

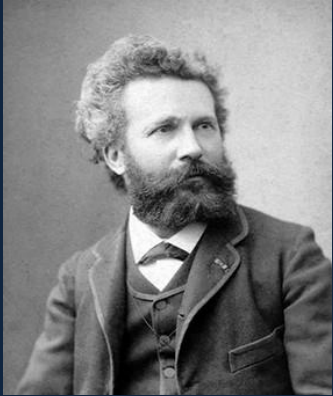
Photographic Plate Legacy from Camille Flammarion Juvisy Observatory

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Camille Flammarion

- Camille Flammarion observatory in Juvisy



1842-1925
Amateur / Professional astronomer !
Creator of the french astronomical
society : SAF



Juvisy site
SAF property
Observatory code 285

- Zeiss refractor

D=240mm, F=3640mm
First light in 1885
Restored in 2011



Available for public
observations

Old photographic plates

- 6000 plates from 1898 to 1947



Star fields, planets & satellites,
Comets, Sun & Moon

- ➡ Identify & Save this century-old heritage (mandatory)
- ➡ Do science at the same time ?
(the answer is Yes !)

Inventory



- searching, sorting, preserving activity
- partnership with archive services
- this is mandatory !



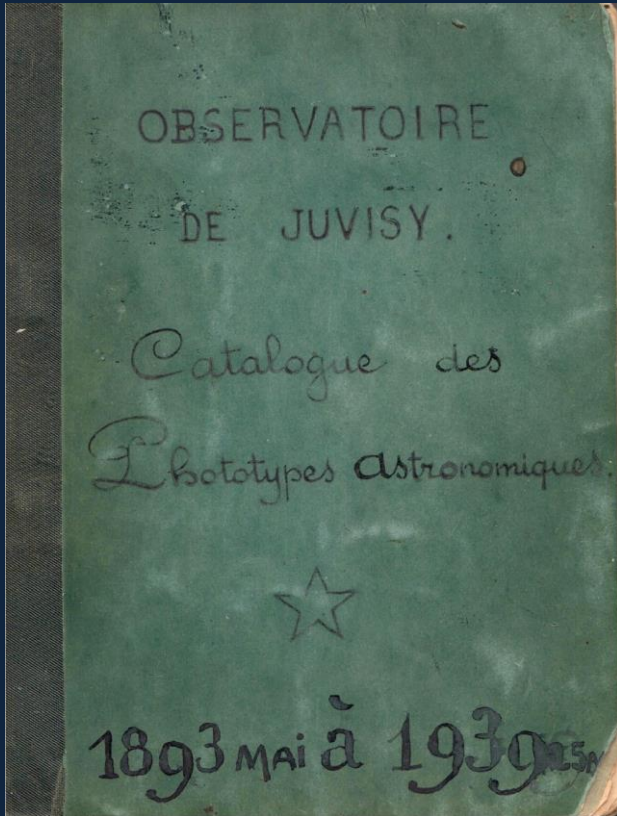
Laurence Mayeur



Francis Oger
Charles White
James Curlin
Guy Artzner

- locate the plates
- change packaging
- digitize logbook

- Hand-written logbooks



n°	Sujets	Dates	Procs (E.m.a)	Objetifs	Plaques, formats	Auteurs
1964	Comète Delavan	1914 Sept. 17	14.35 à 15.57	OP.	diq-rangs Griest. 6x9	F. Rubin
1965	-w-	-w- 20	14.26 à 15.40	Art-T	-w- 13x18B	-
1966	-w-	-w-	-w-	OVr	-w- -w-	-
1967	-w-	-w-	-w-	OP	-w- 6x9	-
1968	-w-	-w- 22	7.29 à 8.30	Art-Ten	-w- 13x18	-
1969	-w-	-w-	-w-	OVr	-w- -w-B	-
1970	-w-	-w-	-w-	OP	-w- 6x9	-
1971	-w-	-w- 23	14.8 à 16.6	Art-Ten	-w- 13x18B	-
1972	-w-	-w-	-w-	OVr	-w- -w-	-
1973	-w-	-w-	-w-	OP	-w- 6x9	-
1974	-w-	-w- 24	7.27 à 8.30	Art-Ten	-w- 13x18B	-
