

## FROM THE OTHER SIDE

A COLUMN BY LEE LAWYER WITH STORIES ABOUT GEOPHYSICS AND GEOPHYSICISTS



This is a quiz. Are you familiar with the names Fred Vine and Alfred Wegener? How about Drummond Matthews? Surely you know about Harry Hess. Maybe Edward Irving? Robert Dietz? Anyone? Here is a clue.

They are all connected in one way or another. Another clue: I could have added Maurice Ewing and Tuzo Wilson. Did that help?

Enough suspense. These people were prominent in the discovery of plate tectonics. I was working on a short item for the *Geophysical Society of Houston Newsletter* regarding Harry Hess. I pondered his contributions and realized that there were several people who contributed at a basic level.

Alfred Wegener proposed continental drift back in 1912. This created a lot of controversy, pro and con, but who can deny the amazing fit between Africa and South America? It was a little tougher to decide how continents drifted around, plowing through the ocean floor.

Harry Hess solved that problem. He postulated that the ocean basins were being formed at the oceanic ridges and consumed at subduction zones—i.e., seafloor spreading. Continents were passive passengers on the newly formed oceanic crust. As far as I can tell, this brilliant insight was not supported by much real data. Fellow researcher Robert Dietz preferred the phrase “plate tectonics.” Hess submitted a scientific report in 1959 to the Office of Naval Research titled “Essay in geopoetry.” He followed the essay with more complete report in 1962 titled “History of ocean basins.” His key conclusion: *The ocean basins are impermanent features, and the continents are permanent although they may be torn apart or welded together and their margins deformed.*

Charles Bates sent me an excellent write-up on Hess, and I have liberally lifted from it for this column. Bates refers to Hess as “truly a man for all seasons—marine geophysicist, field geologist, educator, and naval officer of flag rank.” Hess was aboard the “junky” U.S. Navy submarine S-41 in 1931 when she was cruising in the Bahamas with a Vening Meinesz pendulum aboard. Princeton University had arranged for Hess to keep the meter working. Interestingly, the cantankerous engineering officer, Lt. Hyman Rickover, kept the sub from sinking permanently. Hess was also on a later submarine cruise in 1936, assisted this time by Maurice Ewing (sorry about all that name-dropping).

In WWII, while captain of the *USS Johnson* in the Pacific, Hess modified the fathometer to record depths below 2000

fathoms. This allowed him to discover numerous flat-topped seamounts rising well above the seafloor. He called them “gyots.”

A year or so after the report on ocean basins, two geophysicists came up with an explanation for the magnetic stripes parallel to mid-ocean ridges. Their report was titled “Magnetic anomalies over oceanic ridges.” One author was a graduate student, Fred Vine, and the other was his professor, Drummond Matthews. They reported that the stripes are a result of shifts in the magnetic polarity of the Earth’s magnetic field, confirming Hess’s ideas of seafloor spreading.

Edward A. Irving is a paleomagnetism specialist. His work in remanent magnetism in Australia strongly supported Wegener’s continental drift thesis. At one time, we used the term “polar wandering.” Clearly, the poles weren’t wandering. It was the position of the continents moving around relative to the magnetic north pole that was being measured.

I should have mentioned several other people who contributed to plate tectonics, but I was too lazy to do the research to find out. If you have any anecdotes along these lines, I would like to hear from you.

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Few people have more knowledge of seismic history than I do (few thousand), but Gerhard Keppner is clearly one. He is constantly improving my understanding (accuracy) regarding past events, especially about Ludger Mintrop and Seismos. Check this latest contribution.

The Seismos party for Marland arrived in New York on 15 July 1923 under Mintrop’s leadership. A second crew was ordered but was then integrated into the first one. Soon, the party moved from Oklahoma to Texas. On the client’s side stood Van Waterschoot van der Gracht and party manager John F. Weinzierl. There was always a lot of trouble about the living expenses. Marland had to pay \$5 per man per day. The relation between van der Gracht and Mintrop went berserk when Marland realized that a Seismos crew also worked for Gulf. The quarrel lasted the whole summer of 1924. Van der Gracht denounced this behavior as a double cross. A three-page letter from 8 July 1924 is full of harsh reproaches. I quote only one: “...this difficulty has caused us (Marland Oil) very considerable damage, because competition from the Gulf Company, which we had expected to avoid, has caused lease prices to rise generally, and made negotiations with the landowners much more difficult, and in fact has caused us to actually lose several attractive propositions.”

But finally Marland and Gulf came to an agreement, and the controversy was settled. The result was the famous contract of 28 August 1924. Fifteen pages were needed to include the conditions.

There were two main points:

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- **Seismos** was allowed to work up to 31 December 1925 only for Marland and Gulf in Texas/Louisiana.
- After that date, **Seismos** was “free” but had to agree that Marland had “...full rights to negotiate with the **Seismos** Company for its services in the United States beyond 31 December 1925 up to 31 December 1930, and the **Seismos** Company will not exclude the said Marland Companies from any such right by contracts with any other company, corporation, or person...”

The **seismos** work for Marland ended in 1925. The work was not too fruitful. No salt domes were discovered for Marland, only the Oligocene High of Matagorda in 1925. In the same time frame, the other **Seismos** crew found five salt domes in Texas/Louisiana for Gulf, including the famous Orchard Dome (first seismic discovery) and the oil-rich Starks Dome besides others. I think they all were discovered by Dr. Geuffenhainer’s old Mexican party (the crew that initially started for Mexican Eagle).

Marland had a big effect on oil exploration and geophysics. One year he hired all of the graduating geologists from Oklahoma University. John Weinzierl, mentioned above, was SEG secretary-treasurer 1930 to 1934. The Geological Engineering Company (Karcher et al.) was organized in 1921. The Geophysical Research Corporation was organized in 1925 by Everett Lee DeGolyer (Rycade, Amerada) with Karcher as VP and chief physicist, and the Petty brothers incorporated Petty Geophysical in the same year.

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Because of my experience with radio (see the August FTOS), I have decided to record FTOS and make it available as a podcast on the SEG Web site. You will be able to hear the column as well as read it! It doesn’t get any better than that. Those of you who have not heard my dulcet tones are in for a real treat. The big problem is that the column is written to be read, not spoken. I will have to shorten sentences, eliminate passive voice, and always use contractions. It will require a complete rewrite, hours of work. Plus the odds of me being able to pronounce all of the names in this column are close to zero. Hummmm.... Maybe I will table this great idea unless there is a ground swell of support. **TLE**