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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acex/files/spacex_ses-8launch_presskit.pdf","webcast":"https://www.youtube.com/wa
tch?v=aAj5xapImEs","youtube_id":"aAj5xapImEs","article":"https://www.nasaspacefli
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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on 9","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bbb6c3bb0006eeb1e
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atellite-to-orbit/","wikipedia":"https://en.wikipedia.org/wiki/Thaicom_6"},"stati
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rom this flight as part of a separate certification program for SpaceX to qualify

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/

SpaceX_NASA_CRS-4_PressKit.pdf","webcast":"https://www.youtube.com/watch?v=7YkCh7uOw1Y","youtube_id":"7YkCh7uOw1Y","article":"https://www.nasa.gov/press/2014/september/nasa-cargo-launches-to-space-station-aboard-spacex-resupply-mission-0","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-4"},"static_fire_date_utc":"2014-09-17T00:00:00.000Z","static_fire_date_unix":1410912000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":["5ea6ed2d080df4000697c902"],"capsules":["5e9e2c5bf3591880643b2669"],"payloads":["5eb0e4bcb6c3bb0006eeb1f5"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":18,"name":"CRS-4","date_utc":"2014-09-21T05:52:00.000Z","date_unix":1411278720,"date_local":"2014-09-21T01:52:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a0f359184a683b2634","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce7ffd86e000604b33b"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/df/53/3Ik1KR2O_o.png","large":"https://images2.imgbox.com/ed/f3/MdEzr8rE_o.png"},"reddit":{"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/2rrdha","media":null,"recovery":null},"flickr":{"small":[],"original":["https://farm9.staticflickr.com/8666/16511391418_bb5cdbbd71_o.jpg","https://farm9.staticflickr.com/8612/16848173281_035bdc6009_o.jpg","https://farm9.staticflickr.com/8571/16699496805_bf39747618_o.jpg","https://farm9.staticflickr.com/8650/16699496705_187e4e53fd_o.jpg","https://farm9.staticflickr.com/8663/16077174554_370937efbe_o.jpg","https://farm9.staticflickr.com/8638/16512101410_83763eb9ea_o.jpg","https://farm9.staticflickr.com/8653/16077173984_17885d4bea_o.jpg","https://farm8.staticflickr.com/7635/16848159582_40c0f9d25f_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_nasa_crs-5_presskit.pdf","webcast":"https://www.youtube.com/watch?v=p7x-SumbynI","youtube_id":"p7x-SumbynI","article":"https://spaceflightnow.com/2015/01/10/dragon-successfully-launched-rocket-recovery-demo-crash-lands/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-5"},"static_fire_date_utc":"2014-12-19T00:00:00.000Z","static_fire_date_unix":1418947200,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Following second stage separation, SpaceX performed a test flight which attempted to return the first stage of the Falcon 9 through the atmosphere and land it on an approximately 90-by-50-meter (300 ft x 160 ft) floating platform-called the autonomous spaceport drone ship. Many of the test objectives were achieved, including precision control of the rocket\'s descent to land on the platform at a specific point in the Atlantic ocean, and a large amount of test data was obtained from the first use of grid fin control surfaces used for more precise reentry positioning. The grid fin control system ran out of hydraulic fluid a minute before landing and the landing itself resulted in a crash.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed2f080df4000697c90f","5ea6ed30080df4000697c912"],"capsules":["5e9e2c5bf35918165f3b266a"],"payloads":["5eb0e4bdb6c3bb0006eeb1f6"],"launchpad":"5e9e4501f509094ba4566f84","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"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce8ffd86e000604b33c"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/bc/a6/uDYvXvql_o.png","large":"https://images2.imgbox.com/30/47/WmtGcjW8_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.staticflic

