

Chelyabinsk Event

15 Feb 2013

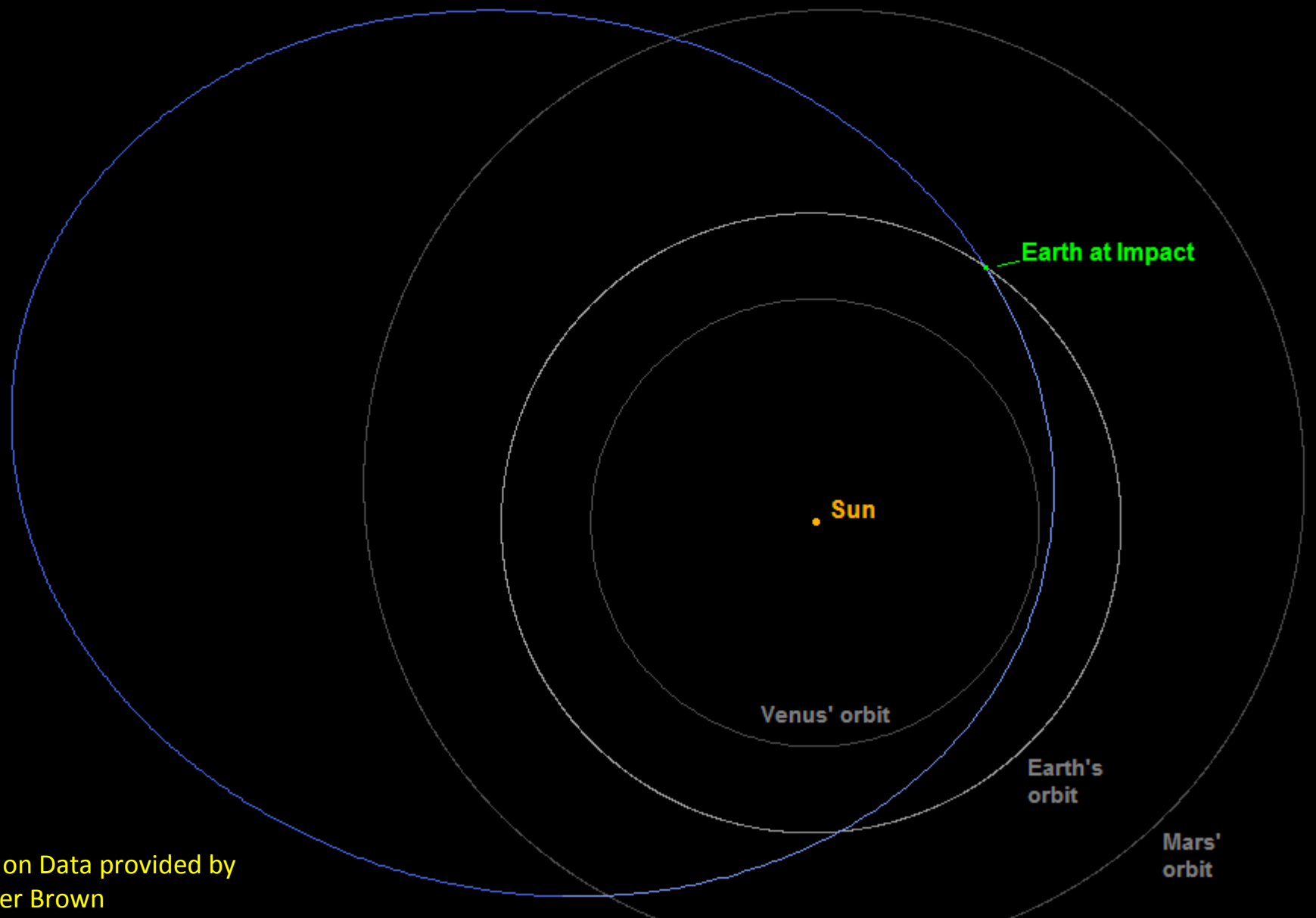
INITIAL, PRELIMINARY ANALYSIS



What we know now

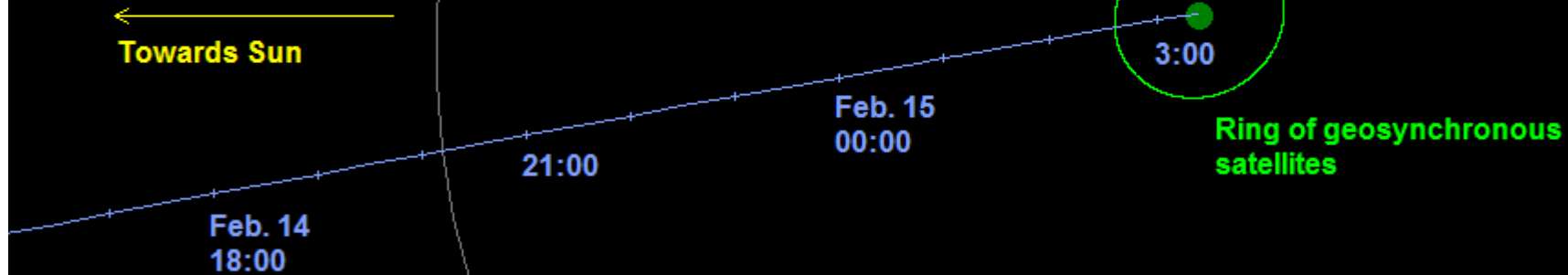
- Impact event occurred at 3:20:26 UTC (9:20 AM local time); Trajectory was ~northeast to southwest across Chelyabinsk, Russia (Southern Urals)
 - Observed from Tyumen, Ekaterinaburg, and Northern Kazakhstan
- Size ~17 meters
 - ~ 6400 – 7700 metric tons
 - Energy of this impact released 470 of kilotons equivalent TNT
 - Altitude of explosion at 20 +/- 10 km
 - Velocity of impact 18 km/s (> 40,200 mph)
 - Not related to 2012 DA₁₄ flyby [15 Feb 2013; that flyby was South to North]
- Largest reported fireball since Tunguska impact (on 30 Jun 1908)
- Much larger than 2008 TC₃ (which impacted in the Sudan) and ~1/10 the size of 2012 DA₁₄
- Reports that a few fragments have been recovered ~80 km west of Chelyabinsk (near a village called Satka)
- Blast wave damaged 4000+ structures (shallow graze ~15° entry; airburst and subsequent shockwaves from explosion)
- Report of 1200+ injured (no deaths), largely due to broken glass

