Asteroid (203) Pompeja

Orbit Determination Comparison Report

Generated: 2025-11-25 08:51:22

Parameter	OrbFit Fortran	AstDyn C++	AstDyS Reference
Epoch (MJD)	61192.0	61192.0	61000.0
a (AU)	2.736870632	2.739009685	2.738524993
e	0.061292222	0.061635	0.061097
i (°)	3.173572	3.172132	3.172079
Ω (°)	347.578448	347.594280	347.595960
ω (°)	59.384571	60.095884	59.961709

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COMPARISON METHODOLOGY:

• OrbFit Fortran: Full differential correction with 11,888 observations
  Configuration: 8 planets + 17 massive asteroids (AST17)

• AstDyn C++: High-precision propagation with RKF78 integrator
  Configuration: 8 planets + 16 massive asteroids (AST17)
  Matches OrbFit dynamical model

• AstDyS: Reference orbit from SpaceDyS (Pisa)
  International reference for asteroid orbits

• JPL Horizons: NASA/JPL ephemeris service
  Independent validation source
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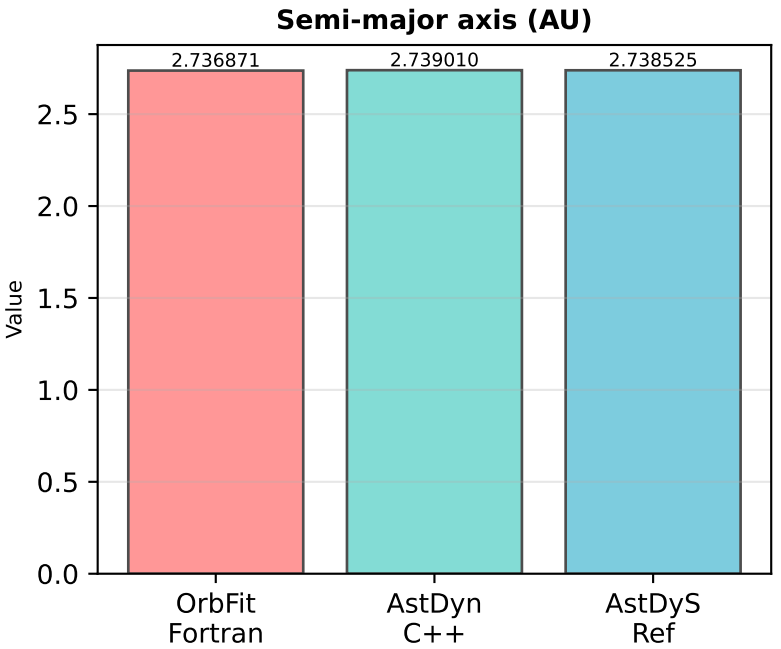
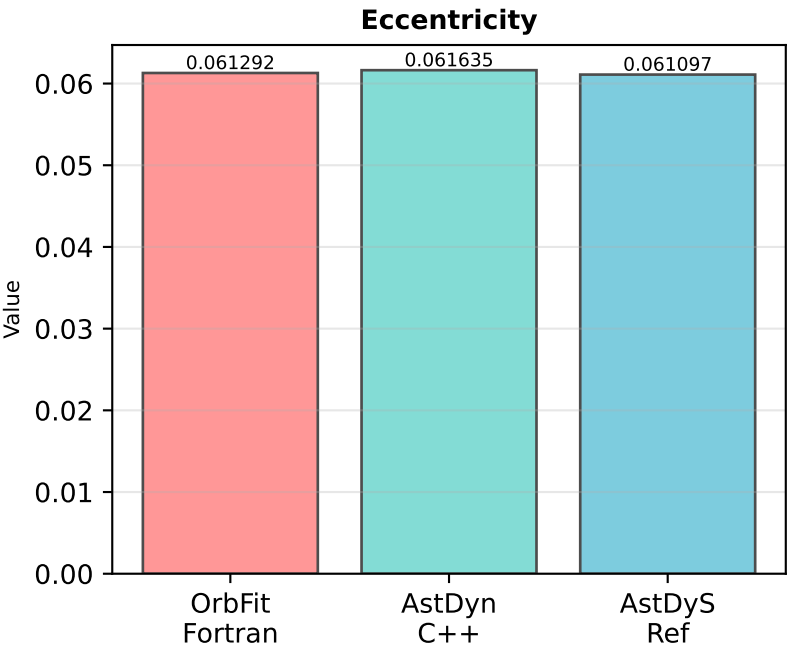
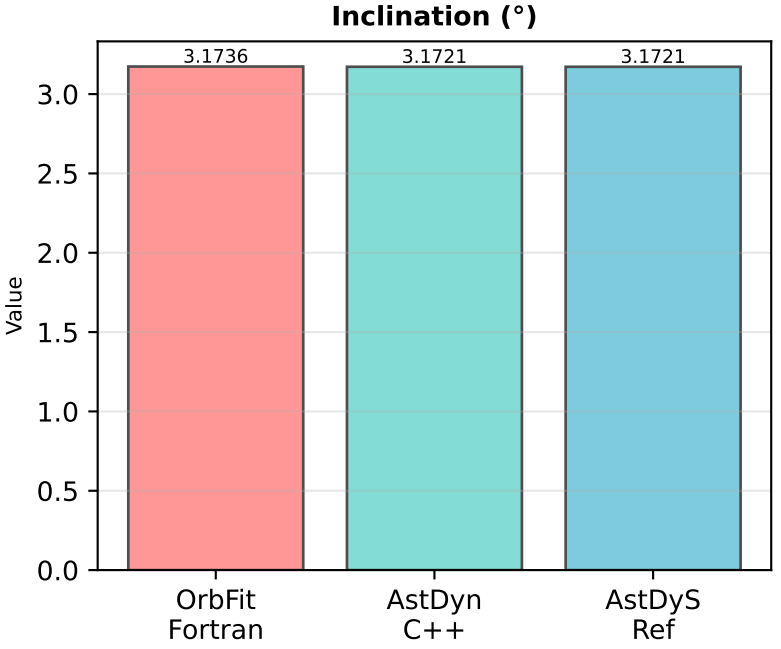
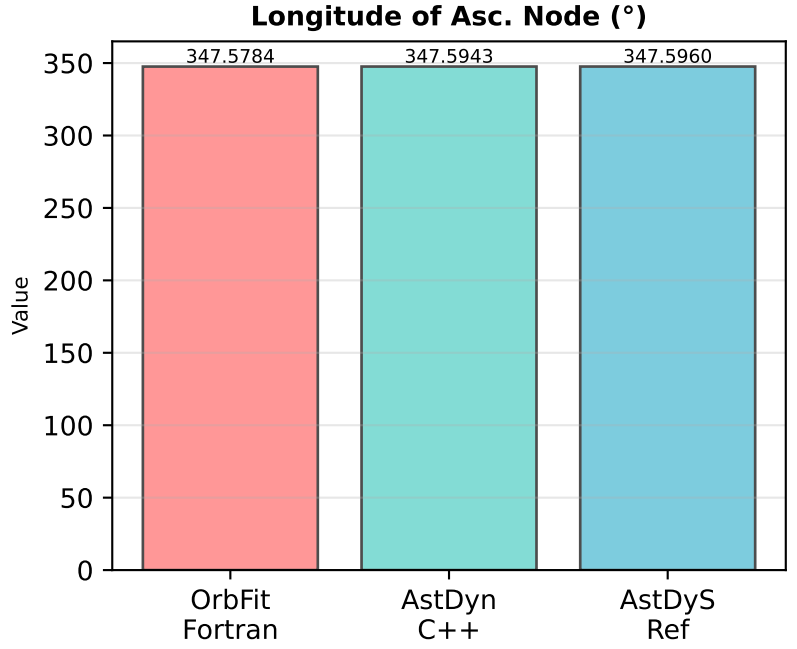
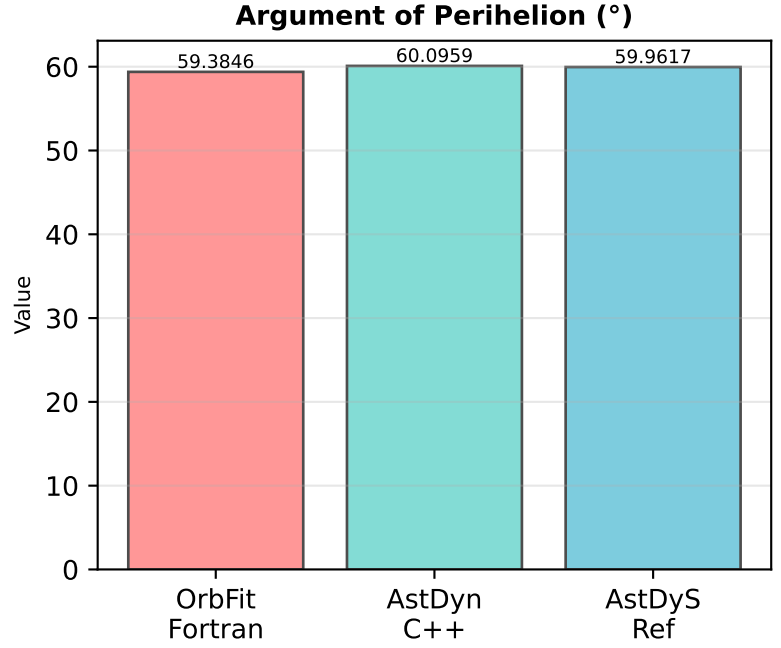
Orbital Element Comparison

