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
import requests
# Pandas is a software library written for the Python programming language for d
import pandas as pd
# NumPy is a library for the Python programming language, adding support for lar
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 da
def getBoosterVersion(data):
```

```
    for x in data['rocket']:
       if x:
        response = requests.get("https://api.spacexdata.com/v4/rockets/"+str(x))
        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
def getLaunchSite(data):
    for x in data['launchpad']:
       if x:
         response = requests.get("https://api.spacexdata.com/v4/launchpads/"+str
         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
def getPayloadData(data):
    for load in data['payloads']:
       if load:
        response = requests.get("https://api.spacexdata.com/v4/payloads/"+load).
        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 dat
def getCoreData(data):
    for core in data['cores']:
            if core['core'] != None:
                response = requests.get("https://api.spacexdata.com/v4/cores/"+c
                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_ty
            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,"ship
s":[]},"links":{"patch":{"small":"https://images2.imgbox.com/94/f2/NN6Ph45r_o.pn
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re engine shutdown at T+7 min 30 s, Failed to reach orbit, Failed to recover firs
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orbit and lost due to Falcon 9 boost stage engine failure, ISS visiting vehicle s
afety rules, and the primary payload owner\'s contractual right to decline a seco
nd ignition of the second stage under some conditions.","crew":[],"ships":["5ea6e
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p://www.parabolicarc.com/2013/09/29/falcon-9-launch-payloads-orbit-vandenber
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LEO capacity. Following second-stage separation from the first stage, an attempt
was made to perform an ocean touchdown test of the discarded booster vehicle. The
test provided good test data on the experiment-its primary objective-but as the b
ooster neared the ocean, aerodynamic forces caused an uncontrollable roll. The ce
nter engine, depleted of fuel by centrifugal force, shut down resulting in the im
pact and destruction of the vehicle.","crew":[],"ships":["5ea6ed2d080df4000697c90
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ght.com/2013/12/spacex-falcon-9-v1-1-milestone-ses-8-launch/","wikipedia":"http
s://en.wikipedia.org/wiki/SES-8"},"static_fire_date_utc":"2013-11-22T06:26:00.000
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to fly U.S. military payloads and found that the Thaicom 6 launch had \\"unacceptable fuel reserves at engine cutoff of the stage 2 second burnoff\\"","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bbb6c3bb0006eeb1f0"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":13,"name":"Thaicom 6","date_utc":"2014-01-06T18:06:00.000Z","date_unix":1389031560,"date_local":"2014-01-06T14:06:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289ff3591878603b262f","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":"5eb87ce3ffd86e000604b336"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/ae/3c/yVvE2vVh_o.png","large":"https://images2.imgbox.com/82/c7/bbs0gt88_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/22zo8c","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7615/16670240949_8d43db0e36_o.jpg","https://farm9.staticflickr.com/8597/16856369125_e97cd30ef7_o.jpg","https://farm8.staticflickr.com/7586/16166732954_9338dc859c_o.jpg","https://farm8.staticflickr.com/7603/16855223522_462da54e84_o.jpg","https://farm8.staticflickr.com/7618/16234010894_e1210ec300_o.jpg","https://farm8.staticflickr.com/7617/16855338881_69542a2fa9_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacexcrs-3_presskit_042014.pdf","webcast":"https://www.youtube.com/watch?v=Od-lON4bTyQ","youtube_id":"Od-lON4bTyQ","article":"https://newatlas.com/crs-3-launch-spacex/31671/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-3"},"static_fire_date_utc":"2014-03-08T00:00:00.000Z","static_fire_date_unix":1394236800,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Following second-stage separation, SpaceX conducted a second controlled-descent test of the discarded booster vehicle and achieved the first successful controlled ocean touchdown of a liquid-rocket-engine orbital booster. Following touchdown the first stage tipped over as expected and was destroyed. This was the first Falcon 9 booster to fly with extensible landing legs and the first Dragon mission with the Falcon 9 v1.1 launch vehicle.","crew":[],"ships":["5ea6ed2d080df4000697c902"],"capsules":["5e9e2c5bf3591859a63b2668"],"payloads":["5eb0e4bbb6c3bb0006eeb1f1"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":14,"name":"CRS-3","date_utc":"2014-04-18T19:25:00.000Z","date_unix":1397849100,"date_local":"2014-04-18T15:25:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289ff3591829343b2630","flight":1,"gridfins":false,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce4ffd86e000604b337"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a4/44/YWAUBkOe_o.png","large":"https://images2.imgbox.com/fd/41/FUnfqHHH_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2aany2","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7585/16602893909_1181317089_o.jpg","https://farm9.staticflickr.com/8747/16581738577_83e0690136_o.png","https://farm8.staticflickr.com/7285/16581736047_6fd536ab11_o.jpg","https://farm8.staticflickr.com/7597/16789021675_35f0148f78_o.jpg","https://farm8.staticflickr.com/7631/16236321533_829ae07b42_o.jpg","https://farm9.staticflickr.com/8726/16830422056_26c2265bbc_o.jpg","https://farm9.staticflickr.com/8591/16670149079_33d6cc3631_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_orbcomm_presskit_final.pdf","webcast":"https://www.youtube.com/watch?v=lbHnSu-DLR4","youtube_id":"lbHnSu-DLR4","article":"https://www.orbcomm.com/en/networks/satellite/orbcomm-og2","wikipedia":"https://en.wikipedia.org/wiki/Falcon_9_flight_10"},"static_fire_date_utc":"2015-12-19T04:57:00.000Z","static_fire_date_unix":1450501020,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","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 simulators. This was the second Falcon 9 booster equipped with landing legs. Following second-stage separation, SpaceX conducted a controlled-descent test of the first stage, which successfully decelerated from \xc2\xa0hypersonic velocity in the upper atmosphere, made reentry and landing burns, deployed its legs and touched down on the ocean surface. As with the previous mission, the first stage then tipped over as expected and was not recovered.","cr

ew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bcb6c3bb0006eeb1f2"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":15,"name":"OG-2 Mission 1","date_utc":"2014-07-14T15:15:00.000Z","date_unix":1405350900,"date_local":"2014-07-14T11:15:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f3591870a63b2631","flight":1,"gridfins":false,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce4ffd86e000604b338"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/dd/4d/szidadu8_o.png","large":"https://images2.imgbox.com/60/3f/hwK01Qce_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2fenrv","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm9.staticflickr.com/8638/16855192031_962f7b1113_o.jpg","https://farm8.staticflickr.com/7603/16648925347_769a6009c7_o.jpg","https://farm9.staticflickr.com/8687/16789027675_cde1bd098a_o.jpg","https://farm8.staticflickr.com/7629/16668638138_7acf13cfb5_o.jpg","https://farm8.staticflickr.com/7281/16668845950_7680146525_o.jpg","https://farm8.staticflickr.com/7626/16233865484_10d9925b5d_o.jpg"]},"presskit":"https://spaceflightnow.com/falcon9/011/presskit.pdf","webcast":"https://www.youtube.com/watch?v=essrkMGlw5s","youtube_id":"essrkMGlw5s","article":"http://spacenews.com/41497spacex-launches-first-of-two-satellites-for-asiasat/","wikipedia":"https://en.wikipedia.org/wiki/AsiaSat_8"},"static_fire_date_utc":"2014-07-31T23:35:15.000Z","static_fire_date_unix":1406849715,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bcb6c3bb0006eeb1f3"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":16,"name":"AsiaSat 8","date_utc":"2014-08-05T08:00:00.000Z","date_unix":1407225600,"date_local":"2014-08-05T04:00:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f359186e2e3b2632","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":"5eb87ce5ffd86e000604b339"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/d4/ea/jdJqr6He_o.png","large":"https://images2.imgbox.com/5a/f0/b3TgnmVr_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2fenrv","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7604/16169087563_0e3559ab5b_o.jpg","https://farm9.staticflickr.com/8742/16233828644_96738200b2_o.jpg","https://farm8.staticflickr.com/7645/16601443698_e70315d1ed_o.jpg","https://farm9.staticflickr.com/8730/16830335046_5f017c17be_o.jpg","https://farm9.staticflickr.com/8637/16855040322_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/7b/fb/Mm0LdwGY_o.png","large":"https://images2.imgbox.com/21/13/ps1yJZFD_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/

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ully-launched-rocket-recovery-demo-crash-lands/","wikipedia":"https://en.wikipedi
a.org/wiki/SpaceX_CRS-5"},"static_fire_date_utc":"2014-12-19T00:00:00.000Z","stat
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n, SpaceX performed a test flight which attempted to return the first stage of th
e 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. M
any of the test objectives were achieved, including precision control of the rock
et\'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 contr
ol surfaces used for more precise reentry positioning. The grid fin control syste
m ran out of hydraulic fluid a minute before landing and the landing itself resul
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kr.com/8654/16511594820_451f194d53_o.jpg","https://farm9.staticflickr.com/8603/16673054016_472fb42a20_o.jpg"]},"presskit":"http://www.spacex.com/press/2015/02/11/dscovr-launch-update","webcast":"https://www.youtube.com/watch?v=OvHJSIKP0Hg","youtube_id":"OvHJSIKP0Hg","article":"https://spaceflightnow.com/2015/02/12/space-weather-observatory-blasts-off-after-17-year-wait/","wikipedia":"https://en.wikipedia.org/wiki/Deep_Space_Climate_Observatory"},"static_fire_date_utc":"2015-01-31T00:00:00.000Z","static_fire_date_unix":1422662400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First launch under USAF\'s OSP 3 launch contract. First SpaceX launch to put a satellite to an orbit with an orbital altitude many times the distance to the Moon: Sun-Earth libration point L1. The first stage made a test flight descent to an over-ocean landing within 10 m (33 ft) of its intended target.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c"],"capsules":[],"payloads":["5eb0e4bdb6c3bb0006eeb1f7"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":20,"name":"DSCOVR","date_utc":"2015-02-11T23:03:00.000Z","date_unix":1423695780,"date_local":"2015-02-11T19:03:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f3591885be3b2636","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ceaffd86e000604b33d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/2b/65/8Hd65fHz_o.png","large":"https://images2.imgbox.com/3f/c9/ZczpJ97M_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2x81fc","media":"https://www.reddit.com/r/spacex/comments/2xmumx","recovery":null},"flickr":{"small":[],"original":["https://farm9.staticflickr.com/8749/16788442562_ed460c2d9e_o.jpg","https://farm9.staticflickr.com/8586/16510243060_48d6a9b1f6_o.jpg","https://farm9.staticflickr.com/8641/16490359747_c043b8c61a_o.jpg","https://farm9.staticflickr.com/8636/16510241270_ca83157509_o.jpg","https://farm8.staticflickr.com/7618/16601658850_13b826e705_o.jpg","https://farm9.staticflickr.com/8617/16510041628_883af57512_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/abs-eutelsatfactsheet.pdf","webcast":"https://www.youtube.com/watch?v=mN7lyaCBzT8","youtube_id":"mN7lyaCBzT8","article":"https://www.space.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","static_fire_date_unix":1424891400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"The launch was Boeing\'s first-ever conjoined launch of a lighter-weight dual-commsat stack that was specifically designed to take advantage of the lower-cost SpaceX Falcon 9 launch vehicle. Per satellite, launch costs were less than $30 million. The ABS satellite reached its final destination ahead of schedule and started operations on September 10.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bdb6c3bb0006eeb1f8","5eb0e4bdb6c3bb0006eeb1f9"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":21,"name":"ABS-3A / Eutelsat 115W B","date_utc":"2015-03-02T03:50:00.000Z","date_unix":1425268200,"date_local":"2015-03-02T23:50:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f35918c0893b2637","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":"5eb87ceaffd86e000604b33e"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/75/39/TJU6xWM5_o.png","large":"https://images2.imgbox.com/c7/02/2XvCh1yD_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/32jnyd","media":"https://www.reddit.com/r/spacex/comments/32lw5y","recovery":null},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7624/17170624642_e5949d160e_o.jpg","https://farm8.staticflickr.com/7708/17170624402_f6de506461_o.jpg","https://farm8.staticflickr.com/7658/17170624462_2efc977fee_o.jpg","https://farm8.staticflickr.com/7611/17171659711_42597fefed_o.jpg","https://farm9.staticflickr.com/8774/17170624412_7091dbd04a_o.jpg"]},"presskit":"https://www.nasa.gov/sites/default/files/files/SpaceX_NASA_CRS-6_PressKit.pdf","webcast":"https://www.youtube.com/watch?v=csVpa25iqH0","youtube_id":"csVpa25iqH0","article":"https://spaceflightnow.com/2015/04/14/falcon-9-successfully-launches-descends-to-off-balance-landing/","wikipedia":"https://en.wikiped

ia.org/wiki/SpaceX_CRS-6"},"static_fire_date_utc":"2015-04-11T00:00:00.000Z","sta
tic_fire_date_unix":1428710400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a
809d1ec","success":true,"failures":[],"details":"Following the first-stage boost,
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
stuck throttle valve resulting in a later-than-intended downthrottle.","crew":
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000697c90c","5ea6ed2f080df4000697c90f","5ea6ed30080df4000697c912"],"capsules":["5
e9e2c5cf359188bfb3b266b"],"payloads":["5eb0e4bdb6c3bb0006eeb1fa"],"launchpad":"5e
9e4501f509094ba4566f84","flight_number":22,"name":"CRS-6","date_utc":"2015-04-14T
20:10:00.000Z","date_unix":1429042200,"date_local":"2015-04-14T16:10:00-04:00","d
ate_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f359186d533b263
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e,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb761634e7
cb"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cecffd86
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ps://farm8.staticflickr.com/7691/17324793792_2dd13ea3f3_o.jpg","https://farm8.sta
ticflickr.com/7691/17139094400_b94ce1ff56_o.jpg","https://farm9.staticflickr.com/
8739/17140415959_38b5ee8bc6_o.jpg","https://farm8.staticflickr.com/7735/167041925
74_e3a0a6fac2_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/space
xthalesfactsheet_final.pdf","webcast":"https://www.youtube.com/watch?v=nBwAYT_ogj
4","youtube_id":"nBwAYT_ogj4","article":"https://spaceflightnow.com/2015/04/28/fa
lcon-9-rocket-powers-into-space-with-satellite-for-turkmenistan/","wikipedia":"ht
tps://en.wikipedia.org/wiki/T%C3%BCrkmen%C3%84lem_52%C2%B0E_/_MonacoSAT"},"static
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9","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":fals
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s://www.reddit.com/r/spacex/comments/3berj3","recovery":null},"flickr":{"small":
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ymhcTtSQ","article":"https://spaceflightnow.com/2015/06/28/falcon-9-rocket-destro
yed-in-launch-mishap/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-
7"},"static_fire_date_utc":"2015-06-26T05:00:00.000Z","static_fire_date_unix":143
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e,"failures":[{"time":139,"altitude":40,"reason":"helium tank overpressure lead t
o the second stage LOX tank explosion"}],"details":"Launch performance was nomina
l until an overpressure incident in the second-stage LOX tank, leading to vehicle
breakup at T+150 seconds. The Dragon capsule survived the explosion but was lost
upon splashdown because its software did not contain provisions for parachute dep
loyment on launch vehicle failure.","crew":[],"ships":["5ea6ed2e080df4000697c90
6","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c"],"capsules":["5e9e2c5cf3
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n 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/7f/15/rjv54Es5_o.png","large":"https://images2.imgbox.com/c9/7f/EQ1g4Iv2_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/72/1e/mA23xHqe_o.png","large":"https://images2.imgbox.com/36/d8/RyPKsTpC_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/4dtoly","media":"https://www.reddit.com/r/spacex/comments/4dtpxn/","recovery":"https://www.reddit.com/r/spacex/comments/4ee2zy"},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1633/25788014884_6a3f9ae183_o.jpg","https://farm2.staticflickr.com/1650/26300505022_8b8b9035e8_o.jpg","https://farm2.staticflickr.com/1486/25787998624_3ca213be1e_o.jpg","https://farm2.staticflickr.com/1450/26326628031_e1b08ec0b3_o.jpg","https://farm2.staticflickr.com/1670/26239020092_05e5e4c538_o.jpg","https://farm2.staticflickr.com/1709/26305479266_76b4d01caf_o.jpg","https://farm2.staticflickr.com/1645/26239017922_28c7ac50e0_o.jpg","https://farm2.staticflickr.com/1559/26288402056_6c5997ce66_o.jpg","https://farm2.staticflickr.com/1449/25709481274_60f8c77358_o.jpg","https://farm2.staticflickr.com/1

671/26217360302_b66c3e384e_o.jpg","https://farm2.staticflickr.com/1704/26283822056_838c1103b9_o.jpg","https://farm2.staticflickr.com/1508/26217345472_118767c608_o.jpg","https://farm2.staticflickr.com/1495/25916886442_821a152917_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_crs8_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=7pUAydjne5M","youtube_id":"7pUAydjne5M","article":"https://spaceflightnow.com/2016/04/08/spacex-lands-rocket-on-floating-platform-after-station-resupply-launch/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-8"},"static_fire_date_utc":"2016-04-05T00:00:00.000Z","static_fire_date_unix":1459814400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Dragon carried over 1500 kg of supplies and delivered (stowed in its trunk) the inflatable Bigelow Expandable Activity Module (BEAM) to the ISS for two years of in-orbit tests. 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/7a/90/Zdo2mijx_o.png","large":"https://images2.imgbox.com/2a/47/az2sxGIB_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"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":29,"name":"JCSAT-2B","date_utc":"2016-05-06T05:21:00.000Z","date_unix":1462512060,"date_local":"2016-05-06T01:21:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f35918077b3b263f","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":"5eb87cf5ffd86e000604b346"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/fa/f2/iR1eKXrX_o.png","large":"https://images2.imgbox.com/84/d

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ps://www.reddit.com/r/spacex/comments/4l4af1","recovery":"https://www.reddit.com/
r/spacex/comments/4lz2y6"},"flickr":{"small":[],"original":["https://farm8.static
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pg","https://farm8.staticflickr.com/7717/26812758364_74569b4327_o.jpg","https://f
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ow.com/2016/05/27/spacex-logs-successful-late-afternoon-launch-for-thaicom/","wik
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ufactured by Orbital ATK, the 3,100-kilogram (6,800 lb) Thaicom 8 communications
satellite will serve Thailand, India and Africa from the 78.5\xc2\xb0 East geosta
tionary location. It is equipped with 24 active Ku-band transponders.","crew":
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l":"2016-05-27T17:39:00-04:00","date_precision":"hour","upcoming":false,"cores":
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ully-fires-satellites-into-orbit-but-loses-booster-on-landing/","wikipedia":"http
s://en.wikipedia.org/wiki/ABS_(satellite_operator)"},"static_fire_date_utc":"2016
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year after pioneering this technique on flight 16, Falcon again launched two Boei
ng 702SP gridded ion thruster satellites in a dual-stack configuration, with the
two customers sharing the rocket and mission costs. First stage landing attempt o
n drone ship failed on landing due to low thrust on one of the three landing engi
nes.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5
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e 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://images2.imgbox.com/0d/5b/8X01C3ov_o.png","large":"https://images2.imgbox.com/ff/19/KCI4DV1a_o.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/89/2a/bkI6LN0R_o.png","large":"https://images2.imgbox.com/24/c3/9MKjvOdD_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-launch-for-iridium/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_ut

