Siberia-Laurentia connection provides conjugate closure along the entire western margin of Laurentia from the Yukon to Mexico. Neoproterozoic rifting broke the connection, with seafloor spreading established by Early Cambrian. We suggest that transform faults followed northwest-trending segments and ridges followed northeast-trending segments of the rift system (relative to modern North America). With previously proposed restorations of northeast Australia against the southern margin of the Siberia-Laurentia craton and Baltica against northeast Laurentia, a 10,000 km long restored pre-Rodinia Proterozoic supercontinent adjoins some 20,000 km of conjugate rift margins.

188-7 Invited Lu, Songnian

ANCIENT CHINA BLOCKS AND RODINIA SUPERCONTINENT

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Keywords: Ancient China continent; Rodinia; A-subduction; Triple rift

The China continent consists mainly of the Yangtze(YC), Tarim (TC) and North China Cratons (NCC) and peripheral mobile belts, in which the YC and TC occur very strong thermo-tectonic events related to the Rodinia assembly and disperse, and display similar Meso- to Neoproterozoic history and features. However there are no compression and rift activities in the NCC at the same time. The NCC is outstandingly different from the YC and TC in the final cratonization time, the Nanhua to Sinian stratigraphy sequences and tillite markers. Thus we proposed a hypothesis of connection between YC and TC, and speculate that NCC was significantly apart away from YC and TC. In Rodinia, the YC and TC are closely adjacent to Australia, while the NCC may be in neighborhood of the Siberia. Besides the Sibao Orogeny welded both the Yangtze and Cathaysia blocks of South China, an orogenic remnant of the early Neoproterozoic is preserved in the North Qinling Orogeny, which belongs to the north YC at that time. Pre-orogenic stages show a quite similar to the Red See Rift evolution. The process is through the bimodal volcanics and alkaline basalts (1243+/-46Ma), the ophiolite (1084+/-73Ma, only exposed in one place) to E-MORB (973+/-35Ma)development. The closure of the rift during the early Neoproterozoic produced a number of syn-collisional plutons between 950Ma and 900Ma. Few ophiolite and arc volcanics are developed in the orogeny, which demonstrates that the see floor separate may not operate and the orogenic formation is related to A-subduction. It is noteworthy that the rifts of the Nanhua Period are widely preserved in both YC and TC. Among the rift systems, a triple one is recently distinguished from the western and northern margins of the YC. It is made up of the south Qinling rift as the east branch, the Bikou rift as the west one and Kangdian rift as the south one. The triple junction is located in the Hannan area, where voluminous gabbros and granitoid batholith are developed. A lot of SHRIMP and single zircon U-Pb ages are yielded from continental flood basalts(808+/-6Ma), bimodal volcanics (790+/-15Ma), Gabbros (785+/-88Ma), mafic dyke swarms (743+/-12Ma), within plate plutons (717+/-10Ma) and A-type granites (711+/-11Ma). The Hannan triple rift should be related to a hot spot of the mid-Neoproterozoic, which not onlt caused the rifting of the YC margins, but also breakup between the Australia, Tarim-Yangtze and Laurentia in the west Rodinia.

188-8 Oral Ren, Jishun

CHINESE PROTOPLATFORM AND RODINIA SUPERCONTINENT

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Keywords: Chinese Protoplatform; Rodinia Supercontinent; Yangtze cycle

In 1970's, we have pointed out that several small-scale cratons, i.e. Sino-Korea craton, Yangtze craton and Tarim craton converged together and formed the Chinese Protoplatform at the end of Yangtze Cycle (ca. 850Ma) (Ren Jishun et al., 1973; Huang Jiqing et al.,1977). Now, increasing evidences have been found to support this hypothesis. It has been widely agreed that the Yangtze craton connected with Tarim craton and was covered by Sinian - Early Cambrian sedimentary. Whether the Sino-Korea craton coalesced with Yangtze craton is still a matter of debate. But, a lot of tectonomagmatic records around 850Ma in Qinling orogenic belt were reported recently, which provide the evidence to support there was a collision between the Sino-Korea craton and the Yangtze craton. At that time, the northern margin of Yangtze craton was an active continent margin and belong to the obduction plate with intense tectonic stress during the collision, so a lot of records of tectonic thermal activities can be found in the middle Qilan and north Qinling orogenic belt. The southern margin of Sino-Korea craton was a passive continent margin with weak tectonic stress, belong to the subduction plate, and therefore seldom tectonomagmatic records around 850Ma can be found in this area. In our opinion, the Chinese Protoplatform possibly was one part of the Rodinia Supercontinent. Evidences from the Late Proterozoic tillites, Late Proterozoic - Cambrian phosphorferous sediments, fossils and paleomagnetic data support that the Chinese Protoplatform likely neighbored to or connected with the Australia - India paleo continent. The Paleo Asian Ocean separated the Chinese Protoplatform from the Siberia paleo continent.

