SpaceX Falcon 9 first stage Landing Prediction

Lab 1: Collecting the data

Estimated time needed: **45** minutes

In this capstone, we will predict if the Falcon 9 first stage will land successfully. SpaceX advertises Falcon 9 rocket launches on its website with a cost of 62 million dollars; other providers cost upward of 165 million dollars each, much of the savings is because SpaceX can reuse the first stage. Therefore if we can determine if the first stage will land, we can determine the cost of a launch. This information can be used if an alternate company wants to bid against SpaceX for a rocket launch. In this lab, you will collect and make sure the data is in the correct format from an API. The following is an example of a successful and launch.

Several examples of an unsuccessful landing are shown here:

Most unsuccessful landings are planned. Space X performs a controlled landing in the oceans.

Objectives

In this lab, you will make a get request to the SpaceX API. You will also do some basic data wrangling and formating.

- Request to the SpaceX API
- Clean the requested data

Import Libraries and Define Auxiliary Functions

We will import the following libraries into the lab

In [1]:
```
# Requests allows us to make HTTP requests which we will use to get data from an API
import requests
# Pandas is a software library written for the Python programming language for data
```

```
import pandas as pd
# NumPy is a library for the Python programming language,
# adding support for large, multi-dimensional arrays and matrices,
# along with a large collection of high-level mathematical functions to operate on t
import numpy as np
# Datetime is a library that allows us to represent dates
import datetime

# Setting this option will print all collumns of a dataframe
pd.set_option('display.max_columns', None)
# Setting this option will print all of the data in a feature
pd.set_option('display.max_colwidth', None)
```

Below we will define a series of helper functions that will help us use the API to extract information using identification numbers in the launch data.

From the `rocket` column we would like to learn the booster name.

In [2]:
```
# Takes the dataset and uses the rocket column to call the API and append the data t
def getBoosterVersion(data):
    for x in data['rocket']:
        response = requests.get("https://api.spacexdata.com/v4/rockets/"+str(x)).jsc
        BoosterVersion.append(response['name'])
```

From the `launchpad` we would like to know the name of the launch site being used, the logitude, and the latitude.

In [3]:
```
# Takes the dataset and uses the launchpad column to call the API and append the dat
def getLaunchSite(data):
    for x in data['launchpad']:
        response = requests.get("https://api.spacexdata.com/v4/launchpads/"+str(x)).
        Longitude.append(response['longitude'])
        Latitude.append(response['latitude'])
        LaunchSite.append(response['name'])
```

From the `payload` we would like to learn the mass of the payload and the orbit that it is going to.

In [4]:
```
# Takes the dataset and uses the payloads column to call the API and append the data
def getPayloadData(data):
    for load in data['payloads']:
        response = requests.get("https://api.spacexdata.com/v4/payloads/"+load).json
        PayloadMass.append(response['mass_kg'])
        Orbit.append(response['orbit'])
```

From `cores` we would like to learn the outcome of the landing, the type of the landing, number of flights with that core, whether gridfins were used, wheter the core is reused, wheter legs were used, the landing pad used, the block of the core which is a number used to seperate version of cores, the number of times this specific core has been reused, and the serial of the core.

In [5]:
```
# Takes the dataset and uses the cores column to call the API and append the data to
def getCoreData(data):
    for core in data['cores']:
            if core['core'] != None:
                response = requests.get("https://api.spacexdata.com/v4/cores/"+core[
                Block.append(response['block'])
                ReusedCount.append(response['reuse_count'])
                Serial.append(response['serial'])
            else:
                Block.append(None)
                ReusedCount.append(None)
                Serial.append(None)
            Outcome.append(str(core['landing_success'])+' '+str(core['landing_type'])
            Flights.append(core['flight'])
            GridFins.append(core['gridfins'])
            Reused.append(core['reused'])
            Legs.append(core['legs'])
            LandingPad.append(core['landpad'])
```

Now let's start requesting rocket launch data from SpaceX API with the following URL:

