

Based on the old art of navigation techniques

a

*new and accurate method,
as a backup for GNSS is presented
for calculating the*

*Position and time
by at least three
altitudes and a sunar
distance*

*for a stationary observer and to take into account the
motion of the vessel.*

For use at sea and in land.

by

The modern sunarians diamond club

Published by NavList

The Web

MMXI

The observations

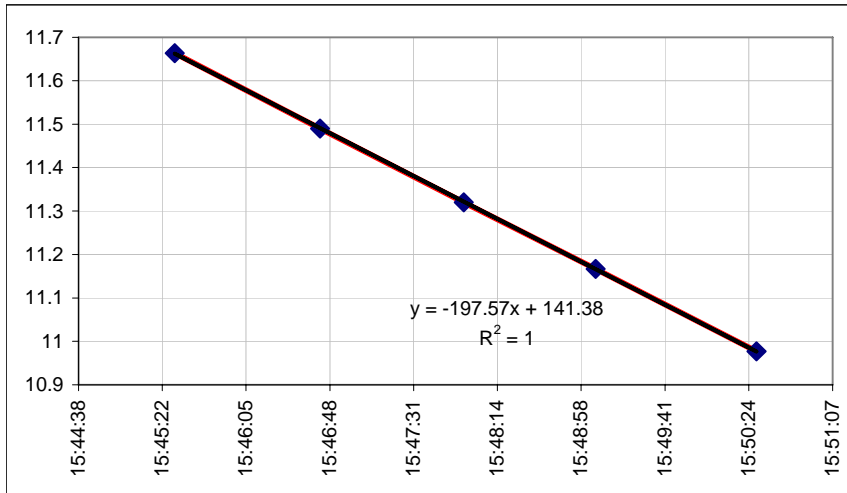
09/02/2011

Sun

UTC		Hs	
15 45 28	15.75777778 15:45:28	11 39.80	11.66333333
15 46 43	15.77861111 15:46:43	11 29.40	11.49
15 47 57	15.79916667 15:47:57	11 19.20	11.32
15 49 05	15.81805556 15:49:05	11 10.00	11.16666667
15 50 28	15.84111111 15:50:28	10 58.60	10.97666667

15.79894444
15:47:56

11.32333333
11° 19.40'



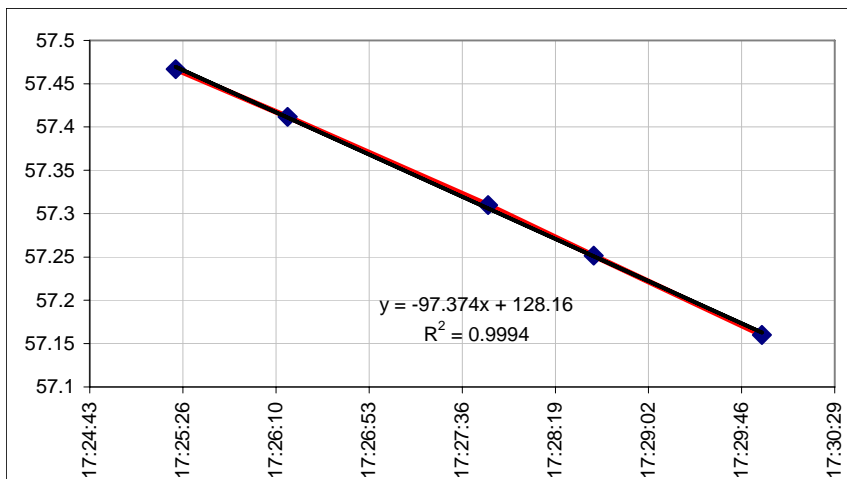
09/02/2011

Moon

UTC		Hs	
17 25 23	17.42305556 17:25:23	57 28.00	57.46666667
17 26 15	17.4375 17:26:15	57 24.70	57.41166667
17 27 48	17.46333333 17:27:48	57 18.60	57.31
17 28 37	17.47694444 17:28:37	57 15.10	57.25166667
17 29 55	17.49861111 17:29:55	57 9.60	57.16

17.45988889
17:27:36

57.32
57° 19.20'



