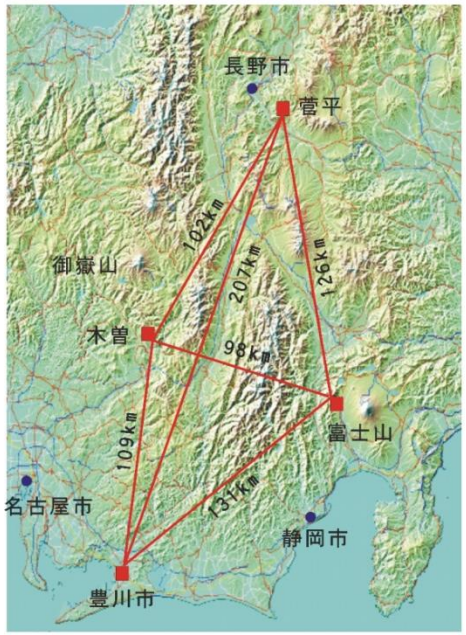
Upgrade of STEL IPS system

2000 m



2000 m^2

Four station system
327MHz

3360m^2

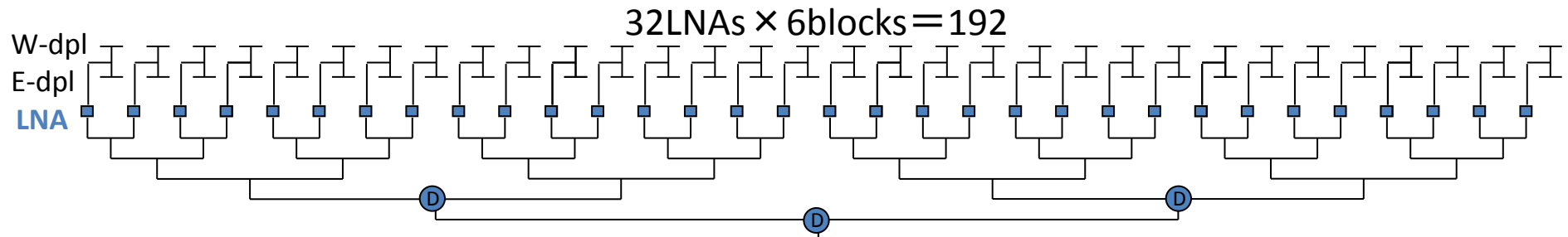
2000m^2

K. Fujiki

Spec. of STELab IPS

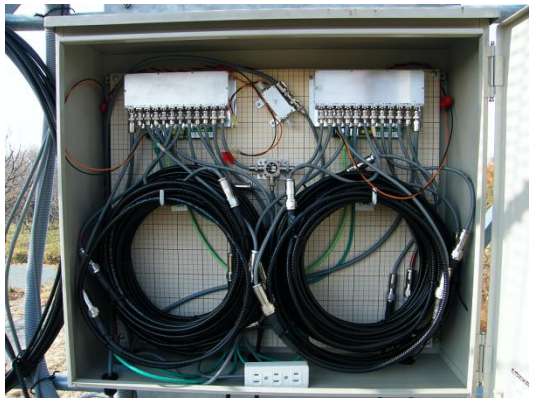
Observatory		Toyokawa	Fuji	Kiso	Sugadaira
Type		Double Cylindrical Parabola	Cylindrical Parabola		
Feed		394(=192x2) λ/2dipoles	192, 144, 192 λ/2dipoles		
observation		transit	tracking		
Beam	NS	electronical phasing	mechanical pointing		
	EW	fixed	electronical phasing		
Aperture (m^2)		3360	2000		
Frequency (MHz)		327MHz			
Bandwidth (MHz)		10MHz			
Tsys (K)		146	151	221	229
integration (ms)		20	20 (100)		

