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Study of future perspectives of Micro/Nano-satellites constellations in the Earth Observation market

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ANNEX

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ANNEX 1: New Space companies

In this annex, it can be found the list of New space companies that has been analysed to be included in the qualitative analysis (table 1).

Table 1. New space companies[1]

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Orbcomm	50	51	1991	Microsat, Smallsat	IoT/ M2M	World's first and only commercial satellite network 100% dedicated to M2M
Globalstar	84	24	1998	Satellite	Internet, IoT/M2M	Like "bent-pipes" or mirrors in the sky, the Globalstar satellites pick up signals from over 80% of the Earth surface
AprizeSat	12	12	2002	Microsat	IoT/ M2M	Low-cost satellite data services for monitoring the fuel level, oil and gas pipelines, and mobile tracking of shipping containers, rail cars and trailers.
ExactEarth	67	67	2008	Nanosat	AIS	9 own nanosats called AprizeSat or ExactView. Hosted payloads on 58 Iridium-Next satellites and 2 PAZ.
O3b	16	20	2013	Satellite	Internet	Satellites in 8000 km Medium Earth Orbit (MEO) for internet backhaul.
Planet	355	150	2013	3U	Earth Observation	29 MP sensor tracking images with 3.7m ground resolution and swath of 24.6 km x 16.4 km from 475 km altitude.
Spire	103	150	2013	3U	Weather, AIS, ADS-B	Measure change in GPS signal after passing atmosphere to calculate precise profiles for temperature, pressure, humidity.
Planet (Terra Bella/ Skybox)	15	24	2013	Smallsat	Earth Observation	Color and near-infrared imagery (90cm resolution) in 120 kg package. First-ever commercial high-resolution video from a satellite.
Astro Digital	6	25	2014	6U, 16U	Earth Observation	6U has 22 m resolution in RGB and NIR. 16U has 2.5 m resolution in RGB, red edge and NIR using one 70 MP sensor.

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
BlackSky / Spaceflight	3	60	2016	Microsat	Earth Observation	A subsidiary of Spaceflight industries. Colour imagery at a resolution of 1 m.
GHGSat	1	20	2016	Microsat	Emissions monitoring	Measure CO2 and methane in a FoV of ~12km x 12km and resolution of <50m. Sensors include 2D Wide-Angle Gabr-Perot imaging spectrometer with 15 kg satellite.
Satellogic	3	90	2016	Microsat	Earth Observation/ Hyperspectral	NuSat 37 kg satellites are capable of 1m ground resolution imaging and video.
Space View	5	16	2016	Satellite	EO	First commercial 560 kg Chinese high-resolution Earth-imaging satellites called SuperView (GaoJing) with a resolution of 0.5m per pixel.
Hongyun/ Xingyun (CASIC)	2	45	2017	Smallsat	Internet, IoT/M2M	Plans to be completed by 2025. The first satellite was 45 kg Jiading-1.
Sky and Space Global	3	200	2017	8U	IoT/ M2M	Plans to use inter-satellite links. Satellites outsourced from GomSpace.
GeoOptics	7	?	2017	6U	Weather	Satellites outsourced from Tyvak
Zhuhai Orbita Control	7	10	2017	Smallsat	Earth Observation / Hyperspectral	Constellation of different video and hyperspectral satellites.
Canon	1	100	2017	Microsat	Earth Observation	8K low-light real-time video and streaming using laser terminal.
Aireon	75	75	2017	Hosted	ADS-B	The hosted payload on Iridium-Next satellites for global air traffic surveillance.
Telesat	2	117	2017	Smallsat	Internet	Full constellation could be 292 and scalable up to 512. One spacecraft was on the failed Soyuz launch.
Iridium NEXT	75	75	2017	Satellite	Internet, IoT/M2M	Original Iridium was launched between 1997-2002 and has been mostly deorbited. Extra hosted payloads from ExactEarth and Aireon
Helios Wire / SIRION	2	30	2017	6U,16U	IoT/ M2M	Uses 30MHz of S-band spectrum to receive tiny data package from billions of sensors.

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Dauria / SatByul	2	8	2017	6U	Earth Observation	Perseus-O multispectral constellation. Many similarities to Astro Digital. MKA-N could be considered the first CubeSats.
Swarm Technologies	7	150	2018	0.25U, 1U	IoT/ M2M	World's smallest two-way communication satellite.
Kepler Communications	2	140	2018	3U, 6U	Internet, IoT/ M2M	Monthly fee based on the data amount. Hope to achieve rates of 1-40 Mbps. Clyde Space will provide at least 3 sats.
ICEYE	2	18	2018	Microsat	SAR	21 launch agreement with Vector Space Systems. 10 platform agreement with York Space Systems.
SpaceX	2	4425	2018	Smallsat	Internet	400 kg satellites according to FCC filing, First technology demonstration mission flew in 2018.
Orbital Sidekick	1	?	2018	?	Earth Observation / Hyperspectral	The first sensor on ISS, Constellation coming in 2020.
Analytical Space	1	?	2018	6U	IoT/ M2M, Orbital data relay, Optical comms	In-orbit relays receiving radio and downlink to the ground with laser communication enabling more data downlink from satellites.
Hiber	2	48	2018	6U	IoT/M2M	Send small packets of data (140 characters, accompanied by time-stamp, identifier and location).
Fleet Space	4	100	2018	3U, 12U, 1.5U	IoT/ M2M	Selected Saber Astronautics as the operations provider
Astrocast	1	80	2018	3U	IoT/M2M	targeting L-Band. Inter-satellite links. NanoSpace propulsion. Further 80 satellites in orbit by 2022.
AISTech	1	150	2018	2U, 6U	IoT/M2M, ADS-B, AIS, IR imaging	2-way comms, thermal imaging to detect forest fires, aviation tracking (ADS-B). Satellites will be built by GomSpace.
HawkEye360	3	30	2018	Microsat	RF spectrum monitoring	Radio frequency (RF) mapping with 15kg sats to help monitor transportation across air, land sea and assist in emergencies. Built by GomSpace.

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Capella Space	1	40	2018	Microsat	SAR	Resolutions from 1m (1600km2) to 30 m(27000km2). Every 3-6 hours globally and 45 min in equatorial regions, improving to every hour in 3-5 years.
Hongyan (CASC)	1	320	2018	Satellite	Internet	Completion in 2023 in multiple phases to provide global broadband access, voice communications and other services.
Reaktor Space	1	36	2018	6U, 2U	Earth Observation / Hyperspectral	Hyperspectral constellation for smart agriculture with 100's of spectral bands and 20 m resolution.
Commsat (Ladybug)	7	72	2018	Microsat, 6U, 3U	IoT/M2M, AIS	Ladybeetle 1 is 100 kg and 3 CubeSats of 6U and 3 of 3U. Plans 4 more in 2019 and complete 72 satellites in 2022.
Audacity Space	1	3	2018	CubeSat	Orbital data relay	3 relay satellites in MEO for continuous communication with satellites. MEO satellites starting from 2022.
Myriota	1	?	2018	CubeSat	IoT/M2M	-
LaserFleet	1	192	2018	CubeSat	Internet, Optical comms	Provide reliable 1 Gbps communication rates to aircraft at altitude. The higher effective data rate at a lower cost than the best-in-class Ku/Ka/V
ADASPACE (ADA space)	1	?	2018	Microsat, CubeSat	Earth Observation	Establish a global, minute-level update Earth image data network consisting of 192 satellites.
OneWeb	0	648	2019	Smallsat	Internet	Joint venture with Airbus to built the constellation of 125 kg satellites.
Axelspace	0	50	2019	Microsat	Earth Observation	Weighs <95kg and captures images with a 2.5-meter resolution over a 57-kilometer area
Karten Space	0	14	2019	6U	Earth Observation	Optical resolution is 3-5 m.
UnSeenLabs	0	?	2019	6U	RF spectrum monitoring	Satellites outsourced from GomSpace.
NSLComm	0	60	2019	6U	Internet, IoT/M2M	Up to 1 Gbps anywhere in the world with a novel antenna.
kaskilo / eightyLEO	0	300	2019	Smallsat	IoT/M2M	10 Gbps intersatellite laser communication links. Ka-band for ground communications.

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Orbital Micro Systems	0	40	2019	3U	Weather	Utilize microwave technology to capture temperature and moisture measurements refreshed and delivered every 15 min.
Lacuna Space	0	32	2019	6U	IoT/M2M	-
Blink Astro	0	?	2019	3U	IoT/M2M	Blink Astro and NanoAvionics have signed an agreed to fly a tech demo payload to LEO in fall 2018
PlanetiQ	0	18	2019	6U	Weather	
Hera Systems	0	50	2019	12U	Earth Observation	
SRT Marine	0	6	2019	6U	AIS	
SatRevolution	0	66	2019	2U	Earth Observation	
Aerial & Maritime	0	?	2019	3U	AIS, ADS-B	
Harris	0	12	2019	6U	Weather	
Earth-i	0	15	2019	Microsat	Earth Observation	First constellation in the world is able to provide full-colour video.
Synspective	0	30	2019	Smallsat	Earth Observation	
Space Systems Engineering	0	?	2019	?	Earth Observation	Advanced Earth Observation VNIR optical instrument payload.
Astrome	0	150	2019	Microsat	Internet	Indian space technology company to provide high-speed broadband internet from space
Cloud Constellation (Space Belt)	0	?	2019	?	Data storage	Space-Base cloud storage. An array of equatorial low earth orbiting data centre satellites. Much more secure and in some cases better-performing. 10-gigabit laser communications links between satellites.
Transcelestial	0	?	2019	CubeSat	Orbital data relay, Optical comms	
Kleos Space	0	20	2019	CubeSat	AIS, Geolocation	
Galaxy Space (Apocalypse)	0	1000	2019	?	Internet	
Strata Space	0	?	2019	PocketQube	Orbital data relay, Data storage	

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Bluefield	0	22	2019	16U	Emissions monitoring	20x20 m pixel resolution and 100ppm-m methane level (detecting natural gas storage and pipeline leaks, fracking, industries, mining, permafrost, wastewater, rice paddies, livestock)
HyperSat	0	6	2020	Smallsat	Earth Observation / Hyperspectral	
Kineis	0	20	2020	16U	IoT/M2M	
XpressSAR	0	4	2020	?	SAR	
UrTheCast	2	24	2020	Satellite	Earth Observation, SAR	
orora.tech	0	100	2021	3U	Weather, IR imaging	
Methera	0	16	2021	Smallsat	Internet	
Trident Space	0	48	2021	Smallsat	SAR	
VEOWARE	0	?	2021	Satellite	Earth Observation	
Scepter	0	?	?	Microsat	Emissions monitoring	Air pollution monitoring precise enough to reveal conditions for individual city blocks.
Astranis	1	?		Smallsat, CubeSat	Internet	Small GEO satellite weighing 300 kg to provide up to 10 Gb/s of bandwidth.
Umbra Lab	0	12	?	Microsat	SAR	
EarthNow	0	500	?	Microsat	Earth Observation	
OQ Technology	0	?	?	CubeSat		
Tekever	0	12	?	16U	Earth Observation , AIS, ADS-B, IoT/M2M	
ArQit	0	?	?	CubeSat	QKD, Optical comms	Quantum Key Distribution shared in laser transmissions from a satellite. Qinetiq is a contractor for spacecraft.
NorStar NorthStar	0	40	?	Microsat	Earth Observation/Hyperspectral	First commercial system to combine Hyperspectral and Infrared sensors to observe Earth.

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Laser Light	0	12	?	Smallsat	Optical comms	Optical laser comm constellation in MEO as an internet infrastructure service.
Alba Orbital	0	?	?	PocketQube	Earth Observation	First PocketQube constellation
Ubiquitilink	0	?	?	CubeSat	IoT/M2M	
LunaSonde	0	?	?	?	Minerals prospecting	Locate aquifers, mineral deposits, and other geological resources up to 2 km underground.
Hypercubes	0	?	?	CubeSat	Earth Observation / Hyperspectral	Track not only the chemical output of factories and farms but also the movement of machines and equipment.
Koolock	0	?	?	CubeSat	Earth Observation, IR imaging, Weather	The most advanced feature set for weather and environmental monitoring.
Efir / Sfera	0	288	?	Smallsat	Internet, Earth Observation	Russian constellation in 870 km orbit operational in 2025. Sfera is 640 satellite constellation which includes Efir plus remote sending spacecraft.
B612 Foundation	0	?	?	Microsat	Asteroid tracking	Track smaller, fast-moving asteroids in the range of 140 m to 1 km wide. Built by York Space Systems.
Galaktika	0	?	Cancelled	Microsat	IoT/M2M	Pulsar IoT constellation for a two-way exchange of data packets at a speed up to 500 bit/sec. No news for a while and removed from the website.
Rupercorp	0	?	Cancelled	6U	Earth Observation	2U CubeSat to be launched in 2018 will be a precursor for the commercial constellation. No news since press release and the company do not seem to have any online presence.
Planetary Resources	3	10	Cancelled	12U	Earth Observation	
Outernet	0	200	Cancelled	1U, 3U	Internet	
Ursa Space Systems	0	?	Cancelled	Microsat	SAR	

Organization	Launched	Planned network	First launch	Form factor	Field	Technical and comments
Earthcube	0	10	Cancelled	CubeSat	Earth Observation, IR imaging	
Terran Orbital (Tyvak)	0	?	Cancelled	CubeSat	IoT/M2M	
ISIS/ Innovative Data Services	0	16	Cancelled	3U	AIS	
Promethean Labs	0	?	Cancelled	CubeSat	Emissions monitoring	Special imager for measuring greenhouse gas (GHG) emissions, monitoring of water and air quality, forestry and land.
BitSat (Dunvegan Space Systems)	0	24	Cancelled	3U	IoT/M2M, Data storage	Cancelled when fundraising fell through.
4skies (NovaNano)	0	?	Cancelled	Microsat	IoT/M2M	Was one of the first in the field, but was not able to raise funding.

ANNEX 2: Flock satellites status.

In this annex and in table 2, it can be found the status of all the satellites launched from the beginning to be part of the Flock constellation of Planet company.

Table 2. Flock satellites constellation status [2]

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1 Dove-1	39513	Planet Labs	3U	09/01/2014	Re-entry 09-06-2014. Was operational
Flock-1 Dove-2	395614	Planet Labs	3U	09/01/2014	Re-entry 2014-05-24. Was operational.
Flock-1 Dove-3	39512	Planet Labs	3U	09/01/2014	Re-entry 2014-05-15. Was operational.
Flock-1 Dove-4	39515	Planet Labs	3U	09/01/2014	Re-entry 2014-06-18. Was operational.
Flock-1 Dove-5	39518	Planet Labs	3U	09/01/2014	Re-entry 2014-06-02. Was operational.
Flock-1 Dove-6	39519	Planet Labs	3U	09/01/2014	Re-entry 2014-06-15. Was operational.
Flock-1 Dove-7	39520	Planet Labs	3U	09/01/2014	Re-entry 2014-06-05. Was operational.
Flock-1 Dove-8	39521	Planet Labs	3U	09/01/2014	Re-entry 2014-05-25. Was operational.
Flock-1 Dove-9	39525	Planet Labs	3U	09/01/2014	Re-entry 2014-07-06. Was operational.
Flock-1 Dove-10	39526	Planet Labs	3U	09/01/2014	Re-entry 2014-06-14. Was operational.
Flock-1 Dove-11	39527	Planet Labs	3U	09/01/2014	Re-entry 2014-06-13. Was operational.
Flock-1 Dove-12	39528	Planet Labs	3U	09/01/2014	Re-entry 2014-10-26. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1 Dove-13	39529	Planet Labs	3U	09/01/2014	Re-entry 2014-07-02. Was operational.
Flock-1 Dove-14	39530	Planet Labs	3U	09/01/2014	Re-entry 2014-06-20. Was operational.
Flock-1 Dove-15	39531	Planet Labs	3U	09/01/2014	Re-entry 2014-05-20. Was operational.
Flock-1 Dove-16	39532	Planet Labs	3U	09/01/2014	Re-entry 2014-06-20. Was operational.
Flock-1 Dove-17	39555	Planet Labs	3U	09/01/2014	Re-entry 2014-05-19. Was operational.
Flock-1 Dove-18	39556	Planet Labs	3U	09/01/2014	Re-entry 2014-10-29. Was operational.
Flock-1 Dove-19	39559	Planet Labs	3U	09/01/2014	Re-entry 2014-06-02. Was operational.
Flock-1 Dove-20	39560	Planet Labs	3U	09/01/2014	Re-entry 2015-10-09. Was operational.
Flock-1 Dove-21	39557	Planet Labs	3U	09/01/2014	Re-entry 2014-05-25. Was operational.
Flock-1 Dove-22	39558	Planet Labs	3U	09/01/2014	Re-entry 2014-06-04. Was operational.
Flock-1 Dove-23	39561	Planet Labs	3U	09/01/2014	Re-entry 2014-07-10. Was operational.
Flock-1 Dove-24	39562	Planet Labs	3U	09/01/2014	Re-entry 2014-06-16. Was operational.
Flock-1 Dove-25	39563	Planet Labs	3U	09/01/2014	Re-entry 2014-06-24. Was operational.
Flock-1 Dove-26	39564	Planet Labs	3U	09/01/2014	Re-entry 2014-06-10. Was operational.
Flock-1 Dove-27	39565	Planet Labs	3U	09/01/2014	Re-entry 2014-05-03. Was operational.
Flock-1 Dove-28	39566	Planet Labs	3U	09/01/2014	Re-entry 2014-06-03. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1C Dove-1	40027	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-2	40029	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-3	40041	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-4	40031	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-5	40038	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-6	40036	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-7	40026	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-8	40040	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-9	40035	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-10	40023	Planet Labs	3U	19/06/2014	Operational
Flock-1C Dove-11	40033	Planet Labs	3U	19/06/2014	Operational
Flock-1b Dove-1	40131	Planet Labs	3U	13/07/2014	Re-entry 2015-01-01. Was operational.
Flock-1b Dove-2	40132	Planet Labs	3U	13/07/2014	Re-entry 2015-03-14. Was operational.
Flock-1b Dove-3	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-4	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-5	40453	Planet Labs	3U	13/07/2014	Re-entry 2014-08-17. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1b Dove-6	40454	Planet Labs	3U	13/07/2014	Re-entry 2015-10-16. Was operational.
Flock-1b Dove-7	40134	Planet Labs	3U	13/07/2014	Re-entry 2015-01-20. Was operational.
Flock-1b Dove-8	40133	Planet Labs	3U	13/07/2014	Re-entry 2015-03-05. Was operational.
Flock-1b Dove-10	40429	Planet Labs	3U	13/07/2014	Re-entry 2015-08-23. Was operational.
Flock-1b Dove-11	40459	Planet Labs	3U	13/07/2014	Re-entry 2015-09-07. Was operational.
Flock-1b Dove-12	40460	Planet Labs	3U	13/07/2014	Re-entry 2015-09-29. Was operational.
Flock-1b Dove-13	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-14	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-15	40126	Planet Labs	3U	13/07/2014	Re-entry 2015-01-07. Was operational.
Flock-1b Dove-16	40127	Planet Labs	3U	13/07/2014	Re-entry 2014-12-13. Was operational.
Flock-1b Dove-17	40140	Planet Labs	3U	13/07/2014	Re-entry 2015-03-04. Was operational.
Flock-1b Dove-18	40139	Planet Labs	3U	13/07/2014	Re-entry 2015-01-16. Was operational.
Flock-1b Dove-19	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-20	Returned to Earth	Planet Labs	3U	13/07/2014	Returned to Earth. Aboard Dragon SpX-5
Flock-1b Dove-21	40427	Planet Labs	3U	13/07/2014	Re-entry 2015-10-12. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1b Dove-22	40428	Planet Labs	3U	13/07/2014	Re-entry 2015-10-03. Was operational.
Flock-1b Dove-23	40123	Planet Labs	3U	13/07/2014	Re-entry 2015-03-03. Was operational.
Flock-1b Dove-24	40122	Planet Labs	3U	13/07/2014	Re-entry 2015-03-15. Was operational.
Flock-1b Dove-25	40125	Planet Labs	3U	13/07/2014	Re-entry 2015-02-01. Was operational.
Flock-1b Dove-26	40124	Planet Labs	3U	13/07/2014	Re-entry 2014-12-14. Was operational.
Flock-1b Dove-27	40422	Planet Labs	3U	13/07/2014	Re-entry 2015-10-14. Was operational.
Flock-1b Dove-28	40423	Planet Labs	3U	13/07/2014	Re-entry 2015-08-07. Was operational.
Flock-1d Dove-1	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-2	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-3	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-4	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-5	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-6	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-7	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-8	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-9	Launch failure	Planet Labs	3U	28/10/2014	Launch failure

