

IGCP PROJECT NO. 440

ANNUAL REPORT FOR 1999

IGCP PROJECT SHORT TITLE: RODINIA ASSEMBLY AND BREAKUP

DURATION AND STATUS: 1999-2003, active

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SIGNATURES OF PROJECT LEADERS:

I have seen and approved this report. Signed: R. Unrug

1. Summary of Major Achievements of the Project:

- a. establishment of project structure and acceptance of work plan by project participants
- b. establishment of working parties
- c. establishment of cooperation with other IGCP projects
- d. organization of 4 scientific meetings
- e. establishment of a Web Home Page for the Project

2. Matters of concern

In 1999 the funds allocated to the IGCP Project 440 by the IGCP Board in the amount of US\$7,000.00 have been reduced by the Nairobi Office of UNESCO to US\$4,300.00. Such practice makes long term planning very difficult, if not impossible. The 1999 allocation had still not been forwarded to the Project Leadership by the end of November. The expenses of the project were covered by an emergency loan from our research grants, but this practice can not be continued in the future. We request that no funding reductions be made in the year 2000, and that the money allocated is transferred promptly to the project.

We are also extremely concerned about the request from the Nairobi Office that "... *money from the Nairobi Office should go strictly to projects that are concerned with Africa.*" (see attached email communications at the end of this report). Because IGCP440 is global in scope, our expenditure involves people from all parts of the world. There appears to be a misunderstanding in the Nairobi Office about the scope of work planned in this project, and we suggest that the project might be easier to administer from Paris. We request that this issue be clarified as soon as possible.

3. Expenditures of the Project in 1999

1. A symposium on Mesoproterozoic Continental Assembly and Subsequent Break-up, and the IGCP 440 first business meeting, during the 10th European Union of Geosciences conference, 28 March – 1 April 1999

IGCP440 sponsored Dr Ken Buchan of the Geological Survey of Canada (601 Booth Street, Ottawa K1A 0E8, Canada. PH: 613-995-4386; Fax: 613-995-7997; Email: kbuchan@nrcan.gc.ca) to give a key-note address on "The 1.7-0.7 Ga paleomagnetic record for Laurentia, Baltica and Siberia and its application to Rodinia reconstructions".

Total expenditure US\$1,000

2. The Kitwe meeting, July 1999

IGCP440 sponsored **Dr. B.K. Sahu** of ITC, Kannalweg 3, 2628 EB Delft (Ph: +31 15 2748847; Fax: +31 15 2623961) to attend the Kitwe meeting. Dr Sahu is a research fellow at Delft, originally from India, who is now working in the Netherlands. He presented a paper on "Aeromagnetic anomaly patterns over Precambrian terranes of Southern Africa and western Dronning Maud Land, East Antarctica and their correlation in a Gondwanaland perspective".

Total expenditure US\$500

3. October 1999 meeting in Yichang, People's Republic of China

Apart from scientific exchanges, the main purpose of the Yichang meeting, from IGCP440 point of view, was to set up its East Asia Working Party. The project partially sponsored seven people from the region to participate in the meeting at US\$200 each for covering their registration fees only. They are:

Prof. Bao Chaomin, Zhejiang Academy of Geological Survey, P.R. China

Prof. Bao is the chief geologist in Zhejiang Province, and has extensive knowledge about the Precambrian geology of the region between the Yangtze and Cathaysia blocks.

Prof. Tang Jiafu, Anhui Academy of Geological Survey, P.R. China

Like Prof. Bao, Prof. Tang is the chief geologist in Anhui Province where some of the best Mesoproterozoic ophiolite complexes are preserved.

Prof. Lu Songnian, Tijin Centre of China Geological Survey

Prof. Lu is the chairman of the Chinese national committee in Precambrian Research, and leader of the IGCP440 Chinese National Working Group. He was elected as a co-coordinator for the IGCP440 East Asia Working Party at the Yichang meeting.

A/Prof. T. Watanabe, Hokkaido University, Japan

A/Prof. Watanabe is the leader of the IGCP440 Japanese National Working Group. He was elected as a co-coordinator for the IGCP440 East Asia Working Party at the Yichang meeting.

Prof. Li Xianhua, Guangzhou Institute of Geochemistry, Chinese Academy of Science

Prof. X. Li is a leading scientists in China who focuses on the basement provinces of South China, as well as geochronological and geochemical signature of other Precambrian rocks in the South China cratons.

A/Prof. Li Jianghai, Beijing University, Beijing, China

A/Prof. Zhang Shihong, China University of Geological Sciences (Beijing), China

Both A/Prof. Li and Zhang are co-leaders of the IGCP440 Chinese National Working Group, and editors of the IGCP440 East Asia Working Party newsletter.

