Supplementary Information

Table S1. Aspect data for new observations in 1998 and 2005.

Date (UT)	r (AU)	Δ (AU)	Phase angle (°)	λ (J2000) (°)	β (°)	Obs.	Filter
(1862) Apollo							
1998 03 31.0	1.588	0.593	4.9	193.0	7.2	Ond	R
1998 04 20.9	1.427	0.476	22.6	177.8	5.2	Ond	R
2005 11 06.4	0.977	0.075	98.4	147.4	17.9	PD	C
2005 11 13.5	1.045	0.095	52.0	103.8	23.6	PD	C
2005 11 18.5	1.093	0.127	32.9	86.1	22.4	PD	C
2005 11 20.4	1.111	0.141	27.7	81.5	21.7	PD	C
2005 11 28.0	1.182	0.205	16.2	70.2	19.1	Sim	R
2005 11 30.1	1.201	0.224	15.1	68.2	18.5	Sim	R

r: Apollo's distance from the Sun
Δ: the distance between the Earth and Apollo
Phase angle: the solar phase angle (Earth-Apollo-Sun)
λ, β: the geocentric ecliptic longitude and latitude of Apollo
Obs.: the observatory; Ond=Ondřejov (0.65 m telescope), PD=Palmer Divide (0.5 m), Sim=Simeiz (1.0 m)
Filter: R for the standard red band, C for clear (unfiltered)

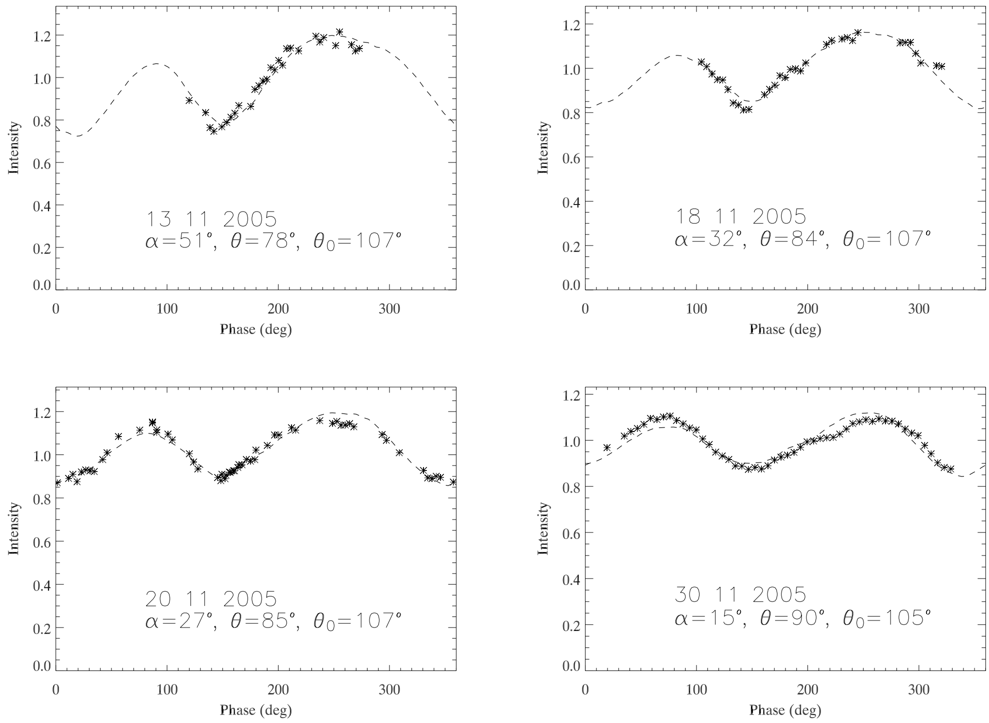

Figure 1: **S1. Lightcurves from the 2005 apparition.** The lightcurves (asterisks) and their inversion model fits (dashed lines) are shown as in Figs. 1 and 2 of the paper.