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ia.org/wiki/SpaceX_CRS-6"},"static_fire_date_utc":"2015-04-11T00:00:00.000Z","sta
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SpaceX attempted a controlled-descent test of the first stage. The first stage co
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stuck throttle valve resulting in a later-than-intended downthrottle.","crew":
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lcon-9-rocket-powers-into-space-with-satellite-for-turkmenistan/","wikipedia":"ht
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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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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
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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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ckr.com/7616/27661312516_640764f8fd_o.jpg","https://farm8.staticflickr.com/7413/2
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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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gle-engine landing burn. All previous landings from a ballistic trajectory had fi
red three engines on the landing-burn, which provided more braking force, but sub
jected the vehicle to greater structural stresses. The single-engine landing burn
takes more time and fuel, but puts less stress on the vehicle.","crew":[],"ship
s":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c9
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6","date_utc":"2016-08-14T05:26:00.000Z","date_unix":1471152360,"date_local":"201
6-08-14T01:26:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"cor
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se,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpa
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CI4DVla_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/4p
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l":[]},"presskit":null,"webcast":"https://www.youtube.com/watch?v=_BgJEXQkjNQ","y
outube_id":"_BgJEXQkjNQ","article":"https://spaceflightnow.com/2016/09/01/spacex-
rocket-and-israeli-satellite-destroyed-in-launch-pad-explosion/","wikipedia":"htt
ps://en.wikipedia.org/wiki/Amos-6"},"static_fire_date_utc":"2016-09-01T13:07:00.0
00Z","static_fire_date_unix":1472735220,"net":false,"window":null,"rocket":"5e9d0
d95eda69973a809d1ec","success":false,"failures":[{"time":-165180,"altitude":0,"re
ason":"buckled liner in several of the COPV tanks, causing perforations that allo
wed liquid and/or solid oxygen to accumulate underneath the lining, which was ign
ited by friction."}],"details":"The rocket and Amos-6 payload were lost in a laun
ch pad explosion on September 1, 2016 during propellant fill prior to a static fi
re test. The pad was clear of personnel and there were no injuries.","crew":[],"s
hips":[],"capsules":[],"payloads":["5eb0e4c1b6c3bb0006eeb207"],"launchpad":"5e9e4
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3:07:00.000Z","date_unix":1472735220,"date_local":"2016-09-01T09:07:00-04:00","da
te_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f359187ee83b264
4","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":tru
e,"landing_success":null,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7c
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ments/5nsico","recovery":"https://www.reddit.com/r/spacex/comments/5oe9kk"},"flic
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tube_id":"7WimRhydggo","article":"https://spaceflightnow.com/2017/01/14/spacex-re
sumes-flights-with-on-target-launch-for-iridium/","wikipedia":"https://en.wikiped
ia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"stat

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0,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"fail
ures":[],"details":"Return-to-flight mission after the loss of Amos-6 in Septembe
r 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 comp
lete deployment of the 66 plus 9 spare satellite constellation by mid 2018. The f
irst two Iridium qualification units were supposed to ride a Dnepr rocket in Apri
l 2016 but were delayed, so Iridium decided to qualify the first batch of 10 sate
llites instead.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000
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um NEXT Mission 1","date_utc":"2017-01-14T17:54:00.000Z","date_unix":148441644
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ex/files/crs10presskitfinal.pdf","webcast":"https://www.youtube.com/watch?v=giNha
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19/historic-launch-pad-back-in-service-with-thundering-blastoff-by-spacex/","wiki
pedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-10"},"static_fire_date_utc":"201
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st Falcon 9 flight from the historic LC-39A launchpad at Kennedy Space Center, ca
rrying supplies and materials to support dozens of science and research investiga
tions scheduled during ISS Expeditions 50 and 51. The first stage returned to lau
nch site and landed at LZ-1.","crew":[],"ships":["5ea6ed30080df4000697c912"],"cap
sules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4c3b6c3bb0006eeb209"],"laun
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eddit.com/r/spacex/comments/5z8if6/rspacex_echostar_23_media_thread_videos_image

