

# Mysterious Comet from Coorg

K V Sankaranarayanan

@kvsankar

<http://gplus.to/kvsankar>

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**Keemale Estate**  
**12.2125 N, 75.7097 E**

**8th February, 2013**

**Subhankar, Sragdhara, and Sankar**

A

*This map is from Google.  
Map data © Google 2013.*



*Image credit: Sankar K V*



Image credit: Sankar K V



*Image credit: Sankar K V*



4:00 a.m.

Night sky snapshot taken using Stellarium  
<http://www.stellarium.org/>  
Some content may be copyrighted





# A Comet!

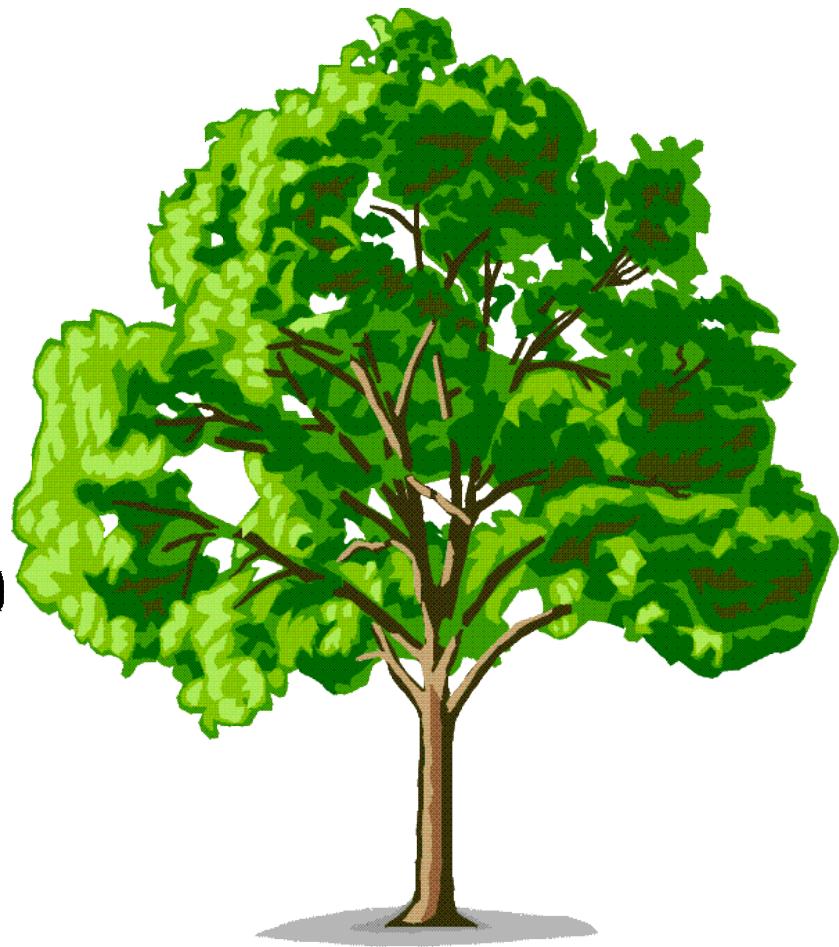
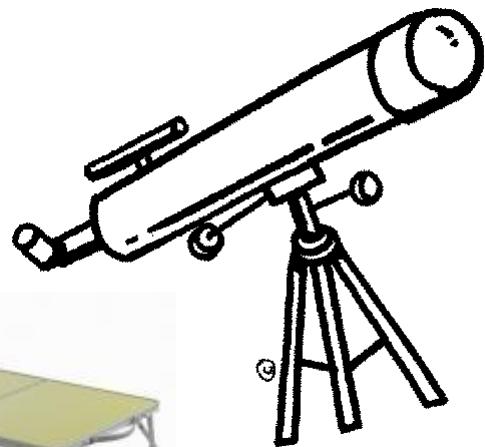
# Not Our Image!

*Image credit Observatoire de Haute, Provence, France*

<http://apod.nasa.gov/apod/ap950826.html>

Created and copyrighted in 1995 by [Robert Nemiroff](#) and [Jerry Bonnell](#).









Canon EOS 60D  
Manfrotto 055XPROB  
498RC4 Ball Head  
70-200 @ 85 mm  
F2.8  
20 seconds  
ISO 1600  
FoV 10° x 15°  
4:40 a.m.

4:46:00 a.m.

4:46:30 a.m.

4:47:00 a.m.

4:47:30 a.m.

# Was that a comet?

Was that a  
comet fragment?

Was that an ISS  
waste dump?

# Space station dumping rubbish over us

MICHAEL FIELD



Last updated 10:08 17/11/2011



Nasa

INCINERATION: The reentry plasma trail of the ISS Progress 42P supply vehicle.

US space agency Nasa has revealed how the International Space Station (ISS) deals with its trash - it throws it out over New Zealand.

Content from <http://www.stuff.co.nz/science/5983523/Space-station-dumping-rubbish-over-us>

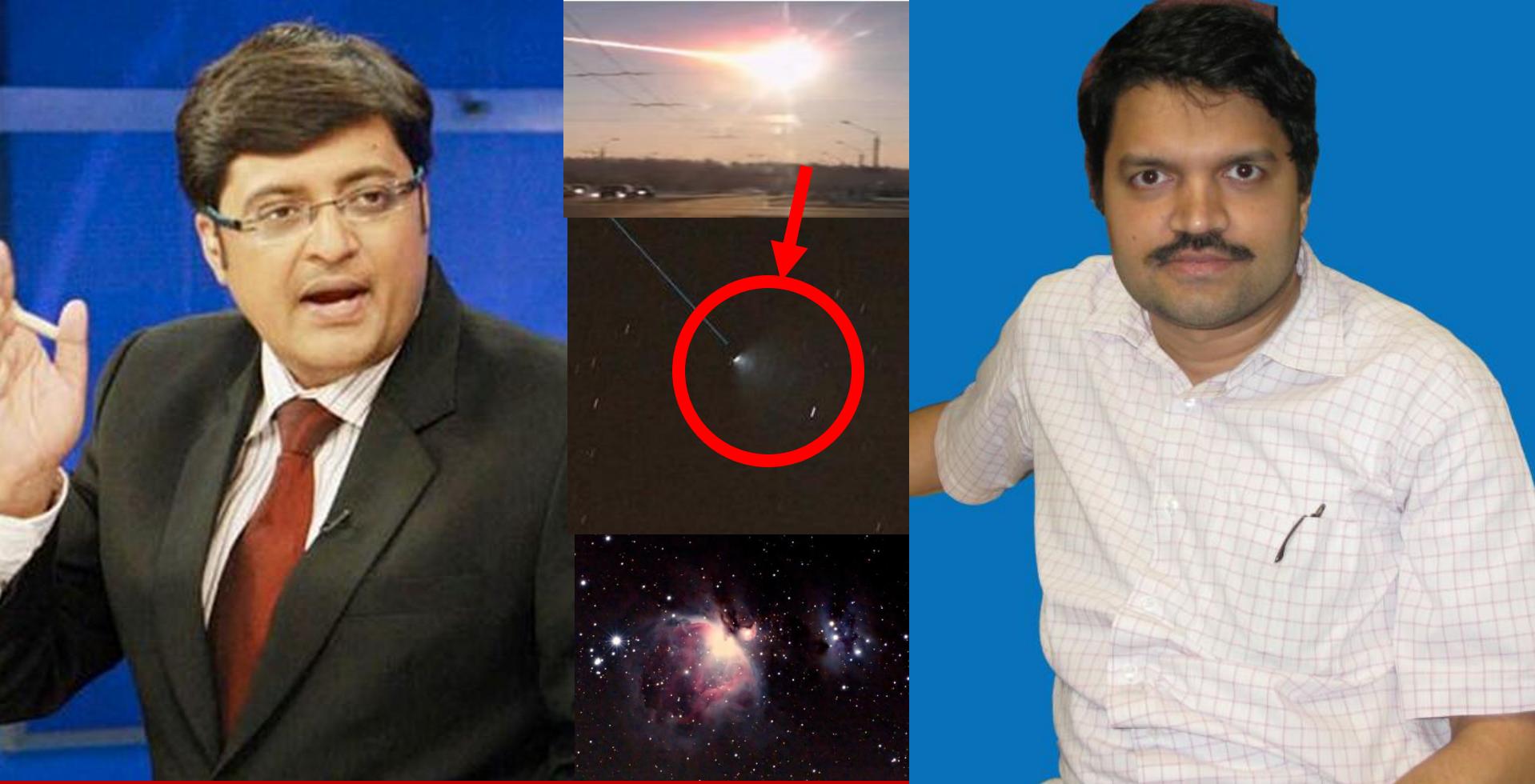
Was that a stray  
asteroid fragment  
coming Earth's way  
picking up some water?

