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ESSAY

Organized Opposition to Plate Tectonics: The New Concepts in Global Tectonics Group

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Abstract—This essay describes the origins, aims, and activities of the New Concepts in Global Tectonics Group, and outlines some of the main geological controversies covered by its quarterly newsletter.

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NCGT Group: Origins and Activities

The New Concepts in Global Tectonics Group is an informal association of earth scientists who are critical of plate tectonics and want to explore alternative theories. It arose after a symposium on "Alternative theories to plate tectonics" held at the 30th International Geological Congress (IGC) in Beijing in August 1996. The name "New Concepts in Global Tectonics" was taken from an earlier symposium held in association with the 28th IGC in Washington, DC, in 1989 (see Chatterjee & Hotton, 1992).

The first issue of the ***New Concepts in Global Tectonics Newsletter*** appeared in December 1996. In their editorial, J. M. Dickins and D. R. Choi wrote:

> Although enormous strides have been made in our knowledge of the earth and much has been added to Geology by Physics and Chemistry, we need to acknowledge that we are only at the beginning of tabulating and understanding what is at the surface of the earth, let alone what is underneath. . . .
>
> In this context, in the 1950s and 60s the new theory of Plate Tectonics was propounded by "Geophysicists" (Physicists) and mainly young Geologists with little experience, depth of understanding or respect for existing geology. The theory, although admittedly simplistic and with little factual basis but claiming to be all embracing, was pursued by its proponents in an aggressive, intolerant, dogmatic and sometimes unfortunately an unscrupulous fashion. Most geologists with knowledge based locally or regionally were not confident in dealing with a new global theory which swept the world and was attractive in giving Geology a prestige not equalled since the nineteenth century.

The ideological influence and strength of the Plate Tectonic Theory has swept aside much well-based data as though it never existed, inhibited many fields of investigation and resulted in the suppression or manipulation of data which does not fit the theory. In the course of time the method has become narrow, monotonous and dull: a catechism repeated too often. As new data has arisen there is a growing scepticism about the theory.

The aims of the NCGT Newsletter are:

- to provide an organizational focus for creative ideas not fitting readily within the scope of plate tectonics;
- to publicize such ideas and work, especially where there has been censorship or discrimination;
- to provide a forum for discussion, which has been inhibited in existing channels;
- to organize symposia, meetings, and conferences;
- to document cases of censorship, discrimination, or victimization, and to provide support in such cases.

Although the newsletter was originally intended to appear twice a year, the enthusiastic response has enabled it to appear four times a year, averaging about 28 pages per issue. In the second issue, the editors wrote:

From the response we have had, there is a considerable demand for publication and the editors are aware from their own experience how difficult it can be to obtain publication, irrespective of their quality, for papers whose interpretations do not fit current orthodoxy, or, for example, do not excise data which might be construed by editors or referees as a challenge to orthodox theory on the basis that if the data does not fit the theory, it must be wrong.

The main driving force behind the newsletter for most of its existence was the chief editor, J. Mac Dickins, former senior paleontologist at the Australian Bureau of Mineral Resources, who passed away in June 2005. Dong R. Choi, a geological consultant, has now assumed the role of editor-in-chief, and an editorial board was recently formed. The newsletter is financed by subscriptions (US$30 a year for individuals and US$50 a year for libraries) and voluntary donations. It is produced in Higgins, Australia (NCGT Group, 6 Mann Place, Higgins, ACT 2615, Australia; ncgt@hotmail.com), and is distributed either by mail or, increasingly, by e-mail (as a pdf file), to more than 200 individuals, libraries, and organizations in over 30 countries. The mailing list is expanding rapidly, particularly since the newsletter started to appear in pdf format.

The NCGT Group has so far organized three international symposia. The first was held in Tsukuba, Japan, on November 22–23, 1998. It was attended by 54 Japanese scientists and 22 scientists from the USA, Australia, Canada, India, China, Korea, Greece, Russia, Mongolia, and Romania. Papers from the symposium were published in a special issue of *Himalayan Geology* (vol. 22, no. 1, 2001). The second symposium was held at La Junta, Colorado, USA, on May 5–11, 2002 (see Maslov, 2002).

The third symposium comprised a meeting on August 25, 2004, as part of the 32nd IGC in Florence, Italy, followed by a meeting on August 29–31, 2004, at

the University of Urbino, attended by **37** scientists from 14 countries. These two meetings marked the first official recognition of the NCGT Group by international authorities (IGC). The proceedings appeared in a special issue of *Bollettino della Societa Geologica Italiana* in late 2005. The next symposium is scheduled for the 33rd IGC in Oslo, Norway, in 2008.

Critics of plate tectonics have organized many conferences and symposia over the years, but previous attempts to organize a group and publish a newsletter did not meet with lasting success. By contrast, the NCGT Group will celebrate its tenth anniversary in 2006, and its newsletter is now well established internationally. Discussions are currently being held on the creation of more formal organizational structures, including the group's legal registration.

