

LARGE TAURIDS DETECTED BY U.S. GOVERNMENT SENSORS

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Polish Fireball Network

Fireballs Reported by US Government Sensors

(1988-Apr-15 to 2017-Sep-05)

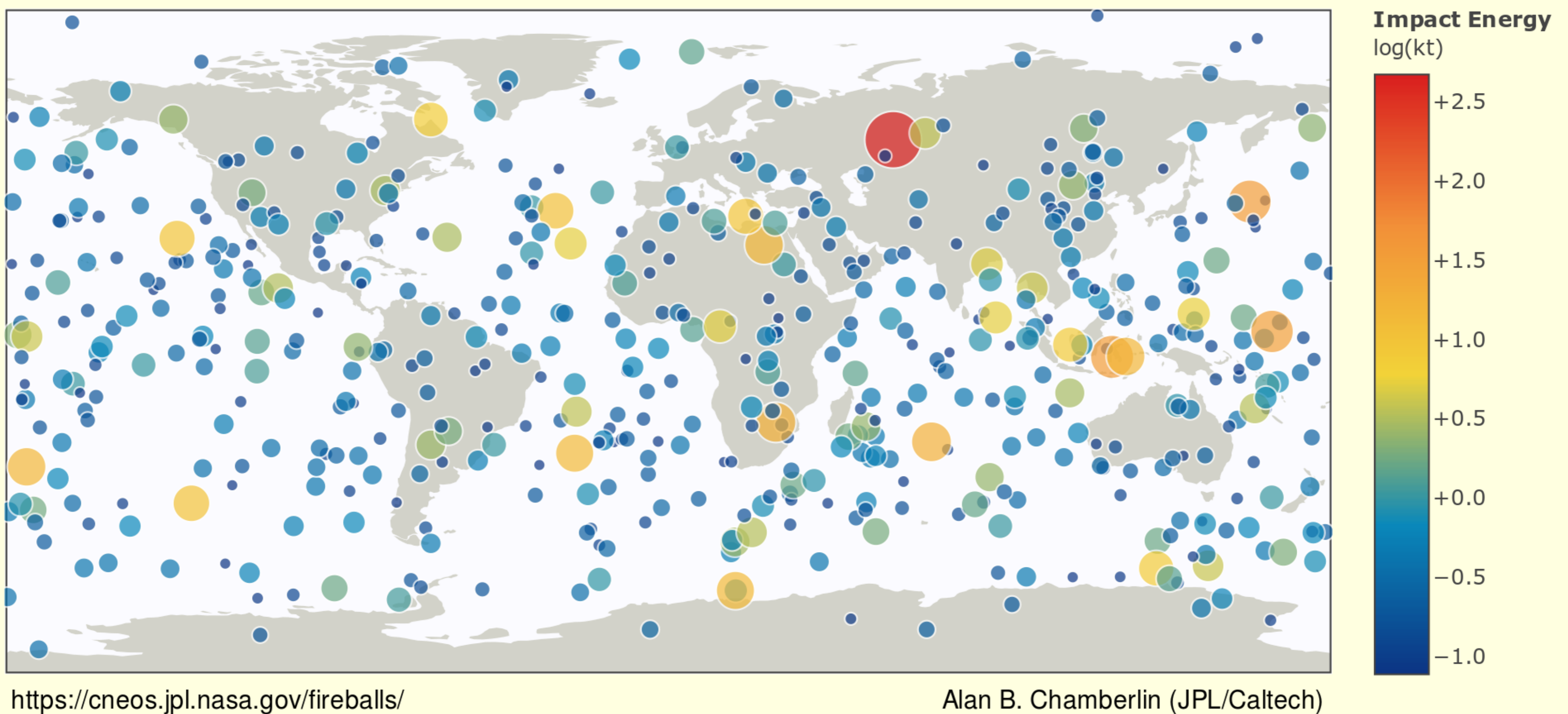


Fig. 1: Positions of all fireballs detected by U.S. Government Sensors (DoD satellites). Source: <https://cneos.jpl.nasa.gov/fireballs/>

Possible Taurids

1. 1999 06 25 06:27:41 UT

Fireball connected with Beta Taurids (the second encounter of the Taurid stream). 800 km northwest from Harbin city in Manchuria, China. Maximal magnitude reached on 69 km, total energy 0.37 kT. Beta Taurids radiant high above horizon. Possible absolute magnitude of $-18.5m \pm 1$

2. 2005 11 02 05:16:47 UT

Maximum brightness detected on 74 kilometers. Observed during 2005 outburst over Pacific Ocean, roughly 1200 km west from the California Peninsula. Total energy 0.21 kT TNT. Taurids radiant twenty five degrees above horizon. Possible maximum absolute magnitude $-18m \pm 1$