Again, was that  
a comet really?

Person of the Year

**TIME**





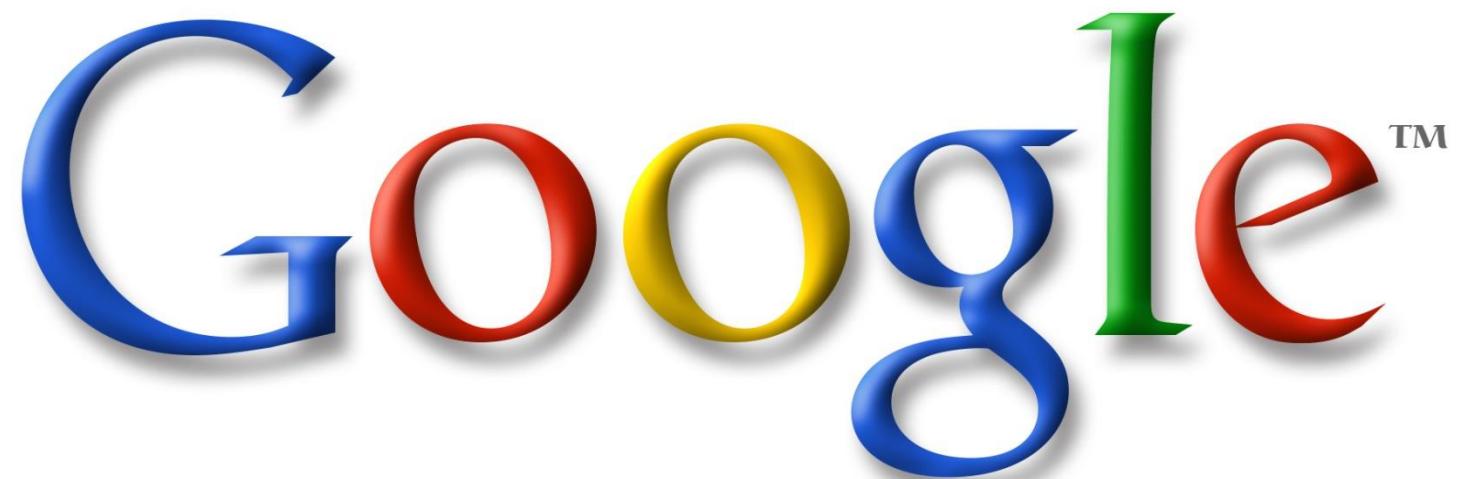
[www.timesnow.tv](http://www.timesnow.tv)



Bangalore Techie  
Discovers Comet



9<sup>th</sup> February, 2013

The Google logo is displayed prominently in the center of the slide. It consists of the word "Google" in a bold, sans-serif font. Each letter is a different color: the 'G' is blue, the first 'o' is red, the second 'o' is yellow, the 'g' is blue, the 'l' is green, and the 'e' is red. A small "TM" symbol is located at the top right of the 'e'. The letters have a slight 3D effect with shadows.





*Image credit: Kiran Tikare, BAS*

It's 11<sup>th</sup> February  
We are back in Bangalore  
And **no** news about any comet!



*Image sourced from <http://johnniecraig.files.wordpress.com/2010/07/sherlock-jeremy-brett.jpg>*

Again, was that  
an ISS waste dump?



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# International Space Station



### Latest News



#### Antares Test Launch Successful

The Antares rocket launched successfully on its maiden test flight from Wallops Flight Facility in Virginia at 5 p.m. EDT Sunday.

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01 02 03 04 05 06 07 08 II

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### Who's on the Station Now?

Current

Future

Past



#### Expedition 35

March 2013 - Sept. 2013

- Roman Romanenko
- Chris Hadfield (Commander)
- Tom Marshburn
- Alexander Misurkin
- Pavel Vinogradov
- Chris Cassidy



# Mike Massimino



@Astro\_Mike

NASA astronaut, mission specialist for STS-125

Houston, TX ·

[http://www.nasa.gov/mission\\_pages/shuttle/shuttlemissions/hst\\_sm4/index.html](http://www.nasa.gov/mission_pages/shuttle/shuttlemissions/hst_sm4/index.html)

1,094

TWEETS

29

FOLLOWING

1,260,876

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### Latest News



#### Antares Test Launch Successful

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### Who's on the Station Now?

Current Future Past



March 2013 - Sept. 2013

- ▶ Roman Romanenko
- ▶ Chris Hadfield (Commander)
- ▶ Tom Marshburn
- ▶ Alexander Misurkin
- ▶ Pavel Vinogradov
- ▶ Chris Cassidy



Chris Hadfield



@Cmdr\_Hadfield

Canadian Astronaut, currently living in space aboard ISS as Commander  
of Expedition 35.