Total expenditure US\$1,400

4. Geological Society of America Annual meeting in Denver, Colorado, USA, between 24–28 October 1999

As part of the International Geological Correlation project, IGCP 440, Professor Powell, as IGCP 440 co-leader, expended part of the IGCP funds in assisting various key scientists to attend the Rodinia Workshop on 24 October, and the accompanying Geological Society of America meeting, October 25–28 (inclusive).

<i>Name</i>	<i>Country</i>	<i>Amount (US \$)</i>
Dr Eugene Khain	Russia	1500.00
(This covered return airfare Moscow to Denver, GSA Registration and a contribution to living costs while at the Denver GSA meeting. Dr Khain is a key person in co-ordinating a planned field workshop in Siberia in 2001)		
Prof. Victor Puchkov	Russia	783.00
(This covered partial assistance for attendance at the GSA meeting, including registration. Prof. Puchkov is co-ordinating the planned field workshop in 2001, and contributed an invited paper to the Topical symposium)		
Prof. Kent Condie	U.S.A.	162.00
(This covered one day's accommodation in order to arrive in Denver early to participate in the Sunday, 24 October IGCP workshop meeting; Prof Condie reported on the Yichang IGCP 440 meeting in China)		
Dr Richard Ernst	Canada	220.00
(This covered Dr Ernst' registration fee at the GSA conference. Dr Ernst was an invited keynote speaker at the workshop and subsequent Topical Session. Dr Ernst is Chair of the thematic working party on mafic dykes)		
Dr Michael Wingate	Australia	1,000
(This was to cover part of Dr Wingate's international airfare for him to give an invited talk on "Paleomagnetic constraints on the timing of Rodinia breakup".		

Total expenditure *US\$3,665.00*

**TOTAL EXPENDITURE ON SCIENTISTS
FOR 1999:
VENUE HIRE FOR MEETINGS**

**US\$6,565.00
US\$ 650.00**

ADMINISTRATION COSTS	<u>US\$ 500.00</u>
<i>GRAND TOTAL FOR 1999</i>	<i>US\$7,715.00</i>
LESS REDUCED AMOUNT ALLOCATED	<u>US\$4,300.00</u>
Amount paid from other sources	US\$ 3415.00

We provided additional amounts from our own sources for our own travel to participate in the above meetings. Our intention in 2000 is to use the major part of the IGCP project funds to support attendance of IGCP 440 scientists in a special Rodinia Workshop, to be held during the 31st IGC in Rio de Janeiro, Brazil. We request that the full amount approved for the project from UNESCO's regular budget in Paris be allocated to IGCP 440, unlike this year where the allocated budget of \$7,000 was reduced by the Nairobi office to US\$4,300.

4. Details of activities of the Project

(1) A symposium on Mesoproterozoic Continental Assembly and Subsequent Break-up, and the IGCP 440 first business meeting, during the 10th European Union of Geosciences conference, 28 March – 1 April 1999

At the initial meeting of IGCP 440, at the EUG 10 in Strasbourg, France, 28 March–1 April, Chris Powell and Joachim Jacobs (Bremen, Germany), convened a symposium on "*Mesoproterozoic continental assembly and subsequent break-up*", at which 21 oral and 14 poster papers were presented. A selection of these papers, together with papers from a companion symposium convened by Alfred Kröner, Victor Khain, J.J. Peucat and Vicki Pease, is being edited by Chris Powell and Joe Meert (USA), for publication as a special issue of Precambrian Research in the second half of 2000.

The IGCP 440 First Business Meeting followed the symposium in the evening. Over 60 people attended the meeting, which was chaired by Professor Powell. Project Co-leaders and Project Secretary were elected at that meeting, and the structure was discussed.

(2) Joint IGCP 418 & 419 meetings in Kitwe, Zambia, July 19–21, with field workshops from July 12–18 (IGCP 418) and July 22–26 (IGCP 419)

Two field excursions and a joint scientific meeting were held jointly by the two closely linked IGCP projects during August 1999 in Kitwe, Zambia. IGCP 440 sponsored one participant to this meeting (see expenditure list above). Professor Powell led a two-hour discussion on IGCP 440 business. It was agreed that IGCP 418/419 participants would form the southern African working group, assembling the material related to IGCP 440, and producing the regional tectonic synthesis to feed into the Rodinia map committee.

This meeting was the third annual meeting of IGCP 418 and the second meeting of IGCP 419. The scientific conference was conducted over three days and afforded many valuable opportunities to meet local and international delegates, and to attend a variety of presentations. Many exciting new revisions of mapping details and geochronology generated a great deal of interest. The 36 papers presented (five by Australian members) covered a wide range of topics related to both "Kibaran" and "Pan African" events.

The pre-conference IGCP 418 field excursion included a transect across the NE-trending Irumide Belt which borders the eastern margin of the greater Congo craton. In the Irumide belt, a series of deformed Paleoproterozoic granitoids and gneisses is overlain by a series of Mesoproterozoic pelites and quartzites, in places multiply deformed and metamorphosed to gneiss. Whether the Irumide Belt is intracratonic or faced a Mesoproterozoic ocean to the southeast is one of the principal unanswered questions.

