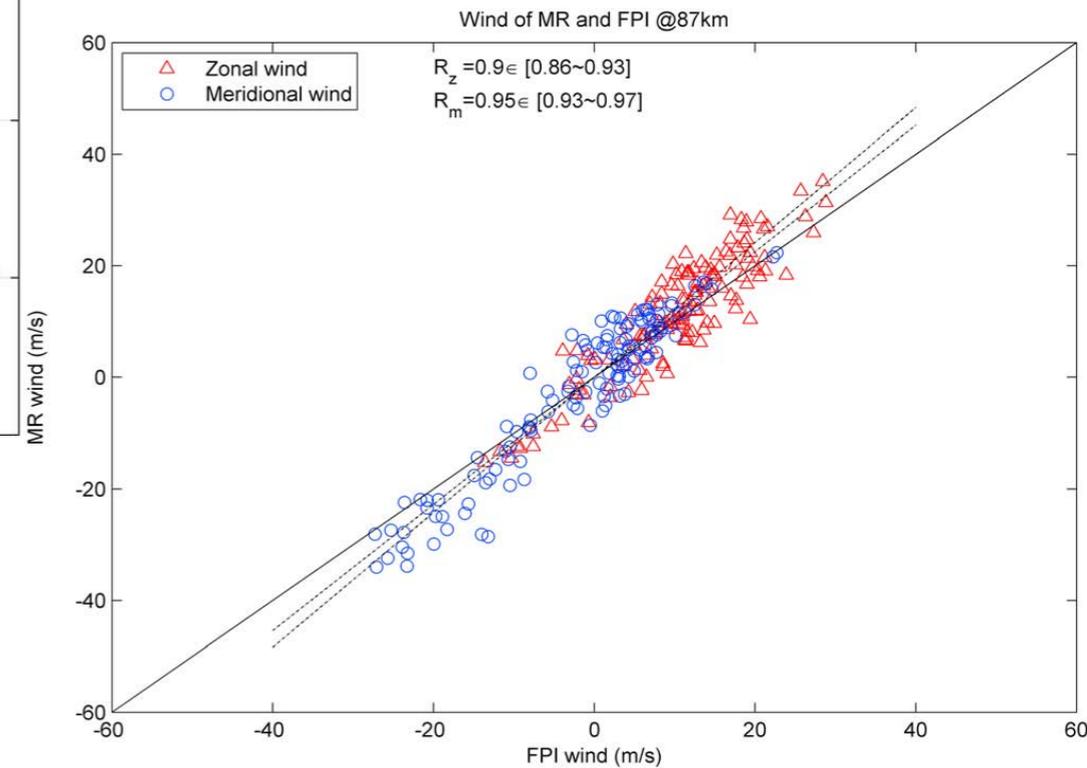
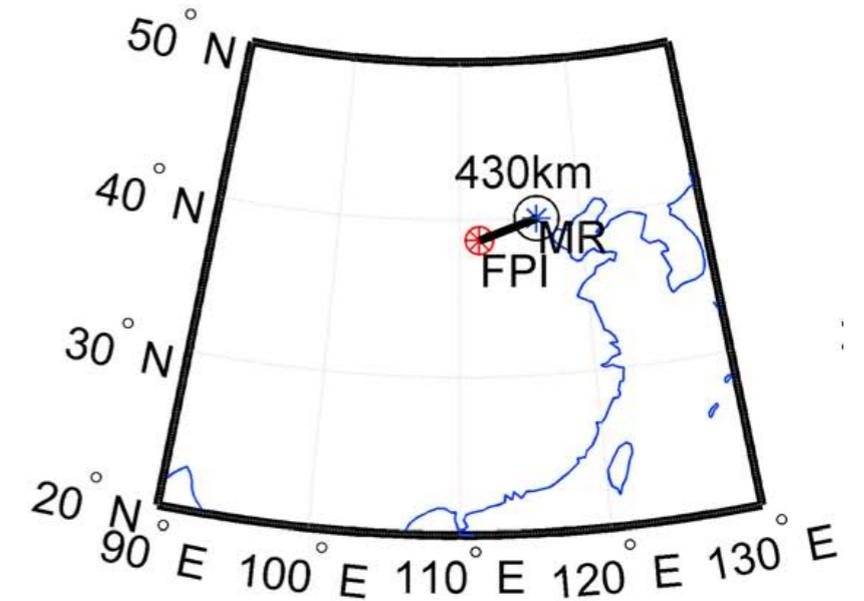
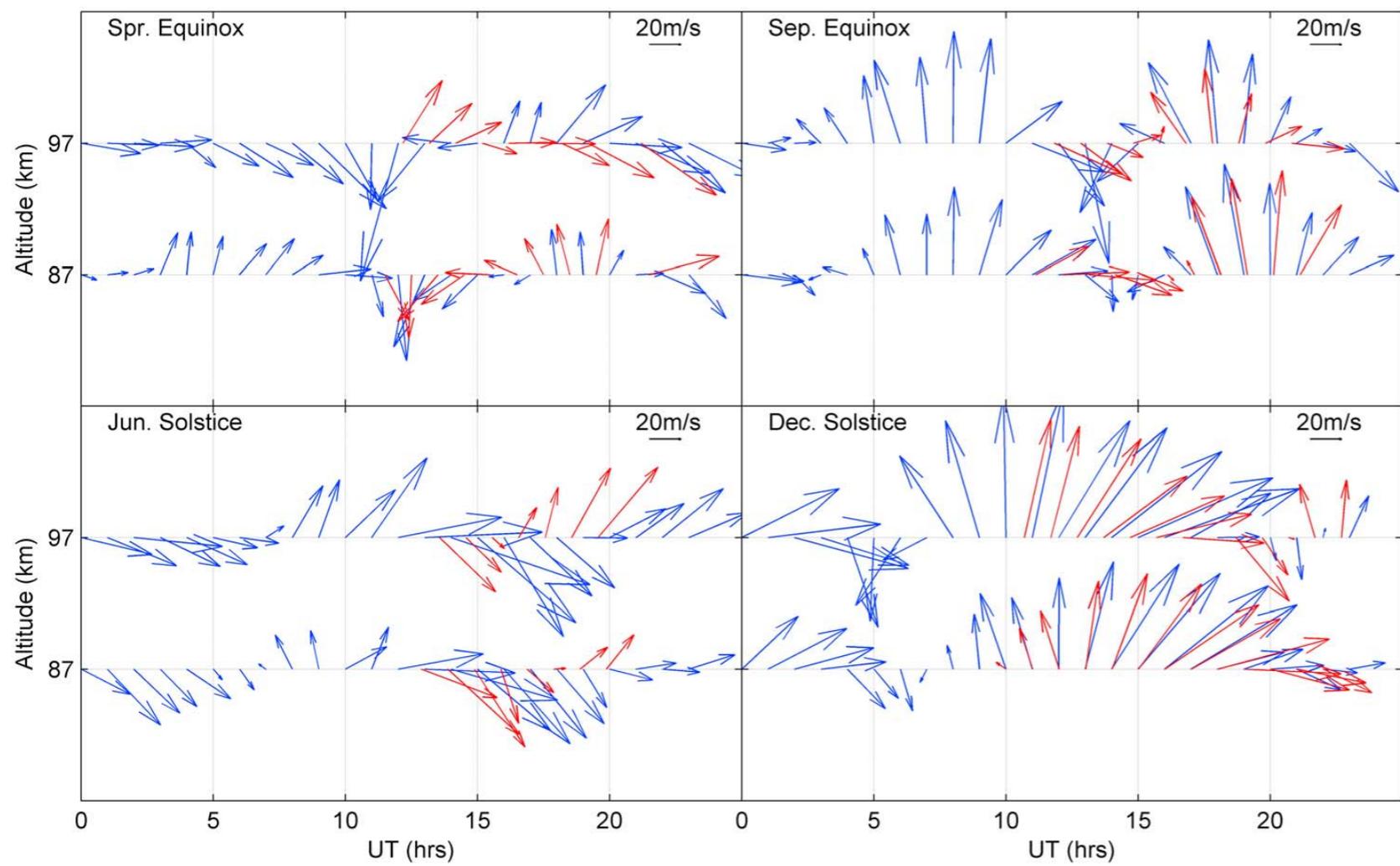
2017 MR & FPI 87km winds scatterplot(hourly mean) werr=10



2017 MR & FPI 97km winds scatterplot(hourly mean) werr=10



FPI vs. MR winds at mid-latitude region



Yu et al., 2016

Summary

- Simultaneous measurements of MLT neutral winds at KSS, Antarctica. However,
 - Optical vs. radar
 - **Snapshot vs. hourly mean winds**
 - Relatively large differences may indicate that there are large variabilities within 1-hour time period in the MLT winds.
- Any complementary aspects of these two measurements?
 - **What information can we obtain with this simultaneous observation?**
 - **With the MR wind observations, is it necessary to keep observing the MLT winds by FPI?**

Future works

- Large number of observed meteor echos: 15,000~40,000 per day
- Increase the temporal resolution of neutral wind observation: 1-hour → 0.5-hour
- Daily mean temperature → separate day & night mean temperatures
- Compare them with FPI winds & temp.