

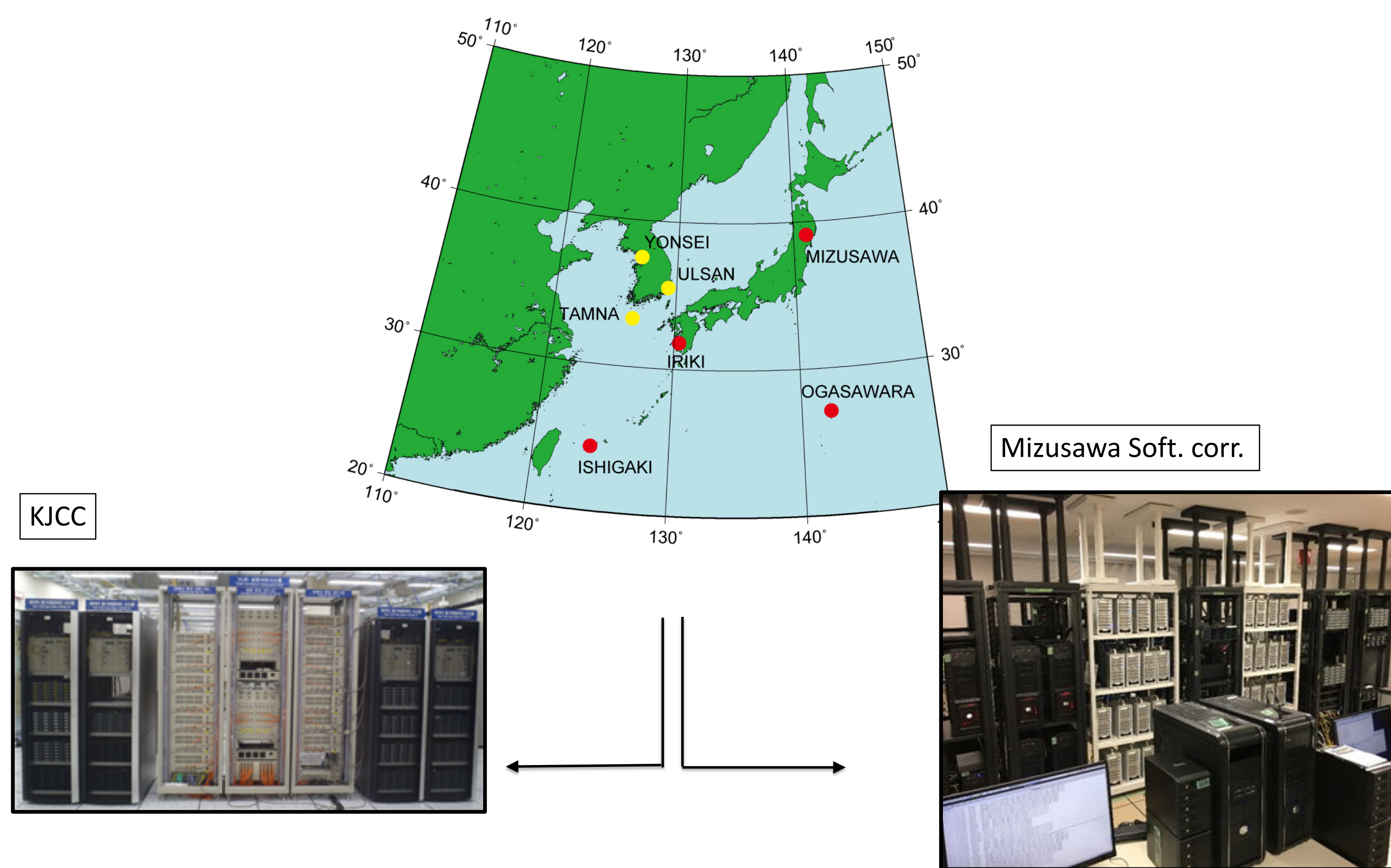
# Data analysis of KaVA Astrometric Test observations For 22 GHz Water Maser Source in W3(OH) Region

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KaVA Galactic astrometry sub-working group is evaluating and establishing an astrometric mode of KaVA array by conducting test observations for Maser-QSO pair and QSO-QSO pair observations. To evaluate the astrometric accuracy obtained by KaVA astrometric mode, we have to compare the phase solutions as well as astrometric positions between VERA array and KaVA array. Also, we have to confirm the consistency between datasets correlated by Mizusawa SW correlator and KJCC.

