

Review of Tidal Phenomena

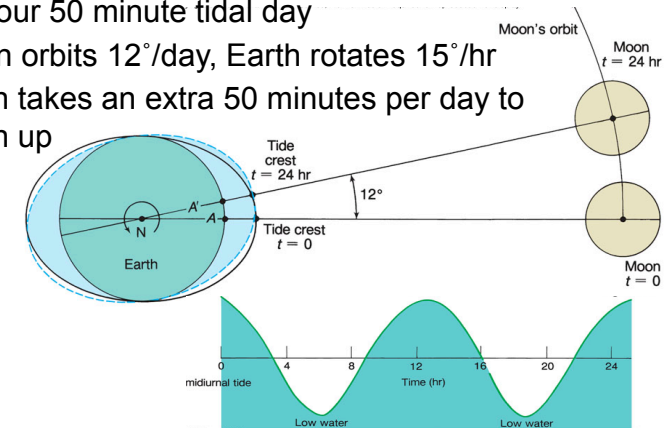


- What tidal effects does each of these processes cause?
 - 29.5-day orbital period of moon
 - Moon's gravity
 - Earth-moon center of mass & "Centrifugal effect"
 - Angle of moon's orbit relative to Earth's Equator (lunar declination)
 - Lunar phases
 - Angle of the Earth's axis relative to its orbit (solar declination)
 - Continents & Earth's rotation

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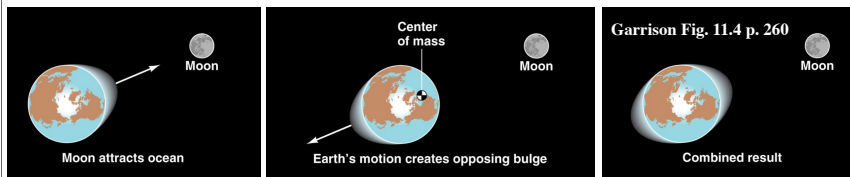
- 29.5-day orbital period of moon
 - 24 hour 50 minute tidal day
 - Moon orbits 12°/day, Earth rotates 15°/hr
 - Earth takes an extra 50 minutes per day to catch up



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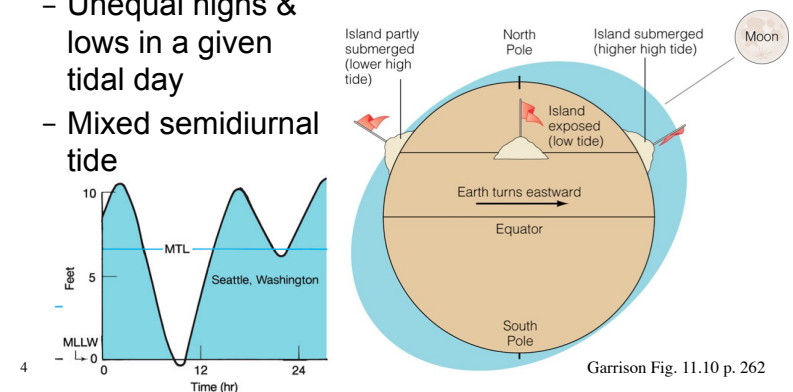
- Moon's gravity
 - Tidal crest facing the moon (equilibrium theory)
- Earth-moon center of mass + Centrifugal effect
 - Tidal crest opposite the moon
 - Sum = 2 tidal crests per day
 - = 2 tidal cycles per day = semidiurnal tide



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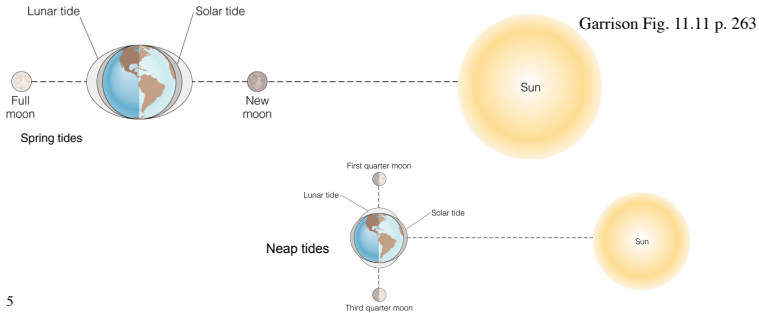
- Angle of moon's orbit relative to Earth's Equator (lunar declination)
 - Unequal highs & lows in a given tidal day
 - Mixed semidiurnal tide



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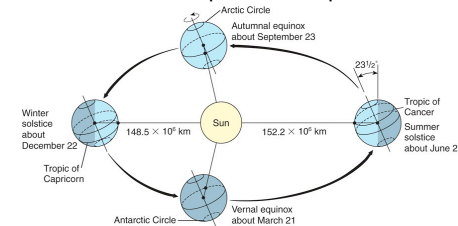
- Lunar phases
 - Spring & neap tides
 - Spring DOES NOT refer to time of year
 - Spring (& neap) tides twice a month, 12 months a year



Review of Tidal Phenomena



- Angle of the Earth's axis relative to its orbit (solar declination)
 - Change in tidal ranges over the year
 - Maximum around solstices at high latitudes
 - Maximum tilt of solar tidal crests relative to equator
 - Minimum around equinoxes at high latitudes
 - Solar tidal crests parallel to equator



Review of Tidal Phenomena



- Continents & Earth's rotation "Dynamic Theory"
 - Tidal crests travel from Antarctic
 - Crests not directly timed to sun & moon
 - Rotary tidal motion & amphidromic pts.
 - Large tidal ranges at heads of ocean basins