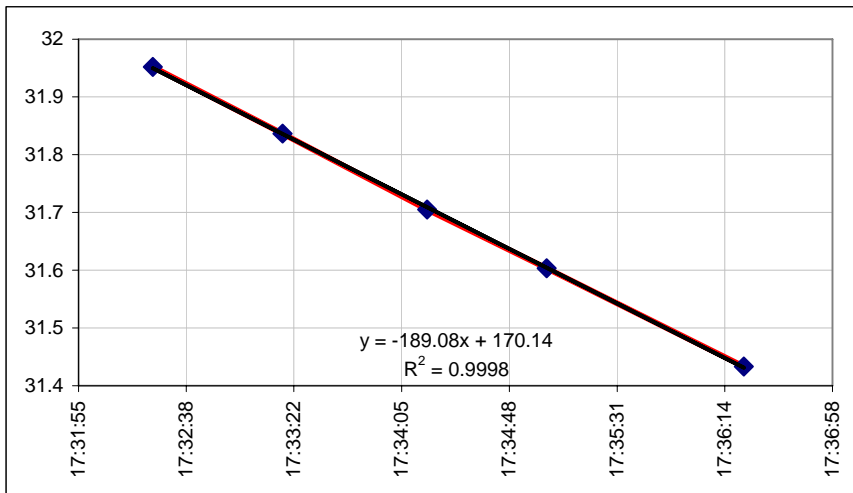
09/02/2011

Jupiter

UTC		Hs	
17 32 25	17.54027778 17:32:25	31 57.10	31.95166667
17 33 17	17.55472222 17:33:17	31 50.20	31.83666667
17 34 15	17.57083333 17:34:15	31 42.30	31.705
17 35 03	17.58416667 17:35:03	31 36.20	31.60333333
17 36 22	17.60611111 17:36:22	31 26.00	31.43333333

17.57122222
17:34:16

31.706
31° 42.36'



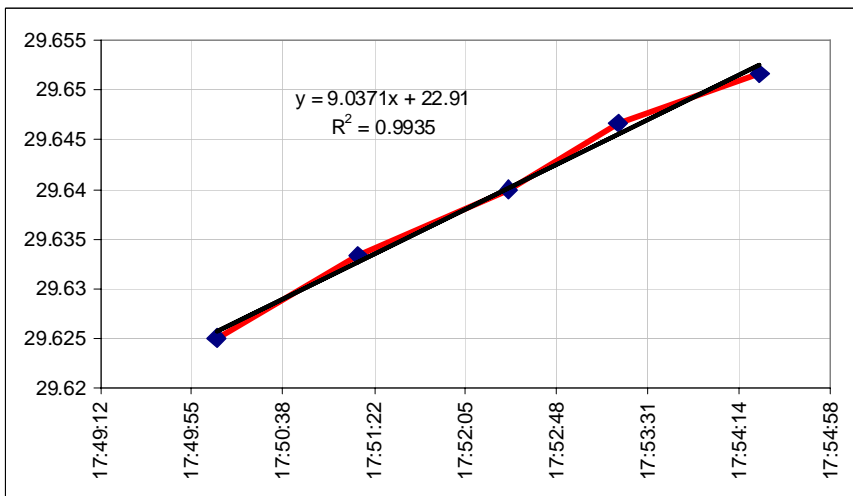
09/02/2011

Jupiter LD

UTC		LDs	
17 50 07	17.83527778 17:50:07	29 37.50	29.625
17 51 14	17.85388889 17:51:14	29 38.00	29.63333333
17 52 25	17.87361111 17:52:25	29 38.40	29.64
17 53 17	17.88805556 17:53:17	29 38.80	29.64666667
17 54 24	17.90666667 17:54:24	29 39.10	29.65166667

17.8715
17:52:17

29.63933333
29° 38.36'



The value of R denotes the quality of shoots.

The solution

After some iterations, the last step is:

09/02/2011
18:07:21 UT1
Geocentric equatorial coordinates
Moon:
GHA = 21.725471 ° = 21° 43.5'
Dec = 16.725159 ° = 16° 43.5'
Phase: 35% (+)
Jupiter
GHA = 47.630887 ° = 47° 37.9'
Dec = 0.350965 ° = 0° 21.1'
Geocentric lunar distance
LD = 30.321046 ° = +30° 19' 15.8"

DR:

B = 46.713333 = 46° 42.8'
L = -2.418333 = -2° 25.1'

IE = 0.000000 '
air T = 12.0 °C
air P = 1017.0 hPa
h Eye = 5.18 m
Dip = 0.066772

Time by lunar distances

Moon:

Hs = 55.580253 = 55° 34.8'
Limb = 0
SD = 14.872523 '
HP = 54.581544 '
R = 0.011127 °
OB = -0.002933 °
PA = 0.512131 °
AG = 0.003287 °
SDag = 15.069730 '

Body: Jupiter

Hs = 29.270125 = 29° 16.2'
Limb = 0
SD = 0.292029 '
HP = 0.026053 '
R = 0.028979 °
OB = -0.000001 °
PA = 0.000378 °
AG = 0.000000 °
SDag = 0.292030 '

Lunar observation:

LDs = 29.639333 = 29° 38.4'

