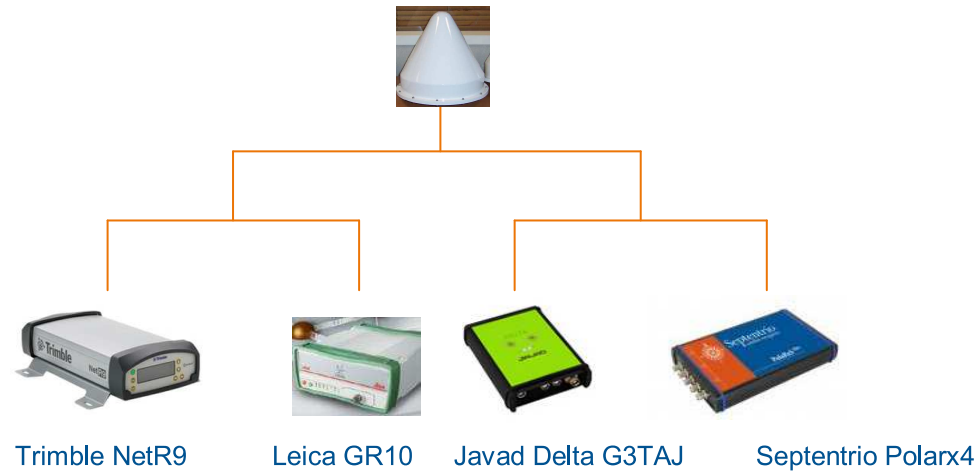


## MGEX receivers measurements comparisons

F. Mercier C. Boulanger

# Tests configurations and data

## Zero baseline

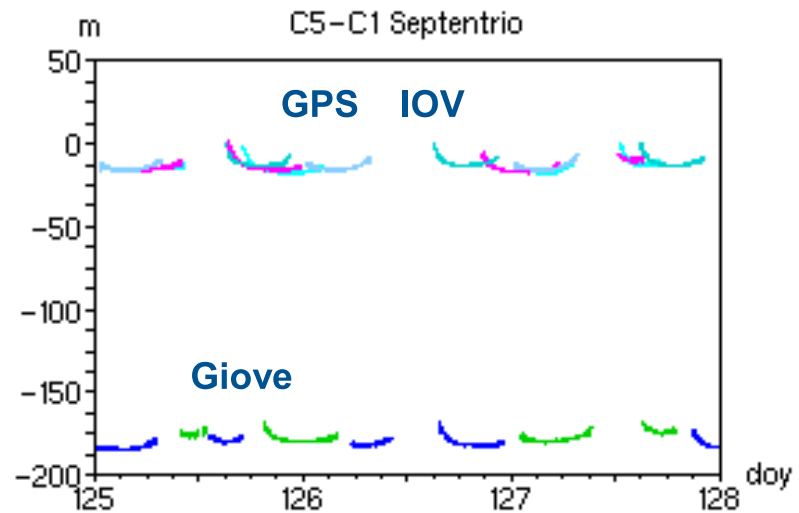
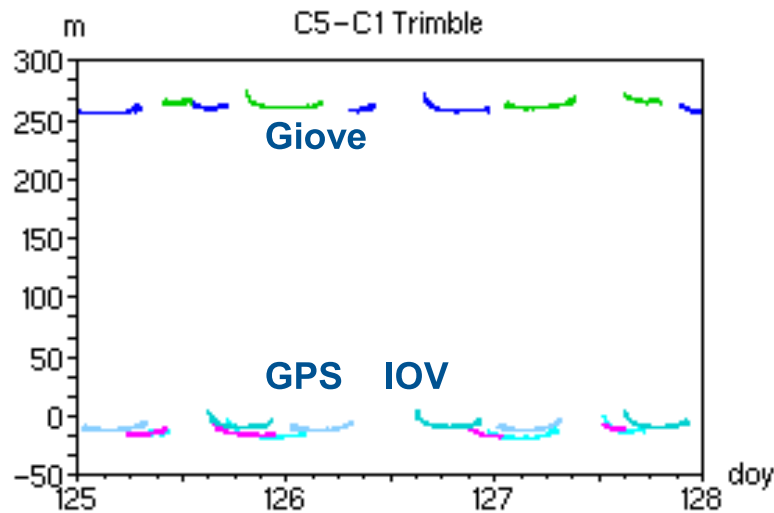
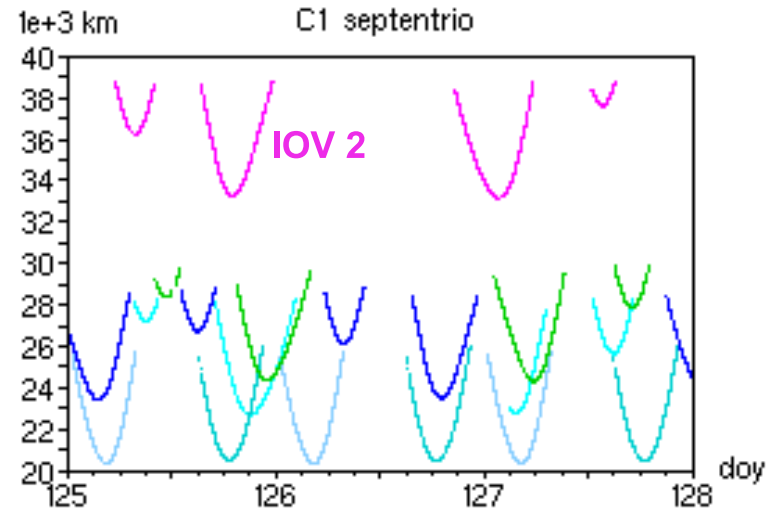
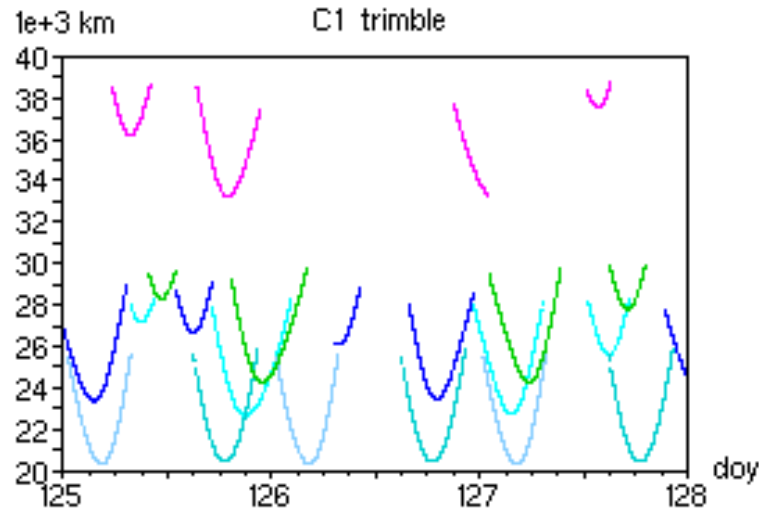


