

SANDRA
BULLOCK

GEORGE
CLOONEY



Realitat

Ficció

DON'T LET GO

FROM DIRECTOR ALFONSO CUARÓN

GRAVITY

WARNER BROS. PICTURES PRESENTS

AN ESPERANTO FILMOJ/HEYDAY FILMS PRODUCTION AN ALFONSO CUARÓN FILM SANDRA BULLOCK GEORGE CLOONEY "GRAVITY" MUSIC BY STEVEN PRICE COSTUME DESIGNER JANY TEMME VISUAL EFFECTS SUPERVISOR TIM WEBBER EDITORS ALFONSO CUARÓN MARK SANGER
PRODUCTION DESIGNER ANDY NICHOLSON DIRECTOR OF PHOTOGRAPHY EMMA WUCL LUBECKI, A.S.C., A.M.C. EXECUTIVE PRODUCERS CHRIS DE FARIA NIKKI PENNY STEPHEN JONES WRITTEN BY ALFONSO CUARÓN & JONAS CUARÓN PRODUCED BY ALFONSO CUARÓN DAVID HEYMANN DIRECTED BY ALFONSO CUARÓN

PG-13
PARENTS STRONGLY CAUTIONED
SOME MATERIAL MAY BE INAPPROPRIATE FOR CHILDREN UNDER 13

gravity-movie.com

SEE IT IN REAL D 3D AND IMAX 3D

10.4.13

WARNER BROS. PICTURES
A TIME WARNER COMPANY



Feel free to leave the room if you are not prepared.

Quick Synopsis of the Movie

- It all starts with a “classical” operation mission at the Hubble Telescope (STS-157).
- Then the crazy Russians make explode one of their satellites and create a cloud of debris.
- This cloud of debris creates a reaction chain impacting on different satellites, telecommunication satellites may be off. Danger for the ISS and Hubble Telescope.
- IMMEDIATE EVACUATION is required.
- To late, the Hubble and all its passenger get hit by the debris.

Quick Synopsis of the Movie

- It all starts with a “classical” operation mission at the Hubble Telescope (STS-157).
- Then the crazy Russians make explode one of their satellites and create a cloud of debris.
- This cloud of debris creates a reaction chain impacting on different satellites, telecommunication satellites may be off. Danger for the ISS and Hubble Telescope.
- IMMEDIATE EVACUATION is required.
- To late, the Hubble and all its passenger get hit by the debris.

The Adventure Begins !!

The Hubble Telescope

The Hubble telescope was launched in April 1997 and it has been working for more that 23 years.



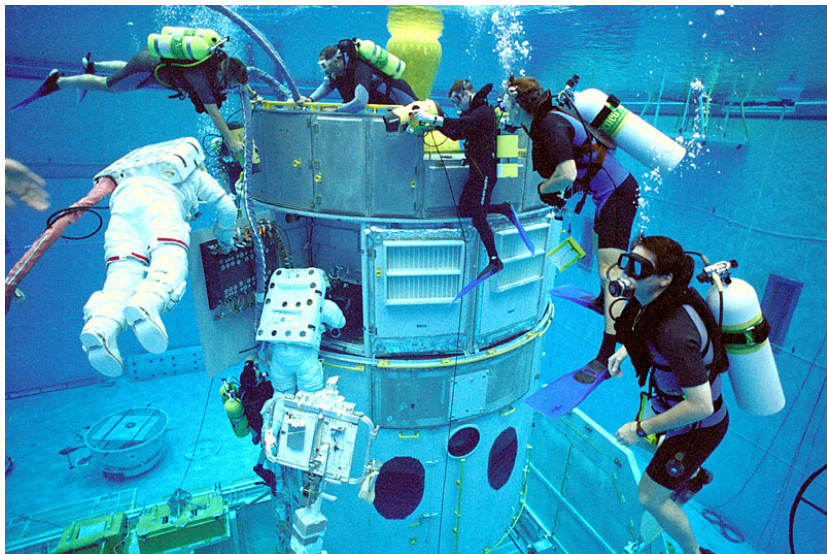
Orbital Parameters

- Almost Circular Orbit ($e \approx 0$)
- Height: ≈ 559 km
- Inclination: 28.5°
- Orbital Period: 96 – 97 min
(14 – 15 rev/day)
- Orbital Velocity: ≈ 7.5 km/s.

