http://fer3.com/arc/m2.aspx/Recent-occultation-Walden-jun-2022-g52759 *220621 - Antoine M. Couëtte*

Recent occultation From: Dave Walden **Date:** 2022 Jun 15, 04:02 -0700

It's 13 June 2022, 2h 20m 8.1s UT. You see delta Scorpii (Dschubba) disappear behind the moon.

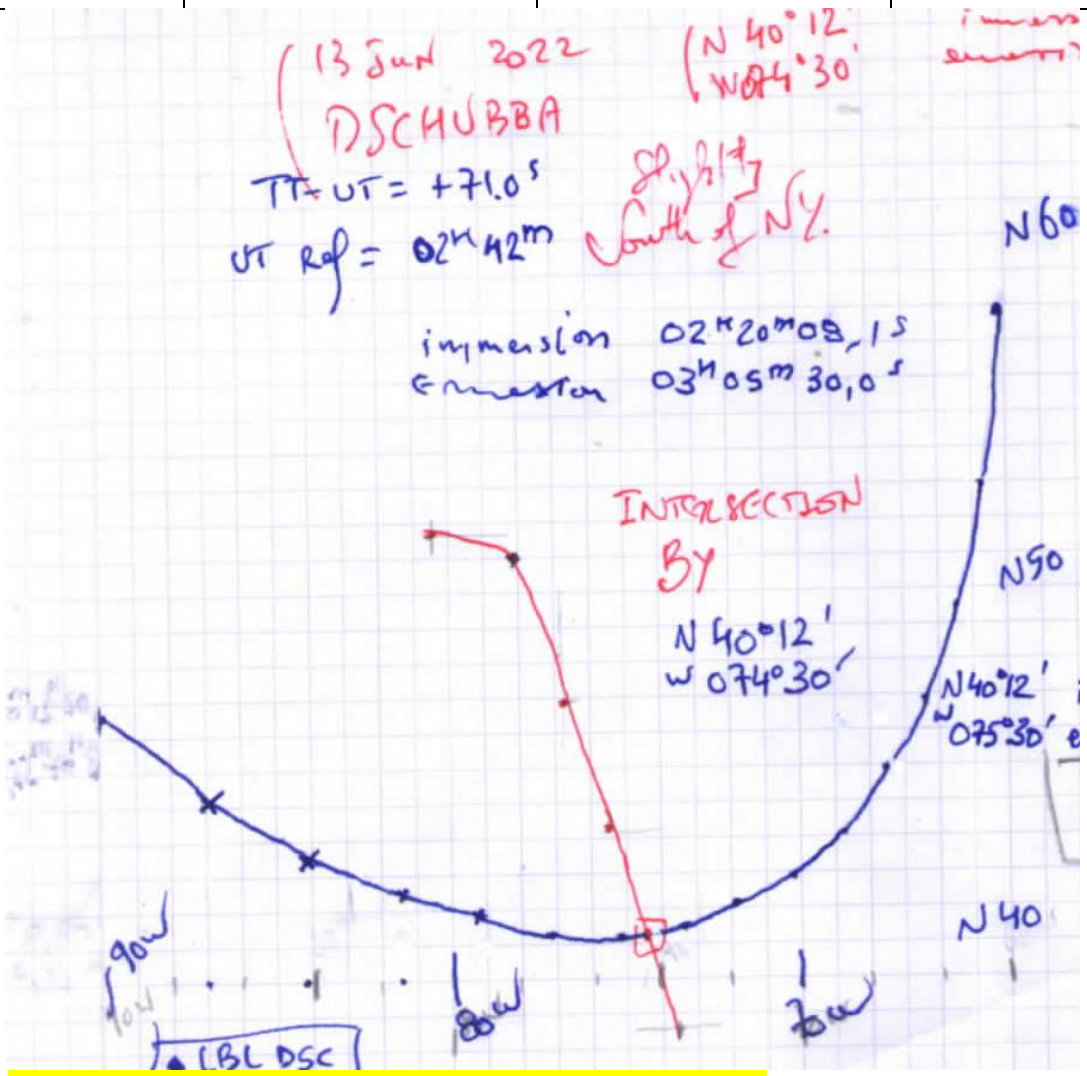
At 3h 5m 30s, you see it reappear. Where are you?

