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:

SEPTEMBER 2013   HARD IMPACT ON OCEAN

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]:
```python
spacex_url="https://api.spacexdata.com/v4/launches/past"
```

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

Check the content of the response

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

b'[{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/94/f2/NN6Ph45r_o.png","large":"https://images2.imgbox.com/5b/02/QcxHUb5V_o.png"},"reddit":{"campaign":null,"launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://www.youtube.com/watch?v=0a_00nJ_Y88","youtube_id":"0a_00nJ_Y88","article":"https://www.space.com/2196-spacex-inaugural-falcon-1-rocket-lost-launch.html","wikipedia":"https://en.wikipedia.org/wiki/DemoSat"},"static_fire_date_utc":"2006-03-17T00:00:00.000Z","static_fire_date_unix":1142553600,"net":false,"window":0,"rocket":"5e9d0d95eda69955f709d1eb","success":false,"failures":[{"time":33,"altitude":null,"reason":"merlin engine failure"}],"details":"Engine failure at 33 seconds and loss of vehicle","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4b5b6c3bb0006eeb1e1"],"launchpad":"5e9e4502f5090995de566f86","flight_number":1,"name":"FalconSat","date_utc":"2006-03-24T22:30:00.000Z","date_unix":1143239400,"date_local":"2006-03-25T10:30:00+12:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289df35918033d3b2623","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cd9ffd86e000604b32a"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/f9/4a/ZboXReNb_o.png","large":"https://images2.imgbox.com/80/a2/bkWotCIS_o.png"},"reddit":{"campaign":null,"launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://www.youtube.com/watch?v=Lk4zQ2wP-Nc","youtube_id":"Lk4zQ2wP-Nc","article":"https://www.space.com/3590-spacex-falcon-1-rocket-fails-reach-orbit.html","wikipedia":"https://en.wikipedia.org/wiki/DemoSat"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69955f709d1eb","success":false,"failures":[{"time":301,"altitude":289,"reason":"harmonic oscillation leading to premature engine shutdown"}],"details":"Successful first stage burn and transition to second stage, maximum altitude 289 km, Premature engine shutdown at T+7 min 30 s, Failed to reach orbit, Failed to recover first stage","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4b6b6c3bb0006eeb1e2"],"launchpad":"5e9e4502f5090995de566f86","flight_number":2,"name":"DemoSat","date_utc":"2007-03-21T01:10:00.000Z","date_unix":1174439400,"date_local":"2007-03-21T13:10:00+12:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289ef35918416a3b2624","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cdaffd86e000604b32b"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/6c/cb/na1tzhHs_o.png","large":"https://images2.imgbox.com/4a/80/k1oAkY0k_o.png"},"reddit":{"campaign":null,"launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://www.youtube.com/watch?v=v0w9p3U8860","youtube_id":"v0w9p3U8860","article":"http://www.spacex.com/news/2013/02/11/falcon-1-flight-3-mission-summary","wikipedia":"https://en.wikipedia.org/wiki/Trailblazer_(satellite)"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69955f709d1eb","success":false,"failures":[{"time":140,"altitude":35,"reason":"residual stage-1 thrust led to collision between stage 1 and stage 2"}],"details":"Residual stage 1 thrust led to collision between stage 1 and stage 2","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4b6b6c3bb0006eeb1e3","5eb0e4b6b6c3bb0006eeb1e4"],"launchpad":"5e9e4502f5090995de566f86","flight_number":3,"name":"Trailblazer","date_utc":"2008-08-03T03:34:00.000Z","date_unix":1217734440,"date_local":"2008-08-03T15:34:00+12:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289ef3591814873b2625","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cdbffd86e000604b32c"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/95/39/sRqN7rsv_o.png","large":"https://images2.imgbox.com/a3/99/qswRYzE8_o.png"},"reddit":{"campaign":null,"launch":null,"media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"we

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s":"CRS-1 successful, but the secondary payload was inserted into abnormally low
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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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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to fly U.S. military payloads and found that the Thaicom 6 launch had \\"unaccept able fuel reserves at engine cutoff of the stage 2 second burnoff\\"","crew": [],"ships":[],"capsules":[],"payloads":["5eb0e4bbb6c3bb0006eeb1f0"],"launchpa d":"5e9e4501f509094ba4566f84","flight_number":13,"name":"Thaicom 6","date_utc":"2 014-01-06T18:06:00.000Z","date_unix":1389031560,"date_local":"2014-01-06T14:06:00 -04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e289ff35918 78603b262f","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_atte mpt":false,"landing_success":null,"landing_type":null,"landpad":null}],"auto_upda te":true,"tbd":false,"launch_library_id":null,"id":"5eb87ce3ffd86e000604b336"}, {"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/ae/3c/yVvE 2vVh_o.png","large":"https://images2.imgbox.com/82/c7/bbs0gt88_o.png"},"reddit": {"campaign":null,"launch":"http://www.reddit.com/r/spacex/comments/22zo8c","medi a":null,"recovery":null},"flickr":{"small":[],"original":["https://farm8.staticfl ickr.com/7615/16670240949_8d43db0e36_o.jpg","https://farm9.staticflickr.com/8597/ 16856369125_e97cd30ef7_o.jpg","https://farm8.staticflickr.com/7586/16166732954_93 38dc859c_o.jpg","https://farm8.staticflickr.com/7603/16855223522_462da54e84_o.jp g","https://farm8.staticflickr.com/7618/16234010894_e1210ec300_o.jpg","https://fa rm8.staticflickr.com/7617/16855338881_69542a2fa9_o.jpg"]},"presskit":"http://www. spacex.com/sites/spacex/files/spacexcrs-3_presskit_042014.pdf","webcast":"http s://www.youtube.com/watch?v=Od-lON4bTyQ","youtube_id":"Od-lON4bTyQ","article":"ht tps://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":"5e9d0d95eda69973a809 d1ec","success":true,"failures":[],"details":"Following second-stage separation, SpaceX conducted a second controlled-descent test of the discarded booster vehicl e and achieved the first successful controlled ocean touchdown of a liquid-rocket -engine orbital booster. Following touchdown the first stage tipped over as expec ted 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 vehicl e.","crew":[],"ships":["5ea6ed2d080df4000697c902"],"capsules":["5e9e2c5bf3591859a 63b2668"],"payloads":["5eb0e4bbb6c3bb0006eeb1f1"],"launchpad":"5e9e4501f509094ba4 566f84","flight_number":14,"name":"CRS-3","date_utc":"2014-04-18T19:25:00.000 Z","date_unix":1397849100,"date_local":"2014-04-18T15:25:00-04:00","date_precisio n":"hour","upcoming":false,"cores":[{"core":"5e9e289ff3591829343b2630","flight": 1,"gridfins":false,"legs":true,"reused":false,"landing_attempt":true,"landing_suc cess":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":fals e,"launch_library_id":null,"id":"5eb87ce4ffd86e000604b337"},{"fairings":{"reuse d":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch": {"small":"https://images2.imgbox.com/a4/44/YWAUBkOe_o.png","large":"https://image s2.imgbox.com/fd/41/FUnfqHHH_o.png"},"reddit":{"campaign":null,"launch":"http://w ww.reddit.com/r/spacex/comments/2aany2","media":null,"recovery":null},"flickr": {"small":[],"original":["https://farm8.staticflickr.com/7585/16602893909_11813170 89_o.jpg","https://farm9.staticflickr.com/8747/16581738577_83e0690136_o.png","htt ps://farm8.staticflickr.com/7285/16581736047_6fd536ab11_o.jpg","https://farm8.sta ticflickr.com/7597/16789021675_35f0148f78_o.jpg","https://farm8.staticflickr.com/ 7631/16236321533_829ae07b42_o.jpg","https://farm9.staticflickr.com/8726/168304220 56_26c2265bbc_o.jpg","https://farm9.staticflickr.com/8591/16670149079_33d6cc3631_ o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/spacex_orbcomm_pres skit_final.pdf","webcast":"https://www.youtube.com/watch?v=lbHnSu-DLR4","youtube_ id":"lbHnSu-DLR4","article":"https://www.orbcomm.com/en/networks/satellite/orbcom m-og2","wikipedia":"https://en.wikipedia.org/wiki/Falcon_9_flight_10"},"static_fi re_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 booste r 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 bur ns, 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

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ather-observatory-blasts-off-after-17-year-wait/","wikipedia":"https://en.wikiped
ia.org/wiki/Deep_Space_Climate_Observatory"},"static_fire_date_utc":"2015-01-31T0
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rm9.staticflickr.com/8617/16510041628_883af57512_o.jpg"]},"presskit":"http://www.
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outube.com/watch?v=mN7lyaCBzT8","youtube_id":"mN7lyaCBzT8","article":"https://ww
w.space.com/28702-spacex-rocket-launches-satellites-video.html","wikipedia":"http
s://en.wikipedia.org/wiki/ABS-3A"},"static_fire_date_utc":"2015-02-25T19:10:00.00
0Z","static_fire_date_unix":1424891400,"net":false,"window":0,"rocket":"5e9d0d95e
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first-ever conjoined launch of a lighter-weight dual-commsat stack that was speci
fically designed to take advantage of the lower-cost SpaceX Falcon 9 launch vehic
le. Per satellite, launch costs were less than $30 million. The ABS satellite rea
ched its final destination ahead of schedule and started operations on September
10.","crew":[],"ships":[],"capsules":[],"payloads":["5eb0e4bdb6c3bb0006eeb1f8","5
eb0e4bdb6c3bb0006eeb1f9"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":
21,"name":"ABS-3A / Eutelsat 115W B","date_utc":"2015-03-02T03:50:00.000Z","date_
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s://www.reddit.com/r/spacex/comments/32jnyd","media":"https://www.reddit.com/r/sp
acex/comments/32lw5y","recovery":null},"flickr":{"small":[],"original":["https://
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ickr.com/7708/17170624402_f6de506461_o.jpg","https://farm8.staticflickr.com/7658/
17170624462_2efc977fee_o.jpg","https://farm8.staticflickr.com/7611/17171659711_42
597fefed_o.jpg","https://farm9.staticflickr.com/8774/17170624412_7091dbd04a_o.jp
g"]},"presskit":"https://www.nasa.gov/sites/default/files/files/SpaceX_NASA_CRS-6
_PressKit.pdf","webcast":"https://www.youtube.com/watch?v=csVpa25iqH0","youtube_i
d":"csVpa25iqH0","article":"https://spaceflightnow.com/2015/04/14/falcon-9-succes
sfully-launches-descends-to-off-balance-landing/","wikipedia":"https://en.wikiped