The trip started amidst the impressive scenery, wildlife, and geology of Lower Zambezi National Park, where the Irumide rocks have been overprinted strongly by Neoproterozoic tectonothermal events centred in the adjacent Zambezi and Mozambique Belts. Many spectacular outcrops included amphibole-cordierite rocks, enigmatic whiteschists, and isoclinally folded amphibolites. Further north in the Irumide Belt, the effects of younger overprints diminish, permitting closer examination of granitoid-gneiss Irumide basement and overlying quartzites.

The post-conference field workshop focussed on the Neoproterozoic sedimentary rocks and mineralisation of the Zambian Copperbelt. Visits to two open-pit mines, and one underground mine, highlighted the relationships between the stratigraphy and copper mineralisation. A number of mining companies, including Cyprus-Amax, Billiton, Caledonia, and ZCCM (Zambian Consolidated Copper Mines), made available extensive collections of drill core for examination and sampling. Several cores intersected Neoproterozoic diamictites, which were of particular interest to sedimentologists and paleomagnetists.

During the IGCP 418 business meeting, delegates agreed to publish a volume of papers, which would include regional geological summaries, compendia of paleomagnetic and geochronological data, a general overview, and a global synthesis. All are to be compiled in a systematic and consistent manner, involving transect maps, cross-sections, and time-space charts. Contributions are to be ready by the 2000 meeting, and all should be in final form by the end of 2000. Contributions covering the 1999 meeting were also invited for inclusion in a special issue of the *Journal of African Earth Sciences*, to be edited by the Zambian organising committee. Any excess funds from the 1999 meeting will be used for geochronological or geochemical analyses and to support attendance of Zambian researchers at future meetings.

In the IGCP 419 business meeting, the leaders noted that the main activity in 2000 would be associated with attendance at the 31st IGC in Brazil, and participation in associated field trips. The facilitators of this year's activities in Zambia, particularly Bert de Waele, Francis Tembo, and Roger Key, are to be congratulated for a very successful field conference and field trips. As well as the four delegates from Australia (Stuart Bull and Peter McGoldrick, [CODES, Tasmania], and Michael Wingate and Chris Powell, [UWA]), attendees included delegates from Belgium, Botswana, Britain, Canada, Congo, Germany, Kenya, Namibia, Netherlands, South Africa, Uganda, USA and Zimbabwe. The field excursions and conference were extremely well organised (at times under difficult conditions), very informative, and sufficiently flexible to accommodate the varied interests of the participants. The goodwill and friendliness of everyone in Zambia made this a memorable field conference.

(3) International Symposium and Field Workshop on Geodynamic and Tectonic Evolution of China and Related Gondwana Crustal Fragments, Yichang, 9–20 October

The symposium and workshops were organised by the Yichang Centre of China Geological Survey, and co-sponsored by IGCP 440 (Rodinia Assembly and Breakup, 1999-2003), IGCP 368 (Proterozoic Events in East Gondwanaland, 1995-1999), IGCP 411 (Geodynamics of Gondwanaland-derived Terranes in E & S Asia, 1998-2002), and Chinese national organisations. About seventy scientists from Australia, Canada, China (including Hong Kong), Germany, India, Japan, Korea, Malaysia, Sri Lanka, Thailand, United Kingdom, United States and Vietnam participated in the two-day symposium and pre- and post-conference field excursions. IGCP440 partially sponsored seven participants to the symposium (US\$200 each to cover their registration fees). Papers presented at the symposium covered geological events of all ages in the region and related continents, with focus on events related to the assembly and breakup of Rodinia, the evolution of the Tethys oceans, and Meso- to Cenozoic accretionary history of Asia. The International Association of Gondwana Research published an abstract volume, and a special volume on *Gondwana Research* for full papers and extended abstracts in 2000 is being organised.

At the symposium, Professors Kent C. Condie and Jonathan Aitchison gave keynote addresses on "Juvenile crust, mantle avalanches, and supercontinents in the last 1.6 Ga" and "Tectonostratigraphy of the Yarlung-Tsangpo suture zone, Tibet", respectively, and M. Yoshida, S. Hada and Z.X. Li delivered invited talks on IGCP 368, 411 and 440, respectively. The symposium was followed by a visit to the in-progress Yangtze Gorges Dam. Pre- and post-conference field trips examined the cover succession of the Yangtze Craton along the Yangtze Gorges, a Tethys suture near the China-Vietnam border, and a traverse across the Qinling-Dabie orogenic belt between the Yangtze and North China cratons.

(i) The establishment of the IGCP 440 East Asia Working Party (EAWP)

To coordinate Rodinia-related research on East Asian continental blocks, an East Asia Working Party was established during the Yichang meeting. Three major issues were discussed: (1) structure and function of the Working Party, (2) major scientific problems in the region related to the assembly and breakup of Rodinia, and (3) end products of IGCP 440-related research in the region.

