

Nations of the World to Send Six Kinetic Impactors to Deflect Oncoming Asteroid

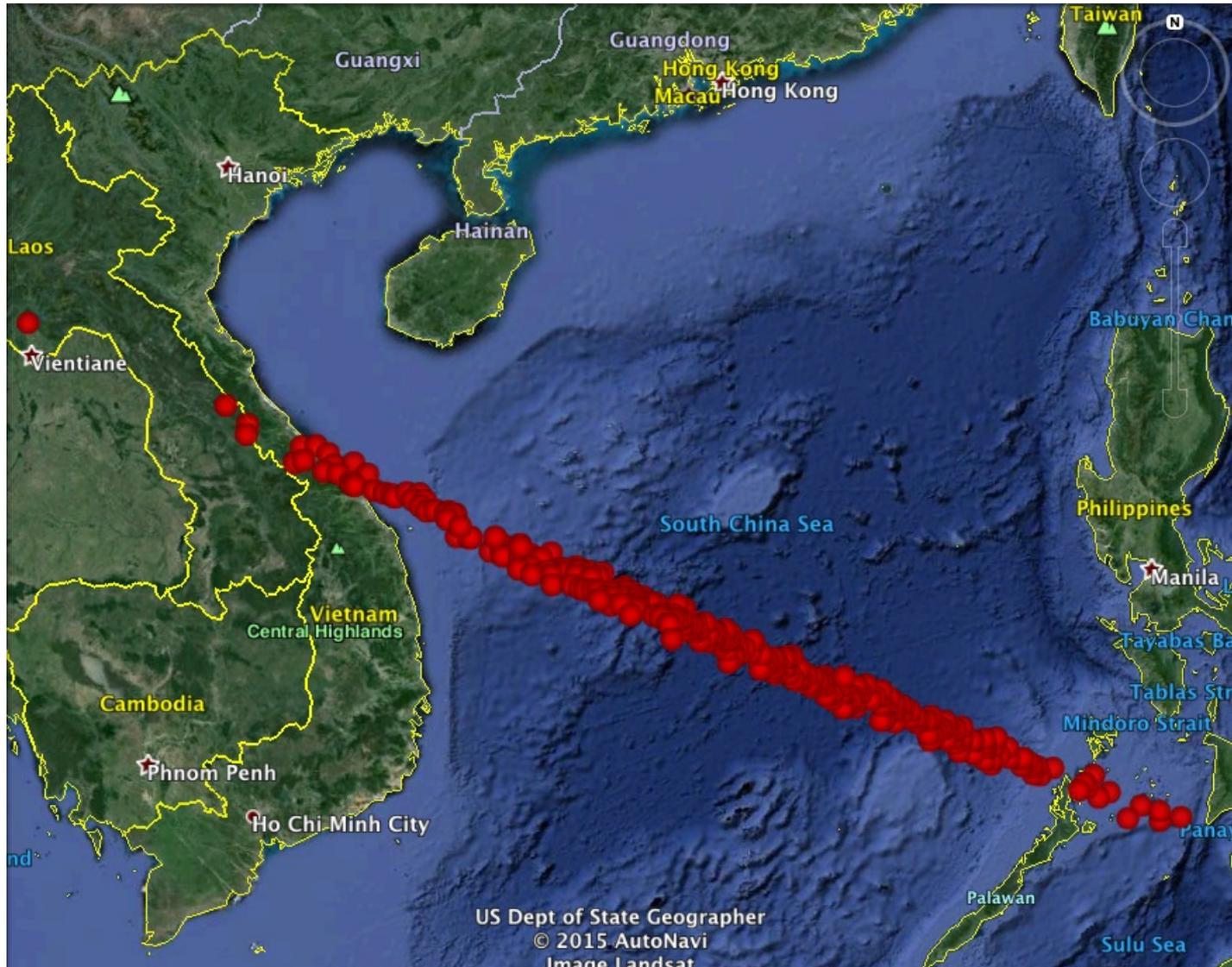
Paul W. Chodas (International Asteroid Warning Network/JPL)

