

Magneto Orbit Decay Analysis Using STK's Lifetime Tool

Assumptions

- Drag coefficient $C_d = 2.2$ (suggested value by STK)
- $C_r = 1$ for total absorption of solar radiation pressure, $C_r = 1.33$ for specular reflection of SRP
- Mass = 1.3868 kg
- Area exposed to sun would be same as cross-sectional area since spacecraft will likely be tumbling and therefore constantly changing orientation with respect to sun (so assume greatest cross-sectional area exposed to sun for worst case, at any given moment)
- Solar Flux File was updated in STK using Data Update Utility

Orbit epoch and simulation start time: 1 Jul 2020 20:00:00.000 UTC

Orbit parameters:

Orbit Epoch:	1 Jul 2020 20:00:00.000 UTCG	Apoqee Altitude	300 km
Coord Epoch:	1 Jul 2020 20:00:00.000 UTCG	Periqee Altitude	300 km
Coord Type:	Classical	Inclination	97 deg
Coord System:	TrueOfDate	Argument of Perigee	0 deg
Prop Specific:	Special Options...	RAAN	274 deg
		True Anomaly	143 deg

Various Scenarios

Varying Solar Flux Sigma

Lifetime for Magneto

Satellite Characteristics	Solar Data
Cd: 2.20000000	Solar Flux File: SolFlx_CSSSI.dat
Cr: 1.33333333	Solar Flux Sigma: 0
Drag Area: 0.01803 m ²	Advanced... Compute Report ...
Area Exposed to: 0.01803 m ²	Graph ...
Mass: 1.3868 kg	☒ Show Graphics
Atmospheric Density Model: NRLMSISE 2000	

Information

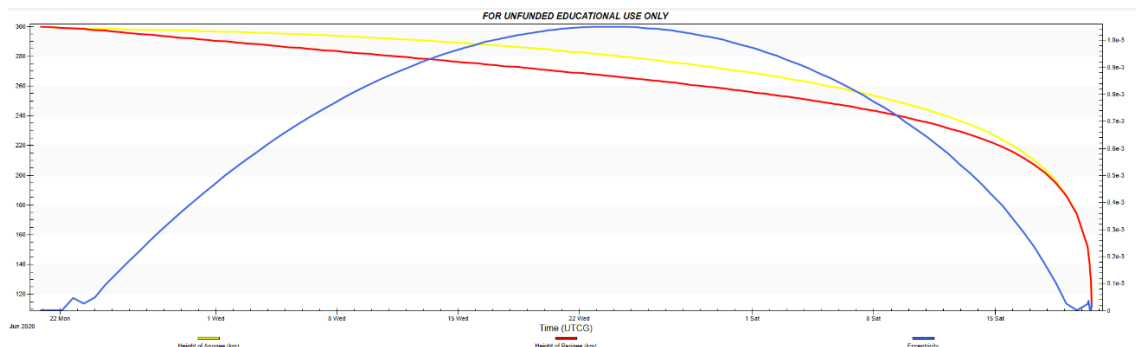
Magneto decay is estimated to be on 20 Aug 2020 13:57:35.633 after 983 orbits. The lifetime is 61 days.

OK

Close Apply Help

Decay Time

61 days



Lifetime for Magneto

Satellite Characteristics

Cd: 2.20000000

Cr: 1.33333333

Drag Area: 0.01803 m²

Area Exposed to: 0.01803 m²

Mass: 1.3868 kg

Atmospheric Density

Model: NRLMSISE 2000

Solar Data

Solar Flux File: SolFlx_CSSI.dat

Solar Flux Sigma: 1

Advanced... Compute Report ...

☒ Show Graphics Graph ...

