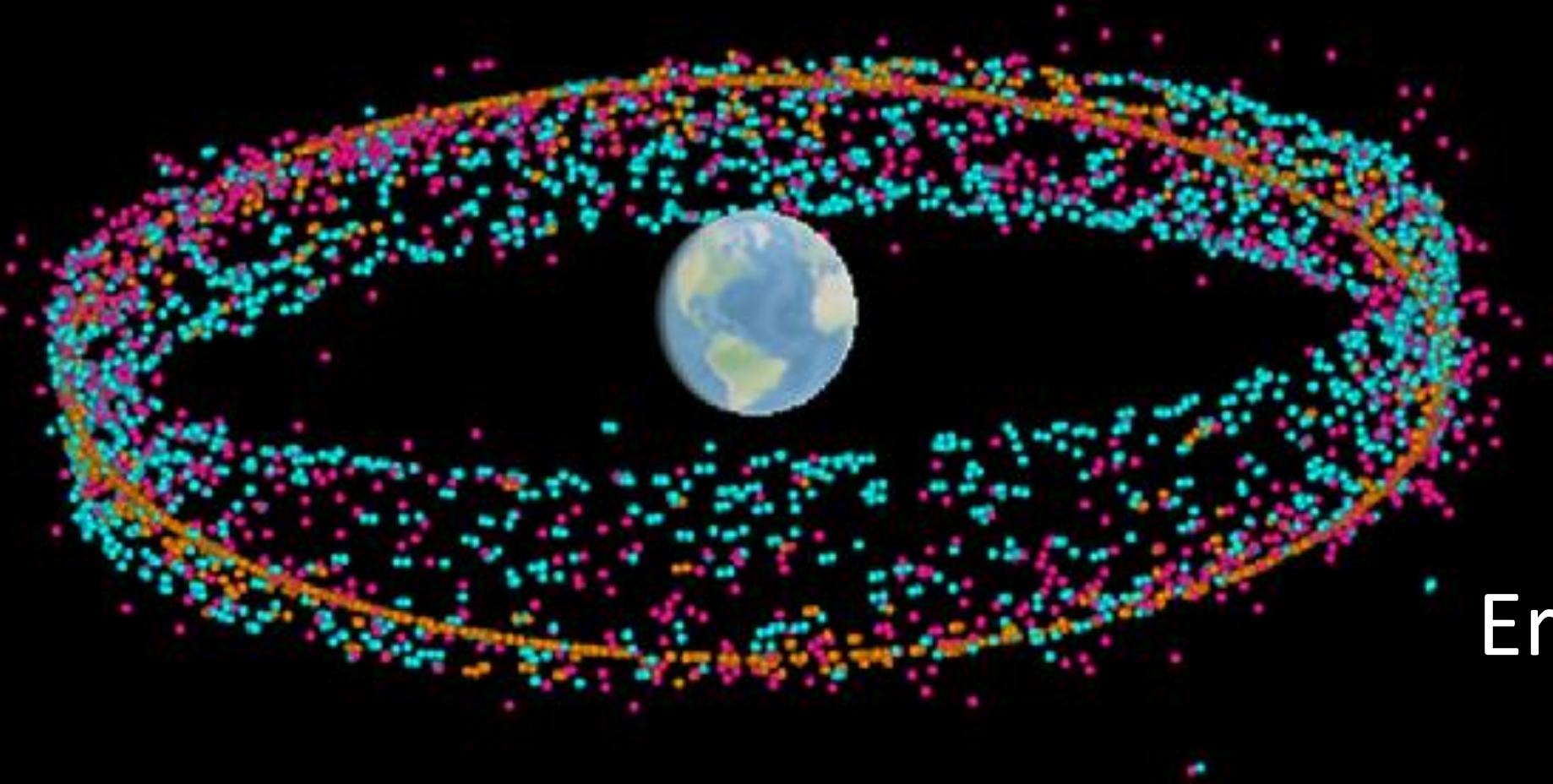


# SDA among different SSA service providers: GEO perspective



Erika Rossetto

June, 2024



# Current Organization

## Chairman

**Joe Chan**  
intelsat



**Alex Cacioni**  
Inmarsat



**Charles Law**  
SES



**David Zamora**  
Eutelsat



## Executive directors

**Lorenzo Arona**  
Avanti



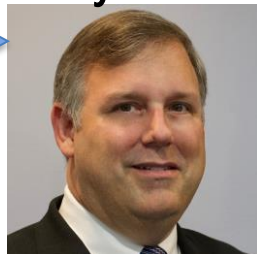
**Erika Rossetto**  
Claro



All SDA directors work with satellite operations

We have a great technical, legal and administrative Team

**Andrew D'Uva**  
Strategy and Policy Advisor



**Robert Hall**  
SDC Operations Manager



**Dan Oltrogge**  
SDC Program Manager



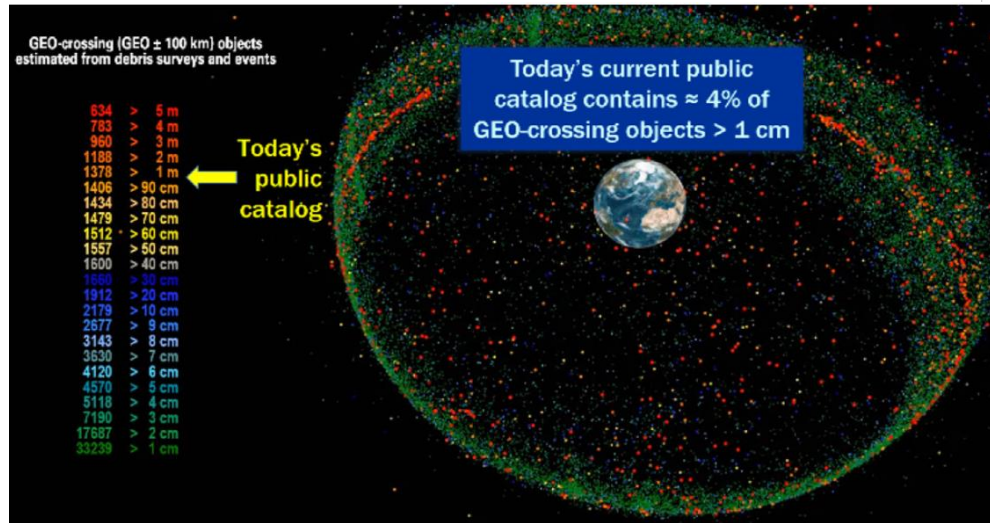
Marketing, social media and administrative support