In [6]:
```
spacex_url="https://api.spacexdata.com/v4/launches/past"
```

In [7]:
```
response = requests.get(spacex_url)
```

Check the content of the response

In [8]:
```
print(response.content)
```

```
b'[{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":
[]},"links":{"patch":{"small":"https://images2.imgbox.com/3c/0e/T8iJcSN3_o.png","lar
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s-reach-orbit.html","wikipedia":"https://en.wikipedia.org/wiki/DemoSat"},"static_fir
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```

n":"harmonic oscillation leading to premature engine shutdown"}],"details":"Successf
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re engine shutdown at T+7 min 30 s, Failed to reach orbit, Failed to recover first s
tage","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4b6b6c3bb0006eeb1e2"],"la
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```
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```

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ul, but the secondary payload was inserted into abnormally low orbit and lost due to
Falcon 9 boost stage engine failure, ISS visiting vehicle safety rules, and the prim
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attempt was made to perform an ocean touchdown test of the discarded booster vehicl
e. The test provided good test data on the experiment-its primary objective-but as t
he booster neared the ocean, aerodynamic forces caused an uncontrollable roll. The c
enter engine, depleted of fuel by centrifugal force, shut down resulting in the impa
ct and destruction of the vehicle.","crew":[],"ships":["5ea6ed2d080df4000697c90
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ImEs","article":"https://www.nasaspaceflight.com/2013/12/spacex-falcon-9-v1-1-milest
one-ses-8-launch/","wikipedia":"https://en.wikipedia.org/wiki/SES-8"},"static_fire_d
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or Falcon 9. The USAF evaluated launch data from this flight as part of a separate c
ertification program for SpaceX to qualify to fly U.S. military payloads and found t
hat the Thaicom 6 launch had \\"unacceptable fuel reserves at engine cutoff of the s
tage 2 second burnoff\\"","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bbb6
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pacex/files/spacexcrs-3_presskit_042014.pdf","webcast":"https://www.youtube.com/watc
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unch-spacex/31671/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-3"},"stati
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d-descent test of the discarded booster vehicle and achieved the first successful co
ntrolled ocean touchdown of a liquid-rocket-engine orbital booster. Following touchd
own the first stage tipped over as expected and was destroyed. This was the first Fa
lcon 9 booster to fly with extensible landing legs and the first Dragon mission with
the Falcon 9 v1.1 launch vehicle.","crew":[],"ships":["5ea6ed2d080df4000697c902"],"c
apsules":["5e9e2c5bf3591859a63b2668"],"payloads":["5eb0e4bbb6c3bb0006eeb1f1"],"launc
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en.wikipedia.org/wiki/Falcon_9_flight_10"},"static_fire_date_utc":"2015-12-19T04:57:
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5eda69973a809d1ec","success":true,"failures":[],"details":"Total payload mass was 1,
316 kg (2,901 lb) : 6 satellites weighing 172 kg each, plus two 142-kg mass simulato
rs. This was the second Falcon 9 booster equipped with landing legs. Following secon
d-stage separation, SpaceX conducted a controlled-descent test of the first stage, w
hich successfully decelerated from\xc2\xa0hypersonic velocity in the upper atmospher
e, made reentry and landing burns, deployed its legs and touched down on the ocean s
urface. As with the previous mission, the first stage then tipped over as expected a
nd was not recovered.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bcb6c3b
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lw5s","article":"http://spacenews.com/41497spacex-launches-first-of-two-satellites-f
or-asiasat/","wikipedia":"https://en.wikipedia.org/wiki/AsiaSat_8"},"static_fire_dat
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855040322_57671ab8eb_o.jpg"]},"presskit":"https://www.spaceflightnow.com/falcon9/012/presskit.pdf","webcast":"https://www.youtube.com/watch?v=39ninsyTRk8","youtube_id":"39ninsyTRk8","article":"https://www.space.com/27052-spacex-launches-asiasat6-satellite.html","wikipedia":"https://en.wikipedia.org/wiki/AsiaSat_6"},"static_fire_date_utc":"2014-08-22T23:51:18.000Z","static_fire_date_unix":1408751478,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bcb6c3bb0006eeb1f4"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":17,"name":"AsiaSat 6","date_utc":"2014-09-07T05:00:00.000Z","date_unix":1410066000,"date_local":"2014-09-07T01:00:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f35918b1bc3b2633","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce6ffd86e000604b33a"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/b4/28/cQwcs8qz_o.png","large":"https://images2.imgbox.com/0d/e8/tfdeNslS_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2grxer","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7608/16661753958_9f61f777e7_o.jpg","https://farm9.staticflickr.com/8593/16763199166_38ba2cafc8_o.jpg","https://farm9.staticflickr.com/8655/16789074175_ba03989359_o.png","https://farm9.staticflickr.com/8659/16166761954_ebc2a72b2a_o.jpg","https://farm9.staticflickr.com/8620/16642025217_a6852b9499_o.jpg"]},"presskit":"https://www.nasa.gov/sites/default/files/files/SpaceX_NASA_CRS-4_PressKit.pdf","webcast":"https://www.youtube.com/watch?v=7YkCh7uOw1Y","youtube_id":"7YkCh7uOw1Y","article":"https://www.nasa.gov/press/2014/september/nasa-cargo-launches-to-space-station-aboard-spacex-resupply-mission-0","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-4"},"static_fire_date_utc":"2014-09-17T00:00:00.000Z","static_fire_date_unix":1410912000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":["5ea6ed2d080df4000697c902"],"capsules":["5e9e2c5bf3591880643b2669"],"payloads":["5eb0e4bcb6c3bb0006eeb1f5"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":18,"name":"CRS-4","date_utc":"2014-09-21T05:52:00.000Z","date_unix":1411278720,"date_local":"2014-09-21T01:52:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f359184a683b2634","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce7ffd86e000604b33b"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/25/b6/RhNppyL3_o.png","large":"https://images2.imgbox.com/fe/5a/WyQS4MXa_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2rrdha","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm9.staticflickr.com/8666/16511391418_bb5cdbbd71_o.jpg","https://farm9.staticflickr.com/8612/16848173281_035bdc6009_o.jpg","https://farm9.staticflickr.com/8571/16699496805_bf39747618_o.jpg","https://farm9.staticflickr.com/8650/16699496705_187e4e53fd_o.jpg","https://farm9.staticflickr.com/8663/16077174554_370937efbe_o.jpg","https://farm9.staticflickr.com/8638/16512101410_83763eb9ea_o.jpg","https://farm9.staticflickr.com/8653/16077173984_17885d4bea_o.jpg","https://farm8.staticflickr.com/7635/16848159582_40c0f9d25f_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_nasa_crs-5_presskit.pdf","webcast":"https://www.youtube.com/watch?v=p7x-SumbynI","youtube_id":"p7x-SumbynI","article":"https://spaceflightnow.com/2015/01/10/dragon-successfully-launched-rocket-recovery-demo-crash-lands/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-5"},"static_fire_date_utc":"2014-12-19T00:00:00.000Z","static_fire_date_unix":1418947200,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Following second stage separation, SpaceX performed a test flight which attempted to return the first stage of the Falcon 9 through the atmosphere and land it on an approximately 90-by-50-meter (300 ft x 160 ft) floating platform-called the autonomous spaceport drone ship. Many of the test objectives were achieved, including precision control of the rocket\'s descent to land on the platform at a specific point in the Atlantic ocean, and a large amount of test data was obtained from the first use of grid fin control surfaces used for more precise reentry positioning. The grid fin control system ran out of hydraulic fluid a minute before landing and the landing itself resulted in a crash.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080d
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ervatory-blasts-off-after-17-year-wait/","wikipedia":"https://en.wikipedia.org/wiki/
Deep_Space_Climate_Observatory"},"static_fire_date_utc":"2015-01-31T00:00:00.000
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3 launch contract. First SpaceX launch to put a satellite to an orbit with an orbita
l altitude many times the distance to the Moon: Sun-Earth libration point L1. The fi
rst stage made a test flight descent to an over-ocean landing within 10 m (33 ft) of
its intended target.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df40
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s://farm9.staticflickr.com/8617/16510041628_883af57512_o.jpg"]},"presskit":"http://w
ww.spacex.com/sites/spacex/files/abs-eutelsatfactsheet.pdf","webcast":"https://www.y
outube.com/watch?v=mN7lyaCBzT8","youtube_id":"mN7lyaCBzT8","article":"https://www.sp
ace.com/28702-spacex-rocket-launches-satellites-video.html","wikipedia":"https://en.
wikipedia.org/wiki/ABS-3A"},"static_fire_date_utc":"2015-02-25T19:10:00.000Z","stati
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ec","success":true,"failures":[],"details":"The launch was Boeing\'s first-ever conj
oined launch of a lighter-weight dual-commsat stack that was specifically designed t
o take advantage of the lower-cost SpaceX Falcon 9 launch vehicle. Per satellite, la
unch costs were less than $30 million. The ABS satellite reached its final destinati
on ahead of schedule and started operations on September 10.","crew":[],"ships":
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n-9-successfully-launches-descends-to-off-balance-landing/","wikipedia":"https://en.
wikipedia.org/wiki/SpaceX_CRS-6"},"static_fire_date_utc":"2015-04-11T00:00:00.000
Z","static_fire_date_unix":1428710400,"net":false,"window":0,"rocket":"5e9d0d95eda69
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t, SpaceX attempted a controlled-descent test of the first stage. The first stage co
ntacted the ship, but soon tipped over due to excess lateral velocity caused by a st
uck throttle valve resulting in a later-than-intended downthrottle.","crew":[],"ship
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c","5ea6ed2f080df4000697c90f","5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf3591
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r","upcoming":false,"cores":[{"core":"5e9e28a1f359186d533b2638","flight":1,"gridfin
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om/7735/16704192574_e3a0a6fac2_o.jpg"]},"presskit":"http://www.spacex.com/sites/spac
ex/files/spacexthalesfactsheet_final.pdf","webcast":"https://www.youtube.com/watch?v
=nBwAYT_ogj4","youtube_id":"nBwAYT_ogj4","article":"https://spaceflightnow.com/2015/
04/28/falcon-9-rocket-powers-into-space-with-satellite-for-turkmenistan/","wikipedi
a":"https://en.wikipedia.org/wiki/T%C3%BCrkmen%C3%84lem_52%C2%B0E_/_MonacoSAT"},"sta
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The Dragon capsule survived the explosion but was lost upon splashdown because its software did not contain provisions for parachute deployment on launch vehicle failure.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c"],"capsules":["5e9e2c5cf35918407d3b266c"],"payloads":["5eb0e4beb6c3bb0006eeb1fc"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":24,"name":"CRS-7","date_utc":"2015-06-28T14:21:00.000Z","date_unix":1435501260,"date_local":"2015-06-28T10:21:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f35918683c3b263a","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":null,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ceeffd86e000604b341"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/89/e8/5eeThzqZ_o.png","large":"https://images2.imgbox.com/65/a5/8iNE9T6Y_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/3xgxh5","media":"https://www.reddit.com/r/spacex/comments/3xm83h/","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1648/23827554109_837b21739e_o.jpg","https://farm1.staticflickr.com/597/23802553412_d41e4dcc64_o.jpg","https://farm6.staticflickr.com/5806/23802550622_9ff8c90098_o.jpg","https://farm1.staticflickr.com/571/23604164970_2a1a2366e4_o.jpg","https://farm6.staticflickr.com/5773/23271687254_5e64d726ba_o.jpg","https://farm6.staticflickr.com/5766/23526044959_5bfe74bc88_o.jpg","https://farm6.staticflickr.com/5723/23785609832_83038751d1_o.jpg","https://farm1.staticflickr.com/715/23833499336_d3fde6a25a_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_orbcomm_press_kit_final2.pdf","webcast":"https://www.youtube.com/watch?v=O5bTbVbe4e4","youtube_id":"O5bTbVbe4e4","article":"https://spaceflightnow.com/2015/12/22/round-trip-rocket-flight-gives-spacex-a-trifecta-of-successes/","wikipedia":"https://en.wikipedia.org/wiki/Falcon_9_flight_20"},"static_fire_date_utc":"2015-12-19T00:09:00.000Z","static_fire_date_unix":1450483740,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Total payload mass was 2,034 kg (4,484 lb) : 11 satellites weighing 172 kg each, plus a 142-kg mass simulator. This was the first launch of the upgraded v1.1 variant (later called Falcon 9 Full Thrust), with a 30 percent power increase. Orbcomm had originally agreed to be the third flight of the enhanced-thrust rocket, but the change to the maiden flight position was announced in October 2015. SpaceX received a permit from the FAA to land the booster on solid ground at Cape Canaveral, and succeeded.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4beb6c3bb0006eeb1fd"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":25,"name":"OG-2 Mission 2","date_utc":"2015-12-22T01:29:00.000Z","date_unix":1450747740,"date_local":"2015-12-22T21:29:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f3591867753b263b","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cefffd86e000604b342"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/72/f2/uK9vYzvk_o.png","large":"https://images2.imgbox.com/71/59/j489OwAI_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/417weg","media":"https://www.reddit.com/r/spacex/comments/41cvdm","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1460/24382360351_9b1f2fcabc_o.jpg","https://farm2.staticflickr.com/1669/24423604506_27d3c4548b_o.jpg","https://farm2.staticflickr.com/1618/24151425850_1cb6040569_o.jpg","https://farm2.staticflickr.com/1622/24127012370_07edc62046_o.jpg","https://farm2.staticflickr.co

m/1508/24127011190_92ef932c96_o.jpg","https://farm2.staticflickr.com/1591/23778325594_08231286fc_o.jpg","https://farm2.staticflickr.com/1542/24038722499_34c10216a3_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_jason3_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=ivdKRJzl6y0","youtube_id":"ivdKRJzl6y0","article":"https://spaceflightnow.com/2016/01/18/satellite-launched-to-measure-motions-of-the-oceans/","wikipedia":"https://en.wikipedia.org/wiki/Jason-3"},"static_fire_date_utc":"2016-01-11T18:42:00.000Z","static_fire_date_unix":1452537720,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First launch of NASA and NOAA joint science mission under the NLS II launch contract (not related to NASA CRS or USAF OSP3 contracts). Last launch of the original Falcon 9 v1.1 launch vehicle. The Jason-3 satellite was successfully deployed to target orbit. SpaceX again attempted a recovery of the first stage booster by landing on an autonomous drone ship; this time located in the Pacific Ocean. The first stage did achieve a soft-landing on the ship, but a lockout on one of the landing legs failed to latch, so that the booster fell over and exploded.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c912","5ea6ed30080df4000697c914"],"capsules":[],"payloads":["5eb0e4beb6c3bb0006eeb1fe"],"launchpad":"5e9e4502f509092b78566f87","flight_number":26,"name":"Jason 3","date_utc":"2016-01-17T15:42:00.000Z","date_unix":1453045320,"date_local":"2016-01-17T08:42:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f3591842fa3b263c","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cf0ffd86e000604b343"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/fa/ef/4FBvVReu_o.png","large":"https://images2.imgbox.com/f6/aa/xDtGo0WJ_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/48u4yq","media":"https://www.reddit.com/r/spacex/comments/472k8c","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1623/25395662282_942fd68ba3_o.jpg","https://farm2.staticflickr.com/1458/25395661442_bfd783f18a_o.jpg","https://farm2.staticflickr.com/1641/25421381351_38390bcb8e_o.jpg","https://farm2.staticflickr.com/1616/25514167315_b19b0a4365_o.jpg","https://farm2.staticflickr.com/1482/24883160354_b03cefd416_o.jpg","https://farm2.staticflickr.com/1653/25420915781_8fc648b4a4_o.jpg","https://farm2.staticflickr.com/1610/25486858116_9c06dfea59_o.jpg","https://farm2.staticflickr.com/1617/25168697841_00dfff89bb_o.jpg","https://farm2.staticflickr.com/1533/24631230904_83b1624807_o.jpg","https://farm2.staticflickr.com/1627/25145624551_1b8743116f_o.jpg","https://farm2.staticflickr.com/1622/25120540712_7fc1a5ed72_o.jpg","https://farm2.staticflickr.com/1550/24585667074_aa712b13a8_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_ses9_press_kit_final.pdf","webcast":"https://www.youtube.com/watch?v=muDPSyO7-A0","youtube_id":"muDPSyO7-A0","article":"https://spaceflightnow.com/2016/03/05/tv-broadcasting-satellite-finally-launched-on-falcon-9/","wikipedia":"https://en.wikipedia.org/wiki/SES-9"},"static_fire_date_utc":"2016-10-02T14:11:00.000Z","static_fire_date_unix":1475417460,"net":false,"window":5400,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Second launch of the enhanced Falcon 9 Full Thrust launch vehicle. Following the launch, SpaceX attempted an experimental landing test to a drone ship, although a successful landing was not expected because launch mass exceeded previously indicated limit for a GTO there was little fuel left. As predicted, booster recovery failed: the spent first stage \\"landed hard\\", but the controlled-descent, atmospheric re-entry and navigation to the drone ship were successful and returned significant test data on bringing back high-energy Falcon 9s.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4beb6c3bb0006eeb1ff"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":27,"name":"SES-9","date_utc":"2016-03-04T23:35:00.000Z","date_unix":1457134500,"date_local":"2016-03-04T19:35:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f359188def3b263d","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cf2ffd86e000604b344"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/49/2a/gkSR50yc_o.png","large":"https://images2.imgbox.com/1b/f0/tyNDMK5j_o.pn

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The rocket\'s first stage landed smoothly on SpaceX\'s autonomous spaceport drone ship 9 minutes after liftoff, making this the first ever successful landing of a rocket booster on a ship at sea as part of an orbital launch. The first stage B1021 was later also the first orbital booster to be used again, when launching SES-10 on March 30, 2017.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed30080df4000697c912","5ea6ed30080df4000697c913"],"capsules":["5e9e2c5cf3591885d43b266d"],"payloads":["5eb0e4bfb6c3bb0006eeb200"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":28,"name":"CRS-8","date_utc":"2016-04-08T20:43:00.000Z","date_unix":1460148180,"date_local":"2016-04-08T16:43:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f359182d0b3b263e","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cf3ffd86e000604b345"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/87/c9/qViUTdt5_o.png","large":"https://images2.imgbox.com/84/40/ddJiuhNV_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/4gyh8z","launch":"https://www.reddit.com/r/spacex/comments/4htenu","media":"https://www.reddit.com/r/spacex/comments/4htg2g","recovery":"https://www.reddit.com/r/spacex/comments/4ihp1p"},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7340/27044931232_7b755276ec_o.jpg","https://farm8.staticflickr.com/7444/27028105566_1d3413daa7_o.jpg","https://farm8.staticflickr.com/7597/26778141961_e3bd237942_o.jpg","https://farm8.staticflickr.com/7079/26778141661_559b48ac80_o.jpg","https://farm8.staticflickr.com/7682/26778141401_c437b04b74_o.jpg","https://farm8.staticflickr.com/7706/26751237322_ceb6d56235_o.jpg","https://farm8.staticflickr.com/7677/26809210466_fc55835f3c_o.jpg","https://farm8.staticflickr.com/7085/26809208046_d77bd31fd0_o.jpg","https://farm8.staticflickr.com/7103/26809207316_cdc7d582e6_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_jcsat_press_kit_final.pdf","webcast":"https://www.youtube.com/watch?v=L0bMeDj76ig","youtube_id":"L0bMeDj76ig","article":"https://spaceflightnow.com/2016/05/06/falcon-9-succeeds-in-middle-of-the-night-launch/","wikipedia":"https://en.wikipedia.org/wiki/JCSAT-2B"},"static_fire_date_utc":"2016-05-01T21:32:00.000Z","static_fire_date_unix":1462138320,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Launched the JCSAT 14 communications satellite for Tokyo-based SKY Perfect JSAT Corp. JCSAT 14 will support data networks, television broadcasters and mobile communications users in Japan, East Asia, Russia, Oceania, Hawaii and other Pacific islands. This was the first time a booster successfully landed after a GTO mission.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c"],"capsules":[],"payloads":["5eb0e4bfb6c3bb0006eeb201"],"launchp

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to_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cf5ffd86e000604b34
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x/files/spacex_thaicom_8_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=z
BYC4f79iXc","youtube_id":"zBYC4f79iXc","article":"https://spaceflightnow.com/2016/0
5/27/spacex-logs-successful-late-afternoon-launch-for-thaicom/","wikipedia":"http
s://en.wikipedia.org/wiki/Thaicom_8"},"static_fire_date_utc":"2016-05-25T00:00:00.00
0Z","static_fire_date_unix":1464134400,"net":false,"window":7200,"rocket":"5e9d0d95e
da69973a809d1ec","success":true,"failures":[],"details":"Manufactured by Orbital AT
K, the 3,100-kilogram (6,800 lb) Thaicom 8 communications satellite will serve Thail
and, India and Africa from the 78.5\xc2\xb0 East geostationary location. It is equip
ped with 24 active Ku-band transponders.","crew":[],"ships":["5ea6ed2e080df4000697c9
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icle":"https://spaceflightnow.com/2016/06/15/spacex-successfully-fires-satellites-in
to-orbit-but-loses-booster-on-landing/","wikipedia":"https://en.wikipedia.org/wiki/A
BS_(satellite_operator)"},"static_fire_date_utc":"2016-06-13T15:03:00.000Z","static_
fire_date_unix":1465830180,"net":false,"window":2700,"rocket":"5e9d0d95eda69973a809d
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e on flight 16, Falcon again launched two Boeing 702SP gridded ion thruster satellit
es in a dual-stack configuration, with the two customers sharing the rocket and miss
ion costs. First stage landing attempt on drone ship failed on landing due to low th
rust on one of the three landing engines.","crew":[],"ships":["5ea6ed2e080df4000697c
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reddit.com/r/spacex/comments/4tayth","recovery":"https://www.reddit.com/r/spacex/com
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cle":"https://spaceflightnow.com/2016/07/18/spacex-sends-supplies-to-space-station-l
ands-another-falcon-rocket/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-
9"},"static_fire_date_utc":"2016-07-16T02:31:47.000Z","static_fire_date_unix":146863
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carried to the ISS. This mission had a successful first-stage landing at Cape Canave
ral.*Including the reusable Dragon Capsule, total payload to orbit was 6457 kg.","cr
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4000697c90c","5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf359183bb73b266e"],"pa
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RlU","webcast":"https://www.youtube.com/watch?v=QZTCEO0gvLo","youtube_id":"QZTCEO0gv
Lo","article":"https://spaceflightnow.com/2016/08/14/falcon-9-rocket-launches-japane