ia.org/wiki/SpaceX_CRS-6"},"static_fire_date_utc":"2015-04-11T00:00:00.000Z","sta
tic_fire_date_unix":1428710400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a
809d1ec","success":true,"failures":[],"details":"Following the first-stage boost,
SpaceX attempted a controlled-descent test of the first stage. The first stage co
ntacted the ship, but soon tipped over due to excess lateral velocity caused by a
stuck throttle valve resulting in a later-than-intended downthrottle.","crew":
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e9e2c5cf359188bfb3b266b"],"payloads":["5eb0e4bdb6c3bb0006eeb1fa"],"launchpad":"5e
9e4501f509094ba4566f84","flight_number":22,"name":"CRS-6","date_utc":"2015-04-14T
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8","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":tru
e,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb761634e7
cb"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cecffd86
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lse,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/a6/9b/IzWT1
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ticflickr.com/7691/17139094400_b94ce1ff56_o.jpg","https://farm9.staticflickr.com/
8739/17140415959_38b5ee8bc6_o.jpg","https://farm8.staticflickr.com/7735/167041925
74_e3a0a6fac2_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/space
xthalesfactsheet_final.pdf","webcast":"https://www.youtube.com/watch?v=nBwAYT_ogj
4","youtube_id":"nBwAYT_ogj4","article":"https://spaceflightnow.com/2015/04/28/fa
lcon-9-rocket-powers-into-space-with-satellite-for-turkmenistan/","wikipedia":"ht
tps://en.wikipedia.org/wiki/T%C3%BCrkmen%C3%84lem_52%C2%B0E_/_MonacoSAT"},"static
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bb0006eeb1fb"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":23,"nam
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9","flight":1,"gridfins":false,"legs":false,"reused":false,"landing_attempt":fals
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s://www.reddit.com/r/spacex/comments/3berj3","recovery":null},"flickr":{"small":
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g","https://farm1.staticflickr.com/287/18999110808_6e153fed64_o.jpg"]},"presski
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it.pdf","webcast":"https://www.youtube.com/watch?v=PuNymhcTtSQ","youtube_id":"PuN
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
5294800,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":fals
e,"failures":[{"time":139,"altitude":40,"reason":"helium tank overpressure lead t
o the second stage LOX tank explosion"}],"details":"Launch performance was nomina
l until an overpressure incident in the second-stage LOX tank, leading to vehicle
breakup at T+150 seconds. The Dragon capsule survived the explosion but was lost
upon splashdown because its software did not contain provisions for parachute dep
loyment on launch vehicle failure.","crew":[],"ships":["5ea6ed2e080df4000697c90
6","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c"],"capsules":["5e9e2c5cf3
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9094ba4566f84","flight_number":24,"name":"CRS-7","date_utc":"2015-06-28T14:21:00.
000Z","date_unix":1435501260,"date_local":"2015-06-28T10:21:00-04:00","date_preci
sion":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f35918683c3b263a","fligh
t":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_s
uccess":null,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_u
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g","large":"https://images2.imgbox.com/99/d4/0aIlpFpw_o.png"},"reddit":{"campaig
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s://www.reddit.com/r/spacex/comments/3xm83h/","recovery":null},"flickr":{"small":
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m6.staticflickr.com/5806/23802550622_9ff8c90098_o.jpg","https://farm1.staticflick
r.com/571/23604164970_2a1a2366e4_o.jpg","https://farm6.staticflickr.com/5773/2327
1687254_5e64d726ba_o.jpg","https://farm6.staticflickr.com/5766/23526044959_5bfe74
bc88_o.jpg","https://farm6.staticflickr.com/5723/23785609832_83038751d1_o.jpg","h
ttps://farm1.staticflickr.com/715/23833499336_d3fde6a25a_o.jpg"]},"presskit":"htt
p://www.spacex.com/sites/spacex/files/spacex_orbcomm_press_kit_final2.pdf","webca
st":"https://www.youtube.com/watch?v=O5bTbVbe4e4","youtube_id":"O5bTbVbe4e4","art
icle":"https://spaceflightnow.com/2015/12/22/round-trip-rocket-flight-gives-space
x-a-trifecta-of-successes/","wikipedia":"https://en.wikipedia.org/wiki/Falcon_9_f
light_20"},"static_fire_date_utc":"2015-12-19T00:09:00.000Z","static_fire_date_un
ix":1450483740,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","succes
s":true,"failures":[],"details":"Total payload mass was 2,034 kg (4,484 lb) : 11
satellites weighing 172 kg each, plus a 142-kg mass simulator. This was the first
launch of the upgraded v1.1 variant (later called Falcon 9 Full Thrust), with a 3
0 percent power increase. Orbcomm had originally agreed to be the third flight of
the enhanced-thrust rocket, but the change to the maiden flight position was anno
unced in October 2015. SpaceX received a permit from the FAA to land the booster
on solid ground at Cape Canaveral, and succeeded.","crew":[],"ships":[],"capsule
s":[],"payloads":["5eb0e4beb6c3bb0006eeb1fd"],"launchpad":"5e9e4501f509094ba4566f
84","flight_number":25,"name":"OG-2 Mission 2","date_utc":"2015-12-22T01:29:00.00
0Z","date_unix":1450747740,"date_local":"2015-12-22T21:29:00-04:00","date_precisi
on":"hour","upcoming":false,"cores":[{"core":"5e9e28a1f3591867753b263b","flight":
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[]},"links":{"patch":{"small":"https://images2.imgbox.com/8a/44/PSksEBjD_o.pn
g","large":"https://images2.imgbox.com/d9/c9/57ioWDgW_o.png"},"reddit":{"campaig
n":null,"launch":"https://www.reddit.com/r/spacex/comments/417weg","media":"http
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rm2.staticflickr.com/1618/24151425850_1cb6040569_o.jpg","https://farm2.staticflic
kr.com/1622/24127012370_07edc62046_o.jpg","https://farm2.staticflickr.com/1508/24
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1286fc_o.jpg","https://farm2.staticflickr.com/1542/24038722499_34c10216a3_o.jp
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t.pdf","webcast":"https://www.youtube.com/watch?v=ivdKRJzl6y0","youtube_id":"ivdK
RJzl6y0","article":"https://spaceflightnow.com/2016/01/18/satellite-launched-to-m
easure-motions-of-the-oceans/","wikipedia":"https://en.wikipedia.org/wiki/Jason-
3"},"static_fire_date_utc":"2016-01-11T18:42:00.000Z","static_fire_date_unix":145
2537720,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":tru
e,"failures":[],"details":"First launch of NASA and NOAA joint science mission un
der the NLS II launch contract (not related to NASA CRS or USAF OSP3 contracts).
Last launch of the original Falcon 9 v1.1 launch vehicle. The Jason-3 satellite w
as successfully deployed to target orbit. SpaceX again attempted a recovery of th
e first stage booster by landing on an autonomous drone ship; this time located i

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","5ea6ed3008 0df4000697c913"],"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/1704/2628382205
6_838c1103b9_o.jpg","https://farm2.staticflickr.com/1508/26217345472_118767c608_
o.jpg","https://farm2.staticflickr.com/1495/25916886442_821a152917_o.jpg"]},"pres
skit":"http://www.spacex.com/sites/spacex/files/spacex_crs8_press_kit.pdf","webca
st":"https://www.youtube.com/watch?v=7pUAydjne5M","youtube_id":"7pUAydjne5M","art
icle":"https://spaceflightnow.com/2016/04/08/spacex-lands-rocket-on-floating-plat
form-after-station-resupply-launch/","wikipedia":"https://en.wikipedia.org/wiki/S
paceX_CRS-8"},"static_fire_date_utc":"2016-04-05T00:00:00.000Z","static_fire_date
_unix":1459814400,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","suc
cess":true,"failures":[],"details":"Dragon carried over 1500 kg of supplies and d
elivered (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 land
ed 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 se
a as part of an orbital launch. The first stage B1021 was later also the first or
bital booster to be used again, when launching SES-10 on March 30, 2017.","crew":
[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4
000697c90c","5ea6ed30080df4000697c912","5ea6ed30080df4000697c913"],"capsules":["5
e9e2c5cf3591885d43b266d"],"payloads":["5eb0e4bfb6c3bb0006eeb200"],"launchpad":"5e
9e4501f509094ba4566f84","flight_number":28,"name":"CRS-8","date_utc":"2016-04-08T
20:43:00.000Z","date_unix":1460148180,"date_local":"2016-04-08T16:43:00-04:00","d
ate_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f359182d0b3b263
e","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":tru
e,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7c
a"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cf3ffd86e
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jx_o.png","large":"https://images2.imgbox.com/2a/47/az2sxGIB_o.png"},"reddit":{"c
ampaign":"https://www.reddit.com/r/spacex/comments/4gyh8z","launch":"https://www.
reddit.com/r/spacex/comments/4htenu","media":"https://www.reddit.com/r/spacex/com
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g","article":"https://spaceflightnow.com/2016/05/06/falcon-9-succeeds-in-middle-o
f-the-night-launch/","wikipedia":"https://en.wikipedia.org/wiki/JCSAT-2B"},"stati
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res":[],"details":"Launched the JCSAT 14 communications satellite for Tokyo-based
SKY Perfect JSAT Corp. JCSAT 14 will support data networks, television broadcaste
rs and mobile communications users in Japan, East Asia, Russia, Oceania, Hawaii a
nd other Pacific islands. This was the first time a booster successfully landed a
fter a GTO mission.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df
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ow.com/2016/05/27/spacex-logs-successful-late-afternoon-launch-for-thaicom/","wik
ipedia":"https://en.wikipedia.org/wiki/Thaicom_8"},"static_fire_date_utc":"2016-0
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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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ps://www.reddit.com/r/spacex/comments/4o5j6o","recovery":"https://www.reddit.com/
r/spacex/comments/4on75l"},"flickr":{"small":[],"original":["https://farm8.static
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d":"gLNmtUEvI5A","article":"https://spaceflightnow.com/2016/06/15/spacex-successf
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
ea6ed2f080df4000697c90c","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5
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e landing burn. All previous landings from a ballistic trajectory had fired three engines on the landing-burn, which provided more braking force, but subjected the vehicle to greater structural stresses. The single-engine landing burn takes more time and fuel, but puts less stress on the vehicle.","crew":[],"ships":["5ea6ed2e 080df4000697c906","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90c","5ea6ed30 080df4000697c913"],"capsules":[],"payloads":["5eb0e4c1b6c3bb0006eeb206"],"launchp ad":"5e9e4501f509094ba4566f84","flight_number":33,"name":"JCSAT-16","date_utc":"2 016-08-14T05:26:00.000Z","date_unix":1471152360,"date_local":"2016-08-14T01:26:00 -04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a2f35918 b8243b2643","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attemp t":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb 234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfa ffd86e000604b34a"},{"fairings":{"reused":false,"recovery_attempt":false,"recovere d":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/0d/5b/ 8X01C3ov_o.png","large":"https://images2.imgbox.com/ff/19/KCI4DVla_o.png"},"reddi t":{"campaign":"https://www.reddit.com/r/spacex/comments/4pv7jl","launch":null,"m edia":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":nul l,"webcast":"https://www.youtube.com/watch?v=_BgJEXQkjNQ","youtube_id":"_BgJEXQkj NQ","article":"https://spaceflightnow.com/2016/09/01/spacex-rocket-and-israeli-sa tellite-destroyed-in-launch-pad-explosion/","wikipedia":"https://en.wikipedia.or g/wiki/Amos-6"},"static_fire_date_utc":"2016-09-01T13:07:00.000Z","static_fire_da te_unix":1472735220,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1e c","success":false,"failures":[{"time":-165180,"altitude":0,"reason":"buckled lin er in several of the COPV tanks, causing perforations that allowed liquid and/or solid oxygen to accumulate underneath the lining, which was ignited by frictio n."}],"details":"The rocket and Amos-6 payload were lost in a launch pad explosio n on September 1, 2016 during propellant fill prior to a static fire test. The pa d was clear of personnel and there were no injuries.","crew":[],"ships":[],"capsu les":[],"payloads":["5eb0e4c1b6c3bb0006eeb207"],"launchpad":"5e9e4501f509094ba456 6f84","flight_number":34,"name":"Amos-6","date_utc":"2016-09-01T13:07:00.000Z","d ate_unix":1472735220,"date_local":"2016-09-01T09:07:00-04:00","date_precision":"h our","upcoming":false,"cores":[{"core":"5e9e28a2f359187ee83b2644","flight":1,"gri dfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":n ull,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":tr ue,"tbd":false,"launch_library_id":null,"id":"5eb87cfbffd86e000604b34b"},{"fairin gs":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"link s":{"patch":{"small":"https://images2.imgbox.com/89/2a/bkI6LN0R_o.png","large":"h ttps://images2.imgbox.com/24/c3/9MKjvOdD_o.png"},"reddit":{"campaign":"https://ww w.reddit.com/r/spacex/comments/5dii6z","launch":"https://www.reddit.com/r/spacex/ comments/5nsaqm","media":"https://www.reddit.com/r/spacex/comments/5nsico","recov ery":"https://www.reddit.com/r/spacex/comments/5oe9kk"},"flickr":{"small":[],"ori ginal":["https://farm1.staticflickr.com/658/32394688795_55a9873ea7_o.jpg","http s://farm1.staticflickr.com/506/32394688095_a3339f3c6d_o.jpg","https://farm1.stati cflickr.com/745/32394687645_63ae2b4740_o.jpg","https://farm1.staticflickr.com/31 8/31548291014_e3a30abca8_o.jpg","https://farm1.staticflickr.com/670/32351549066_e 9cffe8d2b_o.jpg","https://farm6.staticflickr.com/5518/31579784413_83aeac560a_o.jp g","https://farm6.staticflickr.com/5556/32312421135_22c197c156_o.jpg","https://fa rm1.staticflickr.com/529/32312420015_5d2403a847_o.jpg","https://farm1.staticflick r.com/435/32312417695_19c0e50c4b_o.jpg","https://farm1.staticflickr.com/735/32312 416415_b90892af0a_o.jpg","https://farm1.staticflickr.com/293/32312415025_cae16d19 94_o.jpg","https://farm1.staticflickr.com/738/31467130724_92e02c9524_o.jpg","http s://farm1.staticflickr.com/464/31467130374_9f7a7d380e_o.jpg","https://farm1.stati cflickr.com/581/31467129424_bac77d594a_o.jpg","https://farm1.staticflickr.com/38 0/32308163845_c1731a4b1f_o.jpg","https://farm1.staticflickr.com/447/31450835954_7 2ed10a19e_o.jpg","https://farm1.staticflickr.com/507/31450834974_b8a3f4aca5_o.jp g"]},"presskit":"https://drive.google.com/open?id=0BwA3a65ef1OvZC1aU3FuMlQzal E","webcast":"https://www.youtube.com/watch?v=7WimRhydggo","youtube_id":"7WimRhyd ggo","article":"https://spaceflightnow.com/2017/01/14/spacex-resumes-flights-with -on-target-launch-for-iridium/","wikipedia":"https://en.wikipedia.org/wiki/Iridiu m_satellite_constellation#Next-generation_constellation"},"static_fire_date_ut

