

# Tides vs. Elevations: What's the Difference?

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## Tides

- **Definition:** Tides are the **periodic rise and fall of sea level** caused mainly by the gravitational pull of the moon and sun, combined with the earth's rotation.
- **Nature:** They are **dynamic and time dependent**. At any given coastal location, the water level changes throughout the day (high tide, low tide, etc.).
- **Reference Surfaces:** Tidal datums are averages of tidal stages measured over a 19-year cycle (a "tidal epoch"), such as:
  - **Mean Lower Low Water (MLLW):** Average of the lowest daily tides — common chart datum for navigation.
  - **Mean Sea Level (MSL):** Average of all observed sea levels.
  - **Mean High Water (MHW):** Average of daily high tides.

So, tidal datums describe **where the water usually is** relative to some average.

## Elevations

- **Definition:** Elevations are the **vertical distance of a fixed point on land or sea floor above (or below) a reference surface (datum)** such as:
  - **NGVD29 or NAVD88** (geodetic datums).
  - **Ellipsoid heights** (from GPS).
  - **Geoid-based surfaces** approximating mean sea level.
- **Nature:** They are **static (fixed to a reference surface)**. A benchmark or survey monument keeps the same elevation regardless of the tide.
- **Usage:** Used for engineering, mapping, and survey control (e.g., the height of a seawall, the depth of a channel).

## Key Difference

- Tides = moving water levels relative to tidal datums.
- Elevations = fixed land/sea-floor positions relative to geodetic datums.

## Example

At a harbor benchmark, the elevation might be 3.2 m NAVD88. At the same location, the water surface could be at +0.5 m MLLW (tide level) at one moment, and +1.8 m MLLW a few hours later — but the benchmark's elevation doesn't change.