se-satellite-then-nails-bullseye-landing/","wikipedia":"https://en.wikipedia.org/wiki/JCSAT-16"},"static_fire_date_utc":"2016-08-11T04:01:00.000Z","static_fire_date_unix":1470888060,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First attempt to touch down from a ballistic trajectory using a single-engine landing burn. All previous landings from a ballistic trajectory had fired three engines on the landing-burn, which provided more braking force, but subjected the vehicle to greater structural stresses. The single-engine landing burn takes more time and fuel, but puts less stress on the vehicle.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c1b6c3bb0006eeb206"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":33,"name":"JCSAT-16","date_utc":"2016-08-14T05:26:00.000Z","date_unix":1471152360,"date_local":"2016-08-14T01:26:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f35918b8243b2643","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfaffd86e000604b34a"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://imgur.com/OADkTym.png","large":"https://imgur.com/2F5PYz5.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/4pv7jl","launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://www.youtube.com/watch?v=_BgJEXQkjNQ","youtube_id":"_BgJEXQkjNQ","article":"https://spaceflightnow.com/2016/09/01/spacex-rocket-and-israeli-satellite-destroyed-in-launch-pad-explosion/","wikipedia":"https://en.wikipedia.org/wiki/Amos-6"},"static_fire_date_utc":"2016-09-01T13:07:00.000Z","static_fire_date_unix":1472735220,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":false,"failures":[{"time":-165180,"altitude":0,"reason":"buckled liner in several of the COPV tanks, causing perforations that allowed liquid and/or solid oxygen to accumulate underneath the lining, which was ignited by friction."}],"details":"The rocket and Amos-6 payload were lost in a launch pad explosion on September 1, 2016 during propellant fill prior to a static fire test. The pad was clear of personnel and there were no injuries.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c1b6c3bb0006eeb207"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":34,"name":"Amos-6","date_utc":"2016-09-01T13:07:00.000Z","date_unix":1472735220,"date_local":"2016-09-01T09:07:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f359187ee83b2644","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":null,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfbffd86e000604b34b"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a6/e8/5PyY296y_o.png","large":"https://images2.imgbox.com/ab/b8/USCniUHy_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5dii6z","launch":"https://www.reddit.com/r/spacex/comments/5nsaqm","media":"https://www.reddit.com/r/spacex/comments/5nsico","recovery":"https://www.reddit.com/r/spacex/comments/5oe9kk"},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/658/32394688795_55a9873ea7_o.jpg","https://farm1.staticflickr.com/506/32394688095_a3339f3c6d_o.jpg","https://farm1.staticflickr.com/745/32394687645_63ae2b4740_o.jpg","https://farm1.staticflickr.com/318/31548291014_e3a30abca8_o.jpg","https://farm1.staticflickr.com/670/32351549066_e9cffe8d2b_o.jpg","https://farm6.staticflickr.com/5518/31579784413_83aeac560a_o.jpg","https://farm6.staticflickr.com/5556/32312421135_22c197c156_o.jpg","https://farm1.staticflickr.com/529/32312420015_5d2403a847_o.jpg","https://farm1.staticflickr.com/435/32312417695_19c0e50c4b_o.jpg","https://farm1.staticflickr.com/735/32312416415_b90892af0a_o.jpg","https://farm1.staticflickr.com/293/32312415025_cae16d1994_o.jpg","https://farm1.staticflickr.com/738/31467130724_92e02c9524_o.jpg","https://farm1.staticflickr.com/464/31467130374_9f7a7d380e_o.jpg","https://farm1.staticflickr.com/581/31467129424_bac77d594a_o.jpg","https://farm1.staticflickr.com/380/32308163845_c1731a4b1f_o.jpg","https://farm1.staticflickr.com/447/31450835954_72ed10a19e_o.jpg","https://farm1.staticflickr.com/507/31450834974_b8a3f4aca5_o.jpg"]},"presskit":"https://drive.google.com/open?id=0BwA3a65ef1OvZC1aU3FuMlQzalE","webcast":"https://www.youtube.com/watch?v=7WimRhydggo","youtube_id":"7WimRhydggo","article":"https://spaceflightnow.com/2017/01/14/spacex-resumes-flights-with-on-target-la

unch-for-iridium/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2017-01-05T19:40:00.000Z","static_fire_date_unix":1483645200,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Return-to-flight mission after the loss of Amos-6 in September 2016. Iridium NEXT will replace the original Iridium constellation, launched in the late 1990s. Each Falcon mission will carry 10 satellites, with a goal to complete deployment of the 66 plus 9 spare satellite constellation by mid 2018. The first two Iridium qualification units were supposed to ride a Dnepr rocket in April 2016 but were delayed, so Iridium decided to qualify the first batch of 10 satellites instead.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c912","5ea6ed30080df4000697c915"],"capsules":[],"payloads":["5eb0e4c2b6c3bb0006eeb208"],"launchpad":"5e9e4502f509092b78566f87","flight_number":35,"name":"Iridium NEXT Mission 1","date_utc":"2017-01-14T17:54:00.000Z","date_unix":1484416440,"date_local":"2017-01-14T10:54:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f359189e3a3b2645","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfdffd86e000604b34c"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/d3/08/7YmXiSOQ_o.png","large":"https://images2.imgbox.com/02/52/hp8DpyGM_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5n2eqx","launch":"https://www.reddit.com/r/spacex/comments/5uw4bh","media":"https://www.reddit.com/r/spacex/comments/5uoy8o","recovery":"https://www.reddit.com/r/spacex/comments/609aq4"},"flickr":{"small":[],"original":["https://farm3.staticflickr.com/2815/32761844973_d2e8d76e9c_o.jpg","https://farm4.staticflickr.com/3878/32761843663_8e366494f4_o.jpg","https://farm3.staticflickr.com/2790/32852846842_6f1f7b26b9_o.jpg","https://farm3.staticflickr.com/2295/32852845662_e7ae0daf4a_o.jpg","https://farm4.staticflickr.com/3888/33000639155_2a6e2bb23d_o.jpg","https://farm1.staticflickr.com/405/33000638185_b4ec7c7b93_o.jpg","https://farm1.staticflickr.com/574/32874779241_9f463de901_o.jpg","https://farm4.staticflickr.com/3710/32153433074_96337a54db_o.jpg","https://farm1.staticflickr.com/327/32153432924_09dd1482d8_o.jpg","https://farm3.staticflickr.com/2881/32183025803_36bf976b9e_o.jpg","https://farm3.staticflickr.com/2362/32183025493_2a37b4e22c_o.jpg","https://farm1.staticflickr.com/504/32178458813_ff47f61bb9_o.jpg","https://farm1.staticflickr.com/265/32176806823_879ccc5da0_o.jpg","https://farm1.staticflickr.com/401/32866357531_69c6d289ed_o.jpg","https://farm3.staticflickr.com/2105/32945170805_553d45ca56_o.jpg","https://farm4.staticflickr.com/3865/32945170225_58129f00dc_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/crs10presskitfinal.pdf","webcast":"https://www.youtube.com/watch?v=giNhaEzv_PI","youtube_id":"giNhaEzv_PI","article":"https://spaceflightnow.com/2017/02/19/historic-launch-pad-back-in-service-with-thundering-blastoff-by-spacex/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-10"},"static_fire_date_utc":"2017-02-12T21:30:00.000Z","static_fire_date_unix":1486935000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First Falcon 9 flight from the historic LC-39A launchpad at Kennedy Space Center, carrying supplies and materials to support dozens of science and research investigations scheduled during ISS Expeditions 50 and 51. The first stage returned to launch site and landed at LZ-1.","crew":[],"ships":["5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4c3b6c3bb0006eeb209"],"launchpad":"5e9e4502f509094188566f88","flight_number":36,"name":"CRS-10","date_utc":"2017-02-19T14:39:00.000Z","date_unix":1487515140,"date_local":"2017-02-19T10:39:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591829dc3b2646","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfeffd86e000604b34d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/54/f8/0X2hNhNK_o.png","large":"https://images2.imgbox.com/47/c2/mmiTCLkJ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5n2e10/echostar_23_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/5z8dkm/welcome_to_the_rspacex_echostar23_official_launch/","media":"https://www.reddit.com/r/spacex/comments/5z8if6/rspacex_echostar_23_media_thread_videos_images/","recovery":null},"flickr":{"small":[],"original":

["https://farm4.staticflickr.com/3819/33094074350_ae56bd5c73_o.jpg","https://farm3.staticflickr.com/2935/33094073720_92234ddaee_o.jpg","https://farm1.staticflickr.com/768/33094072690_31a85e82ba_o.jpg","https://farm3.staticflickr.com/2876/33094072100_546090a4f3_o.jpg","https://farm3.staticflickr.com/2860/32626053254_d702922d87_o.jpg","https://farm3.staticflickr.com/2904/32654666113_ba833971e0_o.jpg","https://farm1.staticflickr.com/677/32654665263_751d29ded1_o.jpg","https://farm3.staticflickr.com/2936/33299697331_09313ac49d_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/echostarxxiiifinal.pdf","webcast":"https://www.youtube.com/watch?v=lZmqbL-hz7U","youtube_id":"lZmqbL-hz7U","article":"http://spacenews.com/spacex-launches-echostar-23/","wikipedia":"https://en.wikipedia.org/wiki/EchoStar#Satellite_fleet"},"static_fire_date_utc":"2017-03-09T23:00:00.000Z","static_fire_date_unix":1489100400,"net":false,"window":9000,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Communications satellite for EchoStar Corp. EchoStar XXIII, based on a spare platform from the cancelled CMBStar 1 satellite program, will provide direct-to-home television broadcast services over Brazil. There was no attempt at a first-stage recovery so this rocket did not have landing legs or grid fins.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20a"],"launchpad":"5e9e4502f509094188566f88","flight_number":37,"name":"EchoStar 23","date_utc":"2017-03-16T06:00:00.000Z","date_unix":1489644000,"date_local":"2017-03-16T02:00:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591878473b2647","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfeffd86e000604b34e"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/5b/10/dfj7yRG3_o.png","large":"https://images2.imgbox.com/d1/f6/9q2edz2p_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5sjrzj/ses10_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/62aqi7/rspacex_ses10_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/62aqad/rspacex_ses10_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/634gmr/b1021ses10_recovery_thread/"},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/601/33026465643_462ef7a2cb_o.jpg","https://farm3.staticflickr.com/2850/32996438264_b79ca3664b_o.jpg","https://farm4.staticflickr.com/3956/32996437434_4dab1ae8e3_o.jpg","https://farm4.staticflickr.com/3831/32996435084_6c5662caca_o.jpg","https://farm4.staticflickr.com/3775/32915200224_b6ecfabd7e_o.jpg","https://farm4.staticflickr.com/3886/32915199874_b826eac153_o.jpg","https://farm3.staticflickr.com/2842/32915199514_6c44178e87_o.jpg","https://farm4.staticflickr.com/3771/32915198904_2df85aed05_o.jpg","https://farm4.staticflickr.com/3668/32915198334_d2fa2f16ab_o.jpg","https://farm4.staticflickr.com/3955/32915197674_24d6e27cf5_o.jpg","https://farm4.staticflickr.com/3830/33616913981_f04b6e2351_o.jpg","https://farm4.staticflickr.com/3819/33616913111_e699b48d66_o.jpg","https://farm4.staticflickr.com/3835/33361035860_c57ed61239_o.jpg","https://farm4.staticflickr.com/3783/33361035200_bfb797d38f_o.jpg","https://farm4.staticflickr.com/3698/33611796351_54d5a6d65a_o.jpg","https://farm3.staticflickr.com/2857/33611795531_82cc2d8789_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/finalses10presskit.pdf","webcast":"https://www.youtube.com/watch?v=xsZSXav4wI8","youtube_id":"xsZSXav4wI8","article":"https://spaceflightnow.com/2017/03/31/spacex-flies-rocket-for-second-time-in-historic-test-of-cost-cutting-technology/","wikipedia":"https://en.wikipedia.org/wiki/SES-10"},"static_fire_date_utc":"2017-03-27T18:00:00.000Z","static_fire_date_unix":1490637600,"net":false,"window":9000,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First payload to fly on a reused first stage, B1021, previously launched with CRS-8, which also landed a second time. In what is also a first, the payload fairing remained intact after a successful splashdown achieved with thrusters and a steerable parachute.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20b"],"launchpad":"5e9e4502f509094188566f88","flight_number":38,"name":"SES-10","date_utc":"2017-03-30T22:27:00.000Z","date_unix":1490912820,"date_local":"2017-03-30T18:27:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f359182d0b3b263e","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"au

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f"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":
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very":null},"flickr":{"small":[],"original":["https://farm3.staticflickr.com/2922/33
578359423_4169ac8f98_o.jpg","https://farm3.staticflickr.com/2900/33578357343_85c247e
bce_o.jpg","https://farm5.staticflickr.com/4166/34006001860_8c45f28e69_o.jpg","http
s://farm5.staticflickr.com/4166/34005999880_77684dba4b_o.jpg","https://farm3.staticf
lickr.com/2934/34005998140_c77076b6fb_o.jpg","https://farm5.staticflickr.com/4191/34
005996220_fe9e4342d3_o.jpg","https://farm3.staticflickr.com/2883/33575654563_699c544
776_o.jpg","https://farm3.staticflickr.com/2902/33575652913_0dece34db4_o.jpg","http
s://farm5.staticflickr.com/4163/33575651063_24e05826c5_o.jpg","https://farm3.staticf
lickr.com/2876/33994851620_fabd14770f_o.jpg","https://farm3.staticflickr.com/2832/33
973172140_b370b79c51_o.jpg","https://farm3.staticflickr.com/2874/34357262105_11b417b
ea2_o.jpg","https://farm5.staticflickr.com/4158/34357260545_16870a94ba_o.jpg"]},"pre
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s://www.youtube.com/watch?v=EzQpkQ1etdA","youtube_id":"EzQpkQ1etdA","article":"http
s://techcrunch.com/2017/05/01/spacex-successfully-launches-nrol-76-u-s-military-sate
llite/","wikipedia":"https://en.wikipedia.org/wiki/List_of_NRO_launches"},"static_fi
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se,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"d
etails":"First launch under SpaceX\'s certification for national security space miss
ions, which allows SpaceX to contract launch services for classified payloads. Secon
d-stage speed and altitude telemetry were omitted from the launch webcast, which dis
played first-stage telemetry instead, with continuous tracking of the booster from l
iftoff to landing for the first time.","crew":[],"ships":["5ea6ed2f080df4000697c90
c"],"capsules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20c"],"launchpad":"5e9e4502f5090
94188566f88","flight_number":39,"name":"NROL-76","date_utc":"2017-05-01T11:15:00.000
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n":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591811f83b2648","flight":1,"g
ridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":tr
ue,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":tru
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r/spacex/comments/64kguj/","launch":"https://www.reddit.com/r/spacex/comments/6b88h
z/","media":"https://www.reddit.com/r/spacex/comments/6bcf8j/","recovery":null},"fli
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492_o.jpg","https://farm5.staticflickr.com/4155/34684980875_77b745158a_o.jpg","http
s://farm5.staticflickr.com/4183/34296430820_8d3a42c0d7_o.jpg"]},"presskit":"https://
www.spacex.com/sites/spacex/files/inmarsat5f4presskit_final.pdf","webcast":"https://
www.youtube.com/watch?v=ynMYE64IEKs","youtube_id":"ynMYE64IEKs","article":"https://w
ww.space.com/36852-spacex-launches-inmarsat-5-f4-satellite.html","wikipedia":"http
s://en.wikipedia.org/wiki/Inmarsat#Satellites"},"static_fire_date_utc":"2017-05-11T1
6:45:00.000Z","static_fire_date_unix":1494521100,"net":false,"window":2940,"rocke
t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"At 6,070 kg th
is was the heaviest payload launched to GTO by a Falcon 9 rocket. The launch was ori
ginally scheduled for the Falcon Heavy, but performance improvements allowed the mis
sion to be carried out by an expendable Falcon 9 instead.","crew":[],"ships":[],"cap
sules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20d"],"launchpad":"5e9e4502f509094188566
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aceflightnow.com/2017/06/03/reused-dragon-cargo-capsule-launched-on-journey-to-space
-station/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-11"},"static_fire_d
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e,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detai
ls":"This mission delivered the Neutron Star Interior Composition Explorer (NICER) t
o the ISS, along with the MUSES Earth imaging platform and ROSA solar array. For the
first time, this mission launched a refurbished Dragon capsule, serial number C106 w
hich first flew in September 2014 on the CRS-4 mission. Originally scheduled to laun
ch on June 1, but was scrubbed due to inclement weather.","crew":[],"ships":["5ea6ed
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ikipedia.org/wiki/BulgariaSat-1"},"static_fire_date_utc":"2017-06-15T22:25:00.000
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e reused: Second flight of B1029 after the Iridium mission of January 2017. The sate
llite will be the first commercial Bulgarian-owned communications satellite and it w
ill provide television broadcasts and other communications services over southeast E
urope.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5e
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s://www.space.com/37304-liftoff-spacex-second-launch-three-days.html","wikipedia":"h
ttps://en.wikipedia.org/wiki/Iridium_satellite_constellation"},"static_fire_date_ut
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es/spacex/files/intelsat35epresskit.pdf","webcast":"https://www.youtube.com/watch?v=
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7/06/spacex-delivers-for-intelsat-on-heavyweight-falcon-9-mission/","wikipedia":"htt
ps://en.wikipedia.org/wiki/Intelsat_35e"},"static_fire_date_utc":"2017-06-29T00:30:0
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 of sending a heavy satellite (~6,000 kg) to GTO, the rocket will fly in its expenda
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The external payload manifested for this flight is the CREAM cosmic-ray detector. First flight of the Falcon 9 Block 4 upgrade. Last flight of a newly-built Dragon capsule; further missions will use refurbished spacecraft.","crew":[],"ships":["5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf3591869b63b2670"],"payloads":["5eb0e4c4b6c3bb0006eeb212"],"launchpad":"5e9e4502f509094188566f88","flight_number":45,"name":"CRS-12","date_utc":"2017-08-14T16:31:00.000Z","date_unix":1502728260,"date_local":"2017-08-14T12:31:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591884ee3b264d","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d07ffd86e000604b356"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/f9/3a/3kH19hlj_o.png","large":"https://images2.imgbox.com/a7/2a/s41i5C9t_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/6o98st","launch":"https://www.reddit.com/r/spacex/comments/6vihsl/welcome_to_the_rspacex_formosat5_official_launch/","media":"https://www.reddit.com/r/spacex/comments/6vhwi1/rspacex_formosat5_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/6wk653/b1038_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4434/36075361533_54b3b937dd_o.jpg","https://farm5.staticflickr.com/4428/36884090115_ced8a80f14_o.jpg","https://farm5.staticflickr.com/4393/36073897213_6746d2a8b2_o.jpg","https://farm5.staticflickr.com/4341/36073878143_45c3ef0b93_o.jpg","https://farm5.staticflickr.com/4369/35978284213_e12e5743ab_o.jpg","https://farm5.staticflickr.com/4394/35978283413_145ba2ca2f_o.jpg","https://farm5.staticflickr.com/4340/35978282703_5dff70fb19_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/formosat5presskit.pdf","webcast":"https://www.youtube.com/watch?v=J4u3ZN2g_MI","youtube_id":"J4u3ZN2g_MI","article":"https://spaceflightnow.com/2017/08/25/taiwanese-satellite-rides-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedia.org/wiki/Formosat-5"},"static_fire_date_utc":"2017-08-24T18:50:00.000Z","static_fire_date_unix":1503600600,"net":false,"window":2520,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Formosat-5 is an Earth observation satellite of the Taiwanese space agency. The SHERPA space tug by Spaceflight Industries was removed from the cargo manifest of this mission. The satellite has a mass of only 475 kg.","crew":[],"ships":["5ea6ed2e080df4000697c905","5ea6ed2f080df4000697c910"],"capsules":[],"payloads":["5eb0e4c4b6c3bb0006eeb213"],"launchpad":"5e9e4502f509092b78566f87","flight_number":46,"name":"FormoSat-5","date_utc":"2017-08-24T18:50:00.000Z","date_unix":1503600600,"date_local":"2017-08-24T11:50:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f359182d843b264e","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9

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Second flight of the Falcon 9 Block 4 upgrade.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4c5b6c3bb0006eeb214"],"launchpad":"5e9e4502f509094188566f88","flight_number":47,"name":"Boeing X-37B OTV-5","date_utc":"2017-09-07T13:50:00.000Z","date_unix":1504792200,"date_local":"2017-09-07T09:50:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591845123b264f","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d09ffd86e000604b358"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/1c/e0/lhGbeqkh_o.png","large":"https://images2.imgbox.com/16/0c/P2REhX5k_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/6ygwxw/iridium_next_constellation_mission_3_launch/","launch":"https://www.reddit.com/r/spacex/comments/753e0m/iridium_next_mission_3_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/755m2z/rspacex_iridium3_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/75z823/b10411_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4509/37610550066_b56bc5d743_o.jpg","https://farm5.staticflickr.com/4487/37610548356_1b7d30001e_o.jpg","https://farm5.staticflickr.com/4514/37610547696_9114038d60_o.jpg","https://farm5.staticflickr.com/4483/37610547226_01d19395a3_o.jpg","https://farm5.staticflickr.com/4504/36984625383_d7707548ec_o.jpg","https://farm5.staticflickr.com/4505/36984623903_7bb6643649_o.jpg","https://farm5.staticflickr.com/4445/36984622463_6f9b21929c_o.jpg","https://farm5.staticflickr.com/4471/36944884234_92ddc7fb39_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/iridium3presskit.pdf","webcast":"https://www.youtube.com/watch?v=SB4N4xF2B2w&feature=youtu.be","youtube_id":"SB4N4xF2B2w","article":"https://spaceflightnow.com/2017/10/09/spacex-launch-adds-another-10-satellites-to-iridium-next-fleet/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2017-10-05T13:31:00.000Z","static_fire_date_unix":1507210260,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Third of eight missions to launch Iridium\'s second generation constellation from VAFB","crew":[],"ships":["5ea6ed2e080df4000697c905","5ea6ed2f080df4000697c910"],"capsules":[],"payloads":["5eb0e4c5b6c3bb0006eeb215"],"launchpad":"5e9e4502f509092b78566f87","flight_number":48,"name":"Iridium NEXT Mission 3","date_utc":"2017-10-09T12:37:00.000Z","date_unix":1507552620,"date_local":"2017-10-09T05:37:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591843103b2650","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASD

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-with-joint-satellite-for-ses-echostar/","wikipedia":"https://en.wikipedia.org/wiki/
List_of_SES_satellites"},"static_fire_date_utc":"2017-10-02T20:30:00.000Z","static_f
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7/10/30/spacex-launches-and-lands-third-rocket-in-three-weeks/","wikipedia":"http
s://en.wikipedia.org/wiki/Koreasat_5A"},"static_fire_date_utc":"2017-10-26T16:00:00.
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4","date_utc":"2017-12-23T01:27:23.000Z","date_unix":1513992443,"date_local":"2017-12-22T17:27:23-08:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591801cf3b264b","flight":2,"gridfins":true,"legs":false,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d0fffd86e000604b35d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/e8/30/yMNPvCci_o.png","large":"https://images2.imgbox.com/26/99/ppTFXiLw_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7895bo/zuma_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7oqjf0/rspacex_zuma_official_launch

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First-stage booster will attempt landing at LZ-1","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":53,"name":"ZUMA","date_utc":"2018-01-08T01:00:00.000Z","date_unix":1515373200,"date_local":"2018-01-07T20:00:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f35918345e3b2652","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d10ffd86e000604b35e"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/95/ec/FoFpPft0_o.png","large":"https://images2.imgbox.com/42/0a/LAupFe3L_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7olw86/govsat1_ses16_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7tvtbh/rspacex_govsat1_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/7tzzwy/rspacex_govsat1_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4721/40026315981_f16a7cd32a_o.jpg","https://farm5.staticflickr.com/4708/40026316291_0b3aef9d8d_o.jpg","https://farm5.staticflickr.com/4652/39128355655_3eefa0d583_o.jpg","https://farm5.staticflickr.com/4741/39128355825_7c4166dbbe_o.jpg","https://farm5.staticflickr.com/4609/39128355355_17381fc00e_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/govsat1presskit.pdf","webcast":"https://www.youtube.com/watch?v=ScYUA51-POQ","youtube_id":"ScYUA51-POQ","article":"https://spaceflightnow.com/2018/01/31/spacex-rocket-flies-on-60th-anniversary-of-first-u-s-satellite-launch/","wikipedia":"https://en.wikipedia.org/wiki/List_of_SES_satellites#SES_Fleet"},"static_fire_date_utc":"2018-01-26T15:27:00.000Z","static_fire_date_unix":1516980420,"net":false,"window":8460,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Reused booster from the classified NROL-76 mission in May 2017. Following a successful experimental ocean landing that used three engines, the booster unexpectedly remained intact; Elon Musk stated in a tweet that SpaceX will attempt to tow the booster to shore.","crew":[],"ships":["5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":54,"name":"SES-16 / GovSat-1","date_utc":"2018-01-31T21:25:00.000Z","date_unix":1517433900,"date_local":"2018-01-31T16:25:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591811f83b2648","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d11ffd86e000604b35f"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/22/5f/jAAULKc3_o.png","large":"https://images2.imgbox.com/33/1a/ujrnfkna_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7hjp03/falcon_heavy_demo_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7vg63x/rspacex_falcon_heavy_test_flight_official_launch/","media":"https://www.reddit.com/r/spacex/comments/7vimtm/rspacex_falcon_heavy_test_flight_media_thread/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4745/40110304192_b0165b7785_o.jpg","https://farm5.staticflickr.com/4676/40110297852_6173e5cae6_o.jpg","https://farm5.staticflickr.com/4615/40143096241_0324643b5e_o.jpg","https://farm5.staticflickr.co