c":"2017-01-05T19:40:00.000Z","static_fire_date_unix":1483645200,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"Return-to-flight mission after the loss of Amos-6 in September 2016. Iridium NEXT will replace the original Iridium constellation, launched in the late 1990s. Each Falcon mission will carry 10 satellites, with a goal to complete deployment of the 66 plus 9 spare satellite constellation by mid 2018. The first two Iridium qualification units were supposed to ride a Dnepr rocket in April 2016 but were delayed, so Iridium decided to qualify the first batch of 10 satellites instead d.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed30080df4000697c912","5ea6ed30080df4000697c915"],"capsules":[],"payloads":["5eb0e4c2b6c3bb0006eeb208"],"launchpad":"5e9e4502f509092b78566f87","flight_number":35,"name":"Iridium NEXT Mission 1","date_utc":"2017-01-14T17:54:00.000Z","date_unix":1484416440,"date_local":"2017-01-14T10:54:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f359189e3a3b2645","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfdffd86e000604b34c"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/11/eb/qqrhHFhv_o.png","large":"https://images2.imgbox.com/ea/43/D4tA0WaM_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5n2eqx","launch":"https://www.reddit.com/r/spacex/comments/5uw4bh","media":"https://www.reddit.com/r/spacex/comments/5uoy8o","recovery":"https://www.reddit.com/r/spacex/comments/609aq4"},"flickr":{"small":[],"original":["https://farm3.staticflickr.com/2815/32761844973_d2e8d76e9c_o.jpg","https://farm4.staticflickr.com/3878/32761843663_8e366494f4_o.jpg","https://farm3.staticflickr.com/2790/32852846842_6f1f7b26b9_o.jpg","https://farm3.staticflickr.com/2295/32852845662_e7ae0daf4a_o.jpg","https://farm4.staticflickr.com/3888/33000639155_2a6e2bb23d_o.jpg","https://farm1.staticflickr.com/405/33000638185_b4ec7c7b93_o.jpg","https://farm1.staticflickr.com/574/32874779241_9f463de901_o.jpg","https://farm4.staticflickr.com/3710/32153433074_96337a54db_o.jpg","https://farm1.staticflickr.com/327/32153432924_09dd1482d8_o.jpg","https://farm3.staticflickr.com/2881/32183025803_36bf976b9e_o.jpg","https://farm3.staticflickr.com/2362/32183025493_2a37b4e22c_o.jpg","https://farm1.staticflickr.com/504/32178458813_ff47f61bb9_o.jpg","https://farm1.staticflickr.com/265/32176806823_879ccc5da0_o.jpg","https://farm1.staticflickr.com/401/32866357531_69c6d289ed_o.jpg","https://farm3.staticflickr.com/2105/32945170805_553d45ca56_o.jpg","https://farm4.staticflickr.com/3865/32945170225_58129f00dc_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/crs10presskitfinal.pdf","webcast":"https://www.youtube.com/watch?v=giNhaEzv_PI","youtube_id":"giNhaEzv_PI","article":"https://spaceflightnow.com/2017/02/19/historic-launch-pad-back-in-service-with-thundering-blastoff-by-spacex/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-10"},"static_fire_date_utc":"2017-02-12T21:30:00.000Z","static_fire_date_unix":1486935000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"First Falcon 9 flight from the historic LC-39A launchpad at Kennedy Space Center, carrying supplies and materials to support dozens of science and research investigations scheduled during ISS Expeditions 50 and 51. The first stage returned to launch site and landed at LZ-1.","crew":[],"ships":["5ea6ed30080df4000697c912"],"capsules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4c3b6c3bb0006eeb209"],"launchpad":"5e9e4502f509094188566f88","flight_number":36,"name":"CRS-10","date_utc":"2017-02-19T14:39:00.000Z","date_unix":1487515140,"date_local":"2017-02-19T10:39:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591829dc3b2646","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87cfeffd86e000604b34d"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/56/9d/gvzAqLFg_o.png","large":"https://images2.imgbox.com/52/a0/z8Dwflcz_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/5n2e10/echostar_23_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/5z8dkm/welcome_to_the_rspacex_echostar23_official_launch/","media":"https://www.reddit.com/r/spacex/comments/5z8if6/rspacex_echostar_23_media_thread_videos_images/","recovery":null},"f

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g","https://farm1.staticflickr.com/768/33094072690_31a85e82ba_o.jpg","https://far
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z7U","article":"http://spacenews.com/spacex-launches-echostar-23/","wikipedia":"h
ttps://en.wikipedia.org/wiki/EchoStar#Satellite_fleet"},"static_fire_date_utc":"2
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s":"Communications satellite for EchoStar Corp. EchoStar XXIII, based on a spare
platform from the cancelled CMBStar 1 satellite program, will provide direct-to-h
ome television broadcast services over Brazil. There was no attempt at a first-st
age recovery so this rocket did not have landing legs or grid fins.","crew":[],"s
hips":[],"capsules":[],"payloads":["5eb0e4c3b6c3bb0006eeb20a"],"launchpad":"5e9e4
502f509094188566f88","flight_number":37,"name":"EchoStar 23","date_utc":"2017-03-
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abd7e_o.jpg","https://farm4.staticflickr.com/3886/32915199874_b826eac153_o.jp
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6e2351_o.jpg","https://farm4.staticflickr.com/3819/33616913111_e699b48d66_o.jp
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acex-flies-rocket-for-second-time-in-historic-test-of-cost-cutting-technolog
y/","wikipedia":"https://en.wikipedia.org/wiki/SES-10"},"static_fire_date_utc":"2
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s":"First payload to fly on a reused first stage, B1021, previously launched with
CRS-8, which also landed a second time. In what is also a first, the payload fair
ing remained intact after a successful splashdown achieved with thrusters and a s
teerable parachute.","crew":[],"ships":["5ea6ed2e080df4000697c906","5ea6ed2f080df
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ins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":tru
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ssfully-launches-nrol-76-u-s-military-satellite/","wikipedia":"https://en.wikiped
ia.org/wiki/List_of_NRO_launches"},"static_fire_date_utc":"2017-04-25T19:02:00.00
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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
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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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the Falcon Heavy, but performance improvements allowed the mission to be carried

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used-dragon-cargo-capsule-launched-on-journey-to-space-station/","wikipedia":"htt
ps://en.wikipedia.org/wiki/SpaceX_CRS-11"},"static_fire_date_utc":"2017-05-28T16:
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ivered the Neutron Star Interior Composition Explorer (NICER) to the ISS, along w
ith the MUSES Earth imaging platform and ROSA solar array. For the first time, th
is mission launched a refurbished Dragon capsule, serial number C106 which first
flew in September 2014 on the CRS-4 mission. Originally scheduled to launch on Ju
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d: Second flight of B1029 after the Iridium mission of January 2017. The satellit
e will be the first commercial Bulgarian-owned communications satellite and it wi
ll provide television broadcasts and other communications services over southeast
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s://farm5.staticflickr.com/4217/35533872755_900b3e8977_o.jpg"]},"presskit":"htt
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www.space.com/37304-liftoff-spacex-second-launch-three-days.html","wikipedia":"ht
tps://en.wikipedia.org/wiki/Iridium_satellite_constellation"},"static_fire_date_u
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06/spacex-delivers-for-intelsat-on-heavyweight-falcon-9-mission/","wikipedia":"ht
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5"},"static_fire_date_utc":"2017-08-24T18:50:00.000Z","static_fire_date_unix":150
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mooth-launch-of-militarys-x-37b-spaceplane/","wikipedia":"https://en.wikipedia.or
g/wiki/Boeing_X-37"},"static_fire_date_utc":"2017-08-31T20:30:00.000Z","static_fi
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nch-adds-another-10-satellites-to-iridium-next-fleet/","wikipedia":"https://en.wi
kipedia.org/wiki/Iridium_satellite_constellation#Next-generation_constellatio
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ightnow.com/2017/10/12/video-falcon-9-rocket-lifts-off-with-joint-satellite-for-s
es-echostar/","wikipedia":"https://en.wikipedia.org/wiki/List_of_SES_satellite
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-and-lands-third-rocket-in-three-weeks/","wikipedia":"https://en.wikipedia.org/wi
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able of providing communication services from East Africa and Central Asia to sou
thern India, Southeast Asia, the Philippines, Guam, Korea, and Japan. The satelli
te will be placed in GEO at 113\xc3\x82\xc2\xb0 East Longitude, and will provide
services ranging from broadband internet to broadcasting services and maritime co
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cle":"https://spaceflightnow.com/2017/12/15/spacexs-50th-falcon-rocket-launch-kic
ks-off-station-resupply-mission/","wikipedia":"https://en.wikipedia.org/wiki/Spac
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w.spacex.com/sites/spacex/files/zumapresskit.pdf","webcast":"https://www.youtube.
com/watch?v=0PWu3BRxn60","youtube_id":"0PWu3BRxn60","article":"https://spacefligh
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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rom the classified NROL-76 mission in May 2017. Following a successful experiment al ocean landing that used three engines, the booster unexpectedly remained intact; Elon Musk stated in a tweet that SpaceX will attempt to tow the booster to shore.","crew":[],"ships":["5ea6ed2f080df4000697c90b"],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21b"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":54,"name":"SES-16 / GovSat-1","date_utc":"2018-01-31T21:25:00.000Z","date_unix":1517433900,"date_local":"2018-01-31T16:25:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a3f3591811f83b2648","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"Ocean","landpad":null}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d11ffd86e000604b35f"},{"fairings":{"reused":false,"recovery_attempt":false,"recovered":false,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/cd/48/NVrODg2G_o.png","large":"https://images2.imgbox.com/97/11/mjn87zBs_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/7hjp03/falcon_heavy_demo_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/7vg63x/rspacex_falcon_heavy_test_flight_official_launch/","media":"https://www.reddit.com/r/spacex/comments/7vimtm/rspacex_falcon_heavy_test_flight_media_thread/","recovery":null},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4745/40110304192_b0165b7785_o.jpg","https://farm5.staticflickr.com/4676/40110297852_6173e5cae6_o.jpg","https://farm5.staticflickr.com/4615/40143096241_0324643b5e_o.jpg","https://farm5.staticflickr.com/4702/40110298232_4e9c412936_o.jpg","https://farm5.staticflickr.com/4610/39337245575_41d760caef_o.jpg","https://farm5.staticflickr.com/4654/25254688767_59603ff06c_o.jpg","https://farm5.staticflickr.com/4627/40126462801_d54b4f00be_o.jpg","https://farm5.staticflickr.com/4760/40126462231_cdf00ef431_o.jpg","https://farm5.staticflickr.com/4655/40202121122_5d29cfe2ac_o.jpg","https://farm5.staticflickr.com/4631/39337245145_5f5630a66a_o.jpg","https://farm5.staticflickr.com/4650/40126461851_14b93ec9d7_o.jpg","https://farm5.staticflickr.com/4711/40126461411_b1ed283d45_o.jpg","https://farm5.staticflickr.com/4696/40126460511_7b5cc64871_o.jpg","https://farm5.staticflickr.com/4589/38583831555_9ae89f5c10_o.jpg","https://farm5.staticflickr.com/4682/38583829815_e01509d1a7_o.jpg","https://farm5.staticflickr.com/4731/39225582801_80594d5d91_o.jpg","https://farm5.staticflickr.com/4641/39225582421_7aa0c65851_o.jpg","https://farm5.staticflickr.com/4643/27449864329_d2424bc280_o.jpg","https://farm5.staticflickr.com/4681/39225582171_137a4c75e7_o.jpg","https://farm5.staticflickr.com/4644/39225582351_ac6aba2533_o.jpg","https://farm5.staticflickr.com/4587/27449863849_709e135a98_o.jpg"]},"presskit":"http://www.spacex.com/sites/spacex/files/falconheavypresskit_v1.pdf","webcast":"https://www.youtube.com/watch?v=wbSwFU6tY1c","youtube_id":"wbSwFU6tY1c","article":"https://spaceflightnow.com/2018/02/07/spacex-debuts-worlds-most-powerful-rocket-sends-tesla-toward-the-asteroid-belt/","wikipedia":"https://en.wikipedia.org/wiki/Elon_Musk%27s_Tesla_Roadster"},"static_fire_date_utc":"2018-01-24T17:30:00.000Z","static_fire_date_unix":1516815000,"net":false,"window":9000,"rocket":"5e9d0d95eda69974db09d1ed","success":true,"failures":[],"details":"The launch was a success, and the side boosters landed simultaneously at adjacent ground pads. Drone ship landing of the central core failed. Final burn to heliocentric mars-earth orbit was successful after the second stage and payload passed through the Van Allen belts.","crew":[],"ships":["5ea6ed2f080df4000697c90c","5ea6ed2f080df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c6b6c3bb0006eeb21c"],"launchpad":"5e9e4502f509094188566f88","flight_number":55,"name":"Falcon Heavy Test Flight","date_utc":"2018-02-06T20:45:00.000Z","date_unix":1517949900,"date_local":"2018-02-06T15:45:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f359187f703b2653","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"},{"core":"5e9e28a2f359187f273b2642","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb90a834e7c8"},{"core":"5e9e28a2f3591845c73b2640","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d13ffd86e000604b360"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ship