By analysing two datasets of test observations for 22 GHz water maser source in W3(OH) region, we found phase differences between Mizusawa SW correlated data and KJCC correlated data. These differences appear to have a diurnal variation and is similar between two different observational epochs. As a result, these phase differences make position differences of about 0.1 milli-arcsecond by conducting phase referencing. In this poster, I will present detailed plots of delay and phase solutions obtained through data reduction process of test observations.

## Motivations



### Aim of data reduction

To confirm the accuracy of KaVA astrometric mode, we have compared dataset correlated with Mizusawa Software Correlator and KJCC from some points of view.

1. The fringe fitting results
  - Delay, rate, and phase solutions from fringe fitting of QSO (J0244+6228)
2. The quality of the image
  - Peak intensity, rms noise level, spot structures
3. Positions and parallax

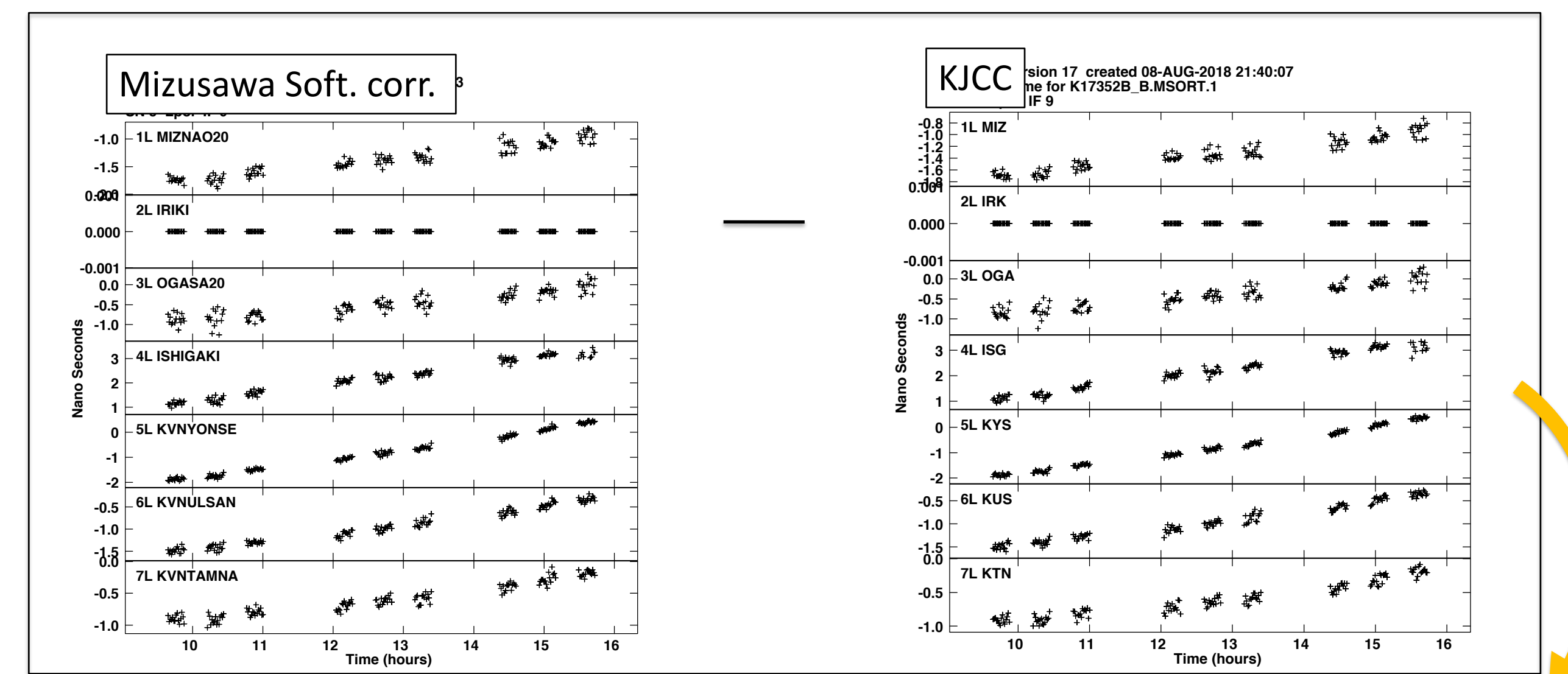
## Observations

Target – Reference source : W3(OH) – J0244+6228  
Line : 22 GHz water maser  
Correlation : Miz soft and KJCC

