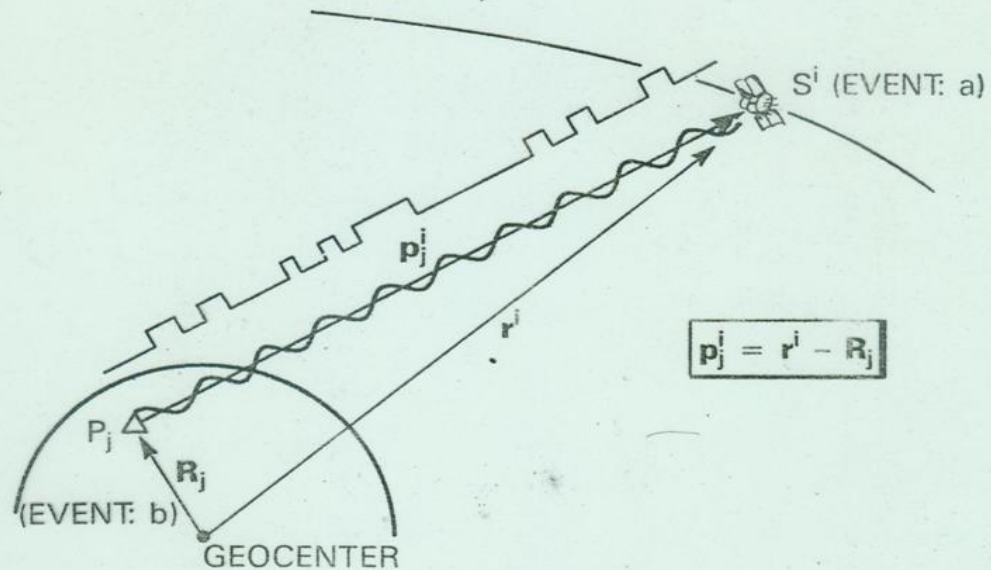


δορυφορικές
τοπογραφικές
γεωδαιτικές
μετρήσεις



PSEUDORANGE AND PHASE



PSEUDORANGE

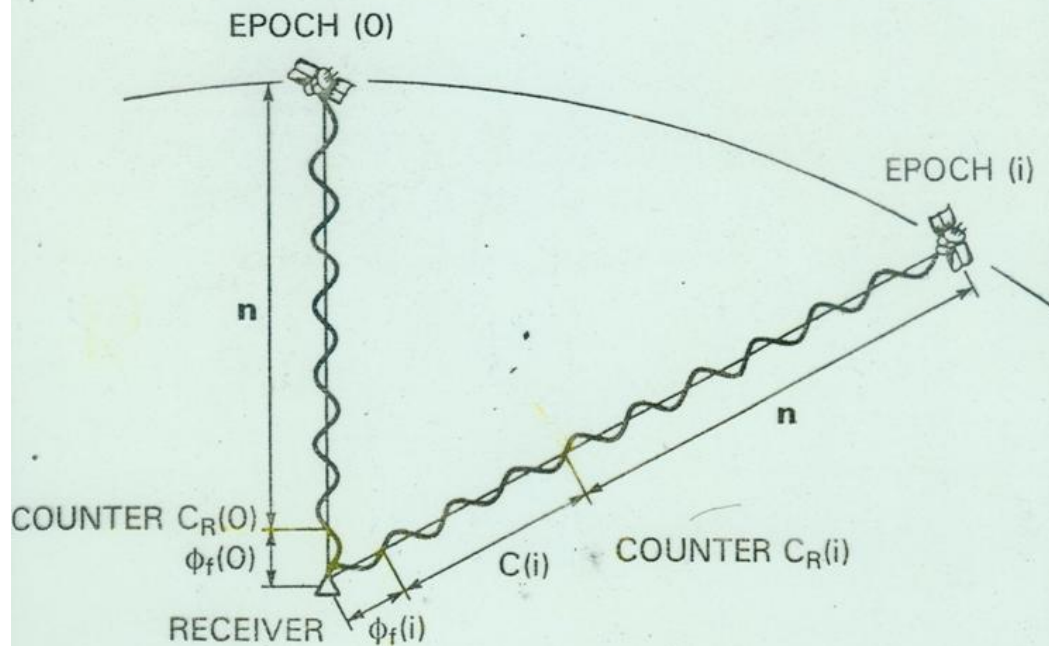
$$| \mathbf{r}^i - \mathbf{R}_j | = \bar{p}_j^i - c [\Delta t^i(a) - \Delta T_j(b)]$$