http://simbad.u-strasbg.fr/simbad/sim-basic?Ident=Dschubba **del Sco** - Spectroscopic Binary

ICRS coord. *(ep=J2000) :*	16 00 20.00528 -22 37 18.1431 (Optical)
Proper motions *mas/yr* :	-10.21 -35.41
Radial velocity / Redshift / cz :	V(km/s) -6.00
Parallaxes *(mas)*:	6.64 [0.89] A
Fluxes (8) :	V 2.32 [~] C

1 - Paper drawing Intersection of Cylinder and Sphere (no refraction) to get graphical approximate position

02h20m08.1 s	SINGLE CURVE	03h05m30 s	SINGLE CURVE
-40.0	**50.0 96.1**	-75.0	**57.1 80.4**
-35.0	**46.4 90.7**	-70.0	**51.0 78.2**
…///…	**…///…**	-65.0	**46.7 76.8**
-10.0	**40.3 77.2**	-60.0	**43.2 75.6**
-05.0	**40.2 75.3**	-55.0	**40.2 74.5**
00.0	**40.5 73.5**	-50.0	**37.7 73.4**
05.0	**41.1 71.9**	-45.0	**35.4 72.3**
…///…	**…///…**	…///…	**…///…**
40.0	**57.9 64.2**	75.0	**50.2 28.8**



Graphical approximate position AP1: N40°12’ / W074°30’ (one intersection only)

(2) First numerical Approximation from AP1 on Ellipsoid with refraction (zero altitude)

Starting from AP1 : N40°12' / W074°30'

imm. : immersion (star disappears behind Moon) *em.* : emersion (star again visible)
In the "Local LAT/LON Coordinates system" with AP1 = (0,0) and LAT/LON units in degrees :
a and b : Coefficients of straight line (1) (*ax+by-ab = 0*) of equal immersion times equal to 02h20m08.1 s
c and d : Coefficients of straight line (2) (*cx+dy-cd = 0*) of equal emersion times equal to 03h05m30.0 s
ΔX and ΔY are the local coordinates (i.e. centered onto AP1) of the intersection of (1) and (2) .
Therefore the intersection of (1) and (2) is an improved position derived from AP1.

			N41°12' W074°30'	*imm. 02h19m18.8s* *em. 03h06m15,5s*	a = 0.46179 b = 7.69091
N4012' W075°30'	*imm.02h20m44,9s* *em. 03h02m23.6s*	c = 0.27663 d = -0.10296	N40°12' W074°30'	*imm. 02h20m50.4s* *em. 03h05m12.6s*	**ΔX = 0.06741°** **ΔY = 0.45774°**

From AP1, compute AP2 with:

- **LAT(AP2) = LAT(AP1) + ΔY = N 40°39.464'**
- **LON(AP2) = LON(AP1) + ΔX = W 074°34.045'**

Numerical check : at AP2, immersion UT = 02h20m05,9s / emersion UT = 03h05m31.8s

(Benchmarks : imm. at 02h20m08.1s and em. 03h05m30,0s)

(3) Second numerical Approximation from AP2 on Ellipsoid with refraction (zero altitude)

Starting from AP2 : N40°39.464' / W074°34.045'

imm. : immersion (star disappears behind Moon) *em.* : emersion (star again visible)
In the "Local LAT/LON Coordinates system" with AP2 = (0,0) and LAT/LON units in degrees :
a and b : Coefficients of straight line (1) (*ax+by-ab = 0*) of equal immersion times equal to 02h20m08.1 s
c and d : Coefficients of straight line (2) (*cx+dy-cd = 0*) of equal emersion times equal to 03h05m30.0 s
ΔX and ΔY are the local coordinates (i.e. centered onto AP2) of the intersection of (1) and (2) .
Therefore the intersection of (1) and (2) is an improved position derived from AP2.

