Geology of Stetson Bank

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Stetson Bank, named for oceanographer Henry Stetson, is a salt dome. So what caused a "salt dome"? Let's start nearly 200 million years ago in the Triassic age, when the supercontinent of Pangea started to break up into Europe, Africa, and North and South America. In early Jurassis time, about 190 million years ago, the newly separated continents had drifted apart enough to form the ancestral Gulf of Mexico. The Gulf was shallow at that time. The source of marine water was somewhat restricted with only narrow openings to the main oceans. And, the climate was hot and dry. Because of those conditions, the Gulf at that time was the site of intense evaporation of the incoming sea water, and a thick layer of salt, the Louann formation, was deposited.

As the continents spread further apart and the Gulf deepened, the waters there became normal salinity, and rivers started to bring in mud, sand, and silt that covered the salt. Through time there was continued deposition of those clastic sediments which are denser than the salt. Because of the overlying load, in many locations the underlying salt began to flow to areas where there was either a structural uplift, or where the overlying rocks were weaker than at other sites. In any case, the salt started to slowly push its way up through the overlying beds, bowing them up, and in many cases, piercing through them. However, in the case of Stetson, and some other domes, large blocks of rock were carried upward on top of the salt, pushing older beds up into younger ones.

At Stetson Bank, rocks of latest Oligocene or earliest Miocene age, about 24 million years old, have been brought up above the surrounding sea bottom, and that is what we see while diving there. The thin, hard beds at Stetson are of fine sandstone to siltstone, and the thicker and softer beds are claystone or mudstone. Those same age beds that we see standing on end at Stetson are nearly horizontal and 10,000 feet below sea level a few miles away where they have not been affected by salt movement. I have taken several samples of mudstone and have had them dated by microfossils such as coccoliths and foraminifers. The foraminifers are also useful in determining what the water depth was at that time at that spot. There is some minor difference in age from one sample to another (probably because they came from different fault blocks), and some difference in paleo water depth. However, all samples that contain good foram assemblages show that water depth there at time of deposition of the mudstone was greater than 3,000 feet!

Salt domes vary in how close to the present earth's surface, or to sea bottom, the salt comes. In a number of salt domes (such as at Avery Island, Louisiana, home of McIlhenny's Tabasco Sauce), the salt is close enough to the surface to be mined. There are even a few in the Gulf today where there is salt at the sea bottom, with only a foot or two of Recent mud over the salt. In other domes, referred to as "deep-seated", the top of the salt may be as much as 10,000+ feet deep. Although most salt domes have the salt in a roughly circular "plug" or "stock" that may be anywhere from 1/2 to 2 miles in diameter, some are not circular. Some have horizontal projections, called "overhangs," at the top. And some may be topped by "caprock" which may be either limestone or anhydrite, or both, due to solution of the salt. All have "faults" or fractures of the overlying and immediately surrounding rock due to movements of those beds.