PHASE

$$\phi_j^i = F_j^i [T_j(b) - t^i(a)] = \frac{F_j^i}{c} | \mathbf{r}^i - \mathbf{R}_j | + F_j^i [\Delta t^i(a) - \Delta T_j(b)]$$



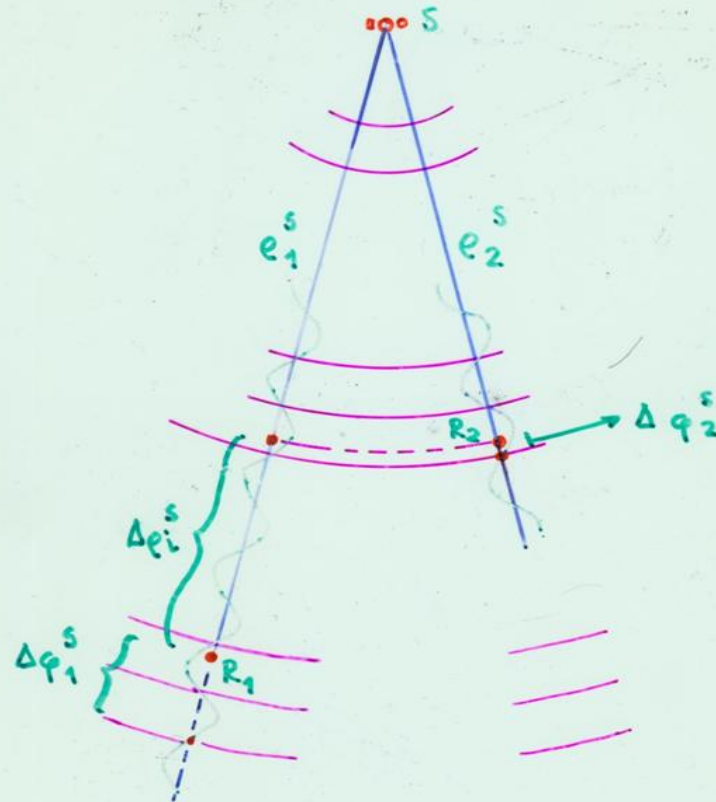
AMBIGUITY



n	AMBIGUITY: UNKNOWN NUMBER OF CYCLES
$\phi_f(i)$	FRACTIONAL PHASE AT EPOCH i
$C_R(i)$	COUNTER READING AT EPOCH i
$C(i)$	CYCLE COUNT [$C_R(i) - C_R(0)$]
$\phi(i)$	PHASE AT EPOCH i [$\phi_f(i) + C(i)$]



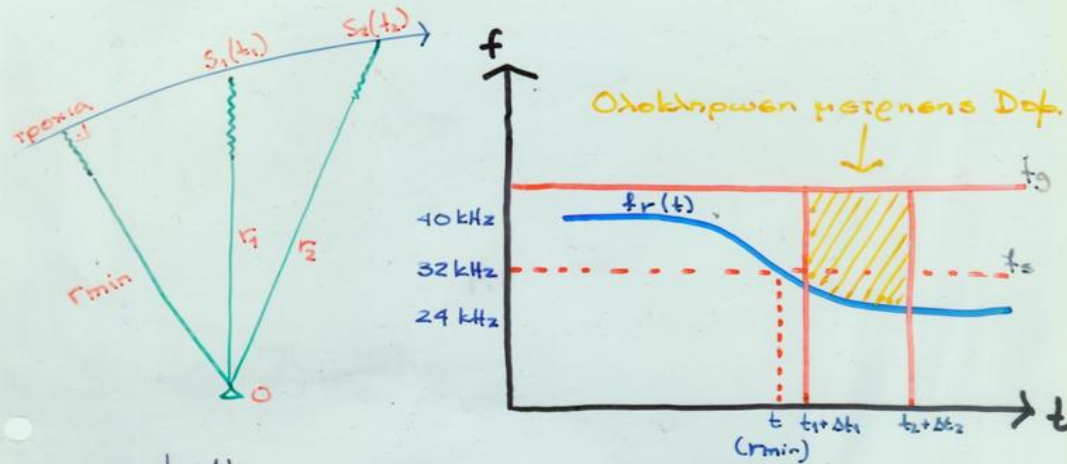
ΜΕΤΡΗΣΕΙΣ ΦΑΣΗΣ



$$\Delta \varphi_i^s = \rho_1^s - \rho_2^s = N^s \cdot \lambda + \Delta \varphi_2^s - \Delta \varphi_1^s$$