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1d Dove-10	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-11	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-12	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-13	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-14	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-15	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-16	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-17	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-18	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-19	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-20	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-21	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-22	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-23	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-24	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-25	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d Dove-26	Launch failure	Planet Labs	3U	28/10/2014	Launch failure
Flock-1d' 1	40451	Planet Labs	3U	10/01/2015	Re-entry 2015-10-13. Was operational.
Flock-1d' 2	40452	Planet Labs	3U	10/01/2015	Re-entry 2015-12-27. Was operational.
Flock-1e 1	40723	Planet Labs	3U	14/04/2015	Re-entry 2016-05-18. Was operational.
Flock-1e 2	40722	Planet Labs	3U	14/04/2015	Re-entry 2016-03-05. Was operational.
Flock-1e 3	40724	Planet Labs	3U	14/04/2015	Re-entry 2016-05-29. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-1e 4	-	Planet Labs	3U	14/04/2015	Re-entry 2016-06-24. Was operational.
Flock-1e 5	40728	Planet Labs	3U	14/04/2015	Re-entry 2016-06-20. Was operational.
Flock-1e 6	40729	Planet Labs	3U	14/04/2015	Re-entry 2016-07-21. Was operational.
Flock-1e 7	40727	Planet Labs	3U	14/04/2015	Re-entry 2016-07-17. Was operational.
Flock-1e 8	40726	Planet Labs	3U	14/04/2015	Re-entry 2016-06-22. Was operational.
Flock-1e 9	40427	Planet Labs	3U	14/04/2015	Re-entry 2016-02-08. Was operational.
Flock-1e 10	40737	Planet Labs	3U	14/04/2015	Re-entry 2016-08-09. Was operational.
Flock-1e 11	40738	Planet Labs	3U	14/04/2015	Re-entry 2016-08-09. Was operational.
Flock-1e 12	40739	Planet Labs	3U	14/04/2015	Re-entry 2016-08-09. Was operational.
Flock-1e 13	40740	Planet Labs	3U	14/04/2015	Re-entry 2016-08-24. Was operational.
Flock-1e 14	40741	Planet Labs	3U	14/04/2015	Re-entry 2016-07-31. Was operational.
Flock-1f 1	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 2	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 3	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 4	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 5	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 6	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 7	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-1f 8	Launch failure	Planet Labs	3U	28/06/2015	Launch failure
Flock-2b 1	40950	Planet Labs	3U	19/08/2015	Re-entry 2016-09-22. Was operational.
Flock-2b 2	40951	Planet Labs	3U	19/08/2015	Re-entry 2016-10-02. Was operational.
Flock-2b 3	40952	Planet Labs	3U	19/08/2015	Re-entry 2016-10-14. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-2b 4	40953	Planet Labs	3U	19/08/2015	Re-entry 2016-10-17. Was operational.
Flock-2b 5	40954	Planet Labs	3U	19/08/2015	Re-entry 2016-09-25. Was operational.
Flock-2b 6	40955	Planet Labs	3U	19/08/2015	Re-entry 2016-08-22. Was operational.
Flock-2b 7	40956	Planet Labs	3U	19/08/2015	Re-entry 2016-09-21. Was operational.
Flock-2b 8	40957	Planet Labs	3U	19/08/2015	Re-entry 2016-05-22. Was operational.
Flock-2b 9	40963	Planet Labs	3U	19/08/2015	Re-entry 2016-10-16. Was operational.
Flock-2b 10	40962	Planet Labs	3U	19/08/2015	Re-entry 2016-10-12. Was operational.
Flock-2b 11	Returned to Earth	Planet Labs	3U	19/08/2015	Returned to Earth. Aboard Dragon SpX-8?
Flock-2b 12	Returned to Earth	Planet Labs	3U	19/08/2015	Returned to Earth. Aboard Dragon SpX-8?
Flock-2b 13	40979	Planet Labs	3U	19/08/2015	Re-entry 2016-10-11. Was operational.
Flock-2b 14	40980	Planet Labs	3U	19/08/2015	Re-entry 2016-09-12. Was operational.
Flock-2e 1	41483	Planet Labs	3U	06/12/2015	Re-entry 2018-06-16. Was operational.
Flock-2e 2	41484	Planet Labs	3U	06/12/2015	Re-entry 2018-01-23. Was operational.
Flock-2e 3	41486	Planet Labs	3U	06/12/2015	Re-entry 2018-04-05. Was operational.
Flock-2e 4	41487	Planet Labs	3U	06/12/2015	Re-entry 2018-03-11. Was operational.
Flock-2e 5	41564	Planet Labs	3U	06/12/2015	Re-entry 2018-08-14. Was operational.
Flock-2e 6	41563	Planet Labs	3U	06/12/2015	Re-entry 2018-02-12. Was operational.
Flock-2e 7	41565	Planet Labs	3U	06/12/2015	Re-entry 2018-04-07. Was operational.
Flock-2e 8	41566	Planet Labs	3U	06/12/2015	Re-entry 2017-07-25. Was operational.
Flock-2e 9	41571	Planet Labs	3U	06/12/2015	Re-entry 2017-12-25. Was operational.
Flock-2e 10	41572	Planet Labs	3U	06/12/2015	Re-entry 2018-02-28. Was operational.
Flock-2e 11	41574	Planet Labs	3U	06/12/2015	Re-entry 2018-03-04. Was operational.

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-2e 12	51473	Planet Labs	3U	06/12/2015	Re-entry 2018-03-04. Was operational.
Flock-2e' 1	41479	Planet Labs	3U	23/03/2016	Re-entry 2018-04-15. Was operational.
Flock-2e' 2	41481	Planet Labs	3U	23/03/2016	Re-entry 2017-12-01. Was operational.
Flock-2e' 3	41480	Planet Labs	3U	23/03/2016	Re-entry 2018-04-18. Was operational.
Flock-2e' 4	41482	Planet Labs	3U	23/03/2016	Re-entry 2017-11-08. Was operational.
Flock-2e' 5	41567	Planet Labs	3U	23/03/2016	Re-entry 2018-06-27. Was operational.
Flock-2e' 6	41568	Planet Labs	3U	23/03/2016	Re-entry 2018-04-05. Was operational.
Flock-2e' 7	41570	Planet Labs	3U	23/03/2016	Re-entry 2017-10-03. Was operational.
Flock-2e' 8	41569	Planet Labs	3U	23/03/2016	Re-entry 2018-04-05. Was operational.
Flock-2e' 9	41575	Planet Labs	3U	23/03/2016	Re-entry 2018-03-12. Was operational.
Flock-2e' 10	41576	Planet Labs	3U	23/03/2016	Re-entry 2018-02-17. Was operational.
Flock-2e' 11	41577	Planet Labs	3U	23/03/2016	Re-entry 2018-03-11. Was operational.
Flock-2e' 12	41578	Planet Labs	3U	23/03/2016	Re-entry 2018-02-28. Was operational.
Flock-2e' 13	41761	Planet Labs	3U	23/03/2016	Re-entry 2018-06-03. Was operational.
Flock-2e' 14	41762	Planet Labs	3U	23/03/2016	Re-entry 2018-10-25. Was operational.
Flock-2e' 15	41763	Planet Labs	3U	23/03/2016	Re-entry 2018-11-10. Was operational.
Flock-2e' 16	41764	Planet Labs	3U	23/03/2016	Re-entry 2018-06-01. Was operational.
Flock-2e' 17	41769	Planet Labs	3U	23/03/2016	Re-entry 2018-06-26. Was operational.
Flock-2e' 18	41776	Planet Labs	3U	23/03/2016	Re-entry 2018-11-07. Was operational.
Flock-2e' 19	41777	Planet Labs	3U	23/03/2016	Re-entry 2018-05-12. Was operational.
Flock-2e' 20	41782	Planet Labs	3U	23/03/2016	Re-entry 2018-09-22. Was operational.
Flock-2p 1	41617	Planet Labs	3U	22/06/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-2p 2	41609	Planet Labs	3U	22/06/2017	Operational
Flock-2p 3	41618	Planet Labs	3U	22/06/2017	Operational
Flock-2p 4	41611	Planet Labs	3U	22/06/2017	Operational
Flock-2p 5	41616	Planet Labs	3U	22/06/2017	Operational
Flock-2p 6	41606	Planet Labs	3U	22/06/2017	Operational
Flock-2p 7	41615	Planet Labs	3U	22/06/2017	Operational
Flock-2p 8	41613	Planet Labs	3U	22/06/2017	Operational
Flock-2p 9	41610	Planet Labs	3U	22/06/2017	Operational
Flock-2p 10	41612	Planet Labs	3U	22/06/2017	Operational
Flock-2p 11	41608	Planet Labs	3U	22/06/2017	Operational
Flock-2p 12	41614	Planet Labs	3U	22/06/2017	Operational
Flock-3p 1	41967	Planet Labs	3U	15/02/2017	Operational
Flock-3p 2	41966	Planet Labs	3U	15/02/2017	Operational
Flock-3p 3	41968	Planet Labs	3U	15/02/2017	Operational
Flock-3p 4	41965	Planet Labs	3U	15/02/2017	Operational
Flock-3p 5	41971	Planet Labs	3U	15/02/2017	Operational
Flock-3p 6	41969	Planet Labs	3U	15/02/2017	Operational
Flock-3p 7	41970	Planet Labs	3U	15/02/2017	Operational
Flock-3p 8	41951	Planet Labs	3U	15/02/2017	Operational
Flock-3p 9	41973	Planet Labs	3U	15/02/2017	Operational
Flock-3p 10	41974	Planet Labs	3U	15/02/2017	Operational
Flock-3p 11	41975	Planet Labs	3U	15/02/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3p 12	41972	Planet Labs	3U	15/02/2017	Operational
Flock-3p 13	42040	Planet Labs	3U	15/02/2017	Operational
Flock-3p 14	42012	Planet Labs	3U	15/02/2017	Operational
Flock-3p 15	42039	Planet Labs	3U	15/02/2017	Operational
Flock-3p 16	42011	Planet Labs	3U	15/02/2017	Operational
Flock-3p 17	41962	Planet Labs	3U	15/02/2017	Operational
Flock-3p 18	41957	Planet Labs	3U	15/02/2017	Operational
Flock-3p 19	41955	Planet Labs	3U	15/02/2017	Operational
Flock-3p 20	41950	Planet Labs	3U	15/02/2017	Operational
Flock-3p 21	41959	Planet Labs	3U	15/02/2017	Operational
Flock-3p 22	41958	Planet Labs	3U	15/02/2017	Operational
Flock-3p 23	42018	Planet Labs	3U	15/02/2017	Operational
Flock-3p 24	41956	Planet Labs	3U	15/02/2017	Operational
Flock-3p 25	41964	Planet Labs	3U	15/02/2017	Operational
Flock-3p 26	41963	Planet Labs	3U	15/02/2017	Operational
Flock-3p 27	41963	Planet Labs	3U	15/02/2017	Operational
Flock-3p 28	41960	Planet Labs	3U	15/02/2017	Operational
Flock-3p 29	42045	Planet Labs	3U	15/02/2017	Operational
Flock-3p 30	41987	Planet Labs	3U	15/02/2017	No signal (2 are non-responsive)
Flock-3p 31	42049	Planet Labs	3U	15/02/2017	No signal (2 are non-responsive)
Flock-3p 32	42023	Planet Labs	3U	15/02/2017	Operational
Flock-3p 33	41990	Planet Labs	3U	15/02/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3p 34	41988	Planet Labs	3U	15/02/2017	Operational
Flock-3p 35	41989	Planet Labs	3U	15/02/2017	Operational
Flock-3p 36	41986	Planet Labs	3U	15/02/2017	Operational
Flock-3p 37	41953	Planet Labs	3U	15/02/2017	Operational
Flock-3p 38	42037	Planet Labs	3U	15/02/2017	Operational
Flock-3p 39	42038	Planet Labs	3U	15/02/2017	Operational
Flock-3p 40	42010	Planet Labs	3U	15/02/2017	Operational
Flock-3p 41	42004	Planet Labs	3U	15/02/2017	Operational
Flock-3p 42	42008	Planet Labs	3U	15/02/2017	Operational
Flock-3p 43	42007	Planet Labs	3U	15/02/2017	Operational
Flock-3p 44	42033	Planet Labs	3U	15/02/2017	Operational
Flock-3p 45	42005	Planet Labs	3U	15/02/2017	Operational
Flock-3p 46	42031	Planet Labs	3U	15/02/2017	Operational
Flock-3p 47	42032	Planet Labs	3U	15/02/2017	Operational
Flock-3p 48	42006	Planet Labs	3U	15/02/2017	Operational
Flock-3p 49	42001	Planet Labs	3U	15/02/2017	Operational
Flock-3p 50	42029	Planet Labs	3U	15/02/2017	Operational
Flock-3p 51	41952	Planet Labs	3U	15/02/2017	Operational
Flock-3p 52	42030	Planet Labs	3U	15/02/2017	Operational
Flock-3p 53	42013	Planet Labs	3U	15/02/2017	Operational
Flock-3p 54	42014	Planet Labs	3U	15/02/2017	Operational
Flock-3p 55	42041	Planet Labs	3U	15/02/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3p 56	42042	Planet Labs	3U	15/02/2017	Operational
Flock-3p 57	41978	Planet Labs	3U	15/02/2017	Operational
Flock-3p 58	41977	Planet Labs	3U	15/02/2017	Operational
Flock-3p 59	42022	Planet Labs	3U	15/02/2017	Operational
Flock-3p 60	41976	Planet Labs	3U	15/02/2017	Operational
Flock-3p 61	42009	Planet Labs	3U	15/02/2017	Operational
Flock-3p 62	42036	Planet Labs	3U	15/02/2017	Operational
Flock-3p 63	42035	Planet Labs	3U	15/02/2017	Operational
Flock-3p 64	42034	Planet Labs	3U	15/02/2017	Operational
Flock-3p 65	42028	Planet Labs	3U	15/02/2017	Operational
Flock-3p 66	42027	Planet Labs	3U	15/02/2017	Operational
Flock-3p 67	42002	Planet Labs	3U	15/02/2017	Operational
Flock-3p 68	42003	Planet Labs	3U	15/02/2017	Operational
Flock-3p 69	42020	Planet Labs	3U	15/02/2017	Operational
Flock-3p 70	41980	Planet Labs	3U	15/02/2017	Operational
Flock-3p 71	42024	Planet Labs	3U	15/02/2017	Operational
Flock-3p 72	42051	Planet Labs	3U	15/02/2017	Operational
Flock-3p 73	41981	Planet Labs	3U	15/02/2017	Operational
Flock-3p 74	42048	Planet Labs	3U	15/02/2017	Operational
Flock-3p 75	41979	Planet Labs	3U	15/02/2017	Operational
Flock-3p 76	42019	Planet Labs	3U	15/02/2017	Operational
Flock-3p 77	42025	Planet Labs	3U	15/02/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3p 78	42047	Planet Labs	3U	15/02/2017	Operational
Flock-3p 79	41984	Planet Labs	3U	15/02/2017	Operational
Flock-3p 80	42026	Planet Labs	3U	15/02/2017	Operational
Flock-3p 81	42043	Planet Labs	3U	15/02/2017	Operational
Flock-3p 82	42046	Planet Labs	3U	15/02/2017	Operational
Flock-3p 83	42050	Planet Labs	3U	15/02/2017	Operational
Flock-3p 84	42021	Planet Labs	3U	15/02/2017	Operational
Flock-3p 85	41983	Planet Labs	3U	15/02/2017	Operational
Flock-3p 86	41985	Planet Labs	3U	15/02/2017	Operational
Flock-3p 87	42044	Planet Labs	3U	15/02/2017	Operational
Flock-3p 88	41982	Planet Labs	3U	15/02/2017	Operational
Flock-2K 1	42852	Planet Labs	3U	24/07/2017	Operational
Flock-2K 2	42853	Planet Labs	3U	24/07/2017	Operational
Flock-2K 3	42850	Planet Labs	3U	24/07/2017	Operational
Flock-2K 4	42851	Planet Labs	3U	24/07/2017	Operational
Flock-2K 5	42864	Planet Labs	3U	24/07/2017	Operational
Flock-2K 6	42897	Planet Labs	3U	24/07/2017	Operational
Flock-2K 7	42862	Planet Labs	3U	24/07/2017	Operational
Flock-2K 8	42863	Planet Labs	3U	24/07/2017	Operational
Flock-2K 9	42896	Planet Labs	3U	24/07/2017	Operational
Flock-2K 10	42895	Planet Labs	3U	24/07/2017	Operational
Flock-2K 11	442894	Planet Labs	3U	24/07/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-2K 12	42893	Planet Labs	3U	24/07/2017	Operational
Flock-2K 13	42891	Planet Labs	3U	24/07/2017	Operational
Flock-2K 14	42892	Planet Labs	3U	24/07/2017	Operational
Flock-2K 15	42890	Planet Labs	3U	24/07/2017	Operational
Flock-2K 16	42889	Planet Labs	3U	24/07/2017	Operational
Flock-2K 17	42888	Planet Labs	3U	24/07/2017	Operational
Flock-2K 18	42887	Planet Labs	3U	24/07/2017	Operational
Flock-2K 19	42886	Planet Labs	3U	24/07/2017	Operational
Flock-2K 20	42885	Planet Labs	3U	24/07/2017	Operational
Flock-2K 21	42860	Planet Labs	3U	24/07/2017	Operational
Flock-2K 22	42861	Planet Labs	3U	24/07/2017	Operational
Flock-2K 23	42859	Planet Labs	3U	24/07/2017	Operational
Flock-2K 24	42857	Planet Labs	3U	24/07/2017	Operational
Flock-2K 25	42884	Planet Labs	3U	24/07/2017	Operational
Flock-2K 26	42883	Planet Labs	3U	24/07/2017	Operational
Flock-2K 27	42882	Planet Labs	3U	24/07/2017	Operational
Flock-2K 28	42880	Planet Labs	3U	24/07/2017	Operational
Flock-2K 29	42871	Planet Labs	3U	24/07/2017	Operational
Flock-2K 30	42872	Planet Labs	3U	24/07/2017	Operational
Flock-2K 31	42869	Planet Labs	3U	24/07/2017	Operational
Flock-2K 32	42870	Planet Labs	3U	24/07/2017	Operational
Flock-2K 33	42879	Planet Labs	3U	24/07/2017	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-2K 34	42878	Planet Labs	3U	24/07/2017	Operational
Flock-2K 35	42877	Planet Labs	3U	24/07/2017	Operational
Flock-2K 36	42876	Planet Labs	3U	24/07/2017	Operational
Flock-2K 37	42867	Planet Labs	3U	24/07/2017	Operational
Flock-2K 38	42868	Planet Labs	3U	24/07/2017	Operational
Flock-2K 39	42866	Planet Labs	3U	24/07/2017	Operational
Flock-2K 40	42865	Planet Labs	3U	24/07/2017	Operational
Flock-2K 41	42875	Planet Labs	3U	24/07/2017	Operational
Flock-2K 42	Deployment failure	Planet Labs	3U	24/07/2017	Deployment failure
Flock-2K 43	42874	Planet Labs	3U	24/07/2017	Operational
Flock-2K 44	42873	Planet Labs	3U	24/07/2017	Operational
Flock-2K 45	42856	Planet Labs	3U	24/07/2017	Operational
Flock-2K 46	42858	Planet Labs	3U	24/07/2017	Operational
Flock-2K 47	42854	Planet Labs	3U	24/07/2017	Operational
Flock-2K 48	42855	Planet Labs	3U	24/07/2017	Operational
Flock-3m 1	42995	Planet Labs	3U	31/10/2017	Operational
Flock-3m 2	42998	Planet Labs	3U	31/10/2017	Operational
Flock-3m 3	42996	Planet Labs	3U	31/10/2017	Operational
Flock-3m 4	42997	Planet Labs	3U	31/10/2017	Operational
Flock-3p' 1	43121	Planet Labs	3U	12/01/2018	Operational
Flock-3p' 2	43120	Planet Labs	3U	12/01/2018	Operational
Flock-3p' 3	43119	Planet Labs	3U	12/01/2018	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3p' 4	43122	Planet Labs	3U	12/01/2018	Operational
Flock-3r 1	43747	Planet Labs	3U	29/11/2018	Operational
Flock-3r 2	43748	Planet Labs	3U	29/11/2018	Operational
Flock-3r 3	43734	Planet Labs	3U	29/11/2018	Operational
Flock-3r 4	43733	Planet Labs	3U	29/11/2018	Operational
Flock-3r 5	43726	Planet Labs	3U	29/11/2018	Operational
Flock-3r 6	43741	Planet Labs	3U	29/11/2018	Operational
Flock-3r 7	43742	Planet Labs	3U	29/11/2018	Operational
Flock-3r 8	43727	Planet Labs	3U	29/11/2018	Operational
Flock-3r 9	43723	Planet Labs	3U	29/11/2018	Operational
Flock-3r 10	43740	Planet Labs	3U	29/11/2018	Operational
Flock-3r 11	43725	Planet Labs	3U	29/11/2018	Operational
Flock-3r 12	43724	Planet Labs	3U	29/11/2018	Operational
Flock-3r 13	43750	Planet Labs	3U	29/11/2018	Operational
Flock-3r 14	43749	Planet Labs	3U	29/11/2018	Operational
Flock-3r 15	43736	Planet Labs	3U	29/11/2018	Operational
Flock-3r 16	43735	Planet Labs	3U	29/11/2018	Operational
Flock-3s 1	43769	Planet Labs	3U	03/12/2018	Operational
Flock-3s 2	43821	Planet Labs	3U	03/12/2018	Operational
Flock-3s 3	43788	Planet Labs	3U	03/12/2018	Operational
Flock-3k 1	43894	Planet Labs	3U	27/12/2018	Operational
Flock-3k 2	43895	Planet Labs	3U	27/12/2018	Operational

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Flock-3k 3	43892	Planet Labs	3U	27/12/2018	Operational
Flock-3k 4	43893	Planet Labs	3U	27/12/2018	Operational
Flock-3k 5	43899	Planet Labs	3U	27/12/2018	Operational
Flock-3k 6	43896	Planet Labs	3U	27/12/2018	Operational
Flock-3k 7	43902	Planet Labs	3U	27/12/2018	Operational
Flock-3k 8	43901	Planet Labs	3U	27/12/2018	Operational
Flock-3k 9	43906	Planet Labs	3U	27/12/2018	Operational
Flock-3k 10	43905	Planet Labs	3U	27/12/2018	Operational
Flock-3k 11	43904	Planet Labs	3U	27/12/2018	Operational
Flock-3k 12	43903	Planet Labs	3U	27/12/2018	Operational
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-v xx	Not launched	Planet Labs	3U	31/12/2019	Not launched

Satellite name	NORAD	Organisation	Type	Rocket launch	Lifetime or status
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched
Folck-xx xx	Not launched	Planet Labs	3U	31/12/2019	Not launched

ANNEX 3: TLE number of Flock constellation satellites

In this annex, it can be found the TLE number for all the operational satellites of the Flock constellation. The TLE number is a data format encoding a list of orbital elements of an Earth-Orbiting object for a given period of time.