Moon Limb = 1

body Limb = 0

Clearing Lunar Distance:

m = 55.513481 = 55° 30.8'
M = 56.014485205508855 = 56° 0.9'
s = 29.203353 = 29° 12.2'
S = 29.174752228553924 = 29° 10.5'
d = 29.890496 = 29° 53.4'

T1 = 17.000000 LD1 = 29.783638
Tc = 18.121450 LDo = 30.320851
T2 = 19.000000 LD2 = 30.741706

Error:

Ta = 18:07:21 LDc = 30° 19.3'
Tc = 18:07:17 LDo = 30° 19.3'
Tc = 18:07:17 LDc = 30° 19.2'
|LDo-LDc(Ta)| = 0.000195° = 0.011727'
|LDo-LDc(Tc)| = 0.000308° = 0.018463'
|Ta-Tc| = 0.063012 min = 3.780747 s

AstroNavigation

File Algorithms!

Home Identification of Stars and Planets Nautical Almanac Sights **Celestial Fix** About

Time

Date: 03/03/2011
 UTC: 16:13:33
 Now

Observer Position

B [+N/-S] = 43.316666
 L [+E/-W] = -2.000000

Celestial Body

Sun
 Moon
 Planet: Mercury
 Star: Acamar
 Aries

Observations

	Date	UTC	Body	Dec	GHA	Ho	Hs
1	09/02/2011	16:02:56	Sun	-14.6381	57.1848	11.4500	
2	09/02/2011	17:42:36	Moon	16.6628	15.7260	57.9794	
3	09/02/2011	17:49:16	Jupiter	0.3499	43.1001	31.6182	

New
Delete

Estimated Position at time of Fix

Date: 01/01/2007
 UTC: 17:49:16
 B = 43.3167
 L = -2.0000

Rhumb between observations

COG = 0.0
 SOG = 0.0 kt

LS Calculation

max iter = 10
 % Prob = 95
 Do

Output

Fix Position

B = 46° 43.1'
 L = -2° 24.1'

Error

DO = 0.00 nm

Results
Iterations

Plot CoPs

Coastlines WVS
GFX

LOPs & Fix

Zoom

0.20 2.00 4.00 6.00 8.00 10.00 12.00 14.00 16.00 18.00 20.00

español english deutsch

Using this new position:

09/02/2011
18:07:21 UT1
Geocentric equatorial coordinates
Moon:
GHA = 21.725471 ° = 21° 43.5'
Dec = 16.725159 ° = 16° 43.5'
Phase: 35% (+)
Jupiter
GHA = 47.630887 ° = 47° 37.9'
Dec = 0.350965 ° = 0° 21.1'
Geocentric lunar distance
LD = 30.321046 ° = +30° 19' 15.8"

DR:
B = 46.718200 = 46° 43.1'
L = -2.401700 = -2° 24.1'

IE = 0.000000 '
air T = 12.0 °C
air P = 1017.0 hPa
h Eye = 5.18 m
Dip = 0.066772

Time by lunar distances

Moon:

Hs = 55.569647 = 55° 34.2'

Limb = 0

SD = 14.872523 '

HP = 54.581544 '

R = 0.011131 °

OB = -0.002933 °

PA = 0.512270 °

AG = 0.003286 °

SDag = 15.069705 '

Body: Jupiter

Hs = 29.258034 = 29° 15.5'

Limb = 0

SD = 0.292029 '

HP = 0.026053 '

R = 0.028993 °

OB = -0.000001 °

PA = 0.000378 °

AG = 0.000000 °

SDag = 0.292030 '

Lunar observation:

LDs = 29.639333 = 29° 38.4'

Moon Limb = 1

body Limb = 0

Clearing Lunar Distance:

m = 55.502875 = 55° 30.2'

M = 56.004013919621208 = 56° 0.2'

s = 29.191262 = 29° 11.5'

S = 29.162647464752169 = 29° 9.8'

d = 29.890495 = 29° 53.4'

T1 = 17.000000 LD1 = 29.783638

Tc = 18.121823 LD0 = 30.321029

T2 = 19.000000 LD2 = 30.741706

Tc = 18:07:19 LDo = 30° 19.3'
Tc = 18:07:19 LDc = 30° 19.2'
|LDo-LDc(Ta)| = 0.000017° = 0.001012'
|LDo-LDc(Tc)| = 0.000308° = 0.018461'
|Ta-Tc| = 0.040644 min = 2.438666 s