ΒΑΣΙΚΗ ΕΞΙΣΩΣΗ ΤΟΥ ΣΥΣΤΗΜΑΤΟΣ DOPPLER



$$I = \int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} (f_g - f_r) dt$$

$$I = f_g(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1) - \int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} f_r dt$$

$$\int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} f_r dt = \int_{t_1}^{t_2} f_s dt = f_s(t_2 - t_1)$$

$$I = f_g(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1) - f_s(t_2 - t_1)$$

$$I = (f_g - f_s)(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1)$$

$$\Delta t_2 - \Delta t_1 = (r_2 - r_1)/c$$

$$I = (f_g - f_s)(t_2 - t_1) + f_g[(r_2 - r_1)/c]$$

$$I = \int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} (f_g - f_r) dt$$

$$I = f_g(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1) - \int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} f_r dt$$

$$\int_{t_1 + \Delta t_1}^{t_2 + \Delta t_2} f_r dt = \int_{t_1}^{t_2} f_s dt = f_s(t_2 - t_1)$$

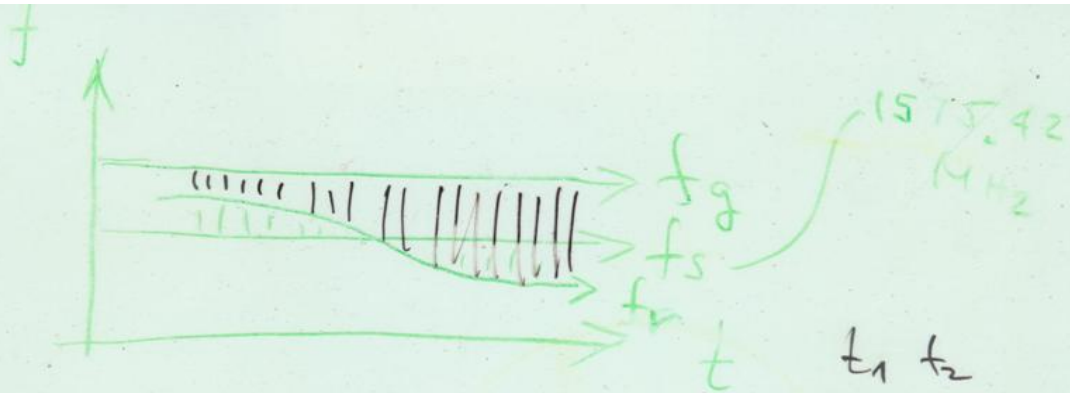
$$I = f_g(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1) - f_s(t_2 - t_1)$$

$$I = (f_g - f_s)(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1)$$

$$I = (f_g - f_s)(t_2 - t_1) + f_g(\Delta t_2 - \Delta t_1)$$

$$\Delta t_2 - \Delta t_1 = (r_2 - r_1)/c$$





$$\frac{t_1 \quad t_2}{1 \text{ sec}} \\ 1575420000$$

$$I = \int_{t_1 + \delta t_1}^{t_2 + \delta t_2} (f_g - f_r) dt$$

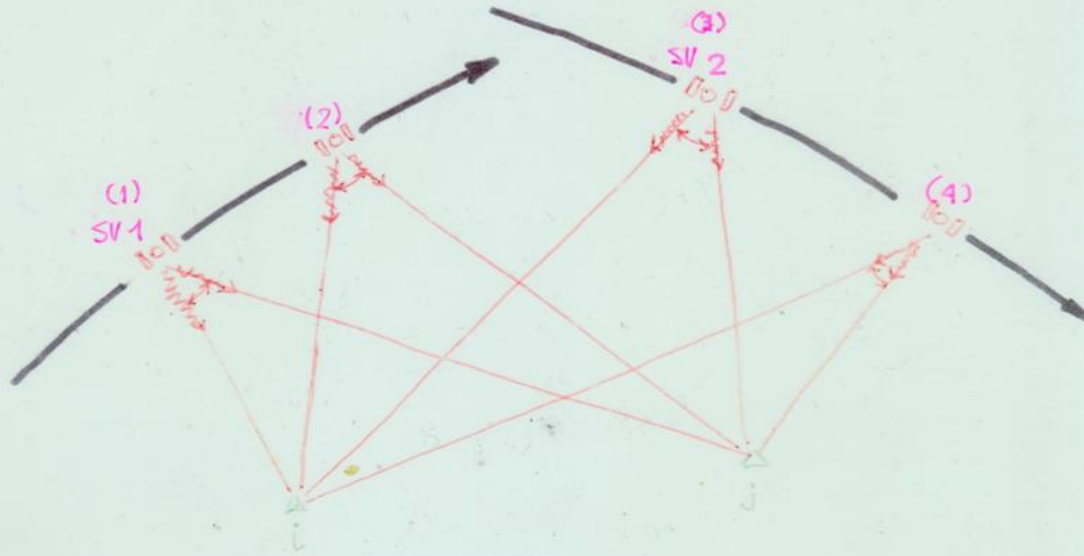
$$I = f_g (t_2 - t_1) + f_g (\delta t_2 - \delta t_1) + \int_{t_1 + \delta t_1}^{t_2 + \delta t_2} f_r dt$$

