Surface Ocean Currents

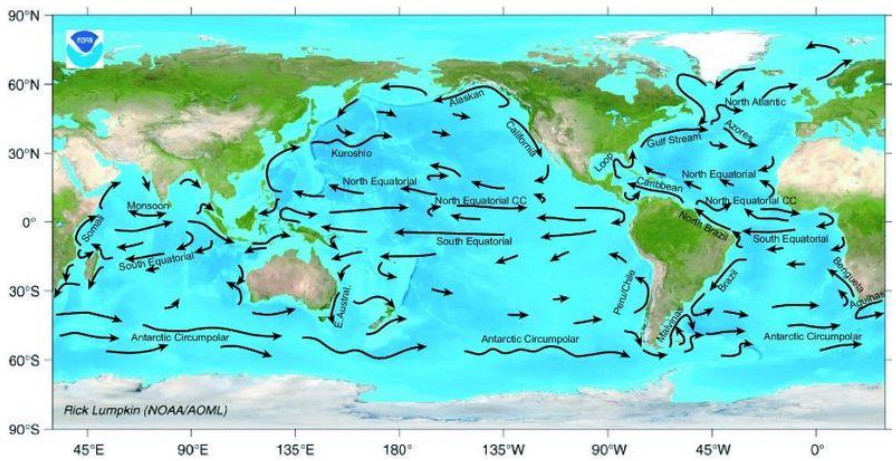
Surface Currents

- **Surface currents** can flow for thousands of kilometers and can reach depths of hundreds of meters
  - Do not depend on weather
  - Remain unchanged even in large storms because they depend on factors that do not change

Study Tip

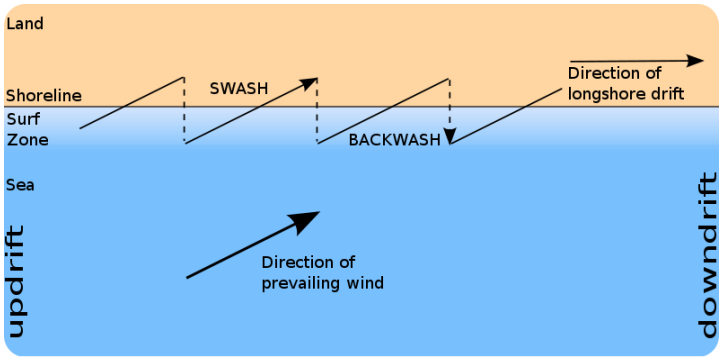
Review the guide "Earth as a Planet" to understand the Coriolis Effect.

- Surface currents are created by 3 things:
  - Global wind patterns
  - Rotation of the Earth
  - Shape of the ocean basins
- Surface currents distribute heat around the planet and influence climate around the globe
- Global winds blow in the same directions all the time and are related to the unequal heating of Earth by the Sun and the rotation of the Earth
  - **Coriolis effect**: more solar radiation strikes the equator than the polar regions



The major surface ocean currents.

- Water in the surface currents is pushed in the direction of the major wind belts:
  - Trade winds: east to west between the equator and 30° N and 30° S
  - Westerlies: west to east in the middle latitudes
  - Polar easterlies: east to west between 50° and 60° north and south of the equator and the north and south pole
- When a surface current collides with land, the current must change direction
- Surface ocean currents create loops called **gyres**
- Local surface currents are also found along shorelines
  - Longshore currents
  - Rip currents: potentially dangerous currents that carry large amounts of water offshore quickly



Longshore currents move water and sediment parallel to the shore in the direction of the prevailing local winds.

Concept Check

- Describe the motion of a water particle that is stuck in a gyre in the North Pacific.
- What should you do if you get stuck in a rip current?
- What would happen if a major surface current did not run into a continent? Note that this is what happens with the Antarctic Circumpolar Current.