Newsletter: Diversity and Debate

The NCGT Group and Newsletter represent a very wide range of views. While some contributors to the newsletter are only mildly critical of plate tectonics, many entirely reject its key tenets of seafloor spreading, subduction, and continental drift, while earth expansionists accept seafloor spreading but reject drift and most (though not all) reject subduction.

Geological and geophysical data are generally open to interpretation and can often be explained in different ways. The newsletter's editors have highlighted the key importance of field geology:

> We believe that workers in the geological sciences have to set themselves consciously to develop the broadest possible knowledge of the actual physical geology of the earth and its time relationships. There is elitism from physics and mathematics but in the end, the place where theory must be tested, the actual experimental laboratory for testing theory in the earth sciences, is the real earth. (#6)

The editors send submitted manuscripts to one or two reviewers among the group's readers, before deciding whether to accept them. The basic aim is to allow both formal and informal contributions, in a spirit of free and open communication, and to publicize a wide variety of opinions, provided they are backed up with data. In the course of time, the editors have become more selective with regard to the articles they publish.

A major dispute among earth scientists concerns the age, composition, and structure of the seafloor. Plate tectonicists contend that ocean crust is continuously being created at "spreading ridges" and consumed in "subduction zones," and can be no more than about 200 million years old. They have established a chronology for the formation of the oceans by correlating the alternating bands of high and low magnetic intensity found in rocks on either side of ocean ridges with dated magnetic-reversal events recorded on land.

Earth expansionists tend to accept this chronology and the relative youth of ocean crust. Many of them believe that in the Early Mesozoic there were no oceans at all, that the Pangea supercontinent covered the entire surface of a smaller earth with about 55% of its current radius, and that the oceans have

formed since then by seafloor spreading, caused by the earth expanding in a very specific, asymmetric manner.

Critics argue that the magnetic-stripe chronology is suspect because it is based on subjective, qualitative correlations, and has not been ground-truthed by radiometric dating, and that the stripe pattern is better explained by fault-related bands of rocks of different magnetic properties. They stress the need to drill all the way through the ocean crust and into the mantle before reaching definitive conclusions on the age and composition of the seafloor. The newsletter has presented a great deal of evidence from ocean drilling, dredging, and seismic research suggesting that ocean crust can be just as old as continental crust and that large areas of it consist of continental-type rocks and were once dry land. There have been some very lively exchanges on this subject.

Some workers contend that the earth as a whole is contracting slightly, rather than expanding, but that there is evidence of phases of slight expansion in the past. They also propose that continental, oceanic, and back-arc rifts can be readily explained in terms of tensional relief in a compressional stress field.

The classical plate-tectonic model of thin, rigid lithospheric "plates" moving over a relatively plastic, low-velocity asthenosphere is now known to be flawed. Seismic studies reveal that the asthenosphere is not a continuous, global layer, and that ancient continental cratons have deep roots or keels extending to depths of up to 300 km or more, with no low-velocity layer beneath them. Furthermore, some plate boundaries appear to be nonexistent.

The extent to which space-geodetic measurements have confirmed the plate-tectonic model of plate movements has been questioned by several contributors, who highlight the ad-hoc fashion in which contradictory and inconsistent data are explained away, and contend that the present network of sites is not extensive enough to determine to what extent the crustal movements detected are local, regional, continent- or ocean-wide, or "plate"-wide.

Paleomagnetic data have served as one of the main supports of plate tectonics and also of earth expansion. The data appear to show that either the geographic poles and/or the continents have changed position over the course of the earth's history. Plate tectonicists argue that it is mainly the continents that have wandered, by being carried along on moving lithospheric plates. Earth expansionists, on the other hand, argue that continents' apparent drift is caused by earth expansion.

Plate tectonicists believe that, in addition to continental drift, a small amount of true polar wander may have taken place; this involves the earth's entire outer shell gliding over the inner shell, thereby altering the location of the geographic poles to a greater or lesser extent. Wrench tectonics, on the other hand, asserts that paleomagnetic data can be explained in terms of large-scale polar wander without any drift, but with in-situ continental rotations. Opponents of mobilism in its various guises argue that entire continents can neither drift nor rotate, and emphasize the unreliability of paleomagnetic data and the dubious assumptions about geomagnetism on which the interpretation of such data is based.

Many articles in the newsletter have presented detailed geological and geo-

physical evidence against the twin doctrines of seafloor spreading and subduction. The volume of crust generated at ocean ridges is supposed to be equaled by the volume subducted, yet the total length of ocean trenches and "collision zones" is only about a third of the length of the "spreading ridges." Sediments in the trenches are generally not present in the enormous volumes that subduction was expected to produce, and are typically undisturbed and horizontally bedded.