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3/","wikipedia":"https://en.wikipedia.org/wiki/EchoStar#Satellite_fleet"},"static
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ed on a spare platform from the cancelled CMBStar 1 satellite program, will provi
de direct-to-home television broadcast services over Brazil. There was no attempt
at a first-stage recovery so this rocket did not have landing legs or grid fin
s.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20a"],"l
aunchpad":"5e9e4502f509094188566f88","flight_number":37,"name":"EchoStar 23","dat
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ficial_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comme
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017/03/31/spacex-flies-rocket-for-second-time-in-historic-test-of-cost-cutting-te
chnology/","wikipedia":"https://en.wikipedia.org/wiki/SES-10"},"static_fire_date_
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ails":"First payload to fly on a reused first stage, B1021, previously launched w
ith CRS-8, which also landed a second time. In what is also a first, the payload
fairing remained intact after a successful splashdown achieved with thrusters and
a steerable parachute.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f08
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e,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":tru
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85c247ebce_o.jpg","https://farm5.staticflickr.com/4166/34006001860_8c45f28e69_o.j
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arm3.staticflickr.com/2934/34005998140_c77076b6fb_o.jpg","https://farm5.staticfli
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s/nrol76presskit.pdf","webcast":"https://www.youtube.com/watch?v=EzQpkQ1etdA","yo
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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
0Z","static_fire_date_unix":1493146920,"net":false,"window":7200,"rocket":"5e9d0d
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aceX\'s certification for national security space missions, which allows SpaceX t
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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e,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":tru
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s://farm5.staticflickr.com/4179/34556139821_b2d6255e07_o.jpg","https://farm5.stat
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sat5f4presskit_final.pdf","webcast":"https://www.youtube.com/watch?v=ynMYE64IEK
s","youtube_id":"ynMYE64IEKs","article":"https://www.space.com/36852-spacex-launc
hes-inmarsat-5-f4-satellite.html","wikipedia":"https://en.wikipedia.org/wiki/Inma
rsat#Satellites"},"static_fire_date_utc":"2017-05-11T16:45:00.000Z","static_fire_
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c","success":true,"failures":[],"details":"At 6,070 kg this was the heaviest payl
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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pcoming":false,"cores":[{"core":"5e9e28a3f359186f3f3b2649","flight":1,"gridfins":
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l,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_lib
rary_id":null,"id":"5eb87d01ffd86e000604b351"},{"fairings":null,"links":{"patch":
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ektkt/","media":"https://www.reddit.com/r/spacex/comments/6emlzr/","recovery":nul
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s://farm5.staticflickr.com/4223/34272083563_f52e5bfffe_o.jpg","https://farm5.stat
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s://farm5.staticflickr.com/4280/34268361083_71fc70ff1a_o.jpg","https://farm5.stat
icflickr.com/4199/35038651646_93d0339269_o.jpg","https://farm5.staticflickr.com/4
227/34223076793_4abe7e74d6_o.jpg"]},"presskit":"http://www.spacex.com/sites/space
x/files/crs11presskit.pdf","webcast":"https://www.youtube.com/watch?v=JuZBOUMsYw
s","youtube_id":"JuZBOUMsYws","article":"https://spaceflightnow.com/2017/06/03/re
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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S","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_
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mments/69hhkm/bulgariasat1_launch_campaign_thread/","launch":"https://www.reddit.
com/r/spacex/comments/6isph2/welcome_to_the_rspacex_bulgariasat1_official/","medi
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s://farm5.staticflickr.com/4230/34681559323_53f05581ca_o.jpg"]},"presskit":"htt
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s://www.youtube.com/watch?v=Y8mLi-rRTh8","youtube_id":"Y8mLi-rRTh8","article":"ht
tps://en.wikipedia.org/wiki/BulgariaSat-1","wikipedia":"https://en.wikipedia.org/
wiki/BulgariaSat-1"},"static_fire_date_utc":"2017-06-15T22:25:00.000Z","static_fi