Information

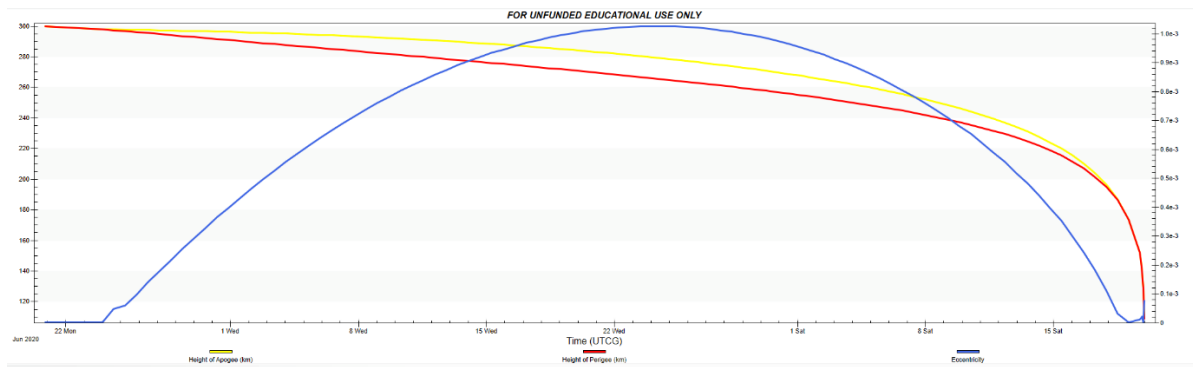
Magneto decay is estimated to be on 19 Aug 2020 22:57:46.370 after 973 orbits. The lifetime is 60 days.

OK

Close Apply Help

Decay Time

60 days



Lifetime for Magneto

Satellite Characteristics

Cd: 2.20000000

Cr: 1.33333333

Drag Area: 0.01803 m²

Area Exposed to: 0.01803 m²

Mass: 1.3868 kg

Atmospheric Density

Model: NRLMSISE 2000

Solar Data

Solar Flux File: SolFlx_CSSI.dat

Solar Flux Sigma: 2

Advanced... Compute Report ...

☒ Show Graphics Graph ...

Information

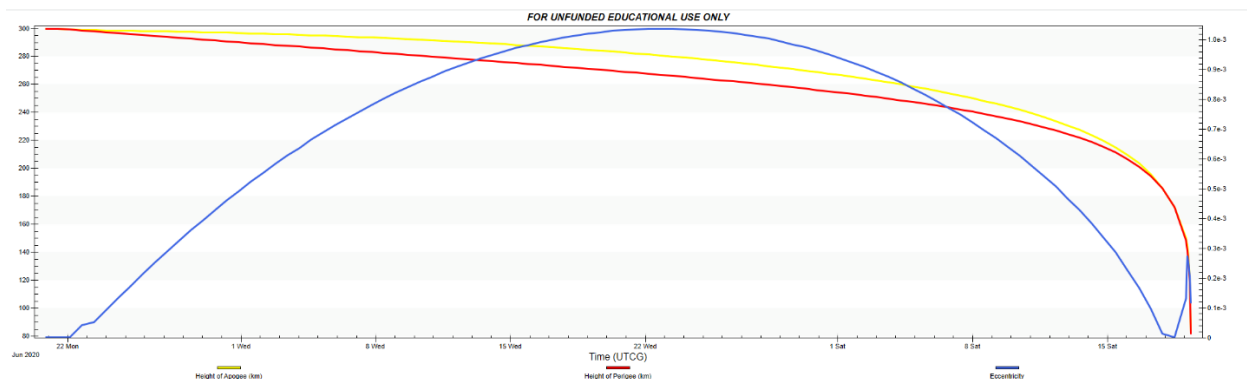
Magneto decay is estimated to be on 19 Aug 2020 07:54:59.997 after 963 orbits. The lifetime is 59 days.

OK

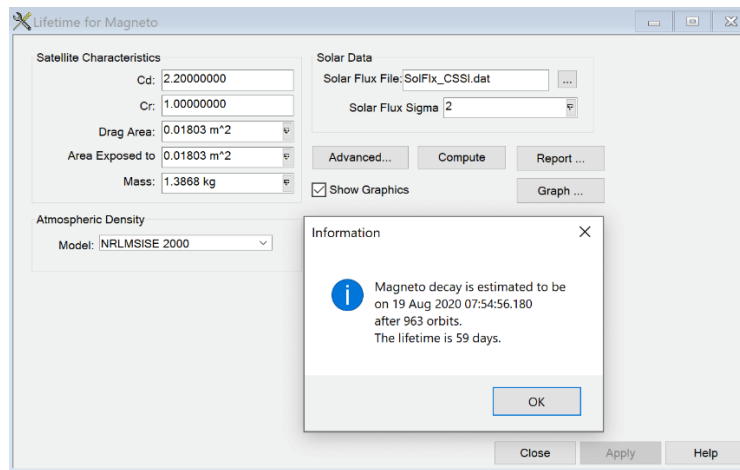
Close Apply Help

Decay Time

59 days



$C_r = 1.0$ (perfect absorptance)



Decay Time
59 days

