

Comparison of observation with and without diversity using Find_Orb

Figure 9, Table 4. For each of the 9 asteroids, we compute the ratio of the semi-major-axis uncertainties for observations with diversity and without diversity. This ratio is plotted on the y-axis. On the x-axis, we show the average of the recovered distances. For each case—diverse and non-diverse—we first average the distances within that case, and then compare the averages between the two cases.

2024 ON

Observations with no diversity

Orbital elements: [Unnamed]										MOIDs: Me 0.641474 Ve 0.282703 Ea 0.002858 Ma 0.216662				
Perihelion 2024 Sep 20.10970 ± 0.363 TT = 2:37:58 (JD 2460573.60970)										MOIDs: Ju 1.887364 Sa 5.867671 Ur 14.731670 Ne 26.681222				
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0029 Find_Orb										Find_Orb ver: 2025 May 15				
M 355.67631834 ± 1.7 (J2000 ecliptic)										Tisserand relative to Earth: 2.92195				
n 0.28615270 ± 0.107 Peri. 185.41178 ± 0.24										Earth encounter velocity 8.3811 km/s				
a 2.28071392 ± 0.57 Node 172.35355 ± 0.10										Barbee-style encounter velocity: 8.6130 km/s				
e 0.5585048 ± 0.11 Incl. 7.58762 ± 1.0										Score: 0.305073				
P 3.44434 U 11.2														
q 1.00692417 ± 0.000467 Q 3.55450367 ± 1.14														
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".03														
YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R				
C2024 08 31.00000	17 55 21.29	+07 11 06.4	FixMel			807	.03-	.02-	.08574	1.0391				
C2024 09 01.00000	17 55 23.93	+06 56 39.6	FixMel			807	.04+	.03+	.08096	1.0360				
C2024 09 02.00000	17 55 30.83	+06 40 11.1	FixMel			807	.01-	.01-	.07616	1.0331				
C2024 09 03.00000	17 55 42.54	+06 21 18.2	FixMel			807	.03+	.01+	.07134	1.0303				
C2024 09 04.00000	17 55 59.74	+05 59 31.1	FixMel			807	.04-	.03-	.06652	1.0277				
C2024 09 05.00000	17 56 23.36	+05 34 10.7	FixMel			807	.01+	.01+	.06168	1.0253				

Observations with diversity

Orbital elements: [Unnamed]										MOIDs: Me 0.641604 Ve 0.282748 Ea 0.002934 Ma 0.219505				
Perihelion 2024 Sep 20.05457 ± 0.0214 TT = 1:18:35 (JD 2460573.55457)										MOIDs: Ju 1.703799 Sa 5.688150 Ur 14.548005 Ne 26.498155				
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0029 Find_Orb										Find_Orb ver: 2025 May 15				
M 355.67020387 ± 0.06 (J2000 ecliptic)										Tisserand relative to Earth: 2.91769				
n 0.26969237 ± 0.00379 Peri. 185.37544 ± 0.009										Tisserand relative to Jupiter: 3.28740				
a 2.37259497 ± 0.0223 Node 172.33623 ± 0.020										Earth encounter velocity 8.6067 km/s				
e 0.5755719 ± 0.00397 Incl. 7.74591 ± 0.036										Barbee-style encounter velocity: 8.8398 km/s				
P 3.65456 U 9.0										Score: 0.316486				
q 1.00695984 ± 1.55e-5 Q 3.73819409 ± 0.0445														
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".03														
YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R				
C2024 08 31.00000	17 55 21.29	+07 11 06.4	FixMel			807	.01-	.01-	.08799	1.0399				
C2024 09 01.00000	17 55 23.93	+06 56 39.6	FixMel			807	.04+	.03+	.08308	1.0368				
C2024 09 02.00000	17 55 30.83	+06 40 11.1	FixMel			807	.04-	.02-	.07815	1.0338				
C2024 09 03.95833	17 56 00.85	+06 00 29.3	FixMel			807	.02+	.03+	.06846	1.0284				
C2024 09 04.08333	17 55 57.76	+05 57 31.4	FixMel			807	.05-	.02-	.06785	1.0281				
C2024 09 04.20833	17 55 57.15	+05 54 24.4	FixMel			807	.03+	.00	.06725	1.0277				