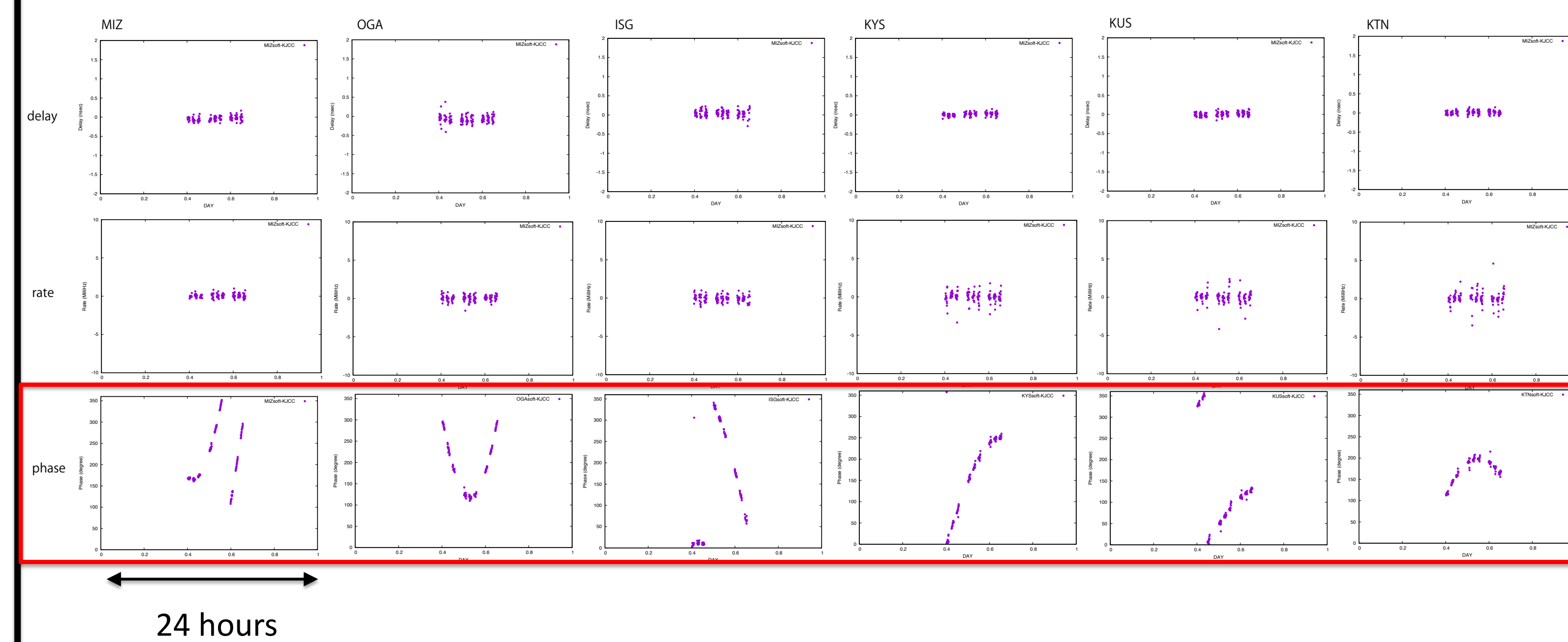
	Miz soft	KJCC	description
R16074A	○	○	ISG not joined Not same a priori parameters
R17293B	○	△ (Problem for maser data for VERA station)	Image and position comparisons could not be conducted Same a priori parameters
R17352B	○	○	Same a priori parameters

## Results Fringe fitting results for R17352B

Fringe fitting solutions of Reference QSO (Delay)



