INFLUENCE OF TIDES ON THE EARTH'S CRUST

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Abstract: Results of research so far indicate that convection currents likely do not play a major role in continental drift. [1] However, it is known that moon and sun tidal forces are sufficient to distort the shape of the planet and likely is the energy source for continental drift in the form of tidal forces. This concept outlines those tidal forces at work on the ocean's ridges, such as the Mid Atlantic Ridge (MAR). Magma entering fissures plus flexure at the ocean's ridges mechanically generates sufficient movement to force the crust plates away from the ridges.

FORCE GENERATED BY TIDES

Ocean tides caused by the moon and sun can influence large volumes of water that can ebb and flow in ocean areas, increasing and decreasing the ocean's surface height. Ocean tides develop in various sizes and flow in various directions mostly due to moon and sun positions. Study indicates this process is related to size of ocean area that resonates mostly with the moon's gravity, and is modified at certain times by the sun. [2]

Figure1---Red silhouette indicates moon's gravity distortion

Land tides are an indicator of the existence of crust flexure, which can rise as much as fifty-five centimeters, and is assumed to occur at the ocean bottom as well. The land has a delay in reaching maximum tidal height of about two hours with regard to the moon's position. The delay of water in reaching maximum or minimum at any point in the ocean varies. The lack of high ocean tides, called amphidromic points, would indicate the tidal flow of ocean water away from the area of ocean bottom maximum rise, and the flow is reversed for bottom minimum. The change in water mass has a dynamical influence on the ocean floor, flexing it most at its weakest locations, the ridges.

When the water is high relative to ocean bottom, there is a few million tons of extra loading depending on size of ocean area involved. This extra weight will put great pressure on the ocean bed thus weak crust locations, such as the MAR and other ocean ridges, will have the most bending. In turn, this will encourage the opening of fissures on or near the bottom of the crust. The increase in crust pressure against the magma is also a factor, encouraging ingress of magma into the fissures.