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r","upcoming":false,"cores":[{"core":"5e9e28a2f359182d0b3b263e","flight":2,"gridf
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ssfully-launches-nrol-76-u-s-military-satellite/","wikipedia":"https://en.wikiped
ia.org/wiki/List_of_NRO_launches"},"static_fire_date_utc":"2017-04-25T19:02:00.00
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o contract launch services for classified payloads. Second-stage speed and altitu
de telemetry were omitted from the launch webcast, which displayed first-stage te
lemetry instead, with continuous tracking of the booster from liftoff to landing
for the first time.","crew":[],"ships":["5ea6ed2f080df4000697c90c"],"capsules":
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rsat#Satellites"},"static_fire_date_utc":"2017-05-11T16:45:00.000Z","static_fire_
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oad launched to GTO by a Falcon 9 rocket. The launch was originally scheduled for
the Falcon Heavy, but performance improvements allowed the mission to be carried

out by an expendable Falcon 9 instead.","crew":[],"ships":[],"capsules":[],"paylo
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x/files/crs11presskit.pdf","webcast":"https://www.youtube.com/watch?v=JuZBOUMsYw
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used-dragon-cargo-capsule-launched-on-journey-to-space-station/","wikipedia":"htt
ps://en.wikipedia.org/wiki/SpaceX_CRS-11"},"static_fire_date_utc":"2017-05-28T16:
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ivered the Neutron Star Interior Composition Explorer (NICER) to the ISS, along w
ith the MUSES Earth imaging platform and ROSA solar array. For the first time, th
is mission launched a refurbished Dragon capsule, serial number C106 which first
flew in September 2014 on the CRS-4 mission. Originally scheduled to launch on Ju
ne 1, but was scrubbed due to inclement weather.","crew":[],"ships":["5ea6ed30080
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t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Due to the constraints of sending a heavy satellite (~6,000 kg) to GTO, the rocket will fly in its expendable configuration and the first-stage booster will not be recovered.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c4b6c3bb0006eeb211"],"launchpad":"5e9e4502f509094188566f88","flight_number":44,"name":"Intelsat 35e","date_utc":"2017-07-05T23:35:00.000Z","date_unix":1499297700,"date_local":"2017-07-05T19:35:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591850cc3b264c","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":"5eb87d06ffd86e000604b355"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/ee/85/dtsbOs0E_o.png","large":"https://images2.imgbox.com/9c/f7/BNIV5kBE_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/6mrga2/crs12_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/6tfcio/welcome_to_the_rspacex_crs12_official_launch/","media":"https://www.reddit.com/r/spacex/comments/6th2nf/rspacex_crs12_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4352/36438808381_733603843d_o.jpg","https://farm5.staticflickr.com/4434/35760634184_f75457493b_o.jpg","https://farm5.staticflickr.com/4418/35741466074_327e9d0a80_o.jpg","https://farm5.staticflickr.com/4414/35741465934_db82541cf3_o.jpg","https://farm5.staticflickr.com/4384/35741465854_e264864537_o.jpg","https://farm5.staticflickr.com/4333/35741465714_d0a8800533_o.jpg","https://farm5.staticflickr.com/4397/35741465464_1d49cc1cae_o.jpg","https://farm5.staticflickr.com/4354/35762350653_d94b2b5b07_o.jpg","https://farm5.staticflickr.com/4353/36571921725_2a0be4ec58_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/crs12presskit.pdf","webcast":"https://www.youtube.com/watch?v=vLxWsYx8dbo","youtube_id":"vLxWsYx8dbo","article":"https://spaceflightnow.com/2017/08/17/photos-falcon-9-rocket-soars-into-space-lands-back-at-cape-canaveral/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-12"},"static_fire_date_utc":"2017-08-10T13:10:00.000Z","static_fire_date_unix":1502370600,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Dragon is expected to carry 2,349 kg (5,179 lb) of pressurized mass and 961 kg (2,119 lb) unpressurized. 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/fd/09/Z1wlUv4U_o.png","large":"https://images2.imgbox.com/5e/95/HLIEaJlQ_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":150
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rue,"failures":[],"details":"Formosat-5 is an Earth observation satellite of the
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d from the cargo manifest of this mission. The satellite has a mass of only 475 k
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mooth-launch-of-militarys-x-37b-spaceplane/","wikipedia":"https://en.wikipedia.or
g/wiki/Boeing_X-37"},"static_fire_date_utc":"2017-08-31T20:30:00.000Z","static_fi
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-and-lands-third-rocket-in-three-weeks/","wikipedia":"https://en.wikipedia.org/wi
ki/Koreasat_5A"},"static_fire_date_utc":"2017-10-26T16:00:00.000Z","static_fire_d
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thern India, Southeast Asia, the Philippines, Guam, Korea, and Japan. The satelli
te will be placed in GEO at 113\xc3\x82\xc2\xb0 East Longitude, and will provide
services ranging from broadband internet to broadcasting services and maritime co
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cle":"https://spaceflightnow.com/2017/12/15/spacexs-50th-falcon-rocket-launch-kic
ks-off-station-resupply-mission/","wikipedia":"https://en.wikipedia.org/wiki/Spac
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d3Q","article":"https://spaceflightnow.com/2017/12/23/spacex-launch-dazzles-deliv
ering-10-more-satellites-for-iridium/","wikipedia":"https://en.wikipedia.org/wik
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tnow.com/2018/01/08/spacex-kicks-off-ambitious-2018-schedule-with-launch-for-u-s-
government/","wikipedia":"https://en.wikipedia.org/wiki/Zuma_(satellite)"},"stati
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nniversary-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:
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rom the classified NROL-76 mission in May 2017. Following a successful experiment
al ocean landing that used three engines, the booster unexpectedly remained intac
t; Elon Musk stated in a tweet that SpaceX will attempt to tow the booster to sho
re.","crew":[],"ships":["5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5e
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jn87zBs_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7h
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43096241_0324643b5e_o.jpg","https://farm5.staticflickr.com/4702/40110298232_4e9c4
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Y1c","youtube_id":"wbSwFU6tY1c","article":"https://spaceflightnow.com/2018/02/07/
spacex-debuts-worlds-most-powerful-rocket-sends-tesla-toward-the-asteroid-bel
t/","wikipedia":"https://en.wikipedia.org/wiki/Elon_Musk%27s_Tesla_Roadster"},"st
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d. Final burn to heliocentric mars-earth orbit was successful after the second st
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l/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":"5eb87d16ffd86e000604b363"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/49/e8/6Tmdhwlq_o.png","large":"https://images2.imgbox.com/28/c4/dc3rQbGy_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/82op7a/crs14_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/88s8a7/rspacex_crs14_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/88l52i/rspacex_crs14_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/819/26326005987_c3aec29db5_o.jpg","https://farm1.staticflickr.com/791/40303273215_4926c917c4_o.jpg","https://farm1.staticflickr.com/867/26326007227_39e71e6775_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/crs-14presskit2018.pdf","webcast":"https://www.youtube.com/watch?v=BPQHG-LevZM","youtube_id":"BPQHG-LevZM","article":"https://spaceflightnow.com/2018/04/02/spacex-supply-ship-departs-cape-canaveral-for-space-station/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-14"},"static_fire_date_utc":"2018-03-28T15:52:00.000Z","static_fire_date_unix":1522252320,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"The launch used a refurbished booster (from CRS-12) for the 11th time, and a refurbished capsule (C110 from CRS-8) for the third time. 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/4d/55/TQjhUrc7_o.png","large":"https://images2.imgbox.com/22/84/wfppRwXb_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/commen

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4/19/all-sky-surveyor-launched-from-cape-canaveral-on-the-hunt-for-exoplanet
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rue,"failures":[],"details":"Part of the Explorers program, this space telescope
is intended for wide-field search of exoplanets transiting nearby stars. It is th
e first NASA high priority science mission launched by SpaceX. It was the first t
ime SpaceX launched a scientific satellite not primarily intended for Earth obser
vations. The second stage placed it into a high-Earth elliptical orbit, after whi
ch 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 Catego
ry 2 certification of its Falcon 9 \'Full Thrust\', certification which is requir
ed 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 exper
imental water landing was performed in order to attempt fairing recovery.","cre
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com/2018/05/11/spacex-debuts-an-improved-human-rated-model-of-the-falcon-9-rocke
t/","wikipedia":"https://en.wikipedia.org/wiki/Bangabandhu-1"},"static_fire_date_
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04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359182

b023b2656","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/c8/01/ijWT6oSs_o.png","large":"https://images2.imgbox.com/e9/61/9dF2ELMJ_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,"date_local":"2018-05-22T12:47:58-08:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f35918345e3b2652","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":"5eb87d1affd86e000604b367"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/fa/c4/37mkd4wY_o.png","large":"https://images2.imgbox.com/9f/0c/0KIBjMfe_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/8jv0ed/ses12_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/8o9woj/rspacex_ses12_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/8oa3k4/rspacex_ses12_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1752/41664024035_14c81a25e3_o.jpg","https://farm2.staticflickr.com/1731/27695627527_d9d5bca0ae_o.jpg","https://farm2.staticflickr.com/1735/27695627327_ed66c7282c_o.jpg","https://farm2.staticflickr.com/1752/27695627417_38ea7d7acf_o.jpg","https://farm2.staticflickr.com/1733/41664023935_e9e8120690_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/ses-12missionpress_kit_6.2.18.pdf","webcast":"https://www.youtube.com/watch?v=2hcM5hqQ45s","youtube_id":"2hcM5hqQ45s","article":"https://spaceflightnow.com/2018/06/04/multi-mission-telecom-craft-launched-by-spacex-for-ses/","wikipedia":"https://en.wikipedia.org/wiki/SES-12"},"static_fire_date_utc":"2018-05-25T01:48:00.000Z","static_fire_date_unix":1527212880,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SES-12, the replacement satellite for NSS-6, was successfully launched and deployed on June 4th, completing SpaceX\'s eleventh flight 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 the Asia-Pacific region, including rapidly growing markets such as India and Indonesia. [SES-12] will be co-located with SES-8","crew":[],"ships":["5ea6ed2e080df4000697c90a"],"capsules":[],"payloads":["5eb0e4c8b6c3bb0006eeb226"],"launchpa

d":"5e9e4501f509094ba4566f84","flight_number":63,"name":"SES-12","date_utc":"2018
-06-04T04:45:00.000Z","date_unix":1528087500,"date_local":"2018-06-04T00:45:00-0
4:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591845
123b264f","flight":2,"gridfins":false,"legs":false,"reused":true,"landing_attemp
t":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_updat
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5_o.png","large":"https://images2.imgbox.com/15/3c/W0LEnrZx_o.png"},"reddit":{"ca
mpaign":"https://www.reddit.com/r/spacex/comments/8pua1m/crs15_launch_campaign_th
read/","launch":"https://www.reddit.com/r/spacex/comments/8ugo3l/rspacex_crs15_of
ficial_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/commen
ts/8ujcwo/rspacex_crs15_media_thread_videos_images_gifs/","recovery":null},"flick
r":{"small":[],"original":["https://farm1.staticflickr.com/836/42374725204_dae09d
b889_o.jpg","https://farm2.staticflickr.com/1781/41281636860_71dca92ab4_o.jpg","h
ttps://farm2.staticflickr.com/1829/42374725534_325e676d19_o.jpg","https://farm2.s
taticflickr.com/1810/42374724974_e50b050403_o.jpg","https://farm1.staticflickr.co
m/843/41281636620_437528bd1f_o.jpg","https://farm2.staticflickr.com/1790/41281637
670_f6a6a2cf6c_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/crs1
5presskit.pdf","webcast":"https://www.youtube.com/watch?v=ycMagB1s8XM","youtube_i
d":"ycMagB1s8XM","article":"https://spaceflightnow.com/2018/06/29/spacex-launches
-ai-enabled-robot-companion-vegetation-monitor-to-space-station/","wikipedia":"ht
tps://en.wikipedia.org/wiki/SpaceX_CRS-15"},"static_fire_date_utc":"2018-06-23T2
1:30:00.000Z","static_fire_date_unix":1529789400,"net":false,"window":0,"rocke
t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Payload inc
luded MISSE-FF 2, ECOSTRESS, and a Latching End Effector. The refurbished booster
featured a record 2.5 months period turnaround from its original launch of the TE
SS satellite \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 with
out landing legs and grid fins.","crew":[],"ships":["5ea6ed30080df4000697c91
2"],"capsules":["5e9e2c5cf359183bb73b266e"],"payloads":["5eb0e4c8b6c3bb0006eeb22
7"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":64,"name":"CRS-15","da
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ding_attempt":false,"landing_success":null,"landing_type":null,"landpad":nul
l}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d1cffd86e0
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e,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/2b/de/2CF8Q4B
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ign_thread/","launch":"https://www.reddit.com/r/spacex/comments/90p1a6/rspacex_te
lstar_19v_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/c
omments/90oxrr/rspacex_telstar_19v_media_thread_videos_images/","recovery":nul
l},"flickr":{"small":[],"original":["https://farm1.staticflickr.com/856/286845501
47_49802752b3_o.jpg","https://farm1.staticflickr.com/927/28684552447_956a9744f1_
o.jpg","https://farm2.staticflickr.com/1828/29700007298_8ac5891d2c_o.jpg","http
s://farm1.staticflickr.com/914/29700004918_31ed7b73ef_o.jpg","https://farm1.stati
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files/telstar19vantagepresskit.pdf","webcast":"https://www.youtube.com/watch?v=xy
bp6zLaGx4","youtube_id":"xybp6zLaGx4","article":"https://spaceflightnow.com/2018/
07/22/spacex-delivers-for-telesat-with-successful-early-morning-launch/","wikiped
ia":"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,"r
ocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SSL-man
ufactured communications satellite intended to be placed at 63\xc2\xb0 West over
the Americas. At 7,075 kg, it became the heaviest commercial communications satel
lite ever launched.","crew":[],"ships":["5ea6ed2e080df4000697c90a","5ea6ed2f080df
4000697c90b","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":
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4","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/b4/96/LRfRepkO_o.png","large":"https://images2.imgbox.com/e6/10/oZPCNx0m_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":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d1fffd86e000604b36b"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/46/b2/NUQmyHR4_o.png","large":"https://images2.imgbox.com/9e/eb/uGUYOYfZ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/91gwfg/merah_putih_telkom4_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/9539nr/rspacex_merah_putih_telkom4_official_launch/","media":"https://www.reddit.com/r/spacex/comments/94zr0b/rspacex_merah_putih_media_thread_videos_images/","recovery":null},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1798/43862495212_8fe1688c4b_o.jpg","https://farm1.staticflickr.com/935/43006330655_f1623a3fa1_o.jpg","https://farm1.staticflickr.com/938/28974313177_d16381ff5f_o.jpg","https://farm2.staticflickr.com/1780/43006334045_fb7b4a8714_o.jpg","https://farm1.staticflickr.com/929/28974335747_ffd87ff274_o.jpg","https://farm1.staticflickr.com/930/30041972208_f735b9690b_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/merahputihpresskit.pdf","webcast":"https://www.youtube.com/watch?v=FjfQNBYv2IY","youtube_id":"FjfQNBYv2IY","article":"https://spaceflightnow.com/2018/08/07/indonesian-communications-satellite-deployed-in-orbit-by-spacex/","wikipedia":"https://en.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":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s fifteenth flight of 2018 launched the Merah Putih (also known as Telkom-4) geostationary communications 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 recovered and is expected to become the

first Falcon 9 booster to fly three missions.","crew":[],"ships":["5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":67,"name":"Merah Putih","date_utc":"2018-08-07T05:18:00.000Z","date_unix":1533619080,"date_local":"2018-08-07T01:18:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359182b023b2656","flight":2,"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":"5eb87d20ffd86e000604b36c"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/55/54/73EXeMfo_o.png","large":"https://images2.imgbox.com/fd/59/nv3Ih3Am_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/95cte4/telstar_18v_apstar_5c_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/9e7bmq/rspacex_telstar_18v_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/9ebkqw/rspacex_telstar_18v_media_thread_videos_images/","recovery":"https://www.reddit.com/r/spacex/comments/9erxlh/telstar_18_vantage_recovery_thread/"},"flickr":{"small":[],"original":["https://farm2.staticflickr.com/1878/43690848045_492ef182dd_o.jpg","https://farm2.staticflickr.com/1856/43881229604_6d42e838b6_o.jpg","https://farm2.staticflickr.com/1852/43881223704_93777e34af_o.jpg","https://farm2.staticflickr.com/1841/43881217094_558b7b214e_o.jpg","https://farm2.staticflickr.com/1869/43881193934_423eff8c86_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/telstar18vantagepresskit.pdf","webcast":"https://www.youtube.com/watch?v=Apw3xqwsG1U","youtube_id":"Apw3xqwsG1U","article":"https://spaceflightnow.com/2018/09/10/spacex-telesat-achieve-repeat-success-with-midnight-hour-launch/","wikipedia":"https://en.wikipedia.org/wiki/Telstar_18V"},"static_fire_date_utc":"2018-09-05T07:21:00.000Z","static_fire_date_unix":1536132060,"net":false,"window":14400,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s sixteenth flight of 2018 launched the Telstar 18v GEO communication satellite for Telesat, the second launch for the canadian company in a few months. The first stage was a new Falcon 9 V1.2 Block 5 which was successfully recovered on OCISLY.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90d","5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":68,"name":"Telstar 18V","date_utc":"2018-09-10T04:45:00.000Z","date_unix":1536554700,"date_local":"2018-09-10T00:45:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","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":"5eb87d22ffd86e000604b36d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/cb/41/RQIY0BjQ_o.png","large":"https://images2.imgbox.com/df/2c/DsfygPln_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 sa

tellite constellation of the Argentine Space Agency CONAE. The second launch of S
aocom 1B will happen in 2019. This flight marked the first RTLS launch out of Van
denberg, with a landing on the concrete pad at SLC-4W, very close to the launch p
ad.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22
c"],"launchpad":"5e9e4502f509092b78566f87","flight_number":69,"name":"SAOCOM 1
A","date_utc":"2018-10-08T02:22:00.000Z","date_unix":1538965320,"date_local":"201
8-10-07T19:22:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"cor
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e,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpa
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w.reddit.com/r/spacex/comments/9xaa76/rspacex_eshail_2_media_thread_videos_images
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very_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4
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ress_kit_11_14_2018.pdf","webcast":"https://www.youtube.com/watch?v=PhTbzc-BqKs&f
eature=youtu.be","youtube_id":"PhTbzc-BqKs","article":"https://spaceflightnow.co
m/2018/11/15/spacex-launches-qatars-eshail-2-communications-satellite/","wikipedi
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\'s eighteenth flight of 2018 was its first for Es\'hailSat. Es\'hail-2 is a comm
unications satellite delivering television and internet to Qatar and the surround
ing region. It was launched into a geostationary transfer orbit from LC-39A at Ke
nnedy Space Center. The booster landed on OCISLY.","crew":[],"ships":["5ea6ed2f08
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e,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landin
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l_launch_discussion_updates/","media":"https://old.reddit.com/r/spacex/comments/a
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icflickr.com/4870/44460659210_de634098ac_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/ssoa_press_kit.pdf","webcast":"https://www.youtube.com/watch?v=Wq8kS6UoOrQ","youtube_id":"Wq8kS6UoOrQ","article":"https://spaceflightnow.com/2018/12/03/spacex-launches-swarm-of-satellites-re-flies-rocket-for-third-time/","wikipedia":"https://en.wikipedia.org/wiki/Spaceflight_Industries"},"static_fire_date_utc":"2018-11-15T21:55:00.000Z","static_fire_date_unix":1542318900,"net":false,"window":1680,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s nineteenth flight of 2018 will fly SSO-A: SmallSat Express out of Vandenberg SLC-4E for Spaceflight. SSO-A is a rideshare to sun synchronus low earth orbit 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 missions. ","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c912","5ea6ed30080df4000697c914","5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb22e"],"launchpad":"5e9e4502f509092b78566f87","flight_number":71,"name":"SSO-A","date_utc":"2018-12-03T18:34:00.000Z","date_unix":1543861920,"date_local":"2018-12-03T10:34:00-08:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359182b023b2656","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":null,"id":"5eb87d25ffd86e000604b370"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/f0/a6/oNKZP5Hu_o.png","large":"https://images2.imgbox.com/ee/c6/MkvXHhu1_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/9z7i4j/crs16_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/a2oubw/rspacex_crs16_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/a2uojp/rspacex_crs16_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/a3n3vm/crs16_emergency_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4835/45473442624_69ee8bee45_o.jpg","https://farm5.staticflickr.com/4903/45473443604_0d668c31da_o.jpg","https://farm5.staticflickr.com/4858/45473444314_413a344dcb_o.jpg","https://farm5.staticflickr.com/4856/45473445134_d9384878f8_o.jpg","https://farm5.staticflickr.com/4840/45473446114_7d5e5d6fe2_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/crs16_press_kit_12_4.pdf","webcast":"https://www.youtube.com/watch?v=Esh1jHT9oTA","youtube_id":"Esh1jHT9oTA","article":"https://spaceflightnow.com/2018/12/05/spacex-falcon-9-boosts-dragon-cargo-ship-to-orbit-first-stage-misses-landing-target/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-16"},"static_fire_date_utc":"2018-11-30T19:57:00.000Z","static_fire_date_unix":1543607820,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 16th Crew Resupply Mission on behalf of NASA, with a total of 20 contracted flights. 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/3c/2f/tL7xDUD6_o.png","large":"https://images2.imgbox.com/f9/31/MGTnAfuR_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":

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pacex/comments/assxjz/rspacex_psnvi_official_launch_discussion_updates/","medi
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U","article":"https://spaceflightnow.com/2019/02/22/israeli-moon-lander-hitches-r
ide-on-spacex-launch-with-indonesian-comsat/","wikipedia":"https://en.wikipedia.o
rg/wiki/PT_Pasifik_Satelit_Nusantara"},"static_fire_date_utc":"2019-02-18T17:03:0
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h this rideshare to GTO for Space Systems Loral (SSL). The primary payload for th
is mission is Nusantara Satu, a communications satellite built by SSL for the pri
vate Indonesian company PT Pasifik Satelit Nusantara (PSN). Spaceflight Industrie
s\' GTO-1 mission consists of two secondary payloads. One of those is Beresheet,
the lunar lander built by the Israeli non-profit organization, SpaceIL. Beresheet
will make its own way to the moon from GTO. The other secondary is Air Force Rese
arch Lab\'s (Space Situational Awareness) S5 mission, which hitches a ride to GEO
aboard Nusantara Satu. This mission launches from SLC-40 at Cape Canaveral AFS. T
he booster is expected to land on OCISLY.","crew":[],"ships":["5ea6ed30080df40006
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t_number":75,"name":"Nusantara Satu (PSN-6) / S5 / Beresheet","date_utc":"2019-02
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very/"},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7899/396
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w.spacex.com/sites/spacex/files/crew_demo-1_press_kit.pdf","webcast":"https://you
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om/2019/03/02/spacex-launches-first-crew-dragon-ferry-ship/","wikipedia":"http
s://en.wikipedia.org/wiki/SpX-DM1"},"static_fire_date_utc":"2019-01-24T19:03:00.0
00Z","static_fire_date_unix":1548356580,"net":false,"window":0,"rocket":"5e9d0d95
eda69973a809d1ec","success":true,"failures":[],"details":"Demonstration Mission 1
(DM-1) will launch Dragon 2 as part of NASA\'s Commercial Crew Transportation Cap
ability program. This mission will demonstrate Dragon 2, and Falcon 9 in its conf
iguration for crewed missions. DM-1 will launch from LC-39A at Kennedy Space Cent

er, 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/14/18/JxCyAHXk_o.png","large":"https://images2.imgbox.com/9f/c3/GvLfwIfg_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":"5e9e28a6f359188fd53b265e","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb90a834e7c8"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d2dffd86e000604b376"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/97/8e/YbVKIUZB_o.png","large":"https://images2.imgbox.com/0d/05/zH7YqLRe_o.png"},"reddit":{"campaign":"https://new.reddit.com/r/spacex/comments/bd2l28/crs17_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/bjsn0v/rspacex_crs17_official_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/comments/bkc4d5/rspacex_crs17_media_thread_videos_images_gifs","recovery":"https://www.reddit.com/r/spacex/comments/bjy7p5/rspacex_crs17_recovery_discussion_updates_thread"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/46856594435_206c773b5a_o.jpg","https://live.staticflickr.com/65535/4