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e":"https://spaceflightnow.com/2018/02/22/recycled-spacex-rocket-boosts-paz-radar
-satellite-first-starlink-testbeds-into-orbit/","wikipedia":"https://en.wikipedi
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pasat-satellite-rides-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedi
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messaging-network-gets-another-boost-from-spacex/","wikipedia":"https://en.wikipe
dia.org/wiki/Iridium_satellite_constellation#Next-generation_constellation"},"sta
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tes. Reused booster from third Iridium flight, and although controlled descent wa
s performed, the booster was expended into the ocean. SpaceX planned a second rec
overy attempt of one half of the fairing using the specially modified boat Mr. St
even. However, the fairing\'s parafoil twisted during the recovery, which led to
water impact at high speed","crew":[],"ships":["5ea6ed2e080df4000697c908"],"capsu
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s://spaceflightnow.com/2018/04/02/spacex-supply-ship-departs-cape-canaveral-for-s
pace-station/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-14"},"static
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time, and a refurbished capsule (C110 from CRS-8) for the third time. External pa
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eling 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":["5ea6ed30080df4000697
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x/files/tesspresskitfinal417.pdf","webcast":"https://www.youtube.com/watch?v=aY-0
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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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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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df4000697c90d","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5eb0e4c7b6c
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atch?v=rQEqKZ7CJlk","youtube_id":"rQEqKZ7CJlk","article":"https://spaceflightnow.
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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cle":"https://spaceflightnow.com/2018/05/22/rideshare-launch-by-spacex-serves-com
mercial-and-scientific-customers/","wikipedia":"https://en.wikipedia.org/wiki/Gra
vity_Recovery_and_Climate_Experiment"},"static_fire_date_utc":"2018-05-18T20:16:0
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hare of GRACE-FO on a Falcon 9 with Iridium following the cancellation of their D
nepr 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 re
use turnaround was a record 4.5 months between flights.","crew":[],"ships":["5ea6
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45s","article":"https://spaceflightnow.com/2018/06/04/multi-mission-telecom-craft
-launched-by-spacex-for-ses/","wikipedia":"https://en.wikipedia.org/wiki/SES-1
2"},"static_fire_date_utc":"2018-05-25T01:48:00.000Z","static_fire_date_unix":152
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rue,"failures":[],"details":"SES-12, the replacement satellite for NSS-6, was suc
cessfully 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\x8
0\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":["5ea6ed2e08
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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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9T05:42:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e
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lstar_19v_official_launch_discussion/","media":"https://www.reddit.com/r/spacex/c
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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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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
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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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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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om/watch?v=FjfQNBYv2IY","youtube_id":"FjfQNBYv2IY","article":"https://spaceflight
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
te_utc":"2018-08-02T15:53:00.000Z","static_fire_date_unix":1533225180,"net":fals
e,"window":7200,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":
[],"details":"SpaceX\'s fifteenth flight of 2018 launched the Merah Putih (also k
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":["5ea6ed2f080df4
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0006eeb22a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":67,"name":"Me
rah Putih","date_utc":"2018-08-07T05:18:00.000Z","date_unix":1533619080,"date_loc
al":"2018-08-07T01:18:00-04:00","date_precision":"hour","upcoming":false,"cores":
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pad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_
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5cte4/telstar_18v_apstar_5c_launch_campaign_thread/","launch":"https://www.reddi
t.com/r/spacex/comments/9e7bmq/rspacex_telstar_18v_official_launch_discussio
n/","media":"https://www.reddit.com/r/spacex/comments/9ebkqw/rspacex_telstar_18v_
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at-achieve-repeat-success-with-midnight-hour-launch/","wikipedia":"https://en.wik
ipedia.org/wiki/Telstar_18V"},"static_fire_date_utc":"2018-09-05T07:21:00.000
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light of 2018 launched the Telstar 18v GEO communication satellite for Telesat, t
he 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":
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e9e4501f509094ba4566f84","flight_number":68,"name":"Telstar 18V","date_utc":"2018
-09-10T04:45:00.000Z","date_unix":1536554700,"date_local":"2018-09-10T00:45:00-0
4:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833
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ex_saocom_1a_official_launch_discussion/","media":"https://www.reddit.com/r/space
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ube_id":"vr_C6LQ7mHc","article":"https://spaceflightnow.com/2018/10/08/spacex-ace
s-first-rocket-landing-in-california-after-launching-argentine-satellite/","wikip
edia":"https://en.wikipedia.org/wiki/SAOCOM"},"static_fire_date_utc":"2018-10-02T
21:00:00.000Z","static_fire_date_unix":1538514000,"net":false,"window":0,"rocke
t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s s
eventeenth 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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8-10-07T19:22:00-07:00","date_precision":"hour","upcoming":false,"cores":[{"cor
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e,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpa
d":"5e9e3032383ecb554034e7c9"}],"auto_update":true,"tbd":false,"launch_library_i
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6Hu3TqR_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/9p
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comments/9x9w9v/rspacex_eshail_2_official_launch_discussion/","media":"https://ww
w.reddit.com/r/spacex/comments/9xaa76/rspacex_eshail_2_media_thread_videos_images
_gifs/","recovery":"https://www.reddit.com/r/spacex/comments/9xmpa7/eshail_2_reco
very_thread/"},"flickr":{"small":[],"original":["https://farm5.staticflickr.com/4
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s://farm5.staticflickr.com/4875/32040173278_b5578ba6be_o.jpg","https://farm5.stat
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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
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14760,"date_local":"2018-11-15T15:46:00-05:00","date_precision":"hour","upcomin
g":false,"cores":[{"core":"5e9e28a5f359181eed3b2657","flight":2,"gridfins":tru
e,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landin
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l_launch_discussion_updates/","media":"https://old.reddit.com/r/spacex/comments/a
0wylf/rspacex_ssoa_media_thread_videos_images_gifs/","recovery":"https://www.redd
it.com/r/spacex/comments/a2tjoe/ssoa_recovery_thread/"},"flickr":{"small":[],"ori
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s://farm5.staticflickr.com/4894/46227271292_2eee9af3eb_o.jpg","https://farm5.stat

icflickr.com/4870/44460659210_de634098ac_o.jpg"]},"presskit":"https://www.spacex.
com/sites/spacex/files/ssoa_press_kit.pdf","webcast":"https://www.youtube.com/wat
ch?v=Wq8kS6UoOrQ","youtube_id":"Wq8kS6UoOrQ","article":"https://spaceflightnow.co
m/2018/12/03/spacex-launches-swarm-of-satellites-re-flies-rocket-for-third-tim
e/","wikipedia":"https://en.wikipedia.org/wiki/Spaceflight_Industries"},"static_f
ire_date_utc":"2018-11-15T21:55:00.000Z","static_fire_date_unix":1542318900,"ne
t":false,"window":1680,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failur
es":[],"details":"SpaceX\'s nineteenth flight of 2018 will fly SSO-A: SmallSat Ex
press out of Vandenberg SLC-4E for Spaceflight. SSO-A is a rideshare to sun synch
ronus low earth orbit consisting of 64 individual microsatellites and cubesats. I
t is also likely to be the third flight of core B1046 which previously flew Banga
bandhu-1 and Merah Putih. If this happens it will be the first time a Falcon 9 ha
s flown more than two missions. ","crew":[],"ships":["5ea6ed2f080df4000697c91
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rs16_official_launch_discussion_updates/","media":"https://www.reddit.com/r/space
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ps://www.reddit.com/r/spacex/comments/a3n3vm/crs16_emergency_recovery_threa
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ps://farm5.staticflickr.com/4856/45473445134_d9384878f8_o.jpg","https://farm5.sta
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x.com/sites/spacex/files/crs16_press_kit_12_4.pdf","webcast":"https://www.youtub
e.com/watch?v=Esh1jHT9oTA","youtube_id":"Esh1jHT9oTA","article":"https://spacefli
ghtnow.com/2018/12/05/spacex-falcon-9-boosts-dragon-cargo-ship-to-orbit-first-sta
ge-misses-landing-target/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-
16"},"static_fire_date_utc":"2018-11-30T19:57:00.000Z","static_fire_date_unix":15
43607820,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":tru
e,"failures":[],"details":"SpaceX\'s 16th Crew Resupply Mission on behalf of NAS
A, with a total of 20 contracted flights. This will bring essential supplies to t
he International Space Station using SpaceX\'s reusable Dragon spacecraft. The Fa
lcon 9 will launch from SLC-40 at Cape Canaveral Air Force Station. During the la
nding of the first stage, a grid fin hydraulic pump stalled, causing the core to
enter an uncontrolled roll, and resulting in a (succesful) water landing.","cre
w":[],"ships":["5ea6ed2f080df4000697c90b"],"capsules":["5e9e2c5cf359185d753b266
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nch_discussion/","media":"https://www.reddit.com/r/spacex/comments/a73kz5/rspacex
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d":"yRiLPoy_Mzc","article":"https://spaceflightnow.com/2018/12/23/spacex-closes-o
ut-year-with-successful-gps-satellite-launch/","wikipedia":"https://en.wikipedia.
org/wiki/GPS_Block_IIIA"},"static_fire_date_utc":"2018-12-13T21:24:00.000Z","stat
ic_fire_date_unix":1544736240,"net":false,"window":1560,"rocket":"5e9d0d95eda6997
3a809d1ec","success":true,"failures":[],"details":"SpaceX\'s twenty-first flight
of 2018 launched the first of the new GPS III satellites (Block IIIA) for the Uni
ted States Air Force and was SpaceX\'s first EELV mission. The spacecraft was del
ivered to a MEO transfer orbit from SLC-40 at Cape Canaveral Air Force Station. T
his mission was the first to fly with the redesigned COPV on the first stage (B10
54) as well as the second. The booster was expended.","crew":[],"ships":[],"capsu
les":[],"payloads":["5eb0e4cab6c3bb0006eeb230"],"launchpad":"5e9e4501f509094ba456
6f84","flight_number":73,"name":"GPS III SV01","date_utc":"2018-12-23T13:51:00.00
0Z","date_unix":1545573060,"date_local":"2018-12-23T08:51:00-05:00","date_precisi
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m/r/spacex/comments/a699fh/iridium_next_constellation_mission_8_launch/","launc
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kr.com/7882/39745613513_6cdd4581af_o.jpg","https://farm8.staticflickr.com/7807/39
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rticle":"https://spaceflightnow.com/2019/01/11/spacex-begins-2019-with-eighth-and
-final-for-upgraded-iridium-network/","wikipedia":"https://en.wikipedia.org/wiki/
Iridium_satellite_constellation#Next-generation_constellation"},"static_fire_date
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e,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"de
tails":"SpaceX\'s first flight of 2019 will be the eighth and final launch of its
planned Iridium flights. Delivering 10 satellites to low earth orbit, this brings
the total up to 75 and completes the Iridium NEXT constellation. This mission lau
nches from SLC-4E at Vandenberg AFB. The booster is expected to land on JRTI.","c
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ebcast":"https://www.youtube.com/watch?v=XS0E35aYJcU","youtube_id":"XS0E35aYJc
U","article":"https://spaceflightnow.com/2019/02/22/israeli-moon-lander-hitches-r
ide-on-spacex-launch-with-indonesian-comsat/","wikipedia":"https://en.wikipedia.o
rg/wiki/PT_Pasifik_Satelit_Nusantara"},"static_fire_date_utc":"2019-02-18T17:03:0
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h this rideshare to GTO for Space Systems Loral (SSL). The primary payload for th
is mission is Nusantara Satu, a communications satellite built by SSL for the pri
vate Indonesian company PT Pasifik Satelit Nusantara (PSN). Spaceflight Industrie
s\' GTO-1 mission consists of two secondary payloads. One of those is Beresheet,
the lunar lander built by the Israeli non-profit organization, SpaceIL. Beresheet
will make its own way to the moon from GTO. The other secondary is Air Force Rese
arch Lab\'s (Space Situational Awareness) S5 mission, which hitches a ride to GEO
aboard Nusantara Satu. This mission launches from SLC-40 at Cape Canaveral AFS. T
he booster is expected to land on OCISLY.","crew":[],"ships":["5ea6ed30080df40006
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om/2019/03/02/spacex-launches-first-crew-dragon-ferry-ship/","wikipedia":"http
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(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"],"caps
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com/r/spacex/comments/b0kscl/arabsat6a_launch_campaign_thread/","launch":"http
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1/spacexs-falcon-heavy-successful-in-commercial-debut/","wikipedia":"https://en.w
ikipedia.org/wiki/Arabsat-6A"},"static_fire_date_utc":"2019-04-05T09:57:00.000
Z","static_fire_date_unix":1554458220,"net":false,"window":7020,"rocket":"5e9d0d9
5eda69974db09d1ed","success":true,"failures":[],"details":"SpaceX will launch Ara
bsat 6A to a geostationary transfer orbit from SLC-39A, KSC. The satellite is a g
eostationary telecommunications satellite built by Lockheed Martin for the Saudi
Arabian company Arabsat. This will be the first operational flight of Falcon Heav
y, and also the first Block 5 Falcon Heavy. All three cores will be new Block 5 c
ores. The side cores are expected to land at LZ-1 and LZ-2, and the center core i
s expected to land on OCISLY.","crew":[],"ships":["5ea6ed2f080df4000697c90e","5ea
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w.spacex.com/sites/spacex/files/crs-17_press_kit.pdf","webcast":"https://youtu.b
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019/05/04/spacex-launches-space-station-resupply-mission-lands-rocket-on-drone-sh
ip/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-17"},"static_fire_date
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tails":"SpaceX\'s 17th Commercial Resupply Services mission for NASA out of a tot
al of 20 contracted flights, this mission brings essential supplies to the Intern
ational Space Station using SpaceX\'s reusable Dragon 1 spacecraft. The external
payloads for this mission include Orbital Carbon Observatory 3 and Space Test Pro
gram-Houston 6. The Falcon 9 launches from SLC-40 at Cape Canaveral AFS. The boos
ter was expected to land at LZ-1, however, due to the ongoing investigation and c
lean-up following the Crew Dragon testing incident, it is likely to land on OCISL
Y instead.\\n   ","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df40
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nk-broadband-satellites-deployed-in-orbit","wikipedia":"https://en.wikipedia.org/
wiki/Starlink_(satellite_constellation)"},"static_fire_date_utc":"2019-05-13T20:0
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t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will
launch dozens of Starlink demonstration satellites from SLC-40, Cape Canaveral AF
S. Starlink is a low Earth orbit broadband internet constellation developed and o
wned by SpaceX which will eventually consist of nearly 12 000 satellites and will
provide low latency internet service to ground terminals around the world. Two pr
ototype satellites, Microsats 2a and 2b, were launched from Vandenberg AFB in Feb
ruary 2018. The booster for this mission will land on OCISLY.","crew":[],"ships":
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97c913","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909","5ea6ed2e080df4000697c908","5ea6ed2f080df4000697c90e"],"capsules":[],"payloads":["5eb0e4ccb6c3bb0006eeb23a","5eb0e4ccb6c3bb0006eeb23b","5eb0e4ccb6c3bb0006eeb23c","5eb0e4ccb6c3bb0006eeb23d","5eb0e4ccb6c3bb0006eeb23e","5eb0e4cdb6c3bb0006eeb23f","5eb0e4cdb6c3bb0006eeb240","5eb0e4cdb6c3bb0006eeb241","5eb0e4cdb6c3bb0006eeb242","5eb0e4cdb6c3bb0006eeb243","5eb0e4cdb6c3bb0006eeb244","5eb0e4cdb6c3bb0006eeb245","5eb0e4ceb6c3bb0006eeb246","5eb0e4ceb6c3bb0006eeb247","5eb0e4ceb6c3bb0006eeb248","5eb0e4ceb6c3bb0006eeb249"],"launchpad":"5e9e4502f509094188566f88","flight_number":81,"name":"STP-2","date_utc":"2019-06-25T03:30:00.000Z","date_unix":1561433400,"date_local":"2019-06-24T23:30:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591878063b2661","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":false,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"},{"core":"5e9e28a6f359183c413b265d","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"},{"core":"5e9e28a6f359188fd53b265e","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb90a834e7c8"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d35ffd86e000604b37a"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/f1/70/USGBp3Dy_o.png","large":"https://images2.imgbox.com/79/a5/ZdV48VwO_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/c8k6g5/crs18_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/ch2ml7/rspacex_crs18_official_launch_discussion_updates/","media":"https://www.reddit.com/r/spacex/comments/chbr8i/rspacex_crs18_media_thread_videos_images_gifs/","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/48380511527_190682b573_o.jpg","https://live.staticflickr.com/65535/48380370691_7b0757a4d3_o.jpg","https://live.staticflickr.com/65535/48380511492_51db1bf984_o.jpg","https://live.staticflickr.com/65535/48380370626_a5d264c637_o.jpg","https://live.staticflickr.com/65535/48380511427_97db52a9e3_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/crs-18_press_kit.pdf","webcast":"https://youtu.be/SlgrxVuP5jk","youtube_id":"SlgrxVuP5jk","article":"https://spaceflightnow.com/2019/07/25/new-docking-port-spacesuit-and-supplies-en-route-to-space-station/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-18"},"static_fire_date_utc":"2019-07-19T15:31:00.000Z","static_fire_date_unix":1563550260,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"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 International Space Station using the reusable Dragon 1 cargo spacecraft. The external 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 Cape Canaveral AFS on a Falcon 9, and the first-stage booster is expected to land back at CCAFS LZ-1.","crew":[],"ships":[],"capsules":["5e9e2c5cf359188bfb3b266b"],"payloads":["5eb0e4ceb6c3bb0006eeb24a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":82,"name":"CRS-18","date_utc":"2019-07-25T22:01:00.000Z","date_unix":1564092060,"date_local":"2019-07-25T18:01:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591809313b2660","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"RTLS","landpad":"5e9e3032383ecb267a34e7c7"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d36ffd86e000604b37b"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/65/c2/MMGkhdcA_o.png","large":"https://images2.imgbox.com/9e/6f/oaYZfAoF_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/cjaawx/amos17_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/cmedgn/rspacex_amos17_official_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/comments/cmppne/rspacex_amos17_media_thread_videos_images_gifs","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/48478269312_58dd3dc446_o.jpg","https://live.staticflickr.com/65535/48478269747_353dcb2e62_o.jpg","https://live.staticflickr.com/65535/48478119901_2de0441026_o.jpg","https://live.staticflickr.com/65535/48478120646_ab72c2c6c3_o.jpg","https://live.stati

