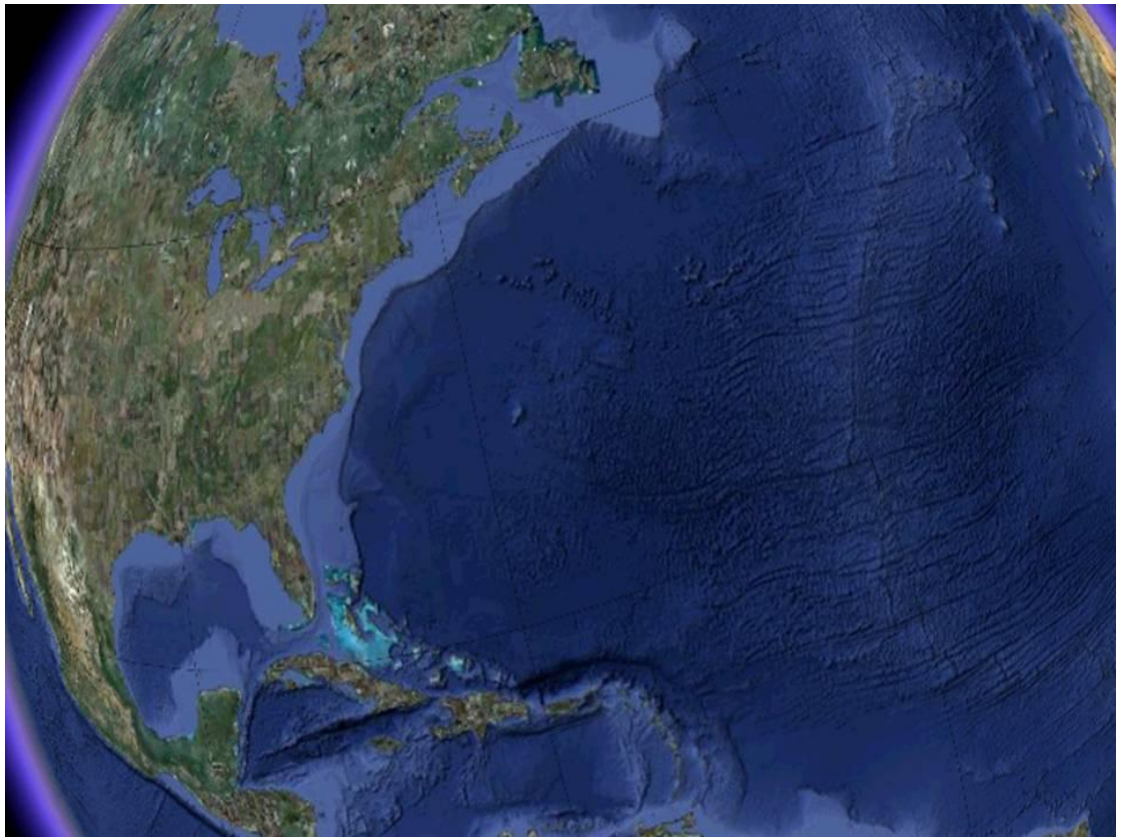
Marine Gravity Anomaly

Overview of Gravity Anomaly

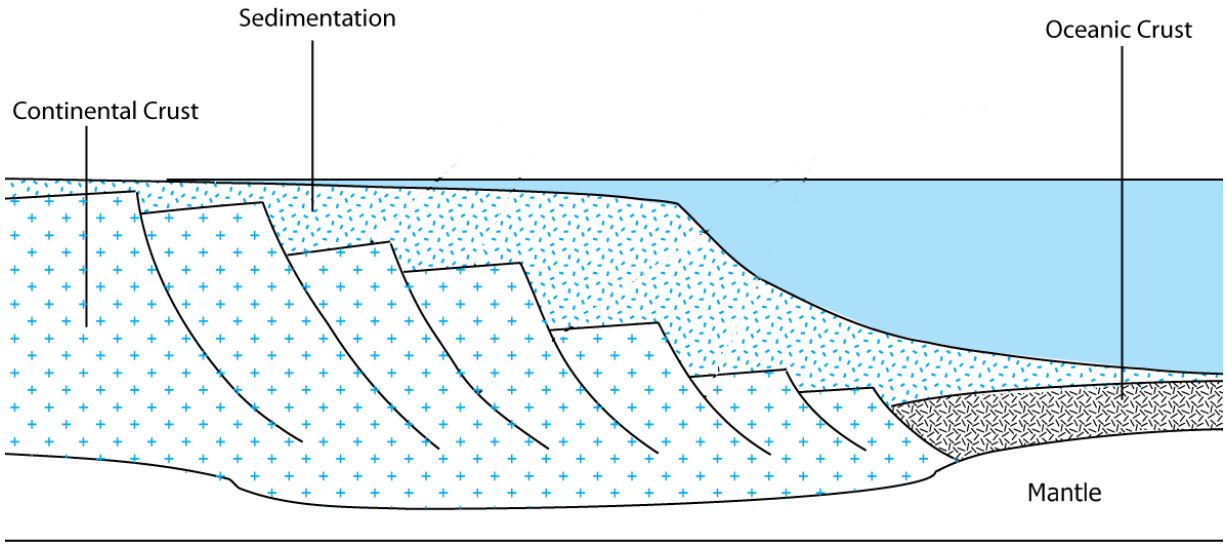
An anomaly is a deviation from the rule. When discussing tectonics,
some areas have regional gravity values that differ from what we might expect.