FE configuration at Toyokawa

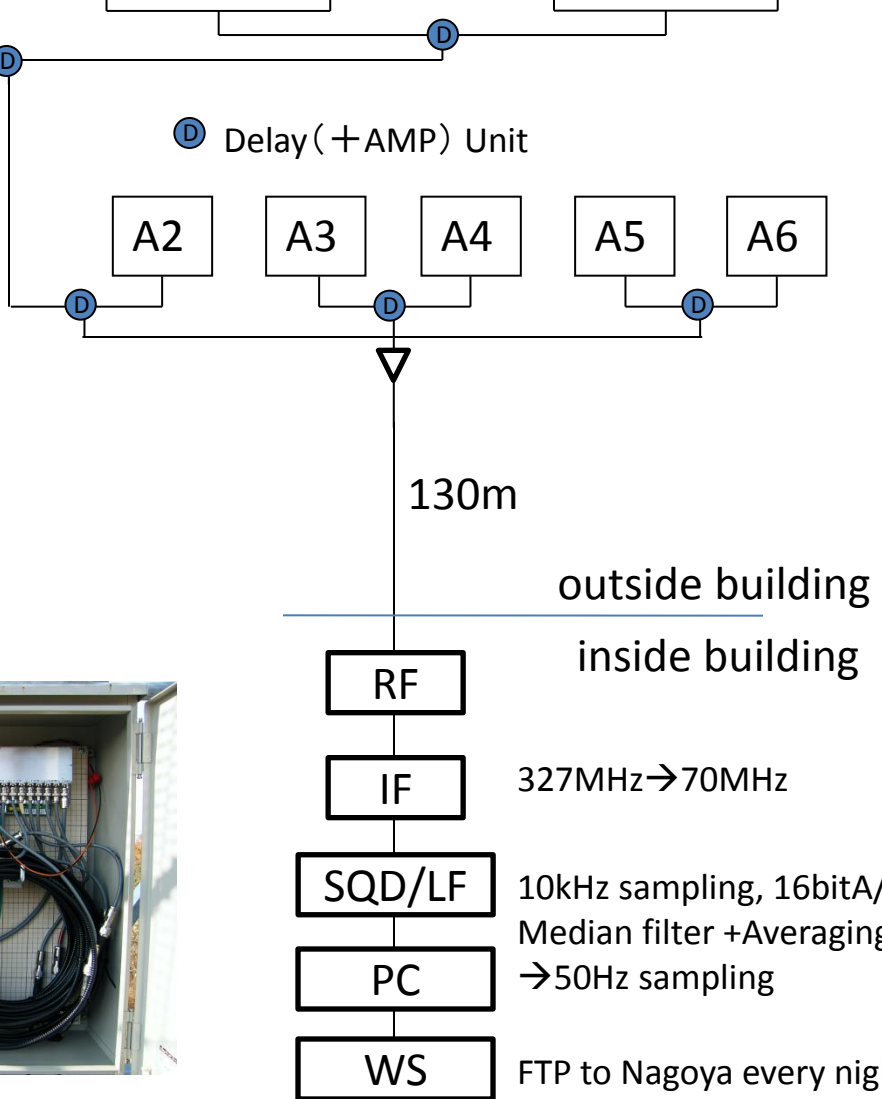


D Delay（＋AMP）Unit

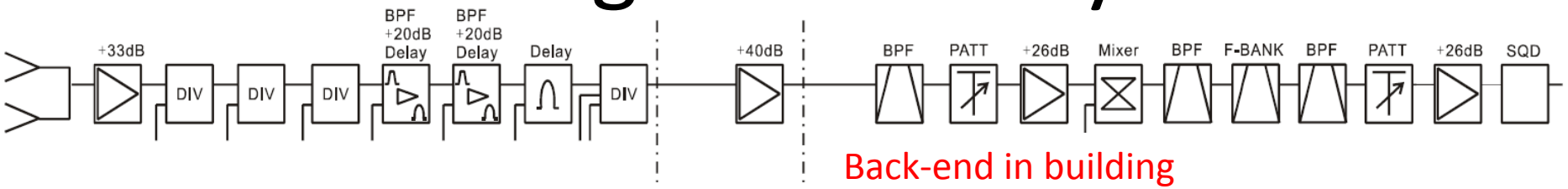
FE box↑



Delay module→



Level diagram of TY system



Back-end in building

antenna | ant. house | RF | 観測周波部 | IF | 中間周波部 | LF

Spectrum Analyzer
RBW:100kHz
VBW:30kHz

