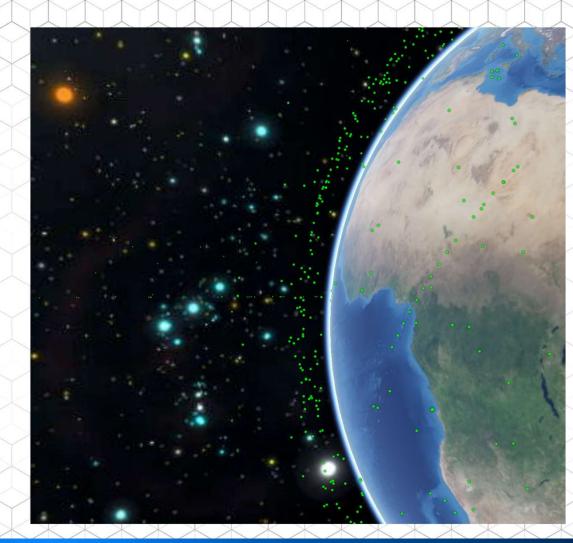
# **SDC Data Sharing**

Robert Hall SDC Operations Manager



#### Agenda

- SDC Recent Stats
- SDC On-boarding
- Best Practices
- GEO Pilot Summary
- SDC Improvements (SDC Powered by COMSPOC)



## **SDC Recent Stats**



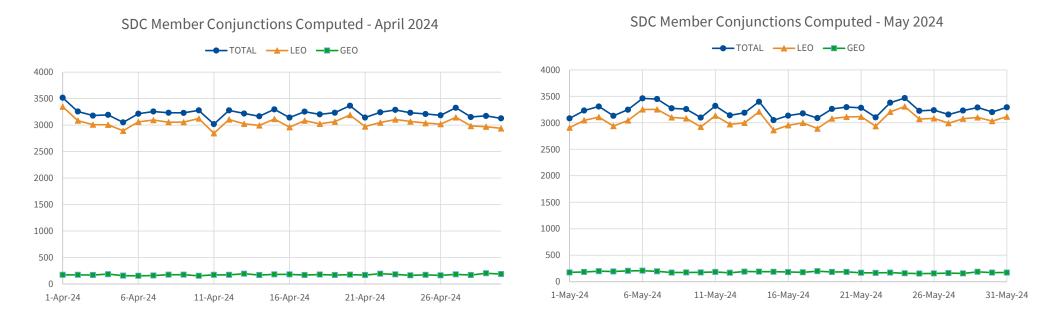
#### Member Totals (June 2024)

- SDC performs flight safety screening (CA) for 693 spacecraft: 283 GEO, 410 LEO/MEO
- 32 different operators provide data for their spacecraft



SDA Proprietary and Confidential

#### **Conjunction Totals**





#### **April 2024 Conjunctions by Distance**

3000 2500 2000 1500 1000 500 0 · 2.491.24 3.101.24 " or APT-2A TO APILA 11.APr.2A 15-191-24 · 20:A91:24 × 23.691.74 r. 24APIZA \* 25.APr.24 . 26 APT 24 × 28.491.74 23:491-24 22-APT2A 13-19124 14-APT-2A 16-194-24 17-APT-2A 18-191-24 19:APT-2A 22.49124 r. J. APIZA × 21.APr2A 1-201-24 30 491 24 A RAY RAY RAY RAY RAY RAY A RAYA