The Hubble Telescope

There have been only 5 Serving Missions to the Hubble Telescope (SM1 December 1993, SM2 February 1997, SM3A December 1999, SM3B March 2002, SM4 May 2009)





OMG (Oh My God!!)



Space Population



Space Population



The Iridium 33/Cosmos 2251 Case

Iridium 33/Cosmos 2251 Collision

Coverage started 2009 March 5

Updated 2012 June 22

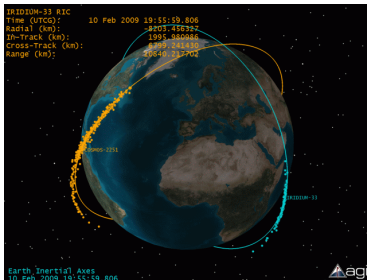
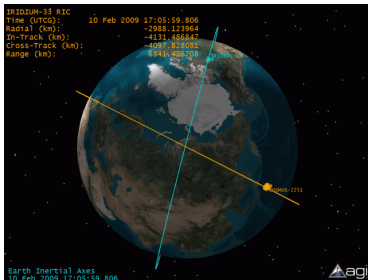
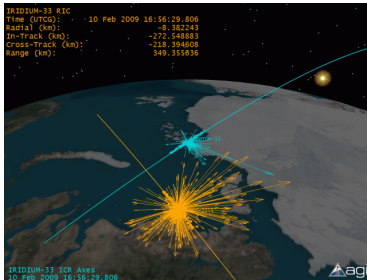
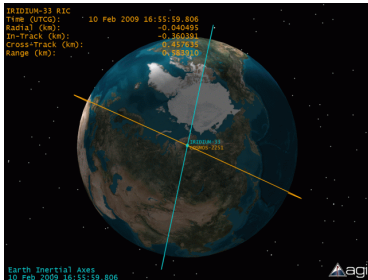
In the report issued on 2009 February 10 at 1502 UTC, [SOCRATES](#) predicted a close approach of 584 m between Iridium 33 and Cosmos 2251. This was not the top predicted close approach for that report or even the top predicted close approach for any of the Iridium satellites for the coming week. But, at the time of predicted close approach (1656 UTC), Iridium 33 suddenly went silent. The US Space Surveillance Network (SSN) subsequently reported that they were tracking debris clouds in both the Iridium 33 and Cosmos 2251 orbits, confirming a collision.

This is the first time two satellites are known to have collided on orbit. While Cosmos 2251, a Russian communications satellite, is thought to have ceased operations about two years after it was launched in 1993, Iridium 33 was part of the operational [Iridium constellation](#) of 66 satellites at the time of the collision.

As of 2012 June 22, the SSN has cataloged 598 pieces of debris (93 pieces of which have already decayed from orbit) associated with [Iridium 33](#) and 1,603 pieces of debris (222 pieces of which have decayed) associated with [Cosmos 2251](#). The materials below are provided to give a sense of the current relationship between the Iridium constellation and the resulting debris clouds.

Source: <http://www.celestrak.com/events/collision/>

The Iridium 33/Cosmos 2251 Case



The Iridium 33/Cosmos 2251 Case

Figure 1 shows the current Iridium constellation with the orbits for the operational satellites shown in green, the spares shown in blue, and the inactive satellites shown in red. The Iridium 33 debris is shown in light blue and the Cosmos 2251 debris is shown in orange. An AGI Viewer 9 file (see [bottom of this page](#) for more information on AGI Viewer 9) of the event is also available.