188-9 Oral Kochhar, Naresh

TRANS-ARAVALLI BLOCK (TAB) OF THE NW INDIAN SHIELD AND SEYCHELLES CONNECTION IN THE LATE PROTEROZOIC : EVIDENCE FROM PLUME RELATED A-TYPE MALANI MAGMATISM

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Keywords: Malani magmatism; Trans-Aravalli block; Indian shield; Seychelles; A-type granites

The Trans - Aravalli Block (TAB) is unique in the evolution of the Indian shield as it marks a major period of anorogenic (A-type), 'Within Plate' high heat producing (HHP) Malani igneous suite of rocks. The Neoproterozoic MIS (55,000 Km2, 732 Ma) comprising peralkaline (Siwana), metaluminous to mildly peralkaline Jalor and peraluminous Tusham and Jhunjhunu granites with cogenetic carapace of acid volcanics (welded tuff, rhyolite, explosion braccia and perlite) are characterized by volcano-plutonic ring structures and radial dykes. The suite is bimodal in nature. The emplacement of MIS is controlled by NE-SW trending lineaments (zones of extension and high heat flow) and owes its origin to hotspot and related tectonics (Kochhar, 2000).Seychelles form an integral part of the Malani supercontinent comprising TAB, Madagascar, Nubian -Arabian shield, Somalia and central Iran (Kochhar, 2001). All these microcontinents are characterized by a common crustal stress pattern, rifting and thermal regime which gave rise to anorogenic alkaline magmatism some 732 Ma B.P. In the paeleomagnetic reconstruction proposed by Torsivc et al., (2001). Seychelles 300N microcontinent and inferred regional correlatives MIS (410N), NW India, Daraina comples, NW Madagascar at marginal positions to what has been called Rodinia supercontinent during the period 725-750 Ma B.P. Further an Andean type-arc setting on the western margin of Rodinia with its product as MIS and magmatism in Seychelles and NE Madagascar has been proposed (Ashwal et al., 2002). Isotopic data from Jalor and Siwana granites (MIS) show close correspondence to Seychelles granitoids especially for Nd, and may represent counterparts of Mahe and Praslin group. In view of the bimodal 'Within Plate', A-type nature of Malani magmatism, its subvolcanic setting indicative of extensional tectonic regime may not represent Andean arc model

188-10 Oral Gibson, George

TESTING RECONSTRUCTIONS OF RODINIA: NEW CONSTRAINTS FROM BASEMENT GEOLOGY OF BROKEN HILL, SOUTH-CENTRAL AUSTRALIA

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Keywords: Rodinia; Broken Hill; Laurentia; geodynamics; core complex

Situated just inboard of the late Neoproterozoic Australian rift margin (Tasman Line), the Broken Hill region occupies a critical position in reconstructions of Rodinia, combining an older basement (Willyama Supergroup) deformed by Paleoproterozoic-Mesoproterozoic events with a subsequent record of crustal extension, dyke intrusion and syn-rift sedimentation commencing around 827 Ma. These events not only constrain the timing and initial direction of late Neoproterozoic continental extension but provide a critical test of competing reconstructions for Rodinia in which south-central Australia is juxtaposed against western Laurentia. Contrary to some reconstructions there is no continuation of 1100-1300 Ma Grenville-age rocks into Broken Hill (SWEAT) and alternative restorations based on juxtaposition of the Broken Hill and Mojave-Oaxaca terranes along the Sonora-Mojave mega-shear (southern USA) result in misalignment of this major palaeo-transform fault with late Neoproterozoic normal faults in south-central Australia. Differences in deformational history and tectonic setting also preclude simple matching of 1.7-1.60 Ga orogenic belts in Australia and Laurentia (AUSWUS). In contrast to the southwest margin of Laurentia which was dominated by plate convergence, terrane assembly and arc magmatism throughout much of the Late Paleoproterozoic (Yavapai and Mazatzal orogenies), the Willyama Supergroup preserves a record of 1.72-1.67 Ga intracontinental rifting and crustal extension (D1) followed by nappe emplacement and crustal thickening after 1640 Ma, culminating in the 1600 Ma Olarian orogeny (D2). Crustal thickening produced a second generation of granulite-grade mineral assemblages in the Willyama Supergroup and was superimposed on rocks initially metamorphosed under low P - high T conditions as a result of D1 crustal thinning and associated bimodal magmatism. The resulting counterclockwise P-T-time path is evident only in the structurally higher parts of the Willyama Supergroup whereas the underlying and once more deeply buried parts of the sequence reveal evidence of decompression and metamorphism under progressively lower pressures as might be expected to occur during emplacement of a metamorphic core complex. A major mylonite zone of D1 age separates upper and lower structural levels. Validation of existing reconstructions for Rodinia requires a greater range of temporally equivalent events be present in western Laurentia than is presently recognised.