			N 41°39.464' W074°34.045'	*imm. 02h18m39.8s* *em. 03h06m30,8s*	a = -0.02555 b = -0.25287
N 40°39.464' W075°34.045'	*imm.02h19m57,2s* *em. 03h02m47.5s*	c = -0.03051 d = 0.01096	N 40°39.464' W074°34.045'	*imm. 02h20m05.9s* *em. 03h05m31.8s*	**ΔX = 0.00172°** **ΔY = - 0.02572°**

From AP2, compute AP3 with:

- **LAT(AP3) = LAT(AP2) + ΔY = N 40°37.921'**
- **LON(AP3) = LON(AP2) + ΔX = W 074°34.148'**

Numerical check : at AP3, immersion UT = 02h20m08.3s / emersion UT = 03h05m29.9s

(Benchmarks : imm. at 02h20m08.1s and em. 03h05m30,0s)

No need for further refinement.

Solution : N 40°37.9' / W 074°34.1' on the WGS84 Ellipsoid with refraction and at Sea Level

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Jun 20th, 2022
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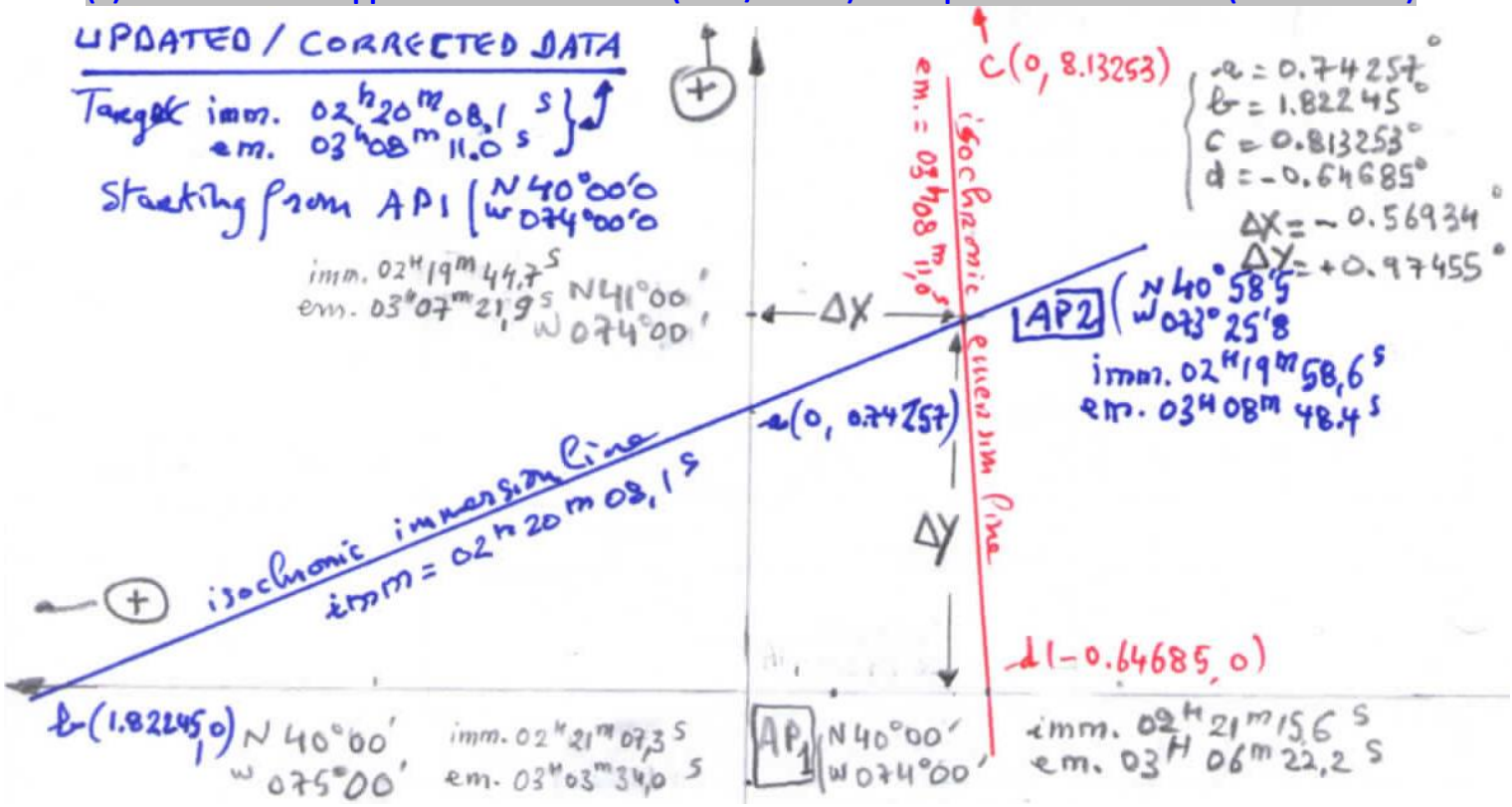
COMPLEMENT dtd Jun 21st, 2022 to reflect Erratum published by Dave Walden on June 18th