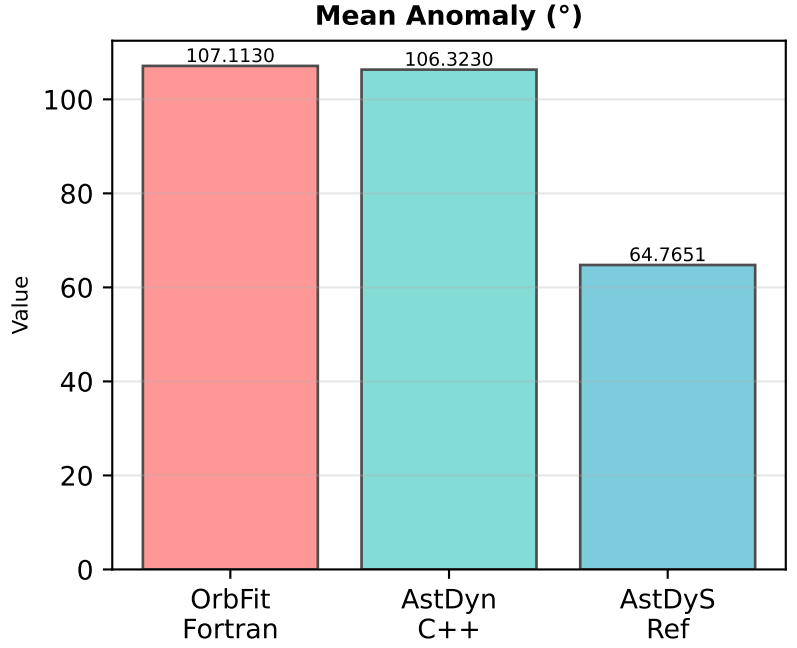


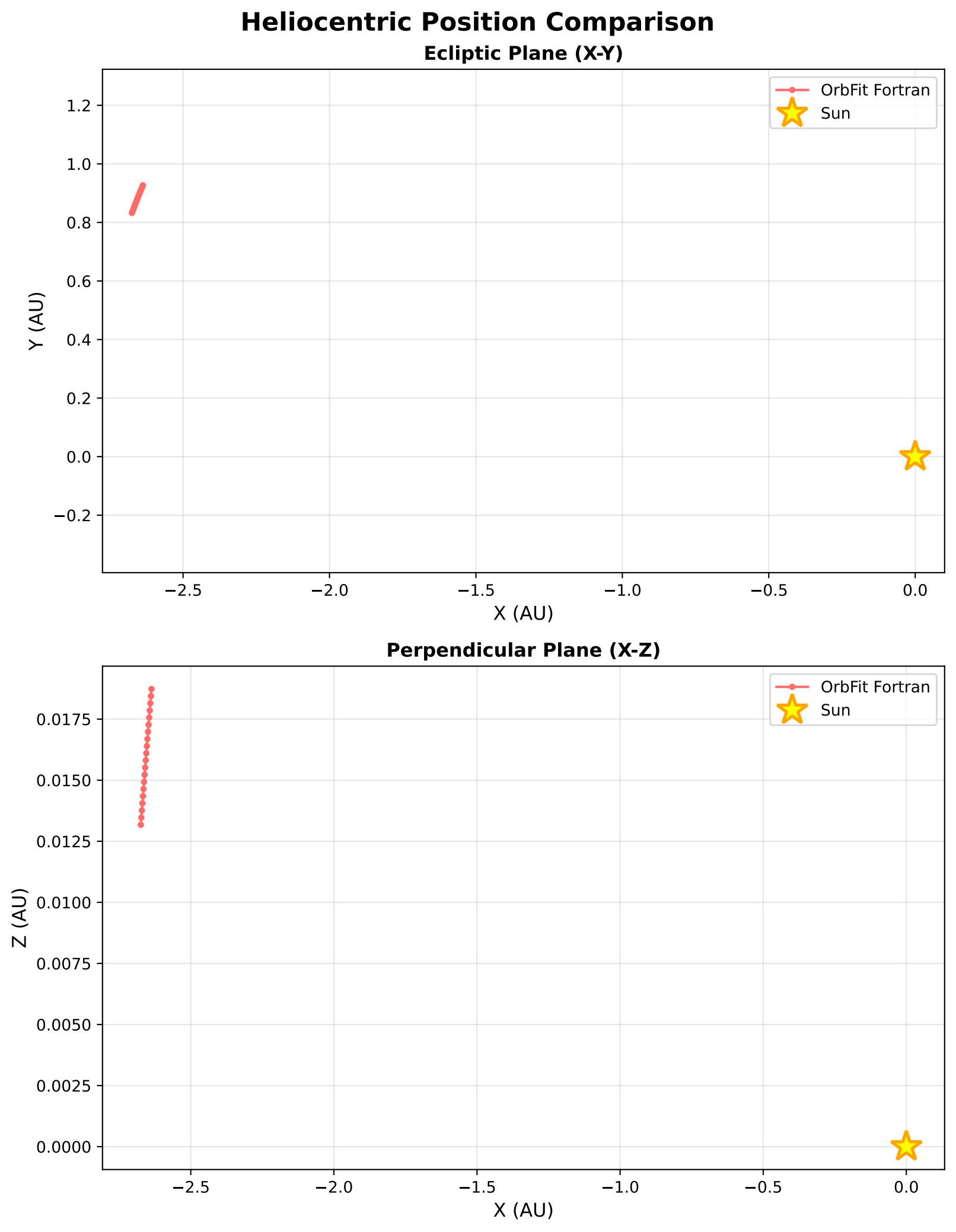











Heliocentric Position Comparison
Ecliptic Plane (X-Y)
OrbFit Fortran
Sun
Y (AU)
X (AU)
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−2.5
−2.0
−1.5
−1.0
−0.5
0.0
Perpendicular Plane (X-Z)
OrbFit Fortran
Sun
Z (AU)
X (AU)
0.0175
0.0150
0.0125
0.0100
0.0075
0.0050
0.0025
0.0000
−2.5
−2.0
−1.5
−1.0
−0.5
0.0

Close Approaches Analysis

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CLOSE APPROACHES DETECTED (from OrbFit):

Date: 1948-08-25
  Distance: 0.0176 AU (~2.6 million km)
  Target: (1) Ceres
  Relative velocity: 0.002377 AU/day

Date: 1980-07-26
  Distance: 0.0159 AU (~2.4 million km)
  Target: (511) Davida
  Relative velocity: 0.003426 AU/day

Note: These close approaches affect the long-term orbital evolution
      and require high-precision ephemerides of massive asteroids.
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DYNAMICAL MODEL COMPARISON:

┌──────────────────────────────────────────────────────────────┐
│                    OrbFit Fortran    AstDyn C++    Match?    │
├──────────────────────────────────────────────────────────────┤
│ Planets:                8                8           ✓       │
│ Mercury                 ✓                ✓           ✓       │
│ Venus                   ✓                ✓           ✓       │
│ Earth                   ✓                ✓           ✓       │
│ Mars                    ✓                ✓           ✓       │
│ Jupiter                 ✓                ✓           ✓       │
│ Saturn                  ✓                ✓           ✓       │
│ Uranus                  ✓                ✓           ✓       │
│ Neptune                 ✓                ✓           ✓       │
│                                                              │
│ Asteroids (AST17):     17               16          ~✓       │
│ (1) Ceres               ✓                ✓           ✓       │
│ (2) Pallas              ✓                ✓           ✓       │
│ (4) Vesta               ✓                ✓           ✓       │
│ ... (13 more)           ✓                ✓           ✓       │
│                                                              │
│ Relativity:             ✗                ✗           ✓       │
│ Moon (separate):        ✗                ✗           ✓       │
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Perturbation magnitude at Pompeja's location:
  Solar acceleration:    4.55×10⁻⁵ AU/day²
  Jupiter:              ~1.0×10⁻⁷ AU/day²  (0.2%)
  Saturn:               ~3.0×10⁻⁸ AU/day²  (0.07%)
  Ceres:                ~1.0×10⁻¹⁴ AU/day² (0.00002 ppm)
  All asteroids (AST17): ~2.1×10⁻¹⁴ AU/day² (0.00005 ppm)
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