m/4702/40110298232_4e9c412936_o.jpg","https://farm5.staticflickr.com/4610/39337245575_41d760caef_o.jpg","https://farm5.staticflickr.com/4654/25254688767_59603ff06c_o.jpg","https://farm5.staticflickr.com/4627/40126462801_d54b4f00be_o.jpg","https://farm5.staticflickr.com/4760/40126462231_cdf00ef431_o.jpg","https://farm5.staticflickr.com/4655/40202121122_5d29cfe2ac_o.jpg","https://farm5.staticflickr.com/4631/39337245145_5f5630a66a_o.jpg","https://farm5.staticflickr.com/4650/40126461851_14b93ec9d7_o.jpg","https://farm5.staticflickr.com/4711/40126461411_b1ed283d45_o.jpg","https://farm5.staticflickr.com/4696/40126460511_7b5cc64871_o.jpg","https://farm5.staticflickr.com/4589/38583831555_9ae89f5c10_o.jpg","https://farm5.staticflickr.com/4682/38583829815_e01509d1a7_o.jpg","https://farm5.staticflickr.com/4731/39225582801_80594d5d91_o.jpg","https://farm5.staticflickr.com/4641/39225582421_7aa0c65851_o.jpg","https://farm5.staticflickr.com/4643/27449864329_d2424bc280_o.jpg","https://farm5.staticflickr.com/4681/39225582171_137a4c75e7_o.jpg","https://farm5.staticflickr.com/4644/39225582351_ac6aba2533_o.jpg","https://farm5.staticflickr.com/4587/27449863849_709e135a98_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/falconheavypresskit_v1.pdf","webcast":"https://www.youtube.com/watch?v=wbSwFU6tY1c","youtube_id":"wbSwFU6tY1c","article":"https://spaceflightnow.com/2018/02/07/spacex-debuts-worlds-most-powerful-rocket-sends-tesla-toward-the-asteroid-belt/","wikipedia":"https://en.wikipedia.org/wiki/Elon_Musk%27s_Tesla_Roadster"},"static_fire_date_utc":"2018-01-24T17:30:00.000Z","static_fire_date_unix":1516815000,"net":false,"window":9000,"rocket":"5e9d0d95eda69974db09d1ed","success":true,"failures":[],"details":"The launch was a success, and the side boosters landed simultaneously at adjacent ground pads. Drone ship landing of the central core failed. Final burn to heliocentric mars-earth orbit was successful after the second stage and payload passed through the Van Allen belts.","crew":[],"ships":["5ea6ed2f080df4000697c90c","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21c"],"launchpad":"5e9e4502f509094188566f88","flight_number":55,"name":"Falcon Heavy Test Flight","date_utc":"2018-02-06T20:45:00.000Z","date_unix":1517949900,"date_local":"2018-02-06T15:45:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359187f703b2653","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"},{"core":"5e9e28a2f359187f273b2642","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb90a834e7c8"},{"core":"5e9e28a2f3591845c73b2640","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d13ffd86e000604b360"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/f9/05/I9duWQ6v_o.png","large":"https://images2.imgbox.com/f1/b8/HAXSg9rr_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7qnflk/paz_microsat2a_2b_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7y0grt/rspacex_paz_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/7zdvop/rspacex_paz_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4768/25557986627_f3cc243afb_o.jpg","https://farm5.staticflickr.com/4631/25557986367_6339dd8f1d_o.jpg","https://farm5.staticflickr.com/4650/25557987937_585c15c34d_o.jpg","https://farm5.staticflickr.com/4695/39718494114_6523797470_o.jpg","https://farm5.staticflickr.com/4655/39533211685_5e0ceb78ef_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/paz_press_kit_2.21.pdf","webcast":"https://www.youtube.com/watch?v=-p-PToD2URA","youtube_id":"-p-PToD2URA","article":"https://spaceflightnow.com/2018/02/22/recycled-spacex-rocket-boosts-paz-radar-satellite-first-starlink-testbeds-into-orbit/","wikipedia":"https://en.wikipedia.org/wiki/Paz_(satellite)"},"static_fire_date_utc":"2018-02-11T18:23:00.000Z","static_fire_date_unix":1518373380,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First flight with fairing 2.0. Will also carry two SpaceX test satellites for the upcoming Starlink constellation.","crew":[],"ships":["5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21d","5eb0e4c6b6c3bb0006eeb21e"],"launchpad":"5e9e4502f509092b78566f87","flight_number":56,"name":"Paz / Starlink Demo","date_utc":"2018-02-22T14:17:00.000Z","date_unix":1519309020,"date_local":"2018-02-22T06:17:00-08:00","date_precisio

n":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f359182d843b264e","flight":2,"gridfins":true,"legs":false,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d14ffd86e000604b361"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/87/5d/ZDr6l98A_o.png","large":"https://images2.imgbox.com/86/73/dycVqz0C_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7r5pyn/hispasat_30w6_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7r5pyn/hispasat_30w6_launch_campaign_thread/","media":"https://www.reddit.com/r/spacex/comments/825asx/rspacex_hispasat_30w6_media_thread_videos_images/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4753/25790223907_36e7b59efa_o.jpg","https://farm5.staticflickr.com/4666/38850799080_e17426795c_o.jpg","https://farm5.staticflickr.com/4758/40660917561_daa8efea04_o.jpg","https://farm5.staticflickr.com/4622/39951085264_b5deeed6c9_o.jpg","https://farm5.staticflickr.com/4772/39951085474_77be77c227_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/hispasat30w6_presskit.pdf","webcast":"https://www.youtube.com/watch?v=Kpfrp-GMKKM","youtube_id":"Kpfrp-GMKKM","article":"https://spaceflightnow.com/2018/03/06/hefty-hispasat-satellite-rides-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedia.org/wiki/Hispasat_30W-6"},"static_fire_date_utc":"2018-02-21T03:46:00.000Z","static_fire_date_unix":1519184760,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Launched with landing legs and titanium grid fins. Did not attempt a landing due to \'unfavorable weather conditions in the recovery area\'.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c7b6c3bb0006eeb21f"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":57,"name":"Hispasat 30W-6","date_utc":"2018-03-06T05:33:00.000Z","date_unix":1520314380,"date_local":"2018-03-06T00:33:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359186cb73b2654","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d15ffd86e000604b362"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/2f/36/Bn1RX3aO_o.png","large":"https://images2.imgbox.com/6e/32/3hj6BIWx_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/82njj5/iridium_next_constellation_mission_5_launch/","launch":"https://www.reddit.com/r/spacex/comments/88184i/rspacex_iridium_next_5_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/88114l/rspacex_iridium5_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/791/40227113515_da97986607_o.jpg","https://farm1.staticflickr.com/788/27248936158_2eaf1a98b3_o.jpg","https://farm1.staticflickr.com/864/40227112595_c34a1cf8d1_o.jpg","https://farm1.staticflickr.com/806/41121608121_8f0b886f9d_o.jpg","https://farm1.staticflickr.com/809/41121608541_cdfec6a849_o.jpg","https://farm1.staticflickr.com/822/40227112875_ec3c5df585_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/iridium-5_press_kit_2018.pdf","webcast":"https://www.youtube.com/watch?v=mp0TW8vkCLg","youtube_id":"mp0TW8vkCLg","article":"https://spaceflightnow.com/2018/03/30/iridium-messaging-network-gets-another-boost-from-spacex/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2018-03-25T12:23:00.000Z","static_fire_date_unix":1521980580,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Fifth Iridium NEXT mission to deploy ten Iridium NEXT satellites. Reused booster from third Iridium flight, and although controlled descent was performed, the booster was expended into the ocean. SpaceX planned a second recovery attempt of one half of the fairing using the specially modified boat Mr. Steven. However, the fairing\'s parafoil twisted during the recovery, which led to water impact at high speed","crew":[],"ships":["5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5eb0e4c7b6c3bb0006eeb220"],"launchpad":"5e9e4502f509092b78566f87","flight_number":58,"name":"Iridium NEXT Mission 5","date_utc":"2018-03-30T14:13:51.000Z","date_unix":1522419231,"date_local":"2018-03-30T07:13:51-08:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591843103b2650","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb

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External payloads include a materials research platform MISSE-FF phase 3 of the Robotic Refueling Mission TSIS, heliophysics sensor several crystallization experiments, and the RemoveDebris spacecraft aimed at space junk removal. The booster was expended in order to test a new landing profile.","crew":[],"ships":["5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf3591885d43b266d"],"payloads":["5eb0e4c7b6c3bb0006eeb221"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":59,"name":"CRS-14","date_utc":"2018-04-02T20:30:41.000Z","date_unix":1522701041,"date_local":"2018-04-02T16:30:41-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591884ee3b264d","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d16ffd86e000604b364"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/ca/54/EEGqRRto_o.png","large":"https://images2.imgbox.com/7d/2c/pYXpOVCz_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/88l46q/tess_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/8cm61o/rspacex_tess_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/8cmzop/rspacex_tess_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/799/27684194488_0d9a703c1c_o.jpg","https://farm1.staticflickr.com/854/41512967372_0c37360126_o.jpg","https://farm1.staticflickr.com/832/41512968122_20c2e31de3_o.jpg","https://farm1.staticflickr.com/803/27684194678_c1ccd0680b_o.jpg","https://farm1.staticflickr.com/902/41512967962_74913ef5b0_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/tesspresskitfinal417.pdf","webcast":"https://www.youtube.com/watch?v=aY-0uBIYYKk","youtube_id":"aY-0uBIYYKk","article":"https://spaceflightnow.com/2018/04/19/all-sky-survey-or-launched-from-cape-canaveral-on-the-hunt-for-exoplanets/","wikipedia":"https://en.wikipedia.org/wiki/Transiting_Exoplanet_Survey_Satellite"},"static_fire_date_utc":"2018-04-11T18:30:00.000Z","static_fire_date_unix":1523471400,"net":false,"window":30,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Part of the Explorers program, this space telescope is intended for wide-field search of exoplanets transiting nearby stars. It is the first NASA high priority science mission launched by SpaceX. It was the first time SpaceX launched a scientific satellite not primarily intended for Earth observations. The second stage placed it into a high-Earth elliptical orbit, after which the satellite\'s own booster will perform complex maneuvers including a lunar flyby, and over the course of two months, reach a stable, 2:1 resonant orbit with the Moon. In January 2018, SpaceX received NASA\'s Launch Services Program Category 2 certification of its Falcon 9 \'Full Thrust\', certification which is required for launching medium risk missions like TESS. It was the last launch of a new Block 4 booster, and marked the 24th successful recovery of the booster. An experimental water landing was performed in order to attempt fairing recovery.","crew":[],"ships":["5ea6ed2e080df4000697c90a","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c7b6c3bb0006eeb222"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":60,"name":"TESS","date_utc":"2018-04-18T22:51:00.000Z","date_unix":1524091860,"date_

local":"2018-04-18T18:51:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f35918863d3b2655","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d18ffd86e000604b365"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/94/3a/eavaQRYD_o.png","large":"https://images2.imgbox.com/df/cf/wlysigUT_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/8624iq/bangabandhu1_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/8ia091/rspacex_bangabandhu1_official_launch_discussion","media":"https://www.reddit.com/r/spacex/comments/8ia5bu/rspacex_bangabandhu1_media_thread_videos_images/","recovery":"https://www.reddit.com/r/spacex/comments/8j6moa/bangabandhu1_block_5_recovery_thread/"},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/903/28197547888_dd697d8147_o.jpg","https://farm1.staticflickr.com/823/42025498712_8ec531950f_o.jpg","https://farm1.staticflickr.com/975/28197546158_880e466fb6_o.jpg","https://farm1.staticflickr.com/823/27200014957_940f3720bb_o.jpg","https://farm1.staticflickr.com/945/42025498442_0b7b91d561_o.jpg","https://farm1.staticflickr.com/967/42025498972_8720104d8a_o.jpg","https://farm1.staticflickr.com/954/42025499162_8a0ef7feaa_o.jpg","https://farm1.staticflickr.com/911/42025499722_47d3433d65_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/bangabandhupresskit51118.pdf","webcast":"https://www.youtube.com/watch?v=rQEqKZ7CJlk","youtube_id":"rQEqKZ7CJlk","article":"https://spaceflightnow.com/2018/05/11/spacex-debuts-an-improved-human-rated-model-of-the-falcon-9-rocket/","wikipedia":"https://en.wikipedia.org/wiki/Bangabandhu-1"},"static_fire_date_utc":"2018-05-04T23:25:00.000Z","static_fire_date_unix":1525476300,"net":false,"window":7620,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First launch of a Block V first stage.","crew":[],"ships":["5ea6ed2e080df4000697c90a","5ea6ed2f080df4000697c90b","5ea6ed30080df4000697c913","5ea6ed30080df4000697c916"],"capsules":[],"payloads":["5eb0e4c7b6c3bb0006eeb223"],"launchpad":"5e9e4502f509094188566f88","flight_number":61,"name":"Bangabandhu-1","date_utc":"2018-05-11T20:14:00.000Z","date_unix":1526069640,"date_local":"2018-05-11T16:14:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359182b023b2656","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d19ffd86e000604b366"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/f5/da/hz3r2Lni_o.png","large":"https://images2.imgbox.com/3d/f9/IHjBUE1f_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/8ffsgl/iridium6_gracefo_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/8kyk5a/rspacex_iridium_next_6_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/8l9tfz/rspacex_iridium6gracefo_media_thread_videos/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/897/42290934301_4c6ac431c8_o.jpg","https://farm1.staticflickr.com/831/42290933051_510176c9da_o.jpg","https://farm1.staticflickr.com/882/42290932011_a522b43015_o.jpg","https://farm1.staticflickr.com/947/42290930761_4bf7b607b1_o.jpg","https://farm1.staticflickr.com/982/42290930181_0117ab0dfb_o.jpg","https://farm1.staticflickr.com/955/42244412292_e787538fc5_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/iridium6presskit2018521.pdf","webcast":"https://www.youtube.com/watch?v=I_0GgKfwCSk","youtube_id":"I_0GgKfwCSk","article":"https://spaceflightnow.com/2018/05/22/rideshare-launch-by-spacex-serves-commercial-and-scientific-customers/","wikipedia":"https://en.wikipedia.org/wiki/Gravity_Recovery_and_Climate_Experiment"},"static_fire_date_utc":"2018-05-18T20:16:00.000Z","static_fire_date_unix":1526674560,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"GFZ arranged a rideshare of GRACE-FO on a Falcon 9 with Iridium following the cancellation of their Dnepr launch contract in 2015. Iridium CEO Matt Desch disclosed in September 2017 that GRACE-FO would be launched on the sixth Iridium NEXT mission. The booster reuse turnaround was a record 4.5 months between flights.","crew":[],"ships":["5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5eb0e4c7b6c3bb0006eeb224","5eb0e4c8b6c3bb0006eeb225"],"launchpad":"5e9e4502f509092b78566f87","flight_number":62,"name":"Iridium NEXT Mission 6","date_utc":"2018-05-22T19:47:58.000Z","date_unix":1527018478,"dat

e_local":"2018-05-22T12:47:58-08:00","date_precision":"hour","upcoming":false,"core
s":[{"core":"5e9e28a4f35918345e3b2652","flight":2,"gridfins":true,"legs":false,"reus
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6e000604b367"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":fals
e,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/4b/b9/oS8ezl6V_
o.png","large":"https://images2.imgbox.com/44/ba/fvMeODet_o.png"},"reddit":{"campaig
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d/","launch":"https://www.reddit.com/r/spacex/comments/8o9woj/rspacex_ses12_official
_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/8oa3k
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sionpress_kit_6.2.18.pdf","webcast":"https://www.youtube.com/watch?v=2hcM5hqQ45s","y
outube_id":"2hcM5hqQ45s","article":"https://spaceflightnow.com/2018/06/04/multi-miss
ion-telecom-craft-launched-by-spacex-for-ses/","wikipedia":"https://en.wikipedia.or
g/wiki/SES-12"},"static_fire_date_utc":"2018-05-25T01:48:00.000Z","static_fire_date_
unix":1527212880,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","succ
ess":true,"failures":[],"details":"SES-12, the replacement satellite for NSS-6, was
 successfully launched and deployed on June 4th, completing SpaceX\'s eleventh fligh
t of 2018. According to SES Luxembourg, The SES-12 satellite will expand SES\xe2\x80
\x99s capabilities to provide direct-to-home (DTH) broadcasting, VSAT, Mobility and
 High Throughput Satellite (HTS) data connectivity services in the Middle East and t
he Asia-Pacific region, including rapidly growing markets such as India and Indonesi
a. [SES-12] will be co-located with SES-8","crew":[],"ships":["5ea6ed2e080df4000697c
90a"],"capsules":[],"payloads":["5eb0e4c8b6c3bb0006eeb226"],"launchpad":"5e9e4501f50
9094ba4566f84","flight_number":63,"name":"SES-12","date_utc":"2018-06-04T04:45:00.00
0Z","date_unix":1528087500,"date_local":"2018-06-04T00:45:00-04:00","date_precisio
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spacex/comments/8ugo3l/rspacex_crs15_official_launch_discussion_updates","media":"ht
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r.com/1790/41281637670_f6a6a2cf6c_o.jpg"]},"presskit":"http://www.spacex.com/sites/s
pacex/files/crs15presskit.pdf","webcast":"https://www.youtube.com/watch?v=ycMagB1s8X
M","youtube_id":"ycMagB1s8XM","article":"https://spaceflightnow.com/2018/06/29/space
x-launches-ai-enabled-robot-companion-vegetation-monitor-to-space-station/","wikiped
ia":"https://en.wikipedia.org/wiki/SpaceX_CRS-15"},"static_fire_date_utc":"2018-06-2
3T21:30:00.000Z","static_fire_date_unix":1529789400,"net":false,"window":0,"rocke
t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Payload includ
ed MISSE-FF 2, ECOSTRESS, and a Latching End Effector. The refurbished booster featu
red a record 2.5 months period turnaround from its original launch of the TESS satel
lite \xe2\x80\x94 the fastest previous was 4.5 months. This was the last commercial
 flight of a Block 4 booster, which was expended into the Atlantic without landing l
egs and grid fins.","crew":[],"ships":["5ea6ed30080df4000697c912"],"capsules":["5e9e
2c5cf359183bb73b266e"],"payloads":["5eb0e4c8b6c3bb0006eeb227"],"launchpad":"5e9e4501
f509094ba4566f84","flight_number":64,"name":"CRS-15","date_utc":"2018-06-29T09:42:0
0.000Z","date_unix":1530265320,"date_local":"2018-06-29T05:42:00-04:00","date_precis

ion":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f35918863d3b2655","flight":2,"gridfins":false,"legs":false,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d1cffd86e000604b369"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/12/7c/NiniYxoh_o.png","large":"https://images2.imgbox.com/c5/53/5jklZkPz_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/8w19yg/telstar_19v_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/90p1a6/rspacex_telstar_19v_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/90oxrr/rspacex_telstar_19v_media_thread_videos_images/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/856/28684550147_49802752b3_o.jpg","https://farm1.staticflickr.com/927/28684552447_956a9744f1_o.jpg","https://farm2.staticflickr.com/1828/29700007298_8ac5891d2c_o.jpg","https://farm1.staticflickr.com/914/29700004918_31ed7b73ef_o.jpg","https://farm1.staticflickr.com/844/29700002748_3047e50a0a_o.jpg","https://farm2.staticflickr.com/1786/29700000688_2514cd3cbb_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/telstar19vantagepresskit.pdf","webcast":"https://www.youtube.com/watch?v=xybp6zLaGx4","youtube_id":"xybp6zLaGx4","article":"https://spaceflightnow.com/2018/07/22/spacex-delivers-for-telesat-with-successful-early-morning-launch/","wikipedia":"https://en.wikipedia.org/wiki/Telstar_19V"},"static_fire_date_utc":"2018-07-18T21:00:00.000Z","static_fire_date_unix":1531947600,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SSL-manufactured communications satellite intended to be placed at 63\xc2\xb0 West over the Americas. At 7,075 kg, it became the heaviest commercial communications satellite ever launched.","crew":[],"ships":["5ea6ed2e080df4000697c90a","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c8b6c3bb0006eeb228"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":65,"name":"Telstar 19V","date_utc":"2018-07-22T05:50:00.000Z","date_unix":1532238600,"date_local":"2018-07-22T01:50:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359181eed3b2657","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d1effd86e000604b36a"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/37/63/NE4EISfK_o.png","large":"https://images2.imgbox.com/90/b5/fS6LMNGd_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/8v4wcm/iridium_next_constellation_mission_7_launch/","launch":"https://www.reddit.com/r/spacex/comments/91i1ru/rspacex_iridium_next_7_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/91gx44/rspacex_iridium_next_constellation_mission_7/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/934/41868222930_0a850d30dc_o.jpg","https://farm1.staticflickr.com/852/41868222500_2ff5f6e5f9_o.jpg","https://farm1.staticflickr.com/929/28787338307_7c0cfce99a_o.jpg","https://farm1.staticflickr.com/928/28787338507_3be74590d2_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/iridium7_press_kit_7_24.pdf","webcast":"https://www.youtube.com/watch?v=vsDknmK30C0","youtube_id":"vsDknmK30C0","article":"https://spaceflightnow.com/2018/07/25/spacexs-second-launch-in-three-days-lofts-10-more-iridium-satellites/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2018-07-20T21:08:00.000Z","static_fire_date_unix":1532120880,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s fourteenth flight of 2018 and seventh of eight launches in a half-a-billion-dollar contract with Iridium. Will use a Block 5 first stage, to be recovered in the Pacific Ocean. Only one mission will be left for Iridium, with 10 more satellites. First attempt to recover a Fairing with the upgraded net. Fairing recovery was not successful.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed2e080df4000697c908","5ea6ed30080df4000697c912","5ea6ed30080df4000697c914"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb229"],"launchpad":"5e9e4502f509092b78566f87","flight_number":66,"name":"Iridium NEXT Mission 7","date_utc":"2018-07-25T11:39:26.000Z","date_unix":1532518766,"date_local":"2018-07-25T04:39:26-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591809c03b2658","flight":1,"gridfins":true,"legs":tru

e,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASD
S","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_lib
rary_id":null,"id":"5eb87d1fffd86e000604b36b"},{"fairings":{"reused":false,"recovery
_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://ima
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rbqW_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/91gwfg/m
erah_putih_telkom4_launch_campaign_thread/","launch":"https://www.reddit.com/r/space
x/comments/9539nr/rspacex_merah_putih_telkom4_official_launch/","media":"https://ww
w.reddit.com/r/spacex/comments/94zr0b/rspacex_merah_putih_media_thread_videos_image
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m/930/30041972208_f735b9690b_o.jpg"]},"presskit":"https://www.spacex.com/sites/space
x/files/merahputihpresskit.pdf","webcast":"https://www.youtube.com/watch?v=FjfQNBYv2
IY","youtube_id":"FjfQNBYv2IY","article":"https://spaceflightnow.com/2018/08/07/indo
nesian-communications-satellite-deployed-in-orbit-by-spacex/","wikipedia":"https://e
n.wikipedia.org/wiki/Telkom_Indonesia"},"static_fire_date_utc":"2018-08-02T15:53:00.
000Z","static_fire_date_unix":1533225180,"net":false,"window":7200,"rocket":"5e9d0d9
5eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s fifteenth fligh
t of 2018 launched the Merah Putih (also known as Telkom-4) geostationary communicat
ions satellite for Telkom Indonesia. It marked the first reuse of any Block 5 first
 stage; the booster B1046 had previously launched Bangabandhu-1. The stage was recov
ered and is expected to become the first Falcon 9 booster to fly three missions.","c
rew":[],"ships":["5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":
[],"payloads":["5eb0e4c9b6c3bb0006eeb22a"],"launchpad":"5e9e4501f509094ba4566f84","f
light_number":67,"name":"Merah Putih","date_utc":"2018-08-07T05:18:00.000Z","date_un
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e,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_t
ype":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"l
aunch_library_id":null,"id":"5eb87d20ffd86e000604b36c"},{"fairings":{"reused":fals
e,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"smal
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x.com/ba/db/3plcm5IB_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/c
omments/95cte4/telstar_18v_apstar_5c_launch_campaign_thread/","launch":"https://www.
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n/","media":"https://www.reddit.com/r/spacex/comments/9ebkqw/rspacex_telstar_18v_med
ia_thread_videos_images/","recovery":"https://www.reddit.com/r/spacex/comments/9erxl
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t":"https://www.youtube.com/watch?v=Apw3xqwsG1U","youtube_id":"Apw3xqwsG1U","articl
e":"https://spaceflightnow.com/2018/09/10/spacex-telesat-achieve-repeat-success-with
-midnight-hour-launch/","wikipedia":"https://en.wikipedia.org/wiki/Telstar_18V"},"st
atic_fire_date_utc":"2018-09-05T07:21:00.000Z","static_fire_date_unix":1536132060,"n
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s":[],"details":"SpaceX\'s sixteenth flight of 2018 launched the Telstar 18v GEO com
munication satellite for Telesat, the second launch for the canadian company in a fe
w months. The first stage was a new Falcon 9 V1.2 Block 5 which was successfully rec
overed on OCISLY.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df40006
97c90d","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb
22b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":68,"name":"Telstar 18
V","date_utc":"2018-09-10T04:45:00.000Z","date_unix":1536554700,"date_local":"2018-0
9-10T00:45:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e