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indow":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detail
s":"SpaceX\'s 18th Commercial Resupply Services mission out of a total of 20 such
contracted flights for NASA, this launch will deliver essential supplies to the I
nternational Space Station using the reusable Dragon 1 cargo spacecraft. The exte
rnal payload for this mission is International Docking Adapter 3, replacing IDA-1
lost in SpaceX\'s CRS-7 launch failure. This mission will launch from SLC-40 at C
ape Canaveral AFS on a Falcon 9, and the first-stage booster is expected to land
back at CCAFS LZ-1.","crew":[],"ships":[],"capsules":["5e9e2c5cf359188bfb3b266
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s://live.staticflickr.com/65535/48478120646_ab72c2c6c3_o.jpg","https://live.stati

cflickr.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://images2.imgbox.com/61/a6/1MnnbXIF_o.png","large":"https://images2.imgbox.com/3a/d1/R1MaGiiV_o.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/5d/26/ZP75Il1j_o.png","large":"https://images2.imgbox.com/6e/76/jVcSQg0K_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_of

ficial_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/2c/03/fMLdgNQ4_o.png","large":"https://images2.imgbox.com/73/e2/4I3Os6n7_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":true,"landing_attempt":true,"landing_success":tru

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n will launch the second batch of Starlink version 1.0 satellites, from SLC-40, C
ape Canaveral AFS. They are expected to contribute to the 550 km x 53\xc2\xb0 she
ll. It is the third Starlink launch overall. Starlink is a low Earth orbit broadb
and internet constellation developed and owned by SpaceX which will eventually co
nsist of nearly 12 000 satellites and will provide low latency internet service t
o ground terminals around the world. The booster for this mission is expected to
land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed30080df4000
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9/spacex-aces-final-major-test-before-first-crew-mission","wikipedia":"https://e
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amic 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 Searcher after s
plashdown in the Atlantic Ocean. This flight does not go to orbit. The booster an

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boosts-60-more-starlink-satellites-into-orbit-after-weather-delays/","wikipedi
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ssion will launch the third batch of Starlink version 1.0 satellites, from SLC-4
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ill be delivered to low Earth orbit and will spend a few weeks maneuvering to the
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nd on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df400069
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ink_press_kit.pdf","webcast":"https://youtu.be/8xeX62mLcf8","youtube_id":"8xeX62m
Lcf8","article":"https://spaceflightnow.com/2020/02/17/spacex-delivers-more-starl
ink-satellites-to-orbit-booster-misses-drone-ship-landing/","wikipedia":"https://
en.wikipedia.org/wiki/SpaceX_Starlink"},"static_fire_date_utc":"2020-02-14T08:31:
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veral AFS. It is the fifth Starlink launch overall. The satellites will be delive
red to low Earth orbit and will spend a few weeks maneuvering to their operationa
l altitude of 550 km. The booster for this mission is expected to land on OCISL
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com/sites/spacex/files/crs-20_mission_press_kit.pdf","webcast":"https://youtu.be/
1MkcWK2PnsU","youtube_id":"1MkcWK2PnsU","article":"https://spaceflightnow.com/202
0/03/07/late-night-launch-of-spacex-cargo-ship-marks-end-of-an-era/","wikipedi
a":"https://en.wikipedia.org/wiki/SpaceX_CRS-20"},"static_fire_date_utc":"2020-03
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ket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s
20th and final Crew Resupply Mission under the original NASA CRS contract, this m
ission brings essential supplies to the International Space Station using SpaceX
\'s reusable Dragon spacecraft. It is the last scheduled flight of a Dragon 1 cap
sule. (CRS-21 and up under the new Commercial Resupply Services 2 contract will u
se Dragon 2.) The external payload for this mission is the Bartolomeo ISS externa
l payload hosting platform. Falcon 9 and Dragon will launch from SLC-40, Cape Can
averal Air Force Station and the booster will land at LZ-1. The mission will be c
omplete with return and recovery of the Dragon capsule and down cargo.","crew":
[],"ships":[],"capsules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4d0b6c3bb
0006eeb253"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":91,"name":"CR
S-20","date_utc":"2020-03-07T04:50:31.000Z","date_unix":1583556631,"date_loca
l":"2020-03-06T23:50:31-05:00","date_precision":"hour","upcoming":false,"cores":
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cflickr.com/65535/49672551303_564ce21658_o.jpg"]},"presskit":"https://www.spacex.
com/sites/spacex/files/sixth_starlink_press_kit.pdf","webcast":"https://youtu.be/
I4sMhHbHYXM","youtube_id":"I4sMhHbHYXM","article":"https://spaceflightnow.com/202
0/03/18/falcon-9-rocket-overcomes-engine-failure-to-deploy-starlink-satellite
s/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_ut

c":"2020-03-13T18:37:00.000Z","static_fire_date_unix":1584124620,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"The sixth Starlink launch overall and the fifth operational batch of Starlink satellites will launch into orbit aboard 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 orbits to 550 km in three groups of 20, making use of precession rates to separate themselves into three planes. The booster will land on a drone ship approximately 628 km downrange.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4d0b6c3bb0006eeb254"],"launchpad":"5e9e4502f509094188566f88","flight_number":92,"name":"Starlink-5","date_utc":"2020-03-18T12:16:00.000Z","date_unix":1584533760,"date_local":"2020-03-18T08:16:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591809c03b2658","flight":5,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d43ffd86e000604b385"},{"fairings":{"reused":true,"recovery_attempt":false,"recovered":null,"ships":["5ea6ed2e080df4000697c908","5ea6ed2f080df4000697c90d"]},"links":{"patch":{"small":"https://images2.imgbox.com/ef/36/h10Ds3kT_o.png","large":"https://images2.imgbox.com/ab/12/2cQPNTCZ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/fxkc7k/starlink6_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/g5jmx0/rspacex_starlink_6_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/g5fqka/rspacex_starlink6_media_thread_photographer/","recovery":"https://www.reddit.com/r/spacex/comments/g6kztd/rspacex_starlink_v1_l6_recovery_discussion/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49673373182_93a517e140_o.jpg","https://live.staticflickr.com/65535/49672551378_fabc17ef6f_o.jpg","https://live.staticflickr.com/65535/49672551303_564ce21658_o.jpg","https://live.staticflickr.com/65535/49806771628_fef13c852d_o.jpg","https://live.staticflickr.com/65535/49807633862_e5abcb41a6_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/seventh_starlink_mission_overview.pdf","webcast":"https://youtu.be/wSge0I7pwFI","youtube_id":"wSge0I7pwFI","article":"https://spaceflightnow.com/2020/04/22/spacexs-starlink-network-surpasses-400-satellite-mark-after-successful-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-04-17T11:48:00.000Z","static_fire_date_unix":1587687810,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the sixth batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape Canaveral AFS. It is the seventh 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":["5ea6ed30080df4000697c913","5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ee68c683c228f36bd5809b5"],"capsules":[],"payloads":["5eb0e4d1b6c3bb0006eeb255"],"launchpad":"5e9e4502f509094188566f88","flight_number":93,"name":"Starlink-6","date_utc":"2020-04-22T19:30:00.000Z","date_unix":1587583800,"date_local":"2020-04-22T15:30:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918c0803b265c","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":"5eb87d44ffd86e000604b386"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/48/a8/LTqq8OrE_o.png","large":"https://images2.imgbox.com/e3/b7/DeT7QTkx_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/fjf6rr/dm2_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/glwz6n/rspacex_cctcap_demonstration_mission_2_general","media":"https://www.reddit.com/r/spacex/comments/gp1gf5/rspacex_dm2_media_thread_photographer_contest/","recovery":"https://www.reddit.com/r/spacex/comments/gu5gkd/cctcap_demonstration_mission_2_stage_1_recovery/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49927519643_b43c6d4c44_o.jpg","https://live.staticflickr.com/65535/49927519588_8a39a3994f_o.jpg","https://live.staticflickr.com/65535/49928343022_6fb33cbd9c_o.jpg","https://li

ve.staticflickr.com/65535/49934168858_cacb00d790_o.jpg","https://live.staticflick
r.com/65535/49934682271_fd6a31becc_o.jpg","https://live.staticflickr.com/65535/49
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r.com/65535/49955609378_9b77e5c771_o.jpg","https://live.staticflickr.com/65535/49
956396262_ef41c1d9b0_o.jpg"]},"presskit":"https://www.nasa.gov/sites/default/file
s/atoms/files/commercialcrew_press_kit.pdf","webcast":"https://youtu.be/xY96v0OIc
K4","youtube_id":"xY96v0OIcK4","article":"https://spaceflightnow.com/2020/05/30/n
asa-astronauts-launch-from-us-soil-for-first-time-in-nine-years/","wikipedia":"ht
tps://en.wikipedia.org/wiki/Crew_Dragon_Demo-2"},"static_fire_date_utc":"2020-05-
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et":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX wil
l launch the second demonstration mission of its Crew Dragon vehicle as part of N
ASA\'s Commercial Crew Transportation Capability Program (CCtCap), carrying two N
ASA astronauts to the International Space Station. Barring unexpected development
s, 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 ba
ck 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, howeve
r 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 m
ission.","crew":["5ebf1a6e23a9a60006e03a7a","5ebf1b7323a9a60006e03a7b"],"ships":
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ps://live.staticflickr.com/65535/49971196871_a0462d0084_o.jpg","https://live.stat
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machine.com/assets/press_kits/185.pdf","webcast":"https://youtu.be/y4xBFHjkUv
w","youtube_id":"y4xBFHjkUvw","article":"https://spaceflightnow.com/2020/06/04/sp
acex-sets-new-mark-in-rocket-reuse-10-years-after-first-falcon-9-launch/","wikipe
dia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-05-13
T11:11:00.000Z","static_fire_date_unix":1589368260,"net":false,"window":0,"rocke
t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This missio
n will launch the seventh batch of operational Starlink satellites, which are exp
ected to be version 1.0, from SLC-40, Cape Canaveral AFS. It is the eighth Starli
nk launch overall. The satellites will be delivered to low Earth orbit and will s
pend 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","5ea6ed2e080df4
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arlink-7","date_utc":"2020-06-04T01:25:00.000Z","date_unix":1591233900,"date_loca
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d":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://images2.imgbox.com/f2/ab/jxHngBd5_o.png","large":"https://images2.imgbox.com/ba/aa/6rusTkQw_o.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://spaceflightnow.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://images2.imgbox.com/1f/83/TEXnegNL_o.png","large":"https://images2.imgbox.com/14/95/yd34FANN_o.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_sv03_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/c3/19/YmxxZMLw_o.png","large":"https://images2.imgbox.com/d4/0b/QdfjLsV3_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":"TshvZlQ7le8","article":"https://spaceflightnow.com/2020/07/20/spacex-delivers-south-koreas-first-military-satellite-into-on-target-orbit/","wikipedia":null},"static_fire_date_utc":"2020-07-11T17:58:00.000Z","static_fire_date_unix":1594490280,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch ANASIS-II, a South Korean geostationary military communication satellite from LC-39A, Kennedy Space Center. It will be South Korea\'s first dedicated military communications satellite. Falcon 9 will deliver the satellite to a geostationary transfer orbit. 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://images2.imgbox.com/ac/ad/FhIfqkTq_o.png","large":"https://images2.imgbox.com/2f/4f/Mk46ah9f_o.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":159677712

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8/spacex-adds-more-satellites-to-ever-growing-starlink-network/","wikipedia":"htt
ps://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-08-17T10:00:0
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unch the tenth batch of operational Starlink satellites, which are expected to be
version 1.0, from LC-39A, Kennedy Space Center. It is the eleventh Starlink launc
h overall. The satellites will be delivered to low Earth orbit and will spend a f
ew weeks maneuvering to their operational altitude of 550 km. This mission is inc
ludes rideshare payloads, SkySats 19-21, on top of the Starlink stack. The booste
r for this mission is expected to land on an ASDS.","crew":[],"ships":["5ea6ed2e0
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80df4000697c90b","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5ed9859f1
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r","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","flight":6,"gridf
ins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":tru
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htnow.com/2020/08/31/spacex-launches-first-polar-orbit-mission-from-florida-in-de
cades/","wikipedia":"https://en.wikipedia.org/wiki/SAOCOM"},"static_fire_date_ut
c":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95
eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s Falcon 9 will
launch the second of the two satellite SAOCOM 1 satellites into a sun-synchronous
polar orbit from SLC-40, Cape Canaveral AFS. SAOCOM 1B is a synthetic aperture ra
dar Earth observation satellite to support disaster management. The SAOCOM spacec
raft are operated by CONAE, the Argentinian National Space Activities Commission,
and are built by INVAP. This mission is also expected to include rideshare payloa

ds 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 will land at LZ-1.","crew":[],"ships":["5ea6ed2e080df4000697c907"],"capsules":[],"payloads":["5eb0e4d1b6c3bb0006eeb259"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":101,"name":"SAOCOM 1B, GNOMES-1, Tyvak-0172","date_utc":"2020-08-30T23:18:00.000Z","date_unix":1598829480,"date_local":"2020-08-30T19:18:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f359187afd3b2662","flight":4,"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":"5eb87d47ffd86e000604b38a"},{"fairings":{"reused":null,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/38/09/yStzn5Er_o.png","large":"https://images2.imgbox.com/83/11/smudwRMI_o.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/iip8h3/rspacex_starlink11_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/ij8mxf/rspacex_starlink11_saocom_1b_media_thread/","recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/_j4xR7LMCGY","youtube_id":"_j4xR7LMCGY","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the eleventh batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape Canaveral Air Force Station. It is the twelfth 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 an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2f080df4000697c90b","5ee68c683c228f36bd5809b5"],"capsules":[],"payloads":["5ef6a4600059c33cee4a829e"],"launchpad":"5e9e4502f509094188566f88","flight_number":102,"name":"Starlink-11 (v1.0)","date_utc":"2020-09-03T12:46:00.000Z","date_unix":1599137160,"date_local":"2020-09-03T08:46:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":2,"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":"5ef6a1e90059c33cee4a828a"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/3b/c3/kd7H9FTQ_o.png","large":"https://images2.imgbox.com/79/1f/hBdiixIW_o.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/iu0vtg/rspacex_starlink12_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/iudifm/rspacex_starlink12_media_thread_photographer/","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50428228397_6151927733_o.jpg","https://live.staticflickr.com/65535/50427359318_67b3397892_o.jpg","https://live.staticflickr.com/65535/50428050591_36defbe958_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/UZkaE_9zwQQ","youtube_id":"UZkaE_9zwQQ","article":null,"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 twelfth batch of operational Starlink satellites, which are expected 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 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 an ASDS.","crew":[],"ships":["5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c910","5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5ef6a48e0059c33cee4a829f"],"launchpad":"5e9e4502f509094188566f88","flight_number":103,"name":"Starlink-12 (v1.0)","date_utc":"2020-10-06T11:29:00.000Z","date_unix":1601983740,"date_local":"2020-10-06T07:29:00-04:00","date_precision":"hour","upcoming":false,"core

s":[{"core":"5e9e28a7f3591817f23b2663","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":"5ef6a2090059c33cee4a828b"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/1d/5c/Eg5XilXY_o.png","large":"https://images2.imgbox.com/42/26/UbDMepRy_o.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/jctqq9/rspacex_starlink13_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/jdgsm2/rspacex_starlink13_media_thread_photographer/","recovery":"https://www.reddit.com/r/spacex/comments/jdgpgl/starlink13_recovery_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50500804918_eb1187e1b2_o.jpg","https://live.staticflickr.com/65535/50501674637_f16f528728_o.jpg","https://live.staticflickr.com/65535/50501515611_2a3753bed1_o.jpg","https://live.staticflickr.com/65535/50501674632_0d5276b1b5_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/UM8CDDAmp98","youtube_id":"UM8CDDAmp98","article":"https://spaceflightnow.com/2020/10/18/spacex-launches-another-batch-of-starlink-satellites/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-10-17T05:23:00.000Z","static_fire_date_unix":1602912180,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the thirteenth batch of operational Starlink satellites, which are expected to be version 1.0, from LC-39A, Kennedy Space Center. It is the fourteenth 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 an ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","5ee68c683c228f36bd5809b5","5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5ef6a4d50059c33cee4a82a1"],"launchpad":"5e9e4502f509094188566f88","flight_number":104,"name":"Starlink-13 (v1.0)","date_utc":"2020-10-18T12:25:00.000Z","date_unix":1603023900,"date_local":"2020-10-18T08:25:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a6f35918c0803b265c","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":null,"id":"5ef6a2bf0059c33cee4a828c"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/65/e5/GS6w5gPI_o.png","large":"https://images2.imgbox.com/21/50/iOx9Tpuy_o.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/jeth8/rspacex_starlink14_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/jhcwun/rspacex_starlink14_media_thread_photographer/","recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/2gbVgTxLgN0","youtube_id":"2gbVgTxLgN0","article":"https://spaceflightnow.com/2020/10/24/spacex-adds-another-60-satellites-to-starlink-network/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-10-21T12:55:00.000Z","static_fire_date_unix":1603284900,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the fourteenth batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Kennedy Space Center. It is the fifteenth 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.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c907","5ea6ed2e080df4000697c908"],"capsules":[],"payloads":["5ef6a4ea0059c33cee4a82a2"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":105,"name":"Starlink-14 (v1.0)","date_utc":"2020-10-24T15:31:00.000Z","date_unix":1603553460,"date_local":"2020-10-24T11:31:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":3,"gridfins":true,"legs":true,"reuse

d":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5ef6a2e70059c33cee4a8293"},{"fairings":{"reused":null,"recovery_attempt":true,"recovered":null,"ships":["5ea6ed2e080df4000697c907"]},"links":{"patch":{"small":"https://images2.imgbox.com/5e/b7/Kn4Vn6nM_o.png","large":"https://images2.imgbox.com/c8/f5/tRqtdHD6_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/io0swm/gps_iii_sv04_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/jobxn2/rspacex_gps_iii_sv04_sacagawea_official_launch/","media":null,"recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50611865511_2299e11860_o.jpg","https://live.staticflickr.com/65535/50611118958_448d239fe1_o.jpg","https://live.staticflickr.com/65535/50611979827_48811d2ea6_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/wufXF5YKR1M","youtube_id":"wufXF5YKR1M","article":"https://spaceflightnow.com/2020/11/06/spacex-launches-gps-navigation-satellite-from-cape-canaveral/","wikipedia":"https://en.wikipedia.org/wiki/GPS_Block_III"},"static_fire_date_utc":"2020-09-25T05:42:00.000Z","static_fire_date_unix":1601012520,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch GPS Block III Space Vehicle 04 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 will be the fourth GPS III satellite launched and the third launched by SpaceX. The satellite will be delivered into a MEO transfer orbit. The booster for this mission will land on an ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ee68c683c228f36bd5809b5","5ea6ed2e080df4000697c907"],"capsules":[],"payloads":["5eb0e4d2b6c3bb0006eeb25e"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":106,"name":"GPS III SV04 (Sacagawea)","date_utc":"2020-11-05T23:24:00.000Z","date_unix":1604618640,"date_local":"2020-11-05T18:24:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c5440622a633027900a0","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":"5eb87d4cffd86e000604b38d"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/98/cc/UJd0SS73_o.png","large":"https://images2.imgbox.com/03/3d/LzQWXPfy_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/iwb8bl/crew1_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/ju7fxv/rspacex_crew1_official_launch_coast_docking/","media":"https://www.reddit.com/r/spacex/comments/judv0r/rspacex_crew1_media_thread_photographer_contest/","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50618376646_8f52c31fc4_o.jpg","https://live.staticflickr.com/65535/50618376731_43ddaab1b8_o.jpg","https://live.staticflickr.com/65535/50618376671_ba4e60af7c_o.jpg","https://live.staticflickr.com/65535/50618376351_ecfdee4ab2_o.jpg","https://live.staticflickr.com/65535/50618727917_01e579c4d9_o.jpg","https://live.staticflickr.com/65535/50618355216_2872d1fe98_o.jpg","https://live.staticflickr.com/65535/50618354801_ff3e722884_o.jpg","https://live.staticflickr.com/65535/50618463487_41642939a4_o.jpg","https://live.staticflickr.com/65535/50617619613_5630422345_o.jpg","https://live.staticflickr.com/65535/50617619668_d680d7319c_o.jpg","https://live.staticflickr.com/65535/50617625523_a7484e0abf_o.jpg","https://live.staticflickr.com/65535/50618469202_fa86f88ab3_o.jpg","https://live.staticflickr.com/65535/50617625183_8554412cee_o.jpg","https://live.staticflickr.com/65535/50618470472_fb8e6507d7_o.jpg","https://live.staticflickr.com/65535/50617626838_c0c71de1f7_o.jpg","https://live.staticflickr.com/65535/50617626738_aa3997aaea_o.jpg","https://live.staticflickr.com/65535/50617626408_fb0bba0f89_o.jpg","https://live.staticflickr.com/65535/51158778650_9b8d555c1e_o.jpg","https://live.staticflickr.com/65535/51158458619_9b74f6a3d0_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/bnChQbxLkkI","youtube_id":"bnChQbxLkkI","article":"https://spaceflightnow.com/2020/11/16/astronauts-ride-spacex-crew-capsule-in-landmark-launch-for-commercial-spaceflight/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_Crew-1"},"static_fire_date_utc":"2020-11-11T16:17:00.000Z","static_fire_date_unix":1605111420,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch the first operational mission of its Crew Dragon vehicle as part of NASA\'s Commercial Crew Transportation Capability Program (CCtCap),

