

# Detection of Yarkovsky Acceleration of (99942) Apophis

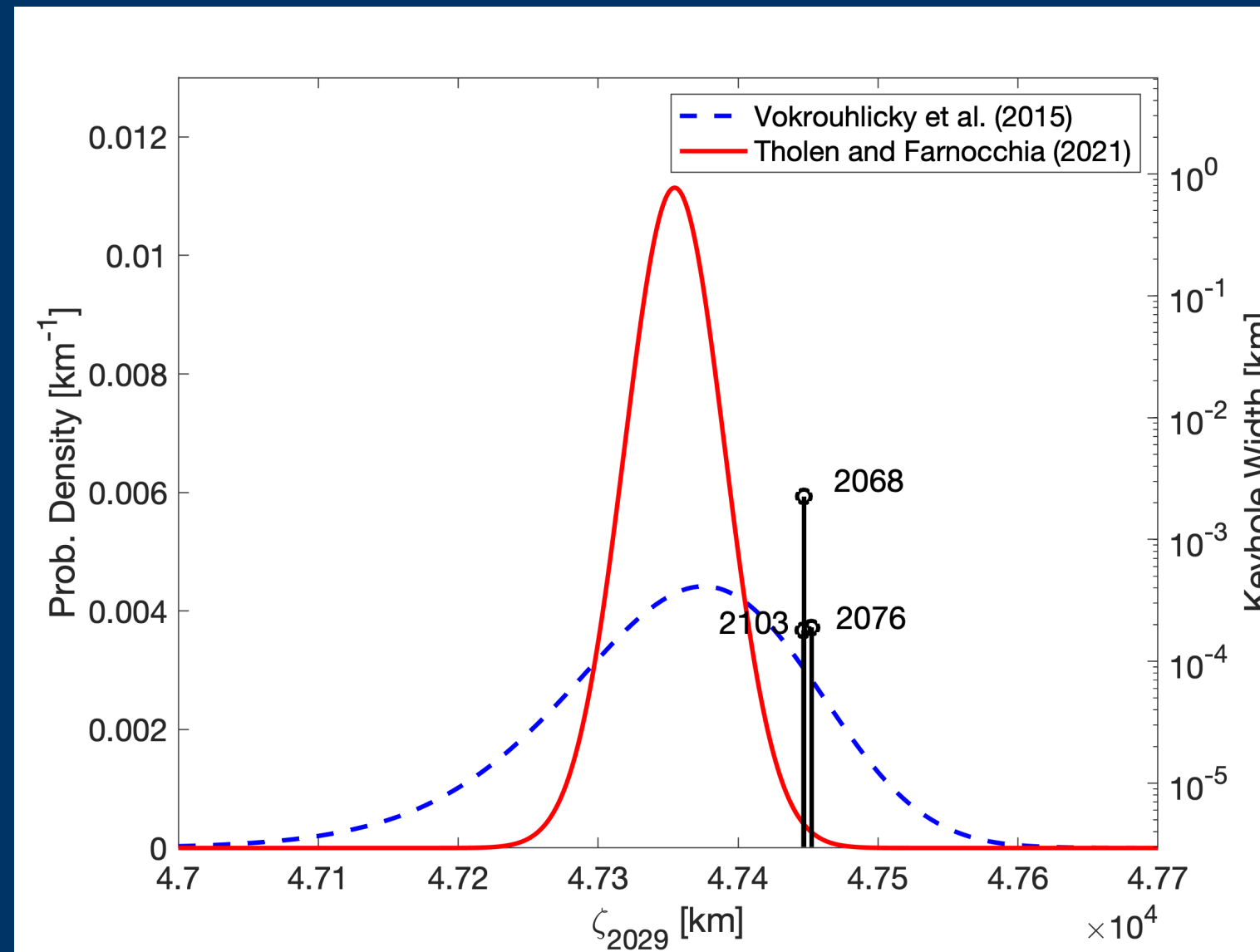
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# Update to DPS and Apophis T-9 Presentations

- Reflects the status of the project as of PDC abstract submission deadline
- Five additional Subaru observations in 2020 December good to 10 milliarcsec
- As of that time, our value for A2 was  $-30 \pm 3 \times 10^{-15}$  AU/d<sup>2</sup>, or slightly more negative than previous determination
- Shifted the peak of the probability distribution a little farther away from the 2068 keyhole (2029 B-plane distance of  $47355 \pm 36$  km)

# Keyhole Map for 2029 Close Approach



# Impact Probabilities Over Next Century

- 10 million clone orbits were checked for Earth impacts over the next century and 13 impacts were found
- 8 of those impacts occurred on 2068 Apr 12.63 for an impact probability of slightly less than 1 in a million in 2068
- Single impacts were also found on 2075 Apr 13.21, 2079 Apr 13.65, 2079 Oct 16.81, 2083 Apr 13.31, and 2091 Apr 13.37
- More recent observations have eliminated the impact risk over the next century

# Acknowledgments

- Several people have helped to acquire observations of Apophis from Mauna Kea Observatory over the years, including Fabrizio Bernardi, Marco Micheli, Garrett Elliott, Dora Fohring, and Denise Hung.
- Most recent funding from NASA grant NNX13AI64G.

# Dedication

- DJT would like to dedicate this presentation to the memory of Apophis co-discoverer and dear friend Roy A. Tucker, who passed away of pancreatic cancer on 2021 March 5, within hours of the 2021 close approach of Apophis to the Earth