188-11 Invited Kampunzu, Ali Basira

AFRICA WITHIN RODINIA SUPERCONTINENT: EVIDENCE FROM THE KIBARAN OROGENIC SYSTEM

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Keywords: Mesoproterozoic; Kibaran belt; Africa; Rodinia

The Mesoproterozoic Kibaran orogenic system of Africa has been ignored in most Rodinia reconstruction scenarios. This orogenic belt extends for >3000 km and is >400 km wide in Africa. It is the result of the convergence of Paleoproterozoic/Archaean cratonic blocks forming the Congo craton to the north and a mosaic including the Kalahari, Bangweulu, Tanzania and West-Nilian cratons (hereafter Kalahari craton) to the south. The orogenic system includes several segments with local names (from north to south): Karagwe-Ankolean, Burundian, Kibaride, Irumide, Choma-Kalomo, Ngamiland, Namaqua-Natal and Lurio belts. These segments define two major groups: (1) provinces affected by a long-lived Mesoproterozic plate convergence between ~1.4-1.0Ga. They host sedimentary basins affected by contractional deformation for the first time during the Mesoproterozoic. The supracrustal sedimentary units are intruded by large batholiths with peak magmatism/deformation at ca. 1.39-1.25 Ga (subduction) and 1.2-1 Ga (continental collision). Geochemical characteristics of 1.39-1.25 Ga mafic rocks suggest an active continental margin, although an ophiolitic complex formed in an oceanic arc has been documented. Strongly peraluminous Sn-Nb-W-REE bearing collisional granites were emplaced at ca. 1-0.96 Ga. (2) Archaean to Paleoproterozoic provinces representing older crust of the converging plates strongly reworked during the 1.1-1 Ga continental collision. Thin-skinned folds-thrusts define the main physiography of this orogen in central-eastern Africa and control the NE-SW structural grain of the belt. The above new geological and geochronological data and interpretations suggest the convergence between the Kalahari craton and a composite Congo-Laurentia craton during the assembly of Rodinia, generating the Kibaran-Grenvillian-Llano belts. IGCP 440 geological and paleomagnetic data will be used to further constrain this interpretation.

188-12 Oral De Waele, Bert

A U-PB SHRIMP GEOCHRONOLOGICAL DATABASE FOR THE IRUMIDE BELT OF ZAMBIA: FROM PALAEOPROTEROZOIC SEDIMENTATION TO LATE MESOPROTEROZOIC MAGMATISM

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Keywords: Irumide belt; Palaeoproterozoic; Mesoproterozoic; Kibaran; Geochronology

Over recent years, a large number of SHRIMP U-Pb ages for various parts of the Irumide belt (IB), and the Bangweulu block (BB) of Zambia, have resulted in a better understanding of the geology of that part of the world. The IB is a region of deformed and metamorphosed rocks to the SE of the undeformed granitoids and volcanics of the BB. The age data indicate a basement to the IB ranging from 1.94 - 1.93 Ga in the NE (Luwalizi granite) to 2.05 - 1.95 Ga in the SW (Mkushi gneiss). A single emplacement age of 2.73 Ga in the SW, suggests the presence of Archean crust, while several ~2.7 Ga xenocrysts in various lithologies of the IB provide indirect evidence of this Archean component.

