From: James E Oberg
Sent: Saturday, January 14, 2012 4:56 PM
Subject: NEWS: Russia says all North America is CLEAR of falling-satellite danger

Jim Oberg advises:

1. Hot news -- the Russian Space Agency has just issued its latest prediction for possible impact points of the Fobos-Grunt probe tomorrow -- and the United States and Canada are TOTALLY clear. But a lot of BIG cities are NOT clear.

2. The Russians expect the probe to hit the atmosphere and scatter fragments sometime tomorrow, between 1436 GMT [9:36 AM] and 2224 GMT [5:24 PM EST].

3. During that approx eight hours, the probe will make five complete circuits of Earth. Somewhere along there -- more likely near the middle of the five, maybe -- it will come in.

4. It's impossible to predict WHERE along those orbits it will ultimately crash [see para 15 for why], but the ground tracks of the orbits can be calculated. And now they have been.

5. Only along those tracks -- within maybe 20-30 miles left and right of the tracks -- is it physically possible for debris from Fobos-Grunt to fall. Everywhere else is CLEAR.

6. The Roskosmos map of their interval of possible fall is at http://www.roscosmos.ru/img/news/2012_01_14_fobos_s.jpg, and it shows North America is completely out of range.

7. The path begins, about 1436 gmt, over central Africa and runs northeast across central Asia and Siberia. It crosses the Pacific, nips the southernmost tip of South America, and then heads right across Africa again.

8. This pass also goes directly over Egypt, Israel, and Syria about 1620 gmt. Then central Asia, Siberia, and northern Japan [quite near the Fukushima nuclear reactors, actually].

9. The next pass nips South America's tip again, crosses the South Atlantic, and runs from Liberia to Libya, then Greece, the Crimea, southern Russia, Mongolia, right over Beijing, and just SW of Japan.

10. The next pass goes up inland of the SE South American coast of Argentina and Brazil, then the coast of Morocco, then Spain, Italy, central Europe and Ukraine, Russia, Kazakhstan, across southern China, the Philippines, nips the NE corner of Australia, then right over Wellington, and off into the Pacific.

11. The next pass hits the Peru-Chile border of the Pacific coast of South America, NE to French Guyana, across the Atlantic to directly overfly Paris, Berlin, southern Russia, then Tibet and Bangladesh, Bangkok, Borneo, right across the middle of Oz, and the southern tip of Kiwiland.

12. The last pass comes across Bogota, across the N. Atlantic to overfly London, Berlin [again], Kiev, Baku, then SE to Mumbai [overhead], to the SW tip of Australia.

13. Plus lots of open water....

14. The odds are that any one piece hits water are about 75%, but because there is a long train of fragments along a several hundred mile swath, the odds of ALL pieces hitting water is no better than 60%.

15. Predicting Earth impact point even 24 hours out is like watching a pitcher standing way out in central field throw a ball to a batter, and only observing the speed and direction it leaves his hand, and trying to call ball/strike. You don't know of any crosswind. You don't know of any spin or spit on the ball. But you're expected to know where the ball goes.

16. That's unfair. So is expecting ANY prediction of satellite impact point at this distance from impact.

17. WHY is predicting entry time so difficult? BECAUSE it is a NON-specified problem -- the two key parameters that determine the amount of drag (and hence DROP), are both HIGHLY VARIABLE throughout the duration of the descent.

18. And neither can be predicted in advance, or even measured in real time, to better than a factor of 2 to 5.

19. First factor: air thickness. As the spacecraft skims the upper reaches of the atmosphere, the density there is highly dependent on air temperature, mostly affected by solar activity. When bursts of charged particles hit these upper layers, they 'excite' air molecules causing them to bounce higher into space.

20. Think of a popcorn popper at full throttle, with the lid suddenly taken off. Get hit in the face with enough popcorn, you will slow down faster.

21. Second factor: Spacecraft orientation, resulting in slim or fat 'profile' facing 'into the wind'. If it flies narrow-end forward, drag is minimized. But if it turns sideways, drag can double or triple. And if it begins doing this out of radar range [99% of its orbital path] you'll never even know it has.

22. Wild card: Vehicle outgassing. With eleven tons of highly volatile chemicals in two dozen tanks, this vehicle is a 'flying bomb' that can spit out leaking fuel in any direction at any time now. It could randomly spray the sky, or if spinning around some axis, it could spray in one favored direction, pushing it off the predicted path.

23. So cut the satellite trackers a little slack.