carrying 3 NASA astronauts and 1 JAXA astronaut to the International Space Statio
n. 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":["5f7f1543bf32c864a52
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9b241"],"ships":["5ea6ed2f080df4000697c910","5ee68c683c228f36bd5809b5","5ea6ed2f0
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s":["5f6f99fddcfdf403df379709"],"payloads":["5eb0e4d2b6c3bb0006eeb25f"],"launchpa
d":"5e9e4502f509094188566f88","flight_number":107,"name":"Crew-1","date_utc":"202
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5:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a633
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o.jpg"]},"presskit":null,"webcast":"https://youtu.be/aVFPzTDCihQ","youtube_id":"a
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ite-launches-to-extend-measurements-of-sea-level-rise/","wikipedia":"https://en.w
ikipedia.org/wiki/Copernicus_Sentinel-6"},"static_fire_date_utc":"2020-11-17T13:1
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t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will
launch Sentinel-6 Michael Freilich into low Earth orbit for NASA, NOAA, ESA, and
the European Organization for the Exploitation of Meteorological Satellites aboar
d a Falcon 9 from SLC-4E, Vandenberg Air Force Station. Sentinel-6(A) is an ocean
observation satellite providing radar ocean surface altimetry data and also atmos
pheric temperature profiles as a secondary mission. The booster for this mission
is will land at LZ-4.","crew":[],"ships":[],"capsules":[],"payloads":["5ed9867c1f
30554030d45c40"],"launchpad":"5e9e4502f509092b78566f87","flight_number":108,"nam
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ches-60-more-starlink-satellites-on-100th-falcon-9-flight/","wikipedia":"https://
en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-11-21T16:31:00.000
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ch the fifteenth batch of operational Starlink satellites, which are version 1.0,

from SLC-40, Cape Canaveral Air Force Station. It will be the sixteenth 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 an ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90c","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d","5ea6ed2e080df4000697c907"],"capsules":[],"payloads":["5fb95c263a88ae63c9546044"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":109,"name":"Starlink-15 (v1.0)","date_utc":"2020-11-25T02:13:00.000Z","date_unix":1606270380,"date_local":"2020-11-24T21:13:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","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":null,"id":"5fb95b3f3a88ae63c954603c"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/a2/a0/cHJWyFCo_o.png","large":"https://images2.imgbox.com/dd/53/W10Rog1y_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jw8bfe/crs21_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/k6my16/rspacex_crs21_official_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/65535/50689254612_db8bc87d2c_o.jpg","https://live.staticflickr.com/65535/50689254712_98ef758c81_o.jpg","https://live.staticflickr.com/65535/50689254512_bb44826694_o.jpg","https://live.staticflickr.com/65535/50689254642_ba6b08d142_o.jpg","https://live.staticflickr.com/65535/50689254552_1d9f91a963_o.jpg"]},"presskit":"https://www.nasa.gov/sites/default/files/atoms/files/spacex_crs-21_mision_overview_high_res.pdf","webcast":"https://youtu.be/4xJAGFR_N-c","youtube_id":"4xJAGFR_N-c","article":"https://spaceflightnow.com/2020/12/06/spacex-launches-first-in-new-line-of-upgraded-space-station-cargo-ships/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-21"},"static_fire_date_utc":"2020-12-03T13:45:00.000Z","static_fire_date_unix":1607003100,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 21st ISS resupply mission on behalf of NASA and the first under the CRS-2 contract, this mission brings 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 Nanoracks Bishop Airlock. 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 return and recovery of the Dragon capsule and down cargo.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d"],"capsules":["5fbb0f8fec55b34eb9f35c14"],"payloads":["5eb0e4d3b6c3bb0006eeb262"],"launchpad":"5e9e4502f509094188566f88","flight_number":110,"name":"CRS-21","date_utc":"2020-12-06T16:17:00.000Z","date_unix":1607271420,"date_local":"2020-12-06T11:17:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","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":"5eb87d4effd86e000604b391"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a9/be/43FhrPoq_o.png","large":"https://images2.imgbox.com/17/34/WgRl7YFh_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/k51p7b/sxm7_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/kaizok/rspacex_sxm7_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/kcev8p/sxm7_media_thread_photographer_contest/","recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/50715254423_3cb2a8ff9c_o.jpg","https://live.staticflickr.com/65535/50715992426_bf43a8f872_o.jpg","https://live.staticflickr.com/65535/50716071077_5a5bc00af9_o.jpg","https://live.staticflickr.com/65535/50716071167_100d6f7092_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/COraGXFb1lo","youtube_id":"COraGXFb1lo","article":"https://spaceflightnow.com/2020/12/13/siriusxm-satellite-rides-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedia.org/wiki/Sirius_XM#Satellites"},"static_fire_date_utc":"2020-12-07T23:00:00.000

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first of two next generation high power S-band broadcast satellites for SiriusXM.
The spacecraft will be delivered into a geostationary transfer orbit and the boos
ter will be recovered downrange. The spacecraft is built by Space Systems Loral
(SSL) on the SSL 1300 platform and includes two solar arrays producing 20kW, and
an unfurlable antenna dish. SXM-7 will replace XM-3 in geostationary orbit.","cre
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st-launch-of-2021/","wikipedia":"https://en.wikipedia.org/wiki/T%C3%BCrksat_5
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bus Defense and Space and based on the Electric Orbit Raising version of the Euro
star 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":[],"ships":["5ea6e
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s":"This mission launches the sixteenth batch of operational Starlink satellites,
which are version 1.0, from SLC-40 or LC-39A. It is the seventeenth Starlink laun
ch 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 l
and on an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c907","5ea6ed2e080df4000
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th batch of operational Starlink satellites, which are version 1.0, from SLC-40.
It is the nineteenth Starlink launch overall. The satellites will be delivered to
low Earth orbit and will spend a few weeks maneuvering to their operational altit
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g-after-launching-60-more-starlink-satellites/","wikipedia":"https://en.wikipedi
a.org/wiki/Starlink"},"static_fire_date_utc":"2021-02-24T12:25:00.000Z","static_f
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t is the eighteenth Starlink launch overall. The satellites will be delivered to
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spaceflightnow.com/2021/03/11/spacex-adds-more-satellites-to-starlink-internet-fl
eet/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_ut
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ch are version 1.0, from LC-39A or SLC-40. It is the 21st Starlink launch overal
l. 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

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ecord-on-starlink-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlin
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h are version 1.0, from LC-39A or SLC-40. It is the 22nd Starlink launch overall.
The satellites will be delivered to low Earth orbit and will spend a few weeks ma
neuvering to their operational altitude. The booster is expected to land on an AS
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Starlink satellites, which are version 1.0, from or SLC-40. It is the 23rd Starli
nk launch overall. The satellites will be delivered to low Earth orbit and will s
pend a few weeks maneuvering to their operational altitude. The booster is expect
ed to land on an ASDS.","crew":[],"ships":["5ee68c683c228f36bd5809b5","5ea6ed3008
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f operational Starlink satellites, which are version 1.0, from or SLC-40 or LC-39
A. It is the 24th Starlink launch overall. The satellites will be delivered to lo
w Earth orbit and will spend a few weeks maneuvering to their operational altitud
e. The booster is expected to land on an ASDS.","crew":[],"ships":["5ea6ed30080df
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ed-capsule-and-flight-proven-rocket/","wikipedia":"https://en.wikipedia.org/wiki/
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uccess":true,"failures":[],"details":"SpaceX launches the second operational miss
ion of its Crew Dragon vehicle as part of NASA\'s Commercial Crew Program, carryi
ng NASA astronauts Shane Kimbrough, Megan McArthur, Thomas Pesquet, and Akihiko H

oshide to the International 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 an ASDS. The mission will be complete with the safe return of the astronauts to Earth.","crew":["5fe3ba5fb3467846b3242188","5fe3bb01b3467846b3242189","5fe3bc3db3467846b324218b","5fe3bc8ab3467846b324218c"],"ships":["5ea6ed2e080df4000697c909","5ea6ed30080df4000697c913"],"capsules":["5e9e2c5df359188aba3b2676"],"payloads":["5fe3b3adb3467846b3242173"],"launchpad":"5e9e4502f509094188566f88","flight_number":123,"name":"Crew-2","date_utc":"2021-04-23T09:49:00.000Z","date_unix":1619171340,"date_local":"2021-04-23T05:49:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a6330279009f","flight":2,"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":"32dcb5ad-7609-4fc0-8094-768ee5c2ebe0","id":"5fe3af58b3467846b324215f"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["6059166413f40e27e8af34b6"]},"links":{"patch":{"small":"https://images2.imgbox.com/cd/30/UYfjAmuT_o.png","large":"https://images2.imgbox.com/2e/a8/bvzKCiwf_o.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/mzol0k/rspacex_starlink24_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/65535/51146838376_4667d78231_o.jpg","https://live.staticflickr.com/65535/51147622479_d027e09727_o.jpg","https://live.staticflickr.com/65535/51147949685_975bd6b4ee_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/RBxkRKZ34yo","youtube_id":"RBxkRKZ34yo","article":"https://spaceflightnow.com/2021/04/29/spacex-launches-60-more-starlink-spacecraft-fcc-clears-spacex-to-fly-satellites-at-lower-altitudes/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 24th batch of operational Starlink satellites, which are version 1.0, from LC-39A or SLC-40. It is the 25th 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":["5ea6ed2f080df4000697c910","5ea6ed2f080df4000697c90d","5ee68c683c228f36bd5809b5","6059166413f40e27e8af34b6"],"capsules":[],"payloads":["605b4be3aa5433645e37d046"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":124,"name":"Starlink-24 (v1.0)","date_utc":"2021-04-29T03:44:00.000Z","date_unix":1619667840,"date_local":"2021-04-28T23:44:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":7,"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":"fbd23c86-89d0-4d3f-b5fb-5d7165d05cca","id":"605b4b6aaa5433645e37d03f"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["6059166413f40e27e8af34b6"]},"links":{"patch":{"small":"https://images2.imgbox.com/33/03/aHKx9cu1_o.png","large":"https://images2.imgbox.com/8e/e0/wOt6ZecV_o.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/n3z0aa/rspacex_starlink25_launch_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/xpl_JnG7rcg","youtube_id":"xpl_JnG7rcg","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2021-05-03T05:00:00.000Z","static_fire_date_unix":1620018000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 25th batch of operational Starlink satellites, which are version 1.0, from LC-39A. It is the 26th 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 OCISLY.","crew":[],"ships":["608c1a06cf7f3d6152666ad4","5ea6ed30080df4000697c913","6059166413f

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launch overall. The satellites will be delivered to low Earth orbit and will spen
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1.0, from LC-39A or SLC-40. It is the 28th Starlink launch overall. The satellite
s 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":
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dow":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detail
s":"Falcon 9 launches to sun-synchronous polar orbit from Florida as part of Spac
eX\'s Rideshare program dedicated to smallsat customers. The mission lifts off fr
om SLC-40, Cape Canaveral on a southward azimuth and performs a dogleg maneuver.
The booster for this mission is expected to return to LZ-1 based on FCC communica
tions filings. This rideshare takes approximately 90 satellites and hosted payloa
ds into orbit on a variety of deployers including three free-flying spacecraft wh
ich dispense their customers\' satellites after separation from the SpaceX stac
k.","crew":[],"ships":["60c8c7a45d4819007ea69871"],"capsules":[],"payloads":["608
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s":"SpaceX\'s 23rd ISS resupply mission on behalf of NASA, this mission brings es
sential supplies to the International Space Station using the cargo variant of Sp
aceX\'s Dragon 2 spacecraft. Cargo includes several science experiments. The boos
ter 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":[],"ship
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first all-civilian mission to space. The mission will be commanded by Jared Isaac
man, the 37-year-old founder and Chief Executive Officer of Shift4 Payments and a
n accomplished pilot and adventurer. Inspiration4 will leave Earth from Kennedy S
pace Center\xe2\x80\x99s historic Launch Complex 39A, the embarkation point for A
pollo 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
d funds for St. Jude Children\xe2\x80\x99s Research Hospital, this milestone repr
esents a new era for human spaceflight and exploration.","crew":["607a3a5f5a906a4
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irect Test (DART) will demonstrate the use of a kinetic impactor to alter an aste
roid\'s trajectory, an intervention that could be used in the future to prevent d
evastating Earth impacts. The target system consists of Didymos, 780 meters in di
ameter, and its moonlet Dimorphos, 160 meters. The DART spacecraft will intercept
the double asteroid, using autonomous guidance to crash into the smaller one. Mov
ing at about 6 km/s, the transferred momentum should alter Dimorphos\'s 12 hour o
rbital period around its companion by several minutes. The mission tests several
technologies, including the Small-body Maneuvering Autonomous Real-Time Navigatio
n (SMART Nav) used to differentiate and steer toward the target body and Roll-Out
Solar Arrays (ROSA) with Transformational Solar Array concentrators. NASA\xe2\x80
\x99s Evolutionary Xenon Thruster \xe2\x80\x94 Commercial (NEXT\xe2\x80\x93C) ion
engine will also be demonstrated, although the spacecraft\'s primary propulsion i
s hydrazine thrusters. DART should arrive at Didymos in late September 2022, when
it is about 11 million kilometers from Earth. Ten days before impact, the Italian
Space Agency\'s cubesat LICIACube will be deployed to observe the collision and e
jecta with its two cameras. Earth-based telescopes will be used to measure the al
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France, will soon be sent to the Cape Canaveral Space Launch Station located in F
lorida, United States. The satellite will be launched into space onboard the Falc
on 9 rocket following pre-launch preparations. With an estimated in-orbit lifetim
e of 30 years and the aim of securing Turkey\xe2\x80\x99s orbital and frequency r
ights, T\xc3\xbcrksat 5B will be launched into an orbital slot at 42 degrees Eas
t. With 12 kW power, T\xc3\xbcrksat 5B will provide TV broadcasting and data comm
unication services over a wide coverage area that reaches the entire Middle East,
the Persian Gulf, the Red Sea, the Mediterranean, North Africa, East Africa, Sout
h Africa and Nigeria. Apart from that, the satellite will also provide customized
services for airlines and commercial ship operators around the world thanks to th
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dit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":null,"media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"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":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["63161610ffc78f3b85670718","63161872ffc78f3b8567071e"],"launchpad":"5e9e4502f5090941885 66f88","flight_number":184,"name":"Starlink 4-2 (v1.5) & Blue Walker 3","date_utc":"2022-09-11T01:10:00.000Z","date_unix":1662858600,"date_local":"2022-09-10T21:10:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591817f23b2663","flight":14,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecb075134e7cd"}],"auto_update":true,"tbd":false,"launch_library_id":"992823ad-f843-4a4a-beca-882b8ce8773a","id":"62a9f89a20413d2695d8871a"},{"fairings":{"reused":null,"recovery_attempt":null,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a9/9a/NXVkTZCE_o.png","large":"https://images2.imgbox.com/e3/cc/hN96PmST_o.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/xd8vhj/rspacex_starlink_434_launch_discussion_and/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/ZlQHF_yBkMQ","youtube_id":"ZlQHF_yBkMQ","article":null,"wikipedia":null},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["63161699ffc78f3b85670719"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":185,"name":"Starlink 4-34 (v1.5)","date_utc":"2022-09-17T01:05:00.000Z","date_unix":1663376700,"date_local":"2022-09-16T21:05:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"60b800111f83cc1e59f16438","flight":6,"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":"9ba04064-c329-40bf-b477-ff468d7d8058","id":"63161329ffc78f3b8567070b"},{"fairings":{"reused":null,"recovery_attempt":null,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a9/9a/NXVkTZCE_o.png","large":"https://images2.imgbox.com/e3/cc/hN96PmST_o.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/xn028t/rspacex_starlink_435_launch_discussion_and/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/VVu2bSJJhgI","youtube_id":"VVu2bSJJhgI","article":null,"wikipedia":null},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"capsules":[],"payloads":["631616a7ffc78f3b8567071a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":186,"name":"Starlink 4-35 (v1.5)","date_utc":"2022-09-24T23:30:00.000Z","date_unix":1664062200,"date_local":"2022-09-24T19:30:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"627843d657b51b752c5c5a53","flight":4,"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":"1c903b65-6667-4fd5-944d-296c5f13e01f","id":"63161339ffc78f3b8567070c"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/eb/d8/D1Yywp0w_o.png","large":"https://images2.imgbox.com/33/2e/k6VE4iYl_o.png"},"reddit":{"campaign":null,"launch":"https://www.reddit.com/r/spacex/comments/xvm76j/rspacex_crew5_launchcoast_docking_discussion_and/","media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/5EwW8ZkArL4","youtube_id":"5EwW8ZkArL4","article":null,"wikipedia":"https://en.wikipedia.org/wiki/SpaceX_Crew-5"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocke

t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":["62dd7196202306255024d13c","62dd71c9202306255024d13d","62dd7210202306255024d13e","62dd7253202306255024d13f"],"ships":[],"capsules":["617c05591bad2c661a6e2909"],"payloads":["62dd73ed202306255024d145"],"launchpad":"5e9e4502f509094188566f88","flight_number":187,"name":"Crew-5","date_utc":"2022-10-05T16:00:00.000Z","date_unix":1664985600,"date_local":"2022-10-05T12:00:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"633d9da635a71d1d9c66797b","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":"f33d5ece-e825-4cd8-809f-1d4c72a2e0d3","id":"62dd70d5202306255024d139"}]'