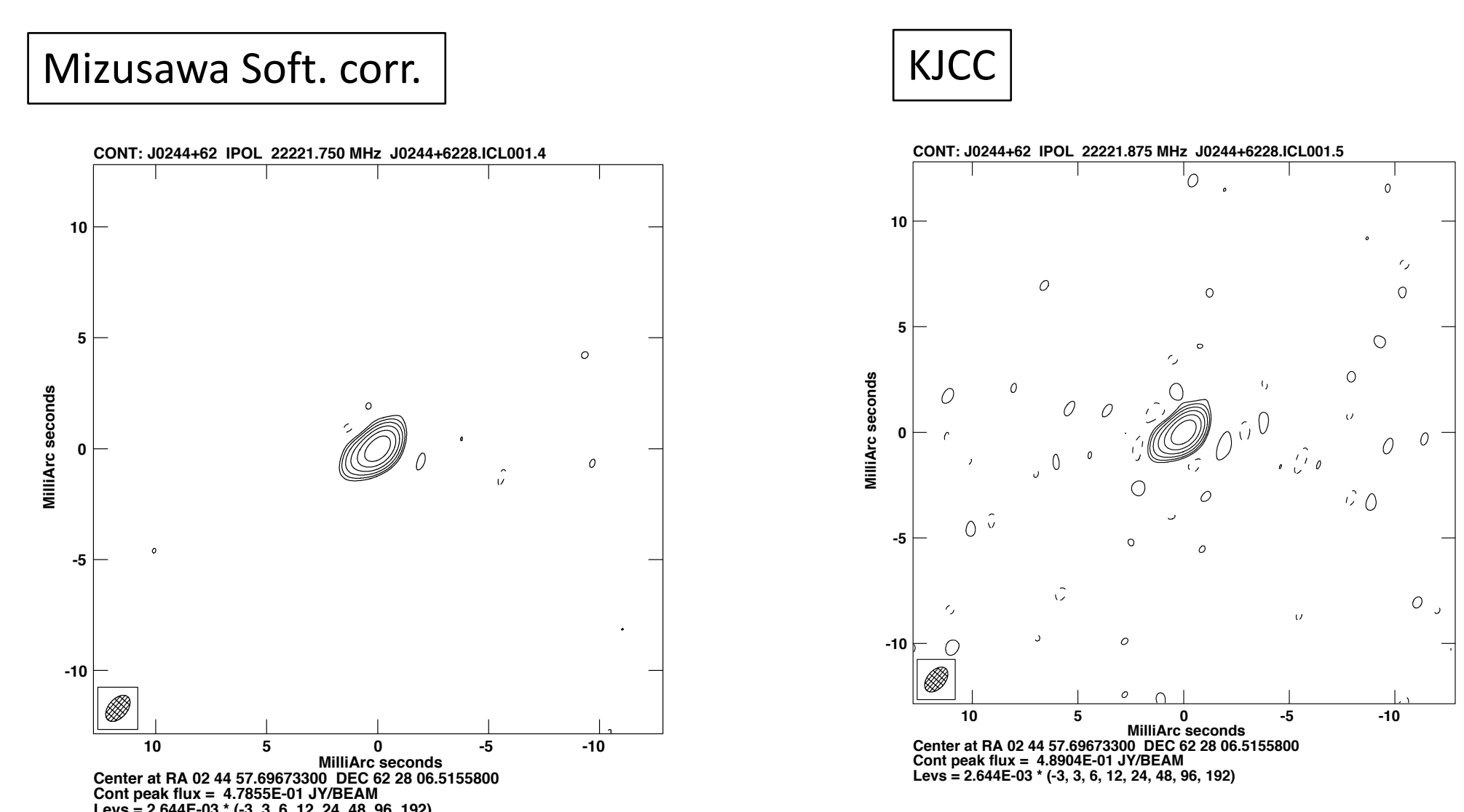
### The difference of fitting results between Miz and KJCC relative to Iriki station



Delay and rate solutions are well consistent with each other correlators.  
-  $\Delta\text{delay} < 0.2$  nsec,  $\Delta\text{rate} < 1$  Millihz

However, **phase solutions** show systematic differences (day scale variation?)  
The behavior of this phase difference is almost **same for different observational epochs.**