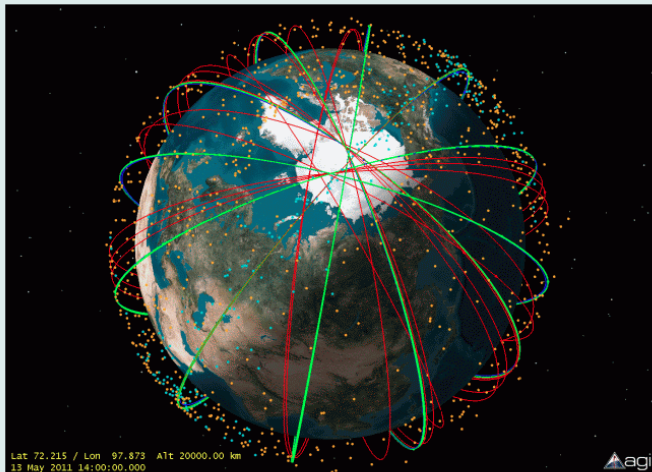


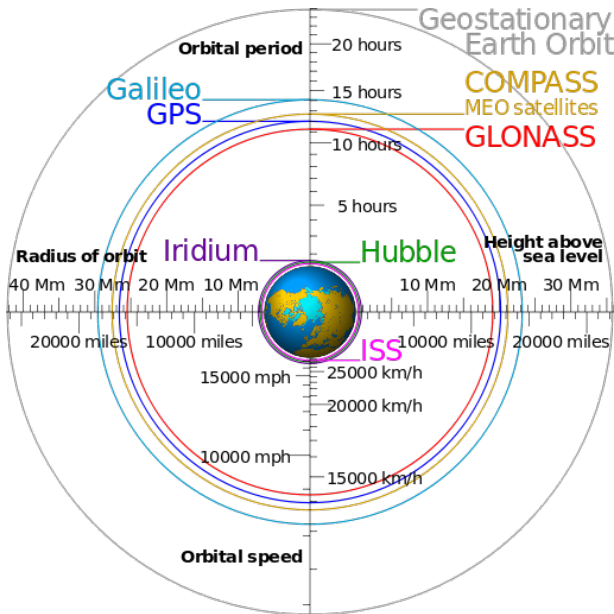
Figure 1. Screen shot from AGI Viewer 9 file of current Iridium constellation and collision debris clouds

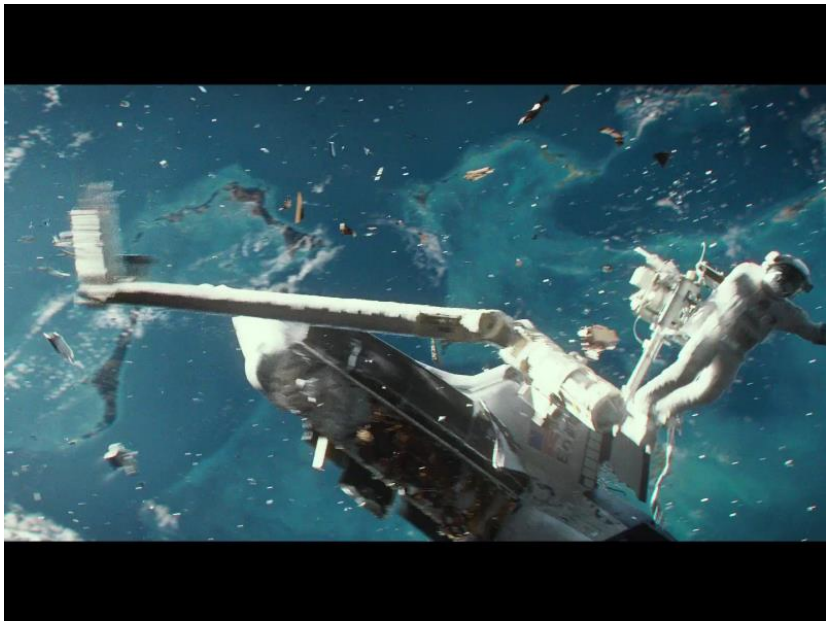
Is a reaction chain possible ?