Observables : C1,L1, C5,L5 (f5a frequency band)  
Six satellites : IOV 1 and 2, GIOVE A and B, GPS 1 and 25  
Two datasets :  
    days 125-127 : Trimble and Septentrio  
    days 165-169 : Trimble, Leica, Javad, Septentrio  
Same external frequency reference

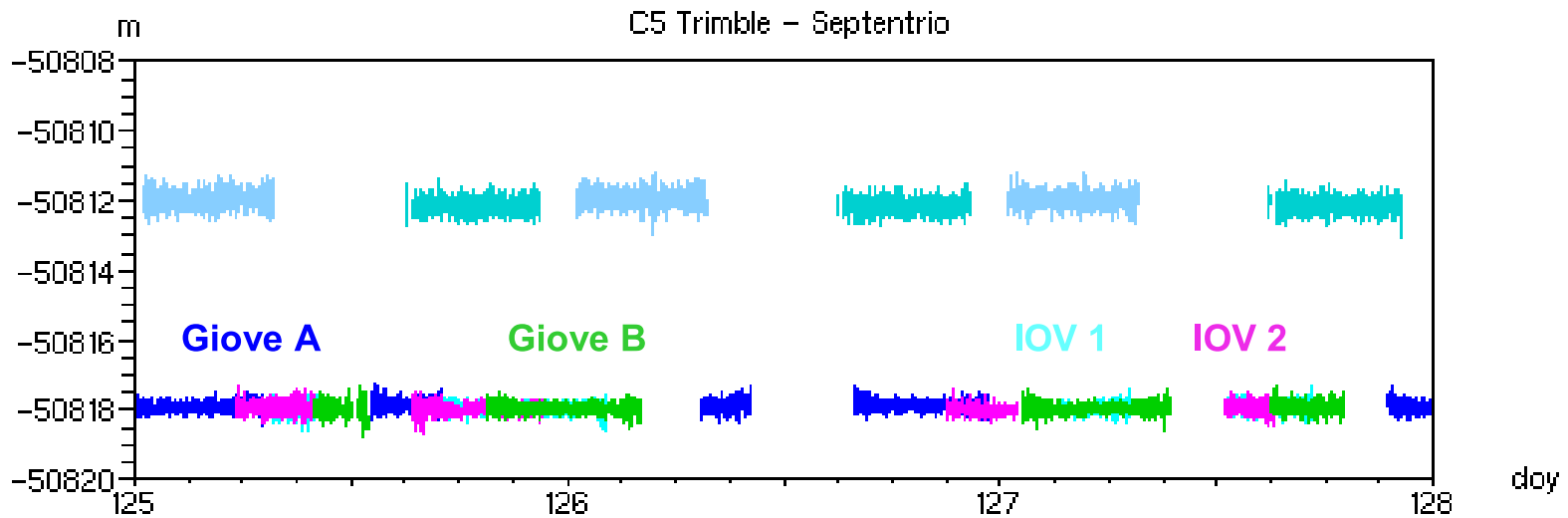
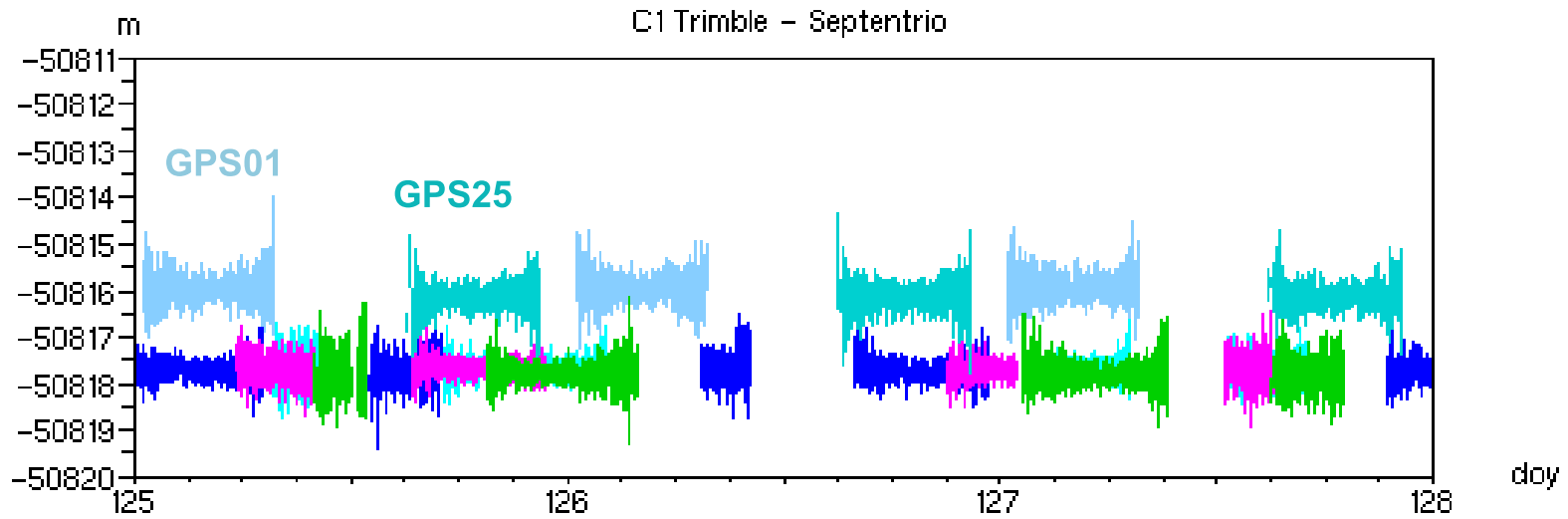
## MGEX network widelane analysis

MGEX network processing, days 165-169, receivers Trimble, Leica, Javad, Septentrio  
C1,L1, C5,L5  
Leica receivers : incomplete data sets (only GPS is correct)  
zero baseline receivers added : tls1, tls2, tls3, tls4