The TLE number is composed by two lines with several numbers on it. Each of these numbers has a specific meaning depending on the position inside the TLE (figure 1).

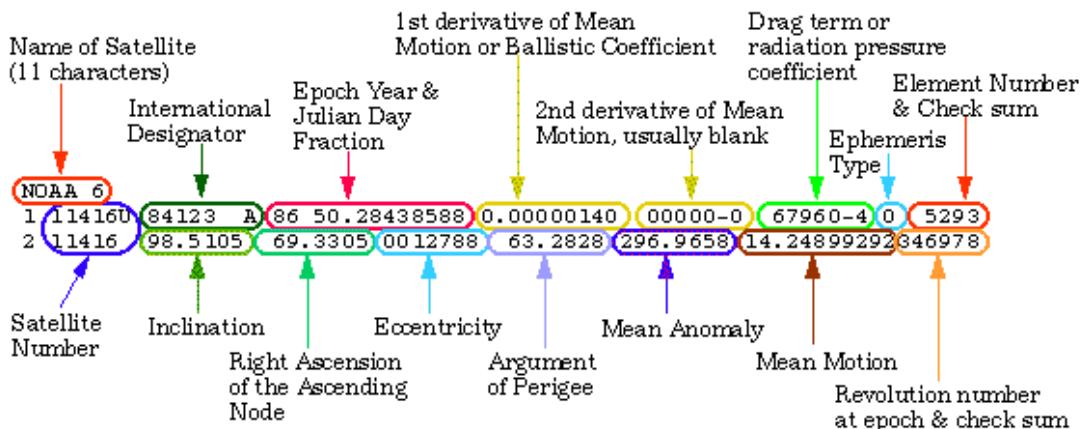


Figure 1. Meaning of each position of the TLE number

In table 3, it has been collected the TLE number of every operational satellite.

Table 3. Two-line element set of each of the Flock satellites.[3]

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 1c-1 (0 Flock 1C-1 0903)	40027	1 40027U 14033T 19140.73544977 .00000551 00000-0 63424-4 0 9999
		2 40027 97.9261 63.8374 0013192 146.4808 213.7247 14.89752710267079
Dove 1c-10 (0 Flock 1C-10 090C)	40023	1 40023U 14033P 19141.33261467 .00000502 00000-0 58307-4 0 9992
		2 40023 97.9234 63.9662 0013219 147.3251 212.8786 14.89697514267155
Dove 1c-11 (0 Flock 1C-11 090D)	40033	1 40033U 14033Z 19141.00674055 .00000550 00000-0 61668-4 0 9995
		2 40033 97.9331 66.9797 0013126 132.0632 228.1704 14.90824905267278
Dove 1c-2 (0 Flock 1C-2 0904)	40029	1 40029U 14033V 19140.74902808 .00000474 00000-0 55305-4 0 9996
		2 40029 97.9248 63.6541 0014504 145.5673 214.6487 14.89785828267070
Dove 1c-3 (0 Flock 1C-3 0905)	40041	1 40041U 14033AH 19140.82216627 .00000403 00000-0 48170-4 0 9990
		2 40041 97.9271 63.9022 0014025 135.9181 224.3156 14.89554955267056
Dove 1c-4 (0 Flock 1C-4 0906)	40031	1 40031U 14033X 19140.74172716 .00000356 00000-0 43352-4 0 9994
		2 40031 97.9253 63.3954 0015207 142.6595 217.5682 14.89421044267049
	40038	1 40038U 14033AE 19140.84299016 .00000411 00000-0 48605-4 0 9993

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 1c-5 (0 Flock 1C-5 0907)		2 40038 97.9288 64.5230 0014912 136.3933 223.8466 14.89908721267101
Dove 1c-6 (0 Flock 1C-6 0908)	40036	1 40036U 14033AC 19140.82254043 .00000448 00000-0 52417-4 0 9996
		2 40036 97.9313 64.9002 0012761 136.2428 223.9803 14.89941507267102
Dove 1c-7 (0 Flock 1C-7 0909)	40026	1 40026U 14033S 19141.26738038 .00000582 00000-0 65485-4 0 9993
		2 40026 97.9290 65.7221 0011793 141.5233 218.6828 14.90450211267235
Dove 1c-8 (0 Flock 1C-8 090A)	40040	1 40040U 14033AG 19140.99606864 .00000399 00000-0 45258-4 0 9991
		2 40040 97.9433 69.6129 0013875 118.0105 242.2518 14.91807444267380
Dove 1c-9 (0 Flock 1C-9 090B)	40035	1 40035U 14033AB 19140.85101754 .00000446 00000-0 52350-4 0 9992
		2 40035 97.9294 64.4836 0012609 135.3536 224.8699 14.89835812267092
Dove 2k-1 (0 Flock 2K-1 0F1A)	42852	1 42852U 17042AD 19141.21135924 .00003237 00000-0 85805-4 0 9993
		2 42852 96.9430 25.3441 0008801 339.6231 20.4663 15.38976837103582
Dove 2k-10 (0 Flock 2K-10 0F32)	42895	1 42895U 17042BY 19141.15143362 .00002324 00000-0 62163-4 0 9996
		2 42895 96.9436 25.4524 0010418 320.3832 39.6652 15.38954126103586
Dove 2k-11 (0 Flock 2K-11 0F33)	42894	1 42894U 17042BX 19141.16034209 .00002550 00000-0 68069-4 0 9997
		2 42894 96.9438 25.4733 0010208 318.3915 41.6554 15.38939685103582
Dove 2k-12 (0 Flock 2K-12 0F36)	42893	1 42893U 17042BW 19140.69425021 .00003070 00000-0 81466-4 0 9993
		2 42893 96.9442 25.0789 0010499 324.2948 35.7596 15.38961649103515
Dove 2k-13 (0 Flock 2K-13 0F37)	42891	1 42891U 17042BU 19140.62480521 +.00004929 +00000-0 +12503-3 0 9999
		2 42891 096.9455 025.0418 0009881 320.2461 039.8061 15.40071263103503
Dove 2k-14 (0 Flock 2K-14 0F3B)	42892	1 42892U 17042BV 19140.74509006 .00004628 00000-0 11991-3 0 9999
		2 42892 96.9431 25.0881 0010077 322.8719 37.1830 15.39452845103529
Dove 2k-15 (0 Flock 2K-15 0F3C)	42890	1 42890U 17042BT 19141.21890386 .00002397 00000-0 64035-4 0 9993
		2 42890 96.9449 25.5990 0010361 321.7948 38.2563 15.38968599103599
Dove 2k-16 (0 Flock 2K-16 0F3D)	42889	1 42889U 17042BS 19140.57843822 +.00002086 +00000-0 +55981-4 0 9997
		2 42889 096.9443 024.9172 0010099 324.1642 035.8926 15.38971927103496
Dove 2k-17 (0 Flock 2K-17 0F40)	42888	1 42888U 17042BR 19141.18235916 .00004066 00000-0 10488-3 0 9995
		2 42888 96.9426 25.5212 0009890 321.4909 38.5631 15.39663006103592
Dove 2k-18 (0 Flock 2K-18 0F44)	42887	1 42887U 17042BQ 19141.15595120 .00002164 00000-0 58056-4 0 9998
		2 42887 96.9440 25.4745 0010542 322.6742 37.3771 15.38932576103582
Dove 2k-19 (0 Flock 2K-19 0F46)	42886	1 42886U 17042BP 19141.22989246 .00001958 00000-0 52677-4 0 9994
		2 42886 96.9439 25.5348 0010444 323.5571 36.4964 15.38961335103590
Dove 2k-2 (0 Flock 2K-2 0F1E)	42853	1 42853U 17042AE 19140.80886847 .00003990 00000-0 11206-3 0 9994
		2 42853 96.9435 23.2232 0009868 345.8637 14.2330 15.37033724103395
Dove 2k-20 (0 Flock 2K-20 0F47)	42885	1 42885U 17042BN 19141.15174589 .00004048 00000-0 10571-3 0 9990
		2 42885 96.9434 25.4792 0010137 323.3471 36.7081 15.39279629103583
Dove 2k-21 (0 Flock 2K-21 0F49)	42860	1 42860U 17042AM 19141.33130558 .00001935 00000-0 52105-4 0 9993
		2 42860 96.9437 25.5176 0008833 337.6984 22.3877 15.38962369103609
Dove 2k-22 (0 Flock 2K-22 0F4A)	42861	1 42861U 17042AN 19140.57430583 +.00004641 +00000-0 +11631-3 0 9995
		2 42861 096.9444 025.2276 0008496 338.4938 021.5951 15.40482384103510

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 2k-23 (0 Flock 2K-23 0F4B)	42859	1 42859U 17042AL 19141.19677831 .00001776 00000-0 47955-4 0 9995
		2 42859 96.9437 25.4085 0008932 337.8509 22.2351 15.38974625103581
Dove 2k-24 (0 Flock 2K-24 0F4F)	42857	1 42857U 17042AJ 19141.16737997 .00004047 00000-0 10444-3 0 9996
		2 42857 96.9425 25.2645 0008365 335.5813 24.5036 15.39663373103579
Dove 2k-25 (0 Flock 2K-25 0F4D)	42884	1 42884U 17042BM 19140.58206350 +.00002114 +00000-0 +56746-4 0 9994
		2 42884 096.9438 024.8843 0010106 326.4276 033.6329 15.38944369103499
Dove 2k-26 (0 Flock 2K-26 0F53)	42883	1 42883U 17042BL 19141.48991532 .00004008 00000-0 10409-3 0 9995
		2 42883 96.9431 25.8884 0009979 322.0228 38.0314 15.39458470103646
Dove 2k-27 (0 Flock 2K-27 0F54)	42882	1 42882U 17042BK 19141.17830646 .00004903 00000-0 12561-3 0 9993
		2 42882 96.9435 25.4586 0009822 325.7187 34.3425 15.39770694103585
Dove 2k-28 (0 Flock 2K-28 1047)	42880	1 42882U 17042BK 19141.17830646 .00004903 00000-0 12561-3 0 9993
		2 42882 96.9435 25.4586 0009822 325.7187 34.3425 15.39770694103585
Dove 2k-29 (0 Flock 2K-29 1048)	42871	1 42871U 17042AY 19141.37285060 .00001936 00000-0 52178-4 0 9999
		2 42871 96.9435 25.6144 0009127 333.0872 26.9900 15.38930128103614
Dove 2k-3 (0 Flock 2K-3 0F21)	42850	1 42850U 17042AB 19141.14456479 .00002666 00000-0 71013-4 0 9995
		2 42850 96.9432 25.2961 0009154 339.4915 20.5963 15.38970351103575
Dove 2k-30 (0 Flock 2K-30 1049)	42872	1 42872U 17042AZ 19141.17566458 .00001800 00000-0 48643-4 0 9993
		2 42872 96.9439 25.4339 0009119 334.5317 25.5479 15.38936581103574
Dove 2k-31 (0 Flock 2K-31 104A)	42869	1 42869U 17042AW 19141.18210793 .00001856 00000-0 50080-4 0 9997
		2 42869 96.9435 25.4114 0009069 333.7116 26.3669 15.38937044103585
Dove 2k-32 (0 Flock 2K-32 104B)	42870	1 42870U 17042AX 19141.44034580 .00001938 00000-0 52194-4 0 9995
		2 42870 96.9432 25.6502 0009016 333.9152 26.1639 15.38949964103625
Dove 2k-33 (0 Flock 2K-33 104C)	42879	1 42879U 17042BG 19141.21279139 .00005255 00000-0 12806-3 0 9991
		2 42879 96.9431 26.1054 0009177 322.3529 37.7076 15.41269830103634
Dove 2k-34 (0 Flock 2K-34 104D)	42878	1 42878U 17042BF 19140.25945323 .00008348 00000-0 21642-3 0 9992
		2 42878 96.9438 24.5776 0009828 328.9365 31.1299 15.39199977103441
Dove 2k-35 (0 Flock 2K-35 104E)	42877	1 42877U 17042BE 19141.17079819 .00001858 00000-0 50069-4 0 9996
		2 42877 96.9439 25.4574 0009945 323.5000 36.5568 15.38973707103587
Dove 2k-36 (0 Flock 2K-36 104F)	42876	1 42876U 17042BD 19140.73812874 .00004657 00000-0 11970-3 0 9999
		2 42876 96.9433 25.0019 0009883 327.2552 32.8081 15.39694896103516
Dove 2k-37 (0 Flock 2K-37 1050)	42867	1 42867U 17042AU 19141.44880432 .00002151 00000-0 57642-4 0 9997
		2 42867 96.9436 25.6724 0009194 337.1626 22.9211 15.38984481103623
Dove 2k-38 (0 Flock 2K-38 1051)	42868	1 42868U 17042AV 19141.44355086 .00004837 00000-0 12690-3 0 9996
		2 42868 96.9434 25.6715 0008913 334.9669 25.1144 15.39056864103628
Dove 2k-39 (0 Flock 2K-39 1052)	42866	1 42866U 17042AT 19141.12553980 .00002558 00000-0 68213-4 0 9993
		2 42866 96.9437 25.3542 0009102 337.9528 22.1326 15.38972990103571
Dove 2k-4 (0 Flock 2K-4 0F24)	42851	1 42851U 17042AC 19140.59102813 +.00002732 +00000-0 +71510-4 0 9990
		2 42851 096.9428 024.9979 0009181 344.5687 015.5278 15.39487848103500
Dove 2k-40 (0 Flock 2K-40 1053)	42865	1 42865U 17042AS 19141.19250646 .00001908 00000-0 51384-4 0 9991
		2 42865 96.9440 25.4387 0009106 338.6876 21.3990 15.38961515103580

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 2k-41 (0 Flock 2K-41 1054)	42875	1 42875U 17042BC 19141.15814629 .00002525 00000-0 67425-4 0 9994
		2 42875 96.9439 25.4655 0010075 324.4373 35.6202 15.38940153103588
Dove 2k-43 (0 Flock 2K-43 1056)	42874	1 42874U 17042BB 19141.23995759 .00001372 00000-0 41489-4 0 9997
		2 42874 96.9430 23.6332 0011595 333.0249 27.0391 15.35743174103468
Dove 2k-44 (0 Flock 2K-44 1020)	42873	1 42873U 17042BA 19140.58831507 +.00002210 +00000-0 +59266-4 0 9997
		2 42873 096.9433 024.8658 0009636 324.3632 035.6970 15.38930281103497
Dove 2k-45 (0 Flock 2K-45 100D)	42856	1 42856U 17042AH 19140.74799788 .00002233 00000-0 59838-4 0 9990
		2 42856 96.9432 24.9270 0008678 339.5373 20.5525 15.38950842103510
Dove 2k-46 (0 Flock 2K-46 103F)	42858	1 42858U 17042AK 19141.16562947 .00004200 00000-0 10878-3 0 9990
		2 42858 96.9433 25.4531 0008495 336.7436 23.3425 15.39527307103589
Dove 2k-47 (0 Flock 2K-47 1043)	42854	1 42854U 17042AF 19140.62229308 +.00002964 +00000-0 +78756-4 0 9992
		2 42854 096.9432 024.8004 0008818 340.7816 019.3097 15.38965534103495
Dove 2k-48 (0 Flock 2K-48 101C)	42855	1 42855U 17042AG 19141.13991813 .00003923 00000-0 10335-3 0 9991
		2 42855 96.9432 25.3160 0008534 339.3805 20.7096 15.39044035103571
Dove 2k-5 (0 Flock 2K-5 0F29)	42864	1 42855U 17042AG 19141.13991813 .00003923 00000-0 10335-3 0 9991
		2 42855 96.9432 25.3160 0008534 339.3805 20.7096 15.39044035103571
Dove 2k-6 (0 Flock 2K-6 0F2A)	42897	1 42897U 17042CA 19140.60078306 +.00002233 +00000-0 +59776-4 0 9997
		2 42897 096.9437 024.8710 0009285 338.6648 021.4210 15.38977189103499
Dove 2k-7 (0 Flock 2K-7 0F2B)	42862	1 42862U 17042AP 19140.61356648 +.00002397 +00000-0 +64044-4 0 9993
		2 42862 096.9440 024.8754 0009124 340.0056 020.0831 15.38971348103502
Dove 2k-8 (0 Flock 2K-8 0F2D)	42863	1 42863U 17042AQ 19140.73954096 .00002130 00000-0 57103-4 0 9991
		2 42863 96.9435 24.9628 0009162 340.8600 19.2301 15.38983297103512
Dove 2k-9 (0 Flock 2K-9 0F2E)	42896	1 42896U 17042BZ 19141.49062136 .00002860 00000-0 73736-4 0 9996
		2 42896 96.9424 26.1794 0009818 318.2025 41.8471 15.39919213103834
Dove 2p-1 (0 Flock 2P-1 0E0D)	41617	1 41617U 16040U 19140.40824632 .00002554 00000-0 10225-3 0 9993
		2 41617 97.3735 206.2695 0011523 128.4832 231.7442 15.25916238161637
Dove 2p-10 (0 Flock 2P-10 0E2F)	41612	1 41612U 16040P 19140.48374200 +.00001487 +00000-0 +61576-4 0 9997
		2 41612 097.3746 206.2218 0011845 129.2012 231.0280 15.25425493161643
Dove 2p-11 (0 Flock 2P-11 0E30)	41608	1 41608U 16040K 19140.42377960 +.00002819 +00000-0 +11117-3 0 9997
		2 41608 097.3691 205.7894 0011542 120.1528 240.0856 15.26335398161629
Dove 2p-12 (0 Flock 2P-12 0E3A)	41614	1 41614U 16040R 19140.61096351 +.00001640 +00000-0 +67763-4 0 9997
		2 41614 097.3756 206.4411 0011797 128.4535 231.7764 15.25365570161665
Dove 2p-2 (0 Flock 2P-2 (0e0E)	41609	1 41609U 16040L 19140.41412728 .00001028 00000-0 43562-4 0 9990
		2 41609 97.3716 205.5997 0011767 121.1112 239.1282 15.25330132161586
Dove 2p-3 (0 Flock 2P-3 (0EOF)	41618	1 41618U 16040V 19141.16133712 .00001234 00000-0 51687-4 0 9992
		2 41618 97.3757 206.9312 0011654 126.5928 233.6384 15.25371870161740
Dove 2p-4 (0 Flock 2P-4 (0E14)	41611	1 41611U 16040N 19141.17107662 .00002064 00000-0 82926-4 0 9993
		2 41611 97.3729 206.8902 0011753 126.4207 233.8117 15.26008589161757