Orbiting Earth on ISS · <http://www.asc-csa.gc.ca/eng/default.asp>

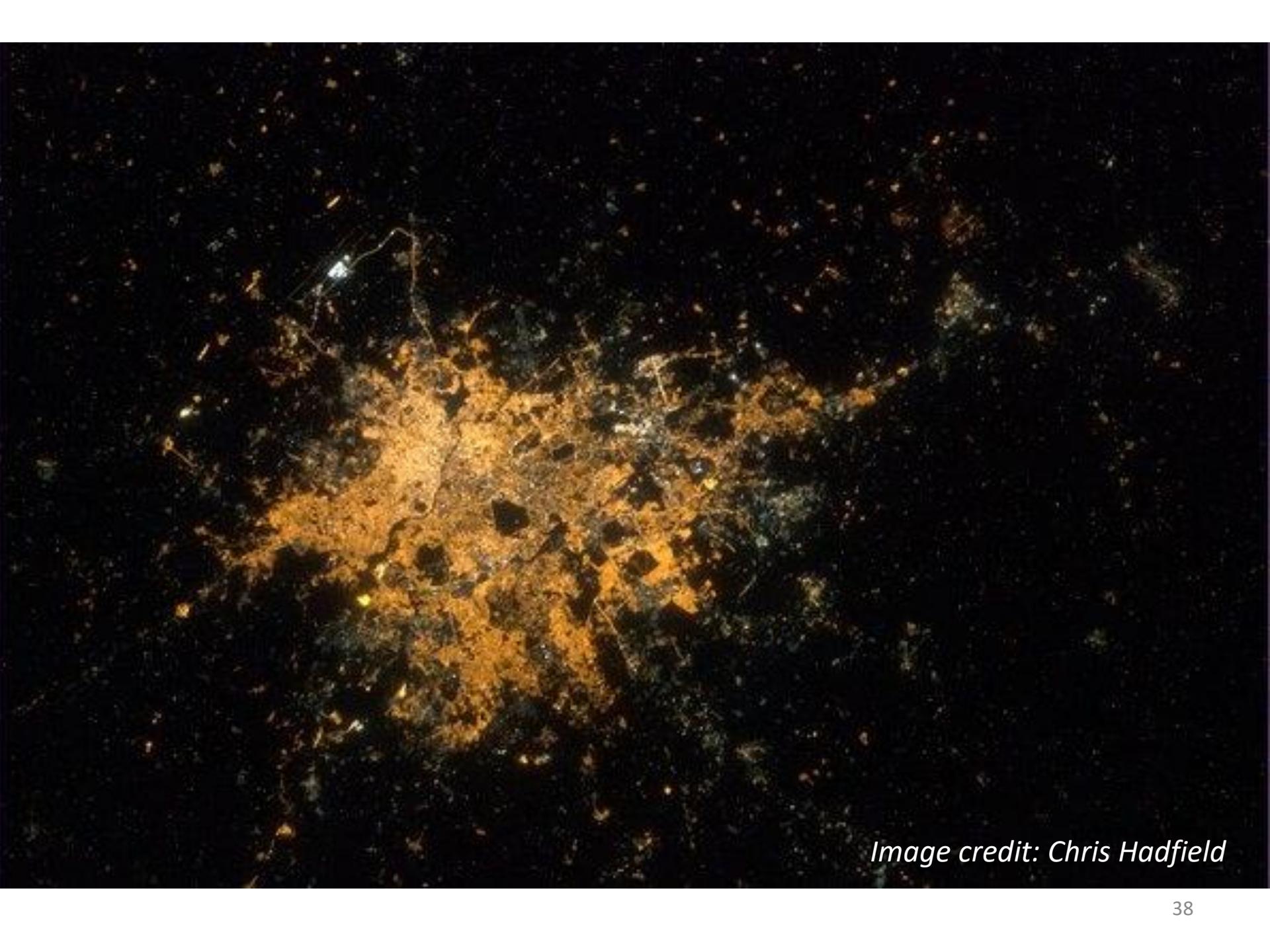
4,658  
TWEETS

43  
FOLLOWING

719,338  
FOLLOWERS



Following



*Image credit: Chris Hadfield*



Sankaranarayanan KV @kvsankar

11 Feb

@Cmdr\_Hadfield Was there a waste dump from the ISS around 2013-02-07 21:30:00Z? I could see a comet like object from Coorg in south India.

[Collapse](#) [Reply](#) [Delete](#) [★ Favorite](#) [••• More](#)

1:28 PM - 11 Feb 13 · Details

[Reply to @Cmdr\\_Hadfield](#)



Chris Hadfield



@Cmdr\_Hadfield



Following

We just undocked a spaceship from our Space Station. The Progress robot ship is loaded with trash, to burn up like a meteorite in 3.5 hrs.



Reply



Retweet



Favorite



More

219

RETWEETS

112

FAVORITES



7:02 PM - 9 Feb 13



*Image credit: NASA*

 SeeSat-L Home Page 

www.satobs.org/seesat/seesatindex.html

ABP      

# SeeSat-L Home Page

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- [Introduction](#)
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- [SeeSat-L Subscribe/Unsubscribe Information](#)
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- [Frequently Asked Questions \(FAQ\)](#)
- [SeeSat-L Members Page](#)
- [Visual Satellite Observers Home Page](#)

## Introduction

SeeSat-L is the mailing list for visual satellite observers. It was created in December 1994 by Walter Nissen and Bart De Pontieu. Since July 2002, it has been maintained by [Ted Molczan](#).

Thanks to the diverse interests of its participants, SeeSat-L has become an almost indispensable tool for the satellite observer, providing him/her with :

- reports of exceptional observations, such as [piloted spacecraft in close proximity](#), [rocket burns](#), [propellant dumps](#), [space shuttle water dumps](#), [re-entries](#), [Iridium Flares](#), [tethered satellites](#), etc...
- the place to share [satellite position](#) and [flash timing](#) observations
- assistance in [identifying unknown satellites](#)
- discussions about [observing techniques](#), [prediction software](#), [estimating orbital elements](#), etc...
- orbital elements of [recent launches](#), [spy satellites](#), and many others
- [trajectory](#) and [orbital elements](#) of upcoming launches
- [re-entry predictions](#) of decaying satellites
- updates of the flash period program of the [Belgian Working Group Satellites](#)
- and much more.

No location

No star  
names

Balloon

Something  
on Earth

How fast  
was it moving?

