others were discussed. The dramatic increases seen in many countries in postage costs in recent years was not discussed, nor was the increased trend toward differential postage rates. Any Canadian who subscribes to a US journal is well aware of the postage surcharges that are now common, and which are sometimes as high as or higher than the cost of the journal. Until such information is known, the true culprits behind these price increases might not be fully known, and it could be that the commercial publishers may not be the beasts they are sometimes portrayed to be.

In the end, many of the problems discussed at the meeting relate to how scientists are taught about the editorial and publication process. Currently, there is no formal training in the process. In graduate school, hopefully, students will learn how to write during the course of completing their theses. However, how good or bad they will be as future authors depends on how good or bad their advisor and committee are. As to learning about the peer review process, it is simply a matter of trial and error. Most readers will probably remember receiving their first detailed manuscript review. With luck, they will have a reviewer or a colleague on hand who can explain to them the nature of the comments and why they were made, and remind them that the ultimate goal of the exercise is to improve the published manuscript and ensure that the scientific methodology, the data, and the conclusions are sound. If not, they may give up in frustration.

Many of the problems discussed at the meeting, as outlined above, could be addressed through education. If scientists were able to take a course before graduation that at least outlined the rudiments of the peer-review process, the role and responsibilities of editors, reviewers, and authors, and the basic elements of a scientific paper, it would make the editor's task much simpler. Whether or not this is something that should be done at the graduate level, or perhaps at the senior undergraduate level, is open to question, but as competition for research funds increases and the need to "publish or perish" grows, the need for such instruction becomes even more acute.

A number of activities were associated with the meeting, some of a tourist nature (boat tour of the Ottawa River), others of more business nature (tour of CISTI), and a field trip (half-day AESE field trip around the Ottawa area).

There was no abstract volume published for the meeting, nor is there any plan to publish any of the proceedings of the meeting. After all, what editor would want the unenviable task of editing another editor's work?

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Digging for the Past Beneath the Stones of Zimbabwe: A Field Meeting on the Archean - Proterozoic Transition

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A field meeting (APT-89) on the Archean-Proterozoic transition (APT) was held in Zimbabwe, September 11-22, 1989, as part of International Geological Correlation Program (IGCP) project # 217. The meeting was convened by Jan Kramers (University of Zimbabwe) on behalf of the Geological Society of Zimbabwe, and was organized around two field excursions to the Archean Zimbabwe Craton and adjacent mobile belts. As most readers are probably unfamiliar with African geology, this report incorporates a brief geological overview and a summary map (Figure 1).

The Precambrian Geological Framework of Zimbabwe

The Zimbabwe Craton.
This classic low-grade granite-greenstone complex ranges in age from >3500 Ma to *ca.* 2600 Ma (Wilson, 1981). Ultramafic to mafic metavolcanic (*i.e.*, greenstone) belts are divided into Sebakwian (≥ 3500 Ma), Bulawayan (2900-2700 Ma) and Shamvaian (≤2700 Ma) Groups, of which the Bulawayan is most extensive. The surrounding granitoid rocks and gneisses mostly represent sodic plutonism associated with the Sebakwian and Bulawayan cycles. Late potassic granites were emplaced *ca.* 2600-2500 Ma ago.

Voluminous greenstone-belt formation in Zimbabwe, *ca.* 2900 Ma ago, was contemporaneous with deposition of the oldest known cratonic cover sequence, the Pongola Group of the nearby Kaapvaal Craton in South Africa. "Cratonization" at the end of the Archean was diachronous within southern Africa, and is also diachronous on a world-wide scale.

The Limpopo Mobile Belt.
The Zimbabwe Craton is flanked to the south by the Limpopo Mobile Belt, an Archean crustal segment with very unusual characteristics. The belt evolved contemporaneously with the granite-greenstone complex of the Zimbabwe Craton, but has a closer resemblance to the curvilinear mobile belts typical of Proterozoic and Phanerozoic provinces. In contrast to other Archean high-grade regions (*e.g.*, Labrador), the belt contains abundant metasedimentary rocks of "miogeoclinal" affinity, and numerous low-angle thrust zones (*e.g.*, Barton, 1983). Some of these features are also shown by the English River and Quetico belts of the Superior Province in Canada.

