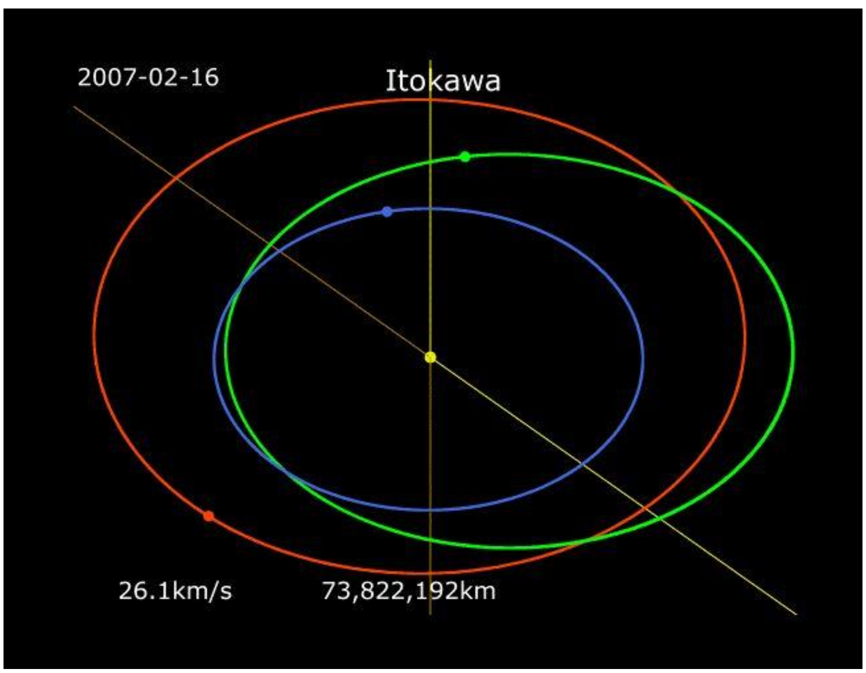
Stellar Metamorphosis: Accretion Friction Braking, Part Two, 25143 Itokawa

Jeffrey J. Wolynski
Jeffrey.wolynski@yahoo.com
September 14, 2019
Rockledge, FL 32955

Abstract: In this paper calculations are done to determine the kinetic energy in joules of an impact at 3 different velocities of the asteroid 25143 Itokawa. More calculations are done in a graph, and some explanation is given as to what will happen to Itokawa in accordance with the General Theory of Stellar Metamorphosis. Essentially any impact velocity of Itokawa due to its large mass will cause enormous destruction, leading to the realization that it must have formed from an even larger destructive event.

Itokawa is an asteroid that has an elliptical orbit that crosses inside of Earth's orbit and back out again. Red is presumably Mars' orbit, Itokawa is green, and Earth is blue. It is about 7 times more massive than the Great Pyramid of Giza.



Itokawa was formed from an impact event that happened long, long ago. It is not a "rubble pile". It is a piece of the remains of a long dead star. Imagine if the Moon was hit by a large object and ejected shrapnel all over, well, this is a good example of what that shrapnel would look like.[1]

In any case, Itokawa will continue orbiting the Sun until it slams into another object, gets ejected, or its orbit decays and gets slung around the solar system (into the more inner or outer regions), to then impact other larger objects. If it hits Jupiter, Saturn, Neptune or Uranus then the total kinetic energy of the impact will transfer into heat. This is how something that massive is removed from impacting old stars like the Earth that are hosting life on its surface. Nature is cruel for sure, but at least she has much larger objects available to vacuum up rogue objects on much larger scales.

This being said, the very act of Itokawa impacting an object, say, Saturn, will not add or subtract any significant amount of orbital or axial angular momentum, or mass. What it will do is allow for the chemical combinations of not before seen chemicals in Saturn's atmosphere to be formed on a larger scale. This is due to the intense transfer of kinetic energy ($1.008 * 10^{16}$) Joules in the larger of the sums to heat energy. That heat energy of impact in a more virgin atmosphere will spur the production of hundreds of thousands of different chemicals, some longer lived than others, but eventually will settle out due to chemical differentiation by mass and electrochemical properties. Of course, only the heaviest, stablest portions of Itokawa will sink to the very center, the iron/nickel alloy and heavy, and unreactive elements like gold and platinum (which all the above are good chemical catalysts by the way). What this means reader is that middle aged stars like Saturn, break apart the dead stellar guts like Itokawa, and recycle them chemically and physically. So when you find gold, or iron, keep in mind that material was collected by the Earth when it was a gas giant, and has fallen deeply towards the interior to collect on the newly forming crust. If early enough, the material sinks all the way to the core, forming the core itself and to never be found.