2024 SJ

Observations
with no
diversity

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using DE405, DE406, covers years 1950.0 to 2200.1
Orbital elements: [Unnamed]
    Perihelion 2024 Sep 9.90740 ± 0.0615 TT = 21:46:39 (JD 2460563.40740)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0686 Ma: 0.0672
M 357.17277714 ± 0.15 (J2000 ecliptic) Find_Orb
n 0.57611435 ± 0.0249 Peri. 152.11154 ± 0.13
a 1.43042003 ± 0.0412 Node 194.54268 ± 0.026
e 0.2627655 ± 0.0191 Incl. 8.77298 ± 0.49
P 1.711/624.864d U 10.3
q 1.05455486 ± 0.00303 Q 1.80628519 ± 0.0794
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".03
  YYYY MM DD.DDDD RA (J2000) dec ----- mag ref Obs Xres Yres delta R
C2024 08 31.00000 19 46 36.55 +45 47 05.8 FixMel 807 .01- .01- .10970 1.0580
C2024 09 01.00000 19 51 30.33 +45 51 20.1 FixMel 807 .02+ .04+ .10739 1.0573
C2024 09 02.00000 19 56 42.47 +45 54 05.3 FixMel 807 .00 .04- .10510 1.0567
C2024 09 03.00000 20 02 13.82 +45 55 10.9 FixMel 807 .02+ .04+ .10282 1.0562
C2024 09 04.00000 20 08 05.17 +45 54 24.4 FixMel 807 .04- .05- .10056 1.0558
C2024 09 05.00000 20 14 17.28 +45 51 32.5 FixMel 807 .02+ .02+ .09833 1.0554
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Observations
with diversity

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using DE405, DE406, covers years 1950.0 to 2200.1
Orbital elements: [Unnamed]
    Perihelion 2024 Sep 9.90552 ± 0.029 TT = 21:43:57 (JD 2460563.40552)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0686 Ma: 0.0671
M 356.59776475 ± 0.029 (J2000 ecliptic) Find_Orb
n 0.57611059 ± 0.00294 Peri. 152.10671 ± 0.07
a 1.43042625 ± 0.00487 Node 194.54556 ± 0.041
e 0.2627668 ± 0.00225 Incl. 8.77266 ± 0.056
P 1.711/624.868d U 8.8
q 1.05455771 ± 0.000372 Q 1.80629479 ± 0.00937
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".02
  YYYY MM DD.DDDD RA (J2000) dec ----- mag ref Obs Xres Yres delta R
C2024 08 31.00000 19 46 36.55 +45 47 05.8 FixMel 807 .01- .01- .10970 1.0580
C2024 09 01.00000 19 51 30.33 +45 51 20.1 FixMel 807 .02+ .04+ .10739 1.0573
C2024 09 02.00000 19 56 42.47 +45 54 05.3 FixMel 807 .01- .04- .10510 1.0567
C2024 09 03.95833 20 07 51.63 +45 54 20.2 FixMel 807 .02- .03- .10066 1.0558
C2024 09 04.08333 20 08 31.74 +45 54 22.3 FixMel 807 .03+ .02+ .10038 1.0557
C2024 09 04.20833 20 09 12.17 +45 53 50.5 FixMel 807 .01- .02+ .10010 1.0557
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2024 RN15