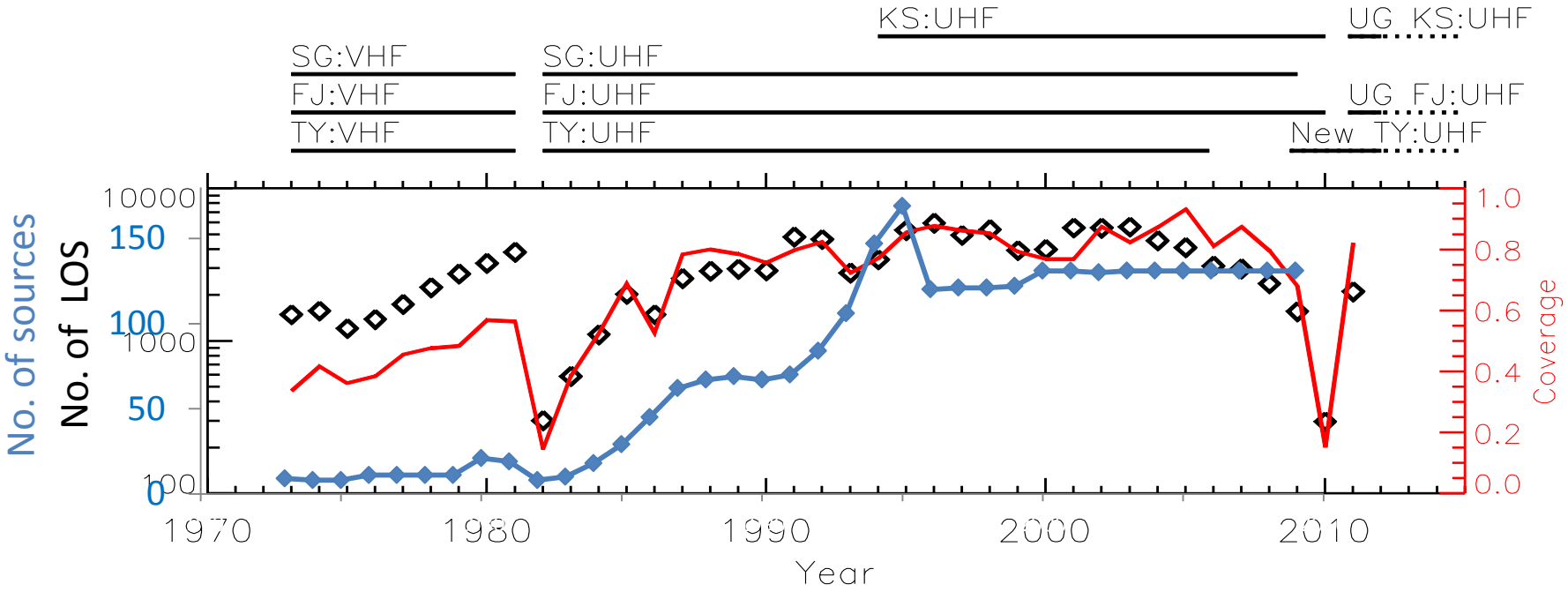
Power Meter
FB: 10MHz
5MHz
2MHz
1MHz

dipole, -125
PA33, -92
div, -92
div, -94
div, -96
D1/BPF, -79
D2/BPF, -65
D5, -73
div, -78
小屋in, -85
A40, -46
WDCin, -64
BPF, -65
PATT(8), -73
A26, -46
mixer, -55
BPF, -57
FilterBank, -48
BPF, -48
PATT(11), -62
A26, -34