cflickr.com/65535/48478120031_5aae1f6131_o.jpg","https://live.staticflickr.com/65
535/48478269442_08479bed36_o.jpg"]},"presskit":"https://www.spacex.com/sites/spac
ex/files/amos-17_mission_press_kit_8_6_2019.pdf","webcast":"https://youtu.be/fZh8
2-WcCuo","youtube_id":"fZh82-WcCuo","article":"https://spaceflightnow.com/2019/0
8/07/spacex-launches-israeli-owned-telecom-satellite/","wikipedia":"https://en.wi
kipedia.org/wiki/Spacecom"},"static_fire_date_utc":"2019-08-01T00:00:00.000Z","st
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973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch Boeing bu
ilt Amos-17, a geostationary communications satellite for Israeli company Spaceco
m. The satellite will be delivered to GTO from KSC LC-39A or possibly CCAFS SLC-4
0, and will replace the defunct Amos-5 at 17\xc2\xb0 E. Amos-17 carries multi-ban
d high throughput and regional beams servicing Africa, Europe and the Middle Eas
t. 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.","cr
ew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c909"],"capsule
s":[],"payloads":["5eb0e4cfb6c3bb0006eeb24b"],"launchpad":"5e9e4501f509094ba4566f
84","flight_number":83,"name":"Amos-17","date_utc":"2019-08-06T22:52:00.000Z","da
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ur","upcoming":false,"cores":[{"core":"5e9e28a5f359181eed3b2657","flight":3,"grid
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null,"landing_type":null,"landpad":null}],"auto_update":true,"tbd":false,"launch_
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m/3a/d1/R1MaGiiV_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/co
mments/dgqcb6/2nd_starlink_mission_launch_campaign_thread","launch":"https://www.
reddit.com/r/spacex/comments/du07rt/rspacex_starlink1_official_launch_discussio
n","media":"https://www.reddit.com/r/spacex/comments/durx53/rspacex_starlink_1_me
dia_thread_videos_images","recovery":"https://www.reddit.com/r/spacex/comments/du
1duu/starlink1_booster_and_fairing_recovery_discussion"},"flickr":{"small":[],"or
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cflickr.com/65535/49052201452_c3b01e37f0_o.jpg","https://live.staticflickr.com/65
535/49051988636_3714a78787_o.jpg","https://live.staticflickr.com/65535/4905147708
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ink_press_kit_nov2019.pdf","webcast":"https://youtu.be/pIDuv0Ta0XQ","youtube_i
d":"pIDuv0Ta0XQ","article":"https://spaceflightnow.com/2019/11/11/successful-laun
ch-continues-deployment-of-spacexs-starlink-network","wikipedia":"https://en.wiki
pedia.org/wiki/Starlink_(satellite_constellation)"},"static_fire_date_utc":"2019-
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ocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mi
ssion will launch the first batch of Starlink version 1.0 satellites, from SLC-4
0, 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 br
oadband internet constellation developed and owned by SpaceX which will eventuall
y consist of nearly 12 000 satellites and will provide low latency internet servi
ce to ground terminals around the world. The booster for this mission is expected
to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed30080df4
000697c913","5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90d"],"capsules":
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4","flight_number":84,"name":"Starlink-1","date_utc":"2019-11-11T14:56:00.000
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4,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_succe
ss":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_updat
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ficial_launch_discussion_updates","media":"https://www.reddit.com/r/spacex/comments/e6ln0m/rspacex_crs19_media_thread_videos_images_gifs","recovery":"https://www.reddit.com/r/spacex/comments/e6lbzy/rspacex_crs19_booster_recovery_discussion_updates"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49178460143_e3ae2bd506_o.jpg","https://live.staticflickr.com/65535/49178954221_8544835325_o.jpg","https://live.staticflickr.com/65535/49179161792_9f1801a963_o.jpg","https://live.staticflickr.com/65535/49178460368_62eb945db8_o.jpg","https://live.staticflickr.com/65535/49184948561_ce20b38bc6_o.jpg","https://live.staticflickr.com/65535/49185149122_00a7fa573d_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/crs-19_mission_press_kit.pdf","webcast":"https://youtu.be/-aoAGdYXp_4","youtube_id":"-aoAGdYXp_4","article":"https://spaceflightnow.com/2019/12/05/dragon-soars-on-research-and-resupply-flight-to-international-space-station","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-19"},"static_fire_date_utc":"2019-11-26T17:04:00.000Z","static_fire_date_unix":1574787840,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 19th Crew Resupply Mission on behalf of NASA with a total of 20 contracted flights, this mission brings essential supplies to the International Space Station using SpaceX\'s reusable Dragon spacecraft. The external payloads for this mission include the Hyperspectral Imager Suite and a lithium-ion battery. Falcon 9 and Dragon will launch from SLC-40, Cape Canaveral AFS. The mission will be complete with return and recovery of the Dragon capsule and down cargo.","crew":[],"ships":["5ea6ed2f080df4000697c90d"],"capsules":["5e9e2c5bf3591880643b2669"],"payloads":["5eb0e4cfb6c3bb0006eeb24d"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":85,"name":"CRS-19","date_utc":"2019-12-05T17:29:23.000Z","date_unix":1575566963,"date_local":"2019-12-05T12:29:23-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f359187afd3b2662","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d39ffd86e000604b37e"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/2c/03/fMLdgNQ4_o.png","large":"https://images2.imgbox.com/73/e2/4I3Os6n7_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/e5w6i8/jcsat18kacific1_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/ebfr9t/rspacex_jcsat18kacific1_official_launch","media":"https://www.reddit.com/r/spacex/comments/ebn4g5/rspacex_jcsat18kacific1_media_thread_videos","recovery":"https://www.reddit.com/r/spacex/comments/ec48p3/jscat_18kacific1_recovery_discussion_and_updates"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49235364922_e55ceb61be_o.jpg","https://live.staticflickr.com/65535/49235136806_e5a3774904_o.jpg","https://live.staticflickr.com/65535/49235137056_585dc050e7_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/jcsat18kacific1_mission_press_kit.pdf","webcast":"https://youtu.be/sbXgZg9JmkI","youtube_id":"sbXgZg9JmkI","article":"https://spaceflightnow.com/2019/12/17/startup-launches-broadband-satellite-on-spacex-rocket-to-connect-pacific-islands","wikipedia":"https://en.wikipedia.org/wiki/JSAT_(satellite_constellation)"},"static_fire_date_utc":"2019-12-13T12:34:00.000Z","static_fire_date_unix":1576240440,"net":false,"window":5280,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch the Boeing built dual payload satellite to geostationary transfer orbit from XXXX. JCSat 18 is a mobile broadband communications payload built for Sky Perfect JSAT Corporation of Japan and will service Asia Pacific. Kacific 1 is a high throughput broadband internet payload built for Kacific Broadband Satellites and will service certain high demand areas of Southeast Asia and the Pacific. Both payloads share a single chassis. The booster for this mission is expected to land on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df4000697c907","5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24e"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":86,"name":"JCSat 18 / Kacific 1","date_utc":"2019-12-17T00:10:00.000Z","date_unix":1576541400,"date_local":"2019-12-16T19:10:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f3591809313b2660","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":tru