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.cl
```

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

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

Out[10]: 200

In [14]:
```
# request the SpaceX launch data
res = requests.get(static_json_url)
print(res.content)
```

b'[{"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/3c/0e/T8iJcSN3_o.png", "large": "https://images2.imgbox.com/40/e3/GypSkayF_o.png"}, "reddit": {"campaign": null, "launch": null, "media": null, "recovery": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast": "https://www.youtube.com/watch?v=0a_00nJ_Y88", "youtube_id": "0a_00nJ_Y88", "article": "https://www.space.com/2196-spacex-inaugural-falcon-1-rocket-lost-launch.html", "wikipedia": "https://en.wikipedia.org/wiki/DemoSat"}, "static_fire_date_utc": "2006-03-17T00:00:00.000Z", "static_fire_date_unix": 1142553600, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69955f709d1eb", "success": false, "details": "Engine failure at 33 seconds and loss of vehicle", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4b5b6c3bb0006eeb1e1"], "launchpad": "5e9e4502f5090995de566f86", "auto_update": true, "failures": [{"time": 33, "altitude": null, "reason": "merlin engine failure"}], "flight_number": 1, "name": "FalconSat", "date_utc": "2006-03-24T22:30:00.000Z", "date_unix": 1143239400, "date_local": "2006-03-25T10:30:00+12:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e289df35918033d3b2623", "flight": 1, "gridfins": false, "legs": false, "reused": false, "landing_attempt": false, "landing_success": null, "landing_type": null, "landpad": null}], "id": "5eb87cd9ffd86e000604b32a"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/4f/e3/I0lkuJ2e_o.png", "large": "https://images2.imgbox.com/be/e7/iNqsqVYM_o.png"}, "reddit": {"campaign": null, "launch": null, "media": null, "recovery": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast": "https://www.youtube.com/watch?v=Lk4zQ2wP-Nc", "youtube_id": "Lk4zQ2wP-Nc", "article": "https://www.space.com/3590-spacex-falcon-1-rocket-fails-reach-orbit.html", "wikipedia": "https://en.wikipedia.org/wiki/DemoSat"}, "static_fire_date_utc": null, "static_fire_date_unix": null, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69955f709d1eb", "success": false, "details": "Successful first stage burn and transition to second stage, maximum altitude 289 km, Premature engine shutdown at T+7 min 30 s, Failed to reach orbit, Failed to recover first stage", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4b6b6c3bb0006eeb1e2"], "launchpad": "5e9e4502f5090995de566f86", "auto_update": true, "failures": [{"time": 301, "altitude": 289, "reason": "harmonic oscillation leading to premature engine shutdown"}], "flight_number": 2, "name": "DemoSat", "date_utc": "2007-03-21T01:10:00.000Z", "date_unix": 1174439400, "date_local": "2007-03-21T13:10:00+12:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e289ef35918416a3b2624", "flight": 1, "gridfins": false, "legs": false, "reused": false, "landing_attempt": false, "landing_success": null, "landing_type": null, "landpad": null}], "id": "5eb87cdaffd86e000604b32b"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/3d/86/cnu0pan8_o.png", "large": "https://images2.imgbox.com/4b/bd/d8UxLh4q_o.png"}, "reddit": {"campaign": null, "launch": null, "media": null, "recovery": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast": "https://www.youtube.com/watch?v=v0w9p3U8860", "youtube_id": "v0w9p3U8860", "article": "http://www.spacex.com/news/2013/02/11/falcon-1-flight-3-mission-summary", "wikipedia": "https://en.wikipedia.org/wiki/Trailblazer_(satellite)"}, "static_fire_date_utc": null, "static_fire_date_unix": null, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69955f709d1eb", "success": false, "details": "Residual stage 1 thrust led to collision between stage 1 and stage 2", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4b6b6c3bb0006eeb1e3", "5eb0e4b6b6c3bb0006eeb1e4"], "launchpad": "5e9e4502f5090995de566f86", "auto_update": true, "failures": [{"time": 140, "altitude": 35, "reason": "residual stage-1 thrust led to collision between stage 1 and stage 2"}], "flight_number": 3, "name": "Trailblazer", "date_utc": "2008-08-03T03:34:00.000Z", "date_unix": 1217734440, "date_local": "2008-08-03T15:34:00+12:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e289ef3591814873b2625", "flight": 1, "gridfins": false, "legs": false, "reused": false, "landing_attempt": false, "landing_success": null, "landing_type": null, "landpad": null}], "id": "5eb87cdbffd86e000604b32c"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "l

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e, "failures": [], "flight_number": 19, "name": "CRS-5", "date_utc": "2015-01-10T09:47:00.000Z", "date_unix": 1420883220, "date_local": "2015-01-10T05:47:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a0f359187a3c3b2635", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": false, "landing_type": "ASDS", "landpad": "5e9e3032383ecb761634e7cb"}], "id": "5eb87ce8ffd86e000604b33c"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/63/c5/0OIpD59z_o.png", "large": "https://images2.imgbox.com/ec/a0/kTPQRyzt_o.png"}, "reddit": {"campaign": null, "launch": "http://www.reddit.com/r/spacex/comments/2vjm9e", "media": null, "recovery": null}, "flickr": {"small": [], "original": ["https://farm9.staticflickr.com/8619/16511407538_9a25c5d8c6_o.jpg", "https://farm9.staticflickr.com/8665/16697946612_1284e952b0_o.jpg", "https://farm9.staticflickr.com/8570/16698990475_16524a93de_o.jpg", "https://farm9.staticflickr.com/8681/16512864259_e849e496b1_o.jpg", "https://farm9.staticflickr.com/8637/16079045013_1f0fab9b54_o.jpg", "https://farm9.staticflickr.com/8601/16512864369_2bb896c344_o.jpg", "https://farm9.staticflickr.com/8646/16697693861_a038331e0a_o.jpg", "https://farm9.staticflickr.com/8680/16511407248_093635a243_o.jpg", "https://farm9.staticflickr.com/8654/16511594820_451f194d53_o.jpg", "https://farm9.staticflickr.com/8603/16673054016_472fb42a20_o.jpg"]}, "presskit": "http://www.spacex.com/press/2015/02/11/dscovr-launch-update", "webcast": "https://www.youtube.com/watch?v=OvHJSIKP0Hg", "youtube_id": "OvHJSIKP0Hg", "article": "https://spaceflightnow.com/2015/02/12/space-weather-observatory-blasts-off-after-17-year-wait/", "wikipedia": "https://en.wikipedia.org/wiki/Deep_Space_Climate_Observatory"}, "static_fire_date_utc": "2015-01-31T00:00:00.000Z", "static_fire_date_unix": 1422662400, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "First launch under USAF\'s OSP 3 launch contract. First SpaceX launch to put a satellite to an orbit with an orbital altitude many times the distance to the Moon: Sun-Earth libration point L1. The first stage made a test flight descent to an over-ocean landing within 10 m (33 ft) of its intended target.", "crew": [], "ships": ["5ea6ed2e080df4000697c906", "5ea6ed2f080df4000697c90b", "5ea6ed2f080df4000697c90c"], "capsules": [], "payloads": ["5eb0e4bdb6c3bb0006eeb1f7"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 20, "name": "DSCOVR", "date_utc": "2015-02-11T23:03:00.000Z", "date_unix": 1423695780, "date_local": "2015-02-11T19:03:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a0f3591885be3b2636", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": true, "landing_type": "Ocean", "landpad": null}], "id": "5eb87ceaffd86e000604b33d"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/20/10/sqPgZfej_o.png", "large": "https://images2.imgbox.com/78/82/H9gthFmK_o.png"}, "reddit": {"campaign": null, "launch": "http://www.reddit.com/r/spacex/comments/2x81fc", "media": "https://www.reddit.com/r/spacex/comments/2xmumx", "recovery": null}, "flickr": {"small": [], "original": ["https://farm9.staticflickr.com/8749/16788442562_ed460c2d9e_o.jpg", "https://farm9.staticflickr.com/8586/16510243060_48d6a9b1f6_o.jpg", "https://farm9.staticflickr.com/8641/16490359747_c043b8c61a_o.jpg", "https://farm9.staticflickr.com/8636/16510241270_ca83157509_o.jpg", "https://farm8.staticflickr.com/7618/16601658850_13b826e705_o.jpg", "https://farm9.staticflickr.com/8617/16510041628_883af57512_o.jpg"]}, "presskit": "http://www.spacex.com/sites/spacex/files/abs-eutelsatfactsheet.pdf", "webcast": "https://www.youtube.com/watch?v=mN7lyaCBzT8", "youtube_id": "mN7lyaCBzT8", "article": "https://www.space.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", "static_fire_date_unix": 1424891400, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "The launch was Boeing\'s first-ever conjoined launch of a lighter-weight dual-commsat stack that was specifically designed to take advantage of the lower-cost SpaceX Falcon 9 launch vehicle. Per satellite, launch costs were less than $30 million. The ABS satellite reached its final destination ahead of schedule and started operations on September 10.", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4bdb6c3bb0006eeb1f8",

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ce-with-satellite-for-turkmenistan/", "wikipedia": "https://en.wikipedia.org/wik
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28/falcon-9-rocket-destroyed-in-launch-mishap/", "wikipedia": "https://en.wikiped
ia.org/wiki/SpaceX_CRS-7"}, "static_fire_date_utc": "2015-06-26T05:00:00.000Z",
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ce was nominal until an overpressure incident in the second-stage LOX tank, leadi
ng to vehicle breakup at T+150 seconds. 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": ["5ea6ed2e
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t-flight-gives-spacex-a-trifecta-of-successes/", "wikipedia": "https://en.wikiped
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ad 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 origi
nally 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 pe
rmit from the FAA to land the booster on solid ground at Cape Canaveral, and succ
eeded.", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4beb6c3bb000
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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", "auto_update": true, "failures": [], "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"}], "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.png"}, "reddit": {"campaign": null, "launch": "https://www.reddit.com/r/spacex/comments/4dtoly", "media": "https://www.reddit.com/r/spacex/comments/4dtpxn/", "recovery": "https://www.reddit.com/r/spacex/comments/4ee2zy"}, "flickr": {"small": [], "original": ["https://farm2.staticflickr.com/1633/25788014884_6a3f9ae183_o.jpg", "https://farm2.staticflickr.com/1650/26300505022_8b8b9035e8_o.jpg", "https://farm2.staticflickr.com/1486/25787998624_3ca213be1e_o.jpg", "https://farm2.staticflickr.com/1450/26326628031_e1b08ec0b3_o.jpg", "https://farm2.staticflickr.com/1670/26239020092_05e5e4c538_o.jpg", "https://farm2.staticflickr.com/1709/26305479266_76b4d01caf_o.jpg", "https://farm2.staticflickr.com/1645/26239017922_28c7ac50e0_o.jpg", "https://farm2.staticflickr.com/1559/26288402056_6c5997ce66_o.jpg", "https://farm2.staticflickr.com/1449/25709481274_60f8c77358_o.jpg", "https://farm2.staticflickr.com/1671/26217360302_b66c3e384e_o.jpg", "https://farm2.staticflickr.com/1704/26283822056_838c1103b9_o.jpg", "https://farm2.staticflickr.com/1508/26217345472_118767c608_o.jpg", "https://farm2.staticflickr.com/1495/25916886442_821a152917_o.jpg"]}, "presskit": "http://www.spacex.com/sites/spacex/files/spacex_crs8_press_kit.pdf", "webcast": "https://www.youtube.com/watch?v=7pUAydjne5M", "youtube_id": "7pUAydjne5M", "article": "https://spaceflightnow.com/2016/04/08/spacex-lands-rocket-on-floating-platform-after-station-resupply-launch/", "wikipedia": "https://en.wikipedia.org/wiki/SpaceX_CRS-8"}, "static_fire_date_utc": "2016-04-05T00:00:00.000Z", "static_fire_date_unix": 1459814400, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "Dragon carried over 1500 kg of supplies and delivered (stowed in its trunk) the inflatable Bigelow Expandable Activity Module (BEAM) to the ISS for two years of in-orbit tests. 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", "auto_update": true, "failures": [], "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"}], "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, "tbd": false, "net": false, "window": 7200, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 29, "name": "JCSAT-2B", "date_utc": "2016-05-06T05:21:00.000Z", "date_unix": 1462512060, "date_local": "2016-05-06T01:21:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a2f35918077b3b263f", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87cf5ffd86e000604b346"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/d1/de/waYRCanq_o.png", "large": "https://images2.imgbox.com/b7/ec/5kukvU10_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/4hjz4k", "launch": "https://www.reddit.com/r/spacex/comments/4l9uou", "media": "https://www.reddit.com/r/spacex/comments/4l4af1", "recovery": "https://www.reddit.com/r/spacex/comments/4lz2y6"}, "flickr": {"small": [], "original": ["https://farm8.staticflickr.com/7420/26814484893_13059e4b39_o.jpg", "https://farm8.staticflickr.com/7321/26812794884_bf91665325_o.jpg", "https://farm8.staticflickr.com/7337/26812792104_9323121f0b_o.jpg", "https://farm8.staticflickr.com/7376/27421461715_5640d2b87a_o.jpg", "https://farm8.staticflickr.com/7717/26812758364_74569b4327_o.jpg", "https://farm8.staticflickr.com/7742/27294263035_9b43bd141c_o.jpg", "https://farm8.staticflickr.com/7252/27294262435_c534cc4351_o.jpg", "https://farm8.staticflickr.com/7698/27294261525_82c4b7e604_o.jpg", "https://farm8.staticflickr.com/7045/27259828166_9e32061cc9_o.jpg", "https://farm8.staticflickr.com/7013/27259827316_c2f7507b3d_o.jpg", "https://farm8.staticflickr.com/7211/27182485331_ed2414a947_o.jpg", "https://farm8.staticflickr.com/7740/27182481921_0d7a759736_o.jpg", "https://farm8.staticflickr.com/7315/26645036414_39736db559_o.jpg"]}, "presskit": "http://www.spacex.com/sites/spacex/files/spacex_thaicom_8_press_kit.pdf", "webcast": "https://www.youtube.com/watch?v=zBYC4f79iXc", "youtube_id": "zBYC4f79iXc", "article": "https://spaceflightnow.com/2016/05/27/spacex-logs-successful-late-afternoon-launch-for-thaicom/", "wikipedia": "https://en.wikipedia.org/wiki/Thaicom_8"}, "static_fire_date_utc": "2016-05-25T00:00:00.000Z", "static_fire_date_unix": 1464134400, "tbd": false, "net": false, "window": 7200, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "Manufactured by Orbital ATK, the 3,100-kilogram (6,800 lb) Thaicom 8 communications satellite will serve Thailand, India and Africa from the 78.5\\u00b0 East geostationary location. It is equipped with 24 active Ku-band transponders.", "crew": [], "ships": ["5ea6ed2e080df4000697c906", "5ea6ed2f080df4000697c90b", "5ea6ed2f080df4000697c90c", "5ea6ed30080df4000697c913"], "capsules": [], "payloads": ["5eb0e4bfb6c3bb0006eeb202"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 30, "name": "Thaicom 8", "date_utc": "2016-05-27T21:39:00.000Z", "date_unix": 1464385140, "date_local": "2016-05-27T17:39:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a2f3591845c73b2640", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7c

a"}], "id": "5eb87cf6ffd86e000604b347"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": false, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/ae/e9/VTH2y7S5_o.png", "large": "https://images2.imgbox.com/07/79/4ajR03l9_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/4ksdy3", "launch": "https://www.reddit.com/r/spacex/comments/4o5u6r", "media": "https://www.reddit.com/r/spacex/comments/4o5j6o", "recovery": "https://www.reddit.com/r/spacex/comments/4on75l"}, "flickr": {"small": [], "original": ["https://farm8.staticflickr.com/7088/27661326426_ce3c3f320d_o.jpg", "https://farm8.staticflickr.com/7698/27661325446_affb08be24_o.jpg", "https://farm8.staticflickr.com/7733/27661322976_073466e80c_o.jpg", "https://farm8.staticflickr.com/7218/27661320706_4c16f3b76b_o.jpg", "https://farm8.staticflickr.com/7340/27661315686_6dcb2ce6f9_o.jpg", "https://farm8.staticflickr.com/7656/27661313956_e1ac9650b9_o.jpg", "https://farm8.staticflickr.com/7616/27661312516_640764f8fd_o.jpg", "https://farm8.staticflickr.com/7413/27078893234_0142dd80f0_o.jpg", "https://farm8.staticflickr.com/7334/27078889924_8819fd55ea_o.jpg"]}, "presskit": "https://drive.google.com/open?id=0BwA3a65ef1OvMGpJSlpDNHhjelU", "webcast": "https://www.youtube.com/watch?v=gLNmtUEvI5A", "youtube_id": "gLNmtUEvI5A", "article": "https://spaceflightnow.com/2016/06/15/spacex-successfully-fires-satellites-into-orbit-but-loses-booster-on-landing/", "wikipedia": "https://en.wikipedia.org/wiki/ABS_(satellite_operator)"}, "static_fire_date_utc": "2016-06-13T15:03:00.000Z", "static_fire_date_unix": 1465830180, "tbd": false, "net": false, "window": 2700, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "One year after pioneering this technique on flight 16, Falcon again launched two Boeing 702SP gridded ion thruster satellites in a dual-stack configuration, with the two customers sharing the rocket and mission costs. First stage landing attempt on drone ship failed on landing due to low thrust on one of the three landing engines.", "crew": [], "ships": ["5ea6ed2e080df4000697c906", "5ea6ed2f080df4000697c90b", "5ea6ed2f080df4000697c90c", "5ea6ed30080df4000697c913"], "capsules": [], "payloads": ["5eb0e4bfb6c3bb0006eeb203", "5eb0e4bfb6c3bb0006eeb204"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 31, "name": "ABS-2A / Eutelsat 117W B", "date_utc": "2016-06-15T14:29:00.000Z", "date_unix": 1466000940, "date_local": "2016-06-15T10:29:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a2f359184f403b2641", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": false, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87cf8ffd86e000604b348"}, {"fairings": null, "links": {"patch": {"small": "https://images2.imgbox.com/b6/52/p5vdNEJF_o.png", "large": "https://images2.imgbox.com/7c/07/rs4MS4HU_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/4ksed1", "launch": "https://www.reddit.com/r/spacex/comments/4t2umd/", "media": "https://www.reddit.com/r/spacex/comments/4tayth", "recovery": "https://www.reddit.com/r/spacex/comments/4znsvo"}, "flickr": {"small": [], "original": ["https://farm9.staticflickr.com/8819/27776240293_fcbf8c4a0a_o.jpg", "https://farm8.staticflickr.com/7720/27776237513_038971797c_o.jpg", "https://farm8.staticflickr.com/7594/27776235133_d794ce01f4_o.jpg", "https://farm8.staticflickr.com/7759/27776229243_a0674e590f_o.jpg", "https://farm8.staticflickr.com/7512/27776228443_6652c6baea_o.jpg", "https://farm9.staticflickr.com/8038/27776218453_34112abbc1_o.jpg", "https://farm8.staticflickr.com/7636/27776215913_3f9f1b05df_o.jpg", "https://farm8.staticflickr.com/7740/28358960896_9785456101_o.jpg", "https://farm8.staticflickr.com/7488/27776206663_262526ba5f_o.jpg", "https://farm8.staticflickr.com/7656/28358955546_ce55d65e16_o.jpg", "https://farm8.staticflickr.com/7467/27776204693_68b4ed82c9_o.jpg", "https://farm8.staticflickr.com/7693/28348649546_0a54b1aa44_o.jpg", "https://farm8.staticflickr.com/7540/28291786662_5e2e874576_o.jpg"]}, "presskit": "https://drive.google.com/open?id=0BwA3a65ef1OvM0JpSXdDUUJMRVk", "webcast": "https://www.youtube.com/watch?v=ThIdCuSsJh8", "youtube_id": "ThIdCuSsJh8", "article": "https://spaceflightnow.com/2016/07/18/spacex-sends-supplies-to-space-station-lands-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": 1468636307, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "Among other cargo, an International Docking Adapter (IDA-2) was carried to the ISS. This mission had a successful

first-stage landing at Cape Canaveral.*Including the reusable Dragon Capsule, tot
al payload to orbit was 6457 kg.", "crew": [], "ships": ["5ea6ed2e080df4000697c90
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launches-japanese-satellite-then-nails-bullseye-landing/", "wikipedia": "https://
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n. All previous landings from a ballistic trajectory had fired three engines on t
he landing-burn, which provided more braking force, but subjected the vehicle to
greater structural stresses. The single-engine landing burn takes more time and f
uel, but puts less stress on the vehicle.", "crew": [], "ships": ["5ea6ed2e080df4
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aceflightnow.com/2016/09/01/spacex-rocket-and-israeli-satellite-destroyed-in-laun
ch-pad-explosion/", "wikipedia": "https://en.wikipedia.org/wiki/Amos-6"}, "static
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test. The pad was clear of personnel and there were no injuries.", "crew": [], "s
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eturn-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 th
e 66 plus 9 spare satellite constellation by mid 2018. The first two Iridium qual
ification units were supposed to ride a Dnepr rocket in April 2016 but were delay
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band satellite capable of providing communication services from East Africa and C
entral Asia to southern India, Southeast Asia, the Philippines, Guam, Korea, and
Japan. The satellite will be placed in GEO at 113\\u00c2\\u00b0 East Longitude, a
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a849_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, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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", "auto_update": true, "failures": [], "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}], "id": "5eb87d16ffd86e000604b363"}, {"fairings": null, "links": {"patch": {"small": "https://images2.imgbox.com/e7/bf/WzMju1cP_o.png", "large": "https://images2.imgbox.com/4c/3a/VGGRo5PT_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/82op7a/crs14_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/88s8a7/rspacex_crs14_official_launch_discussion_updates/", "media": "https://www.reddit.com/r/spacex/comments/88l52i/rspacex_crs14_media_thread_videos_images_gifs/", "recovery": null}, "flickr": {"small": [], "original": ["https://farm1.staticflickr.com/819/26326005987_c3aec29db5_o.jpg", "https://farm1.staticflickr.com/791/40303273215_4926c917c4_o.jpg", "https://farm1.staticflickr.com/867/26326007227_39e71e6775_o.jpg"]}, "presskit": "http://www.spacex.com/sites/spacex/files/crs-14presskit2018.pdf", "webcast": "https://www.youtube.com/watch?v=BPQHG-LevZM", "youtube_id": "BPQHG-LevZM", "article": "https://spaceflightnow.com/2018/04/02/spacex-supply-ship-departs-cape-canaveral-for-space-station/", "wikipedia": "https://en.wikipedia.org/wiki/SpaceX_CRS-14"}, "static_fire_date_utc": "2018-03-28T15:52:00.000Z", "static_fire_date_unix": 1522252320, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "The launch used a refurbished booster (from CRS-12) for the 11th time, and a refurbished capsule (C110 from CRS-8) for the third time. 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", "auto_update": true, "failures": [], "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}], "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_20c2e

31de3_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-surveyor-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, "tbd": false, "net": false, "window": 30, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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", "auto_update": true, "failures": [], "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"}], "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, "tbd": false, "net": false, "window": 7620, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "First launch of a Block V first stage.", "crew": [], "ships": ["5ea6ed2e080df4000697c90a", "5ea6ed2f080df4000697c90b", "5ea6ed30080df4000697c913", "5ea6ed30080df4000697c916"], "capsules": [], "payloads": ["5eb0e4c7b6c3bb0006eeb223"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "failures": [], "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,

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m/r/spacex/comments/8ffsgl/iridium6_gracefo_launch_campaign_thread/", "launch":
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2/rideshare-launch-by-spacex-serves-commercial-and-scientific-customers/", "wikip
edia": "https://en.wikipedia.org/wiki/Gravity_Recovery_and_Climate_Experiment"},
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674560, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d
1ec", "success": true, "details": "GFZ arranged a rideshare of GRACE-FO on a Falc
on 9 with Iridium following the cancellation of their Dnepr launch contract in 20
15. Iridium CEO Matt Desch disclosed in September 2017 that GRACE-FO would be lau
nched on the sixth Iridium NEXT mission. The booster reuse turnaround was a recor
d 4.5 months between flights.", "crew": [], "ships": ["5ea6ed2e080df4000697c90
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m/2018/06/04/multi-mission-telecom-craft-launched-by-spacex-for-ses/", "wikipedi
a": "https://en.wikipedia.org/wiki/SES-12"}, "static_fire_date_utc": "2018-05-25T
01:48:00.000Z", "static_fire_date_unix": 1527212880, "tbd": false, "net": false,
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"SES-12, the replacement satellite for NSS-6, was successfully launched and deplo
yed on June 4th, completing SpaceX\'s eleventh flight of 2018. According to SES L
uxembourg, The SES-12 satellite will expand SES\\u2019s capabilities to provide d
irect-to-home (DTH) broadcasting, VSAT, Mobility and High Throughput Satellite (H
TS) data connectivity services in the Middle East and the Asia-Pacific region, in
cluding rapidly growing markets such as India and Indonesia. [SES-12] will be co-
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the Merah Putih (also known as Telkom-4) geostationary communications satellite f
or Telkom Indonesia. It marked the first reuse of any Block 5 first stage; the bo
oster B1046 had previously launched Bangabandhu-1. The stage was recovered and is
expected to become the first Falcon 9 booster to fly three missions.", "crew":
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-telesat-achieve-repeat-success-with-midnight-hour-launch/", "wikipedia": "http
s://en.wikipedia.org/wiki/Telstar_18V"}, "static_fire_date_utc": "2018-09-05T07:2
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paceX\'s sixteenth flight of 2018 launched the Telstar 18v GEO communication sate
llite for Telesat, the second launch for the canadian company in a few months. Th
e first stage was a new Falcon 9 V1.2 Block 5 which was successfully recovered on
OCISLY.", "crew": [], "ships": ["5ea6ed30080df4000697c913", "5ea6ed2f080df4000697
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8/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, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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", "auto_update": true, "failures": [], "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"}], "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, "tbd": false, "net": false, "window": 6180, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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", "auto_update": true, "failures": [], "flight_number": 70, "name": "Es\\u2019hail 2", "date_utc": "2018-11-15T20:46:00.000Z", "date_unix": 1542314760, "date_local": "2018-11-15T15:46:00-05:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a5f359181eed3b2657", "flight": 2, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87d24ffd86e000604b36f"}, {"fairings": {"reused": false, "recovery_attempt": true, "recovered": false, "ships": ["5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/07/ff/s2SD7HuJ_o.png", "large": "https://images2.imgbox.com/c3/88/YprVKOBk_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/9raysi/ssoa_launch_campaign_thread", "launch": "https://www.reddit.com/r/spacex/comments/a0vjff/rspacex_ssoa_official_launch_discussion_updates/", "media": "https://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_thread/"}, "flickr": {"small": [], "original": ["https://farm