Concordant rhyolite sills and tuffs within the Muva Supergroup (MS) metasedimentary sequence, which occurs both deformed in the IB and undeformed on the BB, record ages of 1.88 - 1.86 Ga. A detrital provenance study on quartzites of the MS, identified zircons of up to 3.05 Ga in age, a broad peak spanning 2.05 - 1.85 Ga, and a youngest grain at 1.80 Ga. The age of the rhyolites and the detrital provenance pattern together indicate a maximum age of deposition for the MS of ~1.80 Ga. The IB contains a range of granitoid rocks, from highly deformed basement gneisses to syn- and late-tectonic plutons. Pre-Irumide granitoids within the IB, yielded ages of 1.65 - 1.55 Ga. The main syn-tectonic magmatism in the IB, occurred between 1.05 - 0.95 Ga, with peak metamorphism constrained on metamorphic zircon rims at 1.02 - 1.01 Ga. Peak conditions were previously poorly constrained at ca. 1.10 Ga, through the use of partially reset Rb-Sr and K-Ar chronometers.Our new data allow a comparison of the IB with adjacent, broadly coeval terranes. Previously, correlations between the IB and the Choma-Kalomo block (CKB) were proposed on the basis of their structural alignment, and broad similarities in timing of granitoid magmatism. This correlation precluded any significant horizontal movement between the Kalahari and Congo cratons during the Neoproterozoic, and supported an intracratonic model for the Neoproterozoic Zambezi belt. Our data reveal no similarities between the CKB and the IB. Although future re-establishment of a link cannot be ruled out, the two terranes appear to have undergone fundamentally different geological histories. This conclusion has important consequences, because it indicates that the Congo and Kalahari craton may have moved independently prior to the Neoproterozoic.

188-13 Oral Jacobs, Joachim

KALAHARI IN RODINIA: STRUCTURAL, GEOCHRONOLOGICAL AND PALEOMAGNETIC CONSTRAINTS

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Keywords: Rodinia; indentation; zircon; SHRIMP; Kalahari

The Kalahari craton consists of the Paleoproterozoic Zimbabwe-Kaapvaal-Grunehogna craton and a rim of Mesoproterozoic mobile belts, including the high-grade Namaqua-Natal-Maud belt. The larger part of the craton is exposed in southern Africa, a smaller fragment is located in Dronning Maud Land (East Antarctica). Kalahari is covered by undeformed mafic volcanic rocks, the Umkondo Group, that gives paleomagnetic information for the position of Kalahari at c. 1110 Ma. However, paleomagnetic data give no conclusive answer for the position of Kalahari in Rodinia, and allow at least four significantly different positions. In particular, Kalahari could either have opposed eastern Laurentia, or it could have been attached to western Australia. For late Mesoproterozoic times, Proto-Kalahari is interpreted as an indenter, with intense dextral transpressional shearing on the Namaquan side and sinistral transpressional shearing seen in Natal. Besides paleomagnetic data, any reconstruction should take into account the structural and metamorphic history as well as the timing of high-grade metamorphism during indentation of Proto-Kalahari. SHRIMP zircon data from the Maud Belt (East Antarctica) indicate metamorphic zircon overgrowth during high-grade metamorphism between c. 1090 to 1050 Ma. These ages are similar to U-Pb data from numerous areas along a c. 2000 km stretch from Natal to central Dronning Maud Land. The Ottawan cycle of the Grenville Orogen has identical metamorphic ages and could therefore possibly be correlated. Paleomagnetic data show a significant misfit at 1110 Ma between Laurentia and Kalahari, however, the two continents must have collided later (1090-1050 Ma), for which time period no good paleomagnetic data for Kalahari exist. The Maud Belt separates the Grunehogna craton from unmetamorphosed Mesoproterozoic volcanic rocks of the Coats Land nunataka. The Coats Land block must represent the foreland of the Maud Belt and could be correlated with the Laurentian foreland. This reconstruction would require a serious reconsideration of the Rodinia assembly and breakup, and Gondwana assembly. Alternatively, Kalahari could have been attached to western Australia with its Mozambiquan side. Here, the Mesoproterozoic rocks of the Namaqua-Natal-Maud Belt are correlated with the Northhampton Complex, with the problem that the Proto-Kalahari indenter would have no counterpart. Another continent would have to be placed along the Natal-Maud-Albany Fraser side.