e,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":null,"id":"5eb87d3bffd86e000604b37f"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":false,"ships":["5ea6ed2e080df4000697c908"]},"links":{"patch":{"small":"https://images2.imgbox.com/36/f5/B08U2KHW_o.png","large":"https://images2.imgbox.com/69/c7/G444jTFk_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/efqnvg/starlink2_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/eko0hr/rspacex_starlink_2_official_launch_discussion","media":"https://www.reddit.com/r/spacex/comments/ekybzb/rspacex_starlink2_media_thread_videos_images_gifs","recovery":"https://www.reddit.com/r/spacex/comments/elgp5k/rspacex_starlink_l2_recovery_discussion_updates"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49346907238_b27507e4d9_o.jpg","https://live.staticflickr.com/65535/49347368761_f4e45bd38a_o.jpg","https://live.staticflickr.com/65535/49347368406_8f9acf1e2a_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/starlink_press_kit_jan2020.pdf","webcast":"https://youtu.be/HwyXo6T7jC4","youtube_id":"HwyXo6T7jC4","article":"https://spaceflightnow.com/2020/01/07/spacex-launches-more-starlink-satellites-tests-design-change-for-astronomers","wikipedia":"https://en.wikipedia.org/wiki/Starlink_(satellite_constellation)"},"static_fire_date_utc":"2020-01-04T11:45:00.000Z","static_fire_date_unix":1578138300,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission will launch the second 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 third 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","5ea6ed2f080df4000697c90b","5ea6ed2f080df4000697c90d"],"capsules":[],"payloads":["5eb0e4cfb6c3bb0006eeb24f"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":87,"name":"Starlink-2","date_utc":"2020-01-07T02:19:00.000Z","date_unix":1578363540,"date_local":"2020-01-06T21:19:00-05:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5e9e28a5f3591833b13b2659","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":"5eb87d3cffd86e000604b380"},{"fairings":{"reused":null,"recovery_attempt":null,"recovered":null,"ships":[]},"links":{"patch":{"small":"https://images2.imgbox.com/c0/9d/SJYvC4hT_o.png","large":"https://images2.imgbox.com/19/df/IH0nVnSr_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/ek7eny/in_flight_abort_test_launch_campaign_thread","launch":"https://www.reddit.com/r/spacex/comments/eq24ap/rspacex_inflight_abort_test_official_launch","media":"https://www.reddit.com/r/spacex/comments/eq7pg4/rspacex_inflight_abort_test_media_thread_videos/","recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/49421605028_b7ba890f0e_o.jpg","https://live.staticflickr.com/65535/49422067976_cda2b8f021_o.jpg","https://live.staticflickr.com/65535/49422067876_13ed519fe6_o.jpg","https://live.staticflickr.com/65535/49421604803_0093a5d2cb_o.jpg","https://live.staticflickr.com/65535/49422294602_0d5e7d8e82_o.jpg","https://live.staticflickr.com/65535/49422068111_2ed613b19b_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/in-flight_abort_test_press_kit.pdf","webcast":"https://youtu.be/mhrkdHshb3E","youtube_id":"mhrkdHshb3E","article":"https://spaceflightnow.com/2020/01/19/spacex-aces-final-major-test-before-first-crew-mission","wikipedia":"https://en.wikipedia.org/wiki/Commercial_Crew_Development"},"static_fire_date_utc":"2020-01-11T09:42:00.000Z","static_fire_date_unix":1578735720,"net":false,"window":14400,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch a Crew Dragon capsule from LC-39A, KSC on a fully fueled Falcon 9 rocket and then trigger the launch escape system during the period of maximum dynamic pressure. As part of NASA\'a Commercial Crew Integrated Capability program (CCiCap) this test will contribute valuable data to help validate Crew Dragon and its launch abort system. The Crew Dragon will be recovered by GO Searcher after splashdown in the Atlantic Ocean. This flight does not go to orbit. The booster an

d upper stage are expected to break up following capsule separation and there wil
l be no landing attempt.","crew":[],"ships":["5ea6ed2f080df4000697c90c"],"capsule
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boosts-60-more-starlink-satellites-into-orbit-after-weather-delays/","wikipedi
a":"https://en.wikipedia.org/wiki/SpaceX_Starlink"},"static_fire_date_utc":"2020-
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ssion will launch the third batch of Starlink version 1.0 satellites, from SLC-4
0, Cape Canaveral AFS. It is the fourth Starlink launch overall. The satellites w
ill be delivered to low Earth orbit and will spend a few weeks maneuvering to the
ir operational altitude of 550 km. The booster for this mission is expected to la
nd on OCISLY.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2e080df400069
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d6a492_o.jpg"]},"presskit":"https://www.spacex.com/sites/spacex/files/fifth_starl
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Lcf8","article":"https://spaceflightnow.com/2020/02/17/spacex-delivers-more-starl
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en.wikipedia.org/wiki/SpaceX_Starlink"},"static_fire_date_utc":"2020-02-14T08:31:
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aunch the fourth batch of Starlink version 1.0 satellites, from SLC-40, Cape Cana
veral AFS. It is the fifth Starlink launch overall. The satellites will be delive
red to low Earth orbit and will spend a few weeks maneuvering to their operationa
l altitude of 550 km. The booster for this mission is expected to land on OCISL
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com/sites/spacex/files/crs-20_mission_press_kit.pdf","webcast":"https://youtu.be/
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0/03/07/late-night-launch-of-spacex-cargo-ship-marks-end-of-an-era/","wikipedi
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ket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s
20th and final Crew Resupply Mission under the original NASA CRS contract, this m
ission brings essential supplies to the International Space Station using SpaceX
\'s reusable Dragon spacecraft. It is the last scheduled flight of a Dragon 1 cap
sule. (CRS-21 and up under the new Commercial Resupply Services 2 contract will u
se Dragon 2.) The external payload for this mission is the Bartolomeo ISS externa
l payload hosting platform. Falcon 9 and Dragon will launch from SLC-40, Cape Can
averal Air Force Station and the booster will land at LZ-1. The mission will be c
omplete with return and recovery of the Dragon capsule and down cargo.","crew":
[],"ships":[],"capsules":["5e9e2c5cf359185d753b266f"],"payloads":["5eb0e4d0b6c3bb
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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
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s":"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 expec
ted 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 2
0, making use of precession rates to separate themselves into three planes. The b
ooster will land on a drone ship approximately 628 km downrange.","crew":[],"ship
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ng_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":f
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e":"https://spaceflightnow.com/2020/04/22/spacexs-starlink-network-surpasses-400-
satellite-mark-after-successful-launch/","wikipedia":"https://en.wikipedia.org/wi
ki/Starlink"},"static_fire_date_utc":"2020-04-17T11:48:00.000Z","static_fire_date
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0, 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 th
eir operational altitude of 550 km. The booster for this mission is expected to l
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asa-astronauts-launch-from-us-soil-for-first-time-in-nine-years/","wikipedia":"ht
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l launch the second demonstration mission of its Crew Dragon vehicle as part of N
ASA\'s Commercial Crew Transportation Capability Program (CCtCap), carrying two N
ASA astronauts to the International Space Station. Barring unexpected development
s, this mission will be the first crewed flight to launch from the United States
since the end of the Space Shuttle program in 2011. DM-2 demonstrates the Falcon
9 and Crew Dragon\'s ability to safely transport crew to the space station and ba
ck to Earth and it is the last major milestone for certification of Crew Dragon.
Initially the mission duration was planned to be no longer than two weeks, howeve
r NASA has been considering an extension to as much as six weeks or three months.
The astronauts have been undergoing additional training for the possible longer m
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acex-sets-new-mark-in-rocket-reuse-10-years-after-first-falcon-9-launch/","wikipe
dia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-05-13
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n will launch the seventh batch of operational Starlink satellites, which are exp
ected to be version 1.0, from SLC-40, Cape Canaveral AFS. It is the eighth Starli
nk launch overall. The satellites will be delivered to low Earth orbit and will s
pend a few weeks maneuvering to their operational altitude of 550 km. The booster
for this mission is expected to land on JRTI on its first mission since arriving
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oyments-continue-with-successful-falcon-9-launch/","wikipedia":"https://en.wikipe
dia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":nul
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link satellites, which are expected to be version 1.0, from SLC-40, Cape Canavera
l 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 al
titude 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 AS
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com/2020/06/30/spacex-launches-its-first-mission-for-u-s-space-force/","wikipedi
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ll 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 Lockh
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X. The satellite will be delivered into a MEO transfer orbit. The booster for thi
s mission is expected to land on an ASDS.","crew":[],"ships":[],"capsules":[],"pa
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ary communication satellite from LC-39A, Kennedy Space Center. It will be South K
orea\'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","5ea6ed2e080
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perational Starlink satellites, which are expected to be version 1.0, from LC-39
A, 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 th
eir operational altitude of 550 km. This mission is includes a rideshare of two B
lackSky satellites on top of the Starlink stack. The booster for this mission is
expected to land an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c908","5ea6ed2
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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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e,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":tru
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s://live.staticflickr.com/65535/50291306216_4fd44c261e_o.jpg","https://live.stati
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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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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 Coas
t in 60 years. The launch azimuth will be southward and the booster will land at
LZ-1.","crew":[],"ships":["5ea6ed2e080df4000697c907"],"capsules":[],"payloads":
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ion":"hour","upcoming":false,"cores":[{"core":"5e9e28a7f359187afd3b2662","fligh
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ps://www.reddit.com/r/spacex/comments/ij8mxf/rspacex_starlink11_saocom_1b_media_t
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eleventh batch of operational Starlink satellites, which are expected to be versi
on 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 spen
d a few weeks maneuvering to their operational altitude of 550 km. The booster fo
r this mission is expected to land on an ASDS.","crew":[],"ships":["5ea6ed2e080df
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8","flight_number":102,"name":"Starlink-11 (v1.0)","date_utc":"2020-09-03T12:46:0
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uccess":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_u
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c","success":true,"failures":[],"details":"This mission will launch the twelfth b
atch of operational Starlink satellites, which are expected to be version 1.0, fr
om 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 m
ission is expected to land on an ASDS.","crew":[],"ships":["5ea6ed2f080df4000697c
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908","5ea6ed30080df4000697c913"],"capsules":[],"payloads":["5ef6a48e0059c33cee4a8
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-12 (v1.0)","date_utc":"2020-10-06T11:29:00.000Z","date_unix":1601983740,"date_lo
cal":"2020-10-06T07:29:00-04:00","date_precision":"hour","upcoming":false,"core

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0/11/06/spacex-launches-gps-navigation-satellite-from-cape-canaveral/","wikipedi
a":"https://en.wikipedia.org/wiki/GPS_Block_III"},"static_fire_date_utc":"2020-09
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ceX will launch GPS Block III Space Vehicle 04 from SLC-40, Cape Canaveral AFS ab
oard a Falcon 9. GPS III is owned and operated by the US Air Force and produced b
y Lockheed Martin. This will be the fourth GPS III satellite launched and the thi
rd 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":["5ea6ed300
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v/rspacex_crew1_official_launch_coast_docking/","media":"https://www.reddit.com/
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618354801_ff3e722884_o.jpg","https://live.staticflickr.com/65535/50618463487_4164
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6/astronauts-ride-spacex-crew-capsule-in-landmark-launch-for-commercial-spaceflig
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e,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"de
tails":"SpaceX will launch the first operational mission of its Crew Dragon vehic
le 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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ite-launches-to-extend-measurements-of-sea-level-rise/","wikipedia":"https://en.w
ikipedia.org/wiki/Copernicus_Sentinel-6"},"static_fire_date_utc":"2020-11-17T13:1
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launch Sentinel-6 Michael Freilich into low Earth orbit for NASA, NOAA, ESA, and
the European Organization for the Exploitation of Meteorological Satellites aboar
d a Falcon 9 from SLC-4E, Vandenberg Air Force Station. Sentinel-6(A) is an ocean
observation satellite providing radar ocean surface altimetry data and also atmos
pheric temperature profiles as a secondary mission. The booster for this mission
is will land at LZ-4.","crew":[],"ships":[],"capsules":[],"payloads":["5ed9867c1f
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be_id":"J442-ti-Dhg","article":"https://spaceflightnow.com/2020/11/25/spacex-laun
ches-60-more-starlink-satellites-on-100th-falcon-9-flight/","wikipedia":"https://
en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2020-11-21T16:31:00.000
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ch the fifteenth batch of operational Starlink satellites, which are version 1.0,

from SLC-40, Cape Canaveral Air Force Station. It will be the sixteenth Starlink
launch overall. The satellites will be delivered to low Earth orbit and will spen
d a few weeks maneuvering to their operational altitude of 550 km. The booster fo
r this mission is expected to land on an ASDS.","crew":[],"ships":["5ea6ed30080df
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4000697c90d","5ea6ed2e080df4000697c907"],"capsules":[],"payloads":["5fb95c263a88a
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2/06/spacex-launches-first-in-new-line-of-upgraded-space-station-cargo-ships/","w
ikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-21"},"static_fire_date_ut
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ls":"SpaceX\'s 21st ISS resupply mission on behalf of NASA and the first under th
e CRS-2 contract, this mission brings essential supplies to the International Spa
ce Station using the cargo variant of SpaceX\'s Dragon 2 spacecraft. The external
payload for this mission is the Nanoracks Bishop Airlock. Falcon 9 and Dragon lau
nch from LC-39A, Kennedy Space Center and the booster is expected to land on an A
SDS. The mission will be complete with return and recovery of the Dragon capsule
and down cargo.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000
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m-satellite-rides-spacex-rocket-into-orbit/","wikipedia":"https://en.wikipedia.or
g/wiki/Sirius_XM#Satellites"},"static_fire_date_utc":"2020-12-07T23:00:00.000