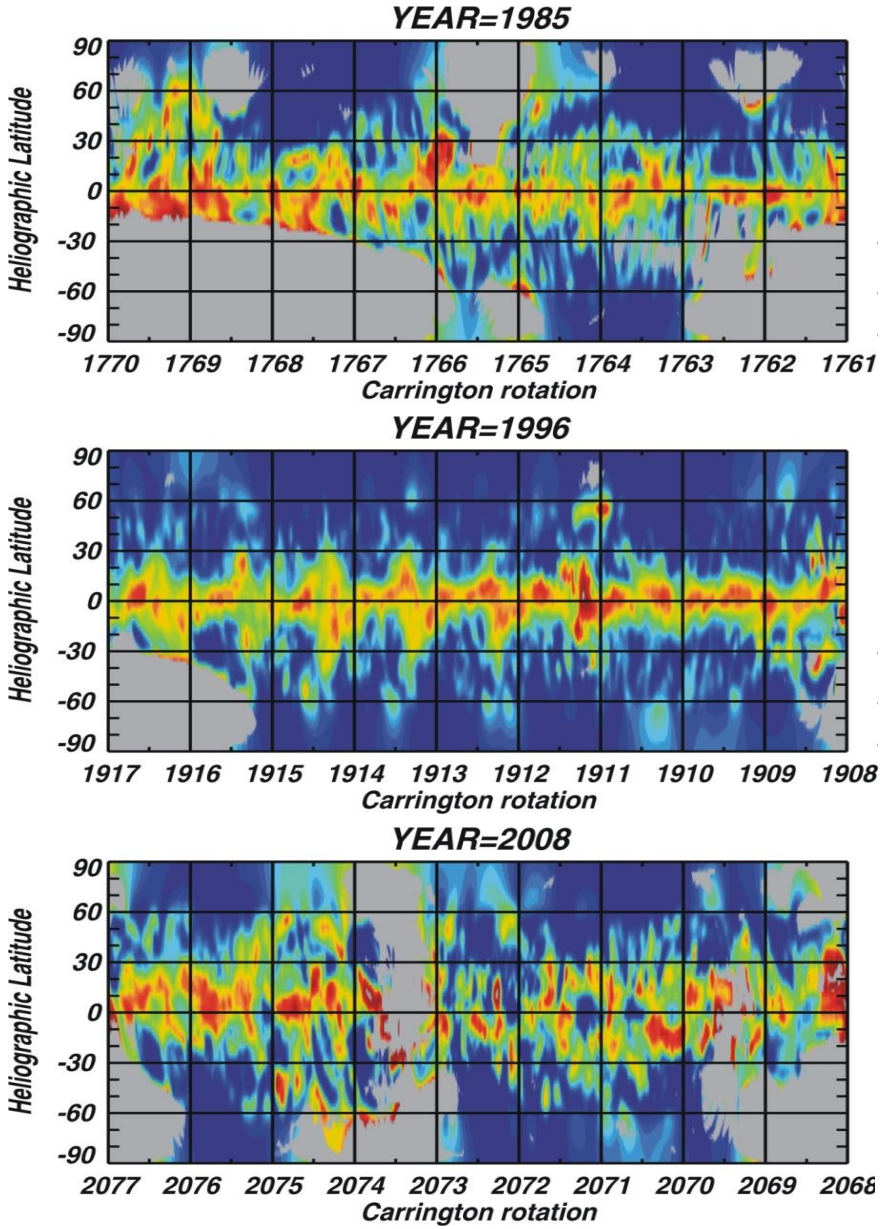
-24
-26
-40
-13.8
-27
-30
-33
-16.3
-19.5
-22.5