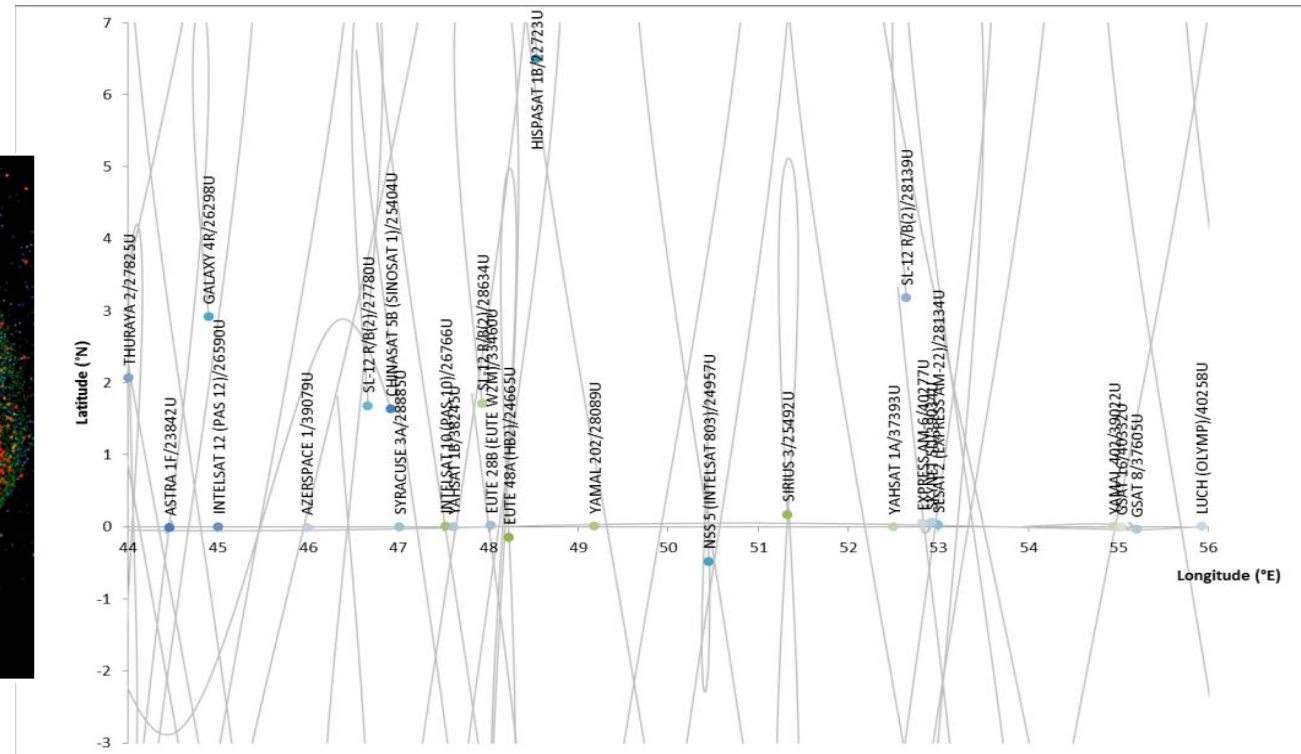


565 active GEO satellite ↔ 253 are providing data to SDA;  
1227 objects catalogued in GEO

Even after reorbit, defunct satellites cross the GEO belt periodically



Source: D.L.Oltrogge et al. at [Acta Astronautica Volume 147](#), June 2018, Pages 316-345