Press Conference, August 1, 2019

Six Kinetic Impactors to Deflect Asteroid

- ▶ Several space-faring nations will launch a total of six kinetic impactors later this month to deflect asteroid 2015 PDC
 - ▶ The U.S. will launch 3 missions, using a Delta IV-H, a Falcon Heavy, and an Atlas V 551. A larger spacecraft to be launched on NASA's first SLS had to be scrapped because the launch vehicle could not be completed in time
 - ▶ Europe, Russia and China are ready to launch one kinetic impactor each, on Ariane 5, Proton, and Long March
 - ▶ The deflections will occur over a 7-day period in early March, 2020
- ▶ Based on tracking observations over the last 2 years, IAWN has refined the trajectory for 2015 PDC, and determined that it will most likely impact in the South China Sea
- ▶ For more info: <http://neo.jpl.nasa.gov/pdc15/day4.html>

Updated Impact Footprint for 2015 PDC



Kinetic Impactor Mission Design

- ▶ Asteroid physical properties have become more certain:
 - ▶ New color measurements support the categorization of this asteroid as S-class; scientists consider it “highly unlikely” that the asteroid could be as large as 400 meters
 - ▶ The best estimate of the asteroid size is now **150 to 250 meters**
 - ▶ Light curve measurements in 2015-17 with amplitude of 0.83 magnitudes indicate a rotation period of 3.2 hours
- ▶ Officials remain confident that 6 KI missions in combination will succeed in deflecting the asteroid away from impact
- ▶ India has joined the effort and will launch a flyby observer to assess the effectiveness of the deflection
- ▶ Development of nuclear deflection missions was put on hold due to strong opposition from some UN Security Council members

Design Your Own Deflection Mission



<http://neo.jpl.nasa.gov/nda>

Delta-V Mode | **Intercept Mode**

Time of Deflection (D): 1096 days

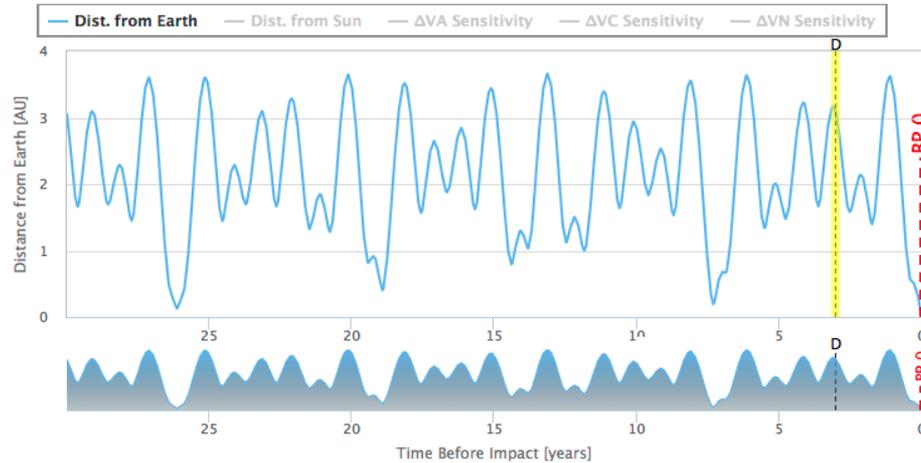
ΔVA : 0.000 mm/s
 ΔVC : 0.000 mm/s
 ΔVN : 0.000 mm/s

Simulated Near Earth Object (NEO)
 PDC15 a=1.78 i=5 e=0.49 View Orbital Parameters