1975	-w-	-w-	-w-	OVr	-w- -w-B	-
1976	-w-	-w-	-w-	OP	-w- 6x9	-
1977	-w-	-w-	13.57 à 16.1	Art-Ten	-w- 13x18B	-
1978	-w-	-w-	-w-	OVr	-w- -w-	-
1979	-w-	-w-	-w-	OP	-w- 6x9	-
1980	-w-	-w- 30	14.43 à 16.15	Art-Ten	-w- 13x18B	-
1981	-w-	-w-	-w-	OVr	-w- -w-	-
1982	-w-	-w-	-w-	OP	-w- 6x9	-
1983	-w-	Oct. 9	6.47 à 7.36	Art-Ten	-w- 13x18	-
1984	-w-	-w-	-w-	OVr	-w- -w-B	-
1985	-w-	-w-	-w-	OP	-w- 6x9	-
1986	-w-	-w- 12	6.39 à 8.4	Art-Ten	-w- 13x18	-
1987	-w-	-w-	-w-	OVr	-w- -w-B	-
1988	-w-	-w-	-w-	OP	-w- 6x9	-
Mobilisé le 12 Décembre 1914 (Guérard) jusqu'au 25 juillet 1917						
1989	Comète Wolf	1917 Juill. 27	12.33 à 14.3	OVr	diq. bleu-cyan. 13x18B	-
1990	-w-	-w-	-w-	Art-Ten	-w- -w-B	-
1991	-w-	-w-	-w-	OP	-w- 6x9	-
1992	Soleil	Avril 7	4.49	OVr-f	lat. Juill.	-w- -w-B
1993	-w-	-w-	-w-	-w-	-w- -w-	-
1994	-w-	-w-	5.2	-w-	-w- -w-	-
1995	-w-	-w-	-w-	-w-	-w- -w-	-
1996	-w-	-w-	5.12	-w-	-w- -w-B	-
1997	-w-	-w-	-w-	-w-	-w- -w-B	-
1998	-w-	-w-	5.20	-w-	-w- -w-	-
1999	-w-	-w-	-w-	-w-	-w- -w-	-

- Main astronomers :
- Eugène Antoniadi (from 1897 to 1901)
 - Ferdinand Quénisset (from 1893 to 1947)

- Modern use of big data → digital transcription

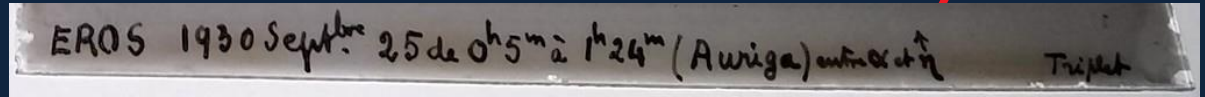
first step : create the database

copy logbook

4116	—	—	—	—	Tripl. Z.	—	—	—
4117	Détermin. f. Ovt. Ag. m	Septembre 20	Soirée	Ovt. Ag. m	—	—	—	—
4118	Eros	Septembre 25	0 ^h 5 ^m à 1 ^h 24 ^m	Astr. Tes.	—	—	—	—
4119	—	—	—	Tripl. Z.	—	—	—	—
4120	Pluton, Gemini	—	1 ^h 55 ^m à 4 ^h 10 ^m	Astr. Tes.	—	—	—	—
4121	—	—	—	Tripl. Z.	—	—	—	—