I do not know if you missed that, but I'll say it again. Since gold is radioactively stable at its only naturally occurring isotope of 197, then chances are it has been recycled over and over and over in multiple stars' lifetimes. This is because when the middle aged stars such as Jupiter or Saturn collect asteroids and meteoroids in large amounts, it separates out the heavy material from the light material like a giant celestial centrifuge. This is probably why there are gold deposits in some areas and not in others, the gold deposits were from ancient asteroids that hit Earth when it was a gas giant. To picture this process, think about when you are in a pool. Now imagine you take a handful of sand and dunk it into the pool and let go. You'll see that the sand doesn't spread to the entire pool, sure it does spread a little bit, but most of it will just slowly sink in one spot on the bottom of the pool. Now since asteroids are not rubble piles, the fact that there are gold containing areas means that asteroids kept their integrity even after impact, and made it towards deeper regions of the gas giant before it eventually succumbed to mixing. This would be akin, using our pool sand analogy, of taking a mud "snowball" and letting that fall to the bottom.

It could even be argued that gold even being on the surface in any amount is direct observational evidence of Earth having broken apart asteroids with a vastly thicker atmosphere. Even more so, the fact that any large asteroid that impacts Earth now with its extremely thin atmosphere as compared to its early atmosphere, will leave huge craters. There simply wasn't a big enough atmosphere to separate out the gold from incoming asteroids. The Earth looked tremendously different as is evidenced by simple things like gold, but carrying on.

The amount of heat energy that incoming asteroids can provide even among highly evolved stars that are orbiting the cold reaches of space is tremendous. Not enough to keep evolving stars hot in perpetuity, but definitely enough to allow for heat to be cycled throughout the star from the very top, very low pressures of the high atmosphere, all the way to the cooling but hellish core.

Below is a excel spreadsheet with the kinetic energy formula KE= 1/2*m*v^2, which is kinetic energy (joules) = 1/2 mass (Kg) times velocity in meters/per second squared. As we can see the kinetic energy of Itokawa impacting any object would be tremendous, even at the velocity of someone walking! The 900 m/s is the velocity of a NATO 5.56 round coming out of a rifle, and the 24,000 m/s is about the orbital velocity of Mars (Itokawa is a bit faster at times). The 1 meter per second is walking pace (2.23 MPH). All three velocities of such a massive impactor would cause enormous destruction. The asteroid Itokawa (7 times more massive than the Great Pyramid of Giza), at walking pace would result in the energy release equivalent of 3.5 tons of TNT. Incredible! Its current kinetic energy around the Sun is the energy equivalent of about 2.4 gigatons of TNT. That's a huge deal. It means the process of planetary accretion (planet formation) happens only where the kinetic energy can be transformed and dissipated back into heat energy (radiation, convection and conduction). That is exactly what stars do with dead stellar remains. The process to transform kinetic energy of asteroids (dead stellar remains) to heat is in the evolving stars themselves during their formation (evolution same thing).

		Kinetic Energy							
		KE=1/2m*v^2							
	kg	m/s	MPH	(m/s)^2		kg/2	equals (Joules)	Joules	Similar
0.5	7,000	22.35	49.99561	499.5225	*	3,500	1,748,329	4,200,000	1 kilogram TNT
0.5	5,000	10	22.3694	100		2,500	250,000		
0.5	92	2	4.47388	4		46	184		
0.5	10,000	6	13.42164	36		5,000	180,000		
0.5	50,000	60	134.2164	3600		25,000	90,000,000		
0.5	500,000	10	22.3694	100		250,000	25,000,000		
0.5	8,000,000	500	1118.47	250000		4,000,000	1,000,000,000,000		
0.5	35,000,000,000	1	2.23694	1		17,500,000,000	17,500,000,000	4,900,000,000	1 ton TNT equivalent
0.5	35,000,000,000	900	2013.246	810000		17,500,000,000	14,175,000,000,000,000	4,200,000,000,000,000	1 megaton TNT
0.5	35,000,000,000	24000	53686.56	5.76E+08		17,500,000,000	10,080,000,000,000,000,000	4,200,000,000,000,000,000	1 gigaton TNT

Sheet 30

9/14/19
~~JJW~~

$KE = \frac{1}{2}mv^2$

$KE = \frac{1}{2}(7{,}000\,kg)(22.35\,m/s)^2$

(50 mph school bus slamming into unmovable wall)

1.148×10^6 Joules

$\boxed{4.2 \times 10^6 \text{ release of 1 kilogram of TNT}}$

25143
Itokawa (A single solid body, NOT a "rubble pile")

$KE = \frac{1}{2}(\underset{\text{mass}}{35{,}000{,}000{,}000\,kg})(24{,}000\,m/s)^2 = 1.008 \times 10^{16}$ Joules

mass

a bit slower orbital velocity
This is Mars' orbital velocity

≈ 2.4 gigatons of TNT if makes impact

$KE = \frac{1}{2}(35{,}000{,}000{,}000\,kg)(900\,m/s)^2 = \cancel{1.00}$ 1.4175×10^{13} Joules

≈ 3.375 megatons of TNT

velocity of 5.56 NATO round

$KE = \frac{1}{2}(35{,}000{,}000{,}000\,kg)(1\,m/s)^2 = 1.7 \times 10^{10}$ Joules

≈ 3.57 tons of TNT!

walking pace

References

[1] http://vixra.org/pdf/1901.0065v1.pdf How Two Lobed Asteroids are Formed