Topic 3: The Solar System – Part 1

https://geowiki.ucsd.edu/sio15

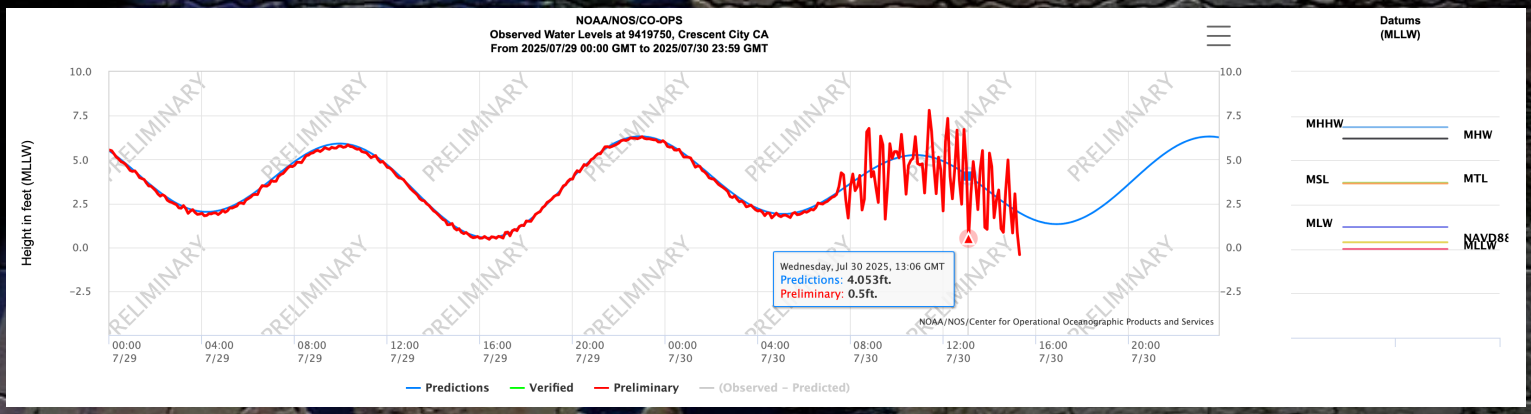
The Earth-Moon System

source: wikimedia

Earth-Moon System: Why is this important?