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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-

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8566f87","flight_number":46,"name":"FormoSat-5","date_utc":"2017-08-24T18:50:00.0
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mooth-launch-of-militarys-x-37b-spaceplane/","wikipedia":"https://en.wikipedia.or
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f","webcast":"https://www.youtube.com/watch?v=SB4N4xF2B2w&feature=youtu.be","youtube_id":"SB4N4xF2B2w","article":"https://spaceflightnow.com/2017/10/09/spacex-launch-adds-another-10-satellites-to-iridium-next-fleet/","wikipedia":"https://en.wikipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date_utc":"2017-10-05T13:31:00.000Z","static_fire_date_unix":1507210260,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Third of eight missions to launch Iridium\'s second generation constellation from VAFB","crew":[],"ships":["5ea6ed2e080df4000697c905","5ea6ed2f080df4000697c910"],"capsules":[],"payloads":["5eb0e4c5b6c3bb0006eeb215"],"launchpad":"5e9e4502f509092b78566f87","flight_number":48,"name":"Iridium NEXT Mission 3","date_utc":"2017-10-09T12:37:00.000Z","date_unix":1507552620,"date_local":"2017-10-09T05:37:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a4f3591843103b2650","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d0affd86e000604b359"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/bc/d3/Yd5qpPd9_o.png","large":"https://images2.imgbox.com/dd/c6/Qns2WYDQ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/6yvn64/ses11echostar_105_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/75bw7p/ses11echostar105_official_launch_discussions/","media":"https://www.reddit.com/r/spacex/comments/75pgu5/rspacex_ses11_media_thread_videos_images_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/76fqz1/b10312_recovery_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4471/37388002420_b86680c3af_o.jpg","https://farm5.staticflickr.com/4497/37388002170_a267280534_o.jpg","https://farm5.staticflickr.com/4455/37388001730_0869279a8d_o.jpg","https://farm5.staticflickr.com/4465/36975195443_b98ed0fb24_o.jpg","https://farm5.staticflickr.com/4499/36975194993_8548a53c60_o.jpg","https://farm5.staticflickr.com/4482/36975194613_15bb109059_o.jpg","https://farm5.staticflickr.com/4453/36975194233_5f8f45c686_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/echostar105ses11presskit.pdf","webcast":"https://www.youtube.com/watch?v=iv1zeGSvhIw","youtube_id":"iv1zeGSvhIw","article":"https://spaceflightnow.com/2017/10/12/video-falcon-9-rocket-lifts-off-with-joint-satellite-for-ses-echostar/","wikipedia":"https://en.wikipedia.org/wiki/List_of_SES_satellites"},"static_fire_date_utc":"2017-10-02T20:30:00.000Z","static_fire_date_unix":1506976200,"net":false,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Nineteenth comsat to GTO, also the fourth satellite launched for SES and second for Echostar. Third time a first stage booster will be reused.","crew":[],"ships":["5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c5b6c3bb0006eeb216"],"launchpad":"5e9e4502f509094188566f88","flight_number":49,"name":"SES-11 / Echostar 105","date_utc":"2017-10-11T22:53:00.000Z","date_unix":1507762380,"date_local":"2017-10-11T18:53:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591829dc3b2646","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":"5eb87d0cffd86e000604b35a"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/bb/fa/vNIBtlSn_o.png","large":"https://images2.imgbox.com/d6/8d/iv3VDTkX_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/73ttkd/koreasat_5a_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/79iuvb/rspacex_koreasat_5a_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/comments/79lmdu/rspacex_koreasat5a_media_thread_videos_images/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4477/38056454431_a5f40f9fd7_o.jpg","https://farm5.staticflickr.com/4455/26280153979_b8016a829f_o.jpg","https://farm5.staticflickr.com/4459/38056455051_79ef2b949a_o.jpg","https://farm5.staticflickr.com/4466/26280153539_ecbc2b3fa9_o.jpg","https://farm5.staticflickr.com/4482/26280154209_bf08d76361_o.jpg","https://farm5.staticflickr.com/4493/38056455211_a4565a9cee_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/koreasat5apr