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first of two next generation high power S-band broadcast satellites for SiriusXM.
The spacecraft will be delivered into a geostationary transfer orbit and the boos
ter will be recovered downrange. The spacecraft is built by Space Systems Loral
(SSL) on the SSL 1300 platform and includes two solar arrays producing 20kW, and
an unfurlable antenna dish. SXM-7 will replace XM-3 in geostationary orbit.","cre
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s://live.staticflickr.com/65535/50740257323_e3e49fa2c6_o.jpg"]},"presskit":nul
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e Office aboard a Falcon 9 from SLC-40, Cape Canaveral Air Force Station. The boo
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st-launch-of-2021/","wikipedia":"https://en.wikipedia.org/wiki/T%C3%BCrksat_5
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s":"SpaceX will launch the first of two next generation satellites on contract fo
r T\xc3\xbcrksat. T\xc3\xbcrksat 5A is a Ku-band broadcast satellite built by Air
bus Defense and Space and based on the Electric Orbit Raising version of the Euro
star E3000 platform. This spacecraft will be delivered into a transfer orbit and
will then raise itself to its operational 31\xc2\xb0 East geostationary orbit to
serve Turkey, the Middle East, Europe, North Africa and South Africa. The booster
for this mission will be recovered downrange via ASDS.","crew":[],"ships":["5ea6e
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e":"https://spaceflightnow.com/2021/01/20/spacex-sets-new-rocket-reuse-records-wi
th-successful-starlink-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starli
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s":"This mission launches the sixteenth batch of operational Starlink satellites,
which are version 1.0, from SLC-40 or LC-39A. It is the seventeenth Starlink laun
ch overall. The satellites will be delivered to low Earth orbit and will spend a
few weeks maneuvering to their operational altitude. The booster is expected to l
and on an ASDS.","crew":[],"ships":["5ea6ed2e080df4000697c907","5ea6ed2e080df4000
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It is the nineteenth Starlink launch overall. The satellites will be delivered to
low Earth orbit and will spend a few weeks maneuvering to their operational altit
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g-after-launching-60-more-starlink-satellites/","wikipedia":"https://en.wikipedi
a.org/wiki/Starlink"},"static_fire_date_utc":"2021-02-24T12:25:00.000Z","static_f
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spaceflightnow.com/2021/03/11/spacex-adds-more-satellites-to-starlink-internet-fl
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ls":"This mission launches the 20th batch of operational Starlink satellites, whi
ch are version 1.0, from LC-39A or SLC-40. It is the 21st Starlink launch overal
l. The satellites will be delivered to low Earth orbit and will spend a few weeks
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The satellites will be delivered to low Earth orbit and will spend a few weeks ma
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Starlink satellites, which are version 1.0, from or SLC-40. It is the 23rd Starli
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ed to land on an ASDS.","crew":[],"ships":["5ee68c683c228f36bd5809b5","5ea6ed3008
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w Earth orbit and will spend a few weeks maneuvering to their operational altitud
e. The booster is expected to land on an ASDS.","crew":[],"ships":["5ea6ed30080df
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ed-capsule-and-flight-proven-rocket/","wikipedia":"https://en.wikipedia.org/wiki/
SpaceX_Crew-2"},"static_fire_date_utc":"2021-04-17T11:01:00.000Z","static_fire_da
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ion of its Crew Dragon vehicle as part of NASA\'s Commercial Crew Program, carryi
ng NASA astronauts Shane Kimbrough, Megan McArthur, Thomas Pesquet, and Akihiko H

oshide to the International Space Station. The Falcon 9 and Crew Dragon lift off from LC-39A, Kennedy Space Center. Both the booster and the capsule have flown previously, each a first for a commercial crew flight. The booster for this mission is expected to land on an ASDS. The mission will be complete with the safe return of the astronauts to Earth.","crew":["5fe3ba5fb3467846b3242188","5fe3bb01b3467846b3242189","5fe3bc3db3467846b324218b","5fe3bc8ab3467846b324218c"],"ships":["5ea6ed2e080df4000697c909","5ea6ed30080df4000697c913"],"capsules":["5e9e2c5df359188aba3b2676"],"payloads":["5fe3b3adb3467846b3242173"],"launchpad":"5e9e4502f509094188566f88","flight_number":123,"name":"Crew-2","date_utc":"2021-04-23T09:49:00.000Z","date_unix":1619171340,"date_local":"2021-04-23T05:49:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a6330279009f","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"32dcb5ad-7609-4fc0-8094-768ee5c2ebe0","id":"5fe3af58b3467846b324215f"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["6059166413f40e27e8af34b6"]},"links":{"patch":{"small":"https://images2.imgbox.com/cd/30/UYfjAmuT_o.png","large":"https://images2.imgbox.com/2e/a8/bvzKCiwf_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/mzol0k/rspacex_starlink24_launch_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51146838376_4667d78231_o.jpg","https://live.staticflickr.com/65535/51147622479_d027e09727_o.jpg","https://live.staticflickr.com/65535/51147949685_975bd6b4ee_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/RBxkRKZ34yo","youtube_id":"RBxkRKZ34yo","article":"https://spaceflightnow.com/2021/04/29/spacex-launches-60-more-starlink-spacecraft-fcc-clears-spacex-to-fly-satellites-at-lower-altitudes/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 24th batch of operational Starlink satellites, which are version 1.0, from LC-39A or SLC-40. It is the 25th Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude. The booster is expected to land on an ASDS.","crew":[],"ships":["5ea6ed2f080df4000697c910","5ea6ed2f080df4000697c90d","5ee68c683c228f36bd5809b5","6059166413f40e27e8af34b6"],"capsules":[],"payloads":["605b4be3aa5433645e37d046"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":124,"name":"Starlink-24 (v1.0)","date_utc":"2021-04-29T03:44:00.000Z","date_unix":1619667840,"date_local":"2021-04-28T23:44:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5ef670f10059c33cee4a826c","flight":7,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"fbd23c86-89d0-4d3f-b5fb-5d7165d05cca","id":"605b4b6aaa5433645e37d03f"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["6059166413f40e27e8af34b6"]},"links":{"patch":{"small":"https://images2.imgbox.com/33/03/aHKx9cu1_o.png","large":"https://images2.imgbox.com/8e/e0/wOt6ZecV_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/n3z0aa/rspacex_starlink25_launch_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/xpl_JnG7rcg","youtube_id":"xpl_JnG7rcg","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":"2021-05-03T05:00:00.000Z","static_fire_date_unix":1620018000,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 25th batch of operational Starlink satellites, which are version 1.0, from LC-39A. It is the 26th Starlink launch overall. The satellites will be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude. The booster is expected to land on OCISLY.","crew":[],"ships":["608c1a06cf7f3d6152666ad4","5ea6ed30080df4000697c913","6059166413f

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b6"]},"links":{"patch":{"small":"https://images2.imgbox.com/ad/eb/pq1vQuoW_o.pn
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ww.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_threa
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Starlink satellites, which are version 1.0, from SLC-40. It is the 27th Starlink
launch overall. The satellites will be delivered to low Earth orbit and will spen
d a few weeks maneuvering to their operational altitude. The booster is expected
to land on an ASDS.","crew":[],"ships":["5ea6ed30080df4000697c913","5ee68c683c228
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n launches the 27th batch of operational Starlink satellites, which are version
1.0, from LC-39A or SLC-40. It is the 28th Starlink launch overall. The satellite
s will be delivered to low Earth orbit and will spend a few weeks maneuvering to
their operational altitude. The booster is expected to land on an ASDS.","crew":
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e,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASD

S","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"c32d1f5e-2dd9-4b55-ac8b-3eb8c4a4e955","id":"605b4b95aa5433645e37d041"},{"fairings":{"reused":true,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2e080df4000697c909","5ea6ed2f080df4000697c90c"]},"links":{"patch":{"small":"https://images2.imgbox.com/28/ee/Bchywpgu_o.png","large":"https://images2.imgbox.com/06/09/908F8uzV_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/jhu37i/starlink_general_discussion_and_deployment_thread/","launch":"https://www.reddit.com/r/spacex/comments/nkxg4s/rspacex_starlink28_launch_discussion_and_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51225270061_42bc3abb43_o.jpg","https://live.staticflickr.com/65535/51226036719_584d141279_o.jpg","https://live.staticflickr.com/65535/51225480623_5ef7d3957a_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/xRu-ekesDyY","youtube_id":"xRu-ekesDyY","article":"https://spaceflightnow.com/2021/05/26/first-phase-of-spacexs-starlink-network-nears-completion-with-falcon-9-launch/","wikipedia":"https://en.wikipedia.org/wiki/Starlink"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"This mission launches the 28th batch of operational Starlink satellites, which were version 1.0, from SLC-40. It was the 29th Starlink launch overall. The satellites plan to be delivered to low Earth orbit and will spend a few weeks maneuvering to their operational altitude. The booster is expected to land on ASDS JRTI.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697c90c","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"],"capsules":[],"payloads":["6079bd679a06446e8c61bf7d"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":128,"name":"Starlink-28 (v1.0)","date_utc":"2021-05-26T18:59:00.000Z","date_unix":1622055540,"date_local":"2021-05-26T14:59:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c54a0622a633027900a1","flight":2,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"fb25ecf0-fb51-4b5e-b678-105f6ba4c06e","id":"6079bd399a06446e8c61bf77"},{"fairings":null,"links":{"patch":{"small":"https://images2.imgbox.com/aa/a8/HhwYIXoB_o.png","large":"https://images2.imgbox.com/16/32/9Z7btrQF_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/nhztq5/crs22_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/nqqojc/rspacex_crs22_launch_docking_discussion_updates/","media":null,"recovery":"https://www.reddit.com/r/spacex/comments/k2ts1q/rspacex_fleet_updates_discussion_thread/"},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51225482033_086576f2cd_o.jpg","https://live.staticflickr.com/65535/51226340205_9c3ac87b8e_o.jpg","https://live.staticflickr.com/65535/51224563112_61d493b775_o.jpg","https://live.staticflickr.com/65535/51224563062_95bf029b80_o.jpg","https://live.staticflickr.com/65535/51225271661_49315dc688_o.jpg","https://live.staticflickr.com/65535/51226340225_27df994080_o.jpg","https://live.staticflickr.com/65535/51224563102_d07c630ef5_o.jpg","https://live.staticflickr.com/65535/51225482053_1fe7157f74_o.jpg","https://live.staticflickr.com/65535/51226038164_304c347347_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/QXf9mRWbXDM","youtube_id":"QXf9mRWbXDM","article":"https://spaceflightnow.com/2021/06/03/spacex-supply-ship-launches-on-mission-to-begin-upgrading-space-station-electrical-grid/","wikipedia":"https://en.wikipedia.org/wiki/SpaceX_CRS-22"},"static_fire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s 22nd ISS resupply mission on behalf of NASA, this mission sends essential supplies to the International Space Station using the cargo variant of SpaceX\'s Dragon 2 spacecraft. The external payload for this mission is the first pair of ISS Roll Out Solar Arrays. Falcon 9 and Dragon launch from LC-39A, Kennedy Space Center and the booster is expected to land on an ASDS. The mission will be complete with splashdown and recovery of the capsule and down cargo.","crew":[],"ships":["5ea6ed2f080df4000697c90b","608c1a06cf7f3d6152666ad4","5ea6ed30080df4000697c913"],"capsules":["60b803421f83cc1e59f1644d"],"payloads":["5fe3b642b3467846b324217b"],"launchpad":"5e9e4502f509094188566f88","flight_number":129,"name":"CRS-22 & IROSA","date_utc":"2021-06-03T17:29:00.