The ENE-trending Northern Marginal Zone (NMZ) consists of granulites that are probably high-grade equivalents of the rocks of the Zimbabwe Craton. A very similar zone in South Africa, adjacent to the Kaapvaal Craton, is termed the Southern Marginal Zone (SMZ). The enigmatic Central Zone (CZ) has N-S structural trends, and is dominated by granulite-facies pelites, quartzites and carbonates, with remnants of *ca.* 3800 Ma basement gneisses. Both components were intruded by layered mafic to anorthositic plutons *ca.* 3200 Ma ago. High-grade metamorphism throughout the belt *ca.* 2900-2700 Ma ago has obscured many details of its long and undoubtedly complex early evolution.

Major ductile shear zones are important features of the belt (*e.g.*, Coward, 1980; McCourt and Vearncombe, 1987). The boundary between the NMZ and the Zimbabwe Craton is defined by gently south-dipping thrust zones that exhume granulite facies rocks. The NMZ and CZ are separated by the Tuli-Sabi shear zone (termed Triangle shear zone in Zimbabwe), a 20 km-wide mylonitic belt with a predominantly dextral sense of movement. The attitude of this structure changes from near-vertical in Botswana to gently south-dipping in Zimbabwe. The CZ and SMZ are separated by the Palala shear zone in South Africa, which has a sinistral sense of motion. Both are long-lived structures that were also reactivated during the Proterozoic; sense-of-motion inferences may thus reflect only the latest episodes of movement. Barton (1983) notes that evidence for dextral, sinistral, normal and reverse motions can often be observed at a single locality.

Tectonic models for the Limpopo Belt resemble those developed for the Grenville Province in North America, and there are many parallels between these two belts, as noted previously by Condie (1976) and Windley (1984), amongst others. Models include a periodically squeezed and sheared aulacogen within a Zimbabwe-Kaapvaal proto-craton (Barton and Key, 1981), a deeply eroded magmatic arc and back-arc basin complex (Fripp, 1982; model discussed by Barton, 1983) and a Himalayan-type collision zone (Light, 1982).

Although loose Grenville-Limpopo parallels have been drawn for 15 years or more, the time may now be opportune for a more detailed comparative analysis. Increased understanding of the evolution of the Grenville Province (*e.g.*, Rivers *et al.*, 1989), and the availability of deep seismic-reflection data from both belts (see below), provide an interesting framework for future collaboration between interested geoscientists in Canada and Africa.

The Great Dyke of Zimbabwe.

The 2460 Ma old Great Dyke of Zimbabwe (*e.g.*, Wilson *et al.*, 1987) is one of the seven geological wonders of the world. The "dyke" actually consists of four, layered mafic-ultramafic intrusions, with an aggregate length of 500 km. The upper levels have a synclinal or lopolithic structure; a truly dyke-like feeder zone probably exists only at depth. The Great Dyke contains enormous reserves of Cr and platinum-group metals. Similar, but somewhat smaller, linear intrusions were emplaced in the Yilgarn Craton of Australia at around the same time. We were surprised that the Great Dyke and its relatives, which are unusual features of the earliest Proterozoic crust, received little attention at APT-89.

The Magondi Mobile Belt.

The Zimbabwe Craton is bounded to the west by the Early Proterozoic (2000-1800 Ma) Magondi Mobile Belt (*e.g.*, Treloar, 1988). A basal red-bed and basalt assemblage (Deweras Group) is overlain by quartzites and carbonates (Lomagundi Group), that are overlain by (or are laterally equivalent to) a greywacke-shale-tuff sequence in the west (Piriwiri Group). At about 1850 Ma, these sequences were thrust southeastward toward the Zimbabwe Craton. The geometry of the Magondi belt foreland zone resembles that of Phanerozoic thin-skinned fold and thrust belts. The western part of the Magondi Belt exposes probable basement gneisses (locally granulitic), granitoid rocks and high-grade equivalents of the Piriwiri Group.

The Zambezi and Moçambique Mobile Belts.