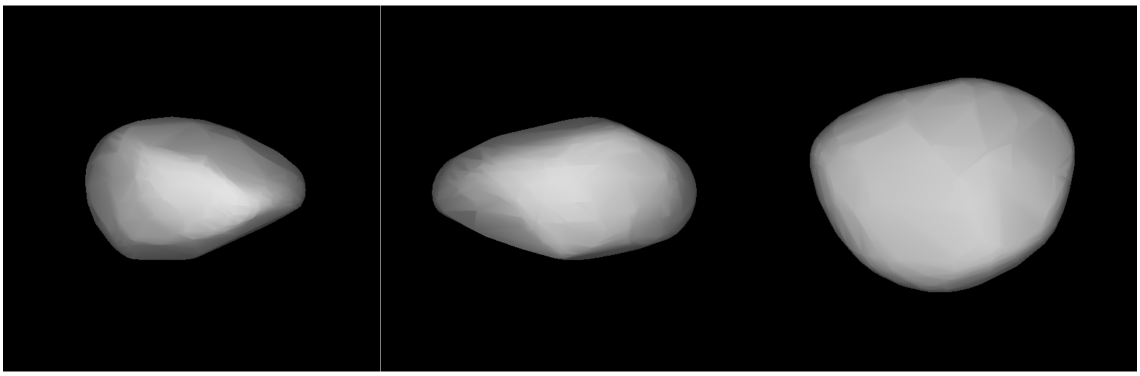

Figure 2: **S2. Shape model of (1862) Apollo from lightcurve inversion.** The model is shown from equatorial level (left and centre, longitudes 90° apart) and pole-on (right).

2

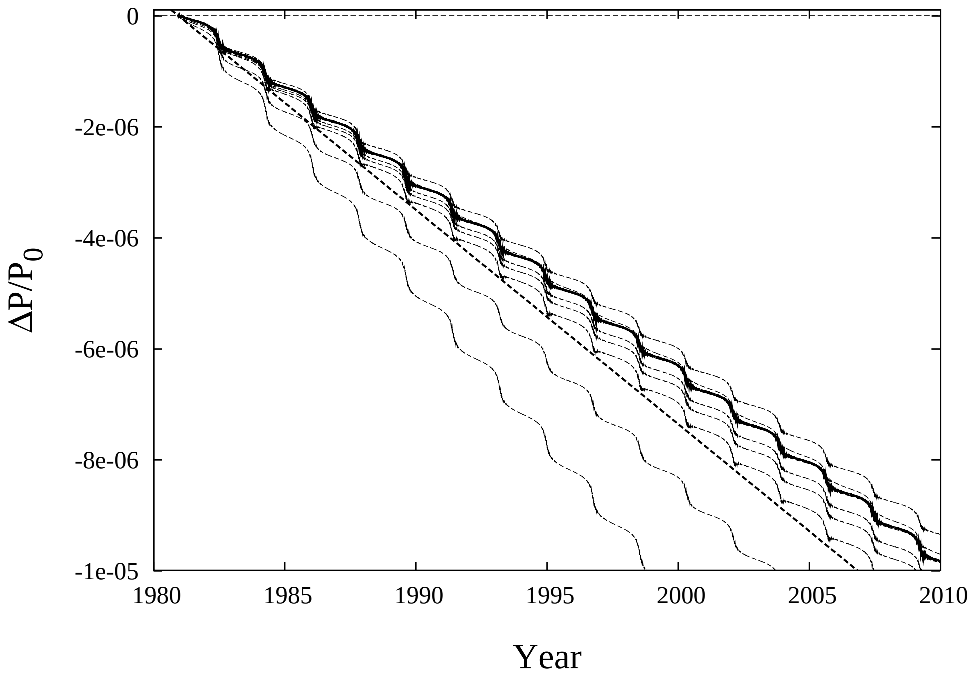

Figure 3: **S3.** $\omega(t)$ **from radiation torques.** Starting from initial data in Table 1 we propagated the spin state of (1862) Apollo by numerically integrating the Euler equations. Solar gravitational torques as well as YORP torques were taken into account. We assumed zero thermal conductivity of the surface, bulk density of 2.5 g/cm^3, and scaled the shape model to have a volume equal to a sphere with diameter of 1400 m. The figure shows $\Delta P/P_0 = (P - P_0)/P_0$ ($P_0 = 3.065447$ from Table 1) vs. time for different shape variants of Apollo all of which fit the photometric observations. The result for the nominal solution (corresponding to the lowest value of χ^2 fit) is shown in bold. The dashed line shows the observed value. All solutions predict that Apollo's rotation rate should accelerate at a pace very similar to the observed one. A slight recalibration of the size or bulk density could align all computed YORP evolutions with the observed curve. The small wiggles about the secular trend are due to the high orbital eccentricity ($e \simeq 0.56$) of Apollo's orbit.