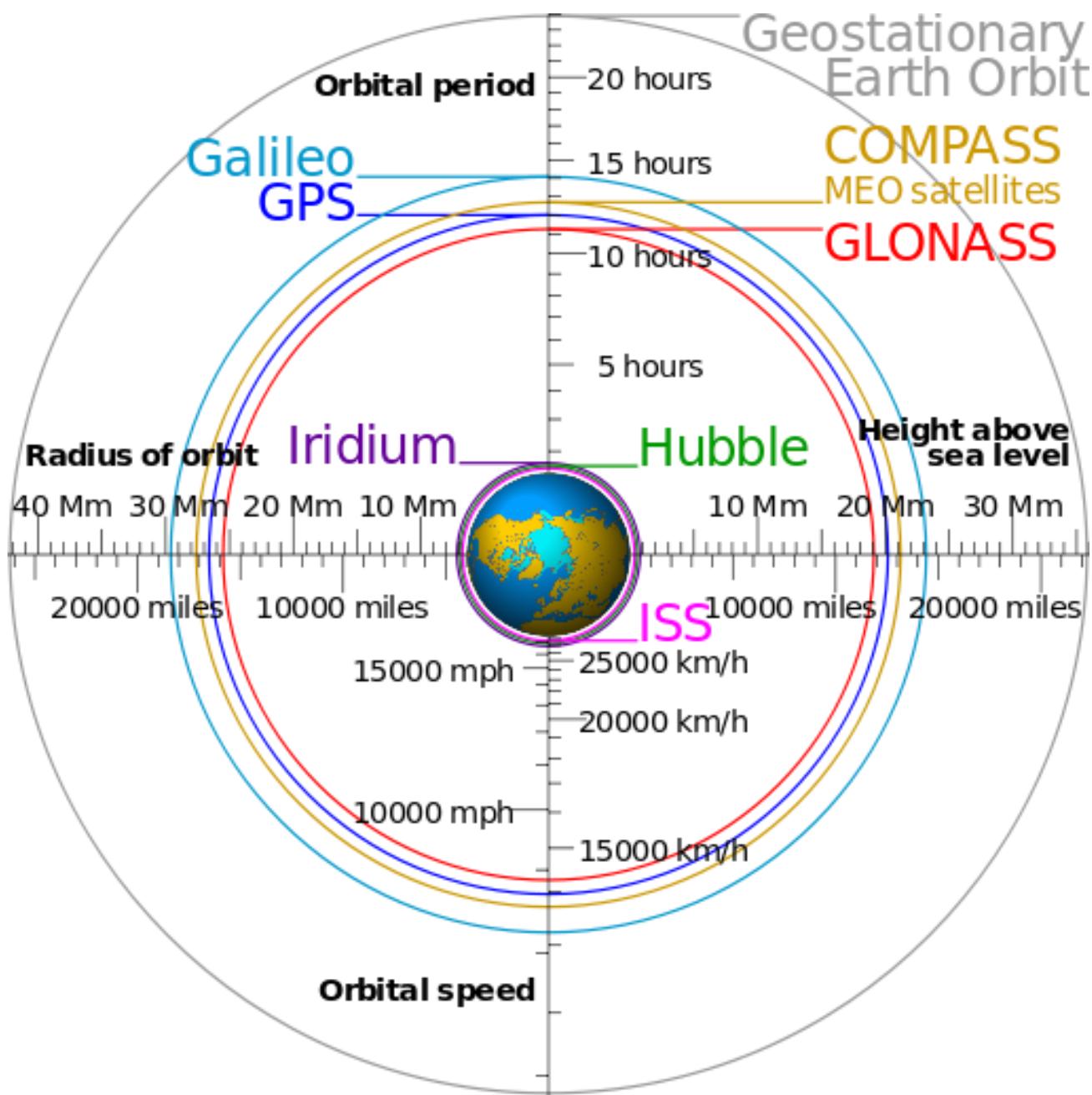


Image credit: [http://en.wikipedia.org/wiki/Medium\\_Earth\\_orbit](http://en.wikipedia.org/wiki/Medium_Earth_orbit)

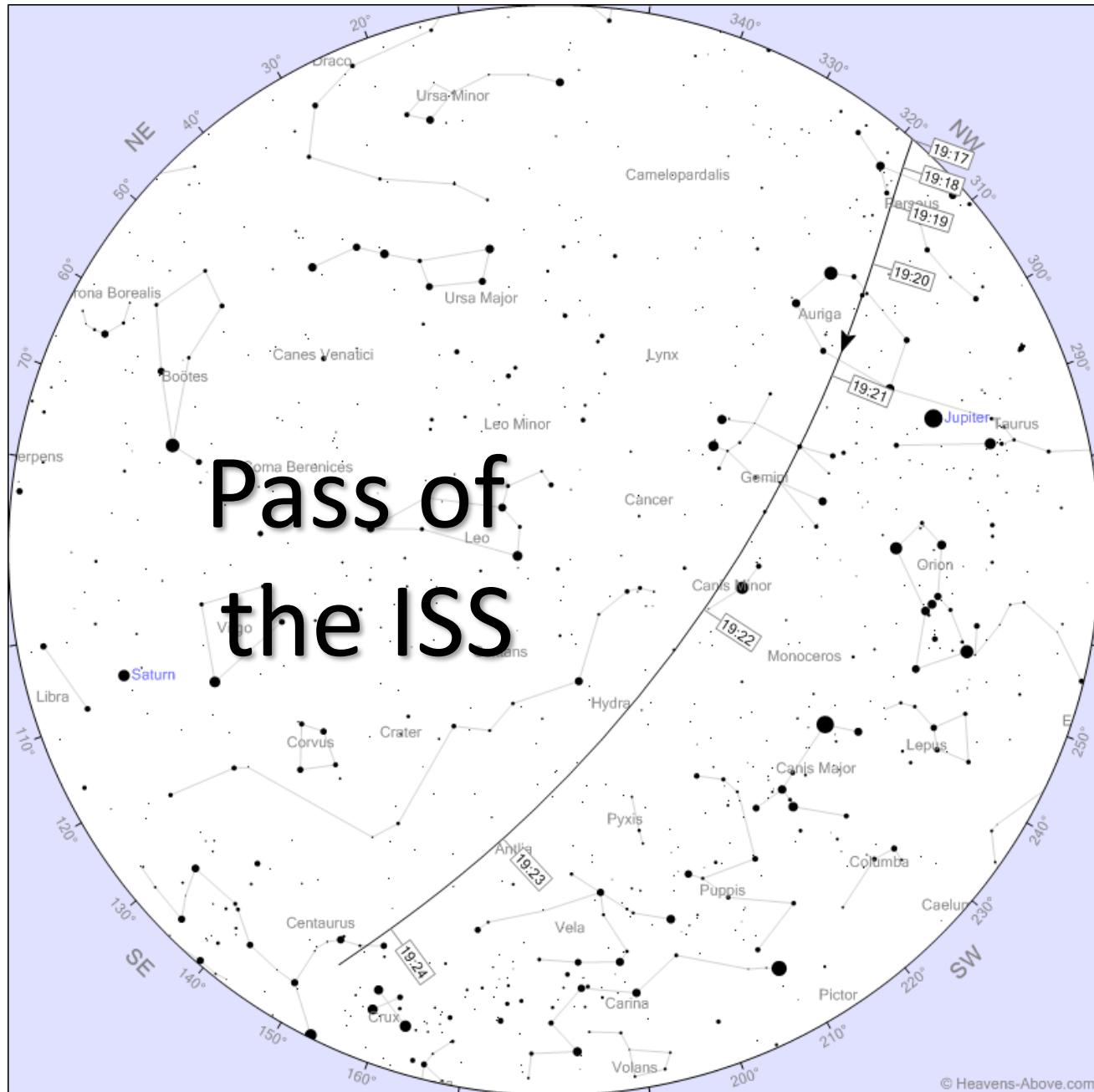
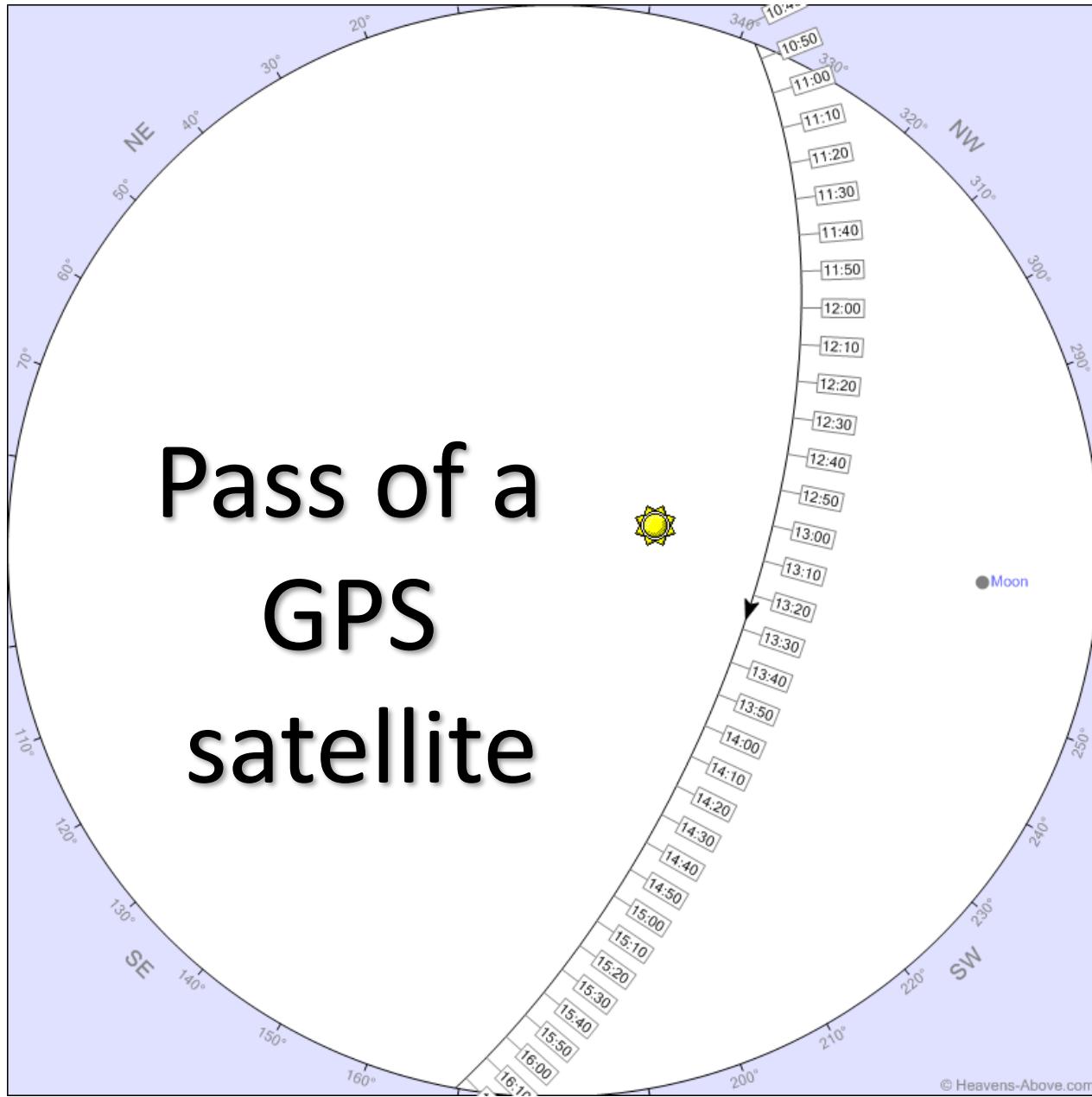
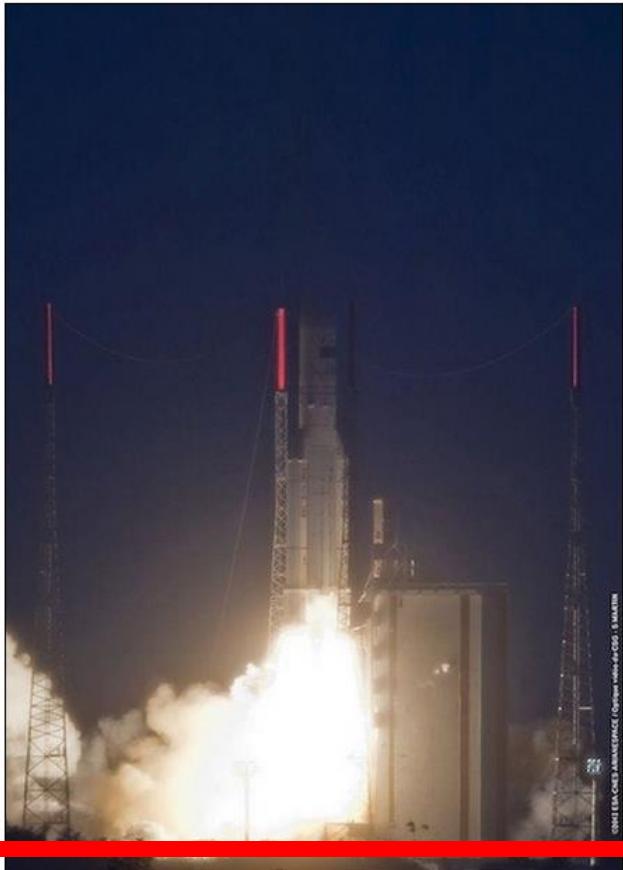