The Zimbabwe Craton is bounded to the north and east by the Pan-African (700-500 Ma) Zambezi (Broderick, 1981) and Moçambique (Stocklmeyer, 1981) Mobile Belts. The Zambezi Belt includes *ca.* 800 Ma old pelitic and psammitic rocks, and probably also

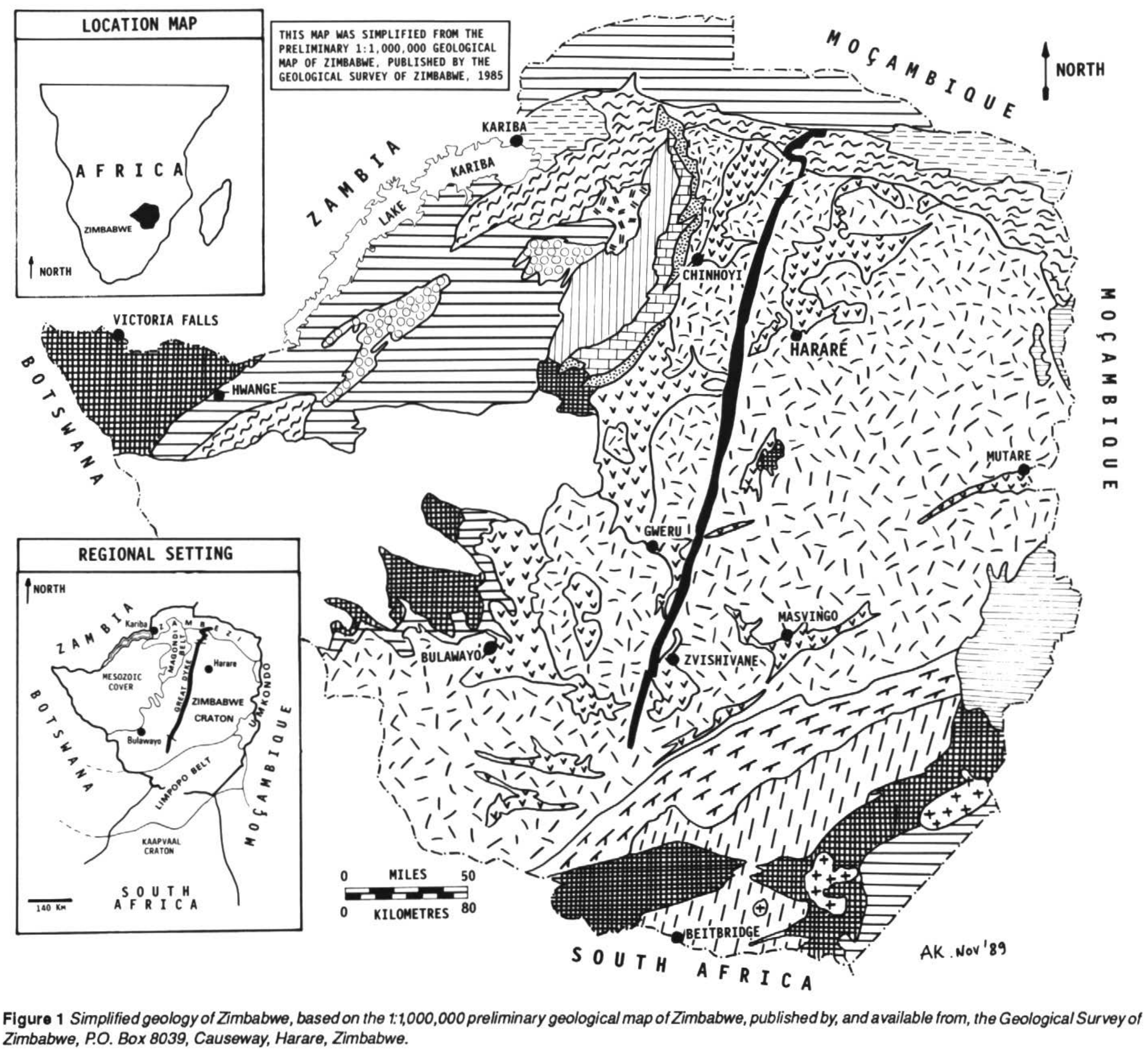

Figure 1 *Simplified geology of Zimbabwe, based on the 1:1,000,000 preliminary geological map of Zimbabwe, published by, and available from, the Geological Survey of Zimbabwe, P.O. Box 8039, Causeway, Harare, Zimbabwe.*

reworked equivalents of the Magondi Belt and earlier basement rocks. Pelites and quartzites in the verdant mountains of easternmost Zimbabwe appear to have been thrust westward toward the Archean craton.