Estimated Orbit About the Sun of the Chelyabinsk Impactor



Based on Data provided by
Dr Peter Brown

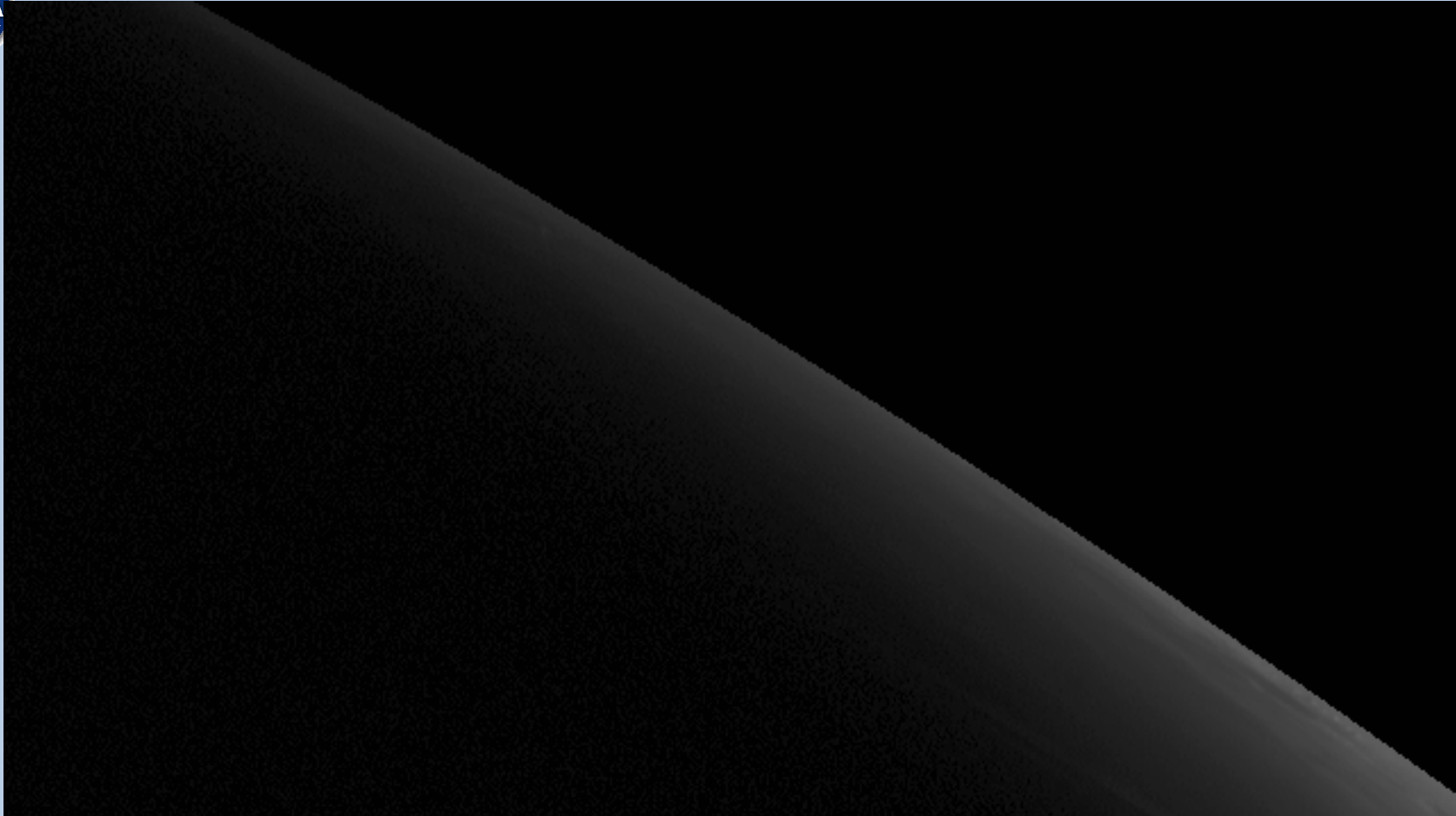
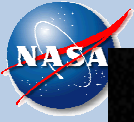
Approximate Final Trajectory of the Chelyabinsk Impactor