confirm Inscription on plates



check

Find the plate

database

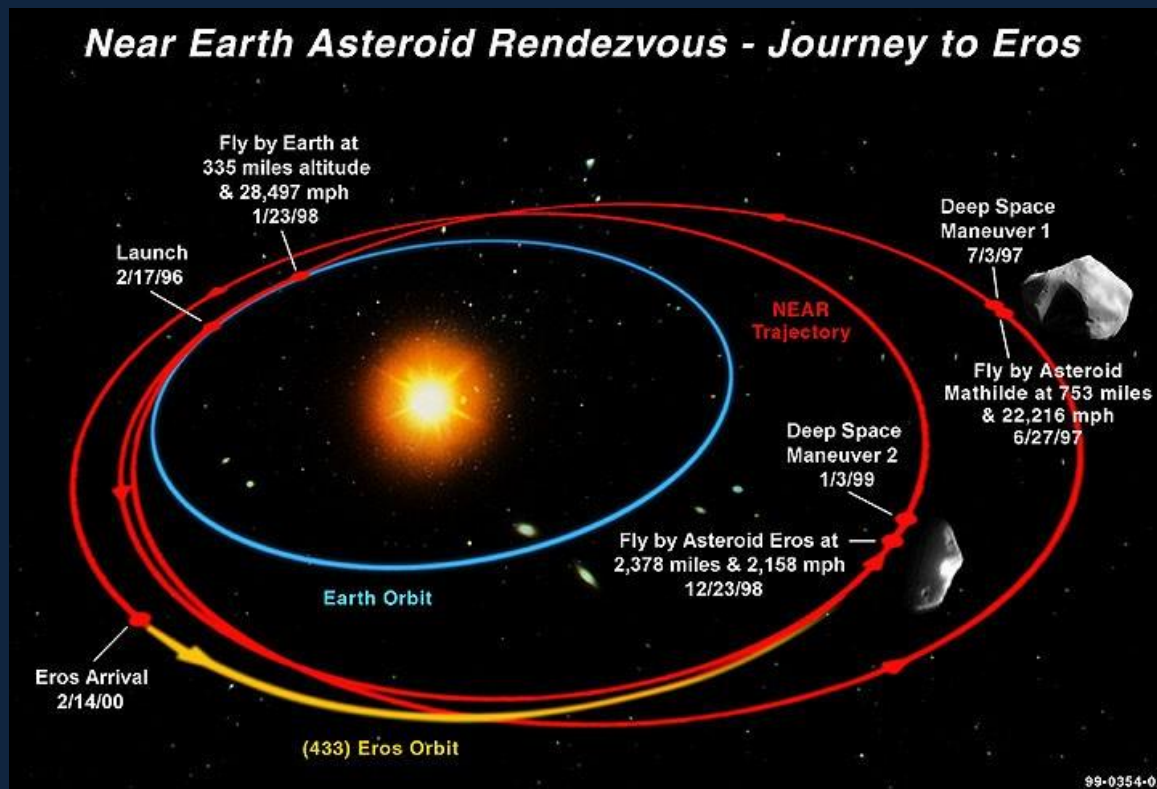
Carnet		Plaque										Comment	Boîte				Champ (J2000)			
page	N	Sujet	Date	Heure	Pos	Objectif	Plaque	L	H	Auteur	Saisie date	Vérification date	n°	pos	Saisie date	Vérification date	AD h m s	DE h m s	Saisie date	
4117																				
4118	Eros		25/09/1930	00:05	1:19	AT		13	18	Quénisset	JG 20/02/18			21	JG 20/06/18					
4119	Eros		25/09/1930	00:05	1:19	TZ		13	18	Quénisset	JG 20/02/18			21	JG 20/06/18					