Highlights of Technical Sessions

Technical sessions were organized in a loosely chronological framework, starting with Archean tectonics. Rob Ellam and coworkers (Milton Keynes, UK) presented geochemical evidence suggesting that Archean crust-generation processes may have differed from those of modern arc environments. However, Julian Vearncombe and coworkers (Nedlands, Australia) stressed variability amongst greenstone belts. They suggested that many models for Archean tectonics are overly simplistic, and that Archean cratons may be collages including a variety of tectonic environments that resemble those of today. Mark Tsomondo (Kwekwe, Zimbabwe) focussed on the well-known Selukwe greenstone belt, and questioned both the age and regional significance of "nappe" structures that are commonly cited as evidence of Early Archean horizontal tectonic regimes.

Discussion moved to analysis of sedimentary sequences that span the APT, with particular reference to the Transvaal Supergroup of South Africa. Mike Duane and Craig Smith (Johannesburg) presented an inverted Nd model age "stratigraphy" that records the unroofing of progressively older crust. Kent Condie and D.J. Wronkiewicz (Soccoro, New Mexico) suggested that changes in La/Yb, Th/U and Eu/Eu* ratios at the APT may reflect contrasting *sedimentary environments*, rather than changes in bulk crustal composition. The Cr/Th ratio was suggested as a better indicator of "cratonization" at the APT, as changes occur in pelites of all sedimentary associations. Kent's objections to unconstrained comparisons were illustrated (appropriately) by slides of apples and oranges!

Two Canadian contributions were also of a comparative nature. Werner Weber (Winnipeg) discussed the Archean of the northwestern Superior Province, and compared it to parts of the Proterozoic Trans-Hudson Orogen, for which plate-tectonic models are now well-established. Andy Kerr (St. John's) and Ingo Ermanovics (Ottawa) compared late-orogenic granitoid rocks from adjacent Archean and Proterozoic domains in Labrador, that suggest a shift from simple two-stage to complex multistage crust-generation processes. H.R. Tomschi (Shamva, Zimbabwe), and M.L. Vinyu and Jan Kramers (Harare) reviewed the geochemistry, geochronology and metallogeny of Late Archean granites that record the final stabilization of the Zimbabwe Craton.

A lively and well-presented session devoted to the Limpopo belt was opened by Hugh Rollinson (Cheltenham, UK), who suggested that the Limpopo belt consists of a collage of "exotic" terranes accreted during the Late Archean. This new and novel interpretation generated lively and constructive discussion from those with diametrically opposed views; it is inherently difficult to test, but certainly cannot be dismissed. Dirk van Reenan and co-workers (Johannesburg) discussed a deep seismic reflection, geo-electrical and gravity traverse conducted across the Limpopo belt. This suggests symmetrical outward transport from the CZ onto both Zimbabwe and Kaapvaal Cratons. Greenstone belt remnants in the NMZ and SMZ are rootless, suggesting that they may have been sliced off by major thrusts. Such observations lend support to models that invoke collisional orogenesis in the Limpopo Belt.

The session concluded with an eloquent synopsis by Steve McCourt (Pretoria), who presented an integrated model to explain the geometry, movement sense and probable age of large-scale ductile shear zones in the belt. This model suggests that the shear zones bounding the CZ to north and south are part of a single, concave-upward structure, and that the CZ was actually transported *westward* along the axis of the belt.

Discussion then moved to Early Proterozoic terranes. Hubert Munyanyiwa and Kosmos Chenjerai (Harare) reviewed the Magondi Belt and adjacent Pan-African Zambezi Belt, with emphasis on metamorphic patterns and evidence for reworking of older crust. Sharad Master (Johannesburg) presented a detailed structural analysis of part of the Magondi Belt foreland zone, comparing its complex geometry to the Laramide thrust belt of the Rockies. Sharad courageously put his field evidence on the block during the post-meeting field trip.