Earth Tides vs other things

2025 Kamchatka Tsunami at Crescent City, CA



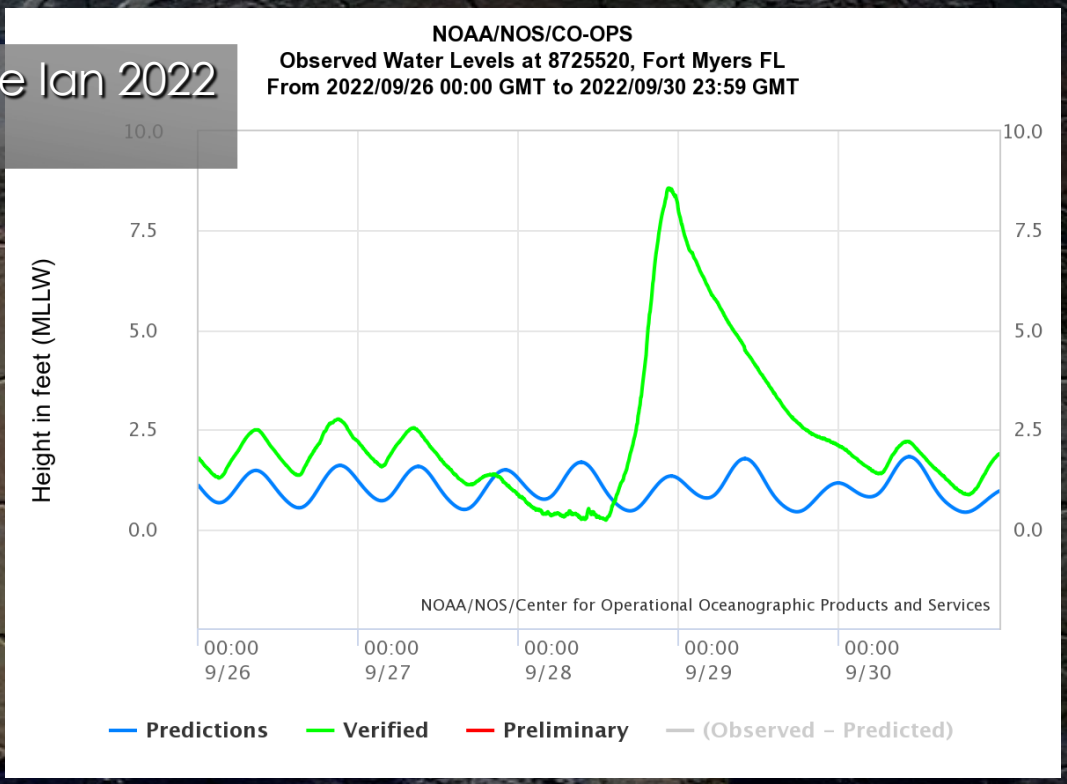
source: NOAA

Earth-Moon System: Why is this important?

Earth Tides vs other things

source: NOAA

Storm Surge, Hurricane Ian 2022 at Fort Myers, FL



seawalls must accommodate *such events*

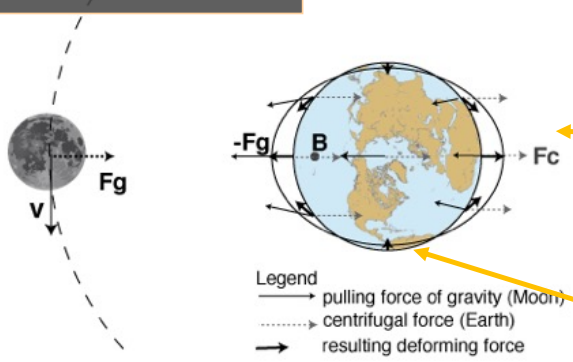
Earth Tides (Sun-Earth-Moon System)

high tide wherever Moon is 'overhead'

Moon orbits Earth

Gravitation and Tides

* Earth's surface feels the pull of the Moon on the near side more than on the far side.



… but also on the 'other side'

low tide at 90°

Fig. 2.15

Watch short Video on tides (3a,b)

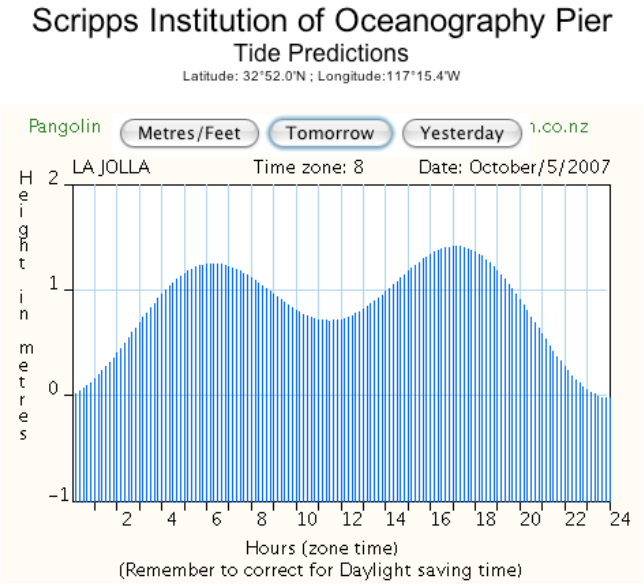
SIO15: Chapter 2: Tides

Change of Tides at a Specific Location

Most places on Earth experience two high tides and two low tides per day (*semi-diurnal tides*).

For example, the tides on October 5, 2007 at the SIO pier looked like the diagram to the right:

Fig. 2.17



http://ocean.peterbrueggeman.com/pierti de.html

A few places experience only one high and one low tide per day (*diurnal tides*).

The tides throughout the day look like this:

Change of Tides at a Specific Location

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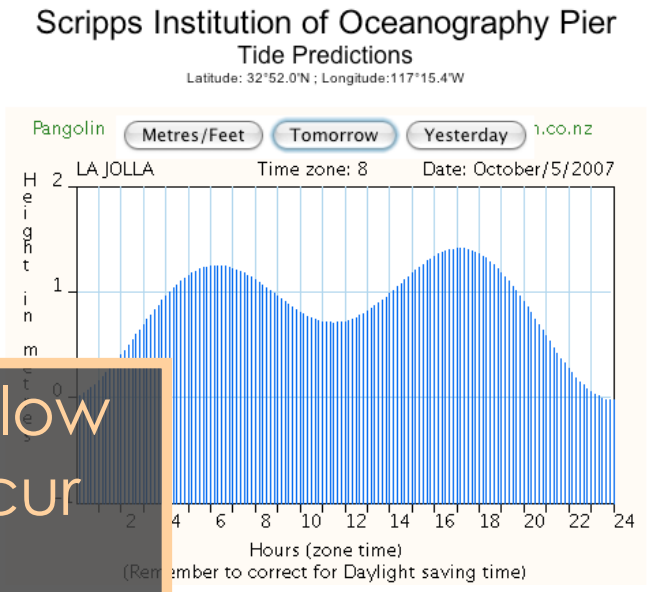

high and low tides occur daily

Fig. 2.17

http://ocean.peterbrueggeman.com/pierti de.html

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The tides throughout the day look like this:

Earth Tides (Sun-Earth-Moon System)

tides also influenced by Sun

Gravitation and Tides

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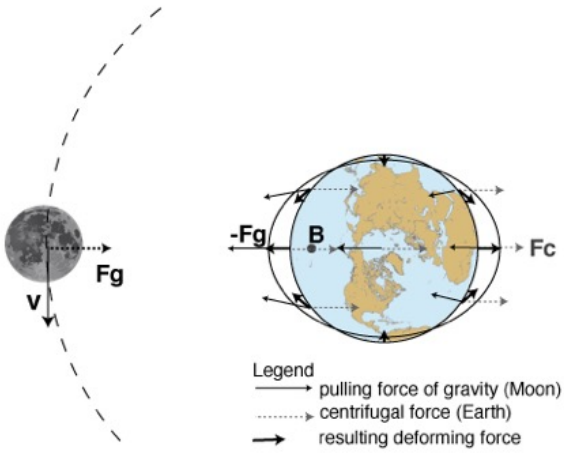
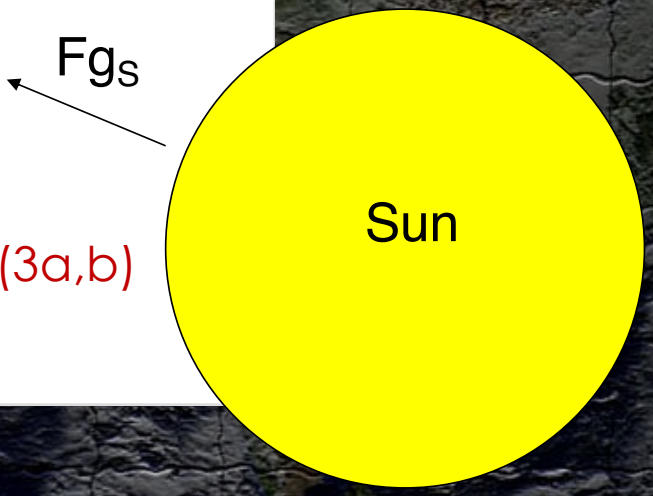


Fig. 2.15

tides "greatest" when Sun, Moon are aligned

tides "smallest" when Sun, Moon are 90°



Watch short Video on tides (3a,b)

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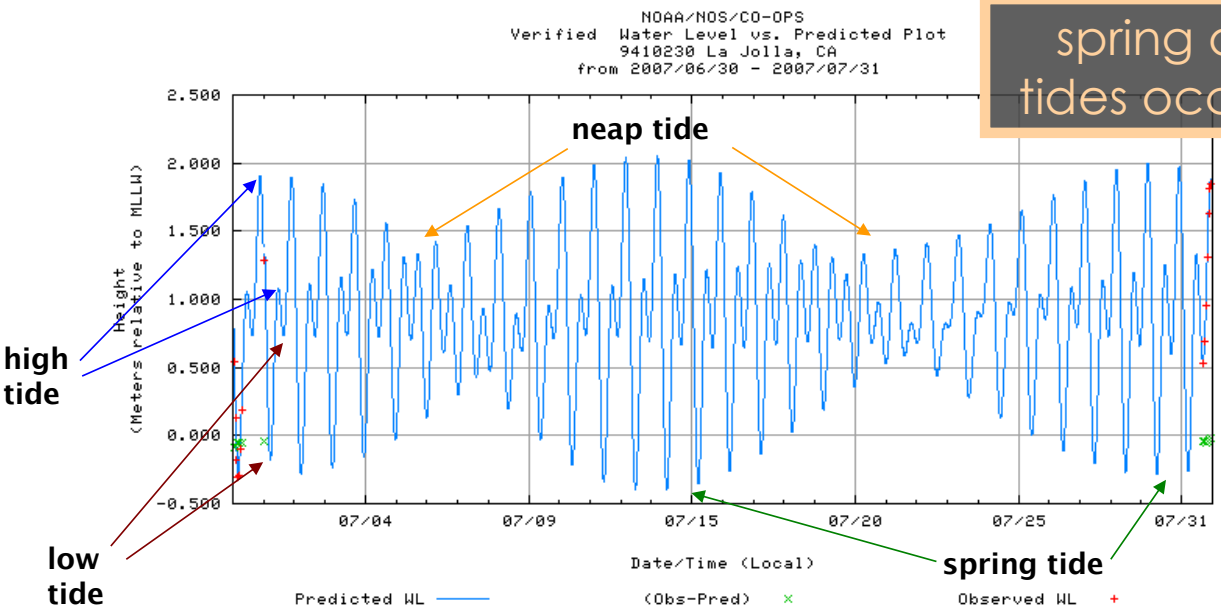
The Moon, Sun and Tides at a Specific Location