Diameter: 0.14 km
 Density: 1.5 (porous rock) g/cm³
 Beta: 0.0001
 Mass: kg

Object parameters are only applicable in Intercept Mode

Reset | Slider Δ 's | Advanced Mode | Tips

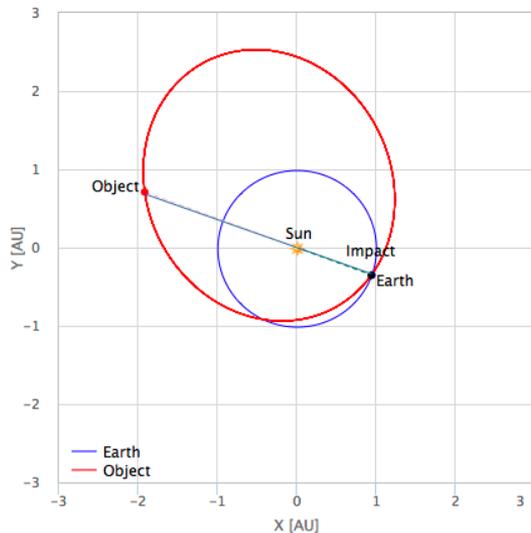


Read overview

Start the app

Take a tour of the app using the 2015 PDC scenario

Orbit and Positions at Deflection



Orbit Changes

ΔVA : 0.000 mm/s
 ΔVC : 0.000 mm/s
 ΔVN : 0.000 mm/s
 Total ΔV : 0.000 mm/s
 Period at D: 864.071 d
 Δ Period: 0.0000 s

B-Plane Values

ζ (zeta): 0.621 R_e
 ξ (xi): -0.436 R_e
 B magnitude: 0.759 R_e
 Capture Rad.: 1.420 R_e
 Perigee Dist.: 0.405 R_e