The East Coast of North America (including the coast of Gulf of Mexico) is characterized by anomalies in regional gravity.

Changes in Density

Regional changes in density often create gravity anomalies.

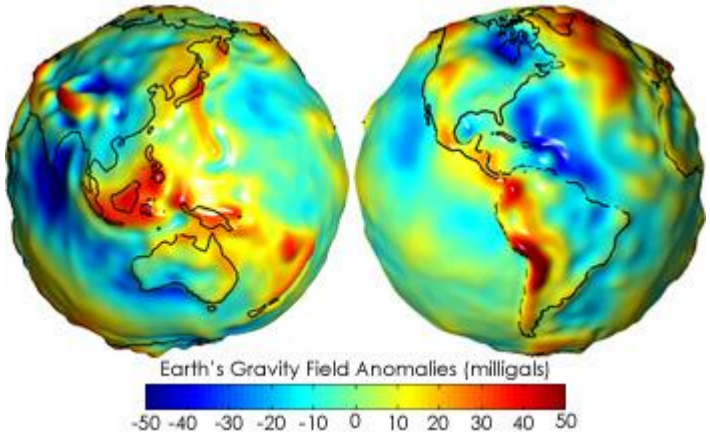


In general, mantle rocks are most dense compared to other regions.
Oceanic crust is less dense than the mantle.
Continental crust is less dense than oceanic crust.
Sediments are the least dense of all.

Density and Gravity

As the topography varies, the column of rock thins and thickens; this changes the gravity field. Changes in rock type, hence rock density, cause variations in the gravity field.

The Earth's surface varies: we have mountains and valleys to wide plains and ocean trenches.



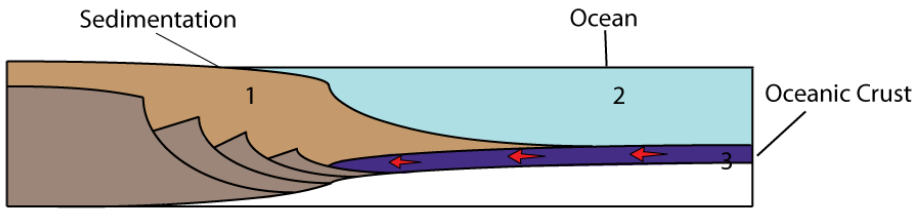
To understand anomalies, let's assume that the Earth is completely smooth and featureless.

Some regions of the planet—such as mountains—*rise above* the assumed surface creating a *positive* anomaly. Red-yellow areas show where these anomalies exist.

Some regions of the planet—such as oceans—*sink below* the assumed surface creating a *negative* anomaly. Blue-green areas show where these anomalies exist.

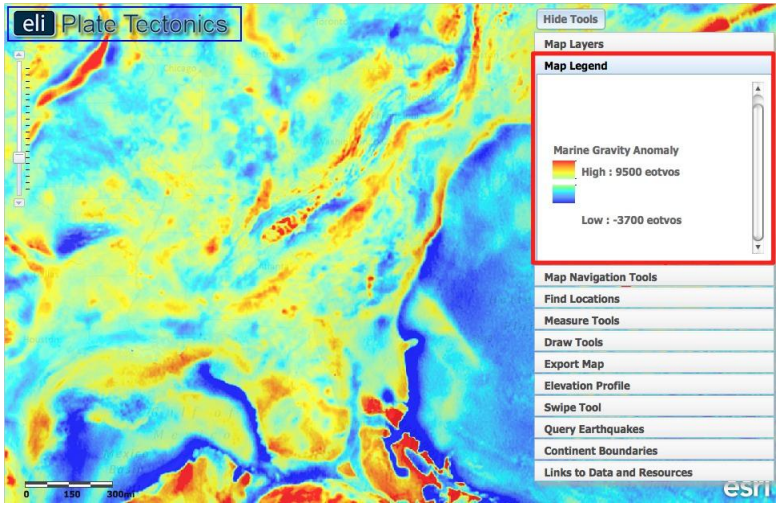
Anomaly designates lithosphere transition

The structure of the lithosphere along the east coast involves a transition from continental lithosphere to oceanic lithosphere.



Ancient subduction and collision thickened the *continental lithosphere* creating the Appalachian Mountains. The continental crust is less dense: it rises high and creates a positive anomaly.

Atlantic Ocean spreading formed the *oceanic lithosphere*. Sediments shed from North America have since buried part of the younger oceanic crust and loaded it down. The oceanic crust is denser: it sinks low and creates a negative anomaly.



Because these different parts of the lithosphere have differing densities, the margin between them can be seen on a gravity anomaly map.