測定日 : 2009/2/13

History of STEL-IPS



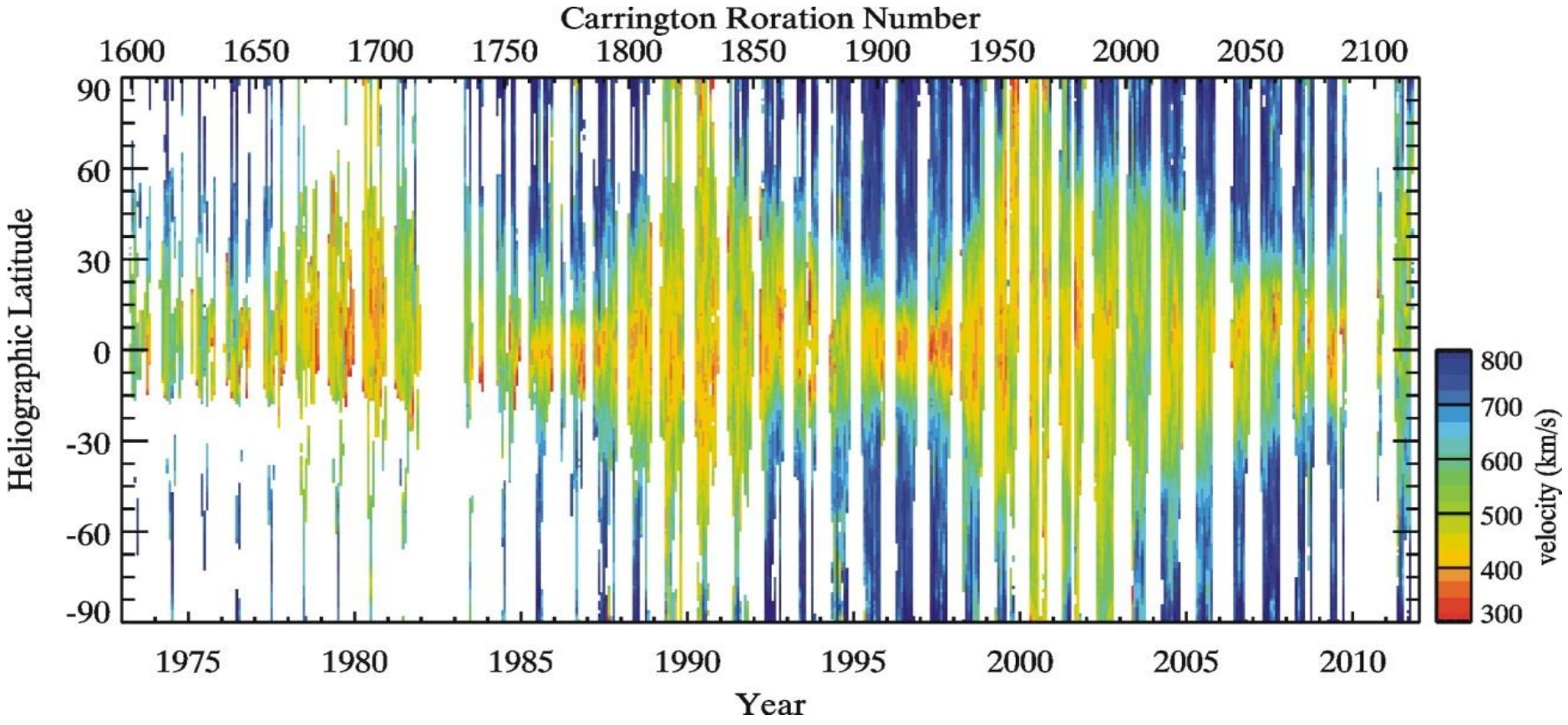
- 1970's: VHF observations
  (STELab data were combined with Cambridge data)
- 1983- : UHF observations
- 1994 : KS ant. started.
- 2005 : Old TY ant. closed.
- 2009 : New TY started
- 2011 : replacement of dipoles in FJ and KS
- 2012- : Upgrade of Backend in FJ and KS
- 2013- : Upgrade of Frontend and refreshment of ant structure.