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_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d22ffd86e000604b36d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/ae/11/H85gskPQ_o.png","large":"https://images2.imgbox.com/66/d2/oVB1ofaZ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/9fwj9o/saocom_1a_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/9lazvr/rspacex_saocom_1a_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/9m3ly5/rspacex_saocom_1a_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1940/44262177535_9582184d3f_o.jpg","https://farm2.staticflickr.com/1917/30234800687_fd94fde151_o.jpg","https://farm2.staticflickr.com/1951/30234801997_b5a65426ca_o.jpg","https://farm2.staticflickr.com/1910/44262169525_e4c6b27299_o.jpg","https://farm2.staticflickr.com/1923/44451125454_8d26929d0b_o.jpg","https://farm2.staticflickr.com/1914/44262170545_22fe55d4bb_o.jpg","https://farm2.staticflickr.com/1934/44262166295_3f84597f09_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/saocom1apresskit.pdf","webcast":"https://www.youtube.com/watch?v=vr_C6LQ7mHc","youtube_id":"vr_C6LQ7mHc","article":"https://spaceflightnow.com/2018/10/08/spacex-aces-first-rocket-landing-in-california-after-launching-argentine-satellite/","wikipedia":"https://en.wikipedia.org/wiki/SAOCOM"},"static_fire_date_utc":"2018-10-02T21:00:00.000Z","static_fire_date_unix":1538514000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s seventeenth flight of 2018 was the first launch of the Saocom Earth observation satellite constellation of the Argentine Space Agency CONAE. The second launch of Saocom 1B will happen in 2019. This flight marked the first RTLS launch out of Vandenberg, with a landing on the concrete pad at SLC-4W, very close to the launch pad.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22c"],"launchpad":"5e9e4502f509092b78566f87","flight_number":69,"name":"SAOCOM 1A","date_utc":"2018-10-08T02:22:00.000Z","date_unix":1538965320,"date_local":"2018-10-07T19:22:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591809c03b2658","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb554034e7c9"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d23ffd86e000604b36e"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a3/96/WvJsBXuE_o.png","large":"https://images2.imgbox.com/59/c8/HPYpMlux_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/9p82jt/eshail_2_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/9x9w9v/rspacex_eshail_2_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/9xaa76/rspacex_eshail_2_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/9xmpa7/eshail_2_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4834/32040174268_b71d703417_o.jpg","https://farm5.staticflickr.com/4810/32040174058_a65fa64e85_o.jpg","https://farm5.staticflickr.com/4814/32040173268_0ab571e7bc_o.jpg","https://farm5.staticflickr.com/4899/32040173568_bb5c991565_o.jpg","https://farm5.staticflickr.com/4875/32040173278_b5578ba6be_o.jpg","https://farm5.staticflickr.com/4862/32040173928_afdfb09939_o.jpg","https://farm5.staticflickr.com/4888/32040173048_b2b29c020f_o.jpg","https://farm5.staticflickr.com/4808/32248947038_dd1cf9e8c3_o.jpg","https://farm5.staticflickr.com/4887/31180979107_da6a935c20_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/eshail-2_mission_press_kit_11_14_2018.pdf","webcast":"https://www.youtube.com/watch?v=PhTbzc-BqKs&feature=youtu.be","youtube_id":"PhTbzc-BqKs","article":"https://spaceflightnow.com/2018/11/15/spacex-launches-qatars-eshail-2-communications-satellite/","wikipedia":"https://en.wikipedia.org/wiki/Es%27hailSat"},"static_fire_date_utc":"2018-11-12T18:13:00.000Z","static_fire_date_unix":1542046380,"net":false,"window":6180,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s eighteenth flight of 2018 was its first for Es\'hailSat. Es\'hail-2 is a communications satellite delivering television and internet to Qatar and the surrounding region. It was launched into a geostationary transfer orbit from LC-39A at Kennedy Space Center. The booster landed on OCISLY.","crew":[],"ships":["5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22d"],"launchpad":"5e9e4502f509094188566f88","flight_number":70,"name":"Es

\xe2\x80\x99hail 2","date_utc":"2018-11-15T20:46:00.000Z","date_unix":1542314760,"da
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d":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpa
d":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":n
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x.com/c3/88/YprVKOBk_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/c
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x/comments/a0vjff/rspacex_ssoa_official_launch_discussion_updates/","media":"http
s://old.reddit.com/r/spacex/comments/a0wylf/rspacex_ssoa_media_thread_videos_images_
gifs/","recovery":"https://www.reddit.com/r/spacex/comments/a2tjoe/ssoa_recovery_thr
ead/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4875/4525756
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o.jpg","https://farm5.staticflickr.com/4822/45257566865_9c9d34a7ca_o.jpg","https://f
arm5.staticflickr.com/4821/45257568225_186c8431cf_o.jpg","https://farm5.staticflick
r.com/4885/45257569445_1d74a601df_o.jpg","https://farm5.staticflickr.com/4869/452575
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arm5.staticflickr.com/4870/44460659210_de634098ac_o.jpg"]},"presskit":"https://www.s
pacex.com/sites/spacex/files/ssoa_press_kit.pdf","webcast":"https://www.youtube.com/
watch?v=Wq8kS6UoOrQ","youtube_id":"Wq8kS6UoOrQ","article":"https://spaceflightnow.co
m/2018/12/03/spacex-launches-swarm-of-satellites-re-flies-rocket-for-third-time/","w
ikipedia":"https://en.wikipedia.org/wiki/Spaceflight_Industries"},"static_fire_date_
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ow":1680,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detail
s":"SpaceX\'s nineteenth flight of 2018 will fly SSO-A: SmallSat Express out of Vand
enberg SLC-4E for Spaceflight. SSO-A is a rideshare to sun synchronus low earth orbi
t consisting of 64 individual microsatellites and cubesats. It is also likely to be
 the third flight of core B1046 which previously flew Bangabandhu-1 and Merah Putih.
If this happens it will be the first time a Falcon 9 has flown more than two mission
s. ","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c912","5ea6e
d30080df4000697c914","5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5eb0e4c9
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a2oubw/rspacex_crs16_official_launch_discussion_updates/","media":"https://www.reddi
t.com/r/spacex/comments/a2uojp/rspacex_crs16_media_thread_videos_images_gifs/","reco
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ad/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4835/45473442
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om/4840/45473446114_7d5e5d6fe2_o.jpg"]},"presskit":"https://www.spacex.com/sites/spa
cex/files/crs16_press_kit_12_4.pdf","webcast":"https://www.youtube.com/watch?v=Esh1j
HT9oTA","youtube_id":"Esh1jHT9oTA","article":"https://spaceflightnow.com/2018/12/05/
spacex-falcon-9-boosts-dragon-cargo-ship-to-orbit-first-stage-misses-landing-targe
t/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-16"},"static_fire_date_ut
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w":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Spa
ceX\'s 16th Crew Resupply Mission on behalf of NASA, with a total of 20 contracted f
lights. This will bring essential supplies to the International Space Station using

SpaceX\'s reusable Dragon spacecraft. The Falcon 9 will launch from SLC-40 at Cape Canaveral Air Force Station. During the landing of the first stage, a grid fin hydraulic pump stalled, causing the core to enter an uncontrolled roll, and resulting in a (succesful) water landing.","crew":[],"ships":["5ea6ed2f080df4000697c90b"],"capsules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4cab6c3bb0006eeb22f"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":72,"name":"CRS-16","date_utc":"2018-12-05T18:16:00.000Z","date_unix":1544033760,"date_local":"2018-12-05T13:16:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f359185c603b265a","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d26ffd86e000604b371"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/b3/24/vKUtLIu9_o.png","large":"https://images2.imgbox.com/e1/cb/cvLgCm0d_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/a4516o/gps_iii2_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/a71wyn/rspacex_gps_iii2_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/a73kz5/rspacex_gps_iii2_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4864/45715171884_f1dd88c058_o.jpg","https://farm8.staticflickr.com/7926/45525648155_32fdab17a5_o.jpg","https://farm8.staticflickr.com/7876/45525649035_ba60162fe0_o.jpg","https://farm8.staticflickr.com/7853/45525649825_e6d35415e1_o.jpg","https://farm5.staticflickr.com/4893/45525650685_02b408c385_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/gps_iii_press_kit.pdf","webcast":"https://youtu.be/yRiLPoy_Mzc","youtube_id":"yRiLPoy_Mzc","article":"https://spaceflightnow.com/2018/12/23/spacex-closes-out-year-with-successful-gps-satellite-launch/","wikipedia":"https://en.wikipedia.org/wiki/GPS_Block_IIIA"},"static_fire_date_utc":"2018-12-13T21:24:00.000Z","static_fire_date_unix":1544736240,"net":false,"window":1560,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s twenty-first flight of 2018 launched the first of the new GPS III satellites (Block IIIA) for the United States Air Force and was SpaceX\'s first EELV mission. The spacecraft was delivered to a MEO transfer orbit from SLC-40 at Cape Canaveral Air Force Station. This mission was the first to fly with the redesigned COPV on the first stage (B1054) as well as the second. The booster was expended.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4cab6c3bb0006eeb230"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":73,"name":"GPS III SV01","date_utc":"2018-12-23T13:51:00.000Z","date_unix":1545573060,"date_local":"2018-12-23T08:51:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918513b3b265b","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d27ffd86e000604b372"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/11/f0/xPDcIpmS_o.png","large":"https://images2.imgbox.com/80/ae/1JL1ZzXD_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/a699fh/iridium_next_constellation_mission_8_launch/","launch":"https://www.reddit.com/r/spacex/comments/aemq2i/rspacex_iridium_next_8_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/aeoxve/rspacex_iridium_next_8_media_thread_videos_images/","recovery":"https://www.reddit.com/r/spacex/comments/aewp4r/iridium_8_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4866/39745612523_14270b4b9d_o.jpg","https://farm8.staticflickr.com/7833/39745612923_21aa442350_o.jpg","https://farm5.staticflickr.com/4881/39745613173_e99b09c000_o.jpg","https://farm8.staticflickr.com/7882/39745613513_6cdd4581af_o.jpg","https://farm8.staticflickr.com/7807/39745613733_1a7b70e54a_o.jpg","https://farm5.staticflickr.com/4891/39745614053_43855205bc_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/iridium8presskit.pdf","webcast":"https://youtu.be/VshdafZvwrg","youtube_id":"VshdafZvwrg","article":"https://spaceflightnow.com/2019/01/11/spacex-begins-2019-with-eighth-and-final-for-upgraded-iridium-network/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2019-01-06T13:51:00.000Z","static_fire_date_unix":1546782660,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s first flight of 2019 will be the eighth a

nd final launch of its planned Iridium flights. Delivering 10 satellites to low eart
h orbit, this brings the total up to 75 and completes the Iridium NEXT constellatio
n. This mission launches from SLC-4E at Vandenberg AFB. The booster is expected to l
and on JRTI.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c91
2","5ea6ed30080df4000697c914"],"capsules":[],"payloads":["5eb0e4cab6c3bb0006eeb23
1"],"launchpad":"5e9e4502f509092b78566f87","flight_number":74,"name":"Iridium NEXT M
ission 8","date_utc":"2019-01-11T15:31:00.000Z","date_unix":1547220660,"date_loca
l":"2019-01-11T07:31:00-08:00","date_precision":"hour","upcoming":false,"cores":[{"c
ore":"5e9e28a5f3591833b13b2659","flight":2,"gridfins":true,"legs":true,"reused":tru
e,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9
e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"i
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e,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.co
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g"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/afxyrd/nusantara_
satu_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/ass
xjz/rspacex_psnvi_official_launch_discussion_updates/","media":"https://www.reddit.c
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s://farm8.staticflickr.com/7829/46259779115_8982c2c8c2_o.jpg","https://farm8.staticf
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nusantara_satu_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=XS0E35aYJc
U","youtube_id":"XS0E35aYJcU","article":"https://spaceflightnow.com/2019/02/22/israe
li-moon-lander-hitches-ride-on-spacex-launch-with-indonesian-comsat/","wikipedia":"h
ttps://en.wikipedia.org/wiki/PT_Pasifik_Satelit_Nusantara"},"static_fire_date_ut
c":"2019-02-18T17:03:00.000Z","static_fire_date_unix":1550509380,"net":false,"windo
w":1920,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detail
s":"SpaceX will launch this rideshare to GTO for Space Systems Loral (SSL). The prim
ary payload for this mission is Nusantara Satu, a communications satellite built by
 SSL for the private Indonesian company PT Pasifik Satelit Nusantara (PSN). Spacefli
ght Industries\' GTO-1 mission consists of two secondary payloads. One of those is B
eresheet, the lunar lander built by the Israeli non-profit organization, SpaceIL. Be
resheet will make its own way to the moon from GTO. The other secondary is Air Force
Research Lab\'s (Space Situational Awareness) S5 mission, which hitches a ride to GE
O aboard Nusantara Satu. This mission launches from SLC-40 at Cape Canaveral AFS. Th
e booster is expected to land on OCISLY.","crew":[],"ships":["5ea6ed30080df4000697c9
13"],"capsules":[],"payloads":["5eb0e4cab6c3bb0006eeb232","5eb0e4cab6c3bb0006eeb23
3","5eb0e4cab6c3bb0006eeb234"],"launchpad":"5e9e4501f509094ba4566f84","flight_numbe
r":75,"name":"Nusantara Satu (PSN-6) / S5 / Beresheet","date_utc":"2019-02-22T01:45:
00.000Z","date_unix":1550799900,"date_local":"2019-02-21T20:45:00-05:00","date_preci
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This mission will demonstrate Dragon 2, and Falcon 9 in its configuration for crewed missions. DM-1 will launch from LC-39A at Kennedy Space Center, likely carrying some cargo to the International Space Station. The booster is expected to land on OCISLY.","crew":[],"ships":["5ea6ed30080df4000697c913"],"capsules":["5e9e2c5df35918b1063b2671"],"payloads":["5eb0e4cbb6c3bb0006eeb235"],"launchpad":"5e9e4502f509094188566f88","flight_number":76,"name":"CCtCap Demo Mission 1","date_utc":"2019-03-02T07:45:00.000Z","date_unix":1551512700,"date_local":"2019-03-02T02:45:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918c0803b265c","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d2bffd86e000604b375"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2f080df4000697c90c"]},"links":{"patch":{"small":"https://images2.imgbox.com/ab/ad/YJDi2l1n_o.png","large":"https://images2.imgbox.com/82/e3/RzQ9nX2V_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/b0kscl/arabsat6a_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/basm9y/rspacex_arabsat6a_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/bbhz9a/rspacex_arabsat6a_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/bcecao/fh_arabsat_6a_center_core_recovery_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/7911/32652060737_4be1171d4a_o.jpg","https://live.staticflickr.com/7807/40628442293_9643eaf670_o.jpg","https://live.staticflickr.com/7804/40628440983_4da5d76cc7_o.jpg","https://live.staticflickr.com/7856/40628439793_27927d11de_o.jpg","https://live.staticflickr.com/7919/40628438523_c597eabff1_o.jpg","https://live.staticflickr.com/7834/40628437283_84088aca75_o.jpg","https://live.staticflickr.com/7856/40628435833_a1bcde59db_o.jpg","https://live.staticflickr.com/7809/40628435153_17c05d3b5e_o.jpg","https://live.staticflickr.com/7885/40628434483_3545598b82_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/arabsat-6a_press_kit.pdf","webcast":"https://youtu.be/TXMGu2d8c8g","youtube_id":"TXMGu2d8c8g","article":"https://spaceflightnow.com/2019/04/11/spacexs-falcon-heavy-successful-in-commercial-debut/","wikipedia":"https://en.wikipedia.org/wiki/Arabsat-6A"},"static_fire_date_utc":"2019-04-05T09:57:00.000Z","static_fire_date_unix":1554458220,"net":false,"window":7020,"rocket":"5e9d0d95eda69974db09d1ed","success":true,"failures":[],"details":"SpaceX will launch Arabsat 6A to a geostationary transfer orbit from SLC-39A, KSC. The satellite is a geostationary telecommunications satellite built by Lockheed Martin for the Saudi Arabian company Arabsat. This will be the first operational flight of Falcon Heavy, and also the first Block 5 Falcon Heavy. All three cores will be new Block 5 cores. The side cores are expected to land at LZ-1 and LZ-2, and the center core is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2f080df4000697c90e","5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90c"],"capsules":[],"payloads":["5eb0e4cbb6c3bb0006eeb236"],"launchpad":"5e9e4502f509094188566f88","flight_number":77,"name":"ArabSat 6A","date_utc":"2019-04-11T22:35:00.000Z","date_unix":1555022100,"date_local":"2019-04-11T18:35:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f3591897453b265f","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"},{"core":"5e9e28a6f359183c413b265d","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"},{"core":"5e9e28a6f359188fd

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fficial_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/comment
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ess_kit.pdf","webcast":"https://youtu.be/AQFhX5TvP0M","youtube_id":"AQFhX5TvP0M","ar
ticle":"https://spaceflightnow.com/2019/05/04/spacex-launches-space-station-resupply
-mission-lands-rocket-on-drone-ship/","wikipedia":"https://en.wikipedia.org/wiki/Spa
ceX_CRS-17"},"static_fire_date_utc":"2019-04-27T07:23:00.000Z","static_fire_date_uni
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rue,"failures":[],"details":"SpaceX\'s 17th Commercial Resupply Services mission for
NASA out of a total of 20 contracted flights, this mission brings essential supplies
to the International Space Station using SpaceX\'s reusable Dragon 1 spacecraft. The
external payloads for this mission include Orbital Carbon Observatory 3 and Space Te
st Program-Houston 6. The Falcon 9 launches from SLC-40 at Cape Canaveral AFS. The b
ooster was expected to land at LZ-1, however, due to the ongoing investigation and c
lean-up following the Crew Dragon testing incident, it is likely to land on OCISLY i
nstead.\\n   ","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c
90e","5ea6ed2f080df4000697c90b"],"capsules":["5e9e2c5cf3591869b63b2670"],"payloads":
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ink_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=riBaVeDTEWI","youtube_
id":"riBaVeDTEWI","article":"https://spaceflightnow.com/2019/05/24/spacexs-first-60-
starlink-broadband-satellites-deployed-in-orbit","wikipedia":"https://en.wikipedia.o
rg/wiki/Starlink_(satellite_constellation)"},"static_fire_date_utc":"2019-05-13T20:0
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ozens of Starlink demonstration satellites from SLC-40, Cape Canaveral AFS. Starlink
is a low Earth orbit broadband internet constellation developed and owned by SpaceX
 which will eventually consist of nearly 12 000 satellites and will provide low late
ncy internet service to ground terminals around the world. Two prototype satellites,
Microsats 2a and 2b, were launched from Vandenberg AFB in February 2018. The booster

for this mission will land on OCISLY.","crew":[],"ships":["5ea6ed30080df4000697c91
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rk8","article":"https://spaceflightnow.com/2019/06/12/three-canadian-radar-surveilla
nce-satellites-ride-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedia.or
g/wiki/RADARSAT_Constellation"},"static_fire_date_utc":"2019-06-08T08:39:00.000Z","s
tatic_fire_date_unix":1559983140,"net":false,"window":780,"rocket":"5e9d0d95eda69973
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llite RADARSAT Constellation Mission into Sun Synchronous orbit from SLC-4E, VAFB. T
he RCM spacecraft are synthetic aperture radar (SAR) Earth observation satellites bu
ilt by the Canadian space company, MDA, for the Canadian Space Agency. This mission
 was delayed when the originally slated booster failed to land after CRS-16. The boo
ster is expected to return to LZ-4.","crew":[],"ships":[],"capsules":[],"payloads":
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cex/files/stp-2_press_kit.pdf","webcast":"https://youtu.be/WxH4CAlhtiQ","youtube_i
d":"WxH4CAlhtiQ","article":"https://spaceflightnow.com/2019/06/25/falcon-heavy-launc
hes-on-military-led-rideshare-mission-boat-catches-fairing","wikipedia":"https://en.
wikipedia.org/wiki/Space_Test_Program"},"static_fire_date_utc":"2019-06-19T21:52:00.
000Z","static_fire_date_unix":1560981120,"net":false,"window":14400,"rocket":"5e9d0d
95eda69974db09d1ed","success":true,"failures":[],"details":"Space Test Program 2 is
 a rideshare managed by the U.S. Air Force Space and Missile Systems Center (SMC), l
aunching from LC-39A, KSC. Most of the spacecraft will be delivered into low Earth o

rbit (LEO) in two deployment sequences separated by a second stage burn. These LEO p
ayloads include the six Taiwan and United States owned COSMIC-2 microsatellites, the
Planetary Society\'s LightSail-B demonstrator cubesat, and others. The third and fin
al deployment will be the Air Force Research Lab\'s DSX spacecraft, which will be de
livered to a medium Earth orbit (MEO). This mission will reuse the side cores from A
rabsat 6A, which will return to LZ-1, and LZ-2. The new center core will boost back
 to land on OCISLY less than 40 km from the launch site.","crew":[],"ships":["5ea6ed
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_updates/","media":"https://www.reddit.com/r/spacex/comments/chbr8i/rspacex_crs18_me
dia_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["h
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e,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detai
ls":"SpaceX\'s 18th Commercial Resupply Services mission out of a total of 20 such c
ontracted flights for NASA, this launch will deliver essential supplies to the Inter
national Space Station using the reusable Dragon 1 cargo spacecraft. The external pa
yload for this mission is International Docking Adapter 3, replacing IDA-1 lost in S
paceX\'s CRS-7 launch failure. This mission will launch from SLC-40 at Cape Canavera
l AFS on a Falcon 9, and the first-stage booster is expected to land back at CCAFS L
Z-1.","crew":[],"ships":[],"capsules":["5e9e2c5cf359188bfb3b266b"],"payloads":["5eb0
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cex/comments/cmedgn/rspacex_amos17_official_launch_discussion_updates","media":"http

s://www.reddit.com/r/spacex/comments/cmppne/rspacex_amos17_media_thread_videos_images_gifs","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/48478269312_58dd3dc446_o.jpg","https://live.staticflickr.com/65535/48478269747_353dcb2e62_o.jpg","https://live.staticflickr.com/65535/48478119901_2de0441026_o.jpg","https://live.staticflickr.com/65535/48478120646_ab72c2c6c3_o.jpg","https://live.staticflickr.com/65535/48478120031_5aae1f6131_o.jpg","https://live.staticflickr.com/65535/48478269442_08479bed36_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/amos-17_mission_press_kit_8_6_2019.pdf","webcast":"https://youtu.be/fZh82-WcCuo","youtube_id":"fZh82-WcCuo","article":"https://spaceflightnow.com/2019/08/07/spacex-launches-israeli-owned-telecom-satellite/","wikipedia":"https://en.wikipedia.org/wiki/Spacecom"},"static_fire_date_utc":"2019-08-01T00:00:00.000Z","static_fire_date_unix":1564617600,"net":false,"window":5280,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch Boeing built Amos-17, a geostationary communications satellite for Israeli company Spacecom. The satellite will be delivered to GTO from KSC LC-39A or possibly CCAFS SLC-40, and will replace the defunct Amos-5 at 17\xc2\xb0 E. Amos-17 carries multi-band high throughput and regional beams servicing Africa, Europe and the Middle East. The cost of this launch is covered for Spacecom by SpaceX credit following the Amos-6 incident. A recovery of the booster for this mission is not expected.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c909"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":83,"name":"Amos-17","date_utc":"2019-08-06T22:52:00.000Z","date_unix":1565131920,"date_local":"2019-08-06T18:52:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359181eed3b2657","flight":3,"gridfins":false,"legs":false,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d37ffd86e000604b37c"},{"fairings":{"reused":true,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/dgqcb6/2nd_starlink_mission_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/du07rt/rspacex_starlink1_official_launch_discussion","media":"https://www.reddit.com/r/spacex/comments/durx53/rspacex_starlink_1_media_thread_videos_images","recovery":"https://www.reddit.com/r/spacex/comments/du1duu/starlink1_booster_and_fairing_recovery_discussion"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49051988851_0b422e1603_o.jpg","https://live.staticflickr.com/65535/49051988746_1a97e38ca8_o.jpg","https://live.staticflickr.com/65535/49052201452_c3b01e37f0_o.jpg","https://live.staticflickr.com/65535/49051988636_3714a78787_o.jpg","https://live.staticflickr.com/65535/49051477088_d86104481d_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/starlink_press_kit_nov2019.pdf","webcast":"https://youtu.be/pIDuv0Ta0XQ","youtube_id":"pIDuv0Ta0XQ","article":"https://spaceflightnow.com/2019/11/11/successful-launch-continues-deployment-of-spacexs-starlink-network","wikipedia":"https://en.wikipedia.org/wiki/Starlink_(satellite_constellation)"},"static_fire_date_utc":"2019-11-11T12:08:00.000Z","static_fire_date_unix":1573474080,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the first batch of Starlink version 1.0 satellites, from SLC-40, Cape Canaveral AFS. They are expected to contribute to the 550 km x 53\xc2\xb0 shell. It is the second Starlink launch overall. Starlink is a low Earth orbit broadband internet constellation developed and owned by SpaceX which will eventually consist of nearly 12 000 satellites and will provide low latency internet service to ground terminals around the world. The booster for this mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed30080df4000697c913","5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24c"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":84,"name":"Starlink-1","date_utc":"2019-11-11T14:56:00.000Z","date_unix":1573484160,"date_local":"2019-11-11T09:56:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591809c03b2658","flight":4,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d39ffd86e000604b37d"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/05/f9/FQWx8g9k_o.png","large":"http