Structure and functions

The aim of the EAWP is to coordinate Rodinia-related research on East Asian continental blocks. It will:

1. identify major scientific problems and facilitate collaborative researches;
2. enhance communication between researchers and research groups;
3. organise workshops, conferences and field excursions;
4. coordinate regional efforts in achieving IGCP project goals such as producing local and regional maps.

After some discussion, it was decided that the EAWP will be loosely organised, with Zheng-Xiang Li of The University of Western Australia, Songnian Lu of the Tianjin Centre of China Geological Survey and Teruo Watanabe of Hokkaido University (Japan) as co-coordinators, and Jianghai Li of Peking University, Zhihong Zhang of China University of Geosciences and Teruo Watanabe as newsletter editors. Depending on interest from the Republic of Korea, another co-coordinator from Korea may be elected at a future meeting (June 2000 in Tokyo?). The newsletter editors may also rotate. The first issue of the EAWP Newsletter will appear in the January 2000 issue of *Gondwana Research*, published by the International Association for Gondwana Research.

Major scientific problems

Most of the current activities are in South China (the Yangtze–Cathaysia collision, mantle plume that started the Rodinia breakup, Neoproterozoic rifting, etc.), and new projects will extend the research into the basement of Cathaysia and a Grenville-age orogenic belt along the northwestern margin of the Yangtze Craton. There is also a need for work in North China, Tarim, Korea peninsula, and the basement of the Indochina block. It was suggested that future work should emphasise

- field mapping and structural analysis on (a) Mesoproterozoic orogenic belts and (b) distribution and age of mafic dyke swarms;
- high-precision geochronology & metamorphic petrology (P-T-T);
- basin analysis of Mesoproterozoic successions to identify possible back-arc and foreland basins related to Rodinia assembly;
- geochemistry, and
- high-quality palaeomagnetism.

Aims

We aim to have a better-tested model (or models) for the positions of the East Asian blocks in Rodinia by the end of IGCP 440. Specifically, we aim to

- have all major scientific findings published in internationally reputable journals;
- produce a number of 1:2 million maps for major working areas in the region;
- produce a 1:5 million Precambrian map for the East Asia region.

(ii) Forthcoming events in the region

A special session on "Assembly and dispersion of Rodinia and Gondwana supercontinents in western Pacific", co-sponsored by IGCP368, 411 & 440, has been proposed for the AGU Western Pacific Geophysics Meeting, to be held on 27-30 June 2000 in Tokyo. The session will deal with all aspects related to the assembly and dispersion of the two supercontinents, Rodinia and Gondwana, in the western Pacific. These problems are important for understanding the origin and amalgamation of cratons that formed the Asian continent. The session includes tectonics, stratigraphy, palaeontology, igneous and metamorphic petrology, paleomagnetism, geochronology and mineral resources. All researchers interested in the formation and breakup of the two supercontinents are welcome to contribute. Convenors: Teruo Watanabe (Hokkaido University, teruwata@ep.sci.hokudai.ac.jp or teruwata@cosmos.sci.hokudai.ac.jp), Zheng-Xiang Li (The University of Western Australia, zli@tsrc.uwa.edu.au), Masaru Yoshida (Osaka City University, myoshida@sci.osaka-cu.ac.jp), and Songnian Lu (Tianjin Centre of China Geological Survey, ljsnmm@shell.tjvan.net.cn).

We also aim at organising a field symposium in South China during 2002. Further development will be posted at both the EAWP Newsletter and the web page of the Tectonics Special Research Centre (<http://www.tsrc.uwa.edu.au>).

(4) Geological Society of America Annual meeting in Denver, Colorado, USA, between 24–28 October 1999.

A full day was allocated to discussion of IGCP 440 at the Geological Society of America's Annual meeting in Denver, Colorado, USA, 24–28 October, 1999. At the IGCP 440 meeting, attended by approximately 50 scientists from Australia, Europe, South America, Asia and North America, discussion focussed on the best ways to achieve the goals of the project, and the possible composition of the regional and thematic working parties. During the main GSA meeting, a symposium convened by Richard Hanson and Chris Powell on *"The role of supercontinents in earth history: Assembly and dispersal of the Rodinian supercontinent (1300–?750 Ma), and impacts on the Proterozoic biosphere, hydrosphere and crust–mantle system"*, attracted thirteen papers, with a further four papers being presented in a tectonics symposium on *"Igneous, metamorphic, and geochronologic perspectives on continental assembly and breakup"*.

At the October meeting in Denver, IGCP 440 sponsored four people (see expenditure list above).

5. Publications

Following are lists of abstracts related to IGCP440 that were presented at the three international conferences officially sponsored or co-sponsored by IGCP 440. Some full-papers will be published in a special volume of Precambrian Research, co-edited by Professors C.McA. Powell and J. Meert. Others will be published in international journals in the coming years.