5.staticflickr.com/4875/45257565145_d53757e0b2_o.jpg", "https://farm5.staticflickr.com/4839/45257565835_4fd6f3e895_o.jpg", "https://farm5.staticflickr.com/4822/45257566865_9c9d34a7ca_o.jpg", "https://farm5.staticflickr.com/4821/45257568225_186c8431cf_o.jpg", "https://farm5.staticflickr.com/4885/45257569445_1d74a601df_o.jpg", "https://farm5.staticflickr.com/4869/45257570925_8eae9a0888_o.jpg", "https://farm5.staticflickr.com/4842/31338804427_2e4dcda6e7_o.jpg", "https://farm5.staticflickr.com/4894/46227271292_2eee9af3eb_o.jpg", "https://farm5.staticflickr.com/4870/44460659210_de634098ac_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/ssoa_press_kit.pdf", "webcast": "https://www.youtube.com/watch?v=Wq8kS6UoOrQ", "youtube_id": "Wq8kS6UoOrQ", "article": "https://spaceflightnow.com/2018/12/03/spacex-launches-swarm-of-satellites-re-flies-rocket-for-third-time/", "wikipedia": "https://en.wikipedia.org/wiki/Spaceflight_Industries"}, "static_fire_date_utc": "2018-11-15T21:55:00.000Z", "static_fire_date_unix": 1542318900, "tbd": false, "net": false, "window": 1680, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "SpaceX\'s nineteenth flight of 2018 will fly SSO-A: SmallSat Express out of Vandenberg SLC-4E for Spaceflight. SSO-A is a rideshare to sun synchronus low earth orbit 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 missions. ", "crew": [], "ships": ["5ea6ed2f080df4000697c910", "5ea6ed30080df4000697c912", "5ea6ed30080df4000697c914", "5ea6ed2e080df4000697c908"], "capsules": [], "payloads": ["5eb0e4c9b6c3bb0006eeb22e"], "launchpad": "5e9e4502f509092b78566f87", "auto_update": true, "failures": [], "flight_number": 71, "name": "SSO-A", "date_utc": "2018-12-03T18:34:00.000Z", "date_unix": 1543861920, "date_local": "2018-12-03T10:34:00-08:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a5f359182b023b2656", "flight": 3, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3033383ecbb9e534e7cc"}], "id": "5eb87d25ffd86e000604b370"}, {"fairings": null, "links": {"patch": {"small": "https://images2.imgbox.com/de/47/liJzNMRP_o.png", "large": "https://images2.imgbox.com/b6/15/tLQrmwcl_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/9z7i4j/crs16_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/a2oubw/rspacex_crs16_official_launch_discussion_updates/", "media": "https://www.reddit.com/r/spacex/comments/a2uojp/rspacex_crs16_media_thread_videos_images_gifs/", "recovery": "https://www.reddit.com/r/spacex/comments/a3n3vm/crs16_emergency_recovery_thread/"}, "flickr": {"small": [], "original": ["https://farm5.staticflickr.com/4835/45473442624_69ee8bee45_o.jpg", "https://farm5.staticflickr.com/4903/45473443604_0d668c31da_o.jpg", "https://farm5.staticflickr.com/4858/45473444314_413a344dcb_o.jpg", "https://farm5.staticflickr.com/4856/45473445134_d9384878f8_o.jpg", "https://farm5.staticflickr.com/4840/45473446114_7d5e5d6fe2_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/crs16_press_kit_12_4.pdf", "webcast": "https://www.youtube.com/watch?v=Esh1jHT9oTA", "youtube_id": "Esh1jHT9oTA", "article": "https://spaceflightnow.com/2018/12/05/spacex-falcon-9-boosts-dragon-cargo-ship-to-orbit-first-stage-misses-landing-target/", "wikipedia": "https://en.wikipedia.org/wiki/SpaceX_CRS-16"}, "static_fire_date_utc": "2018-11-30T19:57:00.000Z", "static_fire_date_unix": 1543607820, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "SpaceX\'s 16th Crew Resupply Mission on behalf of NASA, with a total of 20 contracted flights. 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", "auto_update": true, "failures": [], "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, "la

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atellite-launch/", "wikipedia": "https://en.wikipedia.org/wiki/GPS_Block_IIIA"},
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r Force and was SpaceX\'s first EELV mission. The spacecraft was delivered to a M
EO transfer orbit from SLC-40 at Cape Canaveral Air Force Station. This mission w
as the first to fly with the redesigned COPV on the first stage (B1054) as well a
s the second. The booster was expended.", "crew": [], "ships": [], "capsules":
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com/2019/01/11/spacex-begins-2019-with-eighth-and-final-for-upgraded-iridium-netw
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irst flight of 2019 will be the eighth and final launch of its planned Iridium fl
ights. Delivering 10 satellites to low earth orbit, this brings the total up to 7
5 and completes the Iridium NEXT constellation. This mission launches from SLC-4E
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r Space Systems Loral (SSL). The primary payload for this mission is Nusantara Sa
tu, a communications satellite built by SSL for the private Indonesian company PT
Pasifik Satelit Nusantara (PSN). Spaceflight Industries\' GTO-1 mission consists
of two secondary payloads. One of those is Beresheet, the lunar lander built by t
he Israeli non-profit organization, SpaceIL. Beresheet will make its own way to t
he moon from GTO. The other secondary is Air Force Research Lab\'s (Space Situati
onal Awareness) S5 mission, which hitches a ride to GEO aboard Nusantara Satu. Th
is mission launches from SLC-40 at Cape Canaveral AFS. The booster is expected to
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eused": false, "landing_attempt": true, "landing_success": true, "landing_type": "RTLS", "landpad": "5e9e3032383ecb267a34e7c7"}, {"core": "5e9e28a6f359188fd53b265e", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": true, "landing_type": "RTLS", "landpad": "5e9e3032383ecb90a834e7c8"}], "id": "5eb87d2dffd86e000604b376"}, {"fairings": null, "links": {"patch": {"small": "https://images2.imgbox.com/fc/58/9UErD3ut_o.png", "large": "https://images2.imgbox.com/12/47/6uim8L1a_o.png"}, "reddit": {"campaign": "https://new.reddit.com/r/spacex/comments/bd2l28/crs17_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/bjsn0v/rspacex_crs17_official_launch_discussion_updates", "media": "https://www.reddit.com/r/spacex/comments/bkc4d5/rspacex_crs17_media_thread_videos_images_gifs", "recovery": "https://www.reddit.com/r/spacex/comments/bjy7p5/rspacex_crs17_recovery_discussion_updates_thread"}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/46856594435_206c773b5a_o.jpg", "https://live.staticflickr.com/65535/47720639872_284e49381d_o.jpg", "https://live.staticflickr.com/65535/46856594755_88f1b22e50_o.jpg", "https://live.staticflickr.com/65535/47720639542_1b7c1a71b0_o.jpg", "https://live.staticflickr.com/65535/47720639732_e04b2a9ed7_o.jpg", "https://live.staticflickr.com/65535/32829382467_087d024428_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/crs-17_press_kit.pdf", "webcast": "https://youtu.be/AQFhX5TvP0M", "youtube_id": "AQFhX5TvP0M", "article": "https://spaceflightnow.com/2019/05/04/spacex-launches-space-station-resupply-mission-lands-rocket-on-drone-ship/", "wikipedia": "https://en.wikipedia.org/wiki/SpaceX_CRS-17"}, "static_fire_date_utc": "2019-04-27T07:23:00.000Z", "static_fire_date_unix": 1556349780, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "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 Test Program-Houston 6. The Falcon 9 launches from SLC-40 at Cape Canaveral AFS. The booster was expected to land at LZ-1, however, due to the ongoing investigation and clean-up following the Crew Dragon testing incident, it is likely to land on OCISLY instead.\\n   ", "crew": [], "ships": ["5ea6ed30080df4000697c913", "5ea6ed2f080df4000697c90e", "5ea6ed2f080df4000697c90b"], "capsules": ["5e9e2c5cf3591869b63b2670"], "payloads": ["5eb0e4cbb6c3bb0006eeb237"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 78, "name": "CRS-17", "date_utc": "2019-05-04T06:48:00.000Z", "date_unix": 1556952480, "date_local": "2019-05-04T02:48:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a7f3591809313b2660", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87d2effd86e000604b377"}, {"fairings": {"reused": false, "recovery_attempt": true, "recovered": true, "ships": ["5ea6ed2f080df4000697c90c"]}, "links": {"patch": {"small": "https://images2.imgbox.com/7e/27/MGYJy1JY_o.png", "large": "https://images2.imgbox.com/75/9d/jIMV5w8x_o.png"}, "reddit": {"campaign": "https://www.reddit.com/comments/bjybrl", "launch": "https://www.reddit.com/r/spacex/comments/brfbic/rspacex_starlink_official_launch_discussion", "media": "https://www.reddit.com/r/spacex/comments/bp0479/rspacex_starlink_media_thread_videos_images_gifs", "recovery": "https://www.reddit.com/r/spacex/comments/bsaljm/rspacex_starlink_b10493_recovery_discussion_and"}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/47926143711_4a0b2680bf_o.jpg", "https://live.staticflickr.com/65535/47926136902_d8ce35223d_o.jpg", "https://live.staticflickr.com/65535/47926144123_2a828b66d5_o.jpg", "https://live.staticflickr.com/65535/47926137127_ef58152b6b_o.jpg", "https://live.staticflickr.com/65535/47926137017_e6d86fa820_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/starlink_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.org/wiki/Starlink_(satellite_constellation)"}, "static_fire_date_utc": "2019-05-13T20:06:00.000Z", "static_fire_date_unix": 1557777960, "tbd": false, "net": false, "window": 9000, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "Sp

aceX will launch dozens 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 latency 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": ["5ea6ed30080df4000697c913", "5ea6ed2f080df4000697c90c", "5ea6ed2f080df4000697c90e", "5ea6ed2f080df4000697c90b", "5ea6ed2e080df4000697c909"], "capsules": [], "payloads": ["5eb0e4cbb6c3bb0006eeb238"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 79, "name": "Starlink v0.9", "date_utc": "2019-05-24T02:30:00.000Z", "date_unix": 1558665000, "date_local": "2019-05-23T22:30:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a5f3591833b13b2659", "flight": 3, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87d30ffd86e000604b378"}, {"fairings": {"reused": false, "recovery_attempt": false, "recovered": null, "ships": []}, "links": {"patch": {"small": "https://images2.imgbox.com/4e/dd/qsIUVh1j_o.png", "large": "https://images2.imgbox.com/c3/06/2irK3PGj_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/buq487/radarsat_constellation_launch_campaign_thread", "launch": "https://www.reddit.com/r/spacex/comments/byp69f/rspacex_radarsat_constellation_official_launch", "media": null, "recovery": null}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/48052269657_71764b0fb3_o.jpg", "https://live.staticflickr.com/65535/48052269617_34447619f0_o.jpg", "https://live.staticflickr.com/65535/48052224858_20ea2a411e_o.jpg", "https://live.staticflickr.com/65535/48052269562_325c117b81_o.jpg", "https://live.staticflickr.com/65535/48052182461_a419db6b84_o.jpg", "https://live.staticflickr.com/65535/48052224733_f89f1dd046_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/radarsat_constellation_mission_press_kit.pdf", "webcast": "https://youtu.be/8A2nJd9Urk8", "youtube_id": "8A2nJd9Urk8", "article": "https://spaceflightnow.com/2019/06/12/three-canadian-radar-surveillance-satellites-ride-spacex-rocket-into-orbit/", "wikipedia": "https://en.wikipedia.org/wiki/RADARSAT_Constellation"}, "static_fire_date_utc": "2019-06-08T08:39:00.000Z", "static_fire_date_unix": 1559983140, "tbd": false, "net": false, "window": 780, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "SpaceX is launching the three satellite RADARSAT Constellation Mission into Sun Synchronous orbit from SLC-4E, VAFB. The RCM spacecraft are synthetic aperture radar (SAR) Earth observation satellites built 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 booster is expected to return to LZ-4.", "crew": [], "ships": [], "capsules": [], "payloads": ["5eb0e4ccb6c3bb0006eeb239"], "launchpad": "5e9e4502f509092b78566f87", "auto_update": true, "failures": [], "flight_number": 80, "name": "RADARSAT Constellation", "date_utc": "2019-06-12T14:17:00.000Z", "date_unix": 1560349020, "date_local": "2019-06-12T07:17:00-07:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a6f35918c0803b265c", "flight": 2, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "RTLS", "landpad": "5e9e3032383ecb554034e7c9"}], "id": "5eb87d31ffd86e000604b379"}, {"fairings": {"reused": false, "recovery_attempt": true, "recovered": true, "ships": ["5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/b0/23/BvwaqoS0_o.png", "large": "https://images2.imgbox.com/18/17/gCjLjHbl_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/bw6aa8/stp2_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/c40a29/rspacex_stp2_official_launch_discussion_updates", "media": "https://www.reddit.com/r/spacex/comments/c4ng3a/rspacex_stp2_media_thread_videos_images_gifs", "recovery": null}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/48129211778_83c1769305_o.jpg", "https://live.staticflickr.com/65535/48129211908_8390c775b0_o.jpg", "https://live.staticflickr.com/65535/48129182836_fd53e5646b_o.jpg", "https://live.staticflickr.com/65535/48129269897_22d854be5c_o.jpg", "https://live.staticflickr.com/65535/48129182631_572051790c_o.jpg", "https://live.staticflickr.com/65535/48129211693_d23b0287f1_o.jpg", "https://live.staticflickr.com/6553

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Amos-5 at 17\\u00b0 E. Amos-17 carries multi-band high throughput and regional be
ams servicing Africa, Europe and the Middle East. The cost of this launch is cove
red for Spacecom by SpaceX credit following the Amos-6 incident. A recovery of th
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m/2019/11/11/successful-launch-continues-deployment-of-spacexs-starlink-network",
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to contribute to the 550 km x 53\\u00b0 shell. It is the second Starlink launch o
verall. Starlink is a low Earth orbit broadband internet constellation developed
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will provide low latency internet service to ground terminals around the world. T
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NASA CRS contract, this mission brings essential supplies to the International Sp
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flight of a Dragon 1 capsule. (CRS-21 and up under the new Commercial Resupply Services 2 contract will use Dragon 2.) The external payload for this mission is the Bartolomeo ISS external 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": [], "ships": [], "capsules": ["5e9e2c5cf359185d753b266f"], "payloads": ["5eb0e4d0b6c3bb0006eeb253"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 91, "name": "CRS-20", "date_utc": "2020-03-07T04:50:31.000Z", "date_unix": 1583556631, "date_local": "2020-03-06T23:50:31-05:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a7f359187afd3b2662", "flight": 2, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "RTLS", "landpad": "5e9e3032383ecb267a34e7c7"}], "id": "5eb87d42ffd86e000604b384"}, {"fairings": {"reused": true, "recovery_attempt": true, "recovered": false, "ships": ["5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/9a/96/nLppz9HW_o.png", "large": "https://images2.imgbox.com/d2/3b/bQaWiil0_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/f8awv0/starlink5_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/fhymy3/rspacex_starlink_5_official_launch_discussion/", "media": "https://www.reddit.com/r/spacex/comments/fizrn1/rspacex_starlink5_media_thread_videos_images_gifs/", "recovery": null}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/49673373182_93a517e140_o.jpg", "https://live.staticflickr.com/65535/49672551378_fabc17ef6f_o.jpg", "https://live.staticflickr.com/65535/49672551303_564ce21658_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/sixth_starlink_press_kit.pdf", "webcast": "https://youtu.be/I4sMhHbHYXM", "youtube_id": "I4sMhHbHYXM", "article": "https://spaceflightnow.com/2020/03/18/falcon-9-rocket-overcomes-engine-failure-to-deploy-starlink-satellites/", "wikipedia": "https://en.wikipedia.org/wiki/Starlink"}, "static_fire_date_utc": "2020-03-13T18:37:00.000Z", "static_fire_date_unix": 1584124620, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "The sixth Starlink launch overall and the fifth operational batch of Starlink satellites will launch into orbit aboard 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 orbits to 550 km in three groups of 20, making use of precession rates to separate themselves into three planes. The booster will land on a drone ship approximately 628 km downrange.", "crew": [], "ships": ["5ea6ed30080df4000697c913", "5ea6ed2f080df4000697c90d"], "capsules": [], "payloads": ["5eb0e4d0b6c3bb0006eeb254"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "failures": [], "flight_number": 92, "name": "Starlink 5", "date_utc": "2020-03-18T12:16:00.000Z", "date_unix": 1584533760, "date_local": "2020-03-18T08:16:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a5f3591809c03b2658", "flight": 5, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": false, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5eb87d43ffd86e000604b385"}, {"fairings": {"reused": true, "recovery_attempt": false, "recovered": null, "ships": ["5ea6ed2e080df4000697c908", "5ea6ed2f080df4000697c90d"]}, "links": {"patch": {"small": "https://images2.imgbox.com/9a/96/nLppz9HW_o.png", "large": "https://images2.imgbox.com/d2/3b/bQaWiil0_o.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/fxkc7k/starlink6_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/g5jmx0/rspacex_starlink_6_official_launch_discussion/", "media": "https://www.reddit.com/r/spacex/comments/g5fqka/rspacex_starlink6_media_thread_photographer/", "recovery": "https://www.reddit.com/r/spacex/comments/g6kztd/rspacex_starlink_v1_l6_recovery_discussion/"}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/49673373182_93a517e140_o.jpg", "https://live.staticflickr.com/65535/49672551378_fabc17ef6f_o.jpg", "https://live.staticflickr.com/65535/49672551303_564ce21658_o.jpg", "https://live.staticflickr.com/65535/49806771628_fef13c852d_o.jpg", "https://live.staticflickr.com/65535/49807633862_e5abcb41a6_o.jpg"]}, "presskit": "https://www.spacex.com/sites/spacex/files/seventh_starlink_mission_overview.pd

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maneuvering to their operational altitude of 550 km. The booster for this mission
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sa-astronauts-launch-from-us-soil-for-first-time-in-nine-years/", "wikipedia": "h
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carrying two NASA astronauts to the International Space Station. Barring unexpect
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United States since the end of the Space Shuttle program in 2011. DM-2 demonstrat
es 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
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three months. The astronauts have been undergoing additional training for the pos
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Starlink launch overall. The satellites will be delivered to low Earth orbit and
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nch 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 in
cludes rideshare payloads, SkySats 19-21, on top of the Starlink stack. The boost
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020/08/31/spacex-launches-first-polar-orbit-mission-from-florida-in-decades/", "w
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pacecraft are operated by CONAE, the Argentinian National Space Activities Commis
sion, 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 Spac
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eventh batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Cape Canaveral Air Force Station. It is the twelfth 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 an ASDS.", "crew": [], "ships": ["5ea6ed2e080df4000697c908", "5ea6ed2f080df4000697c90b", "5ee68c683c228f36bd5809b5"], "capsules": [], "payloads": ["5ef6a4600059c33cee4a829e"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "failures": [], "flight_number": 102, "name": "Starlink-11 (v1.0)", "date_utc": "2020-09-03T12:46:00.000Z", "date_unix": 1599137160, "date_local": "2020-09-03T08:46:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5ef670f10059c33cee4a826c", "flight": 2, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5ef6a1e90059c33cee4a828a"}, {"fairings": {"reused": true, "recovery_attempt": true, "recovered": true, "ships": ["5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/9a/96/nLppz9HW_o.png", "large": "https://images2.imgbox.com/d2/3b/bQaWiil0_o.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/iu0vtg/rspacex_starlink12_official_launch_discussion/", "media": "https://www.reddit.com/r/spacex/comments/iudifm/rspacex_starlink12_media_thread_photographer/", "recovery": null}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/50428228397_6151927733_o.jpg", "https://live.staticflickr.com/65535/50427359318_67b3397892_o.jpg", "https://live.staticflickr.com/65535/50428050591_36defbe958_o.jpg"]}, "presskit": null, "webcast": "https://youtu.be/UZkaE_9zwQQ", "youtube_id": "UZkaE_9zwQQ", "article": null, "wikipedia": "https://en.wikipedia.org/wiki/Starlink"}, "static_fire_date_utc": null, "static_fire_date_unix": null, "tbd": false, "net": false, "window": 0, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "This mission will launch the twelfth batch of operational Starlink satellites, which are expected 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 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 an ASDS.", "crew": [], "ships": ["5ea6ed2f080df4000697c90b", "5ea6ed2f080df4000697c910", "5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908", "5ea6ed30080df4000697c913"], "capsules": [], "payloads": ["5ef6a48e0059c33cee4a829f"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "failures": [], "flight_number": 103, "name": "Starlink-12 (v1.0)", "date_utc": "2020-10-06T11:29:00.000Z", "date_unix": 1601983740, "date_local": "2020-10-06T07:29:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a7f3591817f23b2663", "flight": 3, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5ef6a2090059c33cee4a828b"}, {"fairings": {"reused": true, "recovery_attempt": true, "recovered": null, "ships": ["5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/9a/96/nLppz9HW_o.png", "large": "https://images2.imgbox.com/d2/3b/bQaWiil0_o.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/jctqq9/rspacex_starlink13_official_launch_discussion/", "media": "https://www.reddit.com/r/spacex/comments/jdgsm2/rspacex_starlink13_media_thread_photographer/", "recovery": "https://www.reddit.com/r/spacex/comments/jdgpgl/starlink13_recovery_updates_discussion_thread/"}, "flickr": {"small": [], "original": ["https://live.staticflickr.com/65535/50500804918_eb1187e1b2_o.jpg", "https://live.staticflickr.com/65535/50501674637_f16f528728_o.jpg", "https://live.staticflickr.com/65535/50501515611_2a3753bed1_o.jpg", "https://live.staticflickr.com/65535/50501674632_0d5276b1b5_o.jpg"]}, "presskit": null, "webcast": "https://youtu.be/UM8CDDAmp98", "youtube_id": "UM8CDDAmp98", "article": "https://spaceflightnow.com/2020/10/18/spacex-launches-another-batch-of-starlink-satellites/", "wikipedia": "https://en.wikipedia.org/wiki/Starlink"}, "static_fire_date_utc": "2020-10-17T05:23:00.000Z", "static_fire_date_unix": 1602912180, "tbd":

false, "net": false, "window": null, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "This mission will launch the thirteenth batch of operational Starlink satellites, which are expected to be version 1.0, from LC-39A, Kennedy Space Center. It is the fourteenth 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 an ASDS.", "crew": [], "ships": ["5ea6ed30080df4000697c913", "5ea6ed2f080df4000697c90b", "5ee68c683c228f36bd5809b5", "5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908"], "capsules": [], "payloads": ["5ef6a4d50059c33cee4a82a1"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "failures": [], "flight_number": 104, "name": "Starlink-13 (v1.0)", "date_utc": "2020-10-18T12:25:00.000Z", "date_unix": 1603023900, "date_local": "2020-10-18T08:25:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5e9e28a6f35918c0803b265c", "flight": 6, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id": "5ef6a2bf0059c33cee4a828c"}, {"fairings": {"reused": false, "recovery_attempt": true, "recovered": null, "ships": ["5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908"]}, "links": {"patch": {"small": "https://images2.imgbox.com/9a/96/nLppz9HW_o.png", "large": "https://images2.imgbox.com/d2/3b/bQaWiil0_o.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/jetth8/rspacex_starlink14_official_launch_discussion/", "media": "https://www.reddit.com/r/spacex/comments/jhcwun/rspacex_starlink14_media_thread_photographer/", "recovery": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast": "https://youtu.be/2gbVgTxLgN0", "youtube_id": "2gbVgTxLgN0", "article": "https://spaceflightnow.com/2020/10/24/spacex-adds-another-60-satellites-to-starlink-network/", "wikipedia": "https://en.wikipedia.org/wiki/Starlink"}, "static_fire_date_utc": "2020-10-21T12:55:00.000Z", "static_fire_date_unix": 1603284900, "tbd": false, "net": false, "window": null, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "This mission will launch the fourteenth batch of operational Starlink satellites, which are expected to be version 1.0, from SLC-40, Kennedy Space Center. It is the fifteenth 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.", "crew": [], "ships": ["5ea6ed2f080df4000697c910", "5ea6ed2f080df4000697c90b", "5ea6ed2e080df4000697c907", "5ea6ed2e080df4000697c908"], "capsules": [], "payloads": ["5ef6a4ea0059c33cee4a82a2"], "launchpad": "5e9e4501f509094ba4566f84", "auto_update": true, "failures": [], "flight_number": 105, "name": "Starlink-14 (v1.0)", "date_utc": "2020-10-24T15:31:00.000Z", "date_unix": 1603553460, "date_local": "2020-10-24T11:31:00-04:00", "date_precision": "hour", "upcoming": false, "cores": [{"core": "5ef670f10059c33cee4a826c", "flight": 3, "gridfins": true, "legs": true, "reused": true, "landing_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9e3033383ecbb9e534e7cc"}], "id": "5ef6a2e70059c33cee4a8293"}, {"fairings": {"reused": null, "recovery_attempt": true, "recovered": null, "ships": ["5ea6ed2e080df4000697c907"]}, "links": {"patch": {"small": "https://i.imgur.com/Ehe9AgY.png", "large": "https://i.imgur.com/Ehe9AgY.png"}, "reddit": {"campaign": "https://www.reddit.com/r/spacex/comments/io0swm/gps_iii_sv04_launch_campaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/jobxn2/rspacex_gps_iii_sv04_sacagawea_official_launch/", "media": null, "recovery": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast": "https://youtu.be/wufXF5YKR1M", "youtube_id": "wufXF5YKR1M", "article": "https://spaceflightnow.com/2020/11/06/spacex-launches-gps-navigation-satellite-from-cape-canaveral/", "wikipedia": "https://en.wikipedia.org/wiki/GPS_Block_III"}, "static_fire_date_utc": "2020-09-25T05:42:00.000Z", "static_fire_date_unix": 1601012520, "tbd": false, "net": false, "window": null, "rocket": "5e9d0d95eda69973a809d1ec", "success": true, "details": "SpaceX will launch GPS Block III Space Vehicle 04 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 will be the fourth GPS III satellite launched and the third launched by SpaceX. The satellite will be delivered into a MEO transfer orbit. The booster

for this mission will land on an ASDS.", "crew": [], "ships": ["5ea6ed30080df4000
697c913", "5ee68c683c228f36bd5809b5", "5ea6ed2e080df4000697c907"], "capsules":
[], "payloads": ["5eb0e4d2b6c3bb0006eeb25e"], "launchpad": "5e9e4501f509094ba4566
f84", "auto_update": true, "failures": [], "flight_number": 106, "name": "GPS III
SV04 (Sacagawea)", "date_utc": "2020-11-05T23:24:00.000Z", "date_unix": 160461864
0, "date_local": "2020-11-05T18:24:00-05:00", "date_precision": "hour", "upcomin
g": false, "cores": [{"core": "5f57c5440622a633027900a0", "flight": 1, "gridfin
s": true, "legs": true, "reused": false, "landing_attempt": true, "landing_succes
s": true, "landing_type": "ASDS", "landpad": "5e9e3032383ecb6bb234e7ca"}], "id":
"5eb87d4cffd86e000604b38d"}, {"fairings": null, "links": {"patch": {"small": "htt
ps://i.imgur.com/BzaSAnx.png", "large": "https://i.imgur.com/t5R4BAQ.png"}, "redd
it": {"campaign": "https://www.reddit.com/r/spacex/comments/iwb8bl/crew1_launch_c
ampaign_thread/", "launch": "https://www.reddit.com/r/spacex/comments/ju7fxv/rspa
cex_crew1_official_launch_coast_docking/", "media": "https://www.reddit.com/r/spa
cex/comments/judv0r/rspacex_crew1_media_thread_photographer_contest/", "recover
y": null}, "flickr": {"small": [], "original": []}, "presskit": null, "webcast":
"https://youtu.be/bnChQbxLkkI", "youtube_id": "bnChQbxLkkI", "article": null, "wi
kipedia": "https://en.wikipedia.org/wiki/SpaceX_Crew-1"}, "static_fire_date_utc":
"2020-11-11T16:17:00.000Z", "static_fire_date_unix": 1605111420, "tbd": false, "n
et": false, "window": null, "rocket": "5e9d0d95eda69973a809d1ec", "success": tru
e, "details": "SpaceX will launch the first operational mission of its Crew Drago
n vehicle as part of NASA\'s Commercial Crew Transportation Capability Program (C
CtCap), carrying 3 NASA astronauts and 1 JAXA astronaut to the International Spac
e Station. This mission will be the second crewed flight to launch from the Unite
d States since the end of the Space Shuttle program in 2011.", "crew": ["5f7f1543
bf32c864a529b23e", "5f7f158bbf32c864a529b23f", "5f7f15d5bf32c864a529b240", "5f7f1
614bf32c864a529b241"], "ships": ["5ea6ed2f080df4000697c910", "5ee68c683c228f36bd5
809b5", "5ea6ed2f080df4000697c90c", "5ea6ed2e080df4000697c909", "5ea6ed2f080df400
0697c90b"], "capsules": ["5f6f99fddcfdf403df379709"], "payloads": ["5eb0e4d2b6c3b
b0006eeb25f"], "launchpad": "5e9e4502f509094188566f88", "auto_update": true, "fai
lures": [], "flight_number": 107, "name": "Crew-1", "date_utc": "2020-11-16T00:2
7:00.000Z", "date_unix": 1605486420, "date_local": "2020-11-15T19:27:00-05:00",
"date_precision": "hour", "upcoming": false, "cores": [{"core": "5f57c53d0622a633
0279009f", "flight": 1, "gridfins": true, "legs": true, "reused": false, "landing
_attempt": true, "landing_success": true, "landing_type": "ASDS", "landpad": "5e9
e3033383ecbb9e534e7cc"}], "id": "5eb87d4dffd86e000604b38e"}]'

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

In [15]:
```
# Use json_normalize meethod to convert the json result into a dataframe
static_json_df = res.json()
```

In [16]:
```
# apply json_normalize
data = pd.json_normalize(static_json_df)
```

In [17]:
```
# Get the head of the dataframe
# Get the head of the dataframe
data.head(5)
```

Out[17]:

	static_fire_date_utc	static_fire_date_unix	tbd	net	window	ro
0	2006-03-17T00:00:00.000Z	1.142554e+09	False	False	0.0	5e9d0d95eda69955f709
1	None	NaN	False	False	0.0	5e9d0d95eda69955f709
2	None	NaN	False	False	0.0	5e9d0d95eda69955f709
3	2008-09-20T00:00:00.000Z	1.221869e+09	False	False	0.0	5e9d0d95eda69955f709

	static_fire_date_utc	static_fire_date_unix	tbd	net	window	ro
4	None	NaN	False	False	0.0	5e9d0d95eda69955f709

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 [18]:
```
# Lets take a subset of our dataframe keeping only the features we want and the
data = data[['rocket', 'payloads', 'launchpad', 'cores', 'flight_number', 'date_