# Pseudo range, days 125-127, Trimble and Septentrio



# Pseudo range, days 125-127, Trimble and Septentrio



Giove bias aligned on IOV

## Observed biases for pseudo-range, days 165-169

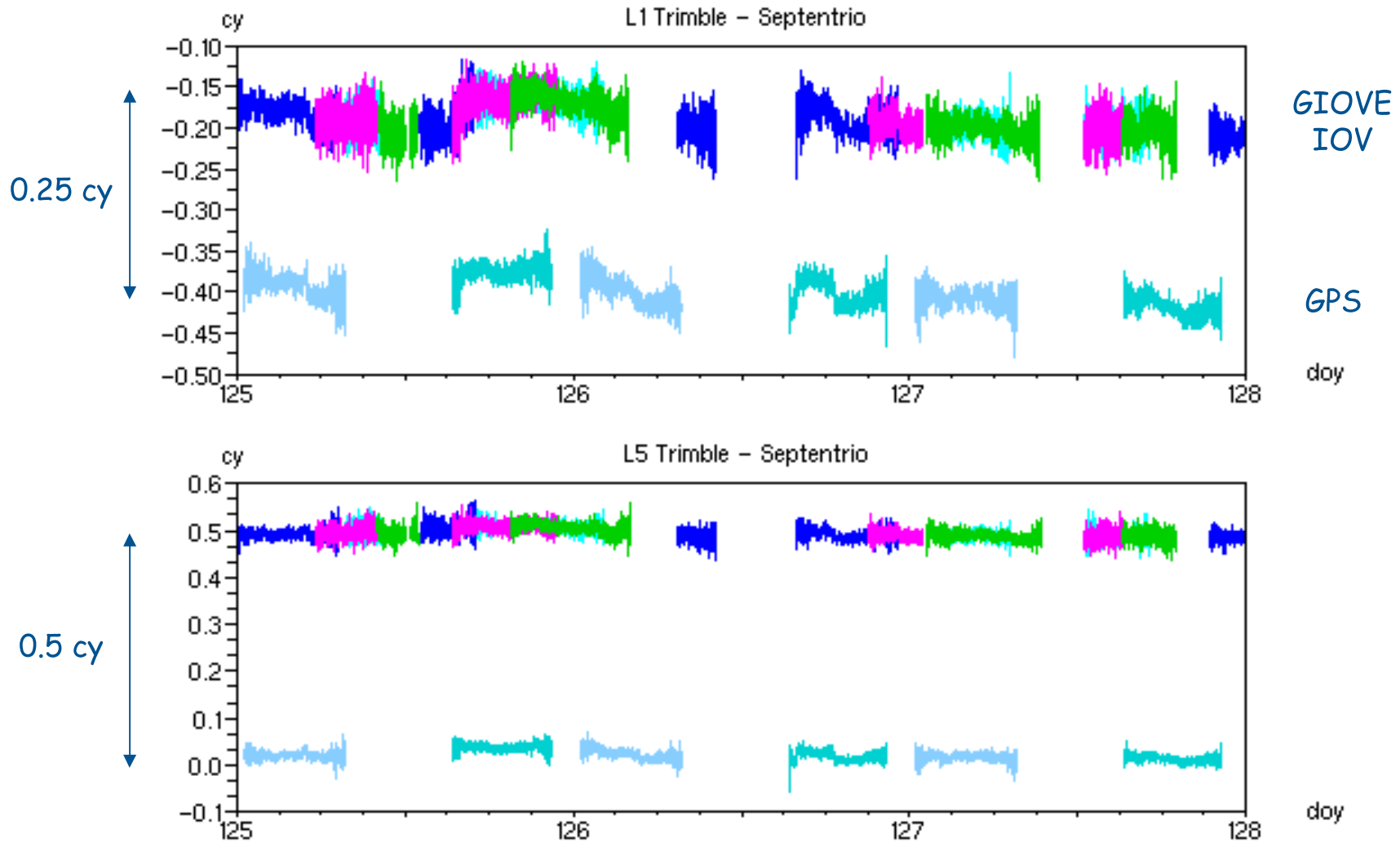
Relative to Septentrio, aligned on GPS, IOV 2 not measured

C5 bias corrected for Trimble and Septentrio as for days 125-127

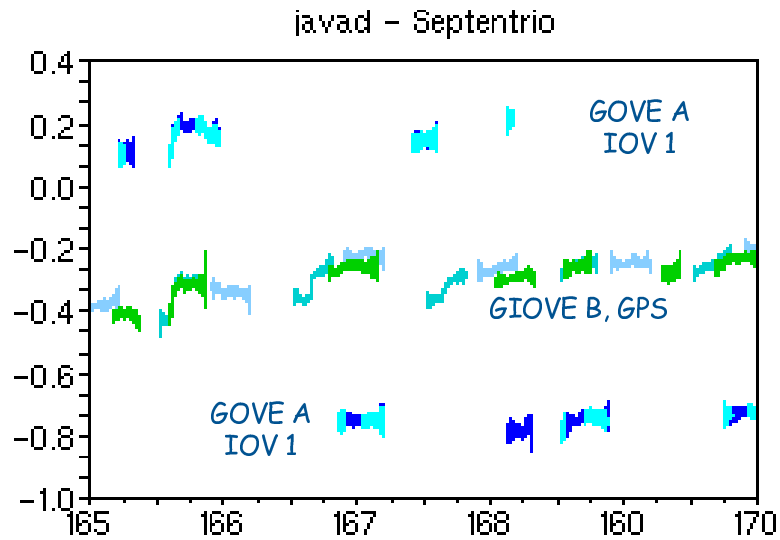
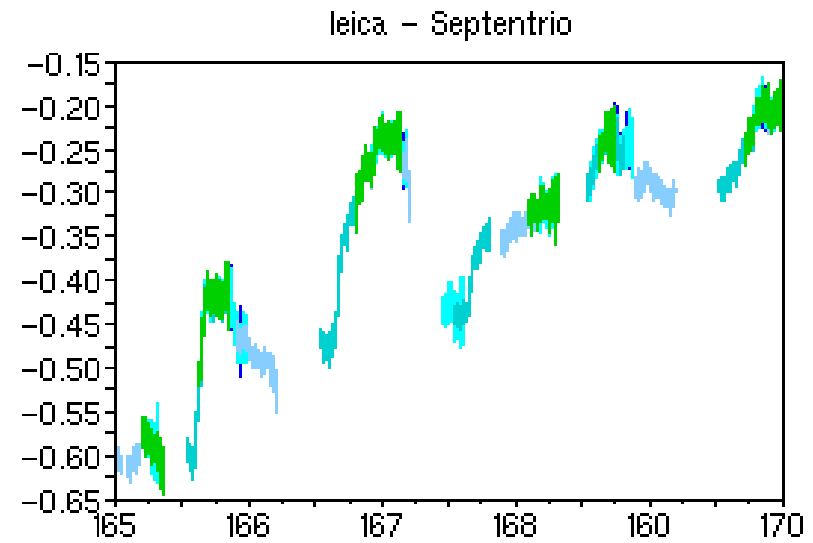
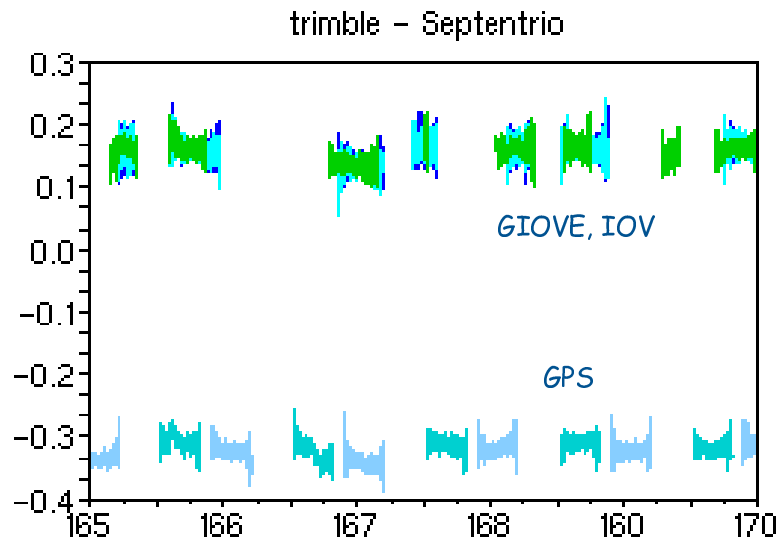
	Trimble			Leica			Javad	
	C1	C5		C1	C5		C1	C5
GIOVE A	-1.61	-5.80		16.71	19.38		0.39	-0.14
GIOVE B	-1.70	-5.86		16.46	19.28		0.13	-0.50
IOV 1	-1.58	-5.87		16.85	19.56		0.64	0.30
GPS01	0.02	0.02		0.06	0.06		0.03	0.01
GPS25	-0.02	-0.02		-0.06	-0.06		-0.03	-0.01