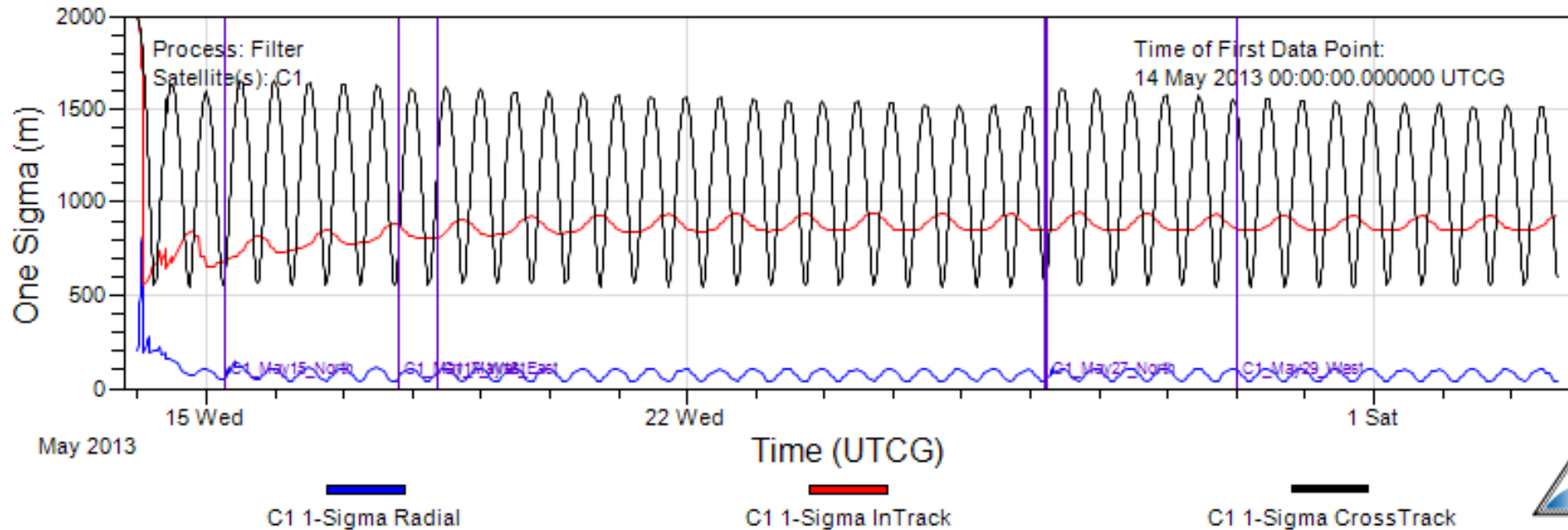


Source: Yahsat presentation at "First International CA Workshop em 2015."



## Support to identify issues in orbit determination process

Position Uncertainty (0.68P)





## Conjunction Reports

**Conjunction Reports**  
To view more items, click the page numbers at the bottom of the page.

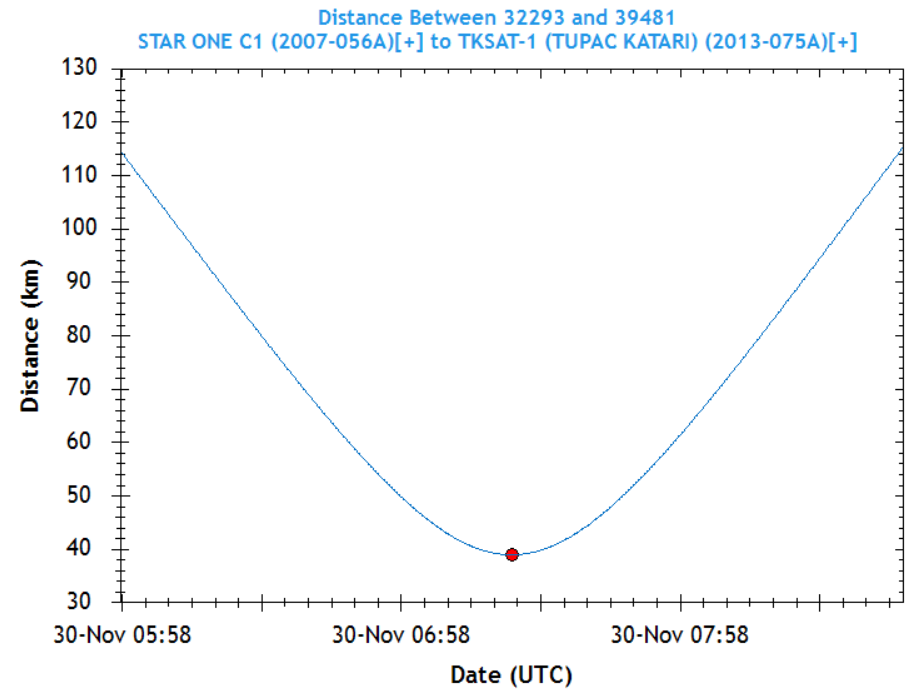
ID	Source	Analysis Start Date (UTC)	Analysis Stop Date (UTC)	Status	# of Satellites
87137	Scheduled Run	2021-11-27 00:00:00.000	2021-12-04 00:00:00.000	Estimated start time: 2021-11-27 00:00:00	0
87135	Scheduled Run	2021-11-26 18:00:00.000	2021-12-03 18:00:00.000	Completed: 12 min 56 sec	23094
87132	Scheduled Run	2021-11-26 12:00:00.000	2021-12-03 12:00:00.000	Completed: 13 min 8 sec	23094
87130	Scheduled Run	2021-11-26 06:00:00.000	2021-12-03 06:00:00.000	Completed: 13 min 0 sec	23094
	Scheduled			Completed: 13 min 11	

**Conjunction Analysis**

Scheduled Conjunction Job: 87015  
 Analysis Start (UTC): 2021-11-16 00:00:00.000  
 Analysis End (UTC): 2021-11-23 00:00:00.000

This Conjunction Job (ID 87015) contains ephemerides that do not match the TLE data.

Satellites	Cross-Track (km)
STAR ONE D2 (4905)(2021-069A)	-1.3163
VIASAT-2 (42740)(2017-029A)	1.3304



— Distance ● Close Approach  
 [Min = 38.885 km, Max = 115.225 km]

STAR ONE C1 from Ephemeris (Operational) received 2021-11-23 14:55:35  
 TKSAT-1 (TUPAC KATARI) from TLE received 2021-11-26 16:36:06  
 Satellite status: [+] = Operational

CA/76441/8686 2021-11-26 00:00:00 UTC

STAR ONE C1 (32293   2007-056A)	38.0317	7.8155	2.1402	38.0919
TKSAT-1 (TUPAC KATARI) (39481   2013-075A)	38.0301	-7.8074	-2.1969	38.0935
278830766	Start Date (UTC) : 2021-11-30 06:57:33.595	Max Probability : 2.64948331699495E-07		
	Time of Closest Approach (UTC) : 2021-11-30 07:21:33.073	Duration (sec) : 2876.4759		
	End Date (UTC) : 2021-11-30 07:45:30.071	Minimum Range (km) : 38.8854		
	Screening Threshold (m) : 50000			



## CDM Analysis

### Latest CDM Analysis Results for STARONE

As of 2021 Nov 24 12:23:13 UTC

- 6 new CDMs
- 3 CDMs skipped because the TCA was past or beyond 7 days
- 3 CDMs analyzed
- No alerts, warnings, or cautions detected (best results)