Image credit: <http://www.Heavens-Above.com>



*Image credit: <http://www.Heavens-Above.com>*

Riding together inside the nose cone of an Ariane 5 rocket, Azerbaijan's first satellite and a Spanish-owned spacecraft to beam television and Internet services to Latin America launched into orbit Thursday from Europe's spaceport in French Guiana.



Liftoff of the Ariane 5 rocket occurred at 2136 GMT (4:36 p.m. EST; 6:36 p.m. local time) from French Guiana. Credit: Arianespace/CNES/ESA

The satellites blasted off at 2136 GMT (4:36 p.m. EST) from the Guiana Space Center, a European-run launch base on the northeast coast of South America.

3:06 a.m. IST

Source: <http://www.spaceflightnow.com/ariane/va212/130207launch/>

Excess fuel dump from cryogenic stage

Primarily liquid Hydrogen and liquid Oxygen

Dumped so that it can explode later and leave debris in orbit (rather than on Earth)

Ice and Lyman-Alpha fluorescence of  
Hydrogen

# Calculations from Ted Molczan

TIME	AZ	EL	R.A.	DEC	VANG	RANGE	ALT
22:12:48	201	39	11:07:03	-35:03:08	0.11	3990	3029
22:13:54	194	42	11:39:50	-34:02:51	0.10	4168	3301
22:15:06	186	45	12:11:08	-32:39:58	0.09	4405	3602
22:16:27	177	47	12:41:09	-30:57:40	0.08	4713	3943
22:17:59	168	48	13:09:31	-29:01:24	0.07	5101	4335
22:19:47	159	48	13:36:39	-26:53:59	0.06	5592	4797
22:21:56	151	47	14:02:33	-24:39:55	0.05	6209	5350
22:24:34	143	46	14:27:29	-22:22:31	0.04	6984	6026
22:27:51	135	45	14:51:33	-20:05:40	0.03	7957	6862
22:32:01	129	43	15:14:56	-17:52:39	0.02	9174	7906
22:37:24	123	40	15:37:51	-15:45:53	0.02	10692	9218
22:44:26	119	38	16:00:28	-13:47:35	0.01	12563	10865
22:53:42	115	36	16:22:56	-11:58:57	0.01	14839	12913
23:05:56	112	34	16:45:20	-10:20:30	0.01	17542	15414
23:22:02	110	34	17:07:44	-08:51:57	0.01	20657	18381
23:43:01	108	34	17:30:11	-07:32:29	0.00	24099	21764
00:09:51	107	35	17:52:39	-06:21:06	0.00	27685	25409
00:43:15	107	38	18:15:07	-05:16:37	0.00	31124	29038
01:23:17	108	43	18:37:35	-04:17:58	0.00	34031	32254
02:09:03	110	48	19:00:03	-03:24:15	0.00	35997	34603
02:58:29	113	55	19:22:38	-02:34:51	0.00	36693	35687

*Time = UTC, beginning on 2013 Feb 07*  
*AZ = azimuth, degrees clockwise from north*  
*EL = elevation above horizon, deg*  
*R.A., Dec are 2000.0 celestial coordinates*  
*VANG = angular velocity, deg/s*  
*Range = distance from observer, km*  
*Alt = altitude above geoid, km*

Main cryogenic stage  
engine shutdown (H2)  
and separation



Upper  
stage  
ignition



Upper  
stage  
shutdown  
(H3)

Fairing jettisoning (FJ)

SRB flame-out (H1) and separation



Main cryogenic stage engine ignition (H0+1s)  
SRB ignition and lift-off





#1 Amazonas-3 for  
Spanish operator  
Hispasat

#2 Azerspace/Africasat-  
1a for the Azerbaijani  
operator Azercosmos  
OJSC and the Azerbaijan  
Ministry of  
Communications and  
Information  
Technologies