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 2p-5 (0 Flock 2P-5 0E16)	41616	1 41616U 16040T 19140.42716604 +.00001944 +00000-0 +79807-4 0 9997
		2 41616 097.3752 206.2303 0011696 128.8846 231.3438 15.25362671161616
Dove 2p-6 (0 Flock 2P-6 0E19)	41606	1 41606U 16040H 19141.16704634 .00001010 00000-0 42682-4 0 9993
		2 41606 97.3715 206.4181 0011865 118.8331 241.4099 15.25458087161786
Dove 2p-7 (0 Flock 2P-7 0E1F)	41615	1 41615U 16040S 19141.17759290 .00002403 00000-0 95596-4 0 9991
		2 41615 97.3712 206.8268 0011431 126.9316 233.2971 15.26185514161753
Dove 2p-8 (0 Flock 2P-8 0E20)	41613	1 41613U 16040Q 19140.84794864 .00001317 00000-0 55012-4 0 9990
		2 41613 97.3744 206.4383 0012152 127.4501 232.7844 15.25340347161695
Dove 2p-9 (0 Flock 2P-9 0E26)	41610	1 41610U 16040M 19140.82285735 .00001193 00000-0 50095-4 0 9995
		2 41610 97.3714 205.9336 0012281 119.1856 241.0612 15.25346542161526
Dove 3k-1 (0 Flock 3K-1 1062)	43894	1 43894U 18111U 19141.48134519 .00002707 00000-0 11324-3 0 9991
		2 43894 97.2918 47.4032 0026101 95.3606 265.0611 15.24116678 22146
Dove 3k-10 (0 Flock 3K-10 106d)	43905	1 43905U 18111AF 19141.18060945 .00001460 00000-0 61988-4 0 9999
		2 43905 97.2922 47.2016 0024019 92.5223 267.8765 15.24402550 22107
Dove 3k-11 (0 Flock 3K-11 106e)	43904	1 43904U 18111AE 19140.78797611 .00000880 00000-0 38538-4 0 9990
		2 43904 97.2922 46.8156 0024200 93.8008 266.5997 15.24369323 22049
Dove 3k-12 (0 Flock 3K-12 106f)	43903	1 43903U 18111AD 19140.79208036 .00000836 00000-0 36753-4 0 9996
		2 43903 97.2919 46.8054 0024114 94.4297 265.9697 15.24355331 22046
Dove 3k-2 (0 Flock 3K-2 106c)	43895	1 43895U 18111V 19141.47699102 .00002802 00000-0 11690-3 0 9997
		2 43895 97.2921 47.4132 0026084 95.0826 265.3390 15.24180511 22147
Dove 3k-3 (0 Flock 3K-3 1068)	43892	1 43892U 18111S 19141.22582028 .00002736 00000-0 11462-3 0 9998
		2 43892 97.2924 47.1479 0026124 96.5881 263.8331 15.24056996 22103
Dove 3k-4 (0 Flock 3K-4 1063)	43893	1 43893U 18111T 19140.69768455 .00003020 00000-0 12611-3 0 9993
		2 43893 97.2926 46.6410 0026022 98.1029 262.3162 15.24088504 22021
Dove 3k-5 (0 Flock 3K-5 1067)	43899	1 43899U 18111Z 19141.20454787 .00000981 00000-0 42741-4 0 9998
		2 43899 97.2923 47.1742 0024248 92.7523 267.6491 15.24257283 22109
Dove 3k-6 (0 Flock 3K-6 1069)	43896	1 43896U 18111W 19141.47240742 .00002675 00000-0 11169-3 0 9999
		2 43896 97.2921 47.4179 0024169 92.1125 268.2880 15.24241365 22142
Dove 3k-7 (0 Flock 3K-7 106a)	43902	1 43902U 18111AC 19140.53645373 .00001839 00000-0 77634-4 0 9993
		2 43902 97.2922 46.5424 0024547 94.6317 265.7725 15.24257919 22001
Dove 3k-8 (0 Flock 3K-8 106b)	43901	1 43901U 18111AB 19140.80446674 .00001509 00000-0 64223-4 0 9999
		2 43901 97.2916 46.7877 0024294 94.1827 266.2188 15.24256510 22046
Dove 3k-9 (0 Flock 3K-9 1065)	43906	1 43906U 18111AG 19141.51564035 .00000835 00000-0 36825-4 0 9993
		2 43906 97.2921 47.5099 0024063 91.1321 269.2673 15.24253722 22158
Dove 3m-1 (0 Flock 3M-1 0F06)	42995	1 42995U 17068J 19140.34066953 .00001659 00000-0 79514-4 0 9993
		2 42995 97.3755 249.8383 0018071 53.6449 306.6451 15.20158482 85837
Dove 3m-2 (0 Flock 3M-2 0F02)	42998	1 42998U 17068M 19141.44216133 .00001732 00000-0 83038-4 0 9993
		2 42998 97.3835 251.6454 0015702 48.2241 312.0333 15.20136224 86018
Dove 3m-3 (0 Flock 3M-3 0F13)	42996	1 42996U 17068K 19141.25950932 .00001532 00000-0 73396-4 0 9996
		2 42996 97.3704 250.5384 0017254 51.4832 308.7947 15.20302498 85983
	42997	1 42997U 17068L 19140.36885503 .00001910 00000-0 91211-4 0 9995

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 3m-4 (0 Flock 3M-4 0F4C)		2 42997 97.3944 251.2620 0017427 55.4129 304.8747 15.20128288 85849
Dove 3p-1 (0 Flock 3P-1 1000)	41967	1 41967U 17008V 19141.17572256 .00002297 00000-0 91335-4 0 9999
		2 41967 97.4068 208.5624 0006651 231.7695 128.2945 15.26304671125465
Dove 3p'-1 (0 Flock 3p'1 1100)	43121	1 43121U 18004L 19141.18167422 .00001628 00000-0 71699-4 0 9994
		2 43121 97.4922 208.8566 0009904 1.9716 358.1557 15.23248596 75075
Dove 3p-10 (0 Flock 3P-10 1022)	41974	1 41974U 17008AC 19141.22044308 .00001949 00000-0 79004-4 0 9997
		2 41974 97.4081 208.7034 0006169 232.7160 127.3517 15.25831572125433
Dove 3p-11 (0 Flock 3P-11 101F)	41975	1 41975U 17008AD 19141.17328807 .00000895 00000-0 38408-4 0 9993
		2 41975 97.4082 208.4467 0006683 234.5125 125.5490 15.25311897125303
Dove 3p-12 (0 Flock 3P-12 1010)	41972	1 41972U 17008AA 19141.16672666 .00001415 00000-0 58954-4 0 9991
		2 41972 97.4081 208.4402 0006491 236.0043 124.0579 15.25349254125536
Dove 3p-13 (0 Flock 3P-13 1016)	42040	1 42040U 17008CW 19141.17560675 .00001839 00000-0 74300-4 0 9998
		2 42040 97.4080 208.7572 0005446 261.2347 98.8274 15.26023507124797
Dove 3p-14 (0 Flock 3P-14 1018)	42012	1 42012U 17008BS 19141.12840150 .00000873 00000-0 37351-4 0 9993
		2 42012 97.4096 208.7115 0005527 265.9231 94.1375 15.25455908125413
Dove 3p-15 (0 Flock 3P-15 101D)	42039	1 42039U 17008CV 19140.41623475 .00002264 00000-0 91164-4 0 9990
		2 42039 97.4074 207.8747 0005572 265.7872 94.2729 15.25891897124681
Dove 3p-16 (0 Flock 3P-16 100E)	42011	1 42011U 17008BR 19140.13582205 .00000882 00000-0 38030-4 0 9991
		2 42011 97.4078 207.4733 0005518 267.2067 92.8540 15.25171583124632
Dove 3p-17 (0 Flock 3P-17 1023)	41962	1 41962U 17008Q 19141.17796441 .00001992 00000-0 79346-4 0 9997
		2 41962 97.4070 208.8035 0006464 232.7581 127.3069 15.26392207125435
Dove 3p-18 (0 Flock 3P-18 102B)	41957	1 41957U 17008K 19141.16549396 .00002317 00000-0 91299-4 0 9998
		2 41957 97.4047 208.7247 0007215 231.0762 128.9834 15.26588150125481
Dove 3p-19 (0 Flock 3P-19 1024)	41955	1 41955U 17008H 19141.18079021 .00000991 00000-0 42165-4 0 9995
		2 41955 97.4071 208.3269 0007384 235.0180 125.0365 15.25337304125536
Dove 3p-2 (0 Flock 3P-2 1001)	41966	1 41966U 17008U 19141.17609134 .00001319 00000-0 55209-4 0 9998
		2 41966 97.4081 208.4206 0006747 231.7603 128.3028 15.25328027125451
Dove 3p'-2 (0 Flock 3p'2 1102)	43120	1 43120U 18004K 19141.16869986 .00000570 00000-0 27526-4 0 9990
		2 43120 97.4926 208.7372 0010049 2.4437 357.6846 15.22689468 75138
Dove 3p-20 (0 Flock 3P-20 1029)	41950	1 41950U 17008C 19141.16921219 .00001022 00000-0 43343-4 0 9998
		2 41950 97.4076 208.3606 0007540 236.0629 123.9892 15.25369432125612
Dove 3p-21 (0 Flock 3P-21 102A)	41959	1 41959U 17008M 19140.41599150 +.00002229 +00000-0 +89710-4 0 9997
		2 41959 097.4080 207.7667 0006809 237.2779 122.7804 15.25920730125346
Dove 3p-22 (0 Flock 3P-22 1028)	41958	1 41958U 17008L 19141.17109747 .00002320 00000-0 92323-4 0 9995
		2 41958 97.4075 208.5335 0006926 230.6618 129.4007 15.26262448125456
Dove 3p-23 (0 Flock 3P-23 1025)	42018	1 42018U 17008BY 19141.17966766 .00000975 00000-0 41533-4 0 9996
		2 42018 97.4074 208.3462 0007073 232.4273 127.6323 15.25320871124389
Dove 3p-24 (0 Flock 3P-24 1026)	41956	1 41956U 17008J 19140.40822095 .00002813 00000-0 10887-3 0 9997
		2 41956 97.4058 208.2238 0006923 229.1800 130.8839 15.27009794125540
	41964	1 41964U 17008S 19141.16949098 .00002252 00000-0 90069-4 0 9991

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Dove 3p-25 (0 Flock 3P-25 102F)		2 41964 97.4058 208.5064 0007059 231.2757 128.7851 15.26124617125445
Dove 3p-26 (0 Flock 3P-26 102D)	41961	1 41961U 17008P 19140.80777332 .00001922 00000-0 77237-4 0 9993
		2 41961 97.4070 208.2466 0006830 232.0538 128.0083 15.26150779125416
Dove 3p-27 (0 Flock 3P-27 1030)	41963	1 41963U 17008R 19141.15926433 .00001884 00000-0 75938-4 0 9995
		2 41963 97.4072 208.5514 0006992 230.7005 129.3614 15.26061242125465
Dove 3p-28 (0 Flock 3P-28 102C)	41960	1 41960U 17008N 19141.16499100 .00001805 00000-0 73897-4 0 9994
		2 41960 97.4073 208.4109 0006937 232.1068 127.9543 15.25599486125534
Dove 3p-29 (0 Flock 3P-29 1033)	42045	1 42045U 17008DB 19140.14322711 .00002161 00000-0 87458-4 0 9993
		2 42045 97.4078 207.5416 0006256 236.7699 123.2940 15.25768730124640
Dove 3p'-3 (0 Flock 3p'3 1105)	43119	1 43119U 18004J 19140.43383522 +.00000768 +00000-0 +35901-4 0 9999
		2 43119 097.4926 208.0290 0010175 005.0400 355.0937 15.22782336075026
Dove 3p-3 (0 Flock 3P-3 1002)	41968	1 41968U 17008W 19141.17647110 .00000839 00000-0 36152-4 0 9998
		2 41968 97.4075 208.3767 0006815 233.1523 126.9090 15.25318633125444
Dove 3p-30 (0 Flock 3P-30 102E)	41987	1 41987U 17008AR 19140.80403552 .00000975 00000-0 41554-4 0 9991
		2 41987 97.4091 208.2357 0005820 240.5142 119.5515 15.25329513125350
Dove 3p-31 (0 Flock 3P-31 1032)	42049	1 42049U 17008DF 19141.49127947 .00000924 00000-0 39522-4 0 9994
		2 42049 97.4082 208.7881 0006508 233.9694 126.0941 15.25336550124285
Dove 3p-32 (0 Flock 3P-32 1035)	42023	1 42023U 17008CD 19141.15908154 .00001008 00000-0 42833-4 0 9999
		2 42023 97.4082 208.4662 0006362 233.7500 126.3150 15.25345244125616
Dove 3p-33 (0 Flock 3P-33 103C)	41990	1 41990U 17008AU 19141.14490144 .00001020 00000-0 43318-4 0 9998
		2 41990 97.4085 208.5034 0005960 234.8642 125.2038 15.25327018124933
Dove 3p-34 (0 Flock 3P-34 103B)	41988	1 41988U 17008AS 19140.23051225 +.00001489 +00000-0 +61931-4 0 9997
		2 41988 097.4087 207.5861 0006083 237.6378 122.4272 15.25328869124791
Dove 3p-35 (0 Flock 3P-35 103D)	41989	1 41989U 17008AT 19141.17449788 .00001779 00000-0 72627-4 0 9993
		2 41989 97.4089 208.6072 0006030 230.2955 129.7752 15.25709863124949
Dove 3p-36 (0 Flock 3P-36 103A)	41986	1 41986U 17008AQ 19141.14402710 .00000920 00000-0 39396-4 0 9994
		2 41986 97.4093 208.5543 0006092 236.4106 123.6551 15.25309268124931
Dove 3p-37 (0 Flock 3P-37 1037)	41953	1 41953U 17008F 19141.18916442 .00001935 00000-0 76160-4 0 9991
		2 41953 97.4085 209.4974 0005337 258.2894 101.7746 15.26840872125678
Dove 3p-38 (0 Flock 3P-38 1036)	42037	1 42037U 17008CT 19141.18188394 .00001783 00000-0 72279-4 0 9990
		2 42037 97.4079 208.7104 0005424 260.8398 99.2226 15.25941067125577
Dove 3p-39 (0 Flock 3P-39 103E)	42038	1 42038U 17008CU 19140.71962604 .00001237 00000-0 51879-4 0 9990
		2 42038 97.4075 208.0498 0005754 265.8507 94.2074 15.25381244125443
Dove 3p-4 (0 Flock 3P-4 1003)	41965	1 41965U 17008T 19141.17480285 .00001316 00000-0 55076-4 0 9990
		2 41965 97.4076 208.3887 0006866 234.4806 125.5792 15.25317828125538
Dove 3p'-4 (0 Flock 3p'4 1107)	43122	1 43122U 18004M 19141.42910240 .00000596 00000-0 28636-4 0 9992
		2 43122 97.4931 209.0213 0009940 3.7562 356.3747 15.22677445 75177
Dove 3p-40 (0 Flock 3P-40 1039)	42010	1 42010U 17008BQ 19141.18491473 .00001033 00000-0 43819-4 0 9992
		2 42010 97.4077 208.5172 0005872 263.3885 96.6684 15.25338423124850
	42004	1 42004U 17008BJ 19140.22997507 +.00002638 +00000-0 +10449-3 0 9992

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Dove 3p-41 (0 Flock 3P-41 1031)		2 42004 097.4074 207.8610 0006064 259.1298 100.9258 15.26291708125339
Dove 3p-42 (0 Flock 3P-42 101E)	42008	1 42008U 17008BN 19141.18990522 .00001232 00000-0 51756-4 0 9998
		2 42008 97.4083 208.5606 0006047 258.7403 101.3156 15.25327578125549
Dove 3p-43 (0 Flock 3P-43 1041)	42007	1 42007U 17008BM 19140.42152883 +.00002185 +00000-0 +88760-4 0 9996
		2 42007 097.4094 207.8252 0005681 262.1518 097.9075 15.25639174125502
Dove 3p-44 (0 Flock 3P-44 1019)	42033	1 42033U 17008CP 19141.14521740 .00001090 00000-0 46166-4 0 9995
		2 42033 97.4086 208.3751 0005986 264.8422 95.2133 15.25297082124179
Dove 3p-45 (0 Flock 3P-45 101A)	42005	1 42005U 17008BK 19140.22764056 +.00002276 +00000-0 +90345-4 0 9996
		2 42005 097.4085 208.0336 0005818 260.7613 099.2967 15.26371655125501
Dove 3p-46 (0 Flock 3P-46 1011)	42031	1 42031U 17008CM 19140.66673203 .00000978 00000-0 41661-4 0 9990
		2 42031 97.4082 208.0357 0006035 260.5721 99.4835 15.25326086125514
Dove 3p-47 (0 Flock 3P-47 1027)	42032	1 42032U 17008CN 19140.79856409 .00001134 00000-0 47842-4 0 9998
		2 42032 97.4081 208.1617 0006052 260.8976 99.1577 15.25326482125383
Dove 3p-48 (0 Flock 3P-48 1042)	42006	1 42006U 17008BL 19140.80113442 .00001476 00000-0 61444-4 0 9997
		2 42006 97.4093 208.2353 0005978 260.8161 99.2401 15.25332477125341
Dove 3p-49 (0 Flock 3P-49 1038)	42001	1 42001U 17008BF 19141.19178883 .00001133 00000-0 47752-4 0 9991
		2 42001 97.4087 208.6028 0006223 258.6783 101.3756 15.25371133125464
Dove 3p-5 (0 Flock 3P-5 0F18)	41971	1 41971U 17008Z 19141.17165824 .00002139 00000-0 85970-4 0 9996
		2 41971 97.4074 208.5966 0006673 235.1863 124.8748 15.26014383125398
Dove 3p-50 (0 Flock 3P-50 1034)	42029	1 42029U 17008CK 19140.67123934 .00001484 00000-0 61735-4 0 9996
		2 42029 97.4092 208.1149 0006093 259.9199 100.1352 15.25336765124717
Dove 3p-51 (0 Flock 3P-51 1006)	41952	1 41952U 17008E 19140.41512866 .00001300 00000-0 54481-4 0 9995
		2 41952 97.4081 207.7905 0006217 259.1324 100.9214 15.25311008125498
Dove 3p-52 (0 Flock 3P-52 1044)	42030	1 42030U 17008CL 19140.80259239 .00001015 00000-0 43129-4 0 9998
		2 42030 97.4089 208.2054 0006143 259.0408 101.0139 15.25345516125506
Dove 3p-53 (0 Flock 3P-53 1007)	42013	1 42013U 17008BT 19140.80851489 .00002157 00000-0 87583-4 0 9994
		2 42013 97.4079 208.2435 0005442 264.0738 95.9880 15.25672370125361
Dove 3p-54 (0 Flock 3P-54 1005)	42014	1 42014U 17008BU 19141.18299722 .00001389 00000-0 58030-4 0 9994
		2 42014 97.4081 208.5453 0005515 264.3712 95.6897 15.25310004125586
Dove 3p-55 (0 Flock 3P-55 1008)	42041	1 42041U 17008CX 19141.49084150 .00000942 00000-0 40247-4 0 9990
		2 42041 97.4081 208.9116 0005445 267.2083 92.8532 15.25331042125671
Dove 3p-56 (0 Flock 3P-46 100F)	42042	1 42042U 17008CY 19141.16288788 .00002004 00000-0 79039-4 0 9990
		2 42042 97.4072 209.2997 0005163 262.6096 97.4556 15.26730684125463
Dove 3p-57 (0 Flock 3P-57 1014)	41978	1 41978U 17008AG 19141.15913867 .00000961 00000-0 40979-4 0 9990
		2 41978 97.4084 208.4647 0006498 233.7225 126.3413 15.25333035125452
Dove 3p-58 (0 Flock 3P-58 1009)	41977	1 41977U 17008AF 19141.16820578 .00001118 00000-0 47220-4 0 9997
		2 41977 97.4082 208.4509 0006389 235.4026 124.6609 15.25334952125618
Dove 3p-59 (0 Flock 3P-59 1045)	42022	1 42022U 17008CC 19140.21743869 +.00002288 +00000-0 +91029-4 0 9996
		2 42022 097.4079 207.8766 0006006 239.4504 120.6142 15.26280323124356