Example : Eros small asteroid



433 Eros
17 km long
Discovered in 1898
Near Earth Object
Mars crosser

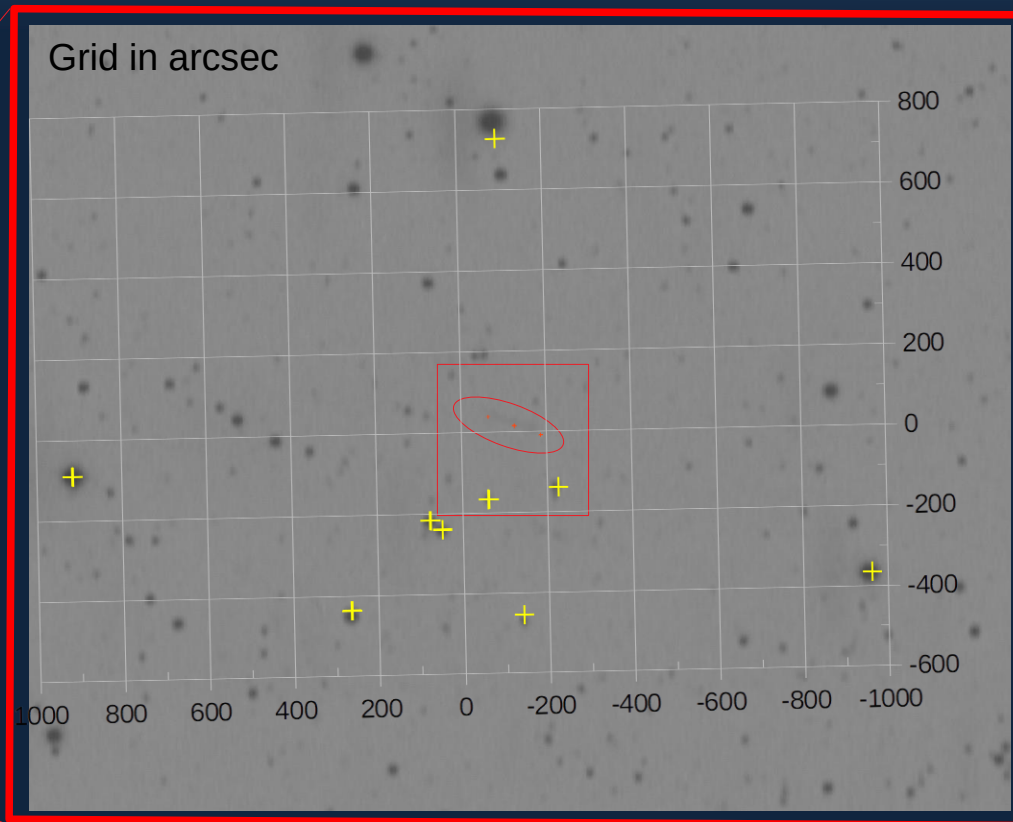
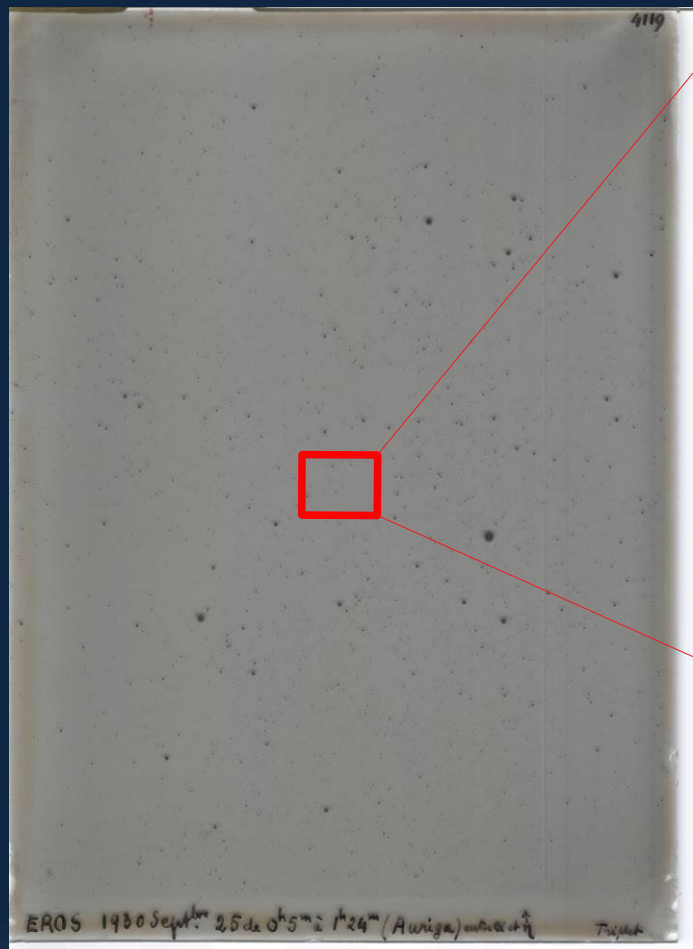
Used in 1930 to determine
the solar parallax