(1) Symposium on “Mesoproterozoic Continental Assembly and Subsequent Break-up” during the 10th European Union of Geosciences conference, 28 March – 1 April 1999 (Sessions A06:1B and A06:2A)

- Buchan, K., Ernst, R., Hamilton, M., Mertanen, S., Pesonen, L., Elming, S-A., THE 1.7-0.7 Ga PALEOMAGNETIC RECORD FOR LAURENTIA, BALTICA AND SIBERIA AND ITS APPLICATION TO RODINIA RECONSTRUCTIONS. *Journal of Conference Abstracts*, V. 4 (No. 1), p.114. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Buchwaldt, R., Toulkeridis, T., Ucauwun, E. K., Todt, W., SINGLE ZIRCON AGES AND GEOCHEMICAL ANALYSIS OF THE MESOPROTEROZOIC MAGMATISM OF SW UGANDA. *Journal of Conference Abstracts*, V. 4 (No. 1), p.118. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Cawood, P. A., McCausland, P. J. A., Dunning, G. R., RIFT RELATED MAGMATISM ASSOCIATED WITH RODINIAN BREAKUP AND OPENING IAPETUS IN THE NORTHEASTERN APPALACHIANS. *Journal of Conference Abstracts*, V. 4 (No. 1), p.121. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Corriveau, L., van Breeman, O., Wodicka, N., Rivard, B., Harris, L., MESOPROTEROZOIC 1.4-1.0 Ga POLYPHASED OROGENESIS IN THE WESTERN GRENVILLE PROVINCE, QUEBEC. *Journal of Conference Abstracts*, V. 4 (No. 1), p.114. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Dalziel, I. W. D., RECONSTRUCTING RODINIA: THE “SWEAT” HYPOTHESIS REVISITED. *Journal of Conference Abstracts*, V. 4 (No. 1), p.115. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Geraldes, M. C., Van Schmus, W. R., Fetter, A. H., Kozuch, M., Tassinari, C. C. G., Teixeira, W., PRE-RODINIA MESOPROTEROZOIC (1450 Ma) MAGMATIC ARC IN SW AMAZON CRATON, MATO GROSSO STATE, BRAZIL. *Journal of Conference Abstracts*, V. 4 (No. 1), p.114-115. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Golynsky, A. V., Grikurov, G. E., Kamenev, E. N., MAGNETIC ANOMALY IMPRINTS OF THE MAJOR TECTONIC PROVINCES IN WESTERN DRONNING MAUD AND COATS LAND, EAST ANTARCTICA. *Journal of Conference Abstracts*, V. 4 (No. 1), p.120. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Hamilton, M. A., Rainbird, R. H., Young, G. M., SHRIMP U-Pb GEOCHRONOLOGY OF THE MESO-NEOPROTEROZOIC TORRIDONIAN SUCCESSION, NW SCOTLAND: EVIDENCE OF LEWISIAN COMPLEXITIES AND LAURENTIAN SOURCES. *Journal of Conference Abstracts*, V. 4 (No. 1), p.122. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Jacobs, J., Fanning, C. M., Henjes-Kunst, F., Olesch, M., Paech, H., U-Pb SHRIMP ZIRCON DATING OF GRENVILLE-AGE ROCKS FROM CENTRAL DRONNING MAUD LAND, E-ANTARCTICA.