Observations
with no
diversity

Orbital elements: [Unnamed]										MOIDs: Me 0.635446 Ve 0.232463 Ea 0.010917 Ma 0.076618				
Perihelion 2024 Nov 1.30837 ± 0.446 TT = 7:24:03 (JD 2460615.80837)										MOIDs: Ju 3.275247 Sa 7.615730 Ur 16.344447 Ne 28.203992				
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0109 Ma: 0.0766										Find_Orb ver: 2025 May 15				
M 330.44041829 ± 2.1	(J2000 ecliptic)	Find_Orb								Tisserand relative to Earth: 2.94400				
n 0.51579867 ± 0.033	Peri.	180.78774 ± 1.2								Earth encounter velocity 7.0993 km/s				
a 1.53986470 ± 0.0657	Node	225.28614 ± 1.1								Barbee-style encounter velocity: 6.5849 km/s				
e 0.3804172 ± 0.0274	Incl.	1.35000 ± 0.07								Score: 0.216020				
P 1.911/697.934d	U	10.4												
q 0.95407357 ± 0.00157	Q	2.12565584 ± 0.133												
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".03														
YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R				
C2024 08 31.00000	22 39 32.98	+02 16 45.4	FixMel			807	.02+	.01-	.14412	1.1513				
C2024 09 01.00000	22 39 51.68	+02 35 19.2	FixMel			807	.06-	.01+	.13900	1.1461				
C2024 09 02.00000	22 40 11.83	+02 54 49.9	FixMel			807	.06+	.01+	.13395	1.1408				
C2024 09 03.00000	22 40 33.72	+03 15 24.0	FixMel			807	.02-	.03-	.12896	1.1356				
C2024 09 04.00000	22 40 57.72	+03 37 09.0	FixMel			807	.00	.02+	.12404	1.1305				
C2024 09 05.00000	22 41 24.22	+04 00 13.2	FixMel			807	.00	.00	.11918	1.1254				

Observations
with diversity

Orbital elements: [Unnamed]										MOIDs: Me 0.635314 Ve 0.232329 Ea 0.010926 Ma 0.076832				
Perihelion 2024 Nov 1.26535 ± 0.0723 TT = 6:22:06 (JD 2460615.76535)										MOIDs: Ju 3.262752 Sa 7.605493 Ur 16.332856 Ne 28.191198				
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0109 Ma: 0.0768										Find_Orb ver: 2025 May 15				
M 330.13128320 ± 0.34	(J2000 ecliptic)	Find_Orb								Tisserand relative to Earth: 2.94335				
n 0.51263255 ± 0.00523	Peri.	180.66617 ± 0.41								Earth encounter velocity 7.1404 km/s				
a 1.54619853 ± 0.0105	Node	225.39693 ± 0.35								Barbee-style encounter velocity: 6.6256 km/s				
e 0.3830451 ± 0.00437	Incl.	1.35670 ± 0.011								Score: 0.217524				
P 1.923/702.244d	U	9.2												
q 0.95393473 ± 0.000631	Q	2.13846234 ± 0.0213												
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".03														
YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R				
C2024 08 31.00000	22 39 32.98	+02 16 45.4	FixMel			807	.05+	.01-	.14507	1.1523				
C2024 09 01.00000	22 39 51.68	+02 35 19.2	FixMel			807	.07-	.01+	.13992	1.1470				
C2024 09 02.00000	22 40 11.83	+02 54 49.9	FixMel			807	.01+	.00	.13483	1.1417				
C2024 09 03.95833	22 40 56.95	+03 36 12.1	FixMel			807	.02+	.01-	.12507	1.1315				
C2024 09 04.08333	22 40 58.55	+03 39 02.9	FixMel			807	.02-	.02+	.12444	1.1309				
C2024 09 04.20833	22 40 58.70	+03 41 53.1	FixMel			807	.01+	.01-	.12381	1.1302				

2024 RJ16

Observations with no diversity

Orbital elements: [Unnamed]
Perihelion 2024 Oct 13.71314 ± 0.0713 TT = 17:06:55 (JD 2460597.21314)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0393 Ma: 0.0924
M 348.40453095 ± 1.1 (J2000 ecliptic) Find_Orb
n 0.29952283 ± 0.0286 Peri. 201.67379 ± 0.12
a 2.21232752 ± 0.141 Node 181.72879 ± 0.038
e 0.5326005 ± 0.0292 Incl. 2.48134 ± 0.09
P 3.29059 U 10.4
q 1.03404063 ± 0.00117 Q 3.39061441 ± 0.28
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".02

YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref Obs	Xres	Yres	delta	R
C2024 08 31.00000	21 53 24.11	-04 23	02.7	FixMel	807	.01-	.00	.15486	1.1615
C2024 09 01.00000	21 54 52.04	-04 18	46.4	FixMel	807	.03+	.01+	.14994	1.1563
C2024 09 02.00000	21 56 27.68	-04 14	22.6	FixMel	807	.02-	.02-	.14510	1.1511
C2024 09 03.00000	21 58 11.80	-04 09	49.5	FixMel	807	.01-	.00	.14033	1.1460
C2024 09 04.00000	22 00 05.23	-04 05	05.2	FixMel	807	.02+	.02+	.13563	1.1410
C2024 09 05.00000	22 02 08.88	-04 00	07.6	FixMel	807	.01-	.01-	.13100	1.1360

Using DE405/DE405; covers years 1599.9 to 2201.1

Orbital elements: [Unnamed]
Perihelion 2024 Oct 13.70896 ± 0.0333 TT = 17:00:54 (JD 2460597.20896)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0394 Ma: 0.0924
M 348.14998420 ± 0.26 (J2000 ecliptic) Find_Orb
n 0.29842172 ± 0.00661 Peri. 201.67231 ± 0.08
a 2.21776621 ± 0.0328 Node 181.73032 ± 0.038
e 0.5337151 ± 0.00672 Incl. 2.48506 ± 0.022
P 3.30273 U 9.4
q 1.03411072 ± 0.000545 Q 3.40142170 ± 0.0651
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".01

YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref Obs	Xres	Yres	delta	R
C2024 08 31.00000	21 53 24.11	-04 23	02.7	FixMel	807	.01-	.00	.15515	1.1618
C2024 09 01.00000	21 54 52.04	-04 18	46.4	FixMel	807	.03+	.01+	.15022	1.1565
C2024 09 02.00000	21 56 27.68	-04 14	22.6	FixMel	807	.02-	.02-	.14537	1.1513
C2024 09 03.95833	22 00 00.71	-04 05	16.4	FixMel	807	.00	.00	.13609	1.1414
C2024 09 04.08333	22 00 13.69	-04 04	42.3	FixMel	807	.01+	.02-	.13548	1.1408
C2024 09 04.20833	22 00 25.79	-04 04	05.9	FixMel	807	.01-	.02+	.13490	1.1402

2024 RO2

Observations
with no
diversity

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Orbital elements: [Unnamed]
    Perihelion 2024 Nov 1.34027 ± 0.2 TT = 8:09:59 (JD 2460615.84027)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0010 Find_Orb
M 334.58221697 ± 0.9 (J2000 ecliptic)
n 0.44327978 ± 0.0157 Peri. 216.26226 ± 0.44
a 1.70353384 ± 0.0403 Node 190.77120 ± 0.29
e 0.4469063 ± 0.013 Incl. 7.12049 ± 0.13
P 2.223/812.113d U 10.0
q 0.94221378 ± 0.000716 Q 2.46485391 ± 0.0804
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".04
      YYYY MM DD.DDDDD RA (J2000) dec ----- mag ref Obs   Xres   Yres   delta   R
C2024 08 31.00000 22 10 04.53 +16 21 36.5 FixMel           807 .04+ .01- .18152 1.1754
C2024 09 01.00000 22 10 03.50 +16 33 40.6 FixMel           807 .07- .02+ .17527 1.1693
C2024 09 02.00000 22 10 03.56 +16 45 43.9 FixMel           807 .02- .02- .16909 1.1632
C2024 09 03.00000 22 10 04.96 +16 57 47.9 FixMel           807 .08+ .02+ .16297 1.1571
C2024 09 04.00000 22 10 07.97 +17 09 54.1 FixMel           807 .02- .02- .15691 1.1511
C2024 09 05.00000 22 10 12.93 +17 22 04.6 FixMel           807 .01- .01+ .15091 1.1451
MOIDs: Me 0.624314 Ve 0.221414 Ea 0.001016 Ma 0.149693
MOIDs: Ju 2.948009 Sa 7.330418 Ur 16.043401 Ne 27.866097
Find_Orb ver: 2025 May 15
Tisserand relative to Earth: 2.90421
Earth encounter velocity 9.2850 km/s
Barbee-style encounter velocity: 8.8817 km/s
Score: 0.259000
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Observations
with diversity

