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[Lamont-Doherty Geological Observatory, Columbia University, Palisades, NY]

The parameters of motion between plates in all major oceans were established using the rates and directions of spreading at mid-ocean ridge crests, thus establishing the rigidity of plates. A worldwide pattern of relative motion between the six major plates was then computed. Finally, reconstructions of the evolution of the world oceans and continents at various stages were attempted. [The *SCI*® indicates that this paper has been cited over 560 times since 1968.]

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"This paper was written at Lamont-Doherty Geological Observatory of Columbia University during the second part of 1967. The work of Walter Pitman, Jim Heirtzler, and their colleagues there had just established that sea-floor spreading was indeed the process by which ocean floor is being formed at the crests of midocean ridges.[1] They had measured the rates and directions of spreading in ail the oceans. In April 1967, Jason Morgan had described at the American Geophysical Union meeting in Washington the geometrical constraints re lated to the displacement of rigid plates on a sphere.[2] It seemed obvious to me that the next step was to compute a consistent worldwide kinematic pattern accounting for the spreading at the crests of midocean ridges. Such a pattern would yield the amount of shortening along deep sea trenches and young alpine mountain belts.

"My first task was to devise the required computer programs and to obtain the parameters of motion in all the main oceans, testing in this way that plates can indeed be considered as rigid in a first approximation. I confronted Jason Morgan with my estimates at a meeting in Woods Hole in September. I then proceeded to compute the worldwide kinematic pattern, assuming only six plates instead of the twelve chosen by Morgan, so that the problem would have a unique solution. The result made a lot of geological sense and convinced me that the rigid plate approximation worked very well. The next step was to use it to reconstruct the configuration of the world at different times in the geological past. This required rediscovering the hard way how finite rotations combine.

"By November, I had finished the first draft of the manuscript. I remember that, being a young PhD at the time, I was very enthusiastic about it and told my wife that I had just written 'the paper of the century.' Well, it was not. Rather, it has been recognized as the first demonstration that the rigid plate approximation, which is the basis of plate tectonics, worked on a worldwide scale whereas many scientists at the time did not think that the approximation would hold at this scale. This was at least what both Jason Morgan and Dan McKenzie told me when they saw my results. This is probably the reason why my paper has been cited so often.

"My paper was the basis of a seismological study by Isacks, Oliver, and Sykes, published in the *Journal of Geophysical Research* six months later.[3] It was their work which made the first systematic use of 'plate tectonics' to explain worldwide tectonic phenomena. They showed that my six plates model could explain most of the seismic phenomena occurring on the Earth and that it did not conflict with major observational facts. As a consequence, my paper became so popular in the first few years that many scientists used it indiscriminately, accepting the division of the Earth in six plates as a dogma instead of a mathematical necessity with the data available, and taking the rates and directions of motion computed at different points along plate boundaries as precise determination everywhere. New, more elaborate global kinematic models have been published since this first one but the basic pattern established in 1967 has not been fundamentally changed."[4,5]

1. **Pitman W C & Heirtzler I R.** Magnetic anomalies over the Pacific-Antarctic ridge. *Science* **154**:1164-71, 1966.
2. **Morgan W J.** Rises, trenches, great faults, and crustal blocks. *J. Geophys. Res.* **73**:1959-82, 1968.
3. **Isacks B, Oliver J & Sykes L R.** Seismology and new global tectonics. *J. Geophys. Res.* **73**:5855-99, 1968.
4. **Minster J B, Jordan T H, Molnar P & Halnes E.** Numerical modelling of instantaneous plate tectonics. *Geophys. J.* **36**:541-76, 1974.
5. **Chase C G.** Plate kinematic: the Americas. East Africa, and the rest of the world. *Earth Planet. Sci. Lett.* **37**:353-68, 1978.