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Dove 3p-6 (0 Flock 3P-6 0F35)	41969	1 41969U 17008X 19141.17160788 .00000948 00000-0 40468-4 0 9996
		2 41969 97.4080 208.4203 0006663 232.1081 127.9555 15.25323234125446
Dove 3p-60 (0 Flock 3P-60 101B)	41976	1 41976U 17008AE 19140.42453373 +.00001164 +00000-0 +49056-4 0 9999
		2 41976 097.4090 207.8072 0006280 239.8441 120.2175 15.25311736124673
Dove 3p-61 (0 Flock 3P-61 1012)	42009	1 42009U 17008BP 19140.40221249 +.00001426 +00000-0 +59414-4 0 9990
		2 42009 097.4086 207.8028 0005906 264.4787 095.5777 15.25349363125476
Dove 3p-62 (0 Flock 3P-62 1046)	42036	1 42036U 17008CS 19141.22334479 .00002046 00000-0 81263-4 0 9997
		2 42036 97.4080 209.1136 0005773 260.7615 99.2971 15.26460134124822
Dove 3p-63 (0 Flock 3P-63 1015)	42035	1 42035U 17008CR 19140.13587375 .00001821 00000-0 74974-4 0 9991
		2 42035 97.4074 207.4887 0005979 266.6866 93.3688 15.25396511123420
Dove 3p-64 (0 Flock 3P-64 100A)	42034	1 42034U 17008CQ 19141.18756588 .00001277 00000-0 53513-4 0 9991
		2 42034 97.4082 208.5508 0005800 262.8267 97.2312 15.25343581125615
Dove 3p-65 (0 Flock 3P-65 1040)	42028	1 42028U 17008CJ 19140.74021281 .00001271 00000-0 53282-4 0 9997
		2 42028 97.4088 208.1460 0006203 256.9955 103.0590 15.25338869125407
Dove 3p-66 (0 Flock 3P-66 1013)	42027	1 42027U 17008CH 19140.80631817 .00001047 00000-0 44391-4 0 9997
		2 42027 97.4085 208.1995 0006355 256.3007 103.7524 15.25333593125511
Dove 3p-67 (0 Flock 3P-67 1017)	42002	1 42002U 17008BG 19141.15776103 .00001835 00000-0 73474-4 0 9996
		2 42002 97.4074 208.9194 0005974 253.3067 106.7516 15.26334943125649
Dove 3p-68 (0 Flock 3P-68 1004)	42003	1 42003U 17008BH 19140.74196865 .00001099 00000-0 46425-4 0 9990
		2 42003 97.4083 208.1012 0006314 256.8977 103.1557 15.25350308125196
Dove 3p-69 (0 Flock 3P-69 0F43)	42020	1 42020U 17008CA 19140.42311474 +.00001439 +00000-0 +59829-4 0 9999
		2 42020 097.4112 208.0488 0006491 240.1692 119.8901 15.25396962124226
Dove 3p-7 (0 Flock 3P-7 100B)	41970	1 41970U 17008Y 19141.22777247 .00002307 00000-0 90846-4 0 9994
		2 41970 97.4069 208.9419 0006513 231.9808 128.0843 15.26616563125484
Dove 3p-70 (0 Flock 3P-70 0F15)	41980	1 41980U 17008AJ 19141.15754909 .00001272 00000-0 53317-4 0 9999
		2 41980 97.4110 208.7292 0006432 237.8888 122.1726 15.25346594125446
Dove 3p-71 (0 Flock 3P-71 0F11)	42024	1 42024U 17008CE 19141.16461108 .00002056 00000-0 81836-4 0 9994
		2 42024 97.4082 208.9619 0006340 238.7585 121.3033 15.26382995124505
Dove 3p-72 (0 Flock 3P-72 0F10)	42051	1 42051U 17008DH 19141.17270051 .00001842 00000-0 74674-4 0 9994
		2 42051 97.4110 208.9077 0006177 237.7208 122.3433 15.25903903123101
Dove 3p-73 (0 Flock 3P-73 0F1B)	41981	1 41981U 17008AK 19141.16021735 .00002275 00000-0 90985-4 0 9991
		2 41981 97.4103 208.8801 0006577 236.3231 123.7381 15.26110606125596
Dove 3p-74 (0 Flock 3P-74 0F22)	42048	1 42048U 17008DE 19141.22803048 .00001314 00000-0 54994-4 0 9991
		2 42048 97.4112 208.8020 0006856 239.0142 121.0423 15.25334039124780
Dove 3p-75 (0 Flock 3P-75 0F12)	41979	1 41979U 17008AH 19141.42026345 .00001018 00000-0 43207-4 0 9998
		2 41979 97.4108 208.9781 0006515 236.7755 123.2859 15.25360312125644
Dove 3p-76 (0 Flock 3P-76 0F17)	42019	1 42019U 17008BZ 19140.42871911 +.00001733 +00000-0 +71612-4 0 9995
		2 42019 097.4114 208.0553 0006570 242.5296 117.5274 15.25331792125334
Dove 3p-77 (0 Flock 3P-77 0F28)	42025	1 42025U 17008CF 19141.41402624 .00001854 00000-0 76320-4 0 9998
		2 42025 97.4105 208.9957 0006450 238.7213 121.3393 15.25371500125494

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Dove 3p-78 (0 Flock 3P-78 OF51)	42047	1 42047U 17008DD 19140.73365990 .00002165 00000-0 87654-4 0 9998
		2 42047 97.4104 208.3582 0006397 236.5251 123.5376 15.25758776124716
Dove 3p-79 (0 Flock 3P-79 OF52)	41984	1 41984U 17008AN 19141.33782765 .00000994 00000-0 42300-4 0 9994
		2 41984 97.4108 208.9424 0006234 239.7803 120.2818 15.25332457125482
Dove 3p-8 (0 Flock 3P-8 100C)	41951	1 41951U 17008D 19141.16924693 .00001293 00000-0 54185-4 0 9994
		2 41951 97.4077 208.3942 0006651 234.2693 125.7926 15.25319253125603
Dove 3p-80 (0 Flock 3P-80 OF4E)	42026	1 42026U 17008CG 19141.18772213 .00000952 00000-0 40629-4 0 9998
		2 42026 97.4107 208.8231 0006097 239.4593 120.6044 15.25345582123604
Dove 3p-81 (0 Flock 3P-81 OF25)	42043	1 42043U 17008CZ 19140.80888734 .00001210 00000-0 50849-4 0 9994
		2 42043 97.4108 208.4259 0006473 243.1158 116.9419 15.25357975124746
Dove 3p-82 (0 Flock 3P-82 OF41)	42046	1 42046U 17008DC 19141.16755004 .00001878 00000-0 75139-4 0 9999
		2 42046 97.4105 209.1315 0006423 235.9400 124.1229 15.26321566124873
Dove 3p-83 (0 Flock 3P-83 OF3F)	42050	1 42050U 17008DG 19141.16517546 .00001251 00000-0 52513-4 0 9997
		2 42050 97.4100 208.6783 0006675 239.2073 120.8508 15.25330850125507
Dove 3p-84 (0 Flock 3P-84 OF42)	42021	1 42021U 17008CB 19141.41748967 .00000953 00000-0 40654-4 0 9997
		2 42021 97.4107 208.9637 0006735 237.2212 122.8378 15.25340402125492
Dove 3p-85 (0 Flock 3P-85 OF1D)	41983	1 41983U 17008AM 19141.42291316 .00001167 00000-0 48353-4 0 9997
		2 41983 97.4107 209.2781 0006323 239.5569 120.5045 15.25905556125511
Dove 3p-86 (0 Flock 3P-86 OF34)	41985	1 41985U 17008AP 19140.88054684 .00000975 00000-0 41582-4 0 9996
		2 41985 97.4112 208.4842 0006142 241.3284 118.7337 15.25310370125407
Dove 3p-87 (0 Flock 3P-87 OF31)	42044	1 42044U 17008DA 19141.41676427 .00001239 00000-0 52037-4 0 9999
		2 42044 97.4103 208.9343 0006629 236.4374 123.6232 15.25330129124985
Dove 3p-88 (0 Flock 3P-88 OF38)	41982	1 41982U 17008AL 19141.17325148 .00001860 00000-0 74865-4 0 9996
		2 41982 97.4099 208.9743 0006384 234.4477 125.6167 15.26130927124572
Dove 3p-9 (0 Flock 3P-9 1021)	41973	1 41973U 17008AB 19141.17062856 .00001235 00000-0 51868-4 0 9994
		2 41973 97.4079 208.4528 0006625 233.4773 126.5855 15.25324469125538
Dove 3r-1 (0 Flock 3R-1 105A)	43747	1 43747U 18096AE 19141.42618804 .00002323 00000-0 88764-4 0 9995
		2 43747 97.4613 211.6187 0023139 79.0103 281.3738 15.27415107 26442
Dove 3r-10 (0 Flock 3R-10 1059)	43740	1 43740U 18096X 19141.43872188 .00003116 00000-0 12046-3 0 9996
		2 43740 97.4608 211.4406 0019613 75.4265 284.9147 15.26827813 26456
Dove 3r-11 (0 Flock 3R-11 1064)	43725	1 43725U 18096G 19141.49857414 .00002953 00000-0 11391-3 0 9990
		2 43725 97.4606 211.5099 0019687 75.5591 284.7831 15.26937173 26437
Dove 3r-12 (0 Flock 3R-12 1066)	43724	1 43724U 18096F 19141.17389715 .00002921 00000-0 11286-3 0 9996
		2 43724 97.4608 211.1811 0019669 76.7661 283.5770 15.26888630 26383
Dove 3r-13 (0 Flock 3R-13 210B)	43750	1 43750U 18096AH 19140.80499063 .00002430 00000-0 91904-4 0 9993
		2 43750 97.4609 211.0611 0023578 82.3778 278.0138 15.27697814 26353
Dove 3r-14 (0 Flock 3R-14 210C)	43749	1 43749U 18096AG 19140.79790318 .00002268 00000-0 85706-4 0 9998
		2 43749 97.4609 211.0700 0023522 81.9563 278.4344 15.27799700 26356
Dove 3r-15 (0 Flock 3R-15 2107)	43736	1 43736U 18096T 19140.23179367 +.00001244 +00000-0 +48901-4 0 9997
		2 43736 097.4619 210.4578 0023676 083.0563 277.3368 15.27361156026255
	43735	1 43735U 18096S 19141.15364034 .00000579 00000-0 24351-4 0 9998

Name of Satellite, Alternate Names	NORAD Number	TLE
Dove 3r-16 (0 Flock 3R-16 2152)		2 43735 97.4618 211.3673 0023740 80.2621 280.1297 15.27236396 26402
Dove 3r-2 (0 Flock 3R-2 105B)	43748	1 43748U 18096AF 19141.43159515 .00002481 00000-0 94980-4 0 9998
		2 43748 97.4617 211.6198 0023133 79.1672 281.2169 15.27282816 26441
Dove 3r-3 (0 Flock 3R-3 105D)	43734	1 43734U 18096R 19141.43298992 .00001399 00000-0 54719-4 0 9999
		2 43734 97.4617 211.6396 0022945 77.9862 343.1431 15.27326983 26436
Dove 3r-4 (0 Flock 3R-4 105E)	43733	1 43733U 18096Q 19141.45007329 .00001341 00000-0 52957-4 0 9991
		2 43733 97.4616 211.6181 0023115 77.4366 347.2361 15.27091473 26430
Dove 3r-5 (0 Flock 3R-5 105F)	43726	1 43726U 18096H 19141.16367479 .00002104 00000-0 81950-4 0 9999
		2 43726 97.4612 211.2071 0019877 77.5591 282.7871 15.26948497 26382
Dove 3r-6 (0 Flock 3R-6 1057)	43741	1 43741U 18096Y 19141.23309659 .00003664 00000-0 14042-3 0 9999
		2 43741 97.4624 211.2794 0019833 78.3619 317.8616 15.26990289 26402
Dove 3r-7 (0 Flock 3R-7 1058)	43742	1 43742U 18096Z 19141.16827545 .00003794 00000-0 14503-3 0 9997
		2 43742 97.4624 211.2221 0020047 78.4709 333.7625 15.27042550 26382
Dove 3r-8 (0 Flock 3R-8 1060)	43727	1 43727U 18096J 19141.41882384 .00003025 00000-0 11615-3 0 9998
		2 43727 97.4616 211.4839 0019975 76.9239 283.4228 15.27064081 26420
Dove 3r-9 (0 Flock 3R-9 1061)	43723	1 43723U 18096E 19141.25169390 .00003324 00000-0 12835-3 0 9998
		2 43723 97.4615 211.2496 0019598 76.6011 326.8239 15.26808060 26390
Dove 3s-1 (0 Flock 3S-1 105C)	43769	1 43769U 18099M 19140.45040227 -.00000050 00000-0 72217-6 0 9996
		2 43769 97.7418 212.5829 0015662 72.3992 287.8938 14.94721416 25054
Dove 3s-2 (0 Flock 3S-2 2151)	43821	1 43821U 18099BR 19140.37536779 -.00000302 00000-0 -21999-4 0 9998
		2 43821 97.7472 212.7589 0015972 69.1250 291.1678 14.95409979 24745
Dove 3s-3 (0 Flock 3S-3 210D)	43788	1 43788U 18099AG 19141.33732554 .00000669 00000-0 66022-4 0 9996
		2 43788 97.7459 213.6607 0016339 67.8367 292.4586 14.95180714 25189

ANNEX 4: Flock satellites orbital parameters.

In this annex, it can be found the orbital parameters of the flock constellation that need it to perform the simulations of the SaVi software. The orbital parameters have been extracted from the TLE number of each satellite (see Annex 3) except the time to periapsis and the Semi-major axis that has been calculated using the following equation:

$$\text{Semi-major axis} = \frac{\text{Perigee}}{1 - \text{eccentricity}} + 6371$$

Where the 6371 value represents the radius of the Earth.

Table 4. Orbital parameters for each of the Flock satellites.

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 1c-1 (0 Flock 1C-1 0903)	0	97,9261	63,8374	0,0013192	146,4808	605	6976,79917	19/06/2014
Dove 1c-10 (0 Flock 1C-10 090C)	381,469	97,9234	64	0,0013219	147,3251	604	6975,79948	19/06/2014
Dove 1c-11 (0 Flock 1C-11 090D)	762,938	97,9331	66,9797	0,0013126	132,0632	606	6977,79648	19/06/2014
Dove 1c-2 (0 Flock 1C-2 0904)	1144,408	97,9248	63,6541	0,0014504	145,5673	605	6976,87877	19/06/2014
Dove 1c-3 (0 Flock 1C-3 0905)	1525,877	97,9271	63,9022	0,0014025	135,9181	608	6979,85392	19/06/2014
Dove 1c-4 (0 Flock 1C-4 0906)	1907,346	97,9253	63,3954	0,0015207	142,6595	607	6978,92447	19/06/2014
Dove 1c-5 (0 Flock 1C-5 0907)	2288,815	97,9288	64,523	0,0014912	136,3933	606	6977,90502	19/06/2014
Dove 1c-6 (0 Flock 1C-6 0908)	2670,284	97,9313	64,9002	0,0012761	136,2428	607	6978,77558	19/06/2014
Dove 1c-7 (0 Flock 1C-7 0909)	3051,753	97,929	65,7221	0,0011793	141,5233	606	6977,7155	19/06/2014