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Orbital elements: [Unnamed]
    Perihelion 2024 Nov 1.33246 ± 0.0838 TT = 7:58:44 (JD 2460615.83246)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0010 Find_Orb
M 334.17751626 ± 0.42 (J2000 ecliptic)
n 0.44267776 ± 0.00669 Peri. 216.24951 ± 0.28
a 1.70507795 ± 0.0172 Node 190.77955 ± 0.19
e 0.4474086 ± 0.00569 Incl. 7.12580 ± 0.06
P 2.226/813.217d U 9.4
q 0.94221133 ± 0.00107 Q 2.46794458 ± 0.0345
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".04
      YYYY MM DD.DDDDD RA (J2000) dec ----- mag ref Obs   Xres   Yres   delta   R
C2024 08 31.00000 22 10 04.53 +16 21 36.5 FixMel           807 .07+ .01- .18172 1.1756
C2024 09 01.00000 22 10 03.50 +16 33 40.6 FixMel           807 .07- .02+ .17547 1.1695
C2024 09 02.00000 22 10 03.56 +16 45 43.9 FixMel           807 .04- .01- .16928 1.1634
C2024 09 03.95833 22 10 08.15 +17 09 20.3 FixMel           807 .00 .02- .15736 1.1515
C2024 09 04.08333 22 10 07.07 +17 11 00.1 FixMel           807 .02+ .01- .15658 1.1508
C2024 09 04.20833 22 10 05.00 +17 12 32.7 FixMel           807 .01+ .02+ .15582 1.1500
MOIDs: Me 0.624311 Ve 0.221414 Ea 0.001020 Ma 0.150051
MOIDs: Ju 2.944986 Sa 7.327581 Ur 16.040521 Ne 27.863014
Find_Orb ver: 2025 May 15
Tisserand relative to Earth: 2.90405
Earth encounter velocity 9.2927 km/s
Barbee-style encounter velocity: 8.8895 km/s
Score: 0.258706
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2022 QV1

Observations
with no
diversity

Using DE405/DE405; covers years 1599.9 to 2201.1

Orbital elements: [Unnamed]
Perihelion 2024 Oct 21.68539 ± 7.9 TT = 16:26:57 (JD 2460605.18539)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.1331 Find_Orb
M 340.17725961 ± 15 (J2000 ecliptic)
n 0.42460265 ± 0.252 Peri. 203.52960 ± 9
a 1.75313048 ± 0.695 Node 155.21045 ± 8
e 0.3548825 ± 0.192 Incl. 7.70243 ± 2.5
P 2.321/847.835d U 11.8
q 1.13097507 ± 0.112 Q 2.37528589 ± 1.28
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".03

YYYY MM DD.DDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R
C2024 08 31.00000	17 13 24.06	-16 07 49.2	FixMel		807	.00	.01-	.53977	1.2315	
C2024 09 01.00000	17 15 15.62	-16 25 21.5	FixMel		807	.02-	.04+	.54038	1.2280	
C2024 09 02.00000	17 17 10.66	-16 42 52.7	FixMel		807	.02+	.04-	.54097	1.2245	
C2024 09 03.00000	17 19 09.17	-17 00 22.0	FixMel		807	.03+	.00	.54155	1.2210	
C2024 09 04.00000	17 21 11.14	-17 17 49.0	FixMel		807	.05-	.00	.54212	1.2176	
C2024 09 05.00000	17 23 16.58	-17 35 13.1	FixMel		807	.02+	.00	.54267	1.2143	

Orbital elements: [Unnamed]
Perihelion 2024 Oct 23.25692 ± 0.834 TT = 6:09:58 (JD 2460606.75692)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.1129 Find_Orb
M 336.60941670 ± 1.7 (J2000 ecliptic)
n 0.47486893 ± 0.0273 Peri. 205.41493 ± 1.0
a 1.62712234 ± 0.0624 Node 157.03140 ± 1.0
e 0.3184044 ± 0.0188 Incl. 7.18419 ± 0.30
P 2.076/758.090d U 10.3
q 1.10903933 ± 0.0121 Q 2.14520534 ± 0.113
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".02