SDC Member Conjunctions Computed by Miss Distance - April 2024

■1 km ■2 km ■5 km ■10 km ■20 km ■50 km



#### May 2024 Conjunctions by Distance

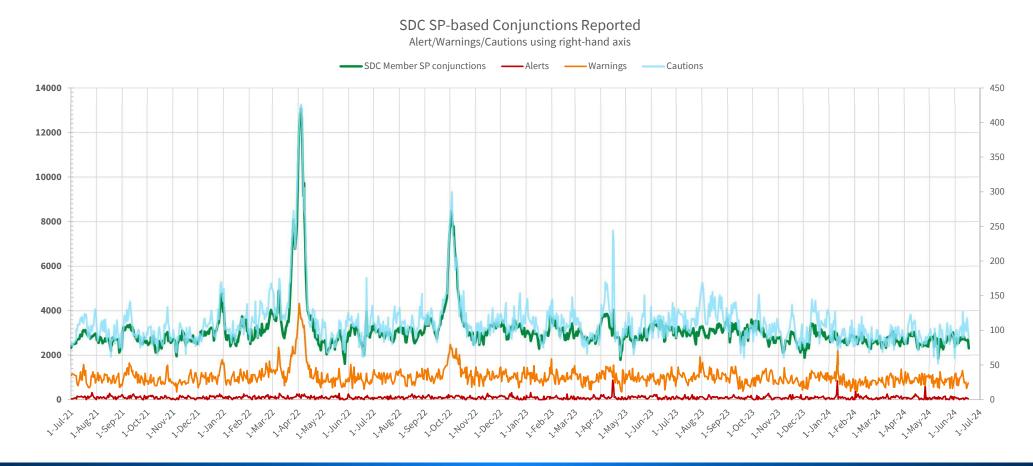
3000 2500 2000 1500 1000 500 0 " SMAYLA in tomay? 11.11.11.22 · 0.11/24 12-11-11-12-12 18: NOV:2A ···· 24.May24 13-11-84-24 14-11-11-124 15.1184/24 16.NoV2A 17.40424 20-11-8424 21-11/24/24 22-11/8422 23-118424 29.11.84.24 30-118424 32,1037,24 1.1184224 A MOTA SHOT & MOTA SHOT A MOTA CHOTA WOTA 24 15-11/21/24 16-11/24 26-11/24 21. May 28. May 24

SDC Member Conjunctions Computed by Miss Distance - May 2024

■1 km ■2 km ■5 km ■10 km ■20 km ■50 km



#### SP Conjunctions – July '21-Jun '24



#### **© COM**SPOC

# **SDC On-boarding**



## Adding a new satellite

- Members are able to add a new satellite to their fleet in the SDC
- However, for every satellite we need to configure ephemeris ingestion/conversion
- Given SDC history, often we have an ephemeris converter that matches
  - SDC currently maintains 19 different ephemeris converters
- Operator cannot upload ephemeris data for new satellite until we have configured ephemeris converter
  - We send an e-mail once we have the proper converter in place/ready for upload



#### **Ephemeris Conversion process**

- We start with an ephemeris sample from the operator
- SDC attempts to convert using ephem header info
  - Frame
  - Units
  - Time
- SDC compares converted ephem to TLEs
- SDC analyzes converted ephem in STK
  - Report converted ephem in original frame and compare to owner source ephem
- In case of new leap seconds, SDC assesses the acceleration of converted ephem
  - If there is a leap second discrepancy, we will see an acceleration spike



## **Best Practices**



### **Ephemeris Data**

- CA screening is relatively easy to do
- Good data is key to effective CA operations
  - Operator ephemerides are the differentiator for SDC
    - 90 points per orbit: GEO 15 min, LEO 1 min
  - Comparative analyses can detect 'glitches' and improve overall SSA
- Operator ephemerides include effects of any planned maneuvers
  - Accounting for operational plans is critical
    - SP/TLE data cover results of canceled maneuvers



### **Ephemeris Data - Recommendations**

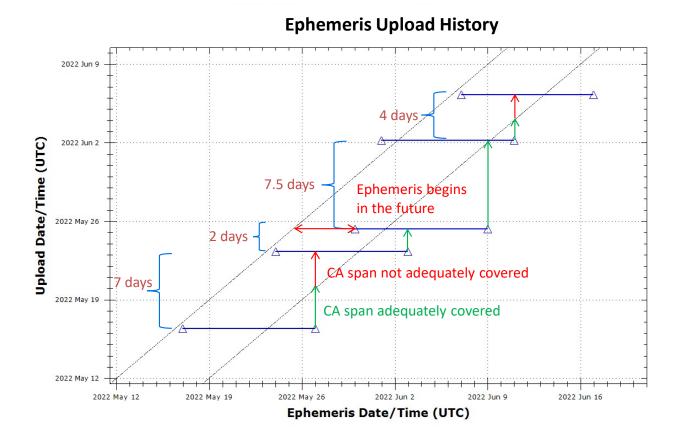
- Upload any time a new OD is performed or ephemeris is generated
  - Updated OD based on new observations
  - Updated ephemeris due to maneuver

#### Upload should be done on a regular cadence

- Automated process is ideal remove potential for operator-related issues
- Do not rely on manual (e.g. "sneaker-net") process
- Uploaded ephemeris should cover entire 7-day analysis window
  - Ephemeris span should be: (upload interval) + 7 days
  - Ephemeris start should not be in the future
- Recommend 14 day span uploaded daily
  - Subject to supported by flight dynamics sw abilities
- If uploaded ephemeris does not adequately cover screening window, it will not be used
  - Invalidates one of the main benefits of SDC