Erratum published here (http://fer3.com/arc/m2.aspx/Recent-occultation-Walden-jun-2022-g52772) as:

Very sorry! A typo was pointed out to me. My position is 40d50m11.4 N, 73d37m29.6s W. The disappearance, 13 June, 2h 20m 8.1s UT. The reappearance, 3h 8m 11.0s UT.

Hence the iteration method depicted in the previous pages is performed again on the updated/corrected data. For didactical reasons, we are starting hereunder from a full degree position - AP1 at N40°/W074° - close from our previous page "AP3" determination derived from the uncorrected original data. The sketch here-under better depicts one such numerical iteration (Ellipsoid with refraction and zero altitude).

(1) First numerical Approximation from AP1 (N40°/W074°) on Ellipsoid with refraction (zero altitude)



(2) Second numerical Approximation from AP2 on Ellipsoid with refraction (zero altitude)

Starting from AP2 : N40°58.5' / W073°25.8'

imm. : immersion (star disappears behind Moon) *em.* : emersion (star again visible)

In the "Local LAT/LON Coordinates system" with AP2 = (0,0) and LAT/LON units in degrees :

a and b : Coefficients of straight line (1) (*ax+by-ab = 0*) of equal immersion times equal to 02h20m08.1 s

c and d : Coefficients of straight line (2) (*cx+dy-cd = 0*) of equal emersion times equal to 03h08m11.0 s

ΔX and ΔY are the local coordinates (i.e. centered onto AP2) of the intersection of (1) and (2) .

Therefore the intersection of (1) and (2) is an improved position derived from AP2.

			N 41°58.5' W073°25.8'	*imm. 02h18m42.2s* *em. 03h09m35.1s*	a = -0.12435 b = -0.49223
N 40°58.5' W074°25.8'	*imm.02h19m39.3s* *em. 03h06m13.2s*	c = -0.80086 d = 0.24098	N 40°58.5' W073°25.8'	*imm. 02h19m58.6s* *em. 03h08m48.4s*	**ΔX = 0.18918°** **ΔY = - 0.17214°**

From AP2, compute AP3 with:

- **LAT(AP3) = LAT(AP2) + ΔY = N 40°48.2' , LON(AP3) = LON(AP2) + ΔX = W 073°37.2'**

Numerical check : at AP3, immersion UT = 02h20m08.8s / emersion UT = 03h08m10.3s

(Benchmarks : imm. at 02h20m08.1s and em. 03h08m11,0s)

No need for further refinement. Final result within 2 miles of published solution.

Position this time somewhere in the western part of Long-Island (Glen Head ?)

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