188-14 Oral Hokada, Tomokazu

GRENVILLIAN (1100-1040 MA) A-TYPE GRANITOID MAGMATISM IN THE NAMAQUA-NATAL AND THE MAUD BELTS: NEW SHRIMP ZIRCON U-PB CHRONOLOGY FROM NATAL AND ANTARCTICA

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Keywords: Natal; Maud; Grenvillian; A-type granitoid; SHRIMP

We carried out SHRIMP zircon U-Pb dating on A-type granitic intrusions from Natal Province, South Africa and from Sverdrupfjella in Western Dronning Maud Land (WDML), Antarctica. The zircon grains are typically elongated and zoned, suggesting magmatic origins. Zircons from the seven granitoid intrusions analyzed in this study suggest 1100-1040 Ma ages, which confirm widespread Grenvillian A-type granitic magmatism in the Namaqua-Natal (South Africa) - the Maud (Antarctica) plutono-metamorphic belts (e.g., Thomas et al., 1993; Robb et al., 1999; Eglington et al., 2003; Jacobs et al., 2003). No older inherited (e.g., ~2500 Ma Archaean basement or 1200 Ma~ island arc magmatism in northern Natal) zircon grains were seen, consistent with the interpretation that these granitoid intrusions were formed through juvenile magmatism (Grantham et al., 2001). The sample from Sverdrupfjella, Antarctica shows a ~530Ma metamorphic rim whereas none of the Natal samples show any younger overgrowths. In the Natal region, mean 207Pb/206Pb ages apparently decrease from north (1100-1090 Ma at Nthilimbitwa Pluton) to south (1060 Ma from Mvoti and Glendale Plutons to 1040 Ma from Kwalembe and Ntilbankulu Plutons). The sample from Sverdrupfjella, Antarctica has ~1093Ma old zircons. The limited metamorphic age data available from country rocks to the intrusions suggest that the intrusions have been generated and emplaced syn- or post-metamorphic of the Namaqua-Natal-WDML regions. Our data, therefore, can constrain the termination of high-grade metamorphism to be no younger than 1040 Ma, and the previously reported younger ~800 Ma ages are considered to correspond to the events later to the major tectono-thermal events in these areas. The available chronological data of the A-type granites show a crude spatial-age relationship with the younger ages <~1060 Ma being restricted to the southern and western margins of the Kalahari Craton (southern Natal and Namaqualand) whereas the older ages >1060 Ma are restricted to the eastern margin (Mozambique, Antarctica and northern Natal) of the Kalahari Craton. The older ages also show a gradual decrease in age from ~1110 Ma in Mozambique to ~1060 Ma in northern Natal.

188-15 Oral Fuck, Reinhardt

GEOLOGICAL RECORDS OF RODINIA EVOLUTION IN PRECAMBRIAN TERRAINS OF SOUTH AMERICA

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Keywords: South America; Rodinia; assembly; breakup

Geological structures and Precambrian rock units thought to be related to Rodinia Supercontinent assembly and breakup were recognized in three main domains of South America: i) Mesoproterozoic fold belts ca. 1.5-1.1 Ga old and corresponding foreland cover successions and coeval cratonic intrusions exposed in the southwestern portion of the Amazon Craton make up the most complete and best preserved record of interpreted Rodinia amalgamation in South America. Recently obtained paleomagnetic data place this part of the Amazon Craton close to the southernmost segment of Laurentia's Grenville margin. Inferred collision of both continents is reflected in the Nova Brasilândia and Sunsas-Aguapeí fold belts, as well as in the Llano Uplift area. ii)In eastern South America small crustal fragments of inferred Rodinia ascent were variably reworked during Neoproterozoic Brasiliano orogenic events, rendering it difficult to recognize and map Meso-Neoproterozoic (Grenvillian) mobile belts. So far, the best candidates to represent possible fragments of such mobile belts were recognized in the Punta del Este, Uruguay, terrain, in the Serra do Itaberaba, São Paulo, eastern Brazil, area, and in the Cariris Velhos, northeastern Brazil, orogen. iii) The third domain comprises a number of scattered basement exposures within the Andean Cordillera, from Venezuela and Colombia (Guajira, Santa Marta, Garzon) in northern South America to Peru-Chile and northwest Argentina (Arequipa-Antofalla, Pampia, Occidentalia) in central and southern South America. Although deeply reworked and fragmentary in exposure, these basement inliers seem to represent the largest litho-structural record of the Meso-Neoproterozoic collage in South America, apparently making up the western margin of the South American Platform.