3. 2005 11 02 07:04:32 UT

Just two hours after previous fireball the second large body entered the earth atmosphere also over Pacific Ocean, 2500 km west of Los Angeles and 1500 km north of Honolulu. Height of maximum brightness 68.5 km, total energy equivalent 0.11 kT TNT. Taurids radiant twenty degrees above horizon. Possible maximum absolute magnitude $-17m \pm 1$

4. 2015 10 31 11:34:30 UT

Fireball recorded during the 2015 Taurids maximum, 7 hours before very bright Southern Taurid fireball detected the same day over Poland. Observed over Pacific Ocean, 2500 km south east of Hawaii Island. Maximum height of 71 kilometers, total energy 0.29 kT. Taurids radiant close to local zenith. Possible maximum absolute magnitude $-18m$

Detected height

For most fireballs detected by U.S. Government Sensors the maximum brightness height is available. Maximum brightness for most fireballs was observed at the height between 20 and 50 km (see figure below, right) which may correspond to their asteroidal origin. High altitude fireballs comprises only small amount of examined data. Interestingly almost all fireballs with maximum brightness observed higher than 68 km occurred during the 2005 and 2015 encounters or during the 1999 daylight encounters. Such heights are typical for large Taurid fireballs as observed by Polish Fireball Network during the 2015 maximum. Observed energy equivalents are less than 0.5 kT which corresponds to magnitude -16 to -18 .

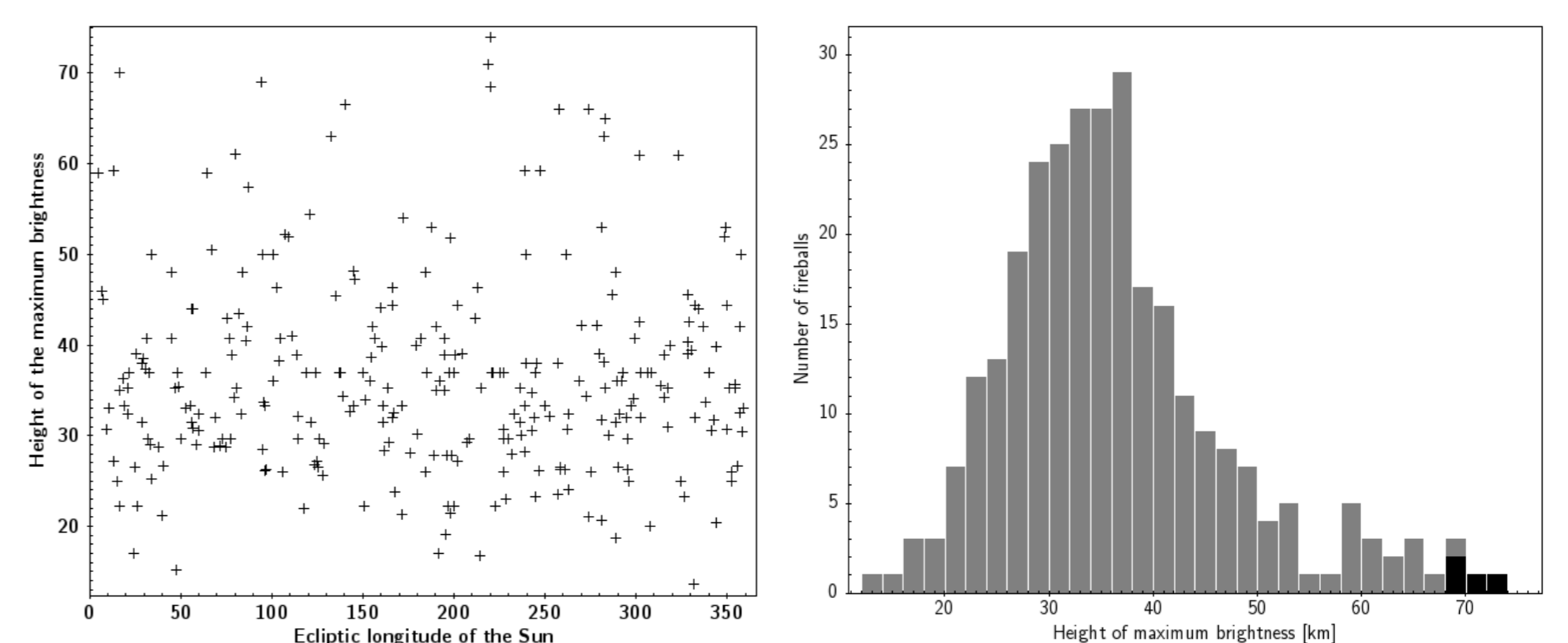


Fig. 2: Maximum brightness altitudes versus solar longitude (left), histogram of the detected altitudes with possible Taurids marked as black bars (right)

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