$$\int_{t_1 + \delta t_1}^{t_2 + \delta t_2} f_r dt = \int_{t_1}^{t_2} f_s dt = f_s (t_2 - t_1)$$

$$R_2 - R_1$$



ΜΕΤΡΗΣΕΙΣ ΦΑΣΗΣ



8 ΜΕΤΡΗΣΕΙΣ ΦΑΣΗΣ

4 ΜΟΝΕΣ ΔΙΑΦΟΡΕΣ

2 ΔΙΠΛΕΣ ΔΙΑΦΟΡΕΣ

1 ΤΡΙΠΛΗ ΔΙΑΦΟΡΑ

$S_{1i}, S_{2i}, S_{3i}, S_{4i}, S_{1j}, S_{2j}, S_{3j}, S_{4j}$

$(S_{1i} - S_{1j}), (S_{2i} - S_{2j}), (S_{3i} - S_{3j})$
 $(S_{4i} - S_{4j})$

$[(S_{1i} - S_{1j}) - (S_{3i} - S_{3j})],$
 $[(S_{2i} - S_{2j}) - (S_{4i} - S_{4j})]$

$\{ [(S_{1i} - S_{1j}) - (S_{3i} - S_{3j})] -$
 $- [(S_{2i} - S_{2j}) - (S_{4i} - S_{4j})] \}$



Απλές διαφορές μεταξύ δεκτών

$$\Delta\Phi = \Delta\rho - c\Delta dt + \lambda\Delta N - \Delta d_{ion} + \Delta d_{trop}$$

Διπλές διαφορές μεταξύ δεκτών - δορυφόρων

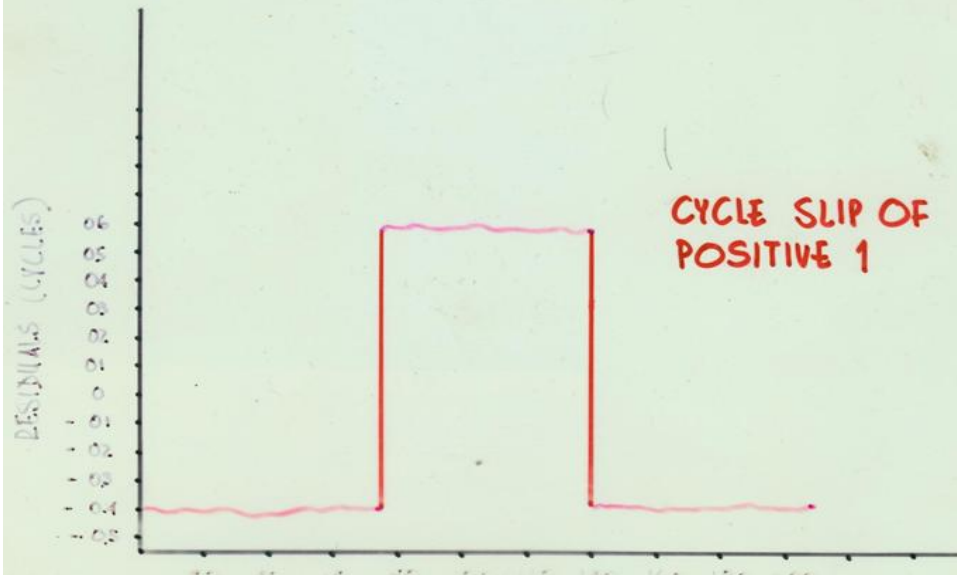
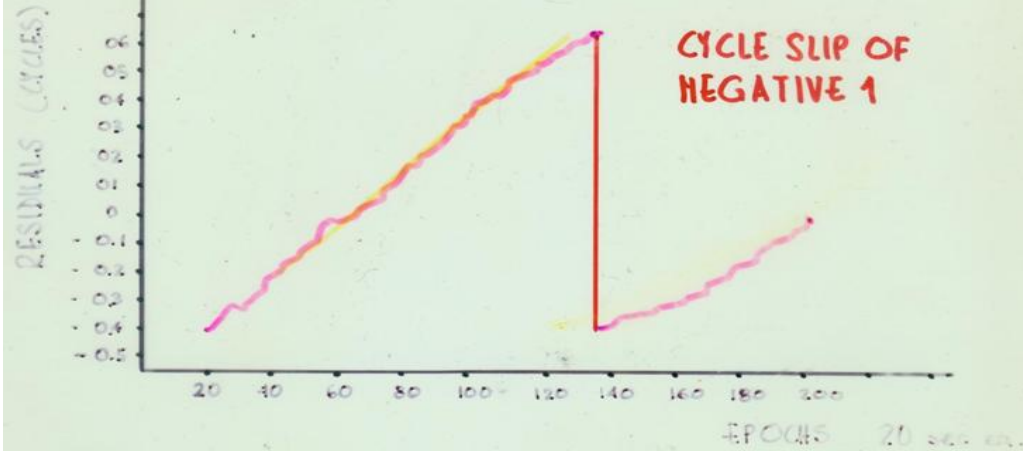
$$\nabla\Delta\Phi = \nabla\Delta\rho + \lambda\nabla\Delta N - \nabla\Delta d_{ion} + \nabla\Delta d_{trop}$$