Primary CDM Results	Secondary Best Results
49055/STAR ONE D2 [+]	42740/VIASAT-2 [+]
CDM TCA: 2021-11-28 20:25:36.426 UTC, 24.433 km [SvS]	Best TCA: 2021-11-28 20:42:16.531 UTC, 40.132 km [EvE]
CDM TCA: 2021-11-29 20:20:18.452 UTC, 21.637 km [SvS]	Best TCA: 2021-11-29 20:42:01.155 UTC, 37.457 km [EvE]
CDM TCA: 2021-11-30 20:15:05.971 UTC, 18.836 km [SvS]	Best TCA: 2021-11-30 20:41:40.100 UTC, 34.630 km [EvE]

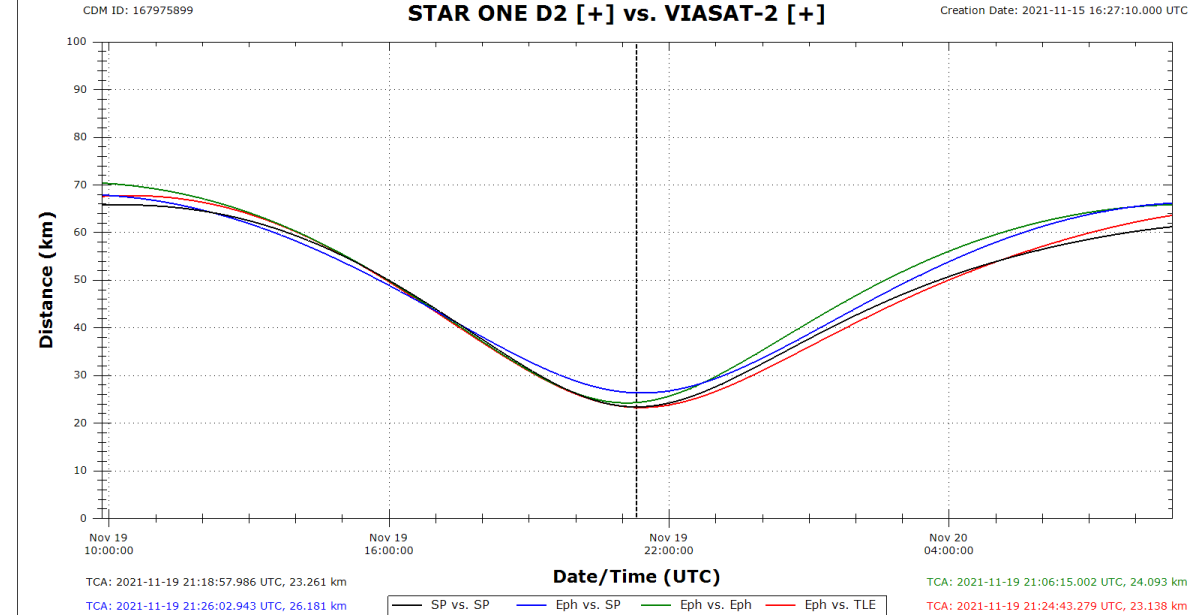
Orbital data used for each CDM or Best result is shown as [AvB], where A is the data used for the primary object and B is the data used for the secondary object. The individual orbital data types are:

- S = SP state vector contained in the CDM
- O = Owner/Operator ephemeris used by 18 SPCS
- E = Ephemeris data uploaded by SDA operator to the SDC
- T = TLE data

For additional information on how to interpret and use these CDM Analysis Summaries, please see the [CDM Analysis Tutorial](#).

### Conjunction Range Comparisons STAR ONE D2 [+] vs. VIASAT-2 [+]

Creation Date: 2021-11-15 16:27:10.000 UTC





## Extra CDM Analysis Option

CDM - STK 11 - [3D Graphics 1 - Earth]

File Edit View Insert Analysis Scenario Utilities Window Help

Search

6 Jan 2020 14:51:50.301

Object Browser

- CDM
  - cdmPrimary
  - cdmSecondary
  - ephPrimary
  - tlePrimary
  - tleSecondary

cdmPrimary RIC	
Time (UTC):	6 Jan 2020 14:51:50.301
Radial (km):	-7.872175
In-Track (km):	-3.531252
Cross-Track (km):	0.173655
Range (km):	8.629660

Conjunction for: STAR ONE C3 & ELEKTRO-L 1 (GOMS 2)  
 CDM ID: 34436930  
 Creation Date: 2020-01-03 08:01:04 UTC  
 SDC Analysis Date: 2020-01-03 09:52:17 UTC

SDC plugin in STK

AGI

3D Graphic... | 6 Jan 2020 14:51:50.301 | Time Step: 10.00 sec



# Ephemeris vs SP Catalogue Screening

Legend		
Alert	Warning	Caution

Primary	Secondary
32293/STAR ONE C1 [+] [SDC: 5.54 days old]	48838/SXM-8 [+] [SDC: 1.54 days old] TCA: 2021-11-26 19:30:59.500 UTC, 49.597 km
40733/STAR ONE C4 [+] [SDC: 2.04 days old]	42740/VIASAT-2 [+] [SDC: 0.50 days old] TCA: 2021-11-23 03:30:46.471 UTC, 48.609 km TCA: 2021-11-24 01:55:58.081 UTC, 49.309 km
49055/STAR ONE D2 [+] [SDC: 3.54 days old]	42740/VIASAT-2 [+] [SDC: 0.50 days old] TCA: 2021-11-22 20:56:36.205 UTC, 39.780 km TCA: 2021-11-23 20:53:37.561 UTC, 39.580 km TCA: 2021-11-24 20:44:50.347 UTC, 39.353 km TCA: 2021-11-25 20:39:44.176 UTC, 43.841 km TCA: 2021-11-26 20:42:52.404 UTC, 49.138 km

For additional information on how to interpret and use these SDC SP Screening results, please see the [SDC SP Screening Tutorial](#).