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 1c-8 (0 Flock 1C-8 090A)	3433,223	97,9433	69,6129	0,0013875	118,0105	607	6978,84338	19/06/2014
Dove 1c-9 (0 Flock 1C-9 090B)	3814,692	97,9294	64,4836	0,0012609	135,3536	607	6978,76633	19/06/2014
Dove 2k-1 (0 Flock 2K-1 0F1A)	4196,161	96,943	25,3441	0,0008801	339,6231	461	6832,40608	14/07/2017
Dove 2k-10 (0 Flock 2K-10 0F32)	4577,63	96,9436	25,4524	0,0010418	320,3832	461	6832,48077	14/07/2017
Dove 2k-11 (0 Flock 2K-11 0F33)	4959,099	96,9438	25,4733	0,0010208	318,3915	461	6832,47107	14/07/2017
Dove 2k-12 (0 Flock 2K-12 0F36)	5340,568	96,9442	25,0789	0,0010499	324,2948	461	6832,48451	14/07/2017
Dove 2k-13 (0 Flock 2K-13 0F37)	5722,038	96,9455	25,0418	0,0009881	320,2461	461	6832,45596	14/07/2017
Dove 2k-14 (0 Flock 2K-14 0F3B)	6103,507	96,9431	25,0881	0,0010077	322,8719	461	6832,46502	14/07/2017
Dove 2k-15 (0 Flock 2K-15 0F3C)	6484,976	96,9449	25,599	0,0010361	321,7948	461	6832,47814	14/07/2017
Dove 2k-16 (0 Flock 2K-16 0F3D)	190,735	96,9443	24,9172	0,010099	324,1642	461	6836,70314	14/07/2017
Dove 2k-17 (0 Flock 2K-17 0F40)	572,204	96,9426	25,5212	0,000989	321,4909	460	6831,45539	14/07/2017
Dove 2k-18 (0 Flock 2K-18 0F44)	953,673	96,944	25,4745	0,0010542	322,6742	461	6832,4865	14/07/2017
Dove 2k-19 (0 Flock 2K-19 0F46)	1335,142	96,9439	25,5348	0,0010444	323,5571	460	6831,48093	14/07/2017
Dove 2k-2 (0 Flock 2K-2 0F1E)	1716,611	96,9435	23,2232	0,0009868	345,8637	461	6832,45536	14/07/2017
Dove 2k-20 (0 Flock 2K-20 0F47)	2098,08	96,9434	25,4792	0,0010137	323,3471	460	6831,46678	14/07/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 2k-21 (0 Flock 2K-21 0F49)	2479,55	96,9437	25,5176	0,0008833	337,6984	460	6831,40668	14/07/2017
Dove 2k-22 (0 Flock 2K-22 0F4A)	2861,019	96,9444	25,2276	0,0008496	338,4938	460	6831,39115	14/07/2017
Dove 2k-23 (0 Flock 2K-23 0F4B)	3242,488	96,9437	25,4085	0,0008932	337,8509	460	6831,41124	14/07/2017
Dove 2k-24 (0 Flock 2K-24 0F4F)	3623,957	96,9425	25,2645	0,0008365	335,5812	459	6830,38427	14/07/2017
Dove 2k-25 (0 Flock 2K-25 0F4D)	4005,426	96,9438	24,8843	0,0010106	326,4276	459	6830,46433	14/07/2017
Dove 2k-26 (0 Flock 2K-26 0F53)	4386,896	96,9431	25,8884	0,0009979	322,0228	459	6830,45849	14/07/2017
Dove 2k-27 (0 Flock 2K-27 0F54)	4768,365	96,9435	25,4586	0,0009822	325,7187	459	6830,45127	14/07/2017
Dove 2k-28 (0 Flock 2K-28 1047)	5149,772	96,9435	25,4586	0,0009822	325,7187	459	6830,45127	14/07/2017
Dove 2k-29 (0 Flock 2K-29 1048)	6294,241	96,9435	25,6144	0,0009127	333,0872	459	6830,41931	14/07/2017
Dove 2k-3 (0 Flock 2K-3 0F21)	6675,711	96,9432	25,2961	0,0009154	339,4915	461	6832,42239	14/07/2017
Dove 2k-30 (0 Flock 2K-30 1049)	0	96,9439	24,4339	0,0009119	334,5317	459	6830,41894	14/07/2017
Dove 2k-31 (0 Flock 2K-31 104A)	381,469	96,9435	25,4114	0,0009069	333,7116	459	6830,41664	14/07/2017
Dove 2k-32 (0 Flock 2K-32 104B)	762,938	96,9432	25,6502	0,0009016	333,9152	458	6829,41331	14/07/2017
Dove 2k-33 (0 Flock 2K-33 104C)	1144,408	96,9431	26,1054	0,0009177	322,3529	458	6829,42069	14/07/2017
Dove 2k-34 (0 Flock 2K-34 104D)	1525,877	96,9438	24,5776	0,0009828	328,9365	458	6829,45057	14/07/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 2k-35 (0 Flock 2K-35 104E)	1907,346	96,9439	25,4574	0,0009945	323,5	458	6829,45593	14/07/2017
Dove 2k-36 (0 Flock 2K-36 104F)	2288,815	96,9433	25,0019	0,0009883	327,2552	458	6829,45309	14/07/2017
Dove 2k-37 (0 Flock 2K-37 1050)	2670,284	96,9436	25,6724	0,0009194	337,1626	458	6829,42147	14/07/2017
Dove 2k-38 (0 Flock 2K-38 1051)	3051,753	96,9434	25,6715	0,0008913	334,9669	458	6829,40858	14/07/2017
Dove 2k-39 (0 Flock 2K-39 1052)	3433,223	96,9437	25,3542	0,0009102	337,9528	458	6829,41725	14/07/2017
Dove 2k-4 (0 Flock 2K-4 0F24)	3814,692	96,9428	24,9979	0,0009181	344,5687	461	6832,42363	14/07/2017
Dove 2k-40 (0 Flock 2K-40 1053)	4196,161	96,944	25,4387	0,0009106	338,6876	458	6829,41743	14/07/2017
Dove 2k-41 (0 Flock 2K-41 1054)	4577,63	96,9439	25,4655	0,0010075	324,4373	458	6829,4619	14/07/2017
Dove 2k-43 (0 Flock 2K-43 1056)	4959,099	96,943	23,6332	0,0011595	333,0249	458	6829,53167	14/07/2017
Dove 2k-44 (0 Flock 2K-44 1020)	5340,568	96,9433	24,8658	0,0009636	324,3632	457	6828,44079	14/07/2017
Dove 2k-45 (0 Flock 2K-45 100D)	5722,038	96,9432	24,927	0,0008678	339,5373	457	6828,39693	14/07/2017
Dove 2k-46 (0 Flock 2K-46 103F)	6103,507	96,9433	25,4531	0,0008495	336,7436	457	6828,38855	14/07/2017
Dove 2k-47 (0 Flock 2K-47 1043)	6484,976	96,9432	24,8004	0,0008818	340,7816	457	6828,40334	14/07/2017
Dove 2k-48 (0 Flock 2K-48 101C)	190,735	96,9432	25,316	0,0008534	339,3805	457	6828,39034	14/07/2017
Dove 2k-5 (0 Flock 2K-5 0F29)	572,204	96,9432	25,316	0,0008534	339,3805	461	6832,39375	14/07/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 2k-6 (0 Flock 2K-6 OF2A)	953,673	96,9437	24,871	0,0009285	338,6648	461	6832,42844	14/07/2017
Dove 2k-7 (0 Flock 2K-7 OF2B)	1335,142	96,944	24,8754	0,0009124	340,0056	461	6832,421	14/07/2017
Dove 2k-8 (0 Flock 2K-8 OF2D)	1716,611	96,9435	24,9628	0,0009162	340,86	461	6832,42276	14/07/2017
Dove 2k-9 (0 Flock 2K-9 OF2E)	2098,08	96,9424	26,1794	0,0009818	318,2025	461	6832,45305	14/07/2017
Dove 2p-1 (0 Flock 2P-1 0E0D)	2479,55	97,3735	206,2695	0,0011523	128,4832	500	6871,57681	22/06/2016
Dove 2p-10 (0 Flock 2P-10 0E2F)	2861,019	97,3746	206,2218	0,0011845	129,2012	500	6871,59295	22/06/2016
Dove 2p-11 (0 Flock 2P-11 0E30)	3242,488	97,3691	205,7894	0,0011542	120,1528	496	6867,57314	22/06/2016
Dove 2p-12 (0 Flock 2P-12 0E3A)	3623,957	97,3756	206,4411	0,0011797	128,4535	499	6870,58937	22/06/2016
Dove 2p-2 (0 Flock 2P-2 (0e0E)	4005,426	97,3756	206,4411	0,0011797	128,45345	499	6870,58937	22/06/2016
Dove 2p-3 (0 Flock 2P-3 (0E0F)	4386,896	97,3757	206,9312	0,0011654	126,5928	500	6871,58338	22/06/2016
Dove 2p-4 (0 Flock 2P-4 0E14)	4768,365	97,3729	206,8902	0,0011753	126,4207	499	6870,58716	22/06/2016
Dove 2p-5 (0 Flock 2P-5 0E16)	5149,772	97,3752	206,2303	0,0011696	128,8846	500	6871,58548	22/06/2016
Dove 2p-6 (0 Flock 2P-6 0E19)	6294,241	97,3715	206,4181	0,0011865	118,8331	500	6871,59395	22/06/2016
Dove 2p-7 (0 Flock 2P-7 0E1F)	6675,711	97,3712	206,8268	0,0011431	126,9316	500	6871,5722	22/06/2016
Dove 2p-8 (0 Flock 2P-8 0E20)	0	97,3744	206,4383	0,0012152	127,4501	500	6871,60834	22/06/2016

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 2p-9 (0 Flock 2P-9 0E26)	381,469	97,3714	205,9336	0,0012281	119,1865	500	6871,61481	22/06/2016
Dove 3k-1 (0 Flock 3K-1 1062)	762,938	97,2918	47,4032	0,0026101	95,3606	480	6852,25613	27/12/2018
Dove 3k-10 (0 Flock 3K-10 106d)	1144,408	97,2922	47,2016	0,0024019	92,5223	480	6852,15569	27/12/2018
Dove 3k-11 (0 Flock 3K-11 106e)	1525,877	97,2922	46,8156	0,00242	93,8008	480	6852,16442	27/12/2018
Dove 3k-12 (0 Flock 3K-12 106f)	1907,346	97,2919	46,8054	0,0024114	94,4297	480	6852,16027	27/12/2018
Dove 3k-2 (0 Flock 3K-2 106c)	2288,815	97,2921	47,4132	0,0026084	95,0826	479	6851,25269	27/12/2018
Dove 3k-3 (0 Flock 3K-3 1068)	2670,284	97,2924	47,1479	0,0026124	96,5881	479	6851,25462	27/12/2018
Dove 3k-4 (0 Flock 3K-4 1063)	3051,753	97,2926	46,641	0,0026022	98,1029	479	6851,24971	27/12/2018
Dove 3k-5 (0 Flock 3K-5 1067)	3433,223	97,2923	47,1742	0,0024248	92,7525	480	6852,16673	27/12/2018
Dove 3k-6 (0 Flock 3K-6 1069)	3814,692	97,2921	47,4179	0,0024169	92,1125	480	6852,16292	27/12/2018
Dove 3k-7 (0 Flock 3K-7 106a)	4196,161	97,2922	46,5424	0,0024547	943617	480	6852,18116	27/12/2018
Dove 3k-8 (0 Flock 3K-8 106b)	4577,63	97,2916	46,7877	0,0024294	94,1827	480	6852,16895	27/12/2018
Dove 3k-9 (0 Flock 3K-9 1065)	4959,099	97,2921	47,5099	0,0024063	91,1321	480	6852,15781	27/12/2018
Dove 3m-1 (0 Flock 3M-1 0F06)	5340,568	97,3755	249,8383	0,0018071	53,6449	499	6870,90338	31/10/2017
Dove 3m-2 (0 Flock 3M-2 0F02)	5722,038	97,3835	251,6456	0,0015702	48,2241	500	6871,78633	31/10/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3m-3 (0 Flock 3M-3 0F13)	6103,507	97,3704	250,5384	0,0017254	51,4832	499	6870,86246	31/10/2017
Dove 3m-4 (0 Flock 3M-4 0F4C)	6484,976	97,3944	251,262	0,0017427	55,4129	499	6870,87113	31/10/2017
Dove 3p-1 (0 Flock 3P-1 1000)	190,735	97,4068	208,5624	0,0006651	231,7695	496	6867,33011	14/02/2017
Dove 3p-10 (0 Flock 3P-10 1022)	572,204	97,4081	208,7034	0,0006169	232,716	496	6867,30617	14/02/2017
Dove 3p-11 (0 Flock 3P-11 101F)	953,673	97,4082	208,4467	0,0006683	234,5125	496	6867,3317	14/02/2017
Dove 3p-12 (0 Flock 3P-12 1010)	1335,142	97,4081	208,4402	0,0006491	236,0043	496	6867,32216	14/02/2017
Dove 3p-13 (0 Flock 3P-13 1016)	1716,611	97,408	208,7572	0,0005446	261,2347	495	6866,26972	14/02/2017
Dove 3p-14 (0 Flock 3P-14 1018)	2098,08	97,4096	208,7115	0,0005527	265,9231	494	6865,27318	14/02/2017
Dove 3p-15 (0 Flock 3P-15 101D)	2479,55	97,4074	207,8747	0,0005572	265,7872	495	6866,27597	14/02/2017
Dove 3p-16 (0 Flock 3P-16 100E)	2861,019	97,4078	207,4733	0,0005518	267,2067	494	6865,27274	14/02/2017
Dove 3p-17 (0 Flock 3P-17 1023)	3242,488	97,407	208,8035	0,0006464	232,7581	496	6867,32082	14/02/2017
Dove 3p-18 (0 Flock 3P-18 102B)	3623,957	97,4047	208,7247	0,0007245	231,0762	496	6867,35961	14/02/2017
Dove 3p-19 (0 Flock 3P-19 1024)	4005,426	97,4071	208,3269	0,0007384	235,018	496	6867,36652	14/02/2017
Dove 3p-2 (0 Flock 3P-2 1001)	4386,896	97,4081	208,4206	0,0006747	231,7603	496	6867,33488	14/02/2017
Dove 3p-20 (0 Flock 3P-20 1029)	4768,365	97,4076	208,3606	0,000754	236,0629	495	6866,37351	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3p-21 (0 Flock 3P-21 102A)	5149,772	97,408	207,7667	0,0006809	237,2779	496	6867,33796	14/02/2017
Dove 3p-22 (0 Flock 3P-22 1028)	6294,241	97,4075	208,5335	0,0006926	230,6618	496	6867,34377	14/02/2017
Dove 3p-23 (0 Flock 3P-23 1025)	6675,711	97,4074	208,3462	0,0007073	232,4273	495	6866,35036	14/02/2017
Dove 3p-24 (0 Flock 3P-24 1026)	0	97,4058	208,2238	0,0006923	229,18	496	6867,34362	14/02/2017
Dove 3p-25 (0 Flock 3P-25 102F)	381,469	97,4058	208,5064	0,0007059	231,2757	496	6867,35037	14/02/2017
Dove 3p-26 (0 Flock 3P-26 102D)	762,938	97,407	208,2466	0,000683	232,0538	496	6867,339	14/02/2017
Dove 3p-27 (0 Flock 3P-27 1030)	1144,408	97,4072	208,5514	0,0006992	230,7005	496	6867,34705	14/02/2017
Dove 3p-28 (0 Flock 3P-28 102C)	1525,877	97,4073	208,4109	0,0006937	232,1068	496	6867,34431	14/02/2017
Dove 3p-29 (0 Flock 3P-29 1033)	1907,346	97,4078	207,5416	0,0006256	236,7699	496	6867,31049	14/02/2017
Dove 3p-3 (0 Flock 3P-3 1002)	2288,815	97,4075	208,3767	0,0006815	233,1523	496	6867,33825	14/02/2017
Dove 3p-30 (0 Flock 3P-30 102E)	2670,284	97,4091	208,2357	0,000582	240,5142	496	6867,28884	14/02/2017
Dove 3p-31 (0 Flock 3P-31 1032)	3051,753	97,4082	208,7881	0,0006508	233,9694	494	6865,3217	14/02/2017
Dove 3p-32 (0 Flock 3P-32 1035)	3433,223	97,4082	208,4662	0,0006362	233,75	495	6866,31512	14/02/2017
Dove 3p-33 (0 Flock 3P-33 103C)	3814,692	97,4085	208,5034	0,000596	234,8642	495	6866,2952	14/02/2017
Dove 3p-34 (0 Flock 3P-34 103B)	4196,161	97,4087	207,5861	0,0006083	237,6378	496	6867,3019	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3p-35 (0 Flock 3P-35 103D)	4577,63	97,4089	208,607	0,000603	230,2955	496	6867,29927	14/02/2017
Dove 3p-36 (0 Flock 3P-36 103A)	4959,099	97,4093	208,5543	0,0006092	236,4106	496	6867,30235	14/02/2017
Dove 3p-37 (0 Flock 3P-37 1037)	5340,568	97,4085	209,4974	0,0005337	258,294	497	6868,26539	14/02/2017
Dove 3p-38 (0 Flock 3P-38 1036)	5722,038	97,4079	208,7104	0,0005424	260,8398	494	6865,26809	14/02/2017
Dove 3p-39 (0 Flock 3P-39 103E)	6103,507	97,4075	208,0498	0,0005754	265,8507	494	6865,28441	14/02/2017
Dove 3p-4 (0 Flock 3P-4 1003)	6484,976	97,4076	208,3887	0,0006866	234,4806	496	6867,34079	14/02/2017
Dove 3p-40 (0 Flock 3P-40 1039)	190,735	97,4077	208,5172	0,0005872	263,3885	494	6865,29025	14/02/2017
Dove 3p-41 (0 Flock 3P-41 1031)	572,204	97,4074	207,861	0,0006064	259,198	405	6776,24574	14/02/2017
Dove 3p-42 (0 Flock 3P-42 101E)	953,673	974083	208,5606	0,0006047	258,7403	494	6865,2989	14/02/2017
Dove 3p-43 (0 Flock 3P-43 1041)	1335,142	97,4094	207,8252	0,0005681	262,1518	495	6866,28137	14/02/2017
Dove 3p-44 (0 Flock 3P-44 1019)	1716,611	97,4086	208,3751	0,0005986	264,8422	494	6865,29589	14/02/2017
Dove 3p-45 (0 Flock 3P-45 101A)	2098,08	97,4085	208,0336	0,0005818	260,7613	495	6866,28816	14/02/2017
Dove 3p-46 (0 Flock 3P-46 1011)	2479,55	97,4082	208,0357	0,0006035	260,5721	494	6865,29831	14/02/2017
Dove 3p-47 (0 Flock 3P-47 1027)	2861,019	97,4081	208,1617	0,0006052	260,8976	494	6865,29915	14/02/2017
Dove 3p-48 (0 Flock 3P-48 1042)	3242,488	97,4093	208,2353	0,0005978	260,8161	495	6866,29609	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3p-49 (0 Flock 3P-49 1038)	3623,957	97,4087	208,6028	0,0006223	258,6783	495	6866,30823	14/02/2017
Dove 3p-5 (0 Flock 3P-5 0F18)	4005,426	97,4074	208,5966	0,0006673	235,1863	496	6867,3312	14/02/2017
Dove 3p-50 (0 Flock 3P-50 1034)	4386,896	97,4092	208,1149	0,0006093	259,9199	494	6865,30118	14/02/2017
Dove 3p-51 (0 Flock 3P-51 1006)	4768,365	97	207,7905	0,0006217	259,1324	494	6865,30731	14/02/2017
Dove 3p-52 (0 Flock 3P-52 1044)	5149,772	97,4089	208,2054	0,0006143	259,0408	494	6865,30365	14/02/2017
Dove 3p-53 (0 Flock 3P-53 1007)	6294,241	97,4079	208,2435	0,0005442	264,0738	495	6866,26953	14/02/2017
Dove 3p-54 (0 Flock 3P-54 1005)	6675,711	97,4081	208,5453	0,0005515	264,3712	494	6865,27259	14/02/2017
Dove 3p-55 (0 Flock 3P-55 1008)	0	97,4081	208,9116	0,0005445	267,2083	494	6865,26913	14/02/2017
Dove 3p-56 (0 Flock 3P-46 100F)	381,469	97,4072	209,2997	0,0005163	262,6096	494	6865,25518	14/02/2017
Dove 3p-57 (0 Flock 3P-57 1014)	762,938	97,4084	208,4647	0,0006498	233,7225	496	6867,32251	14/02/2017
Dove 3p-58 (0 Flock 3P-58 1009)	1144,408	97,4082	208,4509	0,0006389	235,4026	495	6866,31646	14/02/2017
Dove 3p-59 (0 Flock 3P-59 1045)	1525,877	97,4079	207,8766	0,0006006	239,4504	495	6866,29748	14/02/2017
Dove 3p-6 (0 Flock 3P-6 0F35)	1907,346	97,408	208,4203	0,0006663	232,1081	496	6867,33071	14/02/2017
Dove 3p-60 (0 Flock 3P-60 101B)	2288,815	97,409	207,8072	0,000628	239,8441	496	6867,31168	14/02/2017
Dove 3p-61 (0 Flock 3P-61 1012)	2670,284	97,4086	207,8028	0,0005906	264,4787	494	6865,29193	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3p-62 (0 Flock 3P-62 1046)	3051,753	97,408	209,1136	0,0005773	260,7615	494	6865,28535	14/02/2017
Dove 3p-63 (0 Flock 3P-63 1015)	3433,223	97,4074	207,4887	0,0005979	266,6866	494	6865,29554	14/02/2017
Dove 3p-64 (0 Flock 3P-64 100A)	3814,692	97,4082	208,5508	0,00058	262,8267	494	6865,28669	14/02/2017
Dove 3p-65 (0 Flock 3P-65 1040)	4196,161	97,4088	208,146	0,0006203	256,9955	494	6865,30662	14/02/2017
Dove 3p-66 (0 Flock 3P-66 1013)	4577,63	97,4085	208,1995	0,0006355	256,3007	495	6866,31477	14/02/2017
Dove 3p-67 (0 Flock 3P-67 1017)	4959,099	97,4074	208,9194	0,0005974	253,3067	495	6866,29589	14/02/2017
Dove 3p-68 (0 Flock 3P-68 1004)	5340,568	97,4083	208,1012	0,0006314	256,8977	495	6866,31274	14/02/2017
Dove 3p-69 (0 Flock 3P-69 0F43)	5722,038	97,4112	208,0488	0,0006491	240,1692	495	6866,32151	14/02/2017
Dove 3p-7 (0 Flock 3P-7 100B)	6103,507	97,4069	208,9419	0,0006513	231,9808	496	6867,32326	14/02/2017
Dove 3p-70 (0 Flock 3P-70 0F15)	6484,976	97,411	208,7292	0,0006432	237,8888	495	6866,31859	14/02/2017
Dove 3p-71 (0 Flock 3P-71 0F11)	190,735	97,4082	208,9619	0,000634	238,7585	495	6866,31403	14/02/2017
Dove 3p-72 (0 Flock 3P-72 0F10)	572,204	97,411	208,9077	0,0006177	237,7208	495	6866,30595	14/02/2017
Dove 3p-73 (0 Flock 3P-73 0F1B)	953,673	97,4103	208,8801	0,0006577	236,3231	496	6867,32643	14/02/2017
Dove 3p-74 (0 Flock 3P-74 0F22)	1335,142	97,4112	208,802	0,0006856	239,0142	494	6865,33892	14/02/2017
Dove 3p-75 (0 Flock 3P-75 0F12)	1716,611	97,4108	208,9781	0,0006515	236,7755	495	6866,3227	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3p-76 (0 Flock 3P-76 0F17)	2098,08	97,4114	208,0553	0,000657	242,5296	495	6866,32543	14/02/2017
Dove 3p-77 (0 Flock 3P-77 0F28)	2479,55	97,4105	208,9957	0,000645	238,7213	495	6866,31948	14/02/2017
Dove 3p-78 (0 Flock 3P-78 0F51)	2861,019	97,4104	208,3582	0,0006397	236,5251	494	6865,31621	14/02/2017
Dove 3p-79 (0 Flock 3P-79 0F52)	3242,488	97,4108	208,9424	0,0006234	239,7803	496	6867,3094	14/02/2017
Dove 3p-8 (0 Flock 3P-8 100C)	3623,957	97,4077	208,3942	0,0006651	234,2693	496	6867,33011	14/02/2017
Dove 3p-80 (0 Flock 3P-80 0F4E)	4005,426	97,4107	208,8231	0,0006097	239,4593	496	6867,3026	14/02/2017
Dove 3p-81 (0 Flock 3P-81 0F25)	4386,896	97,4108	208,4259	0,0006473	243,1158	494	6865,31997	14/02/2017
Dove 3p-82 (0 Flock 3P-82 0F41)	4768,365	97,4105	209,1315	0,0006423	235,94	494	6865,3175	14/02/2017
Dove 3p-83 (0 Flock 3P-83 0F3F)	5149,772	97,41	208,6783	0,0006675	239,2073	494	6865,32997	14/02/2017
Dove 3p-84 (0 Flock 3P-84 0F42)	6294,241	97,4107	208,9637	0,0006735	237,2212	495	6866,33361	14/02/2017
Dove 3p-85 (0 Flock 3P-85 0F1D)	6675,711	97,4107	209,2781	0,0006323	239,5569	495	6866,31319	14/02/2017
Dove 3p-86 (0 Flock 3P-86 0F34)	0	97,4112	208,4842	0,0006142	241,3284	495	6866,30422	14/02/2017
Dove 3p-87 (0 Flock 3P-87 0F31)	381,469	97,4103	208,9343	0,0006629	236,4374	494	6865,32769	14/02/2017
Dove 3p-88 (0 Flock 3P-88 0F38)	762,938	97,4099	208,9743	0,0006384	234,4477	495	6866,31621	14/02/2017
Dove 3p-9 (0 Flock 3P-9 1021)	1144,408	97,4079	208,4528	0,0006625	233,4773	496	6867,32882	14/02/2017