3

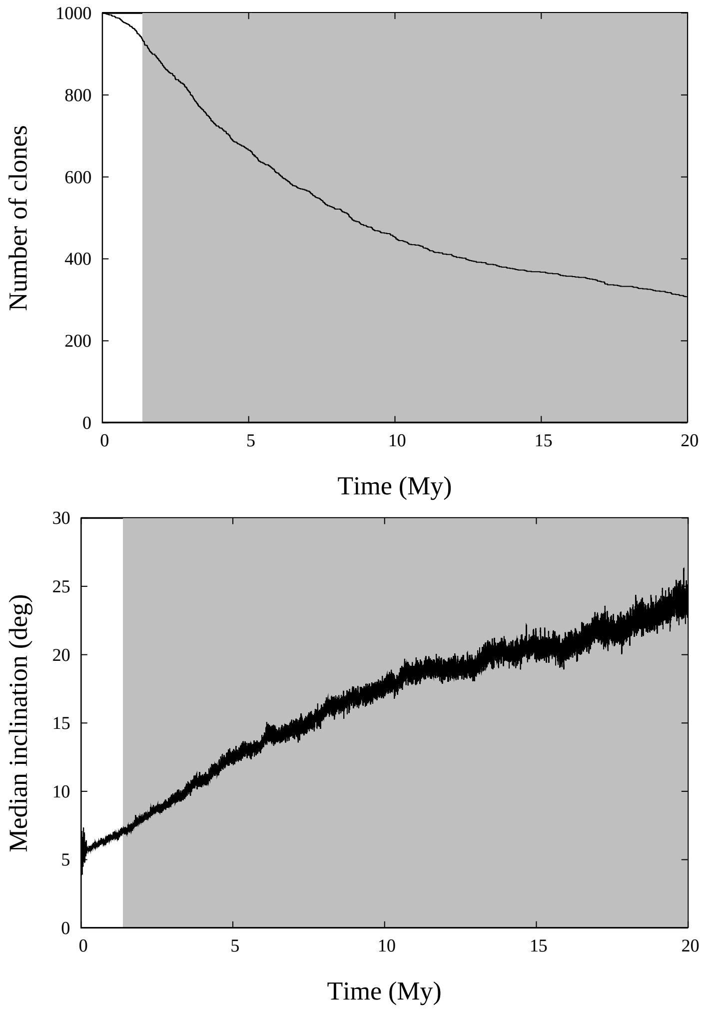

Figure 4: **S4. Orbital evolution of (1862) Apollo.** 1000 close clones of (1862) Apollo were started from the uncertainty ellipsoid in the orbital element space at Jan 1, 2000. Apollo's ephemerides, and the orbital uncertainty, were determined using the OrbFit9 software (`http://newton.dm.unipi.it/`). All planets were included in this simulation with their initial conditions from JPL DE405 ephemerides file. We used the SWIFT-RMVS3 software package for the orbital propagation (`http://www.boulder.swri.edu/~hal/swift.html`). This is a state-of-art N-body symplectic code for long-term planetary dynamics that allows close encounters of test particles and planets. All planets were included and a timestep of 3 days was chosen. The top panel shows the portion of surviving clones in our simulation as a function of time (particles are eliminated mostly by collision with the Sun or the planets). Of the initial 1000 clones, 500 survive at $\sim$ 10 My thus determining the median lifetime of (1862) Apollo. The shaded part of the figure is where the clones will formally rotate with a period shorter than 2 h. The long-living tail of Apollo clones is characterized by higher orbital inclinations which decrease collision probability with the terrestrial planets. The bottom panel shows the median value of the orbital inclination of the surviving clones as a function of time. As a curiosity we mention that 5% of Apollo's orbital clones experienced a collision with the Earth during the next 20 My.

4