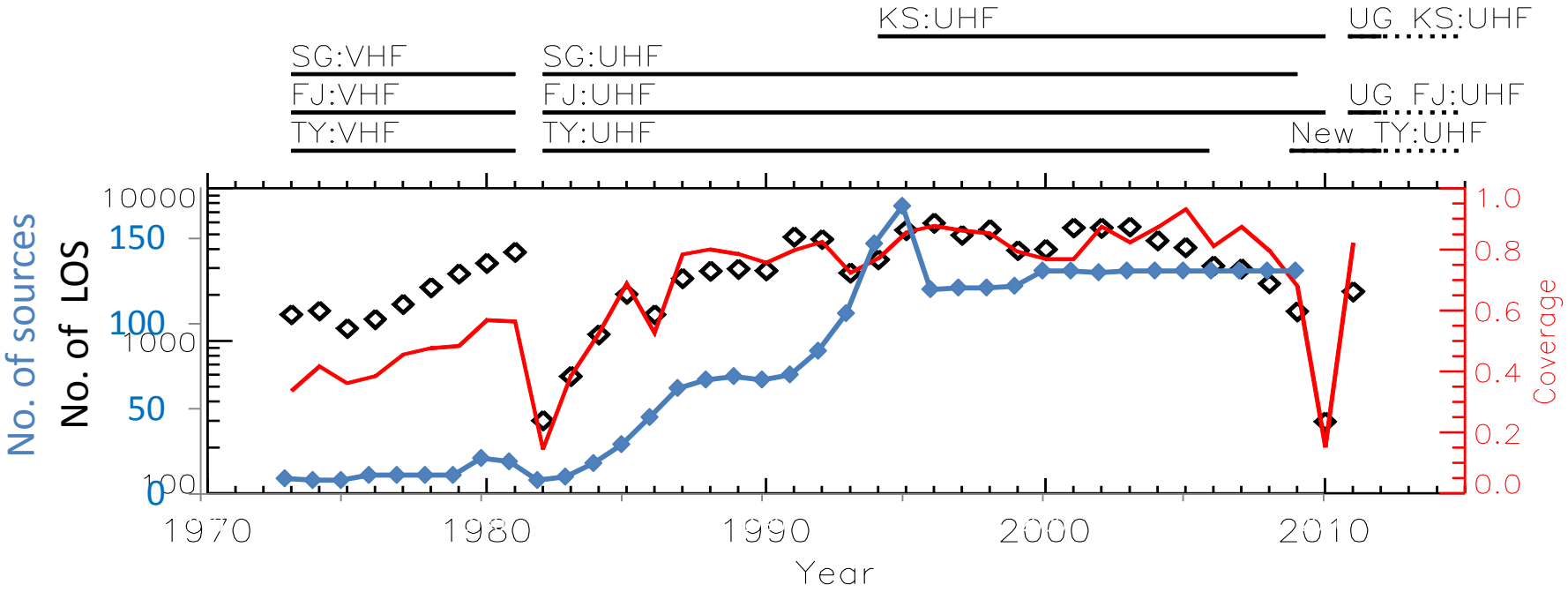
grey area: Velocity is not derived by tomographic analysis because of insufficient coverage of LOS

$$\mathbf{Coverage} = 1 - \frac{S_{grey}}{S_{total}}$$

Long Term Variation of Solar Wind



History of STEL-IPS



- VHF data consist of STEL and Cambridge observations.
- Coverage of VHF observation is insufficient to reconstruct V map even if number of LOS are comparable to UHF observation because the number of radio sources were very limited.
- Selection of IPS sources and the number of IPS sources are important to research whole interplanetary space.