- The **Kessler syndrome** (also called the Kessler effect, collisional cascading or ablation cascade), was proposed by the NASA scientist Donald J. Kessler in 1978.
- It is a scenario in which the density of objects in Low Earth Orbit (LEO) is high enough that collisions between objects could cause a cascade, each collision generating space debris which increases the probability of further collisions.
- One implication is that the distribution of debris in orbit could render space exploration, and even the use of satellites, unfeasible for many generations.

[[Watch Video Iridium_33_and_Cosmos_2251_Collision.mp4](#)]

[[Watch Video Dispersion.wmv](#)]







MovieHDWallpapers.com



Space Walks



Plan to go Home



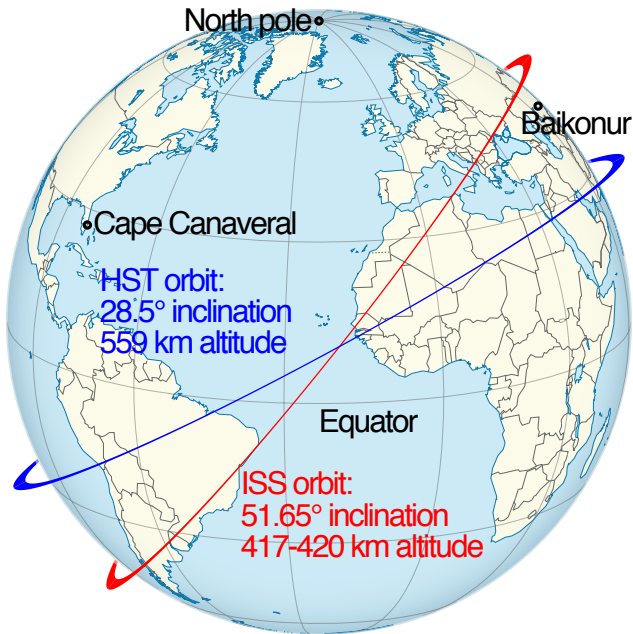
Orbital Parameters

- Almost Circular Orbit ($e \approx 0$)
- Height: ≈ 559 km
- Inclination: 28.5°
- Orbital Period: 96 – 97 min (14 – 15 rev/day)
- Orbital Velocity: ≈ 7.5 km/s.



Orbital Parameters

- Almost Circular Orbit ($e \approx 0.00046$)
- Height: ≈ 417 km
- Inclination: 51.65°
- Orbital Period: 92.92 min (15.49 rev/day)
- Orbital Velocity: ≈ 7.66 km/s.







No Parachute = No Landing !! What can we do ?