Overview of Field Excursions

For most delegates, the main attractions of APT-89 were the field excursions. These attempted to cover the entire Precambrian geology of Zimbabwe — a worthy, but impos-

CENOZOIC and RECENT

Aeolian sands (KALAHARI BASIN)

MESOZOIC

Alkaline granites

Karoo Supergroup

Flood basalts, minor rhyolites

Sandstones, shales and coal measures

LATE PROTEROZOIC

Sijarira Group; sandstones and conglomerates

MIDDLE PROTEROZOIC

ZAMBEZI MOBILE BELT

Makuti and Rushinga Groups; pelitic metasediments and amphibolites

Undivided gneisses and granitoid rocks (may include reworked older material)

MOZAMBIQUE MOBILE BELT

Umkondo Group; quartzites, limestones, shales and metamorphic equivalents

EARLY PROTEROZOIC

MAGONDI MOBILE BELT

Granitoid rocks

Piriwiri Group; pelitic metasediments, and high-grade equivalents in the west

Lomagundi Group; dolomites, quartzites and shales

Deweras Group; arkoses and mafic volcanics

GREAT DYKE OF ZIMBABWE

Dunites, pyroxenites and gabbroic rocks

ARCHEAN

LIMPOPO MOBILE BELT

Northern Marginal Zone (NMZ) ; granulite facies orthogneisses and supracrustal rocks, probably reworked equivalents of the Zimbabwe Craton

Central Zone (CZ) ; granulite facies quartzites, psammites, marbles and iron formation, cut by mafic intrusions and anorthosites

ZIMBABWE CRATON

Greenstone Belts ; ultramafic and mafic volcanic rocks, with lesser intermediate to felsic volcanic rocks and metasedimentary rocks

Granite and gneiss terranes ; predominantly sodic granodiorites and tonalites, with some late potash-rich granites sible, objective. However, it was the authors' first encounter with African geology, so we were grateful for the broad focus, and also for general interest stops, such as the fascinating stone ruins of the ancient Shona-Karanga city at Great Zimbabwe, near Masvingo, and the dolomite caves at Chinhoyi in the Magondi Mobile Belt foreland zone. Fruitful *in situ* discussions and arguments made it increasingly difficult for Jan Kramers to keep the bus on schedule.

Much of Zimbabwe consists of rolling savanna punctuated by rugged iron-formation ridges, and decorated by a seemingly endless variety of extravagantly coloured flowering trees and bougainvillea blossoms. Areas underlain by granites suffer deep weathering of joint planes, creating huge piles of subangular blocks ("castle kopjes") that are eerily reminiscent of glacial erratics in more northern climes. To those of us raised on the rigours of northern Manitoba or the Labrador coast, this perpetually sunny field environment at first seemed a veritable paradise. However, we soon discovered that the majority of the vegetation is armed with two-inch (variably barbed) spines, and were informed that many outcrops are inhabited by black mambas, pythons and other hostile species. Tranquil rivers that glittered innocently beneath the African sun host both crocodiles and the invisible danger of bilharzia, and are strictly off-limits. Snake and crocodile stories were related by African geologists with the same gusto and relish that Canadian geologists apply to their encounters with bears in the field!

The pre-meeting field trip commenced with an examination of a typical greenstone sequence (Belingwe belt) based from the comfortably dilapidated Nilton Hotel in Zvishivane. The unconformity at the base of the Bulawayan sequence near here is protected by national monument status — in view of the careless scientific vandalism that has ruined so many classic localities, we applaud this approach. The underlying tonalites provide evidence for pre-Bulawayan sialic basement material, and one of the world's oldest regoliths is preserved; above the unconformity, pebble conglomerates give way to ferruginous sediments of the Manjeri Formation and komatiitic volcanic rocks of the overlying Reliance Formation. Spinifex-textured komatiites displaying complex folding were discussed at length; some were adamant that this was a "soft-spinifex" (*i.e.*, within-flow) plastic deformation, whereas other participants claimed to see axial planar cleavages indicative of penetrative deformation. The overlying Zeederbergs Formation consists of over 2.5 km of dominantly tholeiitic pillow basalts. The top of the sequence is formed by the sedimentary Cheshire Formation, which includes stromatolitic carbonates.

We were impressed by the great number and variety of mining operations in Zimbabwean greenstone belts, which produce iron ore, chrome, asbestos, gold, copper, nickel and magnesite. Metallogenically, Zimbabwean greenstone belts differ from their Canadian counterparts in that they lack significant volcanogenic massive sulphide deposits. The reasons for this contrast are unclear, as the lithology and environment of these sequences appear closely similar to those of the Superior Province.