Eros has been visited in 2000
by the NEAR Shoemaker probe

Preliminary scan

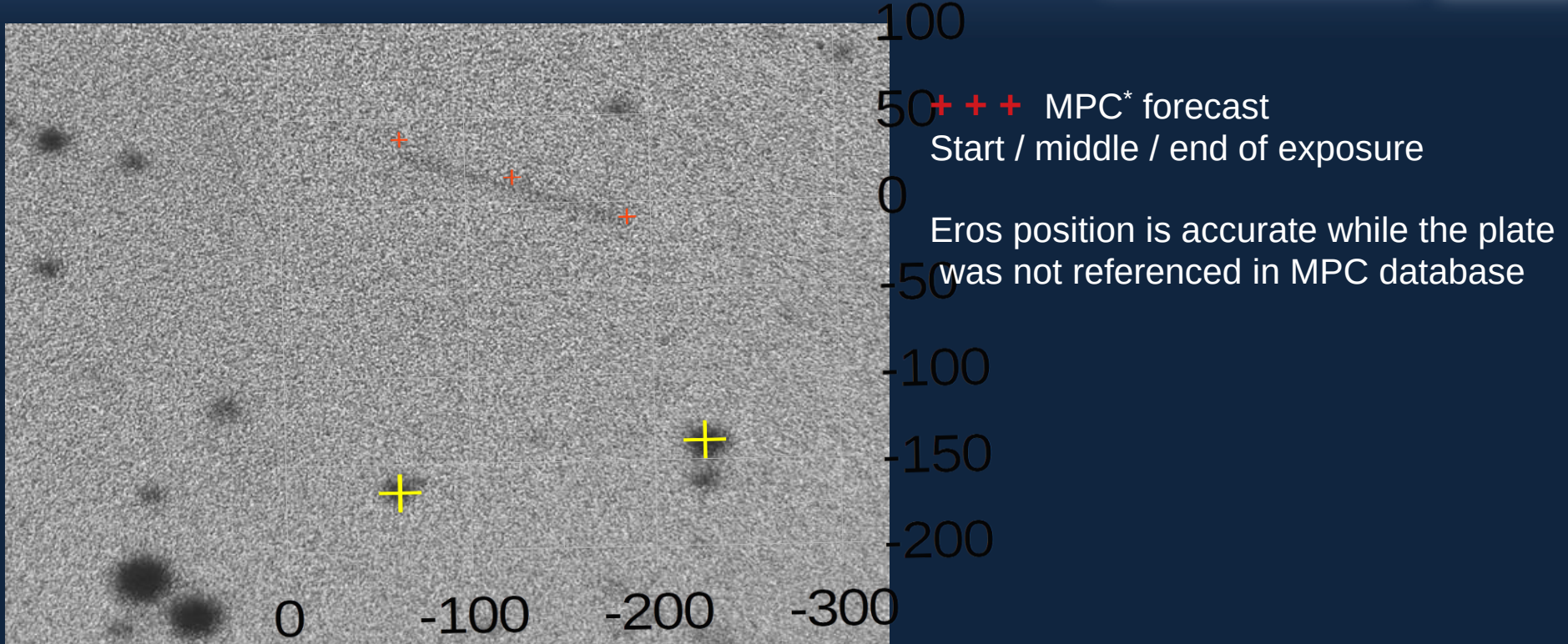
Raw plate : desktop scanner



identify nearby stars
transform pixels to RA / DE
plot the Eros position forecast