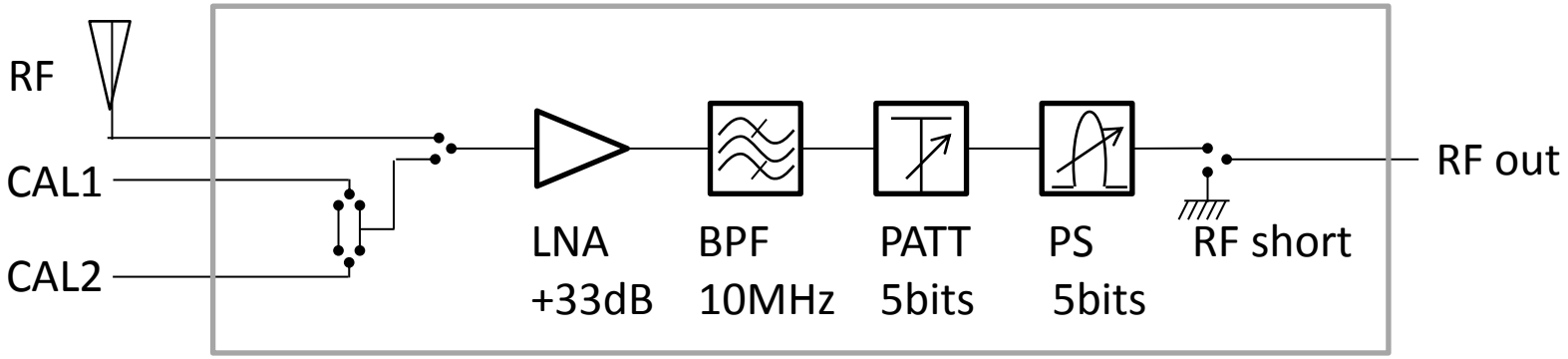
Upgrades of FJ, KS, and SG antenna

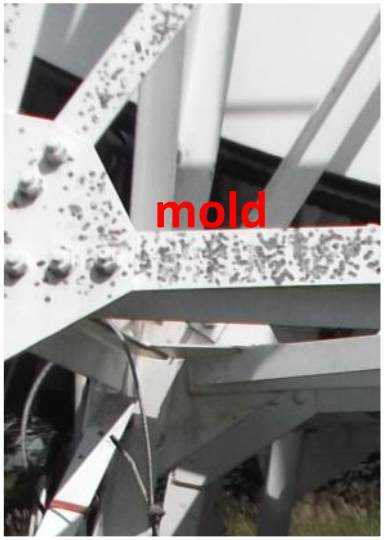
Upgrade		cost
Antenna	painting (antirust)	0.5 M$
	KS motor (NS pointing)	
	reflector (efficiency)	
FE receiver (Low noise)		0.33 M$
Ant. Elevation Control system @KS		0.03 M$

- Refreshments of Antenna have been finished in last month.
- FE receivers has been installed in FJ obs. in last month and will be installed in KS obs. in next spring.
- Antenna Control system will be upgraded in next week.

Spec. of Front-end receiver

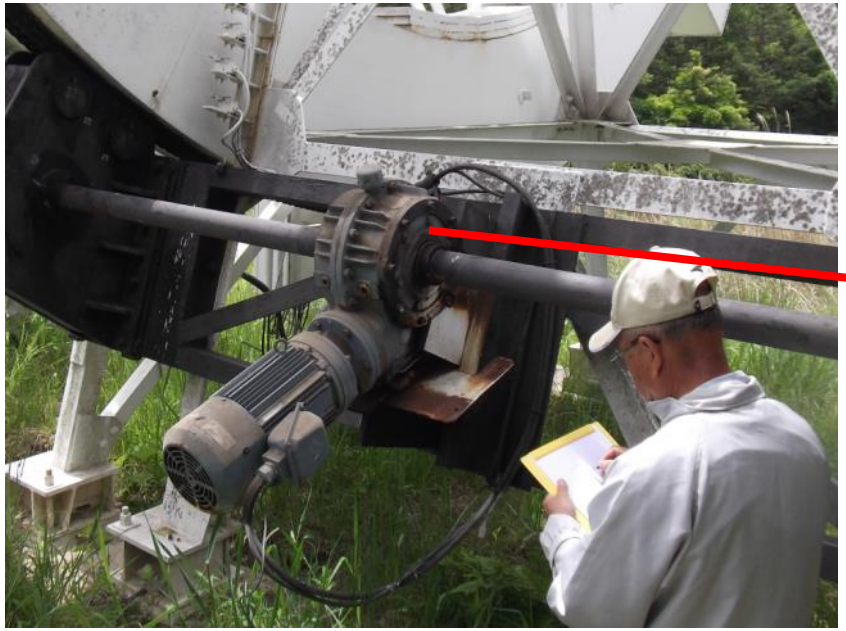
Frequency	327±10MHz
Gain	33 dB
Noise Figure	0.8 dB (max)
VSWR	1.3:1
Gain Controller	0.25 dB step / 5Bits
Phase shifter	11.25 deg step / 5 Bits