spring and neap tides occur monthly



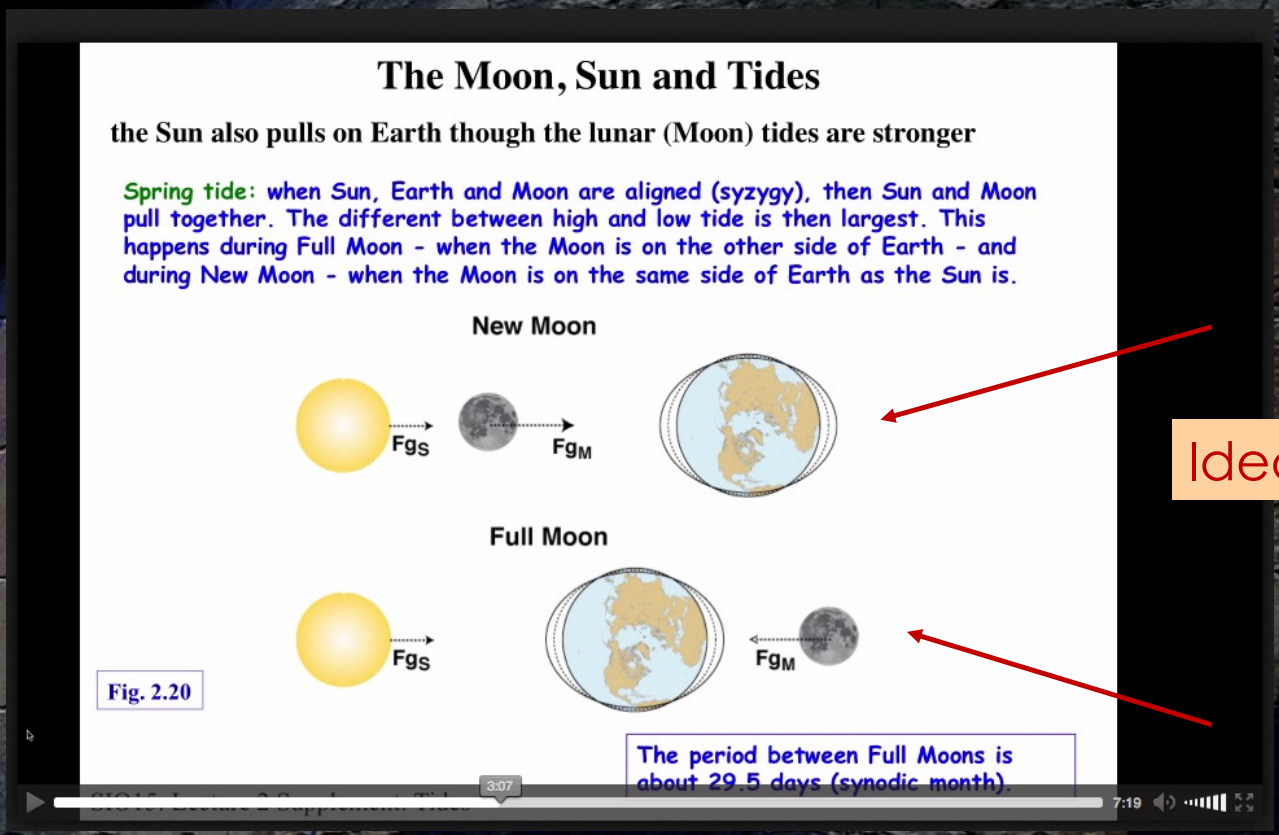
http://tidesandcurrents.noaa.gov

during a synodic month, La Jolla experiences two spring tides and two neap tides.