- Journal of Conference Abstracts, V. 4 (No. 1), p.115. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Kah, L. C., Bartley, J. K., OCEAN CHEMISTRY LINKS TO THE MESOPROTEROZOIC ASSEMBLY OF RODINIA. Journal of Conference Abstracts, V. 4 (No. 1), p.118. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Kroner, A., Hegner, E., Willner, A. P., Windley, B. F., Muhongo, S., FROM RODINIA TO GONDWANA: EVIDENCE FROM NEOPROTEROZOIC HIGH-GRADE TERRAINS IN EAST AFRICA AND MADAGASCAR. Journal of Conference Abstracts, V. 4 (No. 1), p.116. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Lefort, J-P., MISSING PIECES IN THE RODINIA PUZZLE. Journal of Conference Abstracts, V. 4 (No. 1), p.117. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Li, J., TECTONIC CONSTRAINTS FROM CHINESE CRATONIC BLOCKS FOR RECONSTRUCTION OF RODINIA. Journal of Conference Abstracts, V. 4 (No. 1), p.121. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Li, Z. X., Li, X. H., Kinny, P. D., Wang, J., 830-820 Ma MAFIC TO FELSIC IGNEOUS ACTIVITY IN SOUTH CHINA: PART OF PLUME-INDUCED RIFTING THAT LED TO THE BREAKUP OF RODINIA? Journal of Conference Abstracts, V. 4 (No. 1), p.117. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Maslov, A. V., PRECADOMIAN PALEOGEAGRAPHIC EVOLUTION OF THE EASTERN, NORTHEASTERN AND NORTHERN PARTS OF THE EAST EUROPEAN PLATFORM. Journal of Conference Abstracts, V. 4 (No. 1), p.119. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Meert, J., A TALE OF TWO SUPERCONTINENTS. Journal of Conference Abstracts, V. 4 (No. 1), p.120. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Menot, R-P., Peucat, J-J., Pelletier, A., Fanning, M., NEW CONSTRAINTS ON THE ARCHEAN-PROTEROZOIC EVOLUTION OF THE TERRE ADELIE-GEORGE V LAND, EAST ANTARCTICA. Journal of Conference Abstracts, V. 4 (No. 1), p.122. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Mikhalsky, E. V., Laiba, A. A., Belyatsky, B. B., Stuwe, K., THE GEOLOGICAL STRUCTURE OF THE CENTRAL PRINCE CHARLES MOUNTAINS (EAST ANTARCTICA), AND SOME IMPLICATIONS FOR MESOPROTEROZOIC GEODYNAMICS. Journal of Conference Abstracts, V. 4 (No. 1), p.120. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Nedelec, A., Gregoire, V., Bouchez, J. L., Ralison, B., Rakotomanana, D., PAN-AFRICAN TECTONICS IN CENTRAL MADAGASCAR. Journal of Conference Abstracts, V. 4 (No. 1), p.115-116. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Paulsson, O., Austrheim, H., Ohta, Y., PAN-AFRICAN LATE OROGENIC INTRUSIONS IN JUTULSESSEN, WESTERN DRONNING MAUD LAND, ANTARCTICA. Journal of Conference Abstracts, V. 4 (No. 1), p.118. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Powell, C. McA., Unrug, R. ASSEMBLY AND BREAK-UP OF RODINIA: IGCP PROJECT 440. Journal of Conference Abstracts, V. 4 (No. 1), p.122. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Punati, S. R., PALAEOPROTEROZOIC SUPERCONTINENTAL FRAGMENTATION AND AMALGAMATION: EVIDENCE FROM INDIAN AND AUSTRALIAN CONTINENTS. Journal of Conference Abstracts, V. 4 (No. 1), p.118-119. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Rumyantsev, M., EVOLUTION OF MESOPROTEROZOIC ISLAND ARCS AT SOUTHWESTERN MARGIN OF SIBERIAN PLATFORM. Journal of Conference Abstracts, V. 4 (No. 1), p.118. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Schneider, T., Borg, G., SUBDUCTION-RELATED ORIGIN AND EVOLUTION OF THE MESOPROTEROZOIC PIKSTEEL, GAMSBERG, AND NUCKOPF IGNEOUS SUITES, CENTRAL NAMIBIA. Journal of Conference Abstracts, V. 4 (No. 1), p.117. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Sklyarov, E. V., Gladkochub, D. P., Mazukabzov, A. M., Watanabe, T., Ota, T., BREAKUP OF RODINIA: EVIDENCE FROM THE SOUTHERN MARGIN OF THE SIBERIAN CRATON. Journal of Conference Abstracts, V. 4 (No. 1), p.114. EUG10, 28 March-1 April 1999, Strasbourg, France.