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3r-1 (0 Flock 3R-1 105A)	1525,877	97,4613	211,6187	0,0023139	79,0103	476	6848,10397	29/10/2018
Dove 3r-10 (0 Flock 3R-10 1059)	1907,346	97,4608	211,4406	0,0019613	75,4265	476	6847,93541	29/11/2018
Dove 3r-11 (0 Flock 3R-11 1064)	2288,815	97,4606	211,5099	0,0019687	75,5591	476	6847,93895	29/11/2018
Dove 3r-12 (0 Flock 3R-12 1066)	2670,284	97,4608	211,1811	0,0019669	76,7661	476	6847,93809	29/11/2018
Dove 3r-13 (0 Flock 3R-13 210B)	3051,753	97,4609	211,0611	0,0023578	82,3778	476	6848,12497	29/10/2018
Dove 3r-14 (0 Flock 3R-14 210C)	3433,223	97,4609	211,07	0,0023522	81,9563	476	6848,12229	29/10/2018
Dove 3r-15 (0 Flock 3R-15 2107)	3814,692	97,4619	210,4578	0,0023676	83,0563	476	6848,12965	29/10/2018
Dove 3r-16 (0 Flock 3R-16 2152)	4196,161	97,4618	211,3673	0,002374	80,2621	476	6848,13271	29/10/2018
Dove 3r-2 (0 Flock 3R-2 105B)	4577,63	97,4617	211,6198	0,0023133	79,1672	476	6848,10368	29/10/2018
Dove 3r-3 (0 Flock 3R-3 105D)	4959,099	97,4617	211,6396	0,0022945	77,9862	476	6848,09469	29/10/2018
Dove 3r-4 (0 Flock 3R-4 105E)	5340,568	97,4616	211,6181	0,0023115	77,4366	476	6848,10282	29/10/2018
Dove 3r-5 (0 Flock 3R-5 105F)	5722,038	97,4612	211,2071	0,0019877	77,5591	476	6847,94803	29/11/2018
Dove 3r-6 (0 Flock 3R-6 1057)	6103,507	97,4624	211,2794	0,0019833	78,3619	476	6847,94593	29/11/2018
Dove 3r-7 (0 Flock 3R-7 1058)	6484,976	97,4624	211,2221	0,0020047	78,4709	476	6847,95615	29/10/2018
Dove 3r-8 (0 Flock 3R-8 1060)	190,735	97,4616	211,4839	0,0019975	76,9239	476	6847,95271	29/11/2018

Name of Satellite, Alternate Names	Time to periapsis	Inclination (deg)	Long Ascending Node (deg)	Eccentricity (e)	Argument of Perigee (P)	Perigee (km)	Semi-major axis (km)	Date of Launch
Dove 3r-9 (0 Flock 3R-9 1061)	572,204	97,4615	211,2496	0,0019598	76,6011	476	6847,9347	29/10/2018
Dove 3s-1 (0 Flock 3S-1 105C)	953,673	97,7418	212,5829	0,0015662	72,3992	574	6945,90041	03/12/2018
Dove 3s-2 (0 Flock 3S-2 2151)	1335,142	97,7472	212,7589	0,0015972	69,125	572	6943,91506	03/12/2018
Dove 3s-3 (0 Flock 3S-3 210D)	1716,611	97,7459	213,6607	0,0016339	67,8367	573	6944,93776	03/12/2018
Dove 3p'-1 (0 Flock 3p'1 1100)	2098,08	97,4922	208,8566	0,0009904	1,9716	493	6864,48875	11/01/2018
Dove 3p'-2 (0 Flock 3p'2 1102)	2479,55	97,4926	208,7372	0,0010049	2,4437	493	6864,49591	11/01/2018
Dove 3p'-3 (0 Flock 3p'3 1105)	2861,019	97,4926	208,029	0,0010175	5,04	495	6866,50418	11/01/2018
Dove 3p'-4 (0 Flock 3p'4 1107)	3242,488	97,4931	209,0213	0,000994	3,7562	492	6863,48953	11/01/2018

ANNEX 4: SaVi configuration

In this annex, it is explained the different step that has been followed to introduce the orbital data of the Flock constellation in the SaVi software to obtain the results of the coverage and the revisit time. The first step is to introduce the 197 operative satellites of the Flock constellation in 9 different archives (figure 1), to be able to simulate the evolution of the constellation due to the different launch phases.

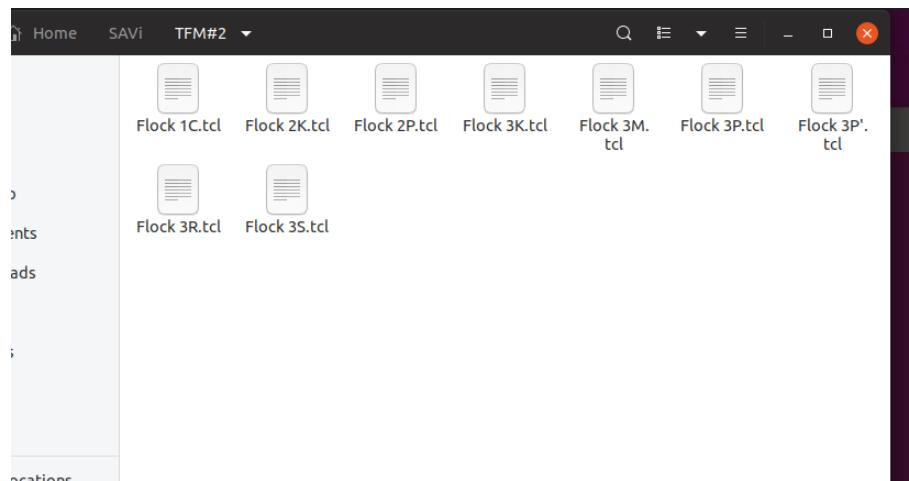


Figure 2. 9 Archives of the 9 launching phases of the Flock constellation.

To create each of these archives, it has been introduced for each satellite the orbital information presented in Annex 3. The orbital information that it must be introduced in the software to be able to simulate it, is the one presented in figure 2.

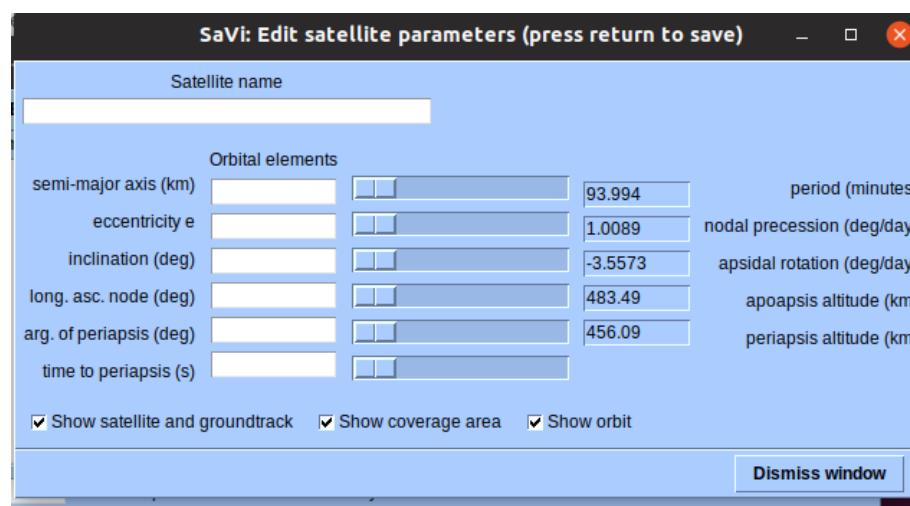


Figure 3. Necessary orbital information of each satellite.

Once the orbital information of the satellites is saved in the system, it is introduced inside the virtual constellation that you are creating, as it can be seen in figure 3.

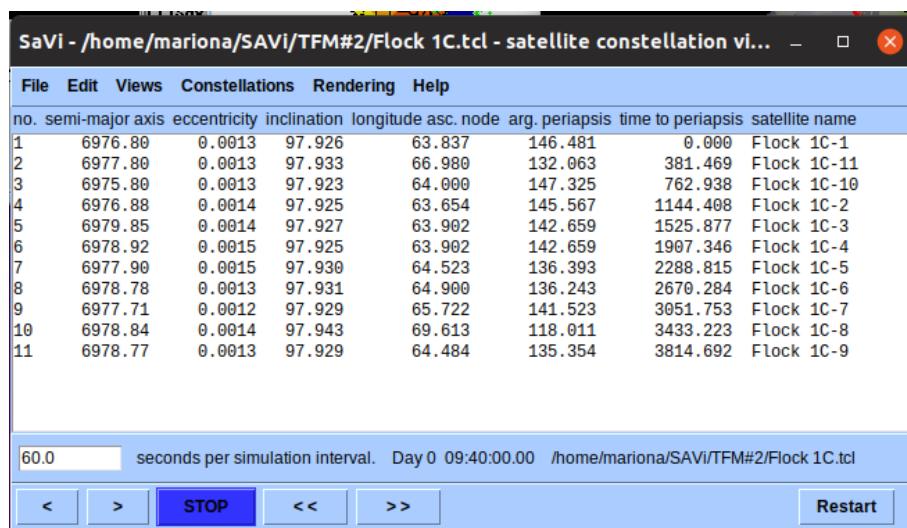


Figure 4. Satellites of the virtual constellation of SaVi software.

And finally, to see the coverage of the constellation, it is necessary to click in views, chose the coverage option and it will pop up the window of figure 4.

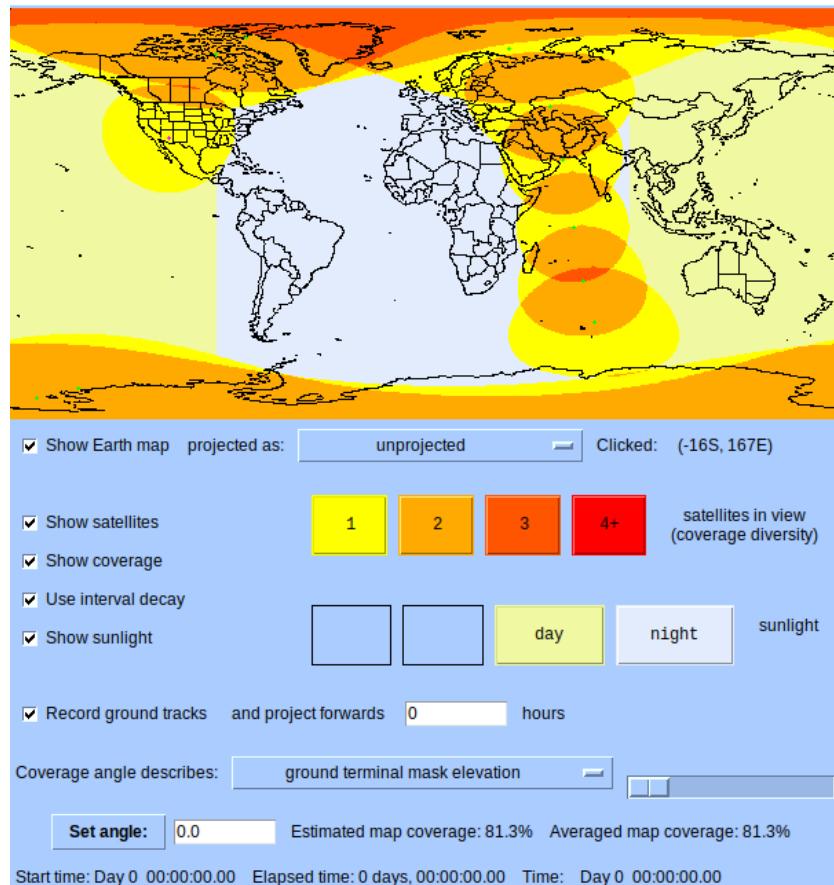


Figure 5. Coverage simulation.

To calculate the revisit time of each of the phases of the Flock constellation, we use the coverage simulation, activating the option record ground tracks and project these ground tracks for specific periods of time until there are no more changes in the simulation.

The periods of time used to compute the revisit time are multiples of 4h beginning in 0h until no more changes. As an example, in the following pages, are the figures obtained by simulating the phase 9 of the Flock constellation (197 operative satellites), the resulting revisit time, in this case, is 24h when the simulation screen become all green (figure

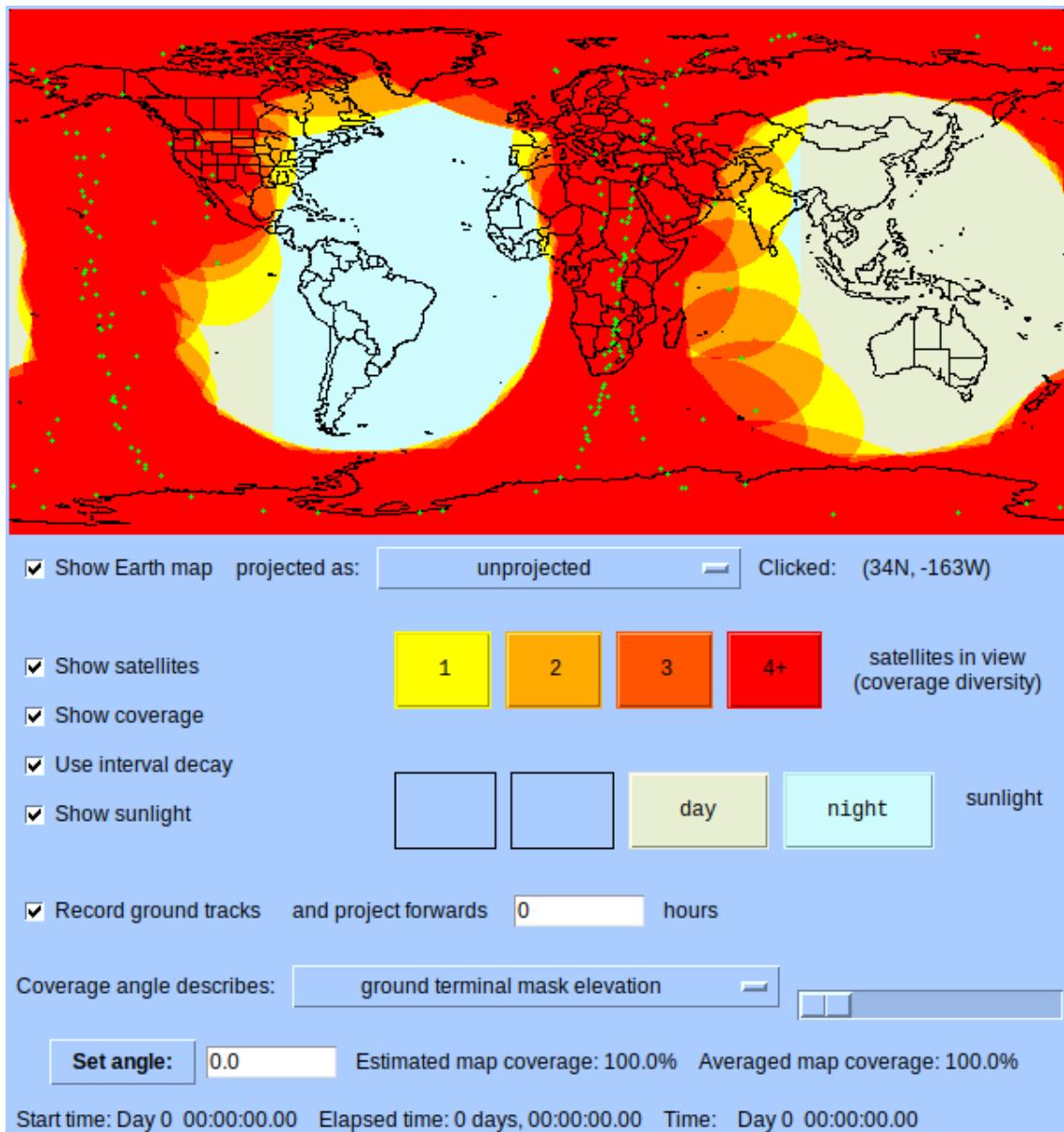


Figure 6. Simulation of phase 9 after 0h.

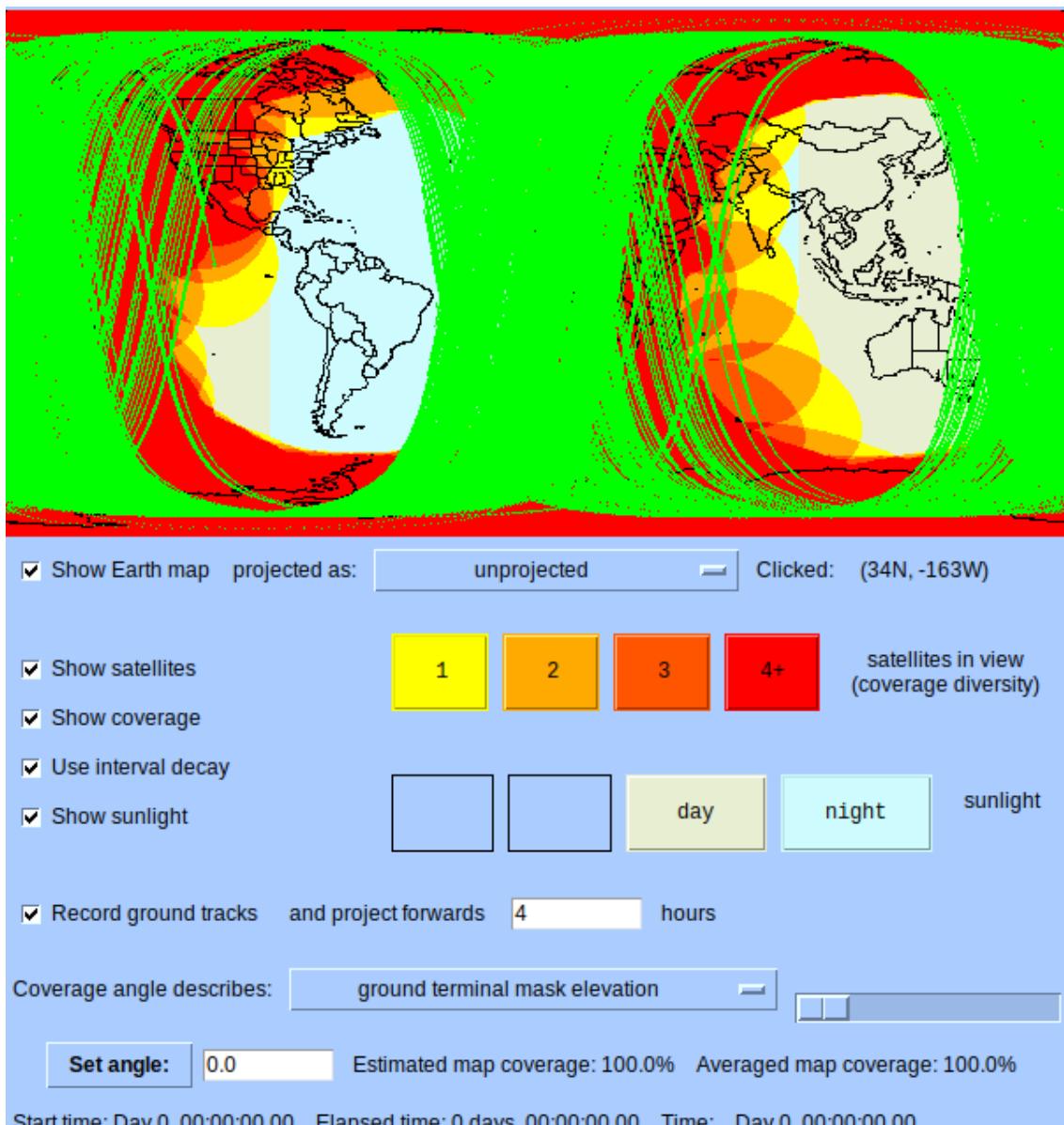


Figure 7. Simulation of phase 9 after 4h.