The period between Full Moons is about 29.5 days (synodic month).

Tidal range: High-low tide

Earth Tides (Sun-Earth-Moon System)



Idealized!

Watch short Video on tides (3a,b)

Solar and Lunar Eclipses

Why do we not have eclipses every month?

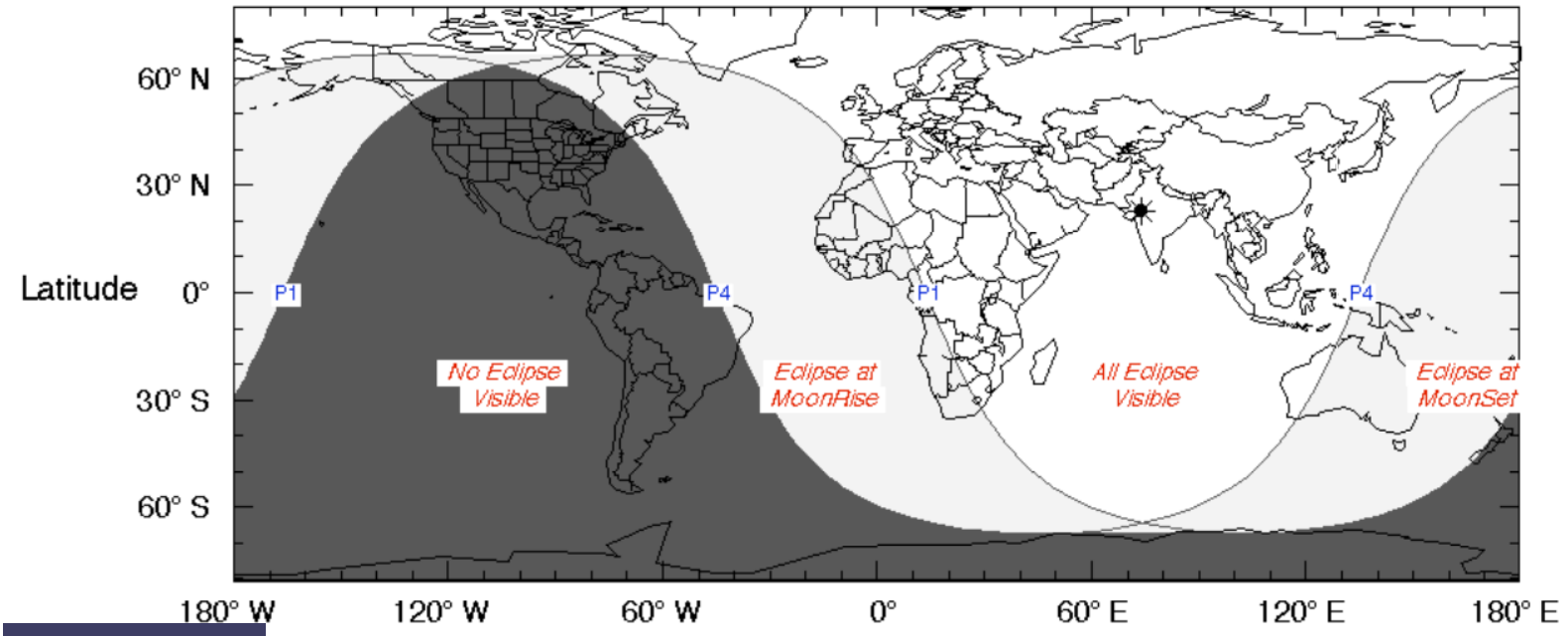
because Moon's orbit around Earth does not lie in the ecliptic

Earth's orbit around Sun

Sideways view

Moon's orbit around Earth

Jan 2020 Lunar Eclipse



source: wikipedia

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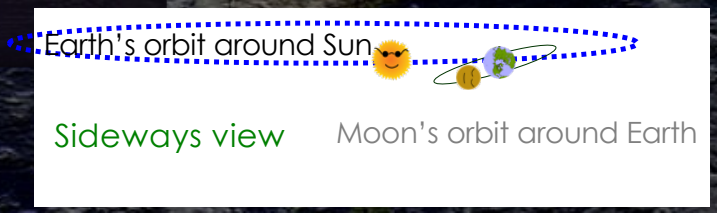

8/21/17 Total Solar Eclipse

source:
greatamericaneclipse.com

Why do we not have eclipses every month?

because Moon's orbit around Earth does not lie in the ecliptic

Next Solar Eclipses

Source: wikipedia/NASA