Values in meters

# Phase measurements comparison, days 125-127



## Phase measurements comparison, days 165-169



Phase L5a comparisons  
ref. Septentrio

## Observed fractional biases for phase, days 165-169

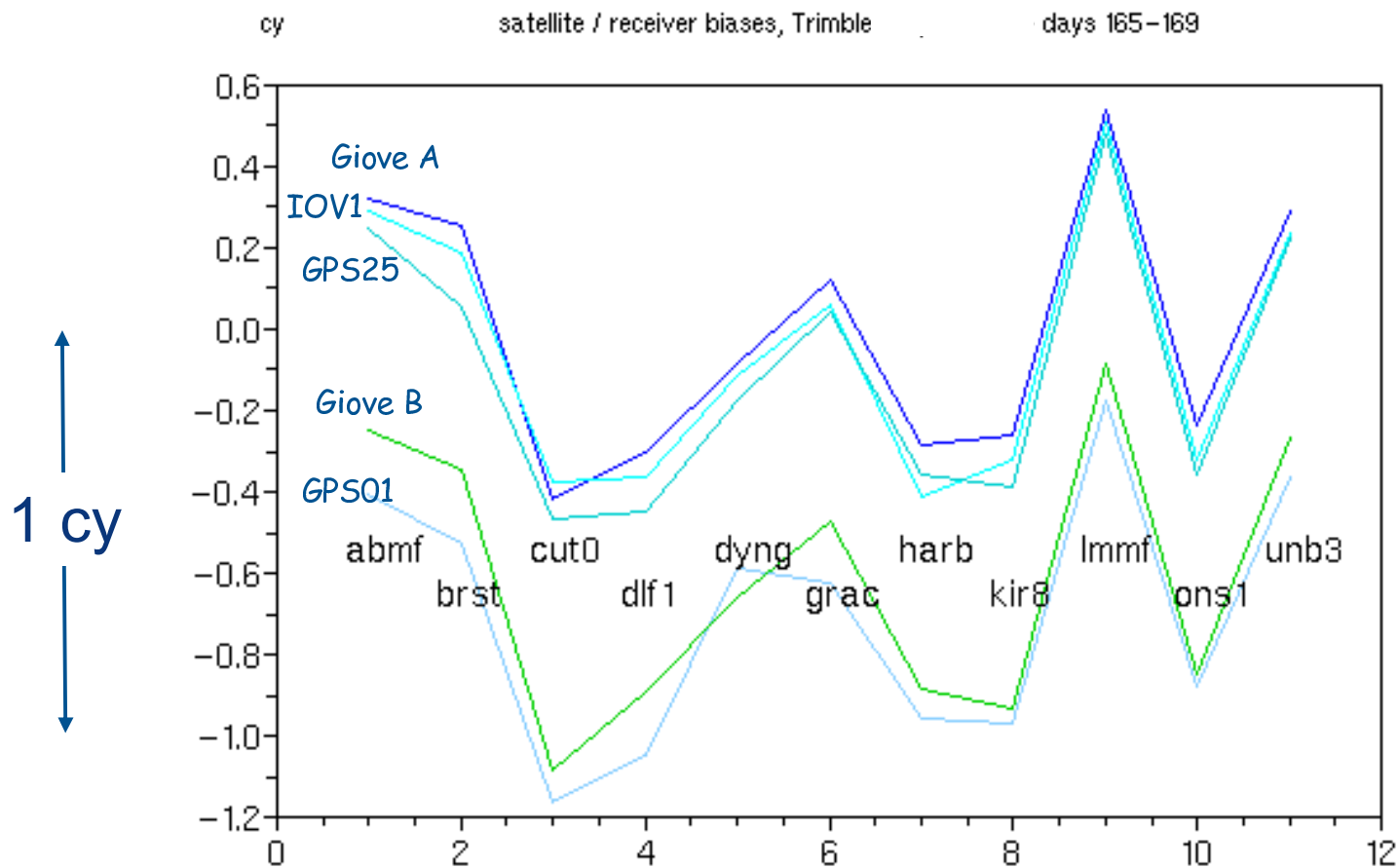
Values in cycles, relative to Septentrio

	Trimble			Leica			Javad	
	L1	L5		L1	L5		L1	L5
GIOVE A	-	-		0.5	-		-	0.5
GIOVE B	-	-		-	-		-	-
IOV 1	-	-		0.5	-		-	0.5
IOV 2 (*)	-	-		0.5	-		-	0.5
GPS	-0.25	0.5		-	-		-	-