<https://www.minorplanetcenter.net/>

Recover the object

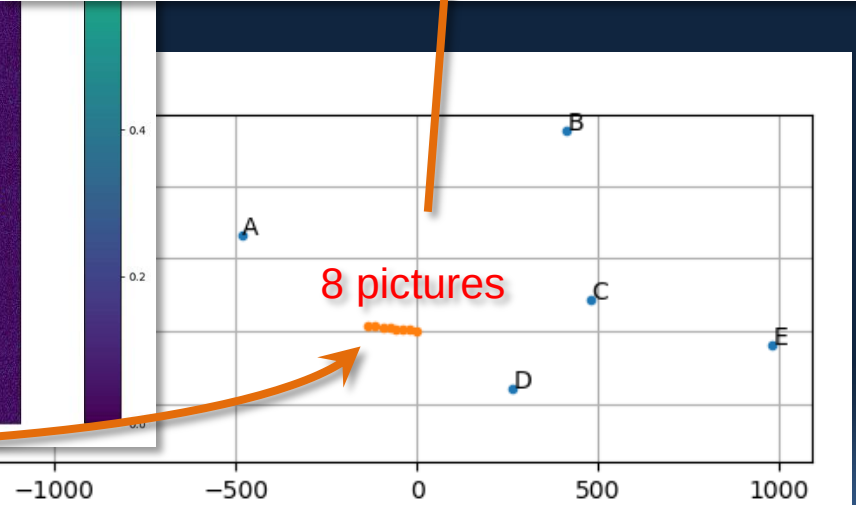
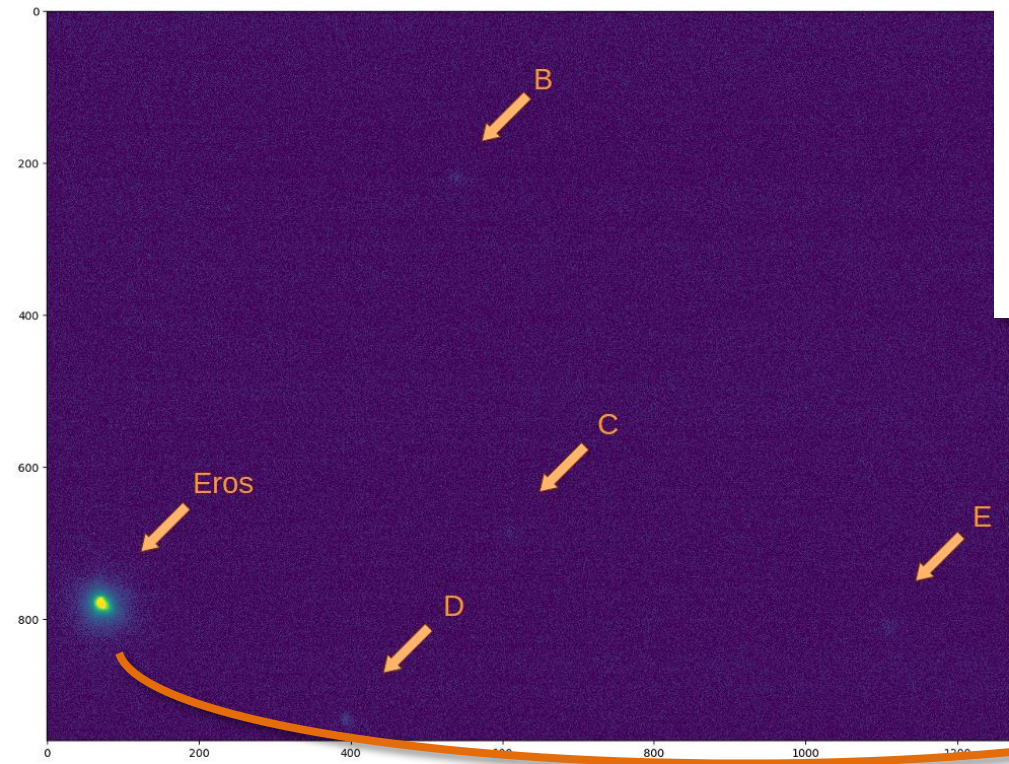
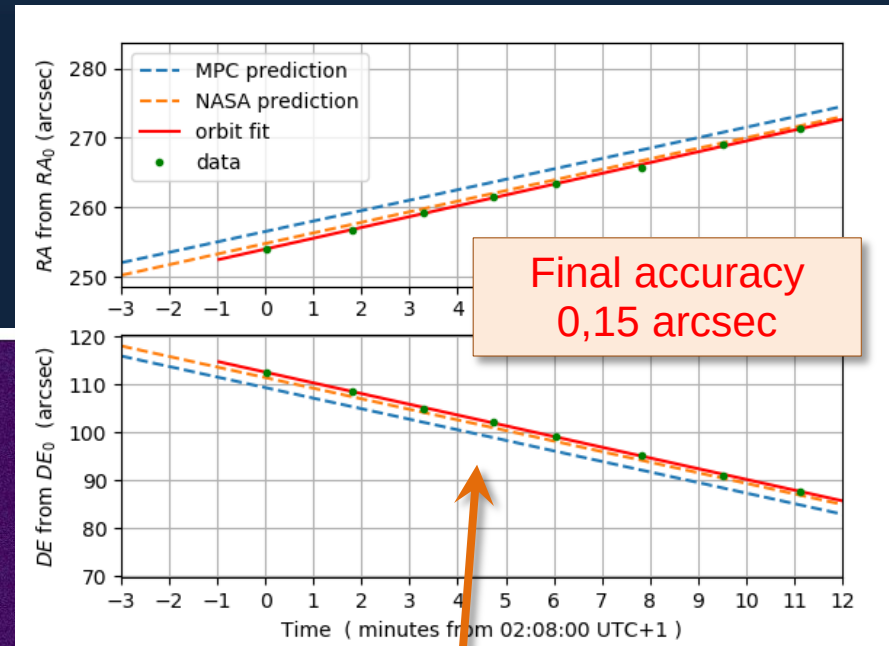


➔ Eros orbit computation is correct : data quality
meta data quality (timestamp)

➔ Juvisy plates and meta data are reliable

89 years later...