- Svenningsen, O. M., ONSET OF SEAFLOOR SPREADING IN THE IAPETUS OCEAN: PRECISE AGE OF THE SAREK DYKE SWARM, NORTHERN SWEDISH CALEDONIDES. *Journal of Conference Abstracts*, V. 4 (No. 1), p.121. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Tack, L., Fernandez-Alonso, M., Wingate, M., CRITICAL ASSESSMENT OF RECENT UNPUBLISHED DATA SUPPORTING A SINGLE AND UNITED GEODYNAMIC EVOLUTION OF THE SAO FRANCISCO-CONGO-TANZANIA CRATONIC BLOCKS IN THE RODINIA CONFIGURATION. *Journal of Conference Abstracts*, V. 4 (No. 1), p.120-121. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Talarico, F., Henjes-Kunst, F., Kleinschmidt, G., AN OPHIOLITIC COMPLEX IN THE NORTHERN SHACKLETON RANGE, ANTARCTICA. *Journal of Conference Abstracts*, V. 4 (No. 1), p.122. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Thomas, R. J., Jacobs, J., MESOPROTEROZOIC MOBILE BELTS OF SOUTHERN AFRICA, EAST ANTARCTICA AND LAURENTIA: IMPLICATIONS FOR THE CONFIGURATION OF RODINIA. *Journal of Conference Abstracts*, V. 4 (No. 1), p.119. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Thrane, K., Watt, G. R., Kinny, P. D., Jones, K. A., Escher, J. C., EARLY NEOPROTEROZOIC BREAKUP OF RODINIA: SIMS U-Pb AGES FROM THE EAST GREENLAND CALEDONIDES. *Journal of Conference Abstracts*, V. 4 (No. 1), p.119. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Torsvik, T. H., Ashwal, L. D., Tucker, B. D., de Wit, M. J., Eide, E. A., GEOCHRONOLOGY AND PALAEOGEOGRAPHY OF SEYCHELLES DYKES: IMPLICATIONS FOR RODINIA SUPERCONTINENT PALAEOGEOGRAPHY. *Journal of Conference Abstracts*, V. 4 (No. 1), p.116. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Van Schmus, W. R., de Brito Neves, B. B., dos Santos, E. J., Fetter, A. H., Kozuch, M., Hackspacher, P. C., TECTONIC HISTORY OF THE BORBOREMA PROVINCE, NE BRAZIL: FROM ATLANTICA TO GONDWANA VIA RODINIA? *Journal of Conference Abstracts*, V. 4 (No. 1), p.115. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Vernikovskiy, V., Vernikovskaya, A., MEZOPROTEROZOIC CONTINENTAL BLOCKS OF TAIMYR AND NEOPROTEROZOIC EVENTS IN ARCTICS. *Journal of Conference Abstracts*, V. 4 (No. 1), p.114. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Wendorff, M., PRELIMINARY OBSERVATIONS ON SEDIMENTOLOGY AND STRATIGRAPHY OF A MESOPROTEROZOIC TERRIGENOUS SHELF SUCCESSION: THE MALE HILL FORMATION TSOLIDO HILLS GROUP, NW BOTSWANA. *Journal of Conference Abstracts*, V. 4 (No. 1), p.117. EUG10, 28 March-1 April 1999, Strasbourg, France.
- Wingate, M. T. D., Giddings, J. W., PALEOMAGNETIC TEST OF THE AUSTRALIA-LAURENTIA CONNECTION AT 755 Ma. *Journal of Conference Abstracts*, V. 4 (No. 1), p.121. EUG10, 28 March-1 April 1999, Strasbourg, France.

(2) International Symposium and Field Workshop on Geodynamic and Tectonic Evolution of China and Relayed Gondwana Crustal Fragments, Yichang, 9–20 October

- Condie, K.C. , JUVENILE CRUST, MANTLE AVALANCHES, AND SUPERCONTINENTS IN THE LAST 1.6 GA. *Gondwana Research*, V. 2 (No. 4), p.543, 1999.
- Divi, R.S. , TECTONIC AND MINERAL DEPOSIT PATTERNS IN EAST GONDWANA CRUST FRAGMENTS. *Program and Abstracts*, p.10-11. International Symposium and Field Workshop on Geodynamic and Tectonic Evolution of China and Relayed Gondwana Crustal Fragments, Yichang, 9–20 October 1999.
- Jacobs, J. and Thomas, R. J. , FROM RODINIA TO GONDWANA, THE EAST-ANTARCTIC PERSPECTIVE. *Gondwana Research*, V. 2 (No. 4), p.567, 1999.
- Li Z.X., 830-820 MA MAFIC TO FELSIC IGNEOUS ACTIVITY IN SOUTH CHINA AND THE BREAK UP OF RODINIA. *Gondwana Research*, V. 2 (No. 4), p.591, 1999.
- Li, Jianghai, Qian Xianglin and Hou Guitang, PROTEROZOIC FRAMEWORK AND EVOLUTION OF NORTH CHINA. *Gondwana Research*, V. 2 (No. 4), 568-571, 1999.

- Li, Xianhua, AGE AND ORIGIN OF THE MAFIC ROCKS AND RADIOLARIAN CHERTS WITHIN THE NE-JIANGXI OPHIOLITE MELANGE: IMPLICATION FOR THE TECTONIC EVOLUTION OF SE CHINA. *Gondwana Research*, V. 2 (No. 4), 588-590, 1999.
- Lu, S., Li, H., Yu, H., Zhao, F. and Yang, C., NEOPROTEROZOIC OROGENY IN NORTHWESTERN CHINA. *Gondwana Research*, V. 2 (No. 4), 610-611, 1999.
- Rajesh, H. M., CHARACTERIZATION AND ORIGIN OF ALUMINOUS A-TYPE GRANITOIDS FROM SOUTHWESTERN INDIA. *Gondwana Research*, V. 2 (No. 4), 604-606, 1999.
- Sengupta, S., EVOLUTION OF A POLYCYCLIC PRECAMBRIAN BASEMENT IN THE SCHIRMACHER HILLS, QUEEN MAUD LAND, EAST ANTARTICA. Program and Abstracts, p.29-30. International Symposium and Field Workshop on Geodynamic and Tectonic Evolution of China and Relayed Gondwana Crustal Fragments, Yichang, 9–20 October 1999.
- Wang J., Li, Z.X., Li, X., and Pan, G.T., NANHUA RIFT: A STORY OF RIFT BASIN RELATED TO RODINIA BREAK-UP. *Gondwana Research*, V. 2 (No. 4), 614-615, 1999.
- Zhan, Minggou, TECTONICS IN THE YUNKAI UPLIFT, SOUTH CHINA AND ITS EFFECT ON THE MINERAL RESOURCES. Program and Abstracts, p.33-34. International Symposium and Field Workshop on Geodynamic and Tectonic Evolution of China and Relayed Gondwana Crustal Fragments, Yichang, 9–20 October 1999.
- Zhao Yue, PROBABLE NEOPROTEROZOIC TECTONISM IN THE LARSEMANN HILLS AND ADJACENT AREAS, EAST ANTARCTICA. *Gondwana Research*, V. 2 (No. 4), 641-642, 1999.