s://images2.imgbox.com/1f/40/3mc9OSdH_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/e0upb3/crs19_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/e5r8hj/rspacex_crs19_official_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/comments/e6ln0m/rspacex_crs19_media_thread_videos_images_gifs","recovery":"https://www.reddit.com/r/spacex/comments/e6lbzy/rspacex_crs19_booster_recovery_discussion_updates"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49178460143_e3ae2bd506_o.jpg","https://live.staticflickr.com/65535/49178954221_8544835325_o.jpg","https://live.staticflickr.com/65535/49179161792_9f1801a963_o.jpg","https://live.staticflickr.com/65535/49178460368_62eb945db8_o.jpg","https://live.staticflickr.com/65535/49184948561_ce20b38bc6_o.jpg","https://live.staticflickr.com/65535/49185149122_00a7fa573d_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/crs-19_mission_press_kit.pdf","webcast":"https://youtu.be/-aoAGdYXp_4","youtube_id":"-aoAGdYXp_4","article":"https://spaceflightnow.com/2019/12/05/dragon-soars-on-research-and-resupply-flight-to-international-space-station","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-19"},"static_fire_date_utc":"2019-11-26T17:04:00.000Z","static_fire_date_unix":1574787840,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 19th Crew Resupply Mission on behalf of NASA with a total of 20 contracted flights, this mission brings essential supplies to the International Space Station using SpaceX\'s reusable Dragon spacecraft. The external payloads for this mission include the Hyperspectral Imager Suite and a lithium-ion battery. Falcon 9 and Dragon will launch from SLC-40, Cape Canaveral AFS. The mission will be complete with return and recovery of the Dragon capsule and down cargo.","crew":[],"ships":["5ea6ed2f080df4000697c90d"],"capsules":["5e9e2c5bf3591880643b2669"],"payloads":["5eb0e4cfb6c3bb0006eeb24d"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":85,"name":"CRS-19","date_utc":"2019-12-05T17:29:23.000Z","date_unix":1575566963,"date_local":"2019-12-05T12:29:23-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f359187afd3b2662","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d39ffd86e000604b37e"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/3c/e7/PotxLenG_o.png","large":"https://images2.imgbox.com/49/eb/evB1Wi95_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/e5w6i8/jcsat18kacific1_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/ebfr9t/rspacex_jcsat18kacific1_official_launch","media":"https://www.reddit.com/r/spacex/comments/ebn4g5/rspacex_jcsat18kacific1_media_thread_videos","recovery":"https://www.reddit.com/r/spacex/comments/ec48p3/jscat_18kacific1_recovery_discussion_and_updates"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49235364922_e55ceb61be_o.jpg","https://live.staticflickr.com/65535/49235136806_e5a3774904_o.jpg","https://live.staticflickr.com/65535/49235137056_585dc050e7_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/jcsat18kacific1_mission_press_kit.pdf","webcast":"https://youtu.be/sbXgZg9JmkI","youtube_id":"sbXgZg9JmkI","article":"https://spaceflightnow.com/2019/12/17/startup-launches-broadband-satellite-on-spacex-rocket-to-connect-pacific-islands","wikipedia":"https://en.wikipedia.org/wiki/JSAT_(satellite_constellation)"},"static_fire_date_utc":"2019-12-13T12:34:00.000Z","static_fire_date_unix":1576240440,"net":false,"window":5280,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch the Boeing built dual payload satellite to geostationary transfer orbit from XXXX. JCSat 18 is a mobile broadband communications payload built for Sky Perfect JSAT Corporation of Japan and will service Asia Pacific. Kacific 1 is a high throughput broadband internet payload built for Kacific Broadband Satellites and will service certain high demand areas of Southeast Asia and the Pacific. Both payloads share a single chassis. The booster for this mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24e"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":86,"name":"JCSat 18 / Kacific 1","date_utc":"2019-12-17T00:10:00.000Z","date_unix":1576541400,"date_local":"2019-12-16T19:10:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591809313b2660","flight":3,"gridfins":true,"legs":true,"reused":tru

e,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9
e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"i
d":"5eb87d3bffd86e000604b37f"},{"fairings":{"reused":false,"recovery_attempt":tru
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ceflightnow.com/2020/01/07/spacex-launches-more-starlink-satellites-tests-design-cha
nge-for-astronomers","wikipedia":"https://en.wikipedia.org/wiki/Starlink_(satellite_
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s":true,"failures":[],"details":"This mission will launch the second batch of Starli
nk version 1.0 satellites, from SLC-40, Cape Canaveral AFS. They are expected to con
tribute to the 550 km x 53\xc2\xb0 shell. It is the third Starlink launch overall. S
tarlink is a low Earth orbit broadband internet constellation developed and owned by
SpaceX which will eventually consist of nearly 12 000 satellites and will provide lo
w latency internet service to ground terminals around the world. The booster for thi
s mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c9
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b","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24
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4e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d3cffd86
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icle":"https://spaceflightnow.com/2020/01/19/spacex-aces-final-major-test-before-fir
st-crew-mission","wikipedia":"https://en.wikipedia.org/wiki/Commercial_Crew_Developm
ent"},"static_fire_date_utc":"2020-01-11T09:42:00.000Z","static_fire_date_unix":1578
735720,"net":false,"window":14400,"rocket":"5e9d0d95eda69973a809d1ec","success":tru
e,"failures":[],"details":"SpaceX will launch a Crew Dragon capsule from LC-39A, KSC
on a fully fueled Falcon 9 rocket and then trigger the launch escape system during t
he period of maximum dynamic pressure. As part of NASA\'a Commercial Crew Integrated
Capability program (CCiCap) this test will contribute valuable data to help validate
Crew Dragon and its launch abort system. The Crew Dragon will be recovered by GO Sea
rcher after splashdown in the Atlantic Ocean. This flight does not go to orbit. The
 booster and upper stage are expected to break up following capsule separation and t
here will be no landing attempt.","crew":[],"ships":["5ea6ed2f080df4000697c90c"],"ca

psules":["5e9e2c5df359184c9a3b2672"],"payloads":["5eb0e4d0b6c3bb0006eeb250"],"launchpad":"5e9e4502f509094188566f88","flight_number":88,"name":"Crew Dragon In Flight Abort Test","date_utc":"2020-01-19T14:00:00.000Z","date_unix":1579442400,"date_local":"2020-01-19T09:00:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359182b023b2656","flight":4,"gridfins":false,"legs":false,"reused":true,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d3dffd86e000604b381"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/eof5pr/starlink3_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/eudve3/rspacex_starlink_3_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/evjdws/rspacex_starlink3_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/evnyij/rspacex_starlink3_recovery_discussion_updates/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49461673512_f4e01c8b27_o.jpg","https://live.staticflickr.com/65535/49461673792_b1804c2a2b_o.jpg","https://live.staticflickr.com/65535/49461673707_cb7fc4a3a8_o.jpg","https://live.staticflickr.com/65535/49461673552_65cc294f82_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/starlink_press_kit_jan272020.pdf","webcast":"https://youtu.be/1KmBDCiL7MU","youtube_id":"1KmBDCiL7MU","article":"https://spaceflightnow.com/2020/01/29/spacex-boosts-60-more-starlink-satellites-into-orbit-after-weather-delays/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_Starlink"},"static_fire_date_utc":"2020-01-20T13:17:00.000Z","static_fire_date_unix":1579526220,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the third batch of Starlink version 1.0 satellites, from SLC-40, Cape Canaveral AFS. It is the fourth Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude of 550 km. The booster for this mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4d0b6c3bb0006eeb251"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":89,"name":"Starlink-3","date_utc":"2020-01-29T14:06:00.000Z","date_unix":1580306760,"date_local":"2020-01-29T09:06:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918c0803b265c","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d3fffd86e000604b382"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/ex0ilm/starlink4_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/f4d8sg/rspacex_starlink4_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/f56mb4/rspacex_starlink4_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/f5es7j/rspacex_starlink4_recovery_discussion_updates/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49549022017_18738a2552_o.jpg","https://live.staticflickr.com/65535/49548795221_edd6dc7ef6_o.jpg","https://live.staticflickr.com/65535/49548795401_93ef80caf5_o.jpg","https://live.staticflickr.com/65535/49549022057_d4dbd6a492_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/fifth_starlink_press_kit.pdf","webcast":"https://youtu.be/8xeX62mLcf8","youtube_id":"8xeX62mLcf8","article":"https://spaceflightnow.com/2020/02/17/spacex-delivers-more-starlink-satellites-to-orbit-booster-misses-drone-ship-landing/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_Starlink"},"static_fire_date_utc":"2020-02-14T08:31:00.000Z","static_fire_date_unix":1581669060,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the fourth batch of Starlink version 1.0 satellites, from SLC-40, Cape Canaveral AFS. It is the fifth Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude of 550 km. The booster for this mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c90

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ks-end-of-an-era/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-20"},"stati
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[],"details":"SpaceX\'s 20th and final Crew Resupply Mission under the original NASA
CRS contract, this mission brings essential supplies to the International Space Stat
ion using SpaceX\'s reusable Dragon spacecraft. It is the last scheduled flight of a
Dragon 1 capsule. (CRS-21 and up under the new Commercial Resupply Services 2 contra
ct will use Dragon 2.) The external payload for this mission is the Bartolomeo ISS e
xternal payload hosting platform. Falcon 9 and Dragon will launch from SLC-40, Cape
 Canaveral Air Force Station and the booster will land at LZ-1. The mission will be
 complete with return and recovery of the Dragon capsule and down cargo.","crew":
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n-9-rocket-overcomes-engine-failure-to-deploy-starlink-satellites/","wikipedia":"htt
ps://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-03-13T18:37:00.00
0Z","static_fire_date_unix":1584124620,"net":false,"window":0,"rocket":"5e9d0d95eda6
9973a809d1ec","success":true,"failures":[],"details":"The sixth Starlink launch over
all and the fifth operational batch of Starlink satellites will launch into orbit ab
oard a Falcon 9 rocket. This mission is expected to deploy all sixty satellites into
an elliptical orbit about fifteen minutes into flight. In the weeks following launch
the satellites are expected to utilize their onboard ion thrusters to raise their or
bits to 550 km in three groups of 20, making use of precession rates to separate the

mselves into three planes. The booster will land on a drone ship approximately 628 k
m downrange.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90
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I","article":"https://spaceflightnow.com/2020/04/22/spacexs-starlink-network-surpass
es-400-satellite-mark-after-successful-launch/","wikipedia":"https://en.wikipedia.or
g/wiki/Starlink"},"static_fire_date_utc":"2020-04-17T11:48:00.000Z","static_fire_dat
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ss":true,"failures":[],"details":"This mission will launch the sixth batch of operat
ional Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape C
anaveral AFS. It is the seventh Starlink launch overall. The satellites will be deli
vered to low Earth orbit and will spend a few weeks maneuvering to their operational
altitude of 550 km. The booster for this mission is expected to land on OCISLY.","cr
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4","article":"https://spaceflightnow.com/2020/05/30/nasa-astronauts-launch-from-us-s

oil-for-first-time-in-nine-years/","wikipedia":"https://en.wikipedia.org/wiki/Crew_Dragon_Demo-2"},"static_fire_date_utc":"2020-05-22T17:39:00.000Z","static_fire_date_unix":1590169140,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch the second demonstration mission of its Crew Dragon vehicle as part of NASA\'s Commercial Crew Transportation Capability Program (CCtCap), carrying two NASA astronauts to the International Space Station. Barring unexpected developments, this mission will be the first crewed flight to launch from the United States since the end of the Space Shuttle program in 2011. DM-2 demonstrates the Falcon 9 and Crew Dragon\'s ability to safely transport crew to the space station and back to Earth and it is the last major milestone for certification of Crew Dragon. Initially the mission duration was planned to be no longer than two weeks, however NASA has been considering an extension to as much as six weeks or three months. The astronauts have been undergoing additional training for the possible longer mission.","crew":["5ebf1a6e23a9a60006e03a7a","5ebf1b7323a9a60006e03a7b"],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90d"],"capsules":["5e9e2c5df359188aba3b2676"],"payloads":["5eb0e4d1b6c3bb0006eeb257"],"launchpad":"5e9e4502f509094188566f88","flight_number":94,"name":"CCtCap Demo Mission 2","date_utc":"2020-05-30T19:22:00.000Z","date_unix":1590866520,"date_local":"2020-05-30T15:22:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d46ffd86e000604b388"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/gamcbr/starlink7_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/gkfe30/rspacex_starlink_7_official_launch_discussion/","media":null,"recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49971196871_a0462d0084_o.jpg","https://live.staticflickr.com/65535/49970682603_e6333945ee_o.jpg"]},"presskit":"https://spacextimemachine.com/assets/press_kits/185.pdf","webcast":"https://youtu.be/y4xBFHjkUvw","youtube_id":"y4xBFHjkUvw","article":"https://spaceflightnow.com/2020/06/04/spacex-sets-new-mark-in-rocket-reuse-10-years-after-first-falcon-9-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-05-13T11:11:00.000Z","static_fire_date_unix":1589368260,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the seventh batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape Canaveral AFS. It is the eighth Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude of 550 km. The booster for this mission is expected to land on JRTI on its first mission since arriving at Port Canaveral.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ee68c683c228f36bd5809b5"],"capsules":[],"payloads":["5eb0e4d1b6c3bb0006eeb256"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":95,"name":"Starlink-7","date_utc":"2020-06-04T01:25:00.000Z","date_unix":1591233900,"date_local":"2020-06-03T21:25:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","flight":5,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d45ffd86e000604b387"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/gwbr4t/starlink8_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/h7gqlc/rspacex_starlink_8_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/h842qk/rspacex_starlink8_media_thread_photographer/","recovery":"https://www.reddit.com/r/spacex/comments/h8sx6q/starlink8_recovery_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50009748327_93e52a451f_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/8riKQXChPGg","youtube_id":"8riKQXChPGg","article":"https://spac

eflightnow.com/2020/06/13/starlink-satellite-deployments-continue-with-successful-falcon-9-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the eighth batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape Canaveral AFS. It is the ninth Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude of 550 km. This mission is includes rideshare payloads, SkySats 16-18, on top of the Starlink stack. The booster for this mission is expected to land an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4d1b6c3bb0006eeb258"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":96,"name":"Starlink-8 & SkySat 16-18","date_utc":"2020-06-13T09:21:00.000Z","date_unix":1592040060,"date_local":"2020-06-13T05:21:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f359187afd3b2662","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d46ffd86e000604b389"},{"fairings":{"reused":null,"recovery_attempt":true,"recovered":true,"ships":[]},"links":{"patch":{"small":"https://imgur.com/yBTgcQH.png","large":"https://imgur.com/vwfiNU7.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/gzeshn/gps_iii_sv03_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/hi5hit/rspacex_gps_iii_sv03_columbus_official_launch/","media":"https://www.reddit.com/r/spacex/comments/hiq0vd/rspacex_gps_iii_sv03_media_thread_photographer/","recovery":"https://www.reddit.com/r/spacex/comments/hjendd/gps_iii_svo3_recovery_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50065947228_804efe6117_o.jpg","https://live.staticflickr.com/65535/50065947263_e1a6ea1e22_o.jpg","https://live.staticflickr.com/65535/50065947218_88ef29951a_o.jpg","https://live.staticflickr.com/65535/50066762457_8c92090037_o.jpg","https://live.staticflickr.com/65535/50085443052_9f6b843a02_o.jpg","https://live.staticflickr.com/65535/50085211776_588bed76f0_o.jpg","https://live.staticflickr.com/65535/50084627433_89d8915596_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/6zr0nfG3Xy4","youtube_id":"6zr0nfG3Xy4","article":"https://spaceflightnow.com/2020/06/30/spacex-launches-its-first-mission-for-u-s-space-force/","wikipedia":"https://en.wikipedia.org/wiki/GPS_Block_III"},"static_fire_date_utc":"2020-06-25T09:48:00.000Z","static_fire_date_unix":1593078480,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch GPS Block III Space Vehicle 03 from SLC-40, Cape Canaveral AFS aboard a Falcon 9. GPS III is owned and operated by the US Air Force and produced by Lockheed Martin. This is the third GPS III satellite and the second launched by SpaceX. The satellite will be delivered into a MEO transfer orbit. The booster for this mission is expected to land on an ASDS.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4d2b6c3bb0006eeb25c"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":97,"name":"GPS III SV03 (Columbus)","date_utc":"2020-06-30T19:55:00.000Z","date_unix":1593546900,"date_local":"2020-06-30T15:55:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d4affd86e000604b38b"},{"fairings":{"reused":null,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://images2.imgbox.com/e7/01/lB9VKSwG_o.png","large":"https://images2.imgbox.com/ad/77/CDzoMWTH_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/hkbhqo/anasisii_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/hu6sci/rspacex_anasisii_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/hun4pv/rspacex_anasisii_media_thread_photographer_contest/","recovery":"https://www.reddit.com/r/spacex/comments/hvgjk9/anasisii_recovery_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50136967628_eda99b6353_o.jpg","https://live.staticflickr.com/65535/50137510881_4618ba6c84_o.jpg","https://live.staticflickr.com/65535/50136967553_e1ac93fab0_o.jpg","https://live.staticflickr.com/65535/50136967658_9347d7c575_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/TshvZlQ7le8","youtube_id":"TshvZlQ7

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The booster is expected to land downrange on an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4d2b6c3bb0006eeb25b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":98,"name":"ANASIS-II","date_utc":"2020-07-20T21:30:00.000Z","date_unix":1595280600,"date_local":"2020-07-20T17:30:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d50ffd86e000604b394"},{"fairings":{"reused":null,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/h8mold/starlink9_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/i4ozw3/rspacex_starlink9_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/hg499n/rspacex_starlink9_media_thread_photographer/","recovery":"https://www.reddit.com/r/spacex/comments/i5smhk/starlink_9blacksky_recovery_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50198901143_0bb53a499e_o.jpg","https://live.staticflickr.com/65535/50199448011_35d0e9c8bf_o.jpg","https://live.staticflickr.com/65535/50199715777_eca6f41d25_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/KU6KogxG5BE","youtube_id":"KU6KogxG5BE","article":"https://spaceflightnow.com/2020/08/07/spacex-closes-out-busy-week-with-launch-of-more-starlink-satellites/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-06-24T18:18:00.000Z","static_fire_date_unix":1593022680,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the ninth batch of operational Starlink satellites, which are expected to be version 1.0, from LC-39A, Kennedy Space Center. It is the tenth Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude of 550 km. This mission is includes a rideshare of two BlackSky satellites on top of the Starlink stack. The booster for this mission is expected to land an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed30080df4000697c913","5ee68c683c228f36bd5809b5"],"capsules":[],"payloads":["5ed9858b1f30554030d45c3e","5ee522e32f1f3d474c758123"],"launchpad":"5e9e4502f509094188566f88","flight_number":99,"name":"Starlink-9 (v1.0) & BlackSky Global 5-6","date_utc":"2020-08-07T05:12:00.000Z","date_unix":1596777120,"date_local":"2020-08-07T01:12:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918c0803b265c","flight":5,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5ed9819a1f30554030d45c29"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/i63bst/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/ibacxz/rspacex_starlink10_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/ic46fw/starlink10_recovery_updates_discussion_thread/","recovery":"https://www.reddit.com/r/spacex/comments/ic46fw/starlink10_recovery_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50241845831_9a7412e81d_o.jpg","https://live.staticflickr.com/65535/50242057637_ea4f98d517_o.jpg","https://live.staticflickr.com/65535/50242057682_6084977bf7_o.jpg","https://live.staticflickr.com/65535/50242057677_e96fbd46e6_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/jTMJK7wb0rM","youtube_id":"jTMJK7wb0rM","article":"https://spaceflightnow.com/2020/08/18/spacex-adds-more-satellites-to

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satellites, which are expected to be version 1.0, from LC-39A, Kennedy Space Center.
It is the eleventh Starlink launch overall. The satellites will be delivered to low
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550 km. This mission is includes rideshare payloads, SkySats 19-21, on top of the St
arlink stack. The booster for this mission is expected to land on an ASDS.","crew":
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rbit-mission-from-florida-in-decades/","wikipedia":"https://en.wikipedia.org/wiki/SA
OCOM"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"windo
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es into a sun-synchronous polar orbit from SLC-40, Cape Canaveral AFS. SAOCOM 1B is
 a synthetic aperture radar Earth observation satellite to support disaster manageme
nt. The SAOCOM spacecraft are operated by CONAE, the Argentinian National Space Acti
vities Commission, and are built by INVAP. This mission is also expected to include
 rideshare payloads Sequoia, and GNOMES-1. This will be the first polar launch from
 the Space Coast in 60 years. The launch azimuth will be southward and the booster w
ill land at LZ-1.","crew":[],"ships":["5ea6ed2e080df4000697c907"],"capsules":[],"pay
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C-40, Cape Canaveral Air Force Station. It is the twelfth Starlink launch overall. T
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ted to land on an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2f080d
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ission will launch the twelfth batch of operational Starlink satellites, which are e
xpected to be version 1.0, from SLC-40, Cape Canaveral Air Force Station. It is the
 thirteenth Starlink launch overall. The satellites will be delivered to low Earth o
rbit and will spend a few weeks maneuvering to their operational altitude of 550 km.
The booster for this mission is expected to land on an ASDS.","crew":[],"ships":["5e