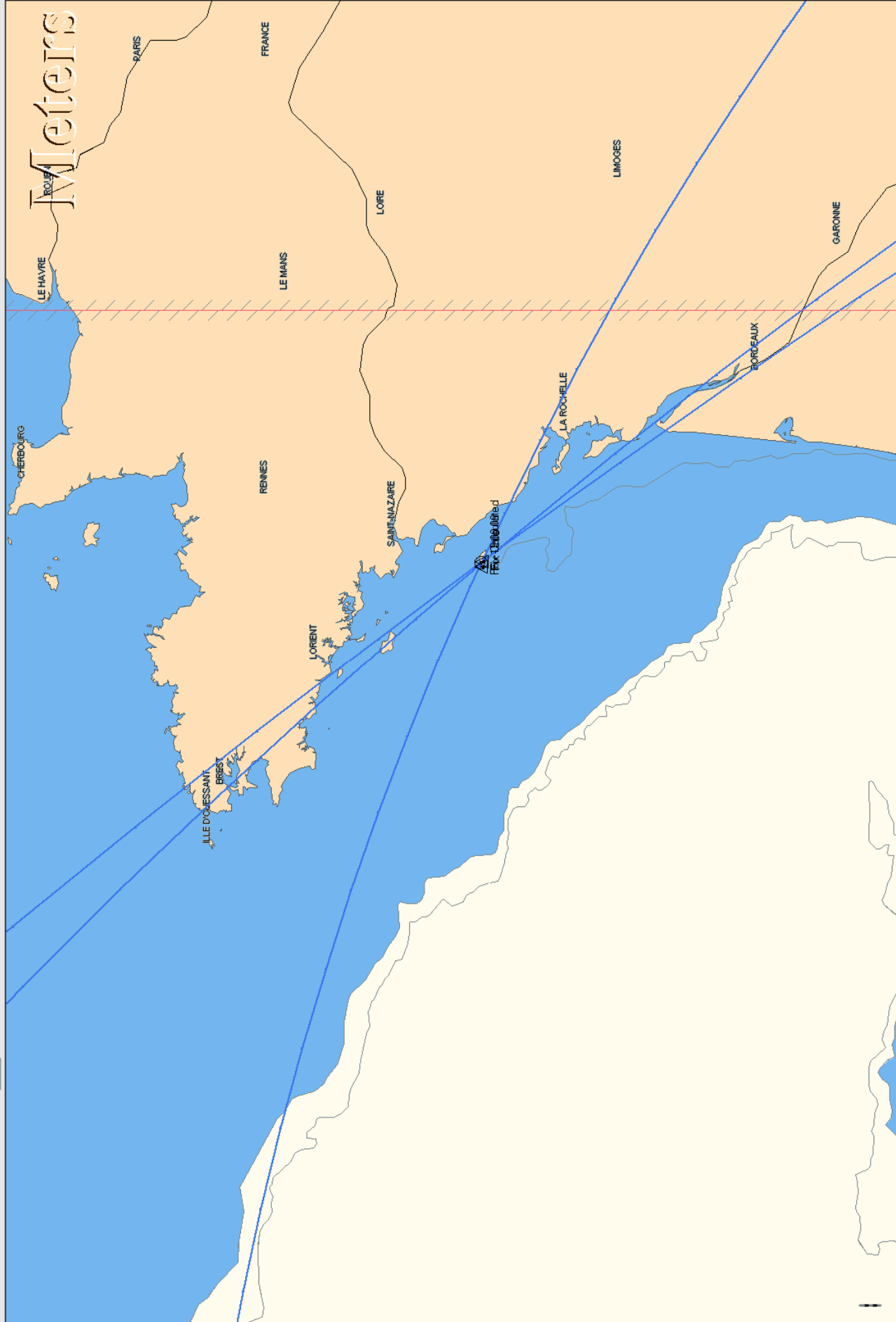
More iterations could reduce the error, but...

Error:

Ta = 18:07:21 LDc = 30° 19.3'



OpenCPN 2.3.1



ISOG: ----- kts COG: ----- Dec

Cursor: 045.54, 3729 N 002.43, 4162 W From Ownship: 308 Dec 520.23 NMi

TrueScale: 2331200

Volar a Buscar negocios

Volar a p. ej., Paseo de la Castellana, 30 - 2804

Lugares

- Mis lugares
- Excursiones
Selección esta carpeta y haz clic en el botón Reproducir de abajo
- Labenne - Maria Theresa
- Hangar
- Faros de Euskal Herria.kmz
- Lugares temporales
- GPS device

Created 03/03/11 16:16:28

Waypoints

- Waypoints
- Fix 12:00:00
- Routes

Capas

- Base de datos principal
- Fronteras y etiquetas
- Lugares
- Fotografías
- Carreteras
- Edificios 3D
- Océanos
- Tiempo
- Galería
- Concienciación global
- Más

Galería de Earth



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Data SIO, NOAA, U.S. Navy, NGA, GEBCO
48° 43' 31" N 2° 25' 56" O elev. 0 m