

And in the beginning

Stephen Moorbath

Geological Evolution of the Earth during the Precambrian.

By Lazarus J. Salop. Translated by V.P. Grudina.

Springer-Verlag: 1983. Pp.459. DM148, \$65.80.

AN INFLUENTIAL sector of the Soviet geological establishment has always rejected the concepts of, and evidence for, sea-floor spreading, continental drift and plate tectonics. The result is that modern views in the USSR concerning the geological evolution of continents, oceans, crust and mantle, follow on closely from the days immediately preceding the great revolution in global tectonics of the early 1960s which so heavily influenced most of the rest of the geological world (including, I suspect, many younger workers in the USSR).

Exactly the same situation prevails in the book under review. It reads almost as if most of the great advances of recent years in geophysics, geochemistry, geochronology, isotope geology, petrogenesis — not to mention field geology — which have so shaped our thinking about Precambrian evolution, had never actually happened. What limited reference there is to what most workers would regard as essential modern background work is mostly either misunderstood or discredited.

Here we still find classical geosynclinal theory in full flower; division of Earth history into numerous cycles, megacycles, orogenies of different "orders", all with impressively exotic names; preservation of the major ocean basins, floored by ancient, subsided, continental crust mainly composed of granulite gneisses, right through from Precambrian times; ubiquitous granitization of supracrustal rocks on every continent during the Katarchaean (c. 4,050–3,750 Myr) leading to a world-wide, primordial granulite crust; production of gneiss domes by astrobleme impacts; and so on. Palaeomagnetic evidence is taken to support polar wandering, whilst the overall tectonic evolution of the continents is explained by a pulsation hypothesis — alternate periods of expansion and compression within the Earth being seen against a background of relatively small but increasing expansion of the planet, reaching its maximum value at the end of the Phanerozoic.

In the well-studied area of early Precambrian rocks in West Greenland, which I happen to know well, the author invents a "Godthaabian orogeny", dated at 4,060–4,000 Myr and divided into Slyudyankan, Sutamian, Fedorovian, Ungran and Iyengran sub-units. In truth, the oldest rocks mapped in the field in this area are the Isua supracrustals, dated at close on 3,800 Myr, which carry no isotopic imprint whatever

of significantly older crustal residence.

And so I could go on. Much of what is postulated in this curious, scholarly, perverse, obstinate text deserves to apply to some planet or other. But does it apply to *this* one? I think not! Nonetheless, the book abounds in detailed, useful descriptions of many areas of Precambrian rocks from all continents, accompanied by sketch maps and (in my view) highly speculative, world-wide correlation diagrams.

I shall occasionally take my review copy off one of my more inaccessible bookshelves to drool over the many mouth-watering descriptions and maps of Precambrian rock formations of the USSR. My hope will be that sooner rather than later the acceptance of modern techniques, data and concepts will lead to a more realistic appraisal of these rocks, and of the Precambrian as a whole. □

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Demand for power

Jerrold H. Krenz

World Energy Supply: Resources. Technologies. Perspectives.

By Manfred Grathwohl.
Walter de Gruyter: 1982. Pp.450.
DM120, \$54.

BEFORE 1973, the year of the Arab oil embargo, energy supplies were generally seen as being virtually unlimited. The idea that consumption in the industrialized nations could continue to increase well into the twenty-first century coloured all projections of energy usage. Yet not only are fuel resources finite but it appears that new technologies are unlikely to produce gluts of low-cost energy supplies. Realistic appraisals of resources and technological limitations are necessary if we are to form a credible image of the future.

In *World Energy Supplies*, Manfred Grathwohl provides this much-needed appraisal. His coverage is thorough and detailed — the book is intended for the serious reader. The collection of references alone (a total of 784) should be of particular interest to the many students of energy.

The text is divided into four main parts, the first of which deals with population, energy consumption and economic activity. In addition to world data, regional and national comparisons are included along with projections of future demand based primarily on a study by the World Energy Conference (1978). Projections of demand were revised downward very substantially during the 1970s; as Grathwohl puts it "energy conservation potentials have been repeatedly underestimated".

A discussion of energy reserves, primarily fossil and uranium fuels, and

solar insolation follows. The coverage here is extremely useful in establishing a geographical perspective of reserves and their relationship to consuming regions.

The third part provides a lucid description of energy conversion technologies for producing "secondary energy carriers", again on a global basis. Both water-cooled and advanced nuclear reactors are discussed, fusion reactions and experiments are described, thermal and photovoltaic solar collectors are appraised, and indirect solar energy systems are covered.

The next chapter, "Environmental Impacts and Safety Problems", is considerably more detailed than similar accounts found in most energy texts. All too frequently these aspects are considered to be of peripheral importance only. Grathwohl affords such constraints — the build-up of atmospheric carbon dioxide, for example — the attention they deserve; while difficult to ascertain, environmental limitations may prove to be more important than resource limitations. The treatment of the entire fission fuel-cycle, accident possibilities and the diversion of fissionable materials for weapons is particularly well done. Proposed disposal schemes for high-level wastes are also discussed, the author recognizing that waste disposal will require a much greater effort than at present. Unfortunately, he offers no suggestions on how to get things moving — that there may be "no recognizable technical or scientific reasons why it [permanent storage] should not be practical" is a worn phrase. It is time to initiate an effort commensurate with the seriousness of the problem.

As Grathwohl repeatedly stresses, the adequacy of energy supplies, especially given the long lead-time necessary for new technologies, depends on future demand. But demand is poorly understood. We lack a body of literature from which to prepare a treatment of energy utilization as extensive as that which Grathwohl offers on energy supplies. Basic research and the accumulation of data on energy usage has hardly begun. Does the myth of unlimited resources still cloud our perception? Would a serious attempt to understand better energy usage be tantamount to acknowledging that our resources are limited and thus constitute too great a threat to one of our cherished myths? While *World Energy Supply* does not quite answer these questions, it does provide a valuable overview of energy problems; for that Grathwohl is to be thanked. □

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● The German edition of *World Energy Supply: Resources. Technologies. Perspectives*. Vol 2 by M. Grathwohl has just been published by Walter de Gruyter; price DM136.