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This mission will be the second crewed flight to launch from the United States since the end of the Space Shuttle program in 2011.","crew":["5f7f1543bf32c864a529b23e","5f7f158bbf32c864a529b23f","5f7f15d5bf32c864a529b240","5f7f1614bf32c864a529b241"],"ships":["5ea6ed2f080df4000697c910","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c90c","5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90b"],"capsules":["5f6f99fddcfdf403df379709"],"payloads":["5eb0e4d2b6c3bb0006eeb25f"],"launchpad":"5e9e4502f509094188566f88","flight_number":107,"name":"Crew-1","date_utc":"2020-11-16T00:27:00.000Z","date_unix":1605486420,"date_local":"2020-11-15T19:27:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a6330279009f","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d4dffd86e000604b38e"},{"fairings":{"reused":null,"recovery_attempt":null,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/8d/11/r6FulTZd_o.png","large":"https://images2.imgbox.com/cc/23/YWTPxp4N_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jkk93v/sentinel6_michael_freilich_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/jxsche/rspacex_sentinel6_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/jyd67q/rspacex_sentinel6_media_thread_photographer/","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50630802488_8cc373728e_o.jpg","https://live.staticflickr.com/65535/50631642722_3af8131c6f_o.jpg","https://live.staticflickr.com/65535/50631544171_66bd43eaa9_o.jpg","https://live.staticflickr.com/65535/50631543966_e8035d5cca_o.jpg","https://live.staticflickr.com/65535/50631643257_c214ceee7b_o.jpg","https://live.staticflickr.com/65535/50631643917_cb7db291d0_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/aVFPzTDCihQ","youtube_id":"aVFPzTDCihQ","article":"https://spaceflightnow.com/2020/11/21/international-satellite-launches-to-extend-measurements-of-sea-level-rise/","wikipedia":"https://en.wikipedia.org/wiki/Copernicus_Sentinel-6"},"static_fire_date_utc":"2020-11-17T13:17:00.000Z","static_fire_date_unix":1605619020,"net":false,"window":null,"rocket":"5e9d0d95eda69973a8

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l Freilich into low Earth orbit for NASA, NOAA, ESA, and the European Organization f
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 radar ocean surface altimetry data and also atmospheric temperature profiles as a s
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2/06/spacex-launches-first-in-new-line-of-upgraded-space-station-cargo-ships/","wiki
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his mission brings essential supplies to the International Space Station using the c
argo variant of SpaceX\'s Dragon 2 spacecraft. The external payload for this mission
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is the Nanoracks Bishop Airlock. Falcon 9 and Dragon launch from LC-39A, Kennedy Spa
ce Center and the booster is expected to land on an ASDS. The mission will be comple
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m/2021/01/08/spacex-deploys-turkish-satellite-in-first-launch-of-2021/","wikipedi
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generation satellites on contract for T\xc3\xbcrksat. T\xc3\xbcrksat 5A is a Ku-band
broadcast satellite built by Airbus Defense and Space and based on the Electric Orbi
t Raising version of the Eurostar E3000 platform. This spacecraft will be delivered
 into a transfer orbit and will then raise itself to its operational 31\xc2\xb0 East
geostationary orbit to serve Turkey, the Middle East, Europe, North Africa and South
Africa. The booster for this mission will be recovered downrange via ASDS.","crew":
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successful-starlink-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlin
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 mission launches the sixteenth batch of operational Starlink satellites, which are
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 The satellites will be delivered to low Earth orbit and will spend a few weeks mane
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d will spend a few weeks maneuvering to their operational altitude. The booster is e
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4/spacex-sticks-75th-falcon-rocket-landing-after-launching-60-more-starlink-satellit
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will be delivered to low Earth orbit and will spend a few weeks maneuvering to their
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The booster is expected to land on an ASDS.","crew":[],"ships":["5ee68c683c228f36bd5809b5","5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","6059166413f40e27e8af34b6"],"capsules":[],"payloads":["60428afbc041c16716f73cdd"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":121,"name":"Starlink-22 (v1.0)","date_utc":"2021-03-24T08:28:00.000Z","date_unix":1616574480,"date_local":"2021-03-24T04:28:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":6,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"ec03fe36-fe2a-4e43-8e10-d07d5349f1de","id":"60428aafc041c16716f73cd7"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":null,"ships":["6059166413f40e27e8af34b6","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/mlitqf/rspacex_starlink23_launch_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51101836837_8671b88722_o.jpg","https://live.staticflickr.com/65535/51101836832_e151d33d66_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/Uy9Jn-3vuPs","youtube_id":"Uy9Jn-3vuPs","article":"https://spaceflightnow.com/2021/04/07/spacex-launches-its-100th-mission-from-floridas-space-coast/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 23rd batch of operational Starlink satellites, which are version 1.0, from or SLC-40 or LC-39A. It is the 24th Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude. The booster is expected to land on an ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["60428b02c041c16716f73cde"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":122,"name":"Starlink-23 (v1.0)","date_utc":"2021-04-07T16:34:00.000Z","date_unix":1617813240,"date_local":"2021-04-07T12:34:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","flight":7,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"385455f4-067e-4c24-9937-ca8283ed3307","id":"60428ac4c041c16716f73cd8"},{"fairings":null,"links":{"patch":{"small":"https://imgur.com/SS92zpG.png","large":"https://imgur.com/OvSAk3K.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/lrx7ez/crew2_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/mvcst9/rspacex_crew2_launch_discussion_updates_thread/","media":null,"recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51136761295_edb4d3ba1d_o.jpg","https://live.staticflickr.com/65535/51135652706_3e8448193d_o.jpg","https://live.staticflickr.com/65535/51135865043_3ee9818a56_o.jpg","https://live.staticflickr.com/65535/51136428854_4723547f5a_o.jpg","https://live.staticflickr.com/65535/51134975562_ca678d7e2f_o.jpg","https://live.staticflickr.com/65535/51135650561_0bd04e5a56_o.jpg","https://live.staticflickr.com/65535/51135650711_f65e45739d_o.jpg","https://live.staticflickr.com/65535/51136428874_30a1912bc6_o.jpg","https://live.staticflickr.com/65535/51135650696_80bb4d0047_o.jpg","https://live.staticflickr.com/65535/51135650641_f8c77b5420_o.jpg","https://live.staticflickr.com/65535/51136428829_2b995a79bc_o.jpg","https://live.staticflickr.com/65535/51135650621_187bc9fa5b_o.jpg","https://live.staticflickr.com/65535/51135324597_816d0bc217_o.jpg","https://live.staticflickr.com/65535/51135997286_1b5a4452f0_o.jpg","https://live.staticflickr.com/65535/51136428899_eb329865d1_o.jpg","https://live.staticflickr.com/65535/51136428909_d4d6cf76ae_o.jpg","https://live.staticflickr.com/65535/51136761220_9a2e6dbaf6_o.jpg"]},"pre

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rnational Space Station. The Falcon 9 and Crew Dragon lift off from LC-39A, Kennedy
 Space Center. Both the booster and the capsule have flown previously, each a first
 for a commercial crew flight. The booster for this mission is expected to land on a
n ASDS. The mission will be complete with the safe return of the astronauts to Eart
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The satellites will be delivered to low Earth orbit and will spend a few weeks maneu
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g":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","flight":8,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"c32d1f5e-2dd9-4b55-ac8b-3eb8c4a4e955","id":"605b4b95aa5433645e37d041"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90c"]},"links":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573IfGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/nkxg4s/rspacex_starlink28_launch_discussion_and_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51225270061_42bc3abb43_o.jpg","https://live.staticflickr.com/65535/51226036719_584d141279_o.jpg","https://live.staticflickr.com/65535/51225480623_5ef7d3957a_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/xRu-ekesDyY","youtube_id":"xRu-ekesDyY","article":"https://spaceflightnow.com/2021/05/26/first-phase-of-spacexs-starlink-network-nears-completion-with-falcon-9-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 28th batch of operational Starlink satellites, which were version 1.0, from SLC-40. It was the 29th Starlink launch overall. The satellites plan to be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude. The booster is expected to land on ASDS JRTI.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90c","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"],"capsules":[],"payloads":["6079bd679a06446e8c61bf7d"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":128,"name":"Starlink-28 (v1.0)","date_utc":"2021-05-26T18:59:00.000Z","date_unix":1622055540,"date_local":"2021-05-26T14:59:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c54a0622a633027900a1","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"fb25ecf0-fb51-4b5e-b678-105f6ba4c06e","id":"6079bd399a06446e8c61bf77"},{"fairings":null,"links":{"patch":{"small":"https://imgur.com/o6zaoex.png","large":"https://imgur.com/klt5qq2.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/nhztq5/crs22_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/nqqojc/rspacex_crs22_launch_docking_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51225482033_086576f2cd_o.jpg","https://live.staticflickr.com/65535/51226340205_9c3ac87b8e_o.jpg","https://live.staticflickr.com/65535/51224563112_61d493b775_o.jpg","https://live.staticflickr.com/65535/51224563062_95bf029b80_o.jpg","https://live.staticflickr.com/65535/51225271661_49315dc688_o.jpg","https://live.staticflickr.com/65535/51226340225_27df994080_o.jpg","https://live.staticflickr.com/65535/51224563102_d07c630ef5_o.jpg","https://live.staticflickr.com/65535/51225482053_1fe7157f74_o.jpg","https://live.staticflickr.com/65535/51226038164_304c347347_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/QXf9mRWbXDM","youtube_id":"QXf9mRWbXDM","article":"https://spaceflightnow.com/2021/06/03/spacex-supply-ship-launches-on-mission-to-begin-upgrading-space-station-electrical-grid/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-22"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 22nd ISS resupply mission on behalf of NASA, this mission sends essential supplies to the International Space Station using the cargo variant of SpaceX\'s Dragon 2 spacecraft. The external payload for this mission is the first pair of ISS Roll Out Solar Arrays. Falcon 9 and Dragon launch from LC-39A, Kennedy Space Center and the booster is expected to land on an ASDS. The mission will be complete with splashdown and recovery of the capsule and down cargo.","crew":[],"ships":["5ea6ed2f080df4000697c90b","608c1a06cf7f3d6152666ad4","5ea6ed30080df4000697c913"],"capsules":["60b803421f83cc1e59f1644d"],"payloads":["5fe3b642b3467846b324217b"],"launchpad":"5e9e4502f509094188566f88","flight_number":129,"name":"CRS-22 & IROSA","date_utc":"2021-06-03T17:29:00.000Z","date_unix":1622741340,"date_local":"2021-06-03T13:29:00-04:00","da

te_precision":"hour","upcoming":false,"cores":[{"core":"60b800111f83cc1e59f16438","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"89a150ea-6e4b-489f-853c-3603ae684611","id":"5fe3af84b3467846b3242161"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"]},"links":{"patch":{"small":"https://i.imgur.com/Iphd7Aj.png","large":"https://i.imgur.com/X9q44xx.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/n9llxw/sxm8_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/nss9br/rspacex_sxm8_launch_discussion_and_updates_thread/","media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/bgtDRR2F2wA","youtube_id":"bgtDRR2F2wA","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Sirius_XM#Satellites"},"static_fire_date_utc":"2021-06-03T06:32:00.000Z","static_fire_date_unix":1622701920,"net":false,"window":5940,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX launches the second of two next generation satellites for SiriusXM from SLC-40, Cape Canaveral Space Force Station. The spacecraft will be delivered into a sub-synchronous geostationary transfer orbit and will replace XM-4 in geostationary orbit. The booster for this mission will land on an ASDS.","crew":[],"ships":["5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c910","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"],"capsules":[],"payloads":["5fe3b57db3467846b324217a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":130,"name":"SXM-8","date_utc":"2021-06-06T04:26:00.000Z","date_unix":1622953560,"date_local":"2021-06-06T00:26:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a6330279009f","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"edaf9a8d-d67c-4e0e-8452-a37b111581d5","id":"5fe3af6db3467846b3242160"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["60c8c7a45d4819007ea69871"]},"links":{"patch":{"small":"https://i.imgur.com/sZIYIsl.png","large":"https://i.imgur.com/n4PN2ko.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/nuud0l/gps_iii_sv05_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/o0gcnq/rspacex_gps_iii_sv05_launch_discussion_and/","media":null,"recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51254829184_e6e1d0d79c_o.jpg","https://live.staticflickr.com/65535/51253353892_de82b01e23_o.jpg","https://live.staticflickr.com/65535/51254285968_288383ce6e_o.jpg","https://live.staticflickr.com/65535/51254829154_3c5980c086_o.jpg","https://live.staticflickr.com/65535/51253353882_e59ea4df4f_o.jpg","https://live.staticflickr.com/65535/51254829139_ca68c19689_o.jpg","https://live.staticflickr.com/65535/51262926489_9fbce20e9c_o.jpg","https://live.staticflickr.com/65535/51262926469_974292477d_o.jpg","https://live.staticflickr.com/65535/51262179176_e4302db116_o.jpg","https://live.staticflickr.com/65535/51263224735_3210fb7499_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/QJXxVtp3KqI","youtube_id":"QJXxVtp3KqI","article":null,"wikipedia":"https://en.wikipedia.org/wiki/GPS_Block_III"},"static_fire_date_utc":"2021-06-13T19:30:00.000Z","static_fire_date_unix":1623612600,"net":false,"window":900,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s fourth GPS III launch will use the first stage from the previous GPS mission. This will be the first time a National Security Space Launch has flown on a flight proven booster. Falcon 9 will launch from SLC-40, Cape Canaveral and the booster will land downrange on a drone ship. GPS III is the third generation of the U.S. Space Force\'s NAVSTAR Global Positioning System satellites, developed by Lockheed Martin. The GPS III constellation will feature a cross-linked command and control architecture, allowing the entire GPS constellation to be updated simultaneously from a single ground station. A new spot beam capability for enhanced military coverage and increased resistance to hostile jamming will be incorporated.","crew":[],"ships":["60c8c7a45d4819007ea69871","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c910"],"capsules":[],"payloads":["5eb0e4d2b6c3bb0006eeb261"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":131,"name":"GPS III SV05","date_utc":"2021-06-17T16:09:00.000Z","date_unix":1623946140,"date_local":"2021-06-17T12:09:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c5440622a633027900a0","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_succes

s":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":t
rue,"tbd":false,"launch_library_id":"110c808a-a091-47ab-8532-4fa058c1de7a","id":"5eb
87d4effd86e000604b390"},{"fairings":{"reused":true,"recovery_attempt":true,"recovere
d":true,"ships":["60c8c7a45d4819007ea69871"]},"links":{"patch":{"small":"https://img
ur.com/IJWn9pK.png","large":"https://imgur.com/u49XVx4.png"},"reddit":{"campaign":"h
ttps://www.reddit.com/r/spacex/comments/nz7rai/transporter2_launch_campaign_threa
d/","launch":"https://www.reddit.com/r/spacex/comments/o9ki7u/rspacex_transporter2_l
aunch_discussion_and/","media":null,"recovery":"https://www.reddit.com/r/spacex/comm
ents/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"origina
l":["https://live.staticflickr.com/65535/51283430951_a9e5a41141_o.jpg","https://liv
e.staticflickr.com/65535/51283430936_3852120bbe_o.jpg","https://live.staticflickr.co
m/65535/51283604493_d1a088b7c9_o.jpg","https://live.staticflickr.com/65535/512844547
95_591717faee_o.jpg","https://live.staticflickr.com/65535/51284454810_9fdd0e8db4_o.j
pg","https://live.staticflickr.com/65535/51283604443_6d92fe1231_o.jpg","https://liv
e.staticflickr.com/65535/51283604428_b24ebf1b5f_o.jpg","https://live.staticflickr.co
m/65535/51283604438_7202e2a388_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/
sSiuW1HcGjA","youtube_id":"sSiuW1HcGjA","article":null,"wikipedia":null},"static_fir
e_date_utc":"2021-06-22T15:24:00.000Z","static_fire_date_unix":1624375440,"net":fals
e,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detai
ls":"Falcon 9 launches to sun-synchronous polar orbit from Florida as part of SpaceX
\'s Rideshare program dedicated to smallsat customers. The mission lifts off from SL
C-40, Cape Canaveral on a southward azimuth and performs a dogleg maneuver. The boos
ter for this mission is expected to return to LZ-1 based on FCC communications filin
gs. This rideshare takes approximately 90 satellites and hosted payloads into orbit
 on a variety of deployers including three free-flying spacecraft which dispense the
ir customers\' satellites after separation from the SpaceX stack.","crew":[],"ship
s":["60c8c7a45d4819007ea69871"],"capsules":[],"payloads":["608ac397eb3e50044e3630e
7"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":132,"name":"Transporter-
2","date_utc":"2021-06-30T19:31:00.000Z","date_unix":1625081460,"date_local":"2021-0
6-30T15:31:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef6
70f10059c33cee4a826c","flight":8,"gridfins":true,"legs":true,"reused":true,"landing_
attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb
267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":"5d248abe-17ef-43ce
-9c04-aef33af40520","id":"600f9b6d8f798e2a4d5f979f"},{"fairings":null,"links":{"patc
h":{"small":"https://i.imgur.com/ZBUSrcD.png","large":"https://i.imgur.com/yPv13SR.p
ng"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/p67i27/crs23_lau
nch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/pcj0ao/rspa
cex_crs23_launch_docking_discussion_updates/","media":null,"recovery":null},"flick
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s://live.staticflickr.com/65535/51411702573_de10cdbc06_o.jpg","https://live.staticfl
ickr.com/65535/51411435116_ac7b3cc3d1_o.jpg"]},"presskit":null,"webcast":"https://yo
utu.be/x-KiDqxAMU0","youtube_id":"x-KiDqxAMU0","article":null,"wikipedia":"https://e
n.wikipedia.org/wiki/SpaceX_CRS-23"},"static_fire_date_utc":"2021-08-26T02:49:00.000
Z","static_fire_date_unix":1629946140,"net":false,"window":0,"rocket":"5e9d0d95eda69
973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 23rd ISS resupply mis
sion on behalf of NASA, this mission brings essential supplies to the International
 Space Station using the cargo variant of SpaceX\'s Dragon 2 spacecraft. Cargo inclu
des several science experiments. The booster for this mission is expected to land on
an ASDS. The mission will be complete with return and recovery of the Dragon capsule
and down cargo.","crew":[],"ships":["5ea6ed2d080df4000697c904"],"capsules":[],"paylo
ads":["5fe3c4f2b3467846b3242193"],"launchpad":"5e9e4502f509094188566f88","flight_num
ber":133,"name":"CRS-23","date_utc":"2021-08-29T07:14:00.000Z","date_unix":163022124
0,"date_local":"2021-08-29T03:14:00-04:00","date_precision":"hour","upcoming":fals
e,"cores":[{"core":"5f57c53d0622a6330279009f","flight":4,"gridfins":true,"legs":tru
e,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASD
S","landpad":"5e9e3033383ecb075134e7cd"}],"auto_update":true,"tbd":false,"launch_lib
rary_id":"13386512-85bb-4c93-a9b0-f5eac05fbe4f","id":"5fe3b11eb3467846b324216c"},{"f
airings":{"reused":true,"recovery_attempt":null,"recovered":null,"ships":[]},"link
s":{"patch":{"small":"https://imgur.com/BrW201S.png","large":"https://imgur.com/573I

fGk.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/pmn0xm/rspacex_starlink21_launch_discussion_and_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51474853666_be4615e186_o.jpg","https://live.staticflickr.com/65535/51475097383_dcf9002e9c_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/4372QYiPZB4","youtube_id":"4372QYiPZB4","article":"https://spaceflightnow.com/2021/09/14/spacex-launches-first-full-batch-of-laser-equipped-starlink-satellites/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2021-09-02T17:29:00.000Z","static_fire_date_unix":1630603740,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":["5ea6ed30080df4000697c913"],"capsules":[],"payloads":["60e3bf3373359e1e20335c3c"],"launchpad":"5e9e4502f509092b78566f87","flight_number":134,"name":"Starlink-2.1","date_utc":"2021-09-14T03:55:00.000Z","date_unix":1631591700,"date_local":"2021-09-13T20:55:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","flight":10,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"6b9f9fe6-7f94-498b-a664-7c9e42dbe76d","id":"60e3bf0d73359e1e20335c37"},{"fairings":null,"links":{"patch":{"small":"https://i.imgur.com/J1uM5nz.png","large":"https://i.imgur.com/jYYTXwC.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/pc1fq7/inspiration4_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/po651k/rspacex_inspiration4_launch_discussion_updates/","media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/3pv01sSq44w","youtube_id":"3pv01sSq44w","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Inspiration4"},"static_fire_date_utc":"2021-09-13T07:07:00.000Z","static_fire_date_unix":1631516820,"net":false,"window":18000,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Inspiration4 is the world\xe2\x80\x99s first all-civilian mission to space. The mission will be commanded by Jared Isaacman, the 37-year-old founder and Chief Executive Officer of Shift4 Payments and an accomplished pilot and adventurer. Inspiration4 will leave Earth from Kennedy Space Center\xe2\x80\x99s historic Launch Complex 39A, the embarkation point for Apollo and Space Shuttle missions, and travel across a low earth orbit on a multi-day journey that will continually eclipse more than 90% of the earth\xe2\x80\x99s population. Named in recognition of the four-person crew that will raise awareness and funds for St. Jude Children\xe2\x80\x99s Research Hospital, this milestone represents a new era for human spaceflight and exploration.","crew":["607a3a5f5a906a44023e0870","607a3ab45a906a44023e0872","607b48375a906a44023e08b8","607b48da5a906a44023e08b9"],"ships":["5ea6ed2f080df4000697c910","5ee68c683c228f36bd5809b5","614251b711a64135defb3654"],"capsules":["5f6f99fddcfdf403df379709"],"payloads":["607a382f5a906a44023e0867"],"launchpad":"5e9e4502f509094188566f88","flight_number":135,"name":"Inspiration4","date_utc":"2021-09-16T00:02:00.000Z","date_unix":1631750520,"date_local":"2021-09-15T20:02:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c5440622a633027900a0","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"621d64e6-0513-45dc-8ffa-c9fd56518398","id":"607a37565a906a44023e0866"},{"fairings":null,"links":{"patch":{"small":null,"large":null},"reddit":{"campaign":null,"launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":null,"youtube_id":null,"article":null,"wikipedia":null},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["6161d22a6db1a92bfba85357"],"launchpad":"5e9e4502f509094188566f88","flight_number":141,"name":"CRS-24","date_utc":"2021-08-29T07:14:00.000Z","date_unix":1630221240,"date_local":"2021-08-29T03:14:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":null,"flight":null,"gridfins":null,"legs":null,"reused":null,"landing_attempt":null,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"6161d2006db1a92bfba85356"}]'

You should see the response contains massive information about SpaceX launches. Next, let's try to discover some more relevant information for this project.

Task 1: Request and parse the SpaceX launch data using the GET request

To make the requested JSON results more consistent, we will use the following static response object for this project:

In [9]:
```
static_json_url='https://cf-courses-data.s3.us.cloud-object-storage.appdomain.cloud/
```

We should see that the request was successfull with the 200 status response code

In [10]:
```
response.status_code
```

Out[10]:
```
200
```

Now we decode the response content as a Json using `.json()` and turn it into a Pandas dataframe using `.json_normalize()`

In [11]:
```
# Use json_normalize meethod to convert the json result into a dataframe
data = pd.json_normalize(response.json())
```

Using the dataframe `data` print the first 5 rows

In [12]:
```
# Get the head of the dataframe
data.head()
```

Out[12]:

	static_fire_date_utc	static_fire_date_unix	net	window	rocket	success	f
							[{'ti 'a
0	2006-03-17T00:00:00.000Z	1.142554e+09	False	0.0	5e9d0d95eda69955f709d1eb	False	' f

	static_fire_date_utc	static_fire_date_unix	net	window	rocket	success	f
1	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb	False	'a ' 'ha os lea pre shut
2	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb	False	'a 35, ' ' th to b stag st
3	2008-09-20T00:00:00.000Z	1.221869e+09	False	0.0	5e9d0d95eda69955f709d1eb	True	
4	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb	True	

You will notice that a lot of the data are IDs. For example the rocket column has no information about the rocket just an identification number.

We will now use the API again to get information about the launches using the IDs given for each launch. Specifically we will be using columns `rocket`, `payloads`, `launchpad`, and `cores`.

In [13]:
```
# Lets take a subset of our dataframe keeping only the features we want and the flig
data = data[['rocket', 'payloads', 'launchpad', 'cores', 'flight_number', 'date_utc'