## Ariane 5

**User's Manual  
Issue 5 Revision 1  
July 2011**

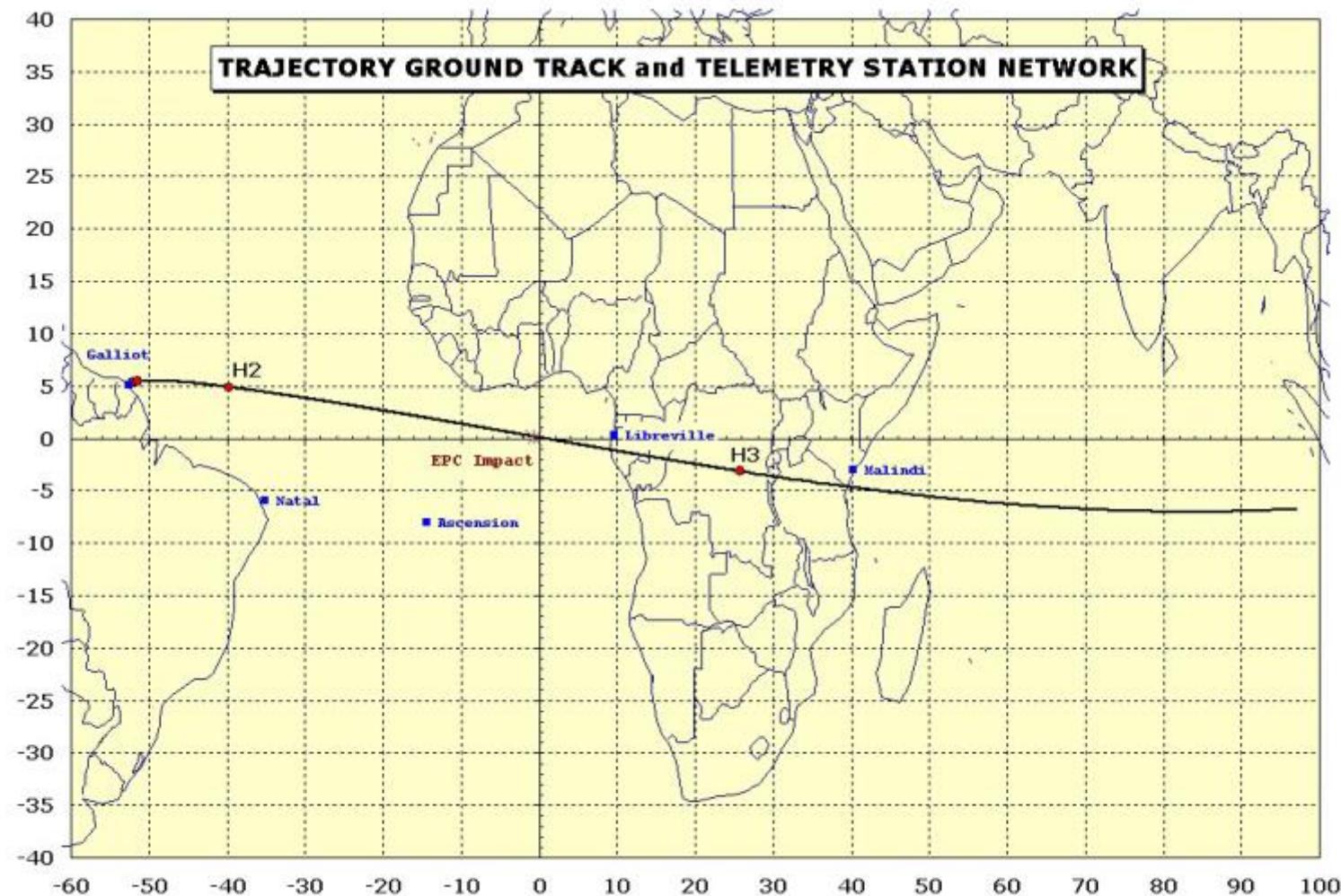
**Issued and approved by ArianeSpace**

**Edouard PEREZ  
Senior Vice President Engineering**



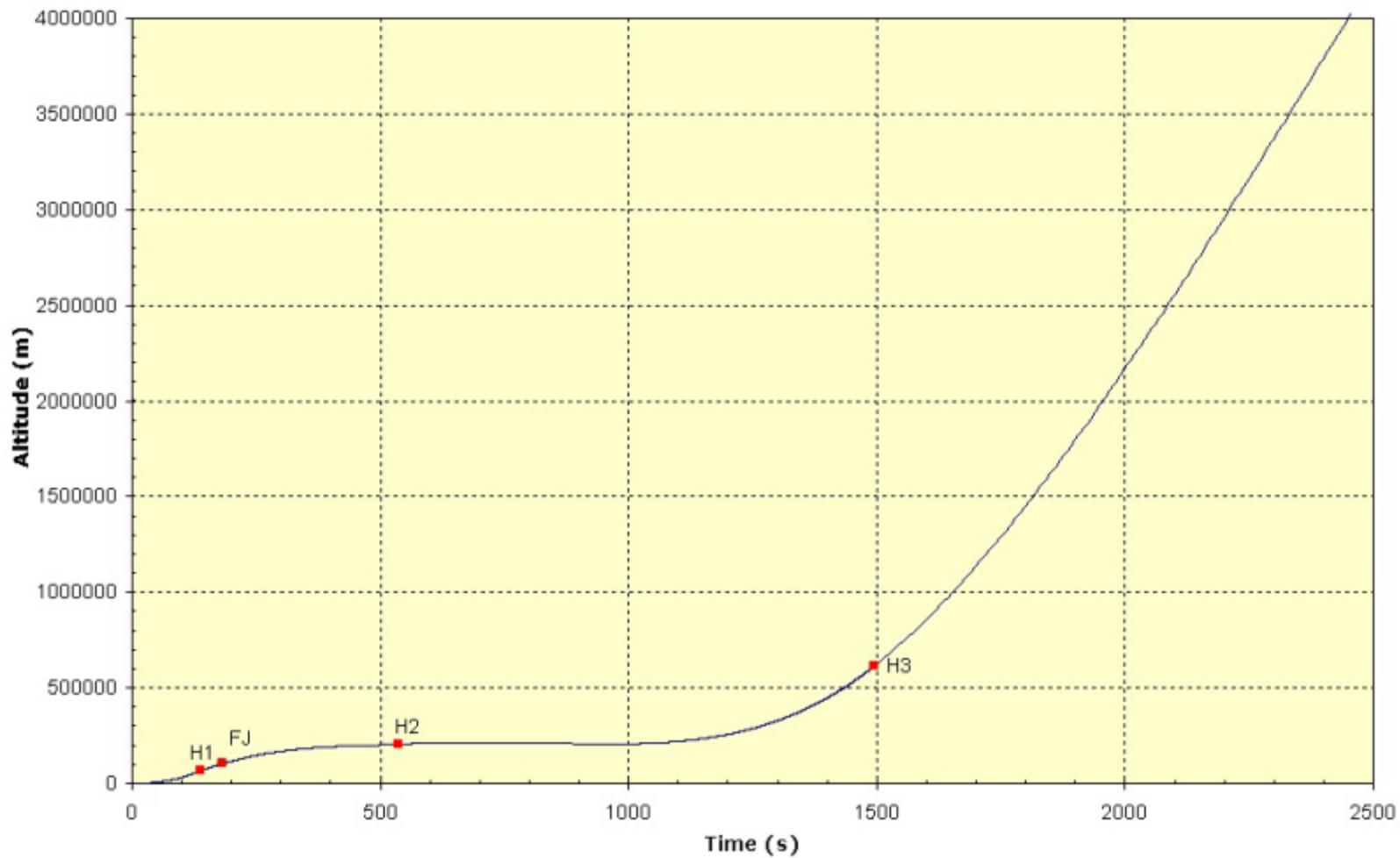
# Ariane 5 User's Manual

[http://www.arianespace.com/launch-services-ariane5/Ariane5\\_users\\_manual\\_Issue5\\_July2011.pdf](http://www.arianespace.com/launch-services-ariane5/Ariane5_users_manual_Issue5_July2011.pdf)