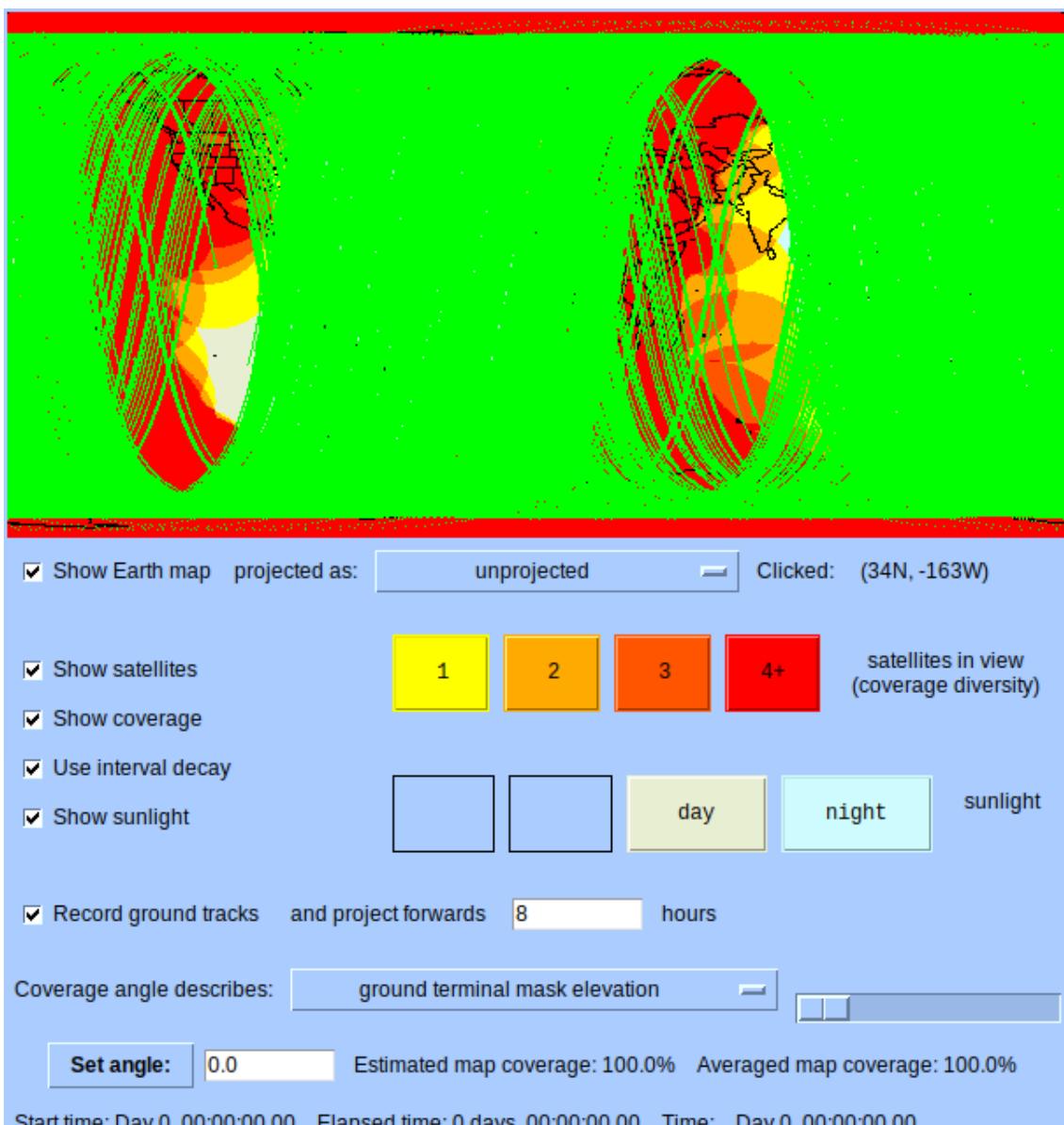


Figure 8. Simulation of phase 9 after 8h.

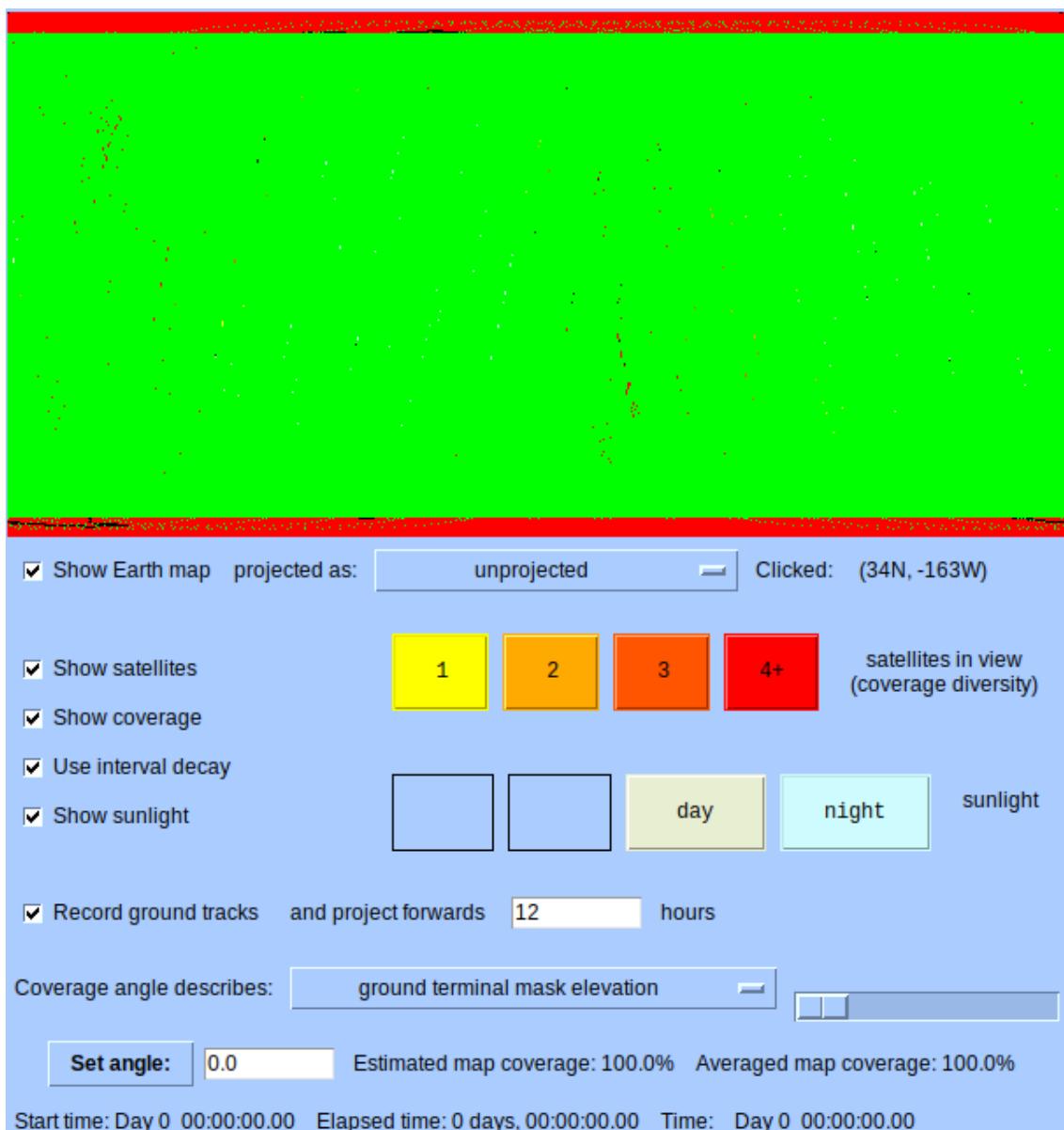


Figure 9. Simulation of phase 9 after 12h.

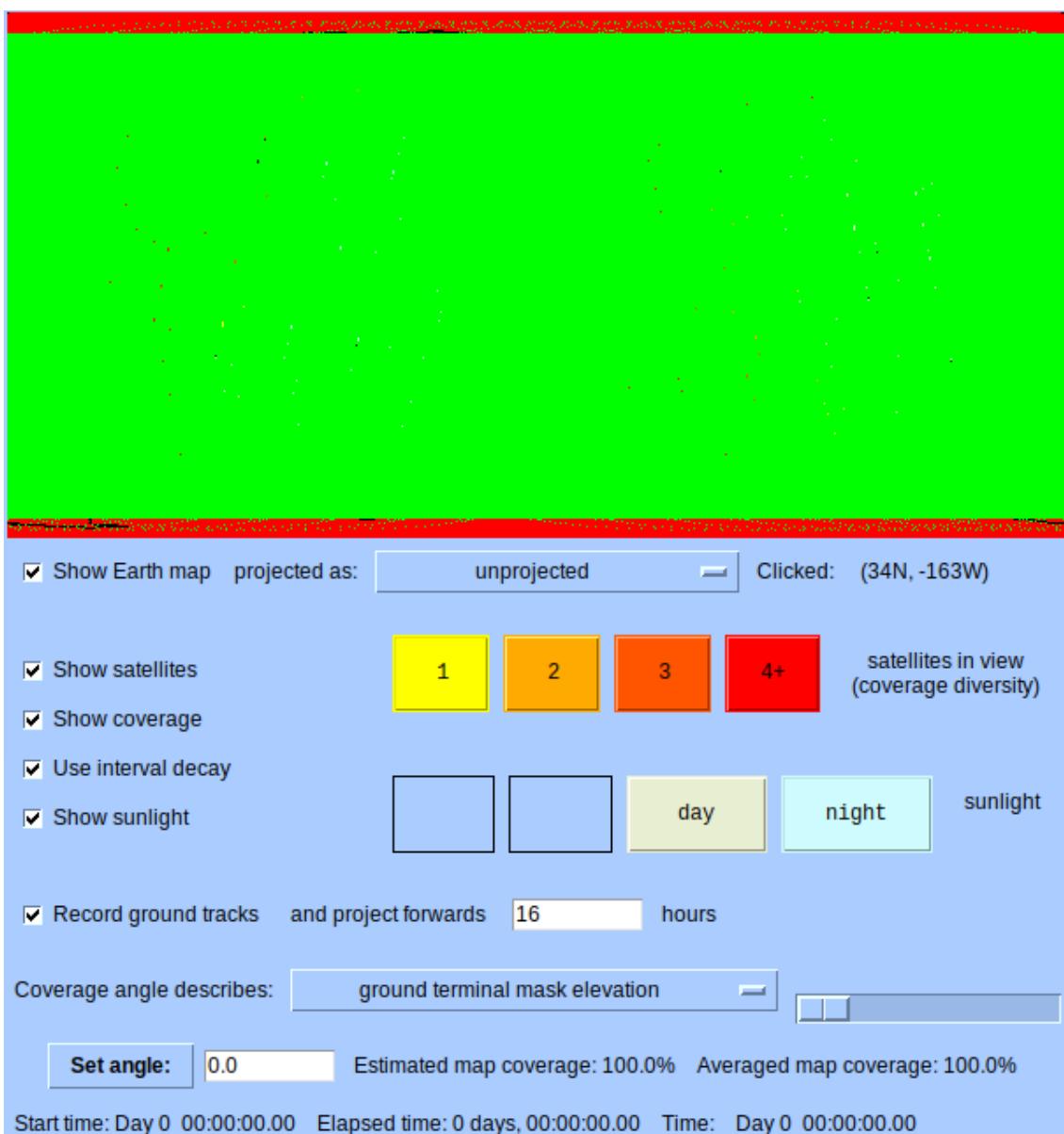


Figure 10. Simulation of phase 9 after 16h.

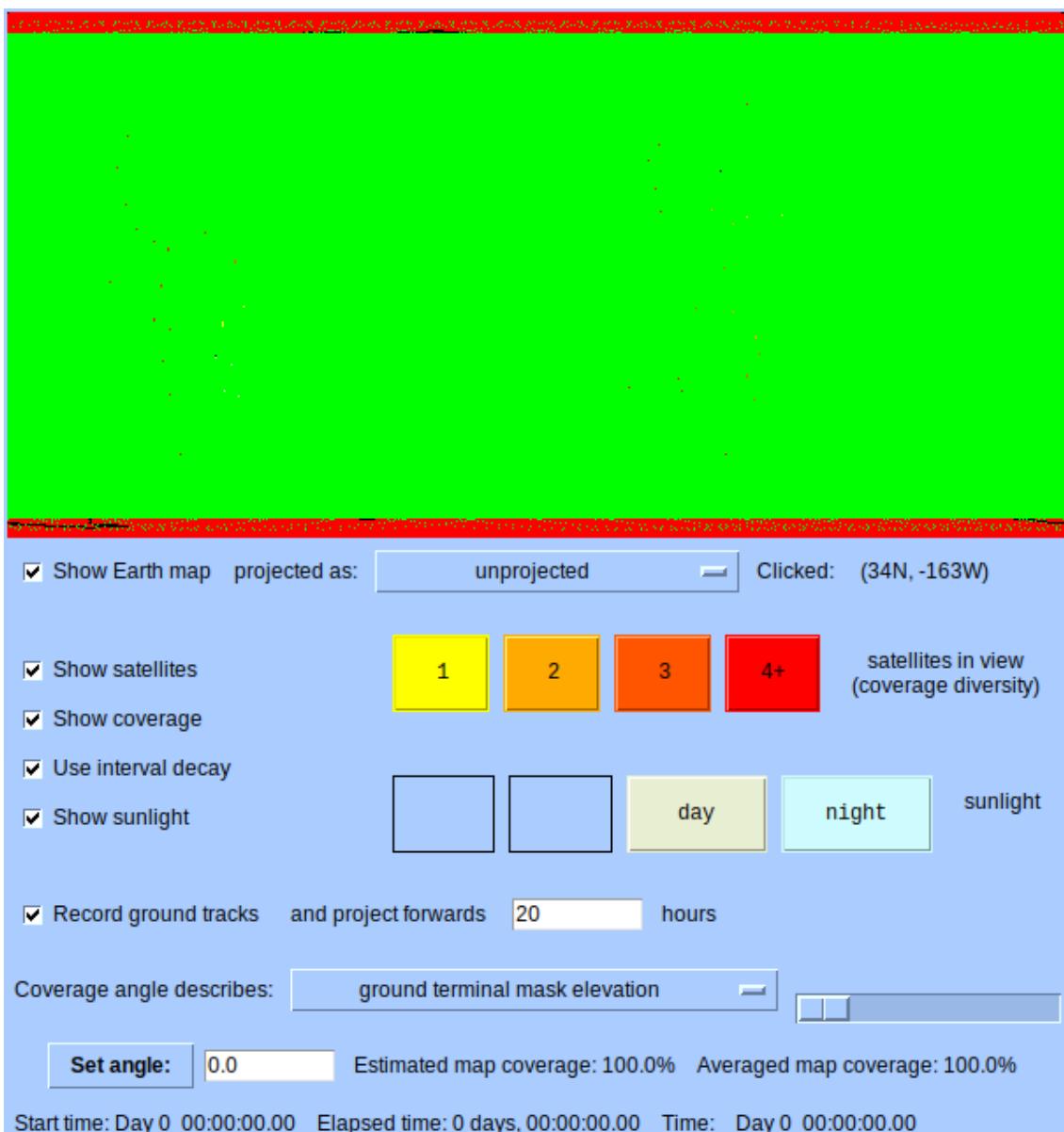


Figure 11. Simulation of phase 9 after 20h.

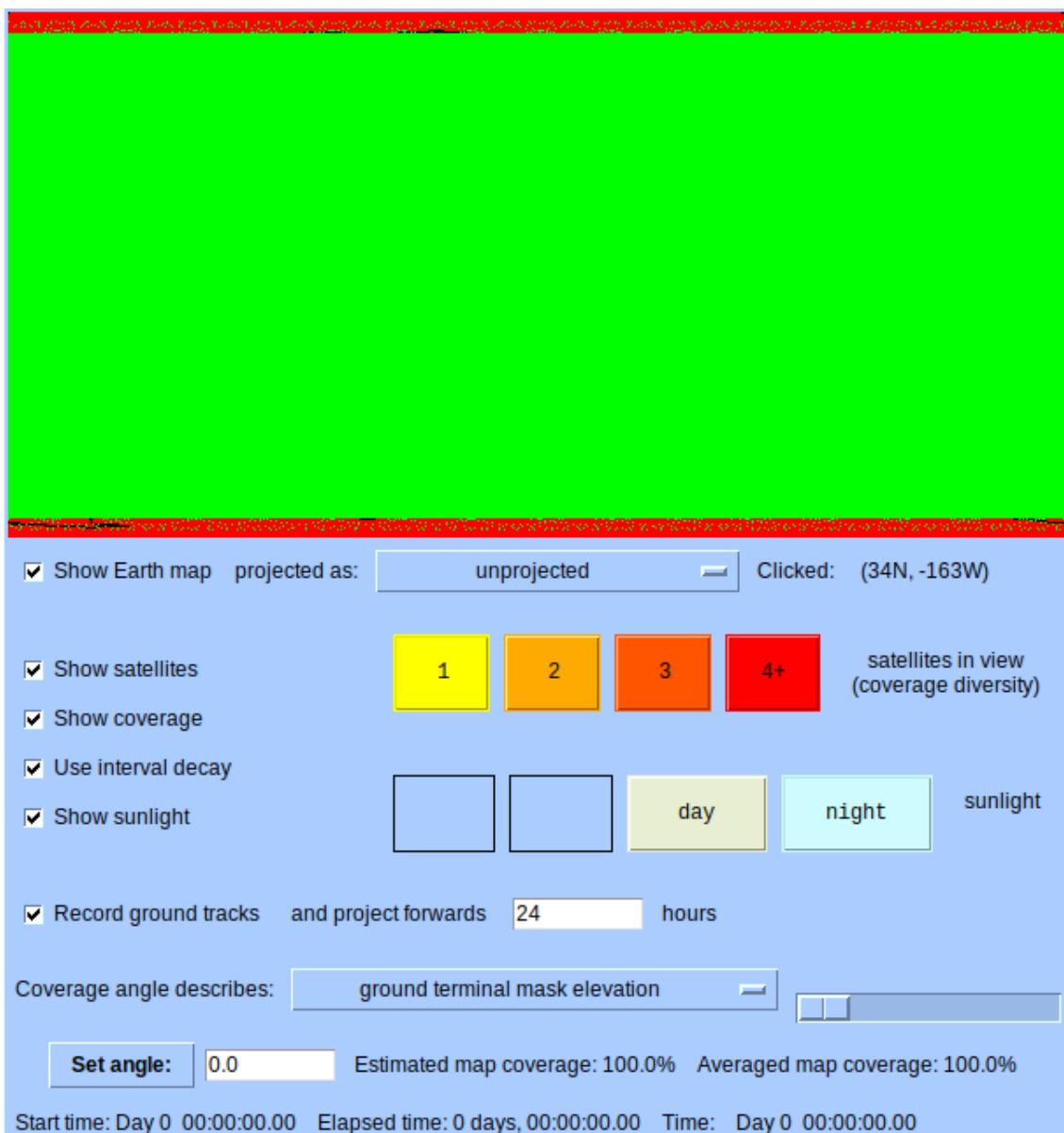


Figure 12. Simulation of phase 9 after 24h.

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