Robert Hall  
SDC Operations Manager  
COMSPOC Corp.

## STARONE Status

Detailed Results

## Current STARONE Status

As of 2021 Nov 27 15:40:20 UTC

Legend		
Alert	Warning	Caution

Recent Analysis Results					
Type	Report	Analyzed	Alerts	Warnings	Cautions
SP	2021-11-27 14:37:46 UTC	6	0	0	0
SP	2021-11-26 17:42:05 UTC	6	0	0	0
CDM	2021-11-26 00:17:35 UTC	0	0	0	0
SP	2021-11-25 14:41:56 UTC	6	0	0	0
CDM	2021-11-25 00:15:35 UTC	0	0	0	0
SP	2021-11-24 17:23:42 UTC	5	0	0	0
CDM	2021-11-24 17:22:32 UTC	0	0	0	0
CDM	2021-11-24 12:23:13 UTC	3	0	0	0
SP	2021-11-23 17:09:41 UTC	6	0	0	0
CDM	2021-11-23 15:26:23 UTC	5	0	0	0
SP	2021-11-22 14:43:52 UTC	8	0	0	0
SP	2021-11-21 14:33:03 UTC	8	0	0	0
CDM	2021-11-21 00:26:07 UTC	6	0	0	0
SP	2021-11-20 14:41:36 UTC	9	0	0	0

## Ephemeris Data Status

Ephemeris Upload/Start Age (days)							
< 0	0-1	1-2	2-3	3-4	4-5	5-6	> 6

Ephemeris Stop (days)						
< 7	7-8	8-9	9-10	10-11	11-12	> 12

Name	Catalog Number	STARONE		Comparisons
		Upload Time (UTC)	Ephemeris Start (UTC)	Ephemeris Stop (UTC)
STAR ONE C1	32293	2021 Nov 23 14:55:31	2021 Nov 23 00:00:00.000	2022 Jan 18 13:30:00.000
STAR ONE C2	32768	2021 Nov 26 00:28:15	2021 Nov 22 22:30:00.000	2021 Dec 22 22:30:00.000
STAR ONE C3	38991	2021 Nov 26	2021 Nov 26	2021 Dec 24

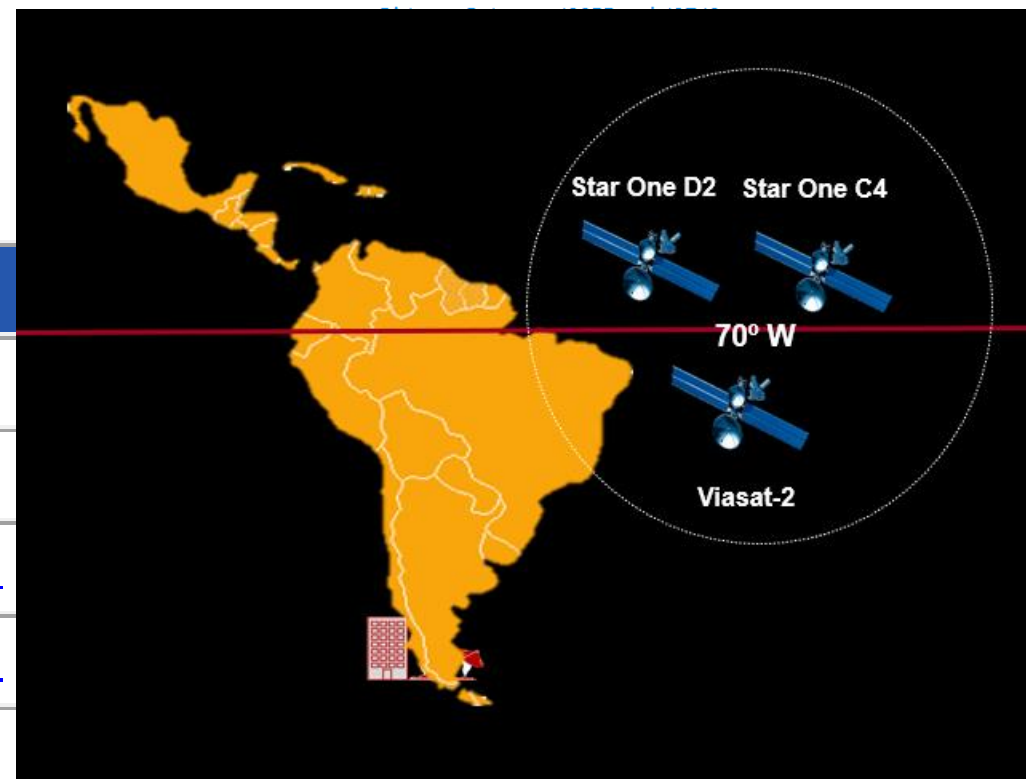




## Neighborhood Watch list, very helpful for colocated satellite

### Neighborhood Watch

Primary Satellite	Neighbor Satellite
<a href="#">STAR ONE C3 (38991 2012-062A)</a>	<a href="#">GOES 16 (41866 2016-071A)</a>
<a href="#">STAR ONE C3 (38991 2012-062A)</a>	<a href="#">SGDC (42692 2017-023B)</a>
<a href="#">STAR ONE C4 (40733 2015-034B)</a>	<a href="#">VIASAT-2 (42740 2017-029A)</a>
<a href="#">STAR ONE D2 (49055 2021-069A)</a>	<a href="#">VIASAT-2 (42740 2017-029A)</a>