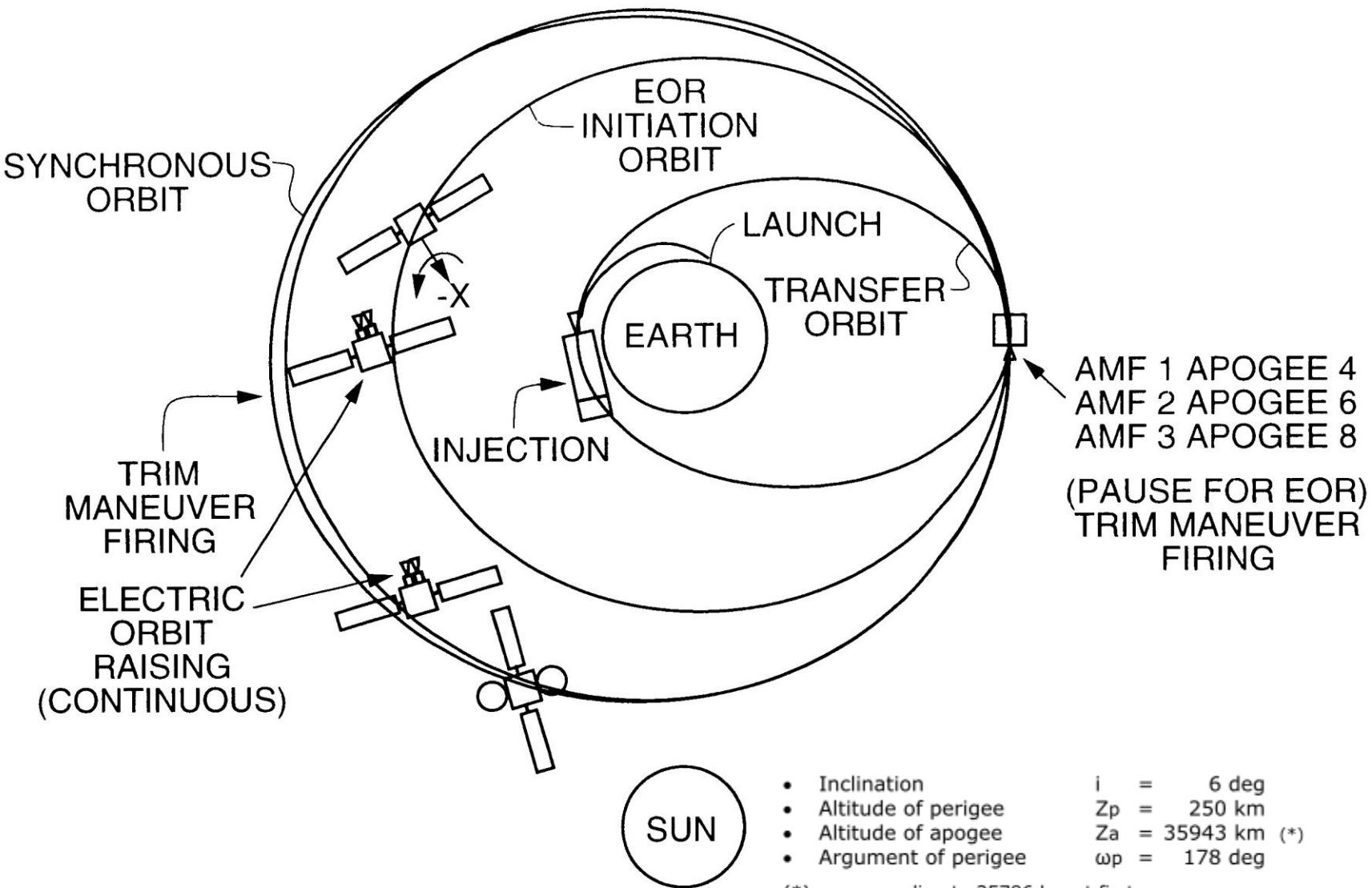
**Figure 2.3.b – Ariane 5 typical GTO - Ground track**

[http://www.arianespace.com/launch-services-ariane5/Ariane5\\_users\\_manual\\_Issue5\\_July2011.pdf](http://www.arianespace.com/launch-services-ariane5/Ariane5_users_manual_Issue5_July2011.pdf)



**Figure 2.3.c – Ariane 5 typical GTO – Altitude**

[http://www.arianespace.com/launch-services-ariane5/Ariane5\\_users\\_manual\\_Issue5\\_July2011.pdf](http://www.arianespace.com/launch-services-ariane5/Ariane5_users_manual_Issue5_July2011.pdf)



- Inclination  $i = 6 \text{ deg}$
- Altitude of perigee  $Z_p = 250 \text{ km}$
- Altitude of apogee  $Z_a = 35943 \text{ km} (*)$
- Argument of perigee  $\omega_p = 178 \text{ deg}$

(\*) corresponding to 35786 km at first apogee

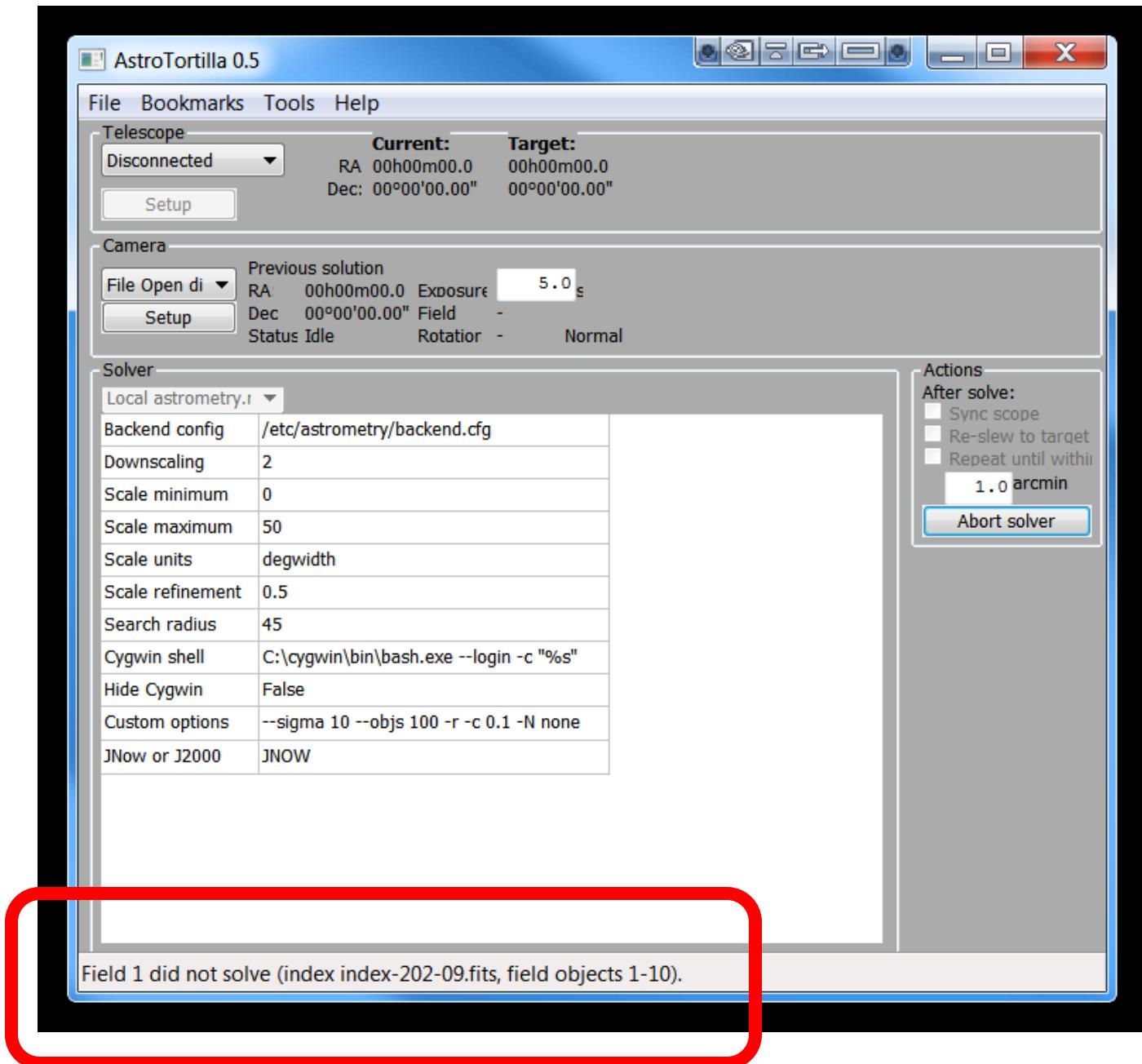
Injection is defined as the end of the upper stage shutdown.