The notion that the inclined seismofocal plane, or Wadati-Benioff zone, landward of deep ocean troughs, represents a "subducting slab" is further undermined by the very low level of seismicity within about 50 km of the trench axis, and the fact that the angle of dip of the seismofocal plane tends to change from low in the upper section, to steep in the intermediate to deep section, to gentle at the bottom, with relatively little seismic activity between the former two (around 300-km depth). Seismic profiles appear to show that the Precambrian lower crust is present under both the ocean floor and continental slope and passes across the trench without any subduction. An alternative view of Wadati-Benioff zones is that they originated as cooling cracks in the primeval earth, and are thrust/reverse faults marking the interface between the uplifting island arc/continental region and the subsiding ocean crust and mantle.

In trying to show how the present continents used to fit neatly together to form supercontinents, drifters have taken many liberties, and all reconstructions have problems. They fit the continents along different depth contours, ignore serious overlaps and geological dissimilarities, include or exclude ocean plateaus and ridges on an ad-hoc basis, and entirely ignore the existence of former landmasses in the present oceans. Earth expansionists, too, place great emphasis on continental reconstructions, and argue that all the present continents fit together much better on a smaller earth. Further investigation of the ocean crust will provide a definitive answer as to whether continental reassemblies based on plate tectonics or expansion tectonics are genuine possibilities or illusions.

A great deal of evidence has been presented in the newsletter to show that the entire earth is covered with a system of lineaments or major structural trends, which formed early in the earth's history but have been subsequently rejuvenated and modified. These fractures have had a significant influence on tectonic events up to the present. Deep earthquakes have been shown to be associated with surface and crustal structures that continue deep into the mantle. Plate tectonicists tend to ignore the pattern of orthogonal lineaments in the oceans. These lineaments appear to date back to the Precambrian and some continue into adjacent continents—contradicting seafloor spreading and large-scale continental drift.

Most plate tectonicists believe that chains of volcanic islands and seamounts are the result of plates moving over "hotspots" of upwelling magma. This should give rise to a systematic age progression along hotspot trails, but a large majority show little or no age progression. Hotspots are commonly attributed to "mantle plumes" rising from the core-mantle boundary. But critics, some of whom are otherwise sympathetic to plate tectonics, have shown that plume

explanations are ad hoc, artificial, and inadequate, and that plumes are not required by any geological evidence. Some opponents of plate tectonics invoke equally controversial "superplumes" to explain the elevation/subsidence of large areas of the ocean floor.

Another important theme in the newsletter is that the earth's relief has been increasing since the mid-Cretaceous: plateaus and mountains are growing higher, and oceans deeper. This is inexplicable in terms of simple plate tectonics. Drilling and dredging data and the location of former sediment sources indicate that substantial areas of the present oceans were once land or shallow sea. The foundering of many of these areas began in the Late Jurassic, accompanied by widespread basalt eruptions or magma floods, leading to the formation of the deep oceans we know today.

The evolution of the earth's crust has been characterized by considerable uplifts and subsidences of up to 10 km or more—as seen in mountain building, epeirogenic movements connected with marine transgressions and regressions on the present continents, the formation of deep sedimentary basins, the deepening of the oceans, and the submergence of paleolands. To explain such phenomena, geologists commonly invoke the vertical and/or horizontal movement of hot magma through faults and channels, and associated density and phase changes, and some workers also invoke the basification/oceanization of continental crust. Surge tectonics emphasizes the abundant evidence for the existence of shallow magma chambers and channels beneath all active tectonic belts.

Several examples of geological authorities suppressing information unfavorable to plate tectonics have been detailed in the newsletter. For instance, Vladim Anfiloff reported on the suppression by the Australian Geological Survey Organization and the Australian National University of information from a gravity survey of the Australian continent, which showed a bifurcating network of basement ridges (#1, 1996). James Murdock, who accepts key elements of plate tectonics, turned to the NCGT Newsletter after failing to find a mainstream publication willing to publish an article highlighting seismic studies by the former US Coast and Geodetic Survey—which showed an absence of earthquakes at the base of the Aleutian Trench—and challenging the official subduction model (#4, 1997). Chris Smoot has documented how mainstream journals have refused to publish articles presenting US Navy bathymetry data pointing to a network of orthogonal megatrends, or "leaky fracture zones," in the oceans (#8, 1998). The newsletter's editors have remarked that nowhere in the history of geology has such a deliberate suppression of factual information taken place. There are plans to tabulate more cases of censorship and suppression by mainstream journals and organizations.

Conclusion

Since its formation in 1996, the New Concepts in Global Tectonics Group and its newsletter have become the main focus of organized opposition to the reigning

paradigm of plate tectonics. The NCGT Newsletter provides a vital forum where critics and opponents of plate tectonics can present and discuss anomalous data and alternative interpretations and theories. The group is now firmly established, and its activities will remain necessary until it once again becomes possible for a variety of competing hypotheses and theories, and the data underpinning them, to be openly aired and debated in mainstream publications.

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