IMPACT

V_{∞} : 11.087 km/s

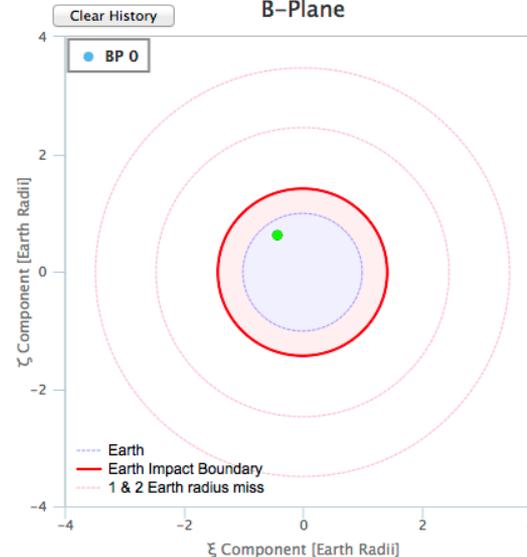
* R_e = Earth Radii

Save Current Session

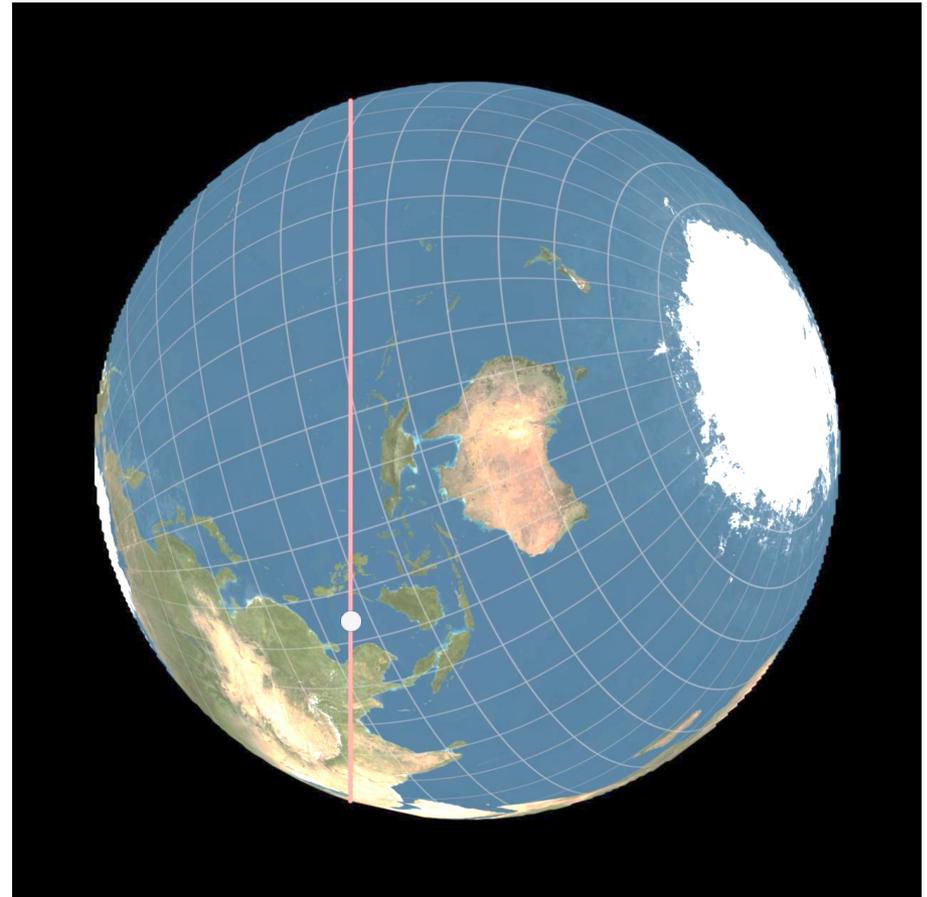
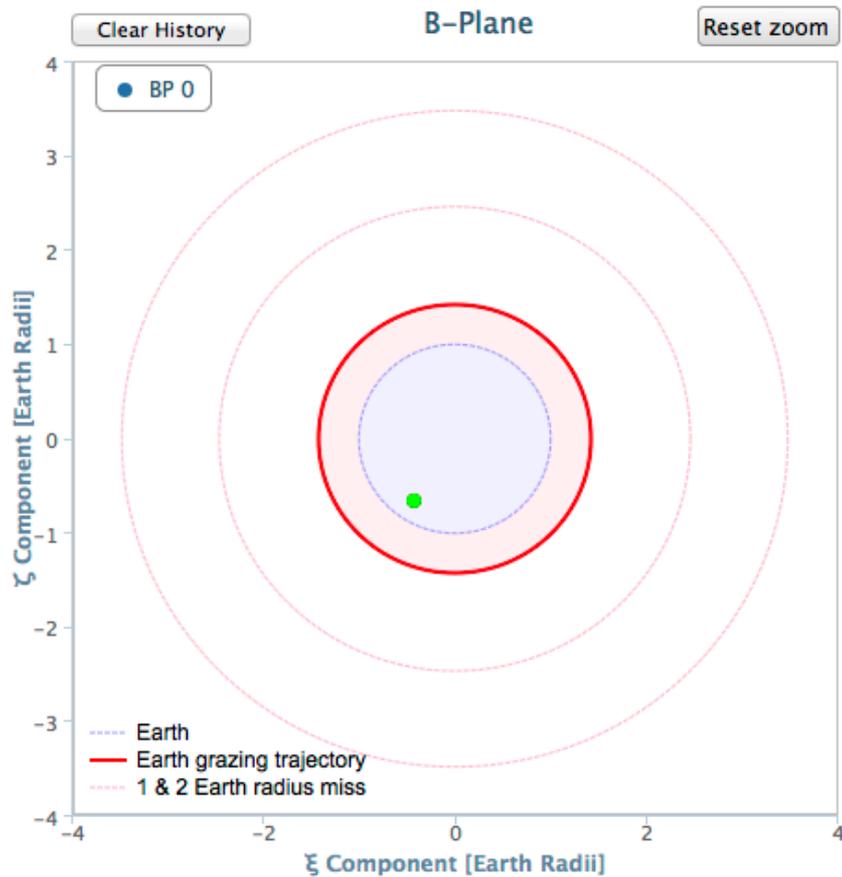
Restore Session

Deflection Map

B-Plane



Updated Nominal Impact Trajectory



For object diam: 0.25 km, density: 1.5 g/cc, Beta: 1, deflect 913 days before impact, flight time 198 days, launch vehicle: Delta IV-H, **3 or 4 launches required**

Close-up of Risk Corridor in B-Plane