188-16 Oral Evans, David

RODINIA RADICALLY REVISED

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Keywords: Rodinia; supercontinents; Proterozoic; tectonics; paleomagnetism

A new configuration of the Rodinia supercontinent is based upon reconstruction of the West African and Amazonian cratons against the Cordilleran rifted margin of Laurentia at 780 Ma. Across both regions, Neoarchean cratonic nuclei (Wyoming and Carajas) are flanked to the north and south by Paleoproterozoic accretionary belts. Assembly of West Gondwanaland via dextral collision beginning at 620 Ma requires, assuming reasonable plate rates, that the Sao Francisco-Congo craton reconstructs in Rodinia near the Arctic margin of Laurentia. Key paleomagnetic data from 1270 and 755 Ma support such a reconstruction and imply that the giant Mackenzie large igneous province, Canada, was originally contiguous with coeval post-Kibaran layered mafic-ultramafic intrusions in central Africa. 1070-Ma and 755-Ma paleomagnetic results from Australia suggest a Rodinian placement near Greenland, adjacent to Baltica. Alignment of 1105-Ma Umkondo poles from Kalahari with coeval Keweenawan results from Laurentia indicate a position between Congo and Australia. India and South China lie outboard of Kalahari and Australia. Gondwanaland constituents thus reconstruct in Rodinia to a mild rearrangement surrounding the western to northeastern margins of Laurentia and Baltica. Siberia's position remains enigmatic.The new configuration implies that the Rodinia-Pangea transition encompassed primarily rifting of Laurentia and Baltica from one side of the proto-Gondwanaland assemblage, their translations across Panthalassa, and reunion with the other side of a fully assembled Gondwanaland 500 million years later. The contiguous Sunsas-Grenville-Sveconorwegian belts involved not continent-continent collision, but rather the final stages of long-lived accretionary tectonism akin to orogeny along the "Samfrau" margin of Paleozoic-Mesozoic Gondwanaland. Intriguingly, the spatial distribution of 1100-Ma mafic magmatism behind the Sunsas-Grenville arc is reminiscent of the Karoo-Ferrar province in Gondwanaland, suggesting a limited role at most for mantle plumes in both episodes. Most of Rodinia had assembled by 1800 Ma, and transition from Paleoproterozoic Nuna to Mesoproterozoic Rodinia involved merely addition of a few cratons rather than widespread fragmentation and reassembly. Uneventful carbon-isotopic variations and absence of glaciation throughout the Mesoproterozoic both attest to environmental and climatic stability accompanying limited continental reshuffling.

188-17 Oral Pisarevsky, Sergei

MODELS OF RODINIA: AN OVERVIEW

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Keywords: Rodinia; Neoproterozoic; assembly; breakup

There is general agreement that the Earth's continental crust may have been assembled to form the supercontinent, Rodinia, in the late Mesoproterozoic and early Neoproterozoic. Rodinia is thought to have been produced by collisional events of broadly Grenvillian (late Mesoproterozoic) age, and to have been relatively long-lived (c. 1100-750 Ma).Nonetheless, there are several versions of its composition and configuration (e.g. Hoffman, 1991; Dalziel, 1997; Weil et al., 1998; Pisarevsky et al., 2003). Laurentia is thought to have formed the core of Rodinia, because it is surrounded by passive margins formed during late Neoproterozoic breakup of the supercontinent. Most Rodinia models propose that Australia, Antarctica, and possibly South China may have been situated along Laurentia's western margin, and Baltica, Amazonia, and the Rio de la Plata craton may have lain along its eastern margin, but the exact positions of all these continents are under debate. The precise position of Siberia is disputed, but it is generally shown as lying along either the northern or the western margin of Laurentia. The positions of the Congo and Kalahari cratons are uncertain, with at least four reconstructions having been shown for Kalahari in the last few years. Several recent studies show that the assembly of Rodinia along the present-day eastern and western Laurentian margins probably did not happened until 1000-950 Ma. There are also some evidence that East Gondwana (Australia, Antarctica, and India) did not assemble until the latest Neoproterozoic or Early Cambrian, and some blocks of it (India and some Antarctican blocks) were not parts of Rodinia. New palaeomagnetic data from Siberia suggest its proximity to northern Laurentia, but with some unknown continental block in between. The breakup of Rodinia probably happened in two stages. The first stage might occur along the western and maybe northern margins of Laurentia. There is a variety of models for this process, one of this