Service status: [+] = Operational

NW/176610/164378 2023-04-03 17:39:03 UTC



## Support during LEOP phase

### Conjunction Analysis

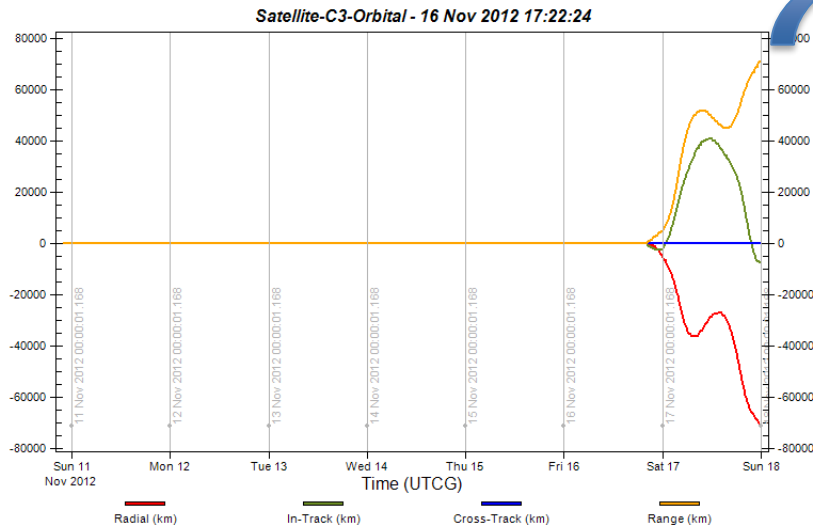
Scheduled Conjunction Job: 82962  
Analysis Start (UTC): 2021-08-08 12:00:00.000  
Analysis End (UTC): 2021-08-15 12:00:00.000

This Conjunction Job (ID 82962) contains ephemerides that did not span the entire analysis interval. [Click here](#) to view them.

Satellites	Cross-Track (km)	In-Track (km)	Radial (km)	Meridian (km)	Time of Closest Approach(UTC)	St En
Star One D2 Launch (77762 2021-7621)	-0.1153	-6.6124	-0.6717	0.6816	2021-08-08 17:07:09	20
STAR ONE D2 (49055 2021-069A)	0.1155	6.6125	0.6707	0.6806		20

Satellite Name
Star One D2 La
STAR ONE D2 (<

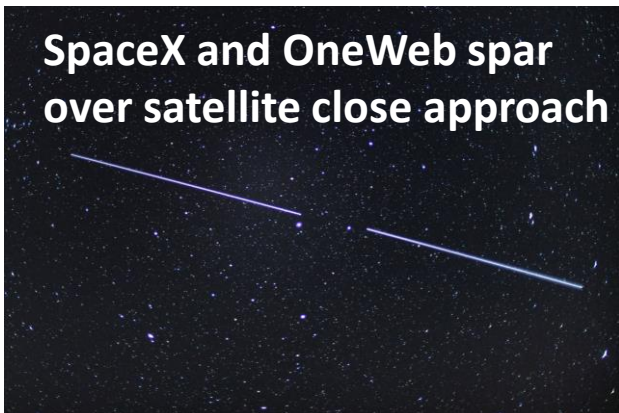
## Support during LEOP phase



Satellites	Cross-Track (km)	In-Track (km)	Radial (km)	Meridian (km)	Time of Closest Approach(UTC)	Start Date (UTC) End Date (UTC)	Duration (sec) Probability	Minimal Range (km)	Screening Threshold (m)
EUTELSAT 28A (26719 2001-011A)	3.1531	0.2316	-1.1959	3.3723	2012-11-13 07:23:01	2012-11-13 07:22:13	96.2902	3.3803	50000.0000
Star One C3 Launch (77760 2012-314L)	-3.1573	-0.1670	1.1957	3.3761		2012-11-13 07:23:49	1.159066E-006		

Satellite Name	Data Type	Last Upload	Name	Contact Phone	Contact E-mail
EUTELSAT 28A (26719 2001-011A)	Ephemeris	2012-11-02 14:59:58	Check Phonebook	Member POC	Member POC

EUTELSAT 28B (33460   2008-065B)	32.0589	0.5865	25.202	40.7788
Star One C3 Launch (77760   2012-314L)	-32.0739	0.0057	-25.1896	40.783
Start Date (UTC)	2012-11-13 07:24:18	Max Probability	7.9625033316437 -09	








**SPACE DATA ASSOCIATION**

# Discussion and education

Home Why Join? Space Data Center News & Events Participants T.S. Kelso Award


beginning of commercial satellite operations, the...

We operate 5...




**Comprehensive STCM Data Fusion Experiment**

By Pascal Wauthier, Chairman, the Space Data Association and Dan Oltrogge. AGI/COMSPOC On Fridav



**Reducing the Risk of Collision**


By Pascal Wauthier, Chairman, the Space Data Association The increasing number of satellites in orbit continues to cause concern for Governments and satellite



**The two Q's of effective data for SSA**


Mark Daley from the US Department of Commerce recently said that human-generated space

Home Why Join? Space Data Center News & Events Participants T.S. Kelso Award




**The Rising Problem of Space Debris**

By Pascal Wauthier, Chairman, the Space Data Association 'Space debris is a rising problem for a number of reasons. One of the main factors is that there are simply more satellites in space



**2020 and the Impact on SSA**

By Pascal Wauthier, Chairman, The Space Data Association 2020 has certainly been one of the strangest years of all time for pretty much everyone across the entire globe. It has also been extremely



**Post-SDA – Where does the missions for Space Situational Awareness take us next?**

In the last blog in our series, we concluded that the SDA's formation "leapfrogged the institutional services by providing more reliable conjunction

## Honoring who has dedicated several Years to space safety

Space Data Association Launches T.S. Kelso Award for Space Safety



The Space Data Association second T.S. Kelso award nomination period closed on 1st July.

The T.S. Kelso Award is presented annually by the Space Data Association as a recognition of outstanding contributions to space flight safety of an individual or, if shared, multiple individuals.