Τριπλές διαφορές μεταξύ δεκτών - δορυφόρων - χρόνου

$$\delta\nabla\Delta\Phi = \delta\nabla\Delta\rho - \delta\nabla\Delta d_{ion} + \delta\nabla\Delta d_{trop}$$



CYCLE SLIPS



2	OBSERVATION DATA					RINEX VERSION / TYPE	
OBSTORNX						29-SEP-92 23:55	
ALEX						PGM / RUN BY / DATE	
ALEX						OBSERVER / AGENCY	
000030	SR299					MARKER NAME	
0	SR299					MARKER NUMBER	
4347583.8826	2108808.2930	4149380.1412					REC # / TYPE / VERS
1.5860	0.0000	0.0000					ANT # / TYPE
1	2						APPROX POSITION XYZ
1	1	3	G 3	G12	G16	ANTENNA: DELTA H/E/N	
4	C1	L1	P2	L2	WAVELENGTH FACT L1/2		
1992	9	28	4	55	30.000000	# / TYPES OF OBSERV	
							TIME OF FIRST OBS
							END OF HEADER
92	9	28	4	55	30.000000	0	7G20G 3G25G24G12G17G16
20187410.702	106085552.256	9	20187410.988	82664187.320	8	0.000000068	
21492186.272	112942188.158	8	21492182.930	88007020.307	7		
22288965.108	117129252.200	7	22288962.704	91269667.285	6		
22899825.289	120339454.118	7	22899831.755	93771123.933	6		
23429011.123	123120291.445	7	23429016.435	95938009.733	6		
24241148.145	127388098.299	7	24241142.382	99263573.726	6		
24624470.628	129402511.542	6	0.000	0.000	0		
92	9	28	4	56	0.000000	0	7G20G 3G25G24G12G17G16
20185366.130	106074802.960	9	20185366.434	82655911.213	8	-0.000000051	
21481063.646	112883753.360	8	21481063.395	87961486.671	7		
22277730.914	117070226.110	7	22277730.160	91223672.897	7		
22914432.408	120416170.045	7	22914429.067	93830902.483	6		
23448744.714	123223970.167	7	23448744.841	96018798.261	6		
24218864.023	127271070.447	6	24218874.196	99172383.227	6		
24611363.883	129333573.133	6	0.000	0.000	0		
92	9	28	4	56	30.000000	0	7G20G 3G25G24G12G17G16
20183332.352	106064119.385	9	20183333.164	82647486.314	8	0.000000030	
21469954.475	112825376.277	8	21469955.092	87915998.027	7		
22266537.335	117011400.459	7	22266536.248	91177834.697	7		
22929041.429	120492956.971	7	22929041.602	93890736.372	6		
23468460.444	123325568.028	7	23468458.840	96099523.791	6		
24196548.718	127153781.730	6	24196552.946	99080989.441	6		
24598219.770	129264542.357	6	0.000	0.000	0		
92	9	28	4	57	0.000000	0	7G20G 3G25G24G12G17G16
							0.000000024