Lets go to Tiangong-1



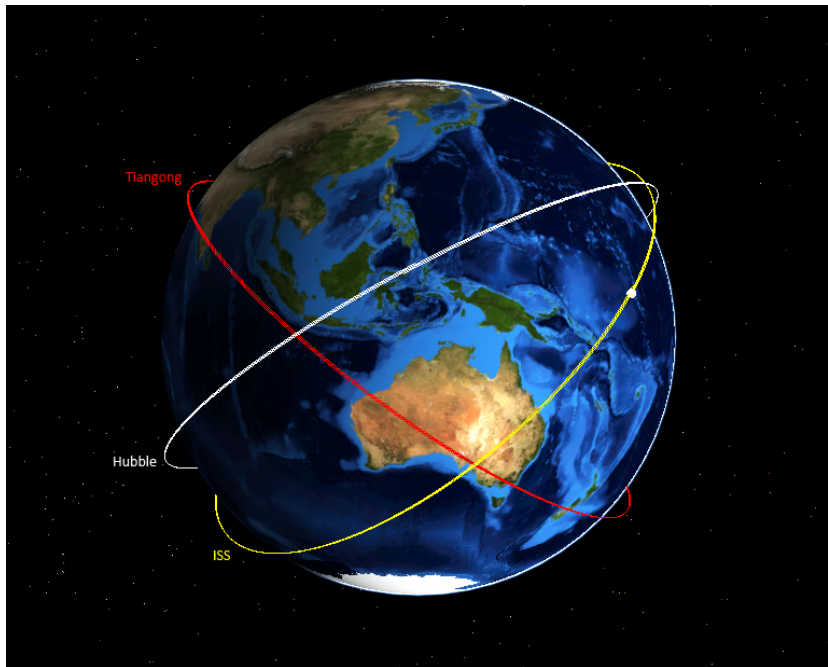
Orbital Parameters

- Almost Circular Orbit ($e \approx 0.00046$)
- Height: ≈ 417 km
- Inclination: 51.65°
- Orbital Period: 92.92 min (15.49 rev/day)
- Orbital Velocity: ≈ 7.66 km/s.



Orbital Parameters

- Almost Circular Orbit ($e \approx 0.00055$)
- Height: ≈ 359.5 km
- Inclination: 42.78°
- Orbital Period: 91.73 min (15.7 rev/day)
- Orbital Velocity: ≈ 7.5 km/s.



Orbital Manoeuvres

Summary of orbital Parameters:

- Hubble: altitude $\approx 555\text{km}$, orbital speed $\approx 7.70\text{km/s}$, inclination 28.47° .
- ISS: altitude $\approx 420\text{km}$, orbital speed $\approx 7.66\text{km/s}$, inclination 51.65° .
- Tiangong: altitude $\approx 350\text{km}$, orbital speed $\approx 7.58\text{km/s}$, inclination 47.77° .

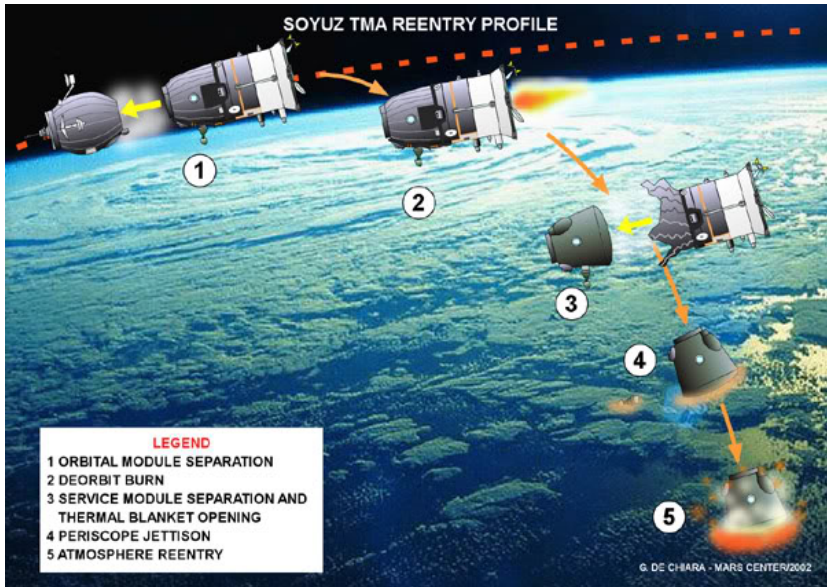
- Change in Amplitude:
 - Hubble to ISS: $\Delta v \approx 37.42\text{m/s}$ (each manoeuvre).
 - ISS to Tiangong: $\Delta v \approx 19.87\text{m/s}$ (each manoeuvre).
- Change in Inclination:
 - Hubble to ISS: $\Delta v \approx 3.09\text{km/s}$.
 - ISS to Tiangong: $\Delta v \approx 0.52\text{km/s}$.
- MMU: $\Delta v \approx 24.4\text{m/s}$.
- Soyuz: $\Delta v \approx 250\text{m/s}$ (usually manoeuvres of max. 30m/s are done).

Source:

<http://sattrackcam.blogspot.com.es/2013/10/a-space-buff-watches-gravity.html>



SOYUZ TMA REENTRY PROFILE



GRAVITY

científicamente correcta

La Estación Espacial Internacional está 200 km abajo de nosotros, en otra órbita y viaja a 28000 km/h.



Estamos muertos.



FIN

CINISMOILUSTRADO.COM