000Z","date_unix":1622741340,"date_local":"2021-06-03T13:29:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"60b800111f83cc1e59f16438","flight":1,"gridfins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3032383ecb6bb234e7ca"}],"auto_update":true,"tbd":false,"launch_library_id":"89a150ea-6e4b-489f-853c-3603ae684611","id":"5fe3af84b3467846b3242161"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"]},"links":{"patch":{"small":"https://images2.imgbox.com/9a/f0/UVl6cZ6e_o.png","large":"https://images2.imgbox.com/98/c3/8McdwgVu_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/n9llxw/sxm8_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/nss9br/rspacex_sxm8_launch_discussion_and_updates_thread/","media":null,"recovery":null},"flickr":{"small":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/bgtDRR2F2wA","youtube_id":"bgtDRR2F2wA","article":null,"wikipedia":"https://en.wikipedia.org/wiki/Sirius_XM#Satellites"},"static_fire_date_utc":"2021-06-03T06:32:00.000Z","static_fire_date_unix":1622701920,"net":false,"window":5940,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX launches the second of two next generation satellites for SiriusXM from SLC-40, Cape Canaveral Space Force Station. The spacecraft will be delivered into a sub-synchronous geostationary transfer orbit and will replace XM-4 in geostationary orbit. The booster for this mission will land on an ASDS.","crew":[],"ships":["5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c910","5ea6ed2f080df4000697c90b","5ea6ed2e080df4000697c909"],"capsules":[],"payloads":["5fe3b57db3467846b324217a"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":130,"name":"SXM-8","date_utc":"2021-06-06T04:26:00.000Z","date_unix":1622953560,"date_local":"2021-06-06T00:26:00-04:00","date_precision":"hour","upcoming":false,"cores":[{"core":"5f57c53d0622a6330279009f","flight":3,"gridfins":true,"legs":true,"reused":true,"landing_attempt":true,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":true,"tbd":false,"launch_library_id":"edaf9a8d-d67c-4e0e-8452-a37b111581d5","id":"5fe3af6db3467846b3242160"},{"fairings":{"reused":false,"recovery_attempt":true,"recovered":true,"ships":["60c8c7a45d4819007ea69871"]},"links":{"patch":{"small":"https://images2.imgbox.com/d0/66/bCRsHNSZ_o.png","large":"https://images2.imgbox.com/2f/6f/ebFS9FDJ_o.png"},"reddit":{"campaign":"https://www.reddit.com/r/spacex/comments/nuud0l/gps_iii_sv05_launch_campaign_thread/","launch":"https://www.reddit.com/r/spacex/comments/o0gcnq/rspacex_gps_iii_sv05_launch_discussion_and/","media":null,"recovery":null},"flickr":{"small":[],"original":["https://live.staticflickr.com/65535/51254829184_e6e1d0d79c_o.jpg","https://live.staticflickr.com/65535/51253353892_de82b01e23_o.jpg","https://live.staticflickr.com/65535/51254285968_288383ce6e_o.jpg","https://live.staticflickr.com/65535/51254829154_3c5980c086_o.jpg","https://live.staticflickr.com/65535/51253353882_e59ea4df4f_o.jpg","https://live.staticflickr.com/65535/51254829139_ca68c19689_o.jpg","https://live.staticflickr.com/65535/51262926489_9fbce20e9c_o.jpg","https://live.staticflickr.com/65535/51262926469_974292477d_o.jpg","https://live.staticflickr.com/65535/51262179176_e4302db116_o.jpg","https://live.staticflickr.com/65535/51263224735_3210fb7499_o.jpg"]},"presskit":null,"webcast":"https://youtu.be/QJXxVtp3KqI","youtube_id":"QJXxVtp3KqI","article":null,"wikipedia":"https://en.wikipedia.org/wiki/GPS_Block_III"},"static_fire_date_utc":"2021-06-13T19:30:00.000Z","static_fire_date_unix":1623612600,"net":false,"window":900,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX\'s fourth GPS III launch will use the first stage from the previous GPS mission. This will be the first time a National Security Space Launch has flown on a flight proven booster. Falcon 9 will launch from SLC-40, Cape Canaveral and the booster will land downrange on a drone ship. GPS III is the third generation of the U.S. Space Force\'s NAVSTAR Global Positioning System satellites, developed by Lockheed Martin. The GPS III constellation will feature a cross-linked command and control architecture, allowing the entire GPS constellation to be updated simultaneously from a single ground station. A new spot beam capability for enhanced military coverage and increased resistance to hostile jamming will be incorporated.","crew":[],"ships":["60c8c7a45d4819007ea69871","5ee68c683c228f36bd5809b5","5ea6ed2f080df4000697c910"],"capsules":[],"payloads":["5eb0e4d2b6c3bb0006eeb261"],"launchpad":"5e9e4501f509094ba4566f84","flight_number":13

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dow":0,"rocket":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"detail
s":"Falcon 9 launches to sun-synchronous polar orbit from Florida as part of Spac
eX\'s Rideshare program dedicated to smallsat customers. The mission lifts off fr
om SLC-40, Cape Canaveral on a southward azimuth and performs a dogleg maneuver.
The booster for this mission is expected to return to LZ-1 based on FCC communica
tions filings. This rideshare takes approximately 90 satellites and hosted payloa
ds into orbit on a variety of deployers including three free-flying spacecraft wh
ich dispense their customers\' satellites after separation from the SpaceX stac
k.","crew":[],"ships":["60c8c7a45d4819007ea69871"],"capsules":[],"payloads":["608
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s":"SpaceX\'s 23rd ISS resupply mission on behalf of NASA, this mission brings es
sential supplies to the International Space Station using the cargo variant of Sp
aceX\'s Dragon 2 spacecraft. Cargo includes several science experiments. The boos
ter for this mission is expected to land on an ASDS. The mission will be complete
with return and recovery of the Dragon capsule and down cargo.","crew":[],"ship
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agon-capsule-in-launch-to-the-international-space-station/","wikipedia":"https://
en.wikipedia.org/wiki/SpaceX_Crew-3"},"static_fire_date_utc":"2021-10-28T05:46:0
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d95eda69973a809d1ec","success":true,"failures":[],"details":"SpaceX will launch t
he third operational mission of its Crew Dragon vehicle as part of NASA\'s Commer
cial Crew Program, carrying four astronauts to the International Space Station, i
ncluding 1 international partner This mission will fly on a new capsule and a onc
e used booster. The booster will land downrange on a drone ship. The Crew-2 missi
on returns from the space station in November.","crew":["5fe3c587b3467846b324219
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3/spacex-launch-starts-deployment-of-new-starlink-orbital-shell/","wikipedia":"ht
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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
tered orbit.","crew":[],"ships":["5ea6ed30080df4000697c913","5ea6ed2f080df4000697
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France, will soon be sent to the Cape Canaveral Space Launch Station located in F
lorida, United States. The satellite will be launched into space onboard the Falc
on 9 rocket following pre-launch preparations. With an estimated in-orbit lifetim
e of 30 years and the aim of securing Turkey\xe2\x80\x99s orbital and frequency r
ights, T\xc3\xbcrksat 5B will be launched into an orbital slot at 42 degrees Eas
t. With 12 kW power, T\xc3\xbcrksat 5B will provide TV broadcasting and data comm
unication services over a wide coverage area that reaches the entire Middle East,
the Persian Gulf, the Red Sea, the Mediterranean, North Africa, East Africa, Sout
h Africa and Nigeria. Apart from that, the satellite will also provide customized
services for airlines and commercial ship operators around the world thanks to th
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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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Canaveral on a southward azimuth and performs a dogleg maneuver. The booster for
this mission is expected to return to LZ-1 based on FCC communications filing
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l":[],"original":[]},"presskit":null,"webcast":"https://youtu.be/VVu2bSJJhgI","yo
utube_id":"VVu2bSJJhgI","article":null,"wikipedia":null},"static_fire_date_utc":n
ull,"static_fire_date_unix":null,"net":false,"window":null,"rocket":"5e9d0d95eda6
9973a809d1ec","success":true,"failures":[],"details":null,"crew":[],"ships":[],"c
apsules":[],"payloads":["631616a7ffc78f3b8567071a"],"launchpad":"5e9e4501f509094b
a4566f84","flight_number":186,"name":"Starlink 4-35 (v1.5)","date_utc":"2022-09-2
4T23:30:00.000Z","date_unix":1664062200,"date_local":"2022-09-24T19:30:00-04:0
0","date_precision":"hour","upcoming":false,"cores":[{"core":"627843d657b51b752c5
c5a53","flight":4,"gridfins":true,"legs":true,"reused":true,"landing_attempt":tru
e,"landing_success":true,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7c
c"}],"auto_update":true,"tbd":false,"launch_library_id":"1c903b65-6667-4fd5-944d-
296c5f13e01f","id":"63161339ffc78f3b8567070c"},{"fairings":null,"links":{"patch":
{"small":"https://images2.imgbox.com/eb/d8/D1Yywp0w_o.png","large":"https://image
s2.imgbox.com/33/2e/k6VE4iYl_o.png"},"reddit":{"campaign":null,"launch":"https://
www.reddit.com/r/spacex/comments/xvm76j/rspacex_crew5_launchcoast_docking_discuss
ion_and/","media":null,"recovery":null},"flickr":{"small":[],"original":[]},"pres
skit":null,"webcast":"https://youtu.be/5EwW8ZkArL4","youtube_id":"5EwW8ZkArL4","a
rticle":null,"wikipedia":"https://en.wikipedia.org/wiki/SpaceX_Crew-5"},"static_f
ire_date_utc":null,"static_fire_date_unix":null,"net":false,"window":null,"rocke

t":"5e9d0d95eda69973a809d1ec","success":true,"failures":[],"details":null,"crew":
["62dd7196202306255024d13c","62dd71c9202306255024d13d","62dd7210202306255024d13
e","62dd7253202306255024d13f"],"ships":[],"capsules":["617c05591bad2c661a6e290
9"],"payloads":["62dd73ed202306255024d145"],"launchpad":"5e9e4502f509094188566f8
8","flight_number":187,"name":"Crew-5","date_utc":"2022-10-05T16:00:00.000Z","dat
e_unix":1664985600,"date_local":"2022-10-05T12:00:00-04:00","date_precision":"hou
r","upcoming":false,"cores":[{"core":"633d9da635a71d1d9c66797b","flight":1,"gridf
ins":true,"legs":true,"reused":false,"landing_attempt":true,"landing_success":tru
e,"landing_type":"ASDS","landpad":"5e9e3033383ecbb9e534e7cc"}],"auto_update":tru
e,"tbd":false,"launch_library_id":"f33d5ece-e825-4cd8-809f-1d4c72a2e0d3","id":"62
dd70d5202306255024d139"}]'

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 [11]:
```
response.status_code==200
```

Out[11]: True

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

In [34]:
```
# Use json_normalize meethod to convert the json result into a dataframe
resp = response.json()
```

In [36]:
```
data = pd.json_normalize(resp)
data
```

Out[36]:

	static_fire_date_utc	static_fire_date_unix	net	window	rocket
0	2006-03-17T00:00:00.000Z	1.142554e+09	False	0.0	5e9d0d95eda69955f709d1eb
1	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb
2	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb
3	2008-09-20T00:00:00.000Z	1.221869e+09	False	0.0	5e9d0d95eda69955f709d1eb

	static_fire_date_utc	static_fire_date_unix	net	window	rocket
4	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb
...	...	...	...	...	..
182	None	NaN	False	NaN	5e9d0d95eda69973a809d1ec
183	None	NaN	False	NaN	5e9d0d95eda69973a809d1ec
184	None	NaN	False	NaN	5e9d0d95eda69973a809d1ec
185	None	NaN	False	NaN	5e9d0d95eda69973a809d1ec
186	None	NaN	False	NaN	5e9d0d95eda69973a809d1ec

static_fire_date_utc	static_fire_date_unix	net	window	rocket

Using the dataframe `data` print the first 5 rows

```
In [14]:   # Get the head of the dataframe
           data.head()
```

Out[14]:

	static_fire_date_utc	static_fire_date_unix	net	window	rocket
0	2006-03-17T00:00:00.000Z	1.142554e+09	False	0.0	5e9d0d95eda69955f709d1eb
1	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb
2	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb
3	2008-09-20T00:00:00.000Z	1.221869e+09	False	0.0	5e9d0d95eda69955f709d1eb

	static_fire_date_utc	static_fire_date_unix	net	window	rocket
4	None	NaN	False	0.0	5e9d0d95eda69955f709d1eb

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 [15]:
```python
# 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 [16]:  #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 [17]:  BoosterVersion
```

```
Out[17]:  []
```

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

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

the list has now been update

```
In [19]:  BoosterVersion[0:5]
```

```
Out[19]:  ['Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 1', 'Falcon 9']
```

we can apply the rest of the functions here:

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

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

```
In [22]:  # Call getCoreData
          getCoreData(data)
```

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

```
In [23]:  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 [24]:
```python
# Create a data from launch_dict
launch_data = pd.DataFrame(launch_dict)
```

Show the summary of the dataframe

In [33]:
```python
# Show the head of the dataframe
launch_data.head()
```

Out[33]:

	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 [26]:
```python
# Hint data['BoosterVersion']!='Falcon 1'
data_falcon9 = launch_data[launch_data['BoosterVersion'] != 'Falcon 1']
```

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

In [27]:
```python
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[27]:

	FlightNumber	Date	BoosterVersion	PayloadMass	Orbit	LaunchSite	Outcome
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 [28]:
```
data_falcon9.isnull().sum()
```

Out[28]:   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 [29]:
```python
# Calculate the mean value of PayloadMass column
payload_mass_mean = data_falcon9['PayloadMass'].mean()

# Replace the np.nan values with its mean value
data_falcon9['PayloadMass'] = data_falcon9['PayloadMass'].replace(np.nan, payloa

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

/home/jupyterlab/conda/envs/python/lib/python3.7/site-packages/ipykernel_launche
r.py:5: 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
  """

```
Out[29]: 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.

Change Log

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