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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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Q","article":"https://spaceflightnow.com/2018/01/31/spacex-rocket-flies-on-60th-a
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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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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spacex-debuts-worlds-most-powerful-rocket-sends-tesla-toward-the-asteroid-bel
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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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x/files/tesspresskitfinal417.pdf","webcast":"https://www.youtube.com/watch?v=aY-0
uBIYYKk","youtube_id":"aY-0uBIYYKk","article":"https://spaceflightnow.com/2018/0
4/19/all-sky-surveyor-launched-from-cape-canaveral-on-the-hunt-for-exoplanet
s/","wikipedia":"https://en.wikipedia.org/wiki/Transiting_Exoplanet_Survey_Satell
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523471400,"net":false,"window":30,"rocket":"5e9d0d95eda69973a809d1ec","success":t
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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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

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ttps://farm2.staticflickr.com/1829/42374725534_325e676d19_o.jpg","https://farm2.s
taticflickr.com/1810/42374724974_e50b050403_o.jpg","https://farm1.staticflickr.co
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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
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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
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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
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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-
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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
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_next_constellation_mission_7_launch/","launch":"https://www.reddit.com/r/spacex/
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s://www.reddit.com/r/spacex/comments/91gx44/rspacex_iridium_next_constellation_mi
ssion_7/","recovery":null},"flickr":{"small":[],"original":["https://farm1.static
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4.pdf","webcast":"https://www.youtube.com/watch?v=vsDknmK30C0","youtube_id":"vsDk
nmK30C0","article":"https://spaceflightnow.com/2018/07/25/spacexs-second-launch-i
n-three-days-lofts-10-more-iridium-satellites/","wikipedia":"https://en.wikipedi
a.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"stati
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et":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failure
s":[],"details":"SpaceX\'s fourteenth flight of 2018 and seventh of eight launche
s in a half-a-billion-dollar contract with Iridium. Will use a Block 5 first stag
e, to be recovered in the Pacific Ocean. Only one mission will be left for Iridiu
m, with 10 more satellites. First attempt to recover a Fairing with the upgraded
net. Fairing recovery was not successful.","crew":[],"ships":["5ea6ed2f080df40006
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97c914"],"capsules":[],"payloads":["5eb0e4c9b6c3bb0006eeb229"],"launchpad":"5e9e4
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now.com/2018/08/07/indonesian-communications-satellite-deployed-in-orbit-by-space
x/","wikipedia":"https://en.wikipedia.org/wiki/Telkom_Indonesia"},"static_fire_da
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e,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":
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nown as Telkom-4) geostationary communications satellite for Telkom Indonesia. It
marked the first reuse of any Block 5 first stage; the booster B1046 had previous
ly 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
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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
a":"https://en.wikipedia.org/wiki/Es%27hailSat"},"static_fire_date_utc":"2018-11-
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ocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX
\'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
0df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c9b6
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14760,"date_local":"2018-11-15T15:46:00-05:00","date_precision":"hour","upcomin
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e,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landin
g_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":fa
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l_launch_discussion_updates/","media":"https://old.reddit.com/r/spacex/comments/a
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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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very/"},"flickr":{"small":[],"original":["https://farm8.staticflickr.com/7899/396
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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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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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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":"2019-12-17T00:10:10.000Z","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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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":
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S-20","date_utc":"2020-03-07T04:50:31.000Z","date_unix":1583556631,"date_loca
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com/sites/spacex/files/sixth_starlink_press_kit.pdf","webcast":"https://youtu.be/
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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