# We will remove rows with multiple cores because those are falcon rockets with
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 v
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 extractin
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 [19]:
```
#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 [ ]:
```
```

In [20]:
```
BoosterVersion
```

Out[20]:
```
[]
```

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

In [21]:
```
# Call getBoosterVersion
getBoosterVersion(data)
```

the list has now been update

In [22]:
```
BoosterVersion[0:5]
```

Out[22]:
```
['Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 9']
```

we can apply the rest of the functions here:

In [23]:
```
# Call getLaunchSite
getLaunchSite(data)
```

In [24]:
```
# Call getPayloadData
getPayloadData(data)
```

In [25]:
```
# Call getCoreData
getCoreData(data)
```

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

In [26]:
```
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 [27]:
```
# Create a data from launch_dict
launch_df = pd.DataFrame([launch_dict])
```

Show the summary of the dataframe

In [28]:
```
# Show the head of the dataframe
launch_df.head(5)
```

Out[28]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
0	[1, 2, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 57, 58, 59, 60, 61, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 76, 78, 79, 80, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103, 104, 105, 106]	[2006-03-24, 2007-03-21, 2008-09-28, 2009-07-13, 2010-06-04, 2012-05-22, 2013-03-01, 2013-09-29, 2013-12-03, 2014-01-06, 2014-04-18, 2014-07-14, 2014-08-05, 2014-09-07, 2014-09-21, 2015-01-10, 2015-02-11, 2015-04-14, 2015-04-27, 2015-06-28, 2015-12-22, 2016-01-17, 2016-03-04, 2016-04-08, 2016-05-06, 2016-05-27, 2016-07-18, 2016-08-14, 2016-09-01,	[Falcon 1, Falcon 1, Falcon 1, Falcon 1, Falcon 9, Falcon	[20, None, 165, 200, None, 525, 677, 500, 3170, 3325, 2296, 1316, 4535, 4428, 2216, 2395, 570, 1898, 4707, 2477, 2034, 553, 5271, 3136, 4696, 3100, 2257, 4600, 5500, 9600, 2490, 5600, 5300, None, 6070, 2708, 3669, 9600, 6761, 2910, 475, 4990, 9600, 5200, 3700, 2205, 9600, None, 4230, 6092, 9600, 2760, 350, 3750, 5383.85, 2410, 7076, 9600, 5800, 7060, 2800, 3000, 4000, 2573, 4400, 9600, 12259, 2482, 13200, 1425, 2227.7, 6500, 15600, 5000, 6800, 15600, None, 15600, 15600, 1977, 15600, 15600, 9525, 15600, 15600, 3880, None, 15600, 1600, 15600, 15600, 15600, 15600, 3681]	[LEO, LEO, LEO, LEO, LEO, LEO, ISS, PO, GTO, GTO, ISS, LEO, GTO, GTO, ISS, ISS, ES-L1, ISS, GTO, ISS, LEO, PO, GTO, ISS, GTO, GTO, GTO, ISS, GTO, GTO, PO, ISS, GTO, GTO, LEO, GTO, ISS, GTO, PO, GTO, ISS, SSO, LEO, PO, GTO, GTO, ISS, PO, LEO, GTO, GTO, PO, ISS, HEO, GTO, GTO, ISS, GTO,	[Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, VAFB	[None None, None None, None None, None None, None None, None None, None None, False Ocean, None None, None None, True Ocean, True Ocean, None None, None None, False Ocean, False ASDS, True Ocean, False ASDS, None None, None ASDS, True RTLS, False ASDS, False ASDS, True ASDS, True ASDS, True ASDS, True RTLS, True ASDS, None ASDS,	[1

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2017-	9, Falcon 9,		PO,	SLC 4E,	True	
	01-14,	Falcon 9, Falcon		GTO,	KSC LC	ASDS,	
	2017-	9, Falcon 9,		GTO,	39A, KSC	True	
	02-19,	Falcon 9, Falcon		SSO,	LC 39A,	RTLS,	
	2017-	9, Falcon 9]		GTO,	VAFB SLC	None	
	03-16,			SSO,	4E, KSC LC	None,	
	2017-			ISS,	39A, VAFB	True	
	03-30,			MEO,	SLC 4E,	ASDS,	
	2017-			PO,	KSC LC	True	
	05-01,			ISS,	39A, KSC	RTLS,	
	2017-			ISS,	LC 39A,	None	
	05-15,			VLEO,	CCSFS SLC	None,	
	2017-			SSO,	40, VAFB	True	
	06-03,			ISS,	SLC 4E,	RTLS,	
	2017-			GTO,	CCSFS SLC	True	
	06-23,			VLEO,	40, CCSFS	ASDS,	
	2017-			ISS,	SLC 40,	True	
	06-25,			GTO,	CCSFS SLC	ASDS,	
	2017-			VLEO,	40, VAFB	None	
	07-05,			SO,	SLC 4E,	None,	
	2017-			VLEO,	CCSFS SLC	True	
	08-14,			VLEO,	40, CCSFS	RTLS,	
	2017-			ISS,	SLC 40,	True	
	08-24,			VLEO,	KSC LC	ASDS,	
	2017-			VLEO,	39A, CCSFS	True	
	09-07,			ISS,	SLC 40,	RTLS,	
	2017-			VLEO,	CCSFS SLC	True	
	10-09,			VLEO,	40, CCSFS	ASDS,	
	2017-			MEO,	SLC 40,	True	
	10-11,			GEO,	VAFB SLC	ASDS,	
	2017-			VLEO,	4E, CCSFS	True	
	10-30,			SSO,	SLC 40,	ASDS,	
	2017-			VLEO,	CCSFS SLC	True	
	12-15,			VLEO,	40, VAFB	RTLS,	
	2017-			VLEO,	SLC 4E,	True	
	12-23,			VLEO,	KSC LC	Ocean,	
	2018-			MEO]	39A, VAFB	True	
	01-08,				SLC 4E,	RTLS,	
	2018-				CCSFS SLC	True	
	01-31,				40, CCSFS	Ocean,	
	2018-				SLC 40,	None	
	03-06,				VAFB SLC	None,	
	2018-				4E, KSC LC	None	
	03-30,				39A, CCSFS	None,	
	2018-				SLC 40,	None	
	04-02,				CCSFS SLC	None,	
	2018-				40, VAFB	True	
	04-18,				SLC 4E,	ASDS,	
	2018-				CCSFS SLC	True	
	05-11,				40, CCSFS	ASDS,	
	2018-				SLC 40,	None	
	06-04,				CCSFS SLC	None,	
	2018-				40, CCSFS	None	
	06-29,				SLC 40,	None,	
	2018-				CCSFS SLC	True	
	07-22,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	07-25,				KSC LC	ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2018-				39A, CCSFS	True	
	08-07,				SLC 40,	ASDS,	
	2018-				CCSFS SLC	True	
	09-10,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	10-08,				KSC LC	RTLS,	
	2018-				39A, KSC	True	
	11-15,				LC 39A,	ASDS,	
	2018-				KSC LC	True	
	12-03,				39A, CCSFS	ASDS,	
	2018-				SLC 40,	False	
	12-05,				CCSFS SLC	RTLS,	
	2018-				40, CCSFS	None	
	12-23,				SLC 40,	None,	
	2019-				CCSFS SLC	True	
	01-11,				40, CCSFS	ASDS,	
	2019-				SLC 40,	True	
	03-02,				CCSFS SLC	ASDS,	
	2019-				40, KSC LC	True	
	05-04,				39A, KSC	ASDS,	
	2019-				LC 39A,	True	
	05-24,				KSC LC	ASDS,	
	2019-				39A, CCSFS	True	
	06-12,				SLC 40,	RTLS,	
	2019-				CCSFS SLC	True	
	07-25,				40]	RTLS,	
	2019-					None	
	08-06,					None,	
	2019-					True	
	11-11,					ASDS,	
	2019-					True	
	12-05,					ASDS,	
	2019-					True	
	12-17,					ASDS,	
	2020-					True	
	01-07,					ASDS,	
	2020-					None	
	01-19,					None,	
	2020-					True	
	01-29,					ASDS,	
	2020-					False	
	02-17,					ASDS,	
	2020-					True	
	03-07,					RTLS,	
	2020-					False	
	03-18,					ASDS,	
	2020-					True	
	04-22,					ASDS,	
	2020-					True	
	05-30,					ASDS,	
	2020-					True	
	06-04,					ASDS,	
	2020-					True	
	06-13,					ASDS,	
	2020-					True	
	06-30,					ASDS,	
	2020-					True	
	07-20,					ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2020-08-18, 2020-08-30, 2020-09-03, 2020-10-06, 2020-10-18, 2020-10-24, 2020-11-05]					True ASDS, True RTLS, True ASDS, True ASDS, True ASDS, True ASDS, True ASDS]	

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 [29]:
```
# Hint data['BoosterVersion']!='Falcon 1'
data_falcon9 = launch_df[launch_df['BoosterVersion'] != 'Falcon 1']
data_falcon9
```

Out[29]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
0	[1, 2, 4, 5, 6, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 57, 58, 59, 60, 61, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 76, 78, 79, 80, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 100, 101, 102, 103, 104, 105, 106]	[2006-03-24, 2007-03-21, 2008-09-28, 2009-07-13, 2010-06-04, 2012-05-22, 2013-03-01, 2013-09-29, 2013-12-03, 2014-01-06, 2014-04-18, 2014-07-14, 2014-08-05, 2014-09-07, 2014-09-21, 2015-01-10, 2015-02-11, 2015-04-14, 2015-04-27, 2015-06-28, 2015-12-22, 2016-01-17, 2016-03-04, 2016-04-08, 2016-05-06, 2016-05-27, 2016-07-18, 2016-08-14, 2016-09-01,	[Falcon 1, Falcon 1, Falcon 1, Falcon 1, Falcon 9, Falcon	[20, None, 165, 200, None, 525, 677, 500, 3170, 3325, 2296, 1316, 4535, 4428, 2216, 2395, 570, 1898, 4707, 2477, 2034, 553, 5271, 3136, 4696, 3100, 2257, 4600, 5500, 9600, 2490, 5600, 5300, None, 6070, 2708, 3669, 9600, 6761, 2910, 475, 4990, 9600, 5200, 3700, 2205, 9600, None, 4230, 6092, 9600, 2760, 350, 3750, 5383.85, 2410, 7076, 9600, 5800, 7060, 2800, 3000, 4000, 2573, 4400, 9600, 12259, 2482, 13200, 1425, 2227.7, 6500, 15600, 5000, 6800, 15600, None, 15600, 15600, 1977, 15600, 15600, 9525, 15600, 15600, 3880, None, 15600, 1600, 15600, 15600, 15600, 15600, 3681]	[LEO, LEO, LEO, LEO, LEO, LEO, ISS, PO, GTO, GTO, ISS, LEO, GTO, GTO, ISS, ISS, ES-L1, ISS, GTO, ISS, LEO, PO, GTO, ISS, GTO, GTO, ISS, GTO, GTO, PO, ISS, GTO, GTO, LEO, GTO, ISS, GTO, PO, GTO, ISS, SSO, LEO, PO, GTO, GTO, ISS, PO, LEO, GTO, GTO, PO, ISS, HEO, GTO, GTO, ISS, GTO,	[Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, VAFB	[None None, None None, None None, None None, None None, None None, None None, False Ocean, None None, None None, True Ocean, True Ocean, None None, None None, False Ocean, False ASDS, True Ocean, False ASDS, None None, None ASDS, True RTLS, False ASDS, False ASDS, True ASDS, True ASDS, True ASDS, True RTLS, True ASDS, None ASDS,	[1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 2 2 1 2 1 1 2 4 4 4 4 3 6 3