YYYY MM DD.DDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta	R
C2024 08 31.00000	17 13 24.06	-16 07 49.2	FixMel		807	.00	.02-	.49954	1.2081	
C2024 09 01.00000	17 15 15.62	-16 25 21.5	FixMel		807	.01-	.05+	.50011	1.2047	
C2024 09 02.00000	17 17 10.66	-16 42 52.7	FixMel		807	.01+	.04-	.50067	1.2014	
C2024 09 03.95833	17 21 06.27	-17 17 05.5	FixMel		807	.00	.00	.50171	1.1950	
C2024 09 04.08333	17 21 20.98	-17 19 15.0	FixMel		807	.01+	.00	.50178	1.1946	
C2024 09 04.20833	17 21 36.16	-17 21 22.5	FixMel		807	.01-	.00	.50187	1.1942	

Observations
with diversity

2024 YR4

Observations with no diversity

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Orbital elements: [Unnamed]
    Perihelion 2024 Nov 21.81553 ± 6.43 TT = 19:34:21 (JD 2460636.31553)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5   Earth MOID: 0.0017   Find_Orb
M 341.39709568 ± 4.1          (J2000 ecliptic)
n  0.23906416 ± 0.033        Peri. 134.42114 ± 1.6
a  2.57114395 ± 0.237        Node 270.94835 ± 3.6
e  0.6667360 ± 0.0185       Incl. 3.39349 ± 0.47
P  4.12277                  U 10.5
q 0.85686950 ± 0.0319        Q 4.28541841 ± 0.442
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".01
  YYYY MM DD.DDDD  RA (J2000)  dec      mag   ref Obs   Xres   Yres   delta   R
C2024 08 31.00000 18 30 06.02 -17 54 41.9 FixMel   807   .00   .01-  .63488 1.4316
C2024 09 01.00000 18 29 04.42 -17 53 35.5 FixMel   807   .00   .03+  .63348 1.4220
C2024 09 02.00000 18 28 06.35 -17 52 27.8 FixMel   807   .01+  .02-  .63211 1.4124
C2024 09 03.00000 18 27 11.84 -17 51 18.7 FixMel   807   .01-  .01+  .63078 1.4028
C2024 09 04.00000 18 26 20.92 -17 50 08.4 FixMel   807   .01-  .01-  .62946 1.3932
C2024 09 05.00000 18 25 33.61 -17 48 56.9 FixMel   807   .01+  .00   .62816 1.3836
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Observations with diversity

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Orbital elements: [Unnamed]
    Perihelion 2024 Nov 22.44731 ± 3.48 TT = 10:44:07 (JD 2460636.94731)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5   Earth MOID: 0.0025   Find_Orb
M 340.73401209 ± 2.2          (J2000 ecliptic)
n  0.24250018 ± 0.0178        Peri. 134.58858 ± 0.9
a  2.54679895 ± 0.125        Node 271.30585 ± 1.9
e  0.6647825 ± 0.0105       Incl. 3.43932 ± 0.26
P  4.06436                  U 10.0
q 0.85373137 ± 0.0176        Q 4.23986654 ± 0.233
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".02
  YYYY MM DD.DDDD  RA (J2000)  dec      mag   ref Obs   Xres   Yres   delta   R
C2024 08 31.00000 18 30 06.02 -17 54 41.9 FixMel   807   .00   .01+  .63964 1.4354
C2024 09 01.00000 18 29 04.42 -17 53 35.5 FixMel   807   .00   .02+  .63830 1.4258
C2024 09 02.00000 18 28 06.35 -17 52 27.8 FixMel   807   .00   .05-  .63700 1.4162
C2024 09 03.95833 18 26 23.19 -17 50 11.1 FixMel   807   .01-  .05+  .63452 1.3974
C2024 09 04.08333 18 26 16.42 -17 50 02.1 FixMel   807   .02+  .01-  .63437 1.3962
C2024 09 04.20833 18 26 09.92 -17 49 51.1 FixMel   807   .00   .02-  .63423 1.3950
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2014 GL1