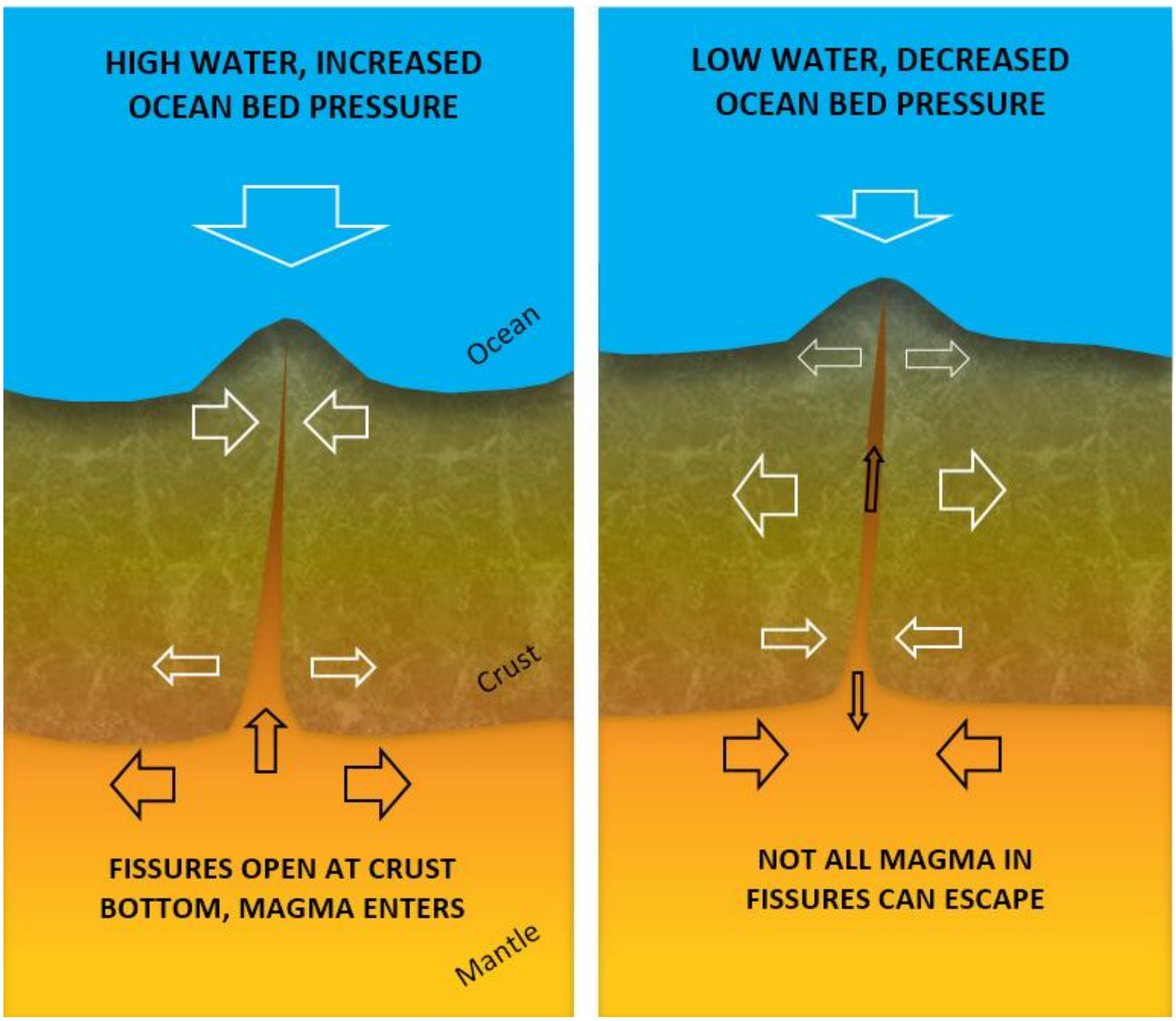

Figure2---Dynamics of ocean bed. High water is shown on left panel and low water on right, with the motion highly exaggerated.

In figure 2, pressures and motions at certain ridge locations are depicted by size and direction of arrows, white indicating forces and motions of water and crust, black indicating magma motion. The dynamic is mostly concentrated along the fissures in the crust that occur due to weakening from tidal stresses over many years. The fissured crust might be similar to a giant hinge, pushing and pulling on the magma in between.

The crust is thinner under the ridges likely due to the gradual upward flow of hot magma into the fissures, and the heat of tidal crust friction. Magma in the fissures can move mostly in vertical directions due to the dynamics, but being now partly plastic might tend to behave somewhat as squeezed rubber, yet flowing around some until it has become gradually more rigid upon further cooling.

Ridge data indicate that ridges are much more recent than other ocean bottom areas. Magma movement and activity inside of and along ridges such as the MAR indicate fissures on the top and underside of the MAR. As already indicated, magma entering the underside fissures is exposed to cooler rock where it will cool more rapidly and becomes less elastic and not easily forced back out. Some of the magma influx at low water is forced upward also, where it forms the most recent upper solid surface of the ocean bottom. [3], [4]

At minimum water, the weight of the ocean is relieved where fissures are located, creating great lateral pressure due to the extra thickness of magma in the fissures, resulting in a continual horizontal force that is sufficient to move the adjacent plates apart very slowly but noticeably in time.

As the plates are thus forced to move, there is little place for them to go except to crowd into each other and if enough pressure is present, there can be a sudden change such as a subduction or strike slip earthquake. There can also be slow accommodation due to the pliability and compressibility of the crust, where motions occur slowly without earthquakes.

The stress and motion of the MAR is likely inducing sound into the ocean, which might be detected with at least three sensitive hydrophones precisely located so that triangulation could show timing, intensities and locations of ocean bottom stresses. The timing of tides could be compared to this data to determine if indeed tides are the energy source. There might be the possibility of seismic wave detection and GPS employed at the same time for further verification.

CONCLUSION

It is assumed this theory comes close to what has been seen and measured at the ocean ridges. The basic mechanism in this proposed process is mechanical and straightforward. Unfortunately, the ocean bottom is not easily studied and has been only glimpsed by submersibles and sonar. The ocean bottom dynamics, especially under ridges such as the MAR, for the most part is yet to be determined.

REFERENCES

1. http://en.wikipedia.org/wiki/Plate_tectonic_theory
2. http://en.wikipedia.org/wiki/Tide
3. http://en.wikipedia.org/wiki/Geophysics
4. http://en.wikipedia.org/wiki/Mid-Atlantic_Ridge