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2017-	9, Falcon 9,		PO,	SLC 4E,	True	
	01-14,	Falcon 9, Falcon		GTO,	KSC LC	ASDS,	
	2017-	9, Falcon 9,		GTO,	39A, KSC	True	
	02-19,	Falcon 9, Falcon		SSO,	LC 39A,	RTLS,	
	2017-	9, Falcon 9]		GTO,	VAFB SLC	None	
	03-16,			SSO,	4E, KSC LC	None,	
	2017-			ISS,	39A, VAFB	True	
	03-30,			MEO,	SLC 4E,	ASDS,	
	2017-			PO,	KSC LC	True	
	05-01,			ISS,	39A, KSC	RTLS,	
	2017-			ISS,	LC 39A,	None	
	05-15,			VLEO,	CCSFS SLC	None,	
	2017-			SSO,	40, VAFB	True	
	06-03,			ISS,	SLC 4E,	RTLS,	
	2017-			GTO,	CCSFS SLC	True	
	06-23,			VLEO,	40, CCSFS	ASDS,	
	2017-			ISS,	SLC 40,	True	
	06-25,			GTO,	CCSFS SLC	ASDS,	
	2017-			VLEO,	40, VAFB	None	
	07-05,			SO,	SLC 4E,	None,	
	2017-			VLEO,	CCSFS SLC	True	
	08-14,			VLEO,	40, CCSFS	RTLS,	
	2017-			ISS,	SLC 40,	True	
	08-24,			VLEO,	KSC LC	ASDS,	
	2017-			VLEO,	39A, CCSFS	True	
	09-07,			ISS,	SLC 40,	RTLS,	
	2017-			VLEO,	CCSFS SLC	True	
	10-09,			VLEO,	40, CCSFS	ASDS,	
	2017-			MEO,	SLC 40,	True	
	10-11,			GEO,	VAFB SLC	ASDS,	
	2017-			VLEO,	4E, CCSFS	True	
	10-30,			SSO,	SLC 40,	ASDS,	
	2017-			VLEO,	CCSFS SLC	True	
	12-15,			VLEO,	40, VAFB	RTLS,	
	2017-			VLEO,	SLC 4E,	True	
	12-23,			VLEO,	KSC LC	Ocean,	
	2018-			MEO]	39A, VAFB	True	
	01-08,				SLC 4E,	RTLS,	
	2018-				CCSFS SLC	True	
	01-31,				40, CCSFS	Ocean,	
	2018-				SLC 40,	None	
	03-06,				VAFB SLC	None,	
	2018-				4E, KSC LC	None	
	03-30,				39A, CCSFS	None,	
	2018-				SLC 40,	None	
	04-02,				CCSFS SLC	None,	
	2018-				40, VAFB	True	
	04-18,				SLC 4E,	ASDS,	
	2018-				CCSFS SLC	True	
	05-11,				40, CCSFS	ASDS,	
	2018-				SLC 40,	None	
	06-04,				CCSFS SLC	None,	
	2018-				40, CCSFS	None	
	06-29,				SLC 40,	None,	
	2018-				CCSFS SLC	True	
	07-22,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	07-25,				KSC LC	ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2018-				39A, CCSFS	True	
	08-07,				SLC 40,	ASDS,	
	2018-				CCSFS SLC	True	
	09-10,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	10-08,				KSC LC	RTLS,	
	2018-				39A, KSC	True	
	11-15,				LC 39A,	ASDS,	
	2018-				KSC LC	True	
	12-03,				39A, CCSFS	ASDS,	
	2018-				SLC 40,	False	
	12-05,				CCSFS SLC	RTLS,	
	2018-				40, CCSFS	None	
	12-23,				SLC 40,	None,	
	2019-				CCSFS SLC	True	
	01-11,				40, CCSFS	ASDS,	
	2019-				SLC 40,	True	
	03-02,				CCSFS SLC	ASDS,	
	2019-				40, KSC LC	True	
	05-04,				39A, KSC	ASDS,	
	2019-				LC 39A,	True	
	05-24,				KSC LC	ASDS,	
	2019-				39A, CCSFS	True	
	06-12,				SLC 40,	RTLS,	
	2019-				CCSFS SLC	True	
	07-25,				40]	RTLS,	
	2019-					None	
	08-06,					None,	
	2019-					True	
	11-11,					ASDS,	
	2019-					True	
	12-05,					ASDS,	
	2019-					True	
	12-17,					ASDS,	
	2020-					True	
	01-07,					ASDS,	
	2020-					None	
	01-19,					None,	
	2020-					True	
	01-29,					ASDS,	
	2020-					False	
	02-17,					ASDS,	
	2020-					True	
	03-07,					RTLS,	
	2020-					False	
	03-18,					ASDS,	
	2020-					True	
	04-22,					ASDS,	
	2020-					True	
	05-30,					ASDS,	
	2020-					True	
	06-04,					ASDS,	
	2020-					True	
	06-13,					ASDS,	
	2020-					True	
	06-30,					ASDS,	
	2020-					True	
	07-20,					ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2020-08-18,					True ASDS,	
	2020-08-30,					True RTLS,	
	2020-09-03,					True ASDS,	
	2020-10-06,					True ASDS,	
	2020-10-18,					True ASDS,	
	2020-10-24,					True ASDS,	
	2020-11-05]					True ASDS]	

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

In [30]:
```
data_falcon9.loc[:,'FlightNumber'] = list(range(1, data_falcon9.shape[0]+1))
data_falcon9
```

Out[30]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
0	1	[2006- 03-24, 2007- 03-21, 2008- 09-28, 2009- 07-13, 2010- 06-04, 2012- 05-22, 2013- 03-01, 2013- 09-29, 2013- 12-03, 2014- 01-06, 2014- 04-18, 2014- 07-14, 2014- 08-05, 2014- 09-07, 2014- 09-21, 2015- 01-10, 2015- 02-11, 2015- 04-14, 2015- 04-27, 2015- 06-28, 2015- 12-22, 2016- 01-17, 2016- 03-04, 2016- 04-08, 2016- 05-06, 2016- 05-27, 2016- 07-18, 2016- 08-14, 2016- 09-01,	[Falcon 1, Falcon 1, Falcon 1, Falcon 1, Falcon 9, Falcon	[20, None, 165, 200, None, 525, 677, 500, 3170, 3325, 2296, 1316, 4535, 4428, 2216, 2395, 570, 1898, 4707, 2477, 2034, 553, 5271, 3136, 4696, 3100, 2257, 4600, 5500, 9600, 2490, 5600, 5300, None, 6070, 2708, 3669, 9600, 6761, 2910, 475, 4990, 9600, 5200, 3700, 2205, 9600, None, 4230, 6092, 9600, 2760, 350, 3750, 5383.85, 2410, 7076, 9600, 5800, 7060, 2800, 3000, 4000, 2573, 4400, 9600, 12259, 2482, 13200, 1425, 2227.7, 6500, 15600, 5000, 6800, 15600, None, 15600, 15600, 1977, 15600, 15600, 9525, 15600, 15600, 3880, None, 15600, 1600, 15600, 15600, 15600, 15600, 3681]	[LEO, LEO, LEO, LEO, LEO, LEO, ISS, PO, GTO, GTO, ISS, LEO, GTO, GTO, ISS, ISS, ES- L1, ISS, GTO, ISS, LEO, PO, GTO, ISS, GTO, GTO, ISS, GTO, GTO, PO, ISS, GTO, GTO, LEO, GTO, ISS, GTO, PO, GTO, ISS, SSO, LEO, PO, GTO, GTO, ISS, PO, LEO, GTO, GTO, PO, ISS, HEO, GTO, GTO, ISS, GTO,	[Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, CCSFS SLC 40, VAFB SLC 4E, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, KSC LC 39A, VAFB	[None None, None None, None None, None None, None None, None None, None None, False Ocean, None None, None None, True Ocean, True Ocean, None None, None None, False Ocean, False ASDS, True Ocean, False ASDS, None None, None ASDS, True RTLS, False ASDS, False ASDS, True ASDS, True ASDS, True ASDS, True RTLS, True ASDS, None ASDS,	[1 1 1 1 1 1 1 1 1 1 1 1 2 1 1 2 2 2 2 1 2 1 1 2 4 4 4 4 3 6 3

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2017-	9, Falcon 9,		PO,	SLC 4E,	True	
	01-14,	Falcon 9, Falcon		GTO,	KSC LC	ASDS,	
	2017-	9, Falcon 9,		GTO,	39A, KSC	True	
	02-19,	Falcon 9, Falcon		SSO,	LC 39A,	RTLS,	
	2017-	9, Falcon 9]		GTO,	VAFB SLC	None	
	03-16,			SSO,	4E, KSC LC	None,	
	2017-			ISS,	39A, VAFB	True	
	03-30,			MEO,	SLC 4E,	ASDS,	
	2017-			PO,	KSC LC	True	
	05-01,			ISS,	39A, KSC	RTLS,	
	2017-			ISS,	LC 39A,	None	
	05-15,			VLEO,	CCSFS SLC	None,	
	2017-			SSO,	40, VAFB	True	
	06-03,			ISS,	SLC 4E,	RTLS,	
	2017-			GTO,	CCSFS SLC	True	
	06-23,			VLEO,	40, CCSFS	ASDS,	
	2017-			ISS,	SLC 40,	True	
	06-25,			GTO,	CCSFS SLC	ASDS,	
	2017-			VLEO,	40, VAFB	None	
	07-05,			SO,	SLC 4E,	None,	
	2017-			VLEO,	CCSFS SLC	True	
	08-14,			VLEO,	40, CCSFS	RTLS,	
	2017-			ISS,	SLC 40,	True	
	08-24,			VLEO,	KSC LC	ASDS,	
	2017-			VLEO,	39A, CCSFS	True	
	09-07,			ISS,	SLC 40,	RTLS,	
	2017-			VLEO,	CCSFS SLC	True	
	10-09,			VLEO,	40, CCSFS	ASDS,	
	2017-			MEO,	SLC 40,	True	
	10-11,			GEO,	VAFB SLC	ASDS,	
	2017-			VLEO,	4E, CCSFS	True	
	10-30,			SSO,	SLC 40,	ASDS,	
	2017-			VLEO,	CCSFS SLC	True	
	12-15,			VLEO,	40, VAFB	RTLS,	
	2017-			VLEO,	SLC 4E,	True	
	12-23,			VLEO,	KSC LC	Ocean,	
	2018-			MEO]	39A, VAFB	True	
	01-08,				SLC 4E,	RTLS,	
	2018-				CCSFS SLC	True	
	01-31,				40, CCSFS	Ocean,	
	2018-				SLC 40,	None	
	03-06,				VAFB SLC	None,	
	2018-				4E, KSC LC	None	
	03-30,				39A, CCSFS	None,	
	2018-				SLC 40,	None	
	04-02,				CCSFS SLC	None,	
	2018-				40, VAFB	True	
	04-18,				SLC 4E,	ASDS,	
	2018-				CCSFS SLC	True	
	05-11,				40, CCSFS	ASDS,	
	2018-				SLC 40,	None	
	06-04,				CCSFS SLC	None,	
	2018-				40, CCSFS	None	
	06-29,				SLC 40,	None,	
	2018-				CCSFS SLC	True	
	07-22,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	07-25,				KSC LC	ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2018-				39A, CCSFS	True	
	08-07,				SLC 40,	ASDS,	
	2018-				CCSFS SLC	True	
	09-10,				40, CCSFS	ASDS,	
	2018-				SLC 40,	True	
	10-08,				KSC LC	RTLS,	
	2018-				39A, KSC	True	
	11-15,				LC 39A,	ASDS,	
	2018-				KSC LC	True	
	12-03,				39A, CCSFS	ASDS,	
	2018-				SLC 40,	False	
	12-05,				CCSFS SLC	RTLS,	
	2018-				40, CCSFS	None	
	12-23,				SLC 40,	None,	
	2019-				CCSFS SLC	True	
	01-11,				40, CCSFS	ASDS,	
	2019-				SLC 40,	True	
	03-02,				CCSFS SLC	ASDS,	
	2019-				40, KSC LC	True	
	05-04,				39A, KSC	ASDS,	
	2019-				LC 39A,	True	
	05-24,				KSC LC	ASDS,	
	2019-				39A, CCSFS	True	
	06-12,				SLC 40,	RTLS,	
	2019-				CCSFS SLC	True	
	07-25,				40]	RTLS,	
	2019-					None	
	08-06,					None,	
	2019-					True	
	11-11,					ASDS,	
	2019-					True	
	12-05,					ASDS,	
	2019-					True	
	12-17,					ASDS,	
	2020-					True	
	01-07,					ASDS,	
	2020-					None	
	01-19,					None,	
	2020-					True	
	01-29,					ASDS,	
	2020-					False	
	02-17,					ASDS,	
	2020-					True	
	03-07,					RTLS,	
	2020-					False	
	03-18,					ASDS,	
	2020-					True	
	04-22,					ASDS,	
	2020-					True	
	05-30,					ASDS,	
	2020-					True	
	06-04,					ASDS,	
	2020-					True	
	06-13,					ASDS,	
	2020-					True	
	06-30,					ASDS,	
	2020-					True	
	07-20,					ASDS,	

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome	Fl
	2020-08-18, 2020-08-30, 2020-09-03, 2020-10-06, 2020-10-18, 2020-10-24, 2020-11-05]					True ASDS, True RTLS, True ASDS, True ASDS, True ASDS, True ASDS, True ASDS]	

Data Wrangling

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

In [31]:
```
data_falcon9.isnull().sum()
```

Out[31]:
```
FlightNumber      0
Date              0
BoosterVersion    0
PayloadMass       0
Orbit             0
LaunchSite        0
Outcome           0
Flights           0
GridFins          0
Reused            0
Legs              0
LandingPad        0
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 [32]:
```
# Calculate the mean value of PayloadMass column
PayloadMass = pd.DataFrame(data_falcon9['PayloadMass'].values.tolist()).mean(1)
print(PayloadMass)
```

```
0    5919.165341
dtype: object
```

In [33]:
```
rows = data_falcon9['PayloadMass'].values.tolist()[0]

df_rows = pd.DataFrame(rows)
df_rows = df_rows.replace(np.nan, PayloadMass)

data_falcon9['PayloadMass'][0] = df_rows.values
data_falcon9
```

```
C:\Users\91939\AppData\Local\Temp\ipykernel_1236\1046548779.py:6: FutureWarning:
ChainedAssignmentError: behaviour will change in pandas 3.0!
You are setting values through chained assignment. Currently this works in certai
n cases, but when using Copy-on-Write (which will become the default behaviour in
pandas 3.0) this will never work to update the original DataFrame or Series, beca
use the intermediate object on which we are setting values will behave as a copy.
A typical example is when you are setting values in a column of a DataFrame, lik
e:

df["col"][row_indexer] = value

Use `df.loc[row_indexer, "col"] = values` instead, to perform the assignment in a
single step and ensure this keeps updating the original `df`.

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy

  data_falcon9['PayloadMass'][0] = df_rows.values
```

Out[33]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outco
0	1	[2006-03-24, 2007-03-21, 2008-09-28, 2009-07-13, 2010-06-04, 2012-05-22, 2013-03-01, 2013-09-29, 2013-12-03, 2014-01-06, 2014-04-18, 2014-07-14, 2014-08-05, 2014-09-07, 2014-09-21, 2015-01-10, 2015-02-11, 2015-04-14, 2015-04-27, 2015-06-28, 2015-12-22, 2016-01-17, 2016-03-04, 2016-04-08, 2016-05-06, 2016-05-27, 2016-07-18, 2016-08-14, 2016-09-01,	[Falcon 1, Falcon 1, Falcon 1, Falcon 1, Falcon 9, Falcon	[[20.0], [5919.16534090909], [165.0], [200.0], [5919.16534090909], [525.0], [677.0], [500.0], [3170.0], [3325.0], [2296.0], [1316.0], [4535.0], [4428.0], [2216.0], [2395.0], [570.0], [1898.0], [4707.0], [2477.0], [2034.0], [553.0], [5271.0], [3136.0], [4696.0], [3100.0], [2257.0], [4600.0], [5500.0], [9600.0], [2490.0], [5600.0], [5300.0], [5919.16534090909], [6070.0], [2708.0], [3669.0], [9600.0], [6761.0], [2910.0], [475.0], [4990.0], [9600.0], [5200.0], [3700.0], [2205.0], [9600.0], [5919.16534090909], [4230.0], [6092.0], [9600.0], [2760.0], [350.0], [3750.0], [5383.85], [2410.0], [7076.0], [9600.0], [5800.0], [7060.0], [2800.0], [3000.0], [4000.0], [2573.0], [4400.0], [9600.0], [12259.0], [2482.0], [13200.0], [1425.0], [2227.7], [6500.0], [15600.0], [5000.0], [6800.0], [15600.0], [5919.16534090909], [15600.0], [15600.0], [1977.0], [15600.0], [15600.0], [9525.0], [15600.0], [15600.0], [3880.0], [5919.16534090909], [15600.0], [1600.0], [15600.0], [15600.0], [15600.0], [15600.0], [3681.0]]	[LEO, LEO, LEO, LEO, LEO, ISS, PO, GTO, GTO, ISS, GTO, GTO, ISS, LEO, PO, GTO, ISS, GTO, GTO, PO, ISS, GTO, SSO, LEO, PO, GTO, GTO, ISS, PO, LEO, GTO, GTO, PO, ISS, HEO, GTO, GTO, ISS, GTO,	[Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, Kwajalein Atoll, CCSFS SLC 40, CCSFS SLC 40, SLC 40, CCSFS SLC 40, SLC 4E, CCSFS SLC 40, CCSFS SLC 40, SLC 40, CCSFS SLC 40, SLC 40, CCSFS SLC 40, SLC 40, CCSFS SLC 40, SLC 4E, CCSFS SLC 40, SLC 40, CCSFS SLC 40, SLC 40, KSC LC 39A, LC 39A, KSC LC 39A, SLC 4E, KSC LC 39A, LC 39A, KSC LC 39A,	[Nc No Nc No Nc No Nc No Nc No Nc No Nc Fa Oce Nc No Nc No T Oce T Oce Nc No Nc No Fa Oce Fa AS T Oce Fa AS Nc No Nc AS T RT Fa AS Fa AS T AS T AS T RT T AS Nc AS

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outco
	2017-	9, Falcon 9,		PO,	SLC 4E,	T
	01-14,	Falcon 9, Falcon		GTO,	KSC LC	AS
	2017-	9, Falcon 9,		GTO,	39A, KSC	T
	02-19,	Falcon 9, Falcon		SSO,	LC 39A,	RT
	2017-	9, Falcon 9]		GTO,	VAFB SLC	Nc
	03-16,			SSO,	4E, KSC LC	No
	2017-			ISS,	39A, VAFB	T
	03-30,			MEO,	SLC 4E,	AS
	2017-			PO,	KSC LC	T
	05-01,			ISS,	39A, KSC	RT
	2017-			ISS,	LC 39A,	Nc
	05-15,			VLEO,	CCSFS SLC	No
	2017-			SSO,	40, VAFB	T
	06-03,			ISS,	SLC 4E,	RT
	2017-			GTO,	CCSFS SLC	T
	06-23,			VLEO,	40, CCSFS	AS
	2017-			ISS,	SLC 40,	T
	06-25,			GTO,	CCSFS SLC	AS
	2017-			VLEO,	40, VAFB	Nc
	07-05,			SO,	SLC 4E,	No
	2017-			VLEO,	CCSFS SLC	T
	08-14,			VLEO,	40, CCSFS	RT
	2017-			ISS,	SLC 40,	T
	08-24,			VLEO,	KSC LC	AS
	2017-			VLEO,	39A, CCSFS	T
	09-07,			ISS,	SLC 40,	RT
	2017-			VLEO,	CCSFS SLC	T
	10-09,			VLEO,	40, CCSFS	AS
	2017-			MEO,	SLC 40,	T
	10-11,			GEO,	VAFB SLC	AS
	2017-			VLEO,	4E, CCSFS	T
	10-30,			SSO,	SLC 40,	AS
	2017-			VLEO,	CCSFS SLC	T
	12-15,			VLEO,	40, VAFB	RT
	2017-			VLEO,	SLC 4E,	T
	12-23,			VLEO,	KSC LC	Oce
	2018-			MEO]	39A, VAFB	T
	01-08,				SLC 4E,	RT
	2018-				CCSFS SLC	T
	01-31,				40, CCSFS	Oce
	2018-				SLC 40,	Nc
	03-06,				VAFB SLC	No
	2018-				4E, KSC LC	Nc
	03-30,				39A, CCSFS	No
	2018-				SLC 40,	Nc
	04-02,				CCSFS SLC	No
	2018-				40, VAFB	T
	04-18,				SLC 4E,	AS
	2018-				CCSFS SLC	T
	05-11,				40, CCSFS	AS
	2018-				SLC 40,	Nc
	06-04,				CCSFS SLC	No
	2018-				40, CCSFS	Nc
	06-29,				SLC 40,	No
	2018-				CCSFS SLC	T
	07-22,				40, CCSFS	AS
	2018-				SLC 40,	T
	07-25,				KSC LC	AS

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outco
	2018-				39A, CCSFS	T
	08-07,				SLC 40,	AS
	2018-				CCSFS SLC	T
	09-10,				40, CCSFS	AS
	2018-				SLC 40,	T
	10-08,				KSC LC	RT
	2018-				39A, KSC	T
	11-15,				LC 39A,	AS
	2018-				KSC LC	T
	12-03,				39A, CCSFS	AS
	2018-				SLC 40,	Fa
	12-05,				CCSFS SLC	RT
	2018-				40, CCSFS	No
	12-23,				SLC 40,	No
	2019-				CCSFS SLC	T
	01-11,				40, CCSFS	AS
	2019-				SLC 40,	T
	03-02,				CCSFS SLC	AS
	2019-				40, KSC LC	T
	05-04,				39A, KSC	AS
	2019-				LC 39A,	T
	05-24,				KSC LC	AS
	2019-				39A, CCSFS	T
	06-12,				SLC 40,	RT
	2019-				CCSFS SLC	T
	07-25,				40]	RT
	2019-					No
	08-06,					No
	2019-					T
	11-11,					AS
	2019-					T
	12-05,					AS
	2019-					T
	12-17,					AS
	2020-					T
	01-07,					AS
	2020-					No
	01-19,					No
	2020-					T
	01-29,					AS
	2020-					Fa
	02-17,					AS
	2020-					T
	03-07,					RT
	2020-					Fa
	03-18,					AS
	2020-					T
	04-22,					AS
	2020-					T
	05-30,					AS
	2020-					T
	06-04,					AS
	2020-					T
	06-13,					AS
	2020-					T
	06-30,					AS
	2020-					T
	07-20,					AS

FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outco
	2020-08-18,					T AS
	2020-08-30,					T RT
	2020-09-03,					T AS
	2020-10-06,					T AS
	2020-10-18,					T AS
	2020-10-24,					T AS
	2020-11-05]					T ASI

In [34]:
```
# missing values in `landing_rows`
landing_rows = data_falcon9['LandingPad'].values.tolist()[0]
landing_rows = pd.DataFrame(landing_rows)
landing_rows.isnull().sum()
```

Out[34]:
```
0    30
dtype: int64
```

In [35]:
```
# save and export new dataset
data_falcon9.to_csv('dataset_part_1.csv', index=False)
```

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

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

Joseph Santarcangelo has a PhD in Electrical Engineering, his research focused on using machine learning, signal processing, and computer vision to determine how videos impact human cognition. Joseph has been working for IBM since he completed his PhD.

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