Mining in Zimbabwe stretches back to at least 12,000 B.C., when Bushman tribes extracted ochre to create delicate cliff paintings that remain vivid to this day. From the 13th to 15th century A.D., the Shona-Karanga kingdom that built Great Zimbabwe traded gold extensively with Arab explorers. The large number of small-scale, low-tech mining operations (notably for gold and chromite) is partly a function of comparatively low labour costs, but also indicates the profusity of mineralization. Some small-scale producers are operated as co-operative ventures by local villagers, an interesting approach that maximizes both recovery and benefits to the community.

We doubt that anyone missed the Nilton Hotel's unique brand of cuisine when we finally moved southward toward the Limpopo Belt. We progressed from massive Late Archean tonalites into deformed equivalents that have NE-trending foliations parallel to the "Limpopo trend", where we saw small-scale ductile shear zones that are probably also related to the mobile belt. The NMZ of the Limpopo Belt was examined in a traverse along the scenic Ngezi River, which exposes high-grade, mylonitic, tonalitic orthogneisses. Remnants of greenstone-type material are here transformed to amphibolites and mafic granulites. The geology resembles that of high-grade Archean orthogneiss complexes such as those in northern Labrador. The final stop of our traverse was in partly retrogressed enderbites (orthopyroxene-bearing tonalites) at Sarabhuru, which may either represent Limpopo plutonism or a reworked piece of the Zimbabwe Craton. An early foliation in this unit is deformed by numerous dextral shears, which are a ubiquitous feature of the NMZ. Dusty, dehydrated, and slightly confused, we rattled our way southward over dirt roads to the Lion and Elephant Motel near Beitbridge, where we sought revival in numerous "Castle" lagers and the epicurean delights of roast warthog, washed down with Zimbabwean white wine.

The Central Zone of the Limpopo Belt in southern Zimbabwe consists of granulite-facies quartzites, psammites, banded iron formations, and rather nondescript quartzofeldspathic gneisses, poorly exposed on a flat plain covered with impenetrable thorny bush. Most delegates agreed on a sedimentary protolith for the first three rock types, but the usual para- *versus* orthogneiss argument erupted at later stops. However, the CZ gneisses are more aluminous than the typical tonalitic basement of the NMZ, and are commonly garnetiferous. We crossed back into the NMZ across the Triangle shear zone (equivalent to the Tuli-Sabi shear zone in Botswana), some 100 km east of our first transect. The zone is a spectacular ultramylonite up to 20 km wide, that dips gently to the south, but has a strong strike-parallel lineation implying *lateral* transport of the CZ gneisses, as suggested by McCourt and Vearncombe (1987). Kinematic indicators are dextral.

The post-meeting field trip commenced with an examination of the youngest greenstone belts at Shamva, near Harare. These contain a greater proportion of clastic sedimentary rocks and fewer mafic volcanic units than typical Bulawayan sequences. Spectacular polymictic pebble and boulder conglomerates exposed in the Mazowe River contain many granitic clasts, perhaps reflecting uplift and erosion of basement rocks due to Late Archean cratonization. However, some delegates pointed out such conglomerates also occur in terranes as old as 3800 Ma, *e.g.*, the Isua belt of Greenland. At the time of our visit, the river was being energetically panned for gold by the local people. Unofficial mining of this type is technically illegal in Zimbabwe, but is widely practised; it is estimated that several tons of gold make their way onto the black market each year. For the villagers, it is far more lucrative than farm labour at about Can $50 per month, but it commonly results in irreversible damage to water supplies, which are equally precious in the increasingly arid climate of sub-Saharan Africa. This disturbing side-effect of rural poverty is also widespread in other developing countries, as evidenced by events in Brazil.

We also visited the Freida-Rebecca openpit gold mine (Cluff Minerals Ltd.), which is a large-scale, high-tech operation representing the other extreme of Zimbabwean mining. The deposit is associated with shear zones cutting an otherwise barren Late Archean granodiorite, but may not be genetically related to its host. Intense weathering and low labour costs enable grades as low as 0.3 g/T to be mined economically, although the average grade is about 2 g/T.

We then visited the Great Dyke at the chrome-mining centre of Mutorashanga. Here, the upper pyroxenites are silicified and the dyke forms a prominent linear range of barren hills. A spectacular vista of the synclinal structure of the rhythmically layered sequence is provided by the workings of hundreds of small-scale chromite mines, that trace individual ore seams for tens of kilometres. Once considered exhausted, some of these have now been reactivated as local co-operative projects.