The SDA gives this award to celebrate and acknowledge substantial, innovative, long-term, and practical original contributions to the advancement of space safety, and also the preservation of the space environment in one or more of the following space disciplines: operations, applied research, technology, law, or policy.



The T.S. Kelso Award for Space Safety 2020 presented to Dr Holger Krag by SDA Technical Director Dan Oltrogge at the 2020 AGI/COMSPOC event.

Left to Right: T.S. Kelso, Holger Krag, Dan Oltrogge

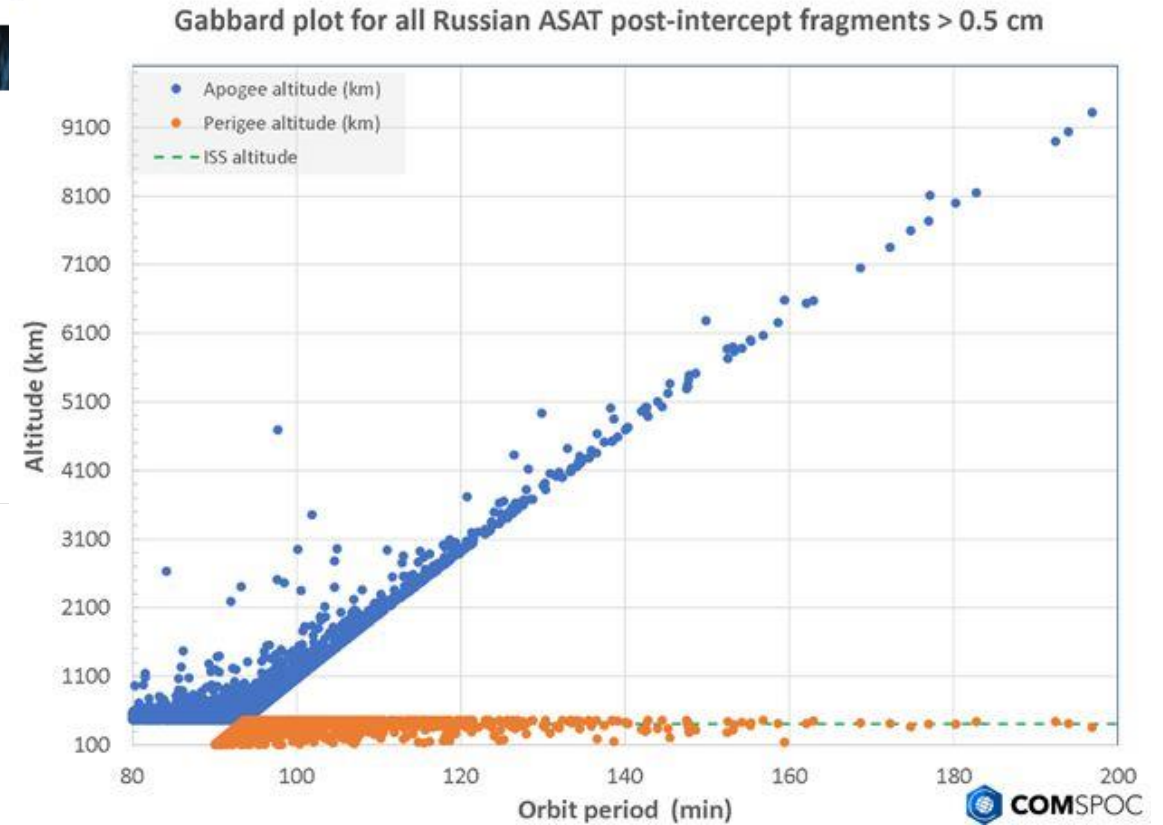
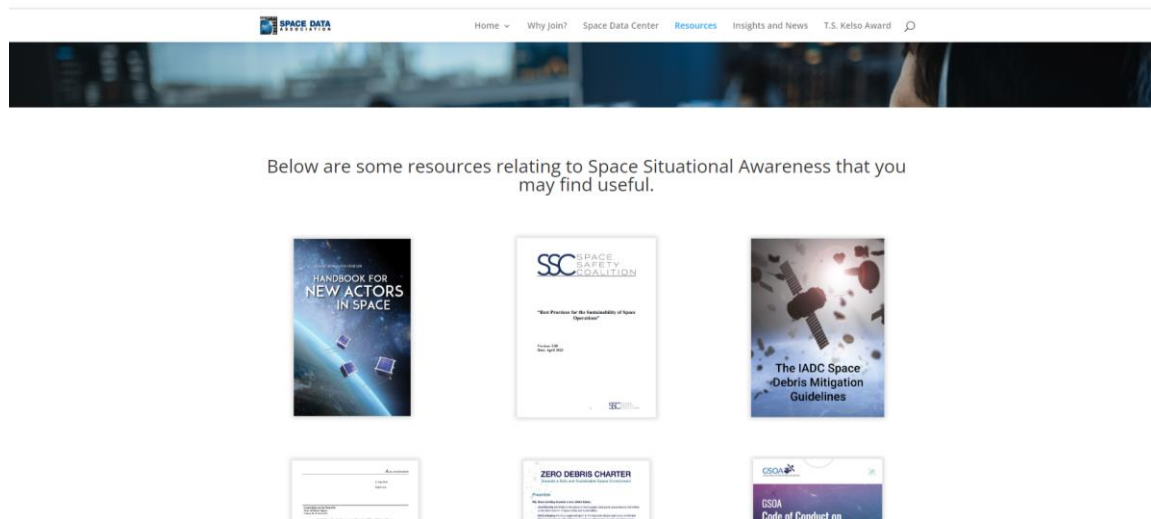
The 2022 recipient of the T.S. Kelso award is Dr Holger Krag of the European Space Agency. He has been recognised for his outstanding contributions to space flight safety. Dr Holger Krag has been a Space Debris Analyst in ESA's Space Debris Office located in Darmstadt, Germany, since 2006. He has worked on establishing risk modes and a collision avoidance system as well as contributing to the first space surveillance studies. In 2014, he was appointed Head of the Space Debris Office, which, among others, provides fundamental support to ESA's then-Space Situational Awareness Programme. In 2019, he took over the position as the head of the programme and led its evolution into the new Space Safety Programme, which was established by ESA in 2019.

