

# Trashing Our Space Neighborhood

**F** = FREE

In ~ 2016 SpaceX announced that it intended to put a constellation of several thousand small communication satellites in fairly low Earth orbits. I immediately knew that nothing would stop SpaceX. My conviction stemmed from the fact that point-to-point communications on Earth would avoid most of the .238-second (~ quarter-of-a-second) delay of relaying information out-&-back from Geostationary communication satellites. I knew that wealthy, greedy people would gladly pay a fortune for that advantage in making more money via access to slightly faster stock trades. I was certain that U.S. space regulatory restraints would be swept aside in quickly achieving the faster trades advantage. (Intentionally blowing up satellites-in-orbit is also a reality. The international 'peaceful use of space' idea of yesteryear seems quaintly idealistic.) Consider the following:

## **Before humans orbited objects around the Earth:**

The Earth is orbiting around the Sun at 18.5 miles/second. Deep space objects drawn directly in by Solar gravity alone would pass Earth going inward at 26.1 miles/second. In the past, when clouds of debris swept past Earth, such as the tails of comets, almost all the debris either entered the atmosphere & burned up, impacted, or kept on going. Being slowed by the atmosphere enough to enter orbit created an orbit that re-entered the atmosphere repeatedly & hence decayed quickly.

## **With a multitude of human-made objects orbiting the Earth:**

When clouds of debris from deep space sweep past Earth, some of the debris will strike the human-made orbiting objects, fragmenting the objects & creating some fragments with persistent orbits that don't pass through the outer atmosphere. Furthermore, some of these orbiting fragments will be energetic enough to have elliptical orbits with apogees far above the elevation at the initial impact point. Deep space debris may turn the three-layers of Starlink satellite constellations into a significant, enduring in-depth flight risk zone, e.g.: when attempting to travel to the Moon, Mars, or anywhere else outside the atmosphere, including briefly popping-up into space as a tourist.

## **In Geosynchronous orbit :**

The big satellites in geosynchronous orbit, and those "parked" near that orbit at the end of their useful lives, are far more problematic. When clouds of debris sweep past Earth – the big satellites will be big targets. Impacts will result in explosive debris that repeatedly passes through the geosynchronous orbit at approximately where the impact occurred (in the ~ inertial space around Earth) moving at about the same differential speeds with which they blew apart. The "at rest" geosynchronous orbit speed is 1.9 miles/second in Earth's inertial space. De-orbiting the space junk in-or-near geosynchronous orbit should be a high international priority. Even so, when deep space debris eventually strikes the remaining geosynchronous satellites - Planet Earth's **geosynchronous orbit lethality zone** will begin to materialize.

If trashing space seems farfetched - web search: "orbital debris NASA" and watch the various-year debris animations/movies. The vicinity of the geosynchronous orbit stands out as a clearly visible, fairly placid doughnut of debris rotating around the Earth about 22,000 miles above the equator.