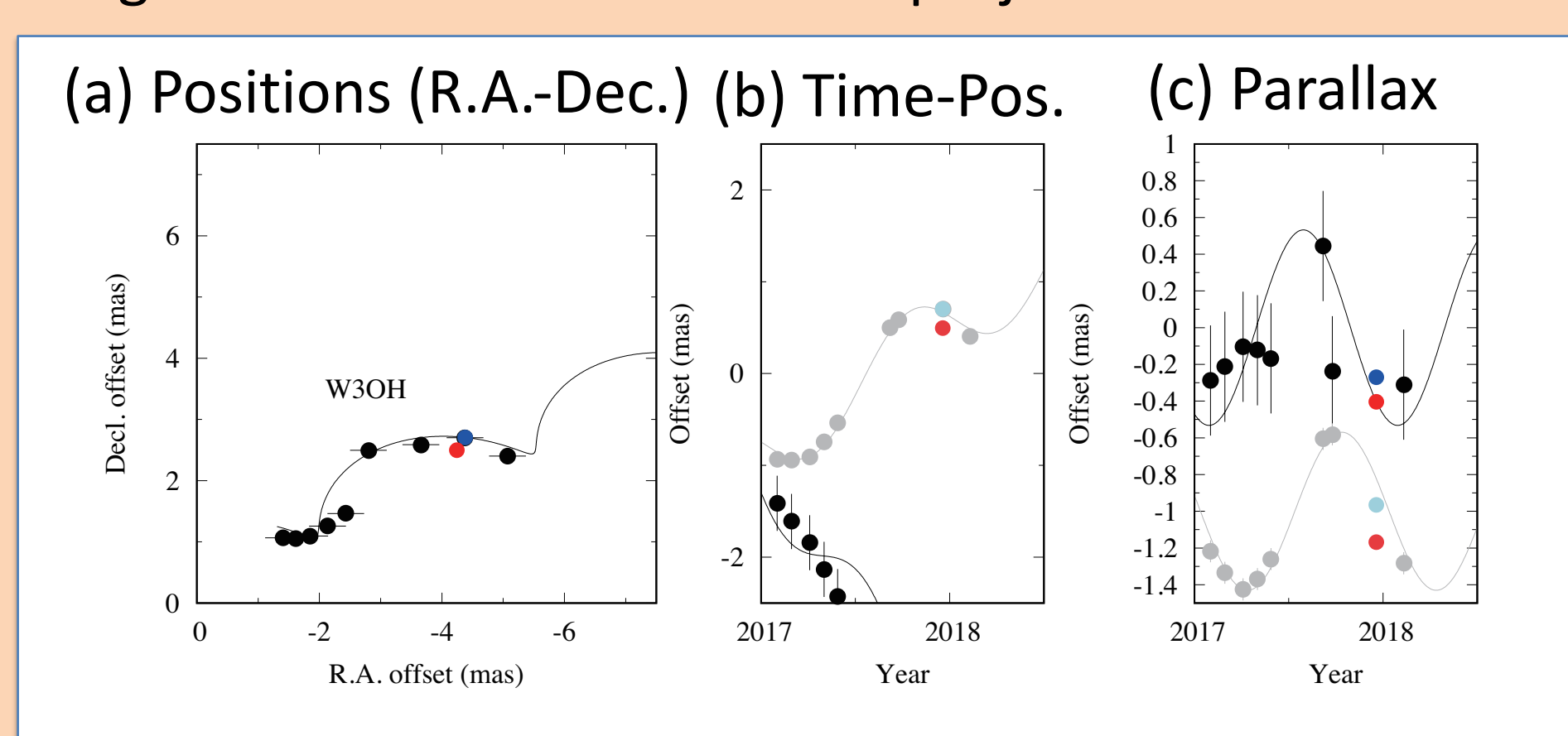
### The image of the reference QSO (J0244+6228)



The rms noise level of KJCC data is slightly larger than Miz soft data

## Parallax fitting

We conducted parallax fitting for a water maser spot at  $V_{lsr} = -51.44$  km/s by using observational data of VERA project observations