## Yearly recognizing who is contributing to a better space environment

Space Data Association Announces T.S Kelso Award 2024 Call for Nominations



SDA Proprietary



Source: [COMSPOC NEWS - Ruminations and Analysis on a Russian ASAT](#)





## Space Domain Awareness: A Global Issue



The space industry is growing exponentially and the need for all space users to operate in a responsible way is greater than ever. Unlike land or sea mass on Earth, or even airspace, space is a global domain, and no one country or organization can fully regulate and monitor it. The industry currently relies on both government, and commercially provided space situational data to track satellites, dangerous debris, and military action in space. All of these systems have however not developed at the same pace as the space industry has expanded. This is an issue, not just because of the need to track and avoid an increased number of functional satellites in space, but also because as activity increases, so does the volume of

**Andrew D'Uva**  
Strategy & Policy Advisor

*Space Sustainability*  
*"It doesn't matter until it matters."*

**[See more on SDA's Blog, Web Page and LinkedIn](#)**





## Office of Space Commerce

Helping U.S. businesses use the unique medium of space to benefit our economy

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- Business with NOAA
- Business with the Government
- Policies
- Regulatory

Home > SSA/STM > Public Comments on Basic SSA Services RFI

## Public Comments on Basic SSA Services RFI

POSTED ON FEBRUARY 24, 2023 POSTED IN SSA/STM TAGGED WITH RFI

Below are the public comments received by the Office of Space Commerce in response to o 2023.

Comments are listed in the order of receipt. They are posted as PDFs.

1. ExoAnalytic Solutions
2. Anonymous
3. Inmarsat
4. Avanti
5. SES
6. Vyoma
7. Kayhan Space
8. Stratagem Group
9. HEO Robotics
10. Yahsat
11. BlueStaq
12. Spire Global
13. Palantir
14. Space Data Association
15. Secure world Foundation
16. General Dynamics Information Technology
17. KBR



[Via Electronic Submission](#)

February 27, 2023

United States Department of Commerce  
National Oceanic and Atmospheric Administration  
Office of Space Commerce  
Attn: Richard DalBello, Director

In Re: *Request for Information on Scope of Civil Space Situational Awareness Services Issued by the National Oceanic and Atmospheric Administration on January 26, 2023*

Access to accurate, timely space situational awareness services are essential to ensuring continued safe space operations for all, preserving U.S. leadership, and enabling U.S. industry to make increasing use of space. The Space Data Association Limited ("SDA") is pleased to provide its response to the above-captioned Request for Information.

As further described below, SDA considers the planned Traffic Management System for Space ("TraCSS") program services are critically important for flight safety and the long-term sustainability of the space environment. We applaud the U.S. Department of Commerce's ("DoC") vision in improving on the important services now being provided by the Department of Defense ("DoD") and demonstrating ongoing leadership and commitment by the United States in this area.

[About the SDA](#)

The SDA is an open, commercially operated, non-profit risk management entity dedicated to safety of flight and space sustainability. SDA's stakeholder participants are commercial, civil and military satellite operators who have invested tens of billions of dollars in satellites on orbit and have come together to reduce the risk of satellite operations.

The SDA has been fully operational for almost twelve years now and was developed with no government funds. The SDA's Space Data Center (SDC), operated by a U.S. commercial company, COMSPOC Corporation, has demonstrated reliability of more than 99.99% over twelve years. The SDA's "crowd-sourcing" model addresses proprietary and intellectual

### Relationship of the Space Data Association to DoC and TraCSS

SDA has consistently stated that DoC should qualitatively improve on the legacy DoD products for SSA and conjunction assessment to enhance safety of flight. This is because "safety" is not DoD's mission nor the result of its public products. New space operational paradigms including proliferated LEO constellations, electric propulsion with its constant low-thrust maneuvers, on-orbit servicing, space tourism, and autonomous flight operations challenge legacy flight safety capabilities. The SDA has mined its conjunction data to determine that close approaches are occurring five times more often than just five years ago. This dramatic change is due to the ever-increasing presence of orbital debris, our improving knowledge of the hazardous debris already present in orbit, and a more than doubling of the active spacecraft population over these five years.

We have enjoyed an ongoing relationship with the Department of Commerce. The SDA helped conceive and conduct a data fusion exercise for Space Traffic Coordination and Management (STCM) in September 2020. NOAA, in its role as a weather satellite operator, participated in this exercise. Implemented and conducted in just four weeks, this STCM data fusion campaign demonstrated how commercial innovation and capabilities, in partnership with government data and participation, were able to achieve dramatic improvements in SSA knowledge. For example, accuracy improvements of between ten and fifty percent in Low Earth Orbit, tenfold

3

accuracy improvements in GEO, and as much as one thousand times improvements in the Launch and Early Orbit Phase of LEO missions were achieved. This study was unique in taking a requirements-based approach by assessing what positional accuracy requirements must be met to allow SSA data to meet the needs of operators and the way they conduct flight safety. The results of this rapid demonstration led us to conclude that such a government/industry partnership is not only effective, but imperative if we are to effectively address and facilitate enduring space sustainability.

More recently, the SDA participated in the DoC's CEO Pilot Program on SSA services from



# In Summary...

- SDA is the only SSA organization formed by satellite operators;
- SDA provides a valuable service and support to its members for a long time counting on great heritage;
- SDA promotes education and important discussion to build a safer space environment;
- SDA continues to advocate for improvements to space safety and is involved in several initiatives.