**(3) Geological Society of America Annual meeting in Denver, Colorado, USA, between 24–28 October 1999
Session 138: Role of Supercontinents in Earth History: Assembly and Dispersal of the Rodinian Supercontinent (1300-750? Ma), and Impacts on Evolution of the Proterozoic Biosphere, Hydrosphere, and Crust-Mantle System**

- Carlson, M.P., Treves, S.B., and Goble, R.J., THE PRECAMBRIAN OF NEBRASKA AND ADJACENT AREAS: ORIGINS AND OROGENS. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-317, 1999.
- Dalziel, I.W. D., GLOBAL PALEOTECTONICS: RECONSTRUCTING A CREDIBLE SUPERCONTINENT. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.
- Ernst, R.E., Buchan, K.L., MANTLE PLUME EVENTS DURING THE ASSEMBLY AND BREAKUP OF RODINIA: THE RECORD FROM SHORT-DURATION LARGE IGNEOUS PROVINCES. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.
- Evans, D.A.D., and Kirschvink, J.L., MULTIPLE EPISODES OF RAPID TRUE POLAR WANDER IN NEOPROTEROZOIC-CAMBRIAN TIME? GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-318, 1999.
- Fonseca, M.A., Alkmim, F.F., and Marshak, S., CROSS-CUTTING RELATIONS AMONG NEOPROTEROZOIC OROGENS SURROUNDING THE SÃO FRANCISCO CRATON, BRAZIL: CLUES TO THE ASSEMBLY OF WEST GONDWANA. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-317, 1999.
- Hoal, K.O., and Hoal, B.G., CONTRASTING STYLES OF MANTLE METASOMATISM WITH TIME: IMPLICATIONS FOR AL-FE MAGMATISM IN RODINIA. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-318, 1999.
- Meert, J.G., PALEOMAGNETIC CONSTRAINTS ON RODINIA CONFIGURATIONS. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.
- Murphy, J.B., Strachan, R.A., Nance, R.D., Parker, D.K., and Fowler, M.B., Proto-Avalonia: A CA. 1.0 GA TECTONOTHERMAL EVENT AND CONSTRAINTS FOR THE CONFIGURATION OF RODINIA? GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-317, 1999.
- Puchkov, V.N., MESO- AND NEOPROTEROZOIC HISTORY OF THE EASTERN AND NORTHERN BALTICA AND ITS BEARING ON THE PROBLEM OF RODINIA. GSA ANNUAL MEETING, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.

- Rivers, T., PROTOLITH AGE AND TECTONIC ZONATION IN THE GRENVILLE PROVINCE: CONSTRAINTS FOR RECONSTRUCTIONS OF THE RODINIA SUPERCONTINENT. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.
- Tucker, R.D., Ashwal, L.D., Hamilton, M.A., Torsvik, T.H., and Carter, L.M., NEOPROTEROZOIC SILICIC MAGMATISM OF NORTHERN MADAGASCAR, SEYCHELLES, AND NW INDIA: CLUES TO RODINIA'S ASSEMBLY AND DISPERSAL. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-317, 1999.
- Weil, A.B., Van der Voo, R., Geissman, J., and Karlstrom, K., PRELIMINARY PALEOMAGNETIC RESULTS FROM THE NEOPROTEROZOIC CHUAR GROUP, GRAND CANYON SUPERGROUP, ARIZONA. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-317, 1999.
- Wingate, M.T.D., PALEOMAGNETIC CONSTRAINTS ON THE TIMING OF RODINIA BREAKUP. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), T58, A-316, 1999.

SESSION 186 : Tectonics IV: Igneous, Metamorphic and Geochronologic Perspectives on Continental Assembly and Breakup

- Dalziel, I.W.D, Lawver, L.A., and Murphy, J.B., PLUMES, OROGENESIS, AND SUPERCONTINENTAL FRAGMENTATION. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), Tectonics IV, A-429, 1999.
- Hanson, R.E., Bowring, S.A., and Dalziel, I.W.D., EMPLACEMENT OF LARGE IGNEOUS PROVINCES IN THE KALAHARI AND LAURENTIAN CRATONS AT 1.1 GA: IMPLICATIONS FOR RODINIA ASSEMBLY. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), Tectonics IV, A-430, 1999.
- Powell, C.McA., Jones, D.L., Pisarevsky, S.A., and Wingate, M