\* : observed after synchronization, days 181-184



## MGEX widelane biases, days 165-169 (Trimble)

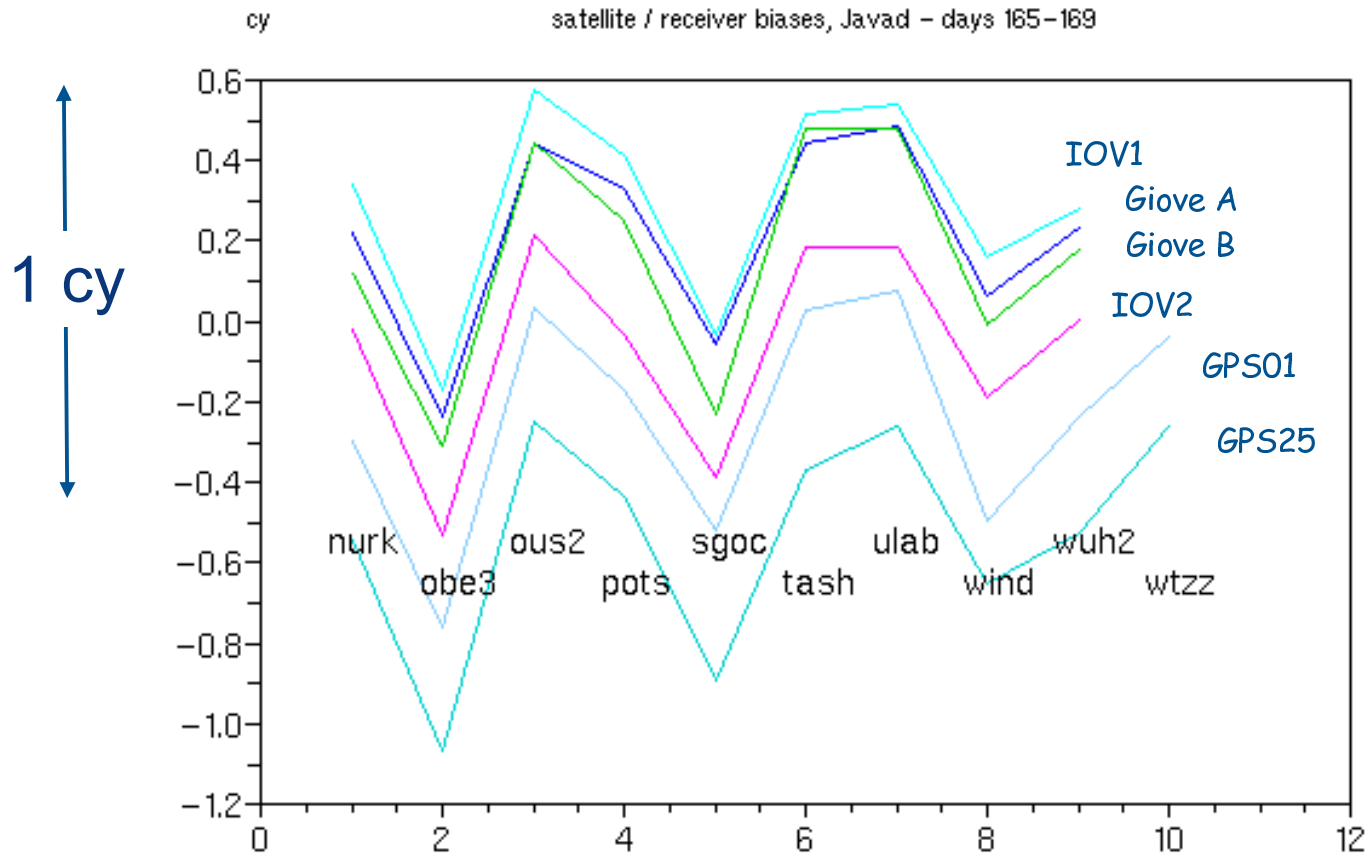


$\text{bias}(\text{satellite}) - \text{bias}(\text{receiver})$

Satellite and receiver biases are stable, consistent between GPS and Galileo

Very good consistency between receivers

## MGEX widelane biases, days 165-169 (Javad)



Satellite and receiver biases are stable, consistent between GPS and Galileo

**But different biases families for Javad and Trimble**



Other results ....

## C1, C5, days 125-127

Trimble - Septentrio, averaged over three days

	bias	nb mes.	rms	
Trimble-Septentrio C1X				
1	-1.667	2854	0.267	GIOVE
16	-1.757	2751	0.320	
11	-1.625	2478	0.243	IOV
12	-1.636	2190	0.250	
13	0.099	2597	0.312	GPS
14	-0.099	2546	0.305	

Trimble-Septentrio C5X			
1	-5.847	2880	0.151
16	-5.910	2798	0.151
11	-5.905	2476	0.149
12	-5.915	2191	0.150
13	0.092	2597	0.221
14	-0.092	2539	0.222