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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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s://youtu.be/P-gLOsDjE3E","youtube_id":"P-gLOsDjE3E","article":"https://spaceflig
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
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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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5:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a633
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lightnow.com/2020/11/21/international-satellite-launches-to-extend-measurements-o
f-sea-level-rise/","wikipedia":"https://en.wikipedia.org/wiki/Copernicus_Sentinel
-6"},"static_fire_date_utc":"2020-11-17T13:17:00.000Z","static_fire_date_unix":16
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true,"failures":[],"details":"SpaceX will launch Sentinel-6 Michael Freilich into
low Earth orbit for NASA, NOAA, ESA, and the European Organization for the Exploi
tation of Meteorological Satellites aboard a Falcon 9 from SLC-4E, Vandenberg Air
Force Station. Sentinel-6(A) is an ocean observation satellite providing radar oc
ean surface altimetry data and also atmospheric temperature profiles as a seconda
ry mission. The booster for this mission is will land at LZ-4.","crew":[],"ship
s":[],"capsules":[],"payloads":["5ed9867c1f30554030d45c40"],"launchpad":"5e9e4502
f509092b78566f87","flight_number":108,"name":"Sentinel-6 Michael Freilich","date_
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spaceflightnow.com/2020/11/25/spacex-launches-60-more-starlink-satellites-on-100t
h-falcon-9-flight/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static
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es":[],"details":"This mission will launch the fifteenth batch of operational Sta

rlink satellites, which are version 1.0, from SLC-40, Cape Canaveral Air Force St
ation. It will be the sixteenth Starlink launch overall. The satellites will be d
elivered to low Earth orbit and will spend a few weeks maneuvering to their opera
tional altitude of 550 km. The booster for this mission is expected to land on an
ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90
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09094ba4566f84","flight_number":109,"name":"Starlink-15 (v1.0)","date_utc":"2020-
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e":"https://spaceflightnow.com/2020/12/06/spacex-launches-first-in-new-line-of-up
graded-space-station-cargo-ships/","wikipedia":"https://en.wikipedia.org/wiki/Spa
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lf 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 Bisho
p Airlock. Falcon 9 and Dragon launch from LC-39A, Kennedy Space Center and the b
ooster is expected to land on an ASDS. The mission will be complete with return a
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stationary transfer orbit and the booster will be recovered downrange. The spacec
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two solar arrays producing 20kW, and an unfurlable antenna dish. SXM-7 will repla
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acex-closes-out-record-year-of-launches-from-floridas-space-coast/","wikipedi
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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 oper
ational altitude. The booster is expected to land on an ASDS.","crew":[],"ships":
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acex-successfully-deploys-60-more-starlink-satellites-but-loses-booster-on-descen
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ll. The satellites will be delivered to low Earth orbit and will spend a few week
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s, which are version 1.0, from LC-39A. It is the eighteenth Starlink launch overa
ll. The satellites will be delivered to low Earth orbit and will spend a few week
s maneuvering to their operational altitude. The booster is expected to land on a
n ASDS.","crew":[],"ships":["5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c91
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ew weeks maneuvering to their operational altitude. The booster is expected to la
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m or SLC-40 or LC-39A. It is the 24th Starlink launch overall. The satellites wil
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d operational mission of its Crew Dragon vehicle as part of NASA\'s Commercial Cr
ew Program, carrying NASA astronauts Shane Kimbrough, Megan McArthur, Thomas Pesq