Observations
with no
diversity

Orbital elements: [Unnamed]									
Perihelion 2024 Dec 6.25121 ± 0.663 TT = 6:01:44 (JD 2460650.75121)									
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Earth MOID: 0.0145 Ve: 0.0052									
M 301.39602802 ± 3.7	Ma: 0.0636	Find_Orb	MOIDs: Me 0.164763 Ve 0.005242 Ea 0.014470 Ma 0.063572						
n 0.63526506 ± 0.0396	Peri. 60.21305 ± 1.4	MOIDs: Ju 3.119922 Sa 7.804562 Ur 16.595475 Ne 28.096725							
a 1.34018905 ± 0.0558	Node 12.29724 ± 1.6	Find_Orb ver: 2025 May 15							Tisserand relative to Earth: 2.50413
e 0.6476146 ± 0.00524	Incl. 4.82268 ± 0.06	Earth encounter velocity 21.1255 km/s							Barbee-style encounter velocity: 20.5173 km/s
P 1.551/566.682d	U 10.6	Score: 0.347292							
q 0.47226298 ± 0.017	Q 2.20811511 ± 0.0958	(J2000 ecliptic)							
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".02									
YYYY MM DD.DDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta R
C2024 08 31.00000	16 40 26.40	-29 14 30.1	FixMeI	807	.01+	.01+	.98475	1.4682	
C2024 09 01.00000	16 40 36.45	-29 10 03.5	FixMeI	807	.04-	.00	.98820	1.4595	
C2024 09 02.00000	16 40 49.50	-29 05 43.9	FixMeI	807	.03+	.03-	0.9916	1.4507	
C2024 09 03.00000	16 41 05.48	-29 01 31.1	FixMeI	807	.01+	.00	0.9949	1.4419	
C2024 09 04.00000	16 41 24.34	-28 57 25.0	FixMeI	807	.02-	.05+	0.9980	1.4330	
C2024 09 05.00000	16 41 46.03	-28 53 25.6	FixMeI	807	.01+	.02-	1.0012	1.4240	

Observations
with diversity

Orbital elements: [Unnamed]									
Perihelion 2024 Dec 6.23539 ± 1.02 TT = 5:38:57 (JD 2460650.73539)									
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Earth MOID: 0.0147 Ve: 0.0050									
M 300.91760005 ± 5.7	Ma: 0.0635	Find_Orb	MOIDs: Me 0.165482 Ve 0.005018 Ea 0.014729 Ma 0.063457						
n 0.63369071 ± 0.0595	Peri. 60.15644 ± 2.2	MOIDs: Ju 3.116740 Sa 7.800411 Ur 16.590803 Ne 28.093324							
a 1.34240786 ± 0.084	Node 12.24564 ± 2.4	Find_Orb ver: 2025 May 15							Tisserand relative to Earth: 2.50426
e 0.6476555 ± 0.00776	Incl. 4.82436 ± 0.10	Earth encounter velocity 21.1226 km/s							Barbee-style encounter velocity: 20.5149 km/s
P 1.555/568.090d	U 10.8	Score: 0.352856							
q 0.47298999 ± 0.026	Q 2.21182574 ± 0.144	(J2000 ecliptic)							
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".03									
YYYY MM DD.DDDD	RA (J2000)	dec	-----	mag	ref	Obs	Xres	Yres	delta R
C2024 08 31.00000	16 40 26.40	-29 14 30.1	FixMeI	807	.01+	.00	.98507	1.4685	
C2024 09 01.00000	16 40 36.45	-29 10 03.5	FixMeI	807	.04-	.01+	.98850	1.4597	
C2024 09 02.00000	16 40 49.50	-29 05 43.9	FixMeI	807	.03+	.02-	0.9919	1.4509	
C2024 09 03.95833	16 41 23.65	-28 57 35.4	FixMeI	807	.06+	.01+	0.9982	1.4335	
C2024 09 04.08333	16 41 25.80	-28 57 03.7	FixMeI	807	.03-	.02-	0.9986	1.4324	
C2024 09 04.20833	16 41 28.27	-28 56 30.7	FixMeI	807	.04-	.02+	0.9990	1.4313	