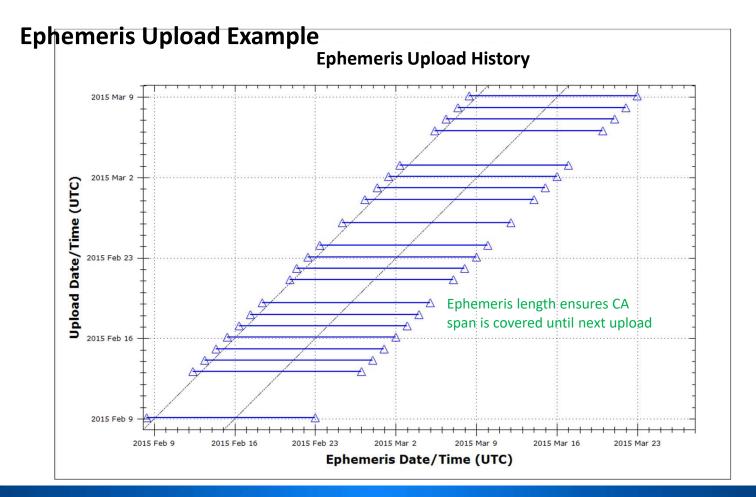
#### **Undesirable Ephemeris Upload**





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#### **Preferred Ephemeris Upload**



## **Ephemeris Types**

#### Operational

- Used for routine upload of operational ephemeris
- Includes planned maneuvers for maneuvers where plans have been finalized

#### Maneuver Planning

- Tool for screening potential maneuver (s)
- Once maneuver plan is finalized, operational ephemeris must be updated to reflect plan



# **GEO Pilot Summary**

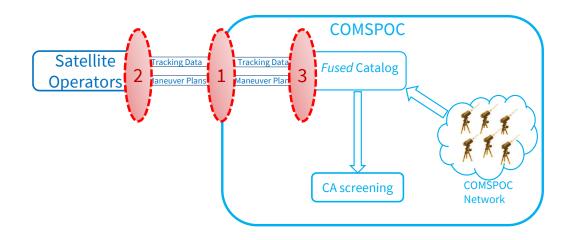


### **SDA / COMSPOC Operator Collaboration**

- SDA operators & COMSPOC worked to bring the data into the system
  - Establish secure (IT) connectivity
  - Provide details of tracking stations (locations and operator calibration info)
  - Provide file format for maneuver plans
    - COMSPOC ensure available maneuver reader (build as necessary)
  - Enable routine tracking data flow
  - COMSPOC perform calibration of each individual tracking site



### **Operator collaboration Focus**



- 1. Establish Network connectivity via IT rules
- 2. Operator scripting to routinely push sensor data + maneuvers for selected sats low latency req'd
- 3. COMSPOC configuration
  - COMSPOC configure tracking data readers based on operator format & frame
  - COMSPOC configure maneuver plans readers
  - COMSPOC calibrate every single operator sensor before allowing use

#### COMSPOC

## **Data sets ingested/fused – during Pilot**

	anuary 31, 2023		y 1, 2023	February 2, 2023	February 3, 21		February 4, 2023	February 5, 2023		February 6,	2023
Avanti	Inmarsat	Intelsat SE	S Telesat	Viasat	Eutelsat Claro	COMSPOC GNSS/o	ther				
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MARSAT 4-F1				ASTRA 1G				GALAXY 12			
MARSAT 4-F3				ASTRA 1KR				GALAXY 14			
IMARSAT 5-F2			_	ASTRA 1L	************			GALAXY 15			
IMARSAT 5-F4				ASTRA 1M				GALAXY 16			
telsat				ASTRA 1N				GALAXY 19			
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utelsat 70B				03B FM2				INTELSAT 18			
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aro				SES-1				ANIK G1			
FAR ONE C2				SES-2				TELSTAR 18V			
AR ONE C3				SES-3				NOAA			
TAR ONE C4				SES-11							-
TAR ONE D1				SES-15				GOES 16			
TAR ONE D2								GOES 17			



## Data sets still being processed – June 2024

	June 11, 2024			June 12, 2024	4		June 13, 2024	June 14, 2024	June 15; 2024		June 16, 20	24	June 17, 2024
Avanti	lnmarsat 📕	Intelsat	SES	Telesat	Claro	COMSPOC	GNSS/other						
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TAR ONE C2						otherse way							
TAR ONE D1													
TAR ONE D2													