uet, and Akihiko Hoshide to the International Space Station. The Falcon 9 and Cre
w Dragon lift off from LC-39A, Kennedy Space Center. Both the booster and the cap
sule have flown previously, each a first for a commercial crew flight. The booste
r for this mission is expected to land on an ASDS. The mission will be complete w
ith the safe return of the astronauts to Earth.","crew":["5fe3ba5fb3467846b324218
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he 26th batch of operational Starlink satellites, which are version 1.0, from SLC
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which are version 1.0, from LC-39A or SLC-40. It is the 28th Starlink launch over
all. The satellites will be delivered to low Earth orbit and will spend a few wee
ks maneuvering to their operational altitude. The booster is expected to land on
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rk-nears-completion-with-falcon-9-launch/","wikipedia":"https://en.wikipedia.org/
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ites, which were version 1.0, from SLC-40. It was the 29th Starlink launch overal
l. The satellites plan to be delivered to low Earth orbit and will spend a few we
eks maneuvering to their operational altitude. The booster is expected to land on
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509094ba4566f84","flight_number":128,"name":"Starlink-28 (v1.0)","date_utc":"2021
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1/06/03/spacex-supply-ship-launches-on-mission-to-begin-upgrading-space-station-e
lectrical-grid/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-22"},"stat
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2nd ISS resupply mission on behalf of NASA, this mission sends essential supplies
to the International Space Station using the cargo variant of SpaceX\'s Dragon 2
spacecraft. The external payload for this mission is the first pair of ISS Roll O
ut Solar Arrays. Falcon 9 and Dragon launch from LC-39A, Kennedy Space Center and
the booster is expected to land on an ASDS. The mission will be complete with spl
ashdown and recovery of the capsule and down cargo.","crew":[],"ships":["5ea6ed2f
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onous geostationary transfer orbit and will replace XM-4 in geostationary orbit.
The booster for this mission will land on an ASDS.","crew":[],"ships":["5ee68c683
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h will use the first stage from the previous GPS mission. This will be the first
time a National Security Space Launch has flown on a flight proven booster. Falco
n 9 will launch from SLC-40, Cape Canaveral and the booster will land downrange o
n a drone ship. GPS III is the third generation of the U.S. Space Force\'s NAVSTA
R Global Positioning System satellites, developed by Lockheed Martin. The GPS III
constellation will feature a cross-linked command and control architecture, allow
ing the entire GPS constellation to be updated simultaneously from a single groun
d station. A new spot beam capability for enhanced military coverage and increase
d resistance to hostile jamming will be incorporated.","crew":[],"ships":["60c8c7
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e,"failures":[],"details":"Falcon 9 launches to sun-synchronous polar orbit from
Florida as part of SpaceX\'s Rideshare program dedicated to smallsat customers. T
he mission lifts off from SLC-40, Cape Canaveral on a southward azimuth and perfo
rms a dogleg maneuver. The booster for this mission is expected to return to LZ-1
based on FCC communications filings. This rideshare takes approximately 90 satell
ites and hosted payloads into orbit on a variety of deployers including three fre
e-flying spacecraft which dispense their customers\' satellites after separation
from the SpaceX stack.","crew":[],"ships":["60c8c7a45d4819007ea69871"],"capsule
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ures":[],"details":"SpaceX\'s 23rd ISS resupply mission on behalf of NASA, this m
ission brings essential supplies to the International Space Station using the car
go variant of SpaceX\'s Dragon 2 spacecraft. Cargo includes several science exper
iments. The booster for this mission is expected to land on an ASDS. The mission
will be complete with return and recovery of the Dragon capsule and down carg
o.","crew":[],"ships":["5ea6ed2d080df4000697c904"],"capsules":[],"payloads":["5fe
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SDS","landpad":"5e9e3033383ecb075134e7cd"}],"auto_update":true,"tbd":false,"launc
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-first-full-batch-of-laser-equipped-starlink-satellites/","wikipedia":"https://e
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\x99s first all-civilian mission to space. The mission will be commanded by Jared
Isaacman, the 37-year-old founder and Chief Executive Officer of Shift4 Payments
and an accomplished pilot and adventurer. Inspiration4 will leave Earth from Kenn
edy Space Center\xe2\x80\x99s historic Launch Complex 39A, the embarkation point
for Apollo and Space Shuttle missions, and travel across a low earth orbit on a m
ulti-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 aw
areness and funds for St. Jude Children\xe2\x80\x99s Research Hospital, this mile
stone represents a new era for human spaceflight and exploration.","crew":["607a3
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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
e fact that it operates in Ka-Band.","crew":[],"ships":["618fad7e563d69573ed8caa
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argo-flight-sets-record-for-most-orbital-launches-from-space-coast-in-a-year/","w
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brings essential supplies to the International Space Station using the cargo vari
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The booster for this mission is expected to land on an ASDS. The mission will be
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d"}],"auto_update":true,"tbd":false,"launch_library_id":"a6b9deb4-f78d-4b57-8e47-
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e":"ASDS","landpad":"5e9e3033383ecb075134e7cd"}],"auto_update":true,"tbd":fals
e,"launch_library_id":"4a114237-e8c5-4248-8d30-7a9026b86430","id":"62f3b5200f55c5
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ion_and_deployment_thread/","launch":null,"media":null,"recovery":"https://www.re
ddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"fli
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502f509094188566f88","flight_number":181,"name":"Starlink 4-23 (v1.5)","date_ut
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22:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"61c1ef45a
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b075134e7cd"}],"auto_update":true,"tbd":false,"launch_library_id":"67158b3c-201d-
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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=requests.get(static_json_url)
```

In [11]:
```
response.status_code
```

Out[11]:
```
200
```

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

In [19]:
```
# Use json_normalize meethod to convert the json result into a dataframe
data = pd.json_normalize(response.json())
```

Using the dataframe `data` print the first 5 rows

In [20]:
```
# Get the head of the dataframe
data.head()
```

Out[20]:

	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 [21]:
```
# 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 [22]:
```
#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 [23]:
```
BoosterVersion
```

Out[23]:
```
[]
```

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

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

the list has now been update

In [25]:
```
BoosterVersion[0:5]
```

Out[25]:
```
['Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 9']
```

we can apply the rest of the functions here:

In [26]:
```
# Call getLaunchSite
getLaunchSite(data)
```

In [27]:
```
# Call getPayloadData
getPayloadData(data)
```

In [28]:
```
# Call getCoreData
getCoreData(data)
```

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

In [29]:
```
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 [30]:
```
# Create a data from launch_dict
data_launch = pd.DataFrame.from_dict(launch_dict)
```