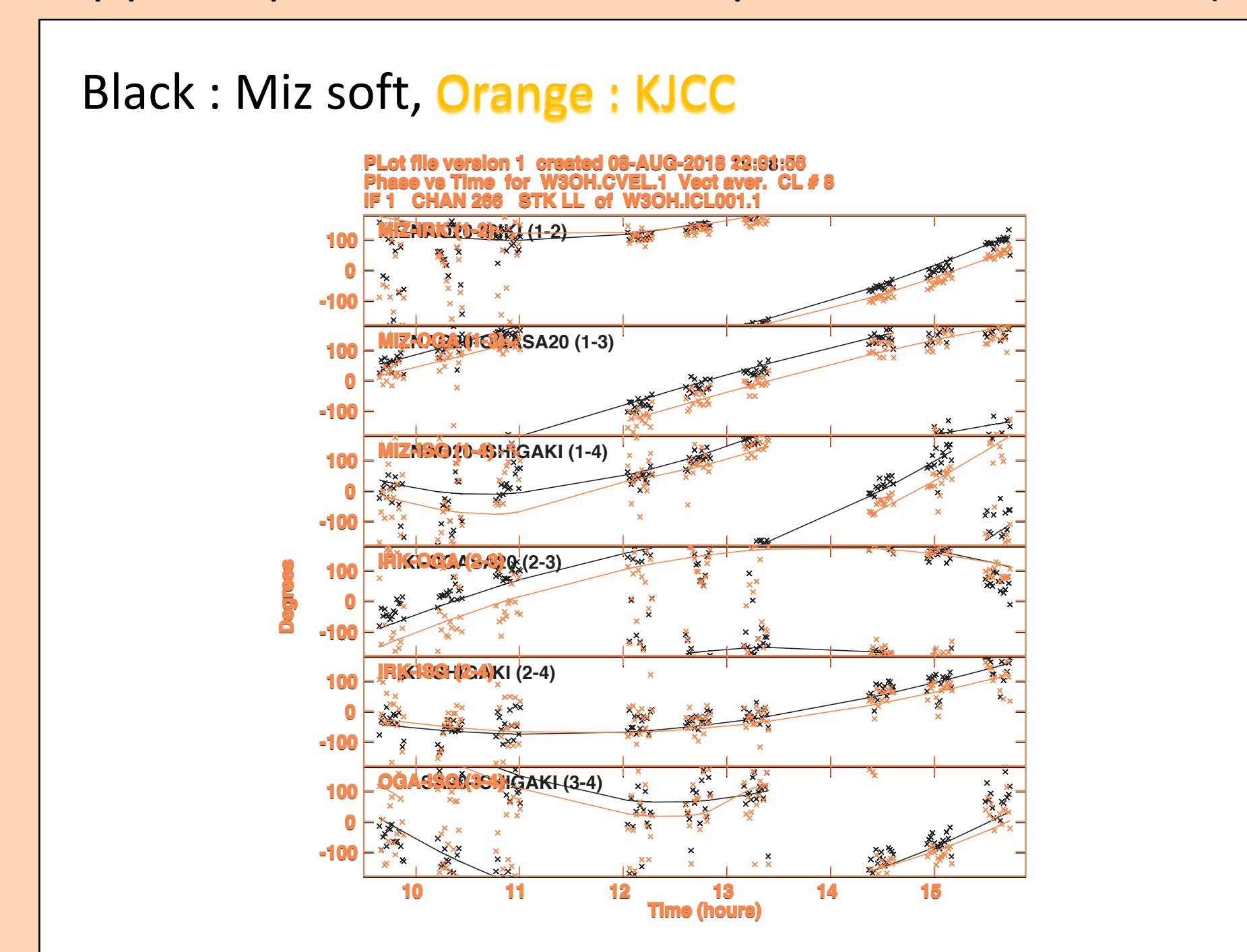


	R.A. (17352)	Dec. (17352)	Parallax	Error
Miz soft	-4.377 mas	2.702 mas	0.562 mas	0.044 mas
KJCC	-4.244 mas	2.497 mas	0.549 mas	0.051 mas

We can see that Miz soft results fit well in the direction of Dec., while KJCC results relatively fit in the direction of R.A..

## Visibility Phase Plot

Visibility phase plot of water maser spot at  $V = -51.44$  km/s (Phase-referenced)



In some part, visibility phase of Miz soft and KJCC are different up to ~50 degree. This phase difference should become a position difference of about 0.2 mas in the left Table.