From the pleasant town of Chinhoyi, we examined the Proterozoic shelf sequence of the Magondi Mobile Belt in the Mangula mine area, where a stratiform copper deposit is located in arkoses and quartzites of the Deweras Group, along their thrust-modified unconformity with the Zimbabwe Craton. Detailed studies of the Deweras Formation in this area suggest an arid alluvial fan - playa lake environment; the mine sequence includes laminated dolomite-anhydrite beds, suggesting formation of a saline basin. The mineralization is believed to have been localized where circulating chloride-rich basin brines encountered reducing horizons. The overlying Lomagundi Formation is dominated by carbonate rocks, including stromatolitic dolomites. The final day of the field trip covered the high-grade portion of the Magondi Belt, which is locally reminiscent of parts of the Limpopo Belt, and concluded in the Pan-African Zambezi Mobile Belt. Our final night was spent in the heat and humidity of the Zambezi valley, overlooking the inland sea of Lake Kariba.

A Retrospective View

The greatest value of the APT-89 meeting was that it brought geologists studying the Archean into contact with those whose interests lie in the Proterozoic, and gave us all a chance to discuss real *versus* perceptual contrasts. The meeting was mostly an exchange of information gathered during the 1980s, and it will take some time for implications to be fully assessed. Relatively few *comparative* studies of Archean and Proterozoic assemblages were presented in Harare; most lectures were discourses on aspects of Archean or Proterozoic geology, and did not delve into contrasts, or possible underlying causes.

Definition of the APT is itself a problem — should it be a *chronostratigraphic* boundary at, for example, 2500 Ma?, or should it be defined on a more local *lithostratigraphic* basis? Although it is clear that some delegates employed "Archean" and "Proterozoic" as *tectonic* terms, a majority seemed (to us) to favour a strictly chronostratigraphic approach. Sharad Master (Johannesburg) observed that, by using the same labels for time intervals and perceived tectonic styles, we have created a "... semantic minefield in a Precambrian no-man's land", where, for example, Archean sequences are commonly described as having "Proterozoic characteristics". If we are going to place rigid time-based definitions, we need to avoid such contradictions, and rethink our terminology.

There is, without question, a need for more comparative trans-boundary studies of the type which Kent Condie and co-workers have conducted. Preservational biases and the effects of differing tectonic settings, as noted by Kent, remain formidable problems in such exercises. These are particularly acute in studies of granitoid rocks, which are the end-products of complex processes. However, such studies are especially important, as "cratonization" *via* granitoid magmatism is probably the most important development during the Late Archean. It is also important to consider the relative *abundances* of rock types on either side of the APT, in addition to their absolute compositions. Although preservational biases must be important, the dominance of apples in the Archean *versus* oranges in the Proterozoic may be more significant than similarities between Archean and Proterozoic apples.

With regard to the underlying causes of Late Archean cratonization and the APT, contributions from theoretical geophysicists would have been a welcome addition to APT-89. Numerical models such as those developed by Campbell and Jarvis (1984) and, more recently, Gurnis (1988) provide a way of exploring links between secular changes in Earth behaviour (*e.g.*, declining heat production) and tectonic processes. Contrasts in crustal structure between Archean and Proterozoic domains, defined by deep seismic studies (*e.g.*, Drummond and Collins, 1986) would also have been relevant to the meeting theme.

A final comment concerns the importance of geochronological investigations. In Canada, we are especially fortunate to have one of the world's finest U-Pb geochronology facilities in Toronto. Tom Krogh and his co-workers, and other laboratories that employ their high-precision techniques, have revolutionized our understanding of the Laurentian Shield. Such is not the case in southern Africa, where many vital correlations remain based on imprecise Rb-Sr isochron or errorchron ages. Southern Africa is of crucial importance to models of early crustal evolution, and precise U-Pb geochronology seems to us a vital step in eventually resolving the myriad problems of southern African geology discussed at APT-89.

To the best of our knowledge, this was the first meeting devoted to the Archean-Proterozoic transition, but it should not be the last, for the stabilization of the Earth's early continental crust from 3000 to 2500 Ma ago is, without doubt, the most fundamental event preserved in the geological record.

Acknowledgements

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