# We will remove rows with multiple cores because those are falcon rockets with 2 ex
data = data[data['cores'].map(len)==1]
data = data[data['payloads'].map(len)==1]

# Since payloads and cores are lists of size 1 we will also extract the single value
data['cores'] = data['cores'].map(lambda x : x[0])
data['payloads'] = data['payloads'].map(lambda x : x[0])

# We also want to convert the date_utc to a datetime datatype and then extracting th
data['date'] = pd.to_datetime(data['date_utc']).dt.date

# Using the date we will restrict the dates of the launches
data = data[data['date'] <= datetime.date(2020, 11, 13)]
```

- From the `rocket` we would like to learn the booster name
- From the `payload` we would like to learn the mass of the payload and the orbit that it is going to
- From the `launchpad` we would like to know the name of the launch site being used, the longitude, and the latitude.
- From `cores` we would like to learn the outcome of the landing, the type of the landing, number of flights with that core, whether gridfins were used, whether the core is reused, whether legs were used, the landing pad used, the block of the core which is a number used to seperate version of cores, the number of times this specific core has been reused, and the serial of the core.

The data from these requests will be stored in lists and will be used to create a new dataframe.

In [14]:
```
#Global variables
BoosterVersion = []
PayloadMass = []
Orbit = []
LaunchSite = []
Outcome = []
Flights = []
GridFins = []
Reused = []
```

```
Legs = []
LandingPad = []
Block = []
ReusedCount = []
Serial = []
Longitude = []
Latitude = []
```

These functions will apply the outputs globally to the above variables. Let's take a looks at `BoosterVersion` variable. Before we apply `getBoosterVersion` the list is empty:

In [15]:
```
BoosterVersion
```

Out[15]:
```
[]
```

Now, let's apply `getBoosterVersion` function method to get the booster version

In [16]:
```
# Call getBoosterVersion
getBoosterVersion(data)
```

the list has now been update

In [17]:
```
BoosterVersion[0:5]
```

Out[17]:
```
['Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 9']
```

we can apply the rest of the functions here:

In [18]:
```
# Call getLaunchSite
getLaunchSite(data)
```

In [19]:
```
# Call getPayloadData
getPayloadData(data)
```

In [20]:
```
# Call getCoreData
getCoreData(data)
```

Finally lets construct our dataset using the data we have obtained. We we combine the columns into a dictionary.

In [21]:
```
launch_dict = {'FlightNumber': list(data['flight_number']),
'Date': list(data['date']),
'BoosterVersion':BoosterVersion,
'PayloadMass':PayloadMass,
'Orbit':Orbit,
'LaunchSite':LaunchSite,
'Outcome':Outcome,
```

```
'Flights':Flights,
'GridFins':GridFins,
'Reused':Reused,
'Legs':Legs,
'LandingPad':LandingPad,
'Block':Block,
'ReusedCount':ReusedCount,
'Serial':Serial,
'Longitude': Longitude,
'Latitude': Latitude}
```

Then, we need to create a Pandas data frame from the dictionary launch_dict.

In [25]:
```
# Create a data from launch_dict
launch_df = pd.DataFrame.from_dict(launch_dict)
```

Show the summary of the dataframe

In [26]:
```
# Show the head of the dataframe
launch_df.head()
```

Out[26]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Flights	GridFi
0	1	2006-03-24	Falcon 1	20.0	LEO	Kwajalein Atoll	None None	1	Fal
1	2	2007-03-21	Falcon 1	NaN	LEO	Kwajalein Atoll	None None	1	Fal
2	4	2008-09-28	Falcon 1	165.0	LEO	Kwajalein Atoll	None None	1	Fal
3	5	2009-07-13	Falcon 1	200.0	LEO	Kwajalein Atoll	None None	1	Fal
4	6	2010-06-04	Falcon 9	NaN	LEO	CCSFS SLC 40	None None	1	Fal

Task 2: Filter the dataframe to only include `Falcon 9` launches

Finally we will remove the Falcon 1 launches keeping only the Falcon 9 launches. Filter the data dataframe using the `BoosterVersion` column to only keep the Falcon 9 launches. Save the filtered data to a new dataframe called `data_falcon9` .

In [32]:
```
# Hint data['BoosterVersion']!='Falcon 1'
data_falcon9 = launch_df[launch_df['BoosterVersion'] == 'Falcon 9']
```

Now that we have removed some values we should reset the FlgihtNumber column

In [33]:
```
data_falcon9.loc[:,'FlightNumber'] = list(range(1, data_falcon9.shape[0]+1))
```

```
data_falcon9
```

```
/opt/conda/envs/Python-3.7-OpenCE/lib/python3.7/site-packages/pandas/core/indexing.p
y:966: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/u
ser_guide/indexing.html#returning-a-view-versus-a-copy
  self.obj[item] = s
```

Out[33]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Flights	GridF
4	1	2010-06-04	Falcon 9	NaN	LEO	CCSFS SLC 40	None None	1	Fa
5	2	2012-05-22	Falcon 9	525.0	LEO	CCSFS SLC 40	None None	1	Fa
6	3	2013-03-01	Falcon 9	677.0	ISS	CCSFS SLC 40	None None	1	Fa
7	4	2013-09-29	Falcon 9	500.0	PO	VAFB SLC 4E	False Ocean	1	Fa
8	5	2013-12-03	Falcon 9	3170.0	GTO	CCSFS SLC 40	None None	1	Fa
...	...	...	...	...	...	...	...	...	
89	86	2020-09-03	Falcon 9	15600.0	VLEO	KSC LC 39A	True ASDS	2	T
90	87	2020-10-06	Falcon 9	15600.0	VLEO	KSC LC 39A	True ASDS	3	T
91	88	2020-10-18	Falcon 9	15600.0	VLEO	KSC LC 39A	True ASDS	6	T
92	89	2020-10-24	Falcon 9	15600.0	VLEO	CCSFS SLC 40	True ASDS	3	T
93	90	2020-11-05	Falcon 9	3681.0	MEO	CCSFS SLC 40	True ASDS	1	T

90 rows × 17 columns

Data Wrangling

We can see below that some of the rows are missing values in our dataset.

In [34]:

```
data_falcon9.isnull().sum()
```

Out[34]:

```
FlightNumber       0
Date               0
BoosterVersion     0
PayloadMass        5
Orbit              0
```

```
LaunchSite         0
Outcome            0
Flights            0
GridFins           0
Reused             0
Legs               0
LandingPad        26
Block              0
ReusedCount        0
Serial             0
Longitude          0
Latitude           0
dtype: int64
```

Before we can continue we must deal with these missing values. The `LandingPad` column will retain None values to represent when landing pads were not used.

Task 3: Dealing with Missing Values

Calculate below the mean for the `PayloadMass` using the `.mean()`. Then use the mean and the `.replace()` function to replace `np.nan` values in the data with the mean you calculated.

In [41]:
```
# Calculate the mean value of PayloadMass column
PayloadMass_mean = data_falcon9.PayloadMass.mean()
# Replace the np.nan values with its mean value
data_falcon9['PayloadMass'] = data_falcon9['PayloadMass'].replace(np.nan, PayloadMas
```

```
/opt/conda/envs/Python-3.7-OpenCE/lib/python3.7/site-packages/ipykernel/__main__.py:
4: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/u
ser_guide/indexing.html#returning-a-view-versus-a-copy
```

You should see the number of missing values of the `PayLoadMass` change to zero.

In [42]:
```
data_falcon9.isnull().sum()
```

Out[42]:
```
FlightNumber       0
Date               0
BoosterVersion     0
PayloadMass        0
Orbit              0
LaunchSite         0
Outcome            0
Flights            0
GridFins           0
Reused             0
Legs               0
LandingPad        26
Block              0
ReusedCount        0
Serial             0
```

```
Longitude           0
Latitude            0
dtype: int64
```

Now we should have no missing values in our dataset except for in `LandingPad`.

We can now export it to a **CSV** for the next section,but to make the answers consistent, in the next lab we will provide data in a pre-selected date range.

```
data_falcon9.to_csv('dataset_part\_1.csv', index=False)
```

Authors

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Change Log

Date (YYYY-MM-DD)	Version	Changed By	Change Description
2020-09-20	1.1	Joseph	get result each time you run
2020-09-20	1.1	Azim	Created Part 1 Lab using SpaceX API
2020-09-20	1.0	Joseph	Modified Multiple Areas