Ceres

Observations
with no
diversity

USING DE405/DE405, COVERS years 1999.5 to 2201.1
Orbital elements: [Unnamed]
Perihelion 2025 Nov 2.67532 ± 5195 TT = 16:12:27 (JD 2460982.17532)
Epoch 2024 Sep 5.0 TT = JDT 2460558.5 Find_Orb
M 277.93720896 ± 1100 (J2000 ecliptic) MOIDs: Me 2.470779 Ve 2.105244 Ea 1.844814 Ma 1.328753
n 0.19369264 ± 0.291 Peri. 304.61756 ± 900 MOIDs: Ju 2.169102 Sa 6.115975 Ur 15.258501 Ne 26.969560
a 2.95842547 ± 2.96 Node 78.65427 ± 20 Find_Orb ver: 2025 May 15
e 0.0449997 ± 1.25 Incl. 10.23114 ± 4.2 Score: -0.379779
P 5.08851 U 11.9
q 2.82529714 ± 0.863 Q 3.09155381 ± 6.78
From 6 observations 2024 Aug. 31-Sept. 5; mean residual 0".03

YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref Obs	Xres	Yres	delta R
C2024 08 31.00000	18 33 20.19	-30 55 52.1	FixMel	807	.01- .02+	2.3213	2.9482	
C2024 09 01.00000	18 33 28.53	-30 55 31.2	FixMel	807	.03+ .03-	2.3329	2.9478	
C2024 09 02.00000	18 33 38.45	-30 55 07.6	FixMel	807	.03- .04-	2.3445	2.9473	
C2024 09 03.00000	18 33 49.96	-30 54 41.3	FixMel	807	.03+ .04+	2.3563	2.9469	
C2024 09 04.00000	18 34 03.03	-30 54 12.5	FixMel	807	.04- .05+	2.3681	2.9464	
C2024 09 05.00000	18 34 17.67	-30 53 41.3	FixMel	807	.01+ .04-	2.3801	2.9460	

Observations
with diversity

Orbital elements: [Unnamed]
Perihelion 2025 Mar 18.58664 ± 368 TT = 14:04:45 (JD 2460753.08664)
Epoch 2024 Sep 4.0 TT = JDT 2460557.5 Ju: 0.0287 Sa: 0.4344 Find_Orb
M 353.31627282 ± 80 (J2000 ecliptic) MOIDs: Me 1.947695 Ve 1.593210 Ea 1.330195 Ma 0.950268
n 0.03417271 ± 0.0506 Peri. 285.99850 ± 100 MOIDs: Ju 0.028716 Sa 0.434418 Ur 2.921303 Ne 14.025586
a 9.40480283 ± 9.28 Node 70.41841 ± 7 Find_Orb ver: 2025 May 15
e 0.7537531 ± 0.284 Incl. 8.72908 ± 3.1 Tisserand relative to Jupiter: 2.29979
P 28.84194 U 10.8 SR Score: 0.587070
q 2.31590349 ± 0.749 Q 16.4937021 ± 8.84
From 6 observations 2024 Aug. 31-Sept. 4; mean residual 0".21

YYYY MM DD.DDDDD	RA (J2000)	dec	-----	mag	ref Obs	Xres	Yres	delta R
C2024 08 31.00000	18 33 20.19	-30 55 52.1	FixMel	807	.40- .06-	2.3672	2.9921	
C2024 09 01.00000	18 33 28.53	-30 55 31.2	FixMel	807	.20+ .03+	2.3734	2.9864	
C2024 09 02.00000	18 33 38.45	-30 55 07.6	FixMel	807	.48+ .08+	2.3796	2.9808	
C2024 09 03.95833	18 34 02.52	-30 54 13.7	FixMel	807	.03+ .01+	2.3921	2.9697	
C2024 09 04.08333	18 34 04.07	-30 54 09.9	FixMel	807	.03- .01-	2.3929	2.9690	
C2024 09 04.20833	18 34 05.69	-30 54 05.2	FixMel	807	.28- .05-	2.3938	2.9683	