mold


rust
ruptured


painting after removing rust and mold



Summary

Observatory		Toyokawa	Fuji	Kiso	Sugadaira
Type		Double Cylindrical Parabola	Cylindrical Parabola		
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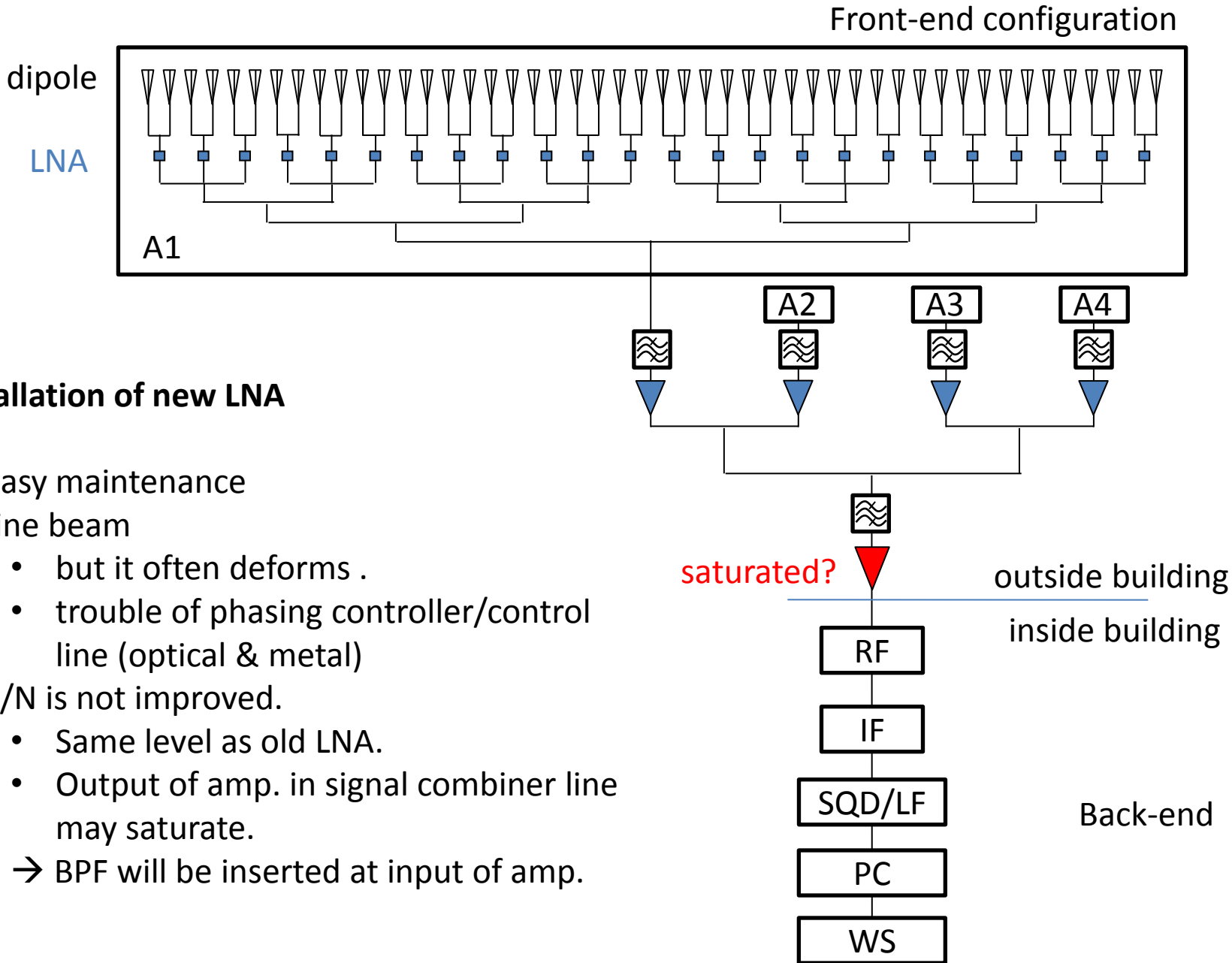
Tsys (K)		146	151	221	229
integration (ms)		20	20		

- Antennas at Fuji, Kiso and Sugadaira are in upgrading phase.
- Refreshment of Antenna has been finished in last month.
- FE receivers has been installed in FJ antenna in last month and will be installed in KS antenna in next spring.
- Upgrade of elevation controller will be started today.
- We will check total performance of the IPS system in next season.

Is Fuji-ant. Improved ?



installation of new LNA

- Easy maintenance
- fine beam
  - but it often deforms .
  - trouble of phasing controller/control line (optical & metal)
- S/N is not improved.
  - Same level as old LNA.
  - Output of amp. in signal combiner line may saturate.

  → BPF will be inserted at input of amp.