29/01/2019, Juvisy observatory
Eros 0,2 a.u. from Earth



Juvisy plates contents

- objects to do science with

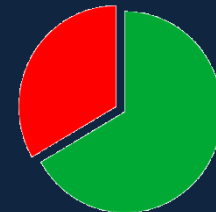
Planets		
Object	plates	oldest
Mercury	0	
Venus	52	1911
Mars	61	1907
Jupiter	129	1902
Saturn	52	1893
Uranus	1	1921
Neptune	6	1905
Pluto	0	

Satellites		
Object	plates	oldest
Moon	64	1898
Phobos	0	
Deimos	0	
Io	0	
Europa	0	
Ganymede	0	
Callisto	0	
Titan	0	

Asteroid belt		
Object	plates	oldest
Ceres	0	
Pallas	0	
Vesta	0	
Hygée	0	
Junon	0	
Astrée	0	

Comets		
Object	plates	oldest
overall	144	1893
Halley	40	1910

Nova		
Object	plates	oldest
Persei	8	1901
Lacerta	11	1911
Gemini	15	1912
Aquilae	16	1918
Cigny	7	1920
Monoceros	2	1940
Puppis	8	1942
Aquilae	2	1943
Aquilae	9	1945
Cor. Bor.	3	1946



~ 2/3 of the plates have been transcribed

Juvisy plates contents

- Messier objects

Messier		
Object	plates	oldest
M1	4	1909
M2	1	1901
M3	1	1907
M4	3	1908
M5	2	1908
M6	2	1904
M7	2	1908
M8	3	1898
M9	1	1918
M10	1	1918
M11	3	1893
M12	1	1918
M13	3	1893
M14	2	1918
M15	2	1918
M16	1	1904
M17	1	1897
M18		
M19	1	1918
M20	2	1941
M21		
M22	1	1899
M23	2	1904
M24	1	1904
M25	1	1904
M26	2	1904
M27	2	1906
M28	1	1918

Messier		
Object	plates	oldest
M29	1	1893
M30	1	1918
M31	4	1894
M32	1	1907
M33	1	1906
M34	1	1905
M35	1	1897
M36	1	1897
M37	2	1918
M38		
M39	2	1894
M40	1	1904
M41	1	1904
M42	3	1897
M43		
M44	5	1897
M45	6	1893
M46	2	1906
M47		
M48	1	1904
M49		
M50	2	1919
M51	1	1906
M52	1	1904
M53		
M54	2	1919
M55	1	1919
M56	1	1919

Messier		
Object	plates	oldest
M57	1	1908
M58	3	1919
M59		
M60		
M61		
M62	1	1919
M63	1	1919
M64	1	1919
M65		
M66		
M67	2	1904
M68		
M69	1	1919
M70	1	1919
M71	2	1919
M72	1	1919
M73	1	1919
M74	1	1920
M75	1	1919
M76	1	1920
M77	1	1920
M78	1	1920
M79	1	1920
M80	1	1919
M81	1	1920
M82	1	1920
M83		
M84	1	1920

Messier		
Object	plates	oldest
M85		
M86	1	1904
M87	1	1920
M88	1	1920
M89	1	1920
M90	1	1920
M91	1	1906
M92	1	1920
M93	1	1905
M94	1	1920
M95	1	1920
M96	1	1920
M97	1	1921
M98	1	1921
M99	1	1921
M100	1	1921
M101	1	1921
M102	1	1921
M103	2	1893
M104		
M105		
M106		
M107		
M108		
M109		
M110		

Valuation of heritage

- Repackage the plates for the next century
 - Safer cover paper and box
- Logbook transcription
 - close to completion
- Scan the plates
 - Looking for a worthy dedicated scanner
- Federate actions with other groups



the NAROO machine comes just in time!