Show the summary of the dataframe

In [31]:
```
# Show the head of the dataframe
data_launch.head()
```

Out[31]:

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

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

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

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

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

In [34]:
```
data_falcon9.loc[:,'FlightNumber'] = list(range(1, data_falcon9.shape[0]+1))
data_falcon9
```

```
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages/pandas/core/indexi
ng.py:1773: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  self._setitem_single_column(ilocs[0], value, pi)
```

Out[34]:

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

90 rows × 17 columns

Data Wrangling

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

In [35]:
```
data_falcon9.isnull().sum()
```

Out[35]:
```
FlightNumber       0
Date               0
BoosterVersion     0
PayloadMass        5
Orbit              0
LaunchSite         0
Outcome            0
Flights            0
GridFins           0
Reused             0
Legs               0
LandingPad        26
Block              0
ReusedCount        0
Serial             0
Longitude          0
Latitude           0
dtype: int64
```

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

Task 3: Dealing with Missing Values

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

In [36]:
```
# Calculate the mean value of PayloadMass column

# Replace the np.nan values with its mean value
payload_mass_mean = data_falcon9['PayloadMass'].mean()

data_falcon9['PayloadMass'].replace(np.nan, payload_mass_mean, inplace = True)

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

```
/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages/pandas/core/generi
c.py:6619: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stabl
e/user_guide/indexing.html#returning-a-view-versus-a-copy
  return self._update_inplace(result)
```

```
Out[36]: FlightNumber       0
         Date               0
         BoosterVersion     0
         PayloadMass        0
         Orbit              0
         LaunchSite         0
         Outcome            0
         Flights            0
         GridFins           0
         Reused             0
         Legs               0
         LandingPad        26
         Block              0
         ReusedCount        0
         Serial             0
         Longitude          0
         Latitude           0
         dtype: int64
```

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.

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