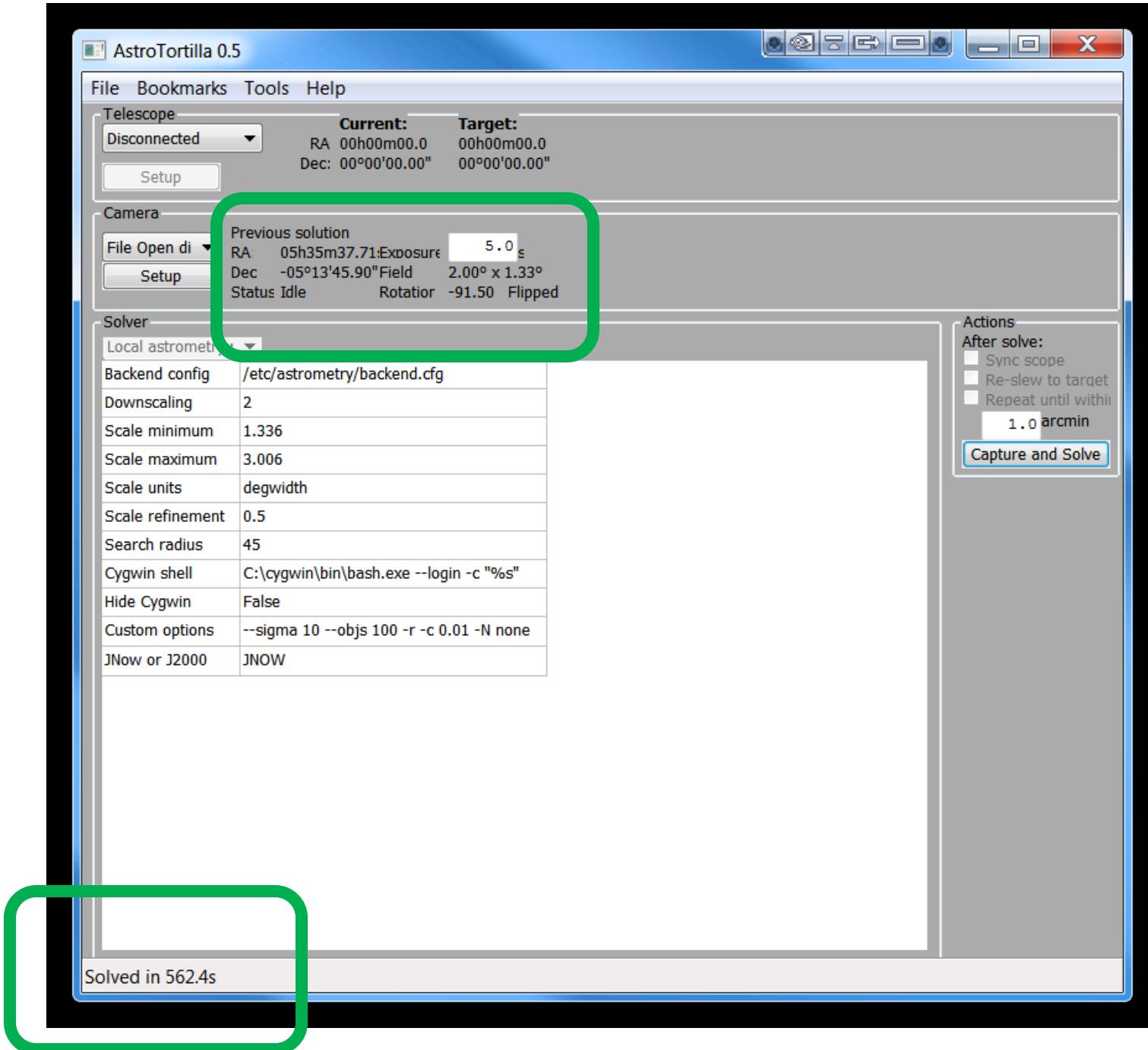
Image sourced from <http://www.freepatentsonline.com/6543723.html>

We still need to verify  
the observed object  
locations  
with the rocket orbit

Where exactly did we see  
the “comet”?

Find the co-ordinates  
using astrometry







*Image credit: Sankar K V*

# Make a Visual Comparison

Download the Rocket's Orbital Parameters

Load Them Into *Stellarium*

Get a Plot

Compare with Photographs

# Orbit Parameters

2013-006A

1	39078U	13006A	13039.56557547	-.00000178	00000-0	00000+0	0	51
2	39078	6.3698	286.7526	7281285	181.3468	174.0478	2.27433850	17

2013-006B

1	39079U	13006B	13039.52616458	-.00000182	00000-0	00000+0	0	38
2	39079	6.0333	289.7335	7279565	178.3320	142.3887	2.27719725	02

2013-006C

1	39080U	13006C	13039.57920560	-.00000179	00000-0	00000+0	0	44
2	39080	6.0254	289.6345	7275216	178.4634	186.7530	2.28067959	18

# Some TLE Sources

<https://www.space-track.org/>

<http://www.calsky.com/>

*<http://celesttrak.com/NORAD/documentation/tle-fmt.asp>*

*<http://www.satobs.org/element.html>*

4:37 AM IST



2013-006A, B, and C are all close by

4:46 AM IST



2013-006A, B, and C are all close by

5:14 AM IST



2013-006A, B, and C are all close by

5:28 AM



?



Case Closed!

*Image sourced from <http://jasobrecht.com/sherlock-holmes-favorite-music/>*

What does this story tell us?

# #1 Be ready for surprises!

# #2 Know your equipment well

# #3 Keep binoculars handy!

# #4 Research, research, research

Dig breadth-wise and depth-wise

# #5 Don't give up!

The satisfaction and  
pleasure is indescribable

A dark, nighttime landscape featuring silhouetted tree branches in the foreground and middle ground. A small, bright crescent moon is visible in the dark sky above the horizon.

Thank You!