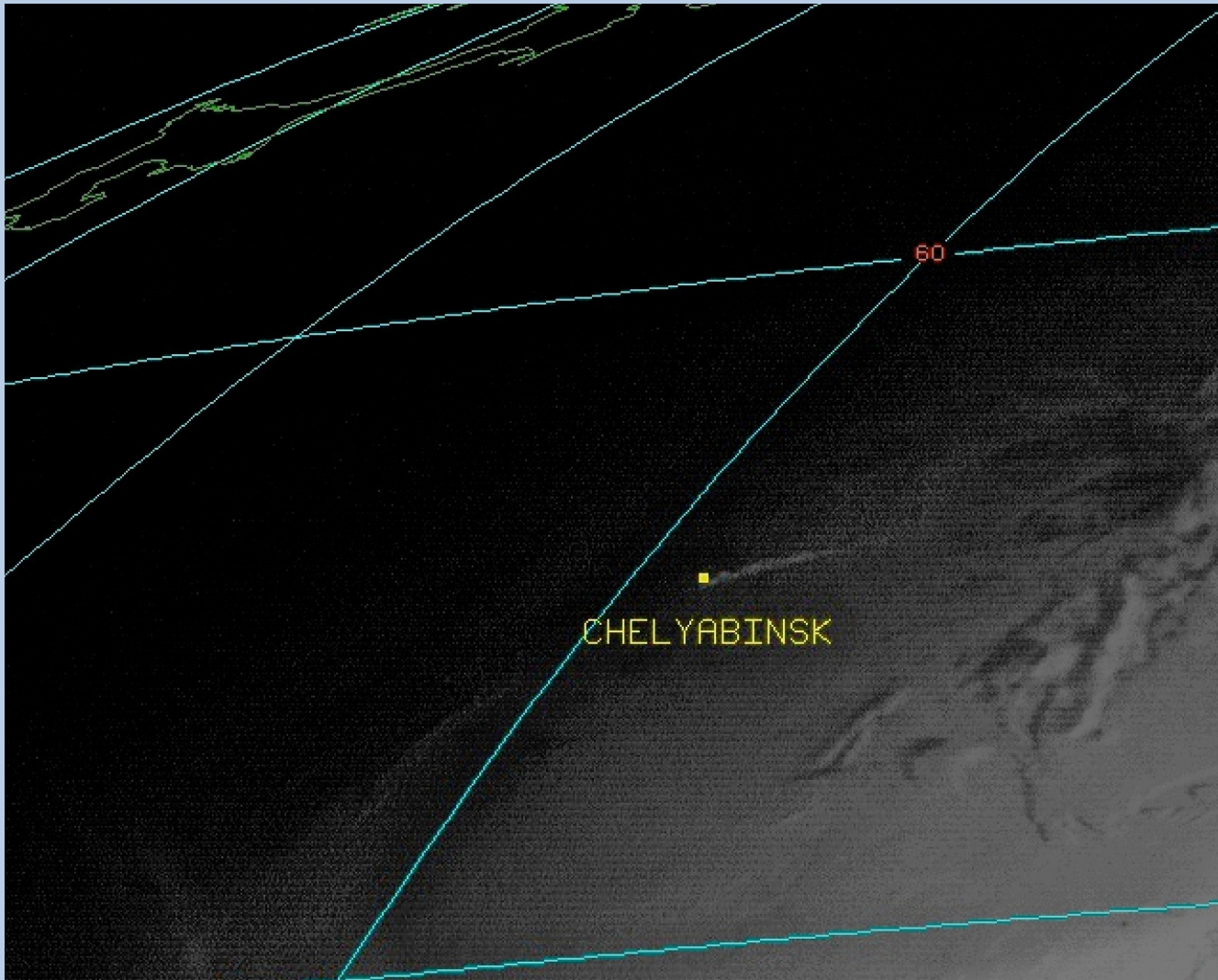
1-hour time ticks, times in GMT

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This animated GIF image shows the meteor that entered the atmosphere above Chelyabinsk, Russia the morning of February 15, 2013 around 9:20 am local time, 0320Z. The GIF consists of 8 separate images starting at 0300Z and proceeding in 15 minute increments until 0445Z, at which time the vapor trail blends into the reflected light of the morning sun. The images show the horizon taken at the farthest extent of the EUMETSAT METEOSAT-10 satellite's high resolution visible channel, near latitude 55 north, longitude 61 west. Courtesy European Organisation for the Exploitation of Meteorological Satellites, and NOAA



A Meteor entered the Earth's atmosphere over the Ural Mountains of western Russia today at approximately 0320 UTC (09:20 AM local time). The visible image from just after sunrise, above, from the Chinese FY-2D satellite shows an east-west plume, likely from the meteor, near Chelyabinsk.