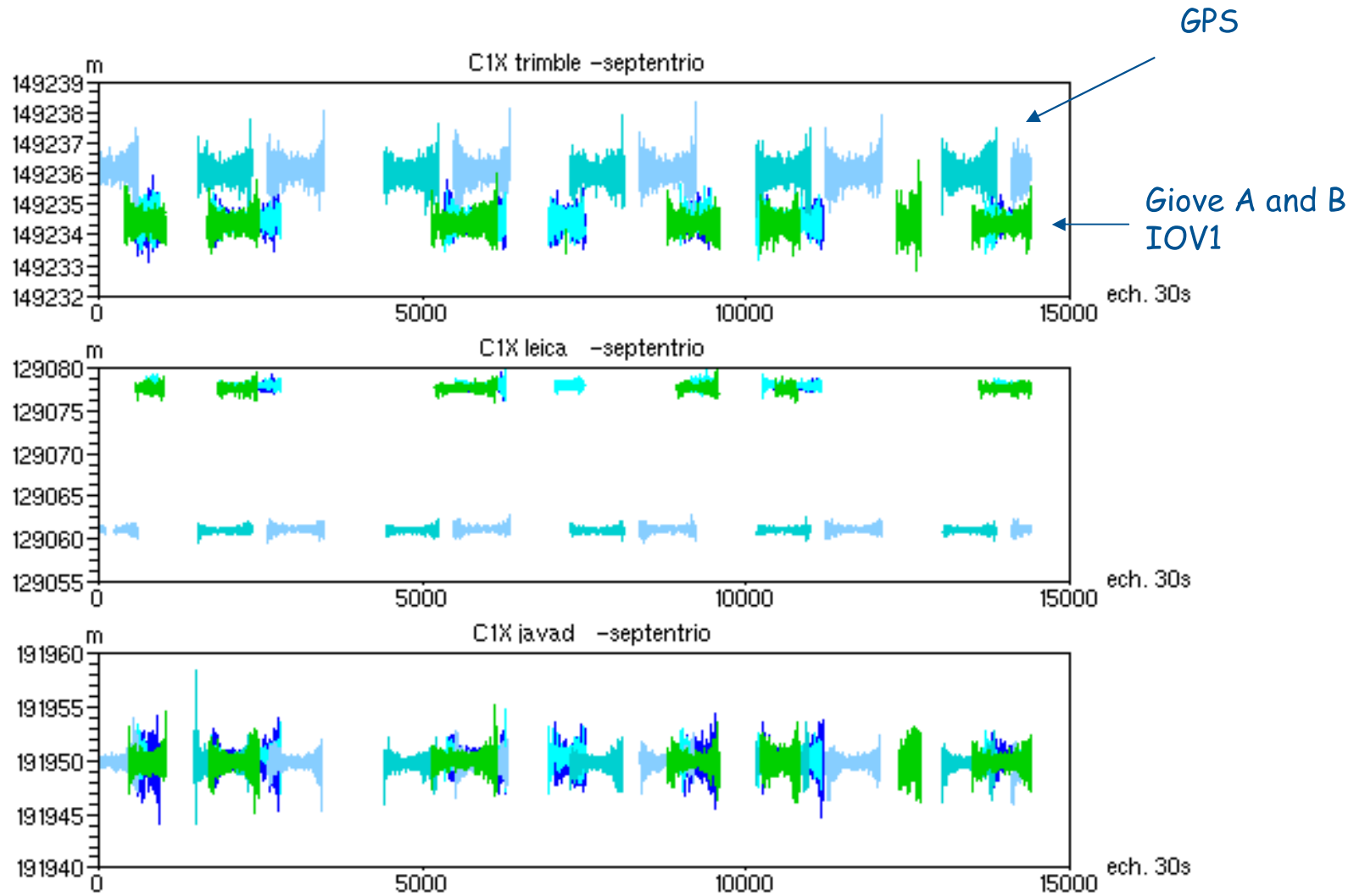
IOV 1 and 2, identical biases

Giove A and B, similar biases (globally aligned on IOV)

GPS : very different biases (20 cm), on C1 and C5

Very good noise, C5 Galileo

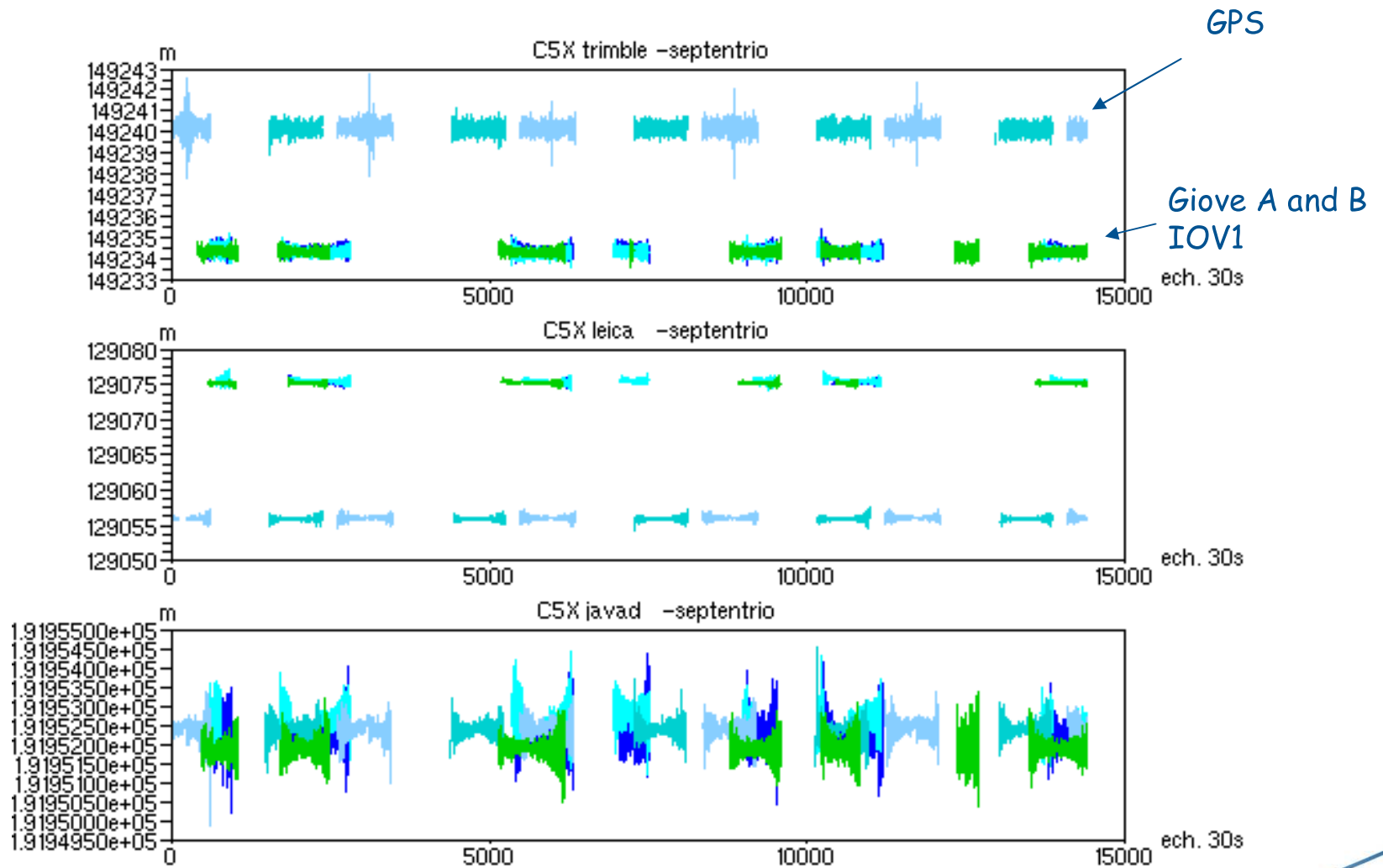
# C1, days 165-169



reference Septentrio



# C5, days 165-169



reference Septentrio

# Synthesis, days 165,169

## C1 (reference Septentrio)

	bias	nb	rms
Trimble			
1	-1.610	4903	0.270
16	-1.697	5130	0.285
11	-1.577	5201	0.252
13	0.021	4367	0.330
14	-0.021	4158	0.317
Leica			
1	16.712	2750	0.230
16	16.463	3756	0.388
11	16.848	4250	0.277
13	0.063	4237	0.298
14	-0.063	4064	0.235
Javad			
1	0.394	4741	0.880
16	0.125	4987	0.791
11	0.644	3115	0.637
13	0.030	4239	0.599
14	-0.030	4044	0.601

## C5 (reference Septentrio)

	bias	nb	rms
Trimble			
1	-5.800	4969	0.163
16	-5.865	5240	0.150
11	-5.871	5202	0.159
13	0.022	4369	0.324
14	-0.022	4162	0.225
Leica			
1	19.381	2750	0.156
16	19.278	3756	0.167
11	19.555	4249	0.230
13	0.061	4237	0.250
14	-0.061	4064	0.204
Javad			
1	-0.139	4805	0.316
16	-0.498	5042	0.252
11	0.297	3115	0.291
13	0.006	4243	0.228
14	-0.006	4050	0.181

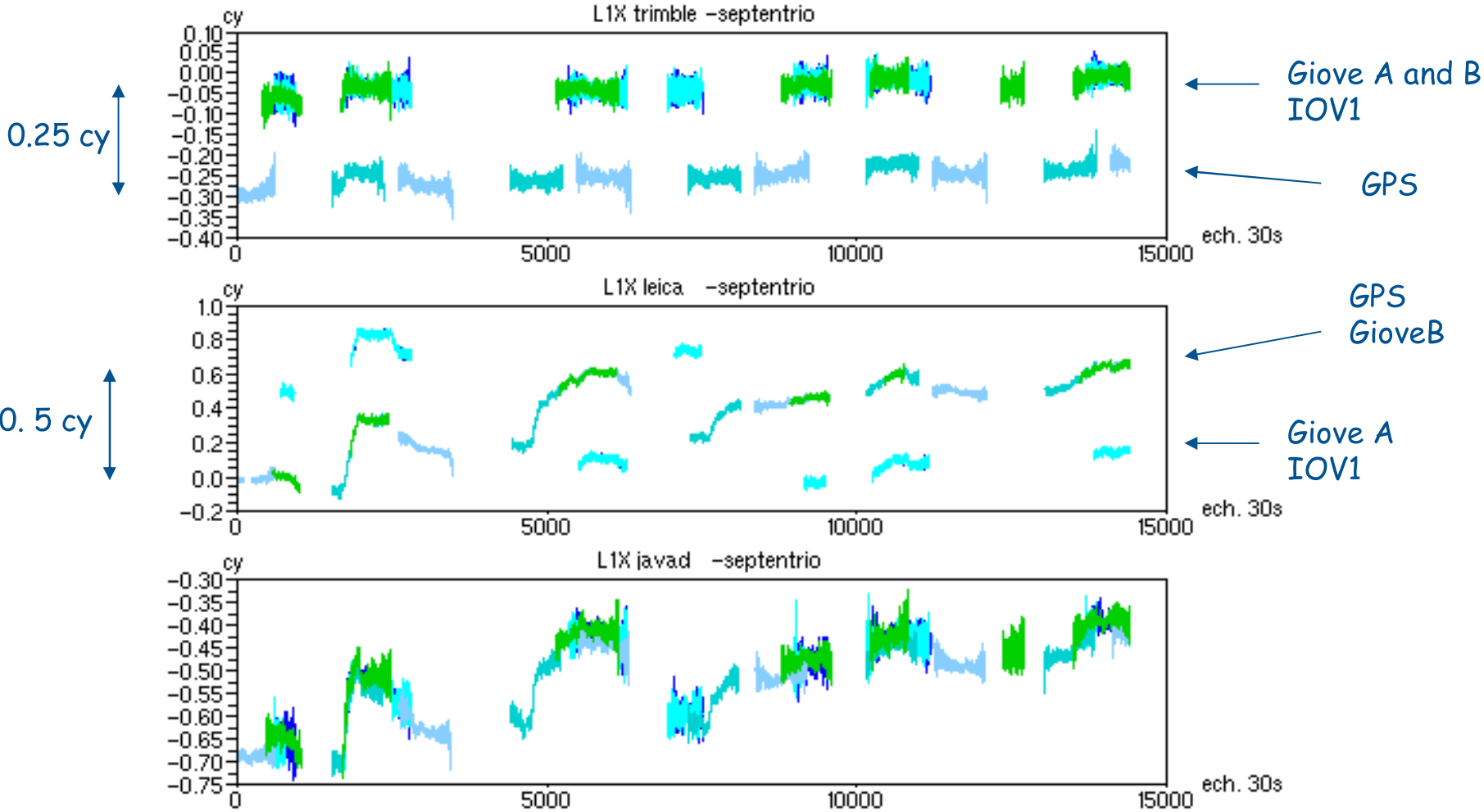
Giove  
IOV1  
GPS

Missing measurements for Leica  
Noise for Javad  
Inter system bias GPS-Galileo ...  
Differences between satellites

< 10 cm for Trimble, 20 cm for Leica, up to 50 cm for Javad

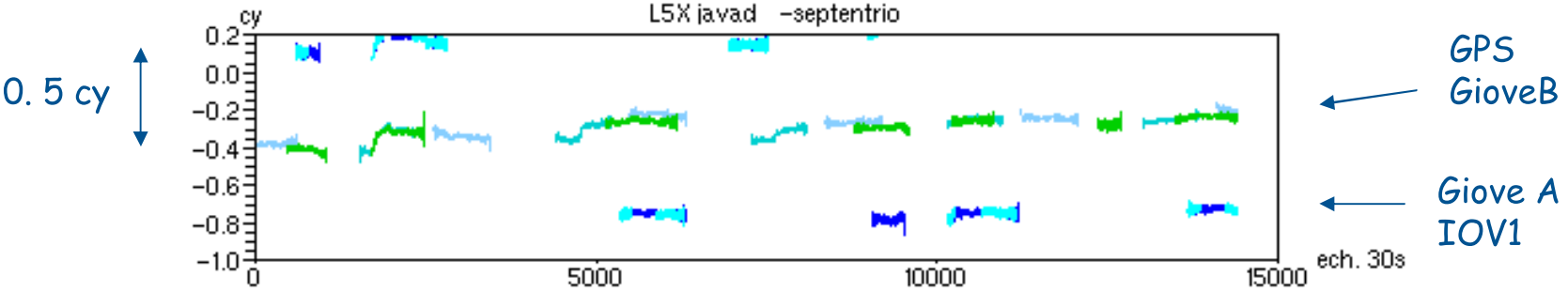
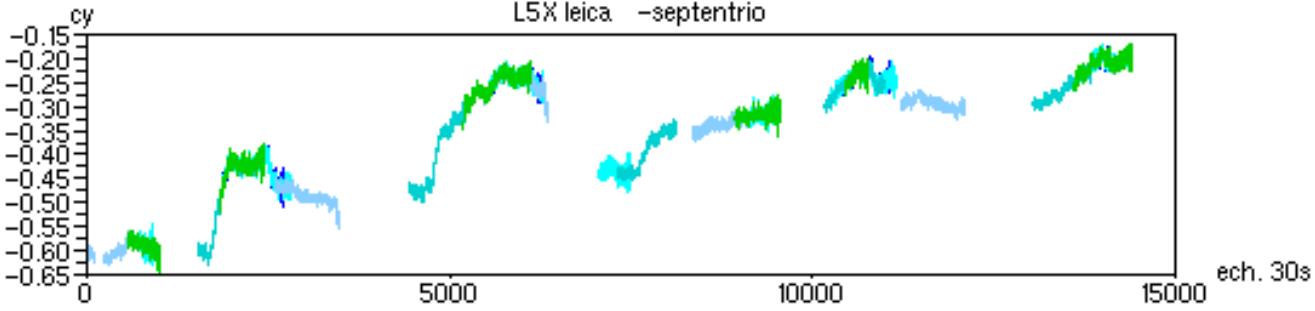
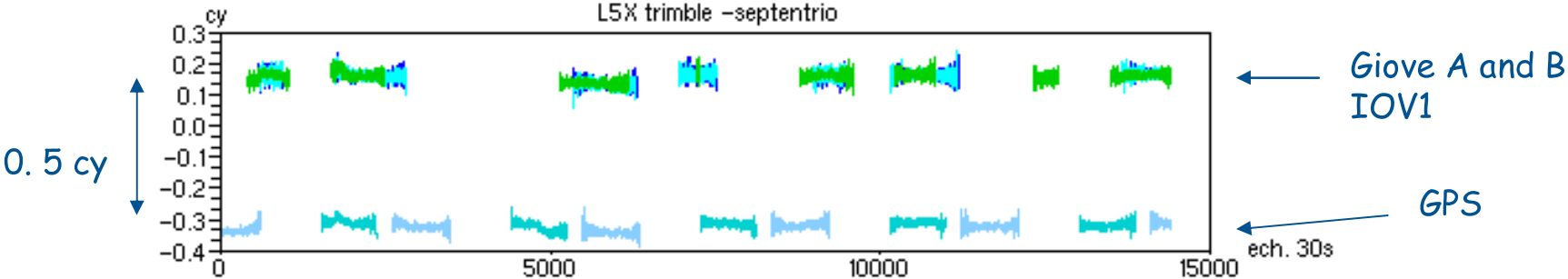


# Phase L1, days 165-169



0.25 or 0.5 cycles, depending on satellites and receivers  
 Javad and Septentrio identical  
 Leica, 0.5 cy difference between Giove A and B  
 Thermal effects Leica and Javad (clocks)

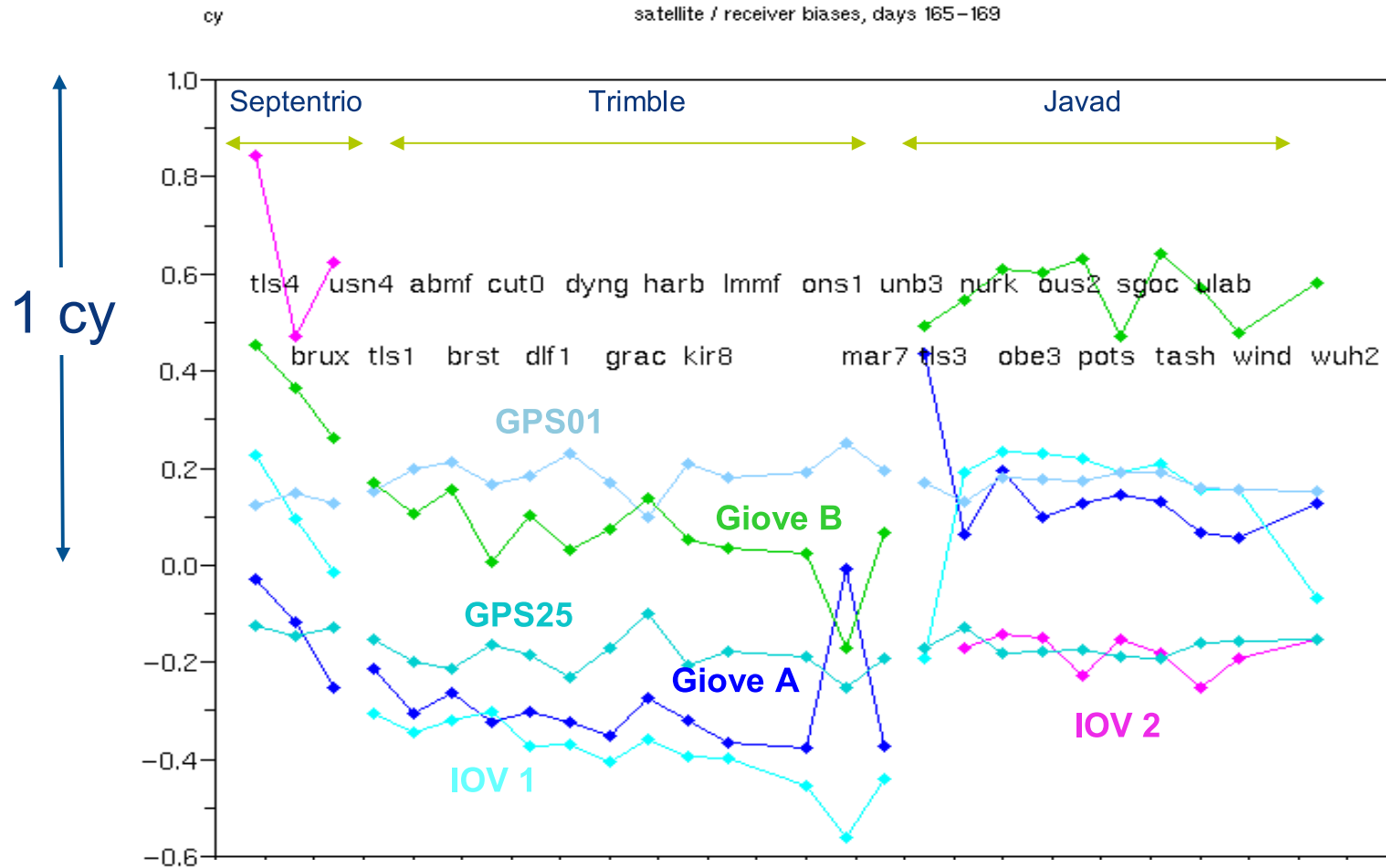
# Phase L5, days 165-169



Similar to effects on L1, but now :  
 Leica and Septentrio identical  
 Javad, 0.5 cy difference between Giove A and B



# Mgex network, satellite widelane biases



phase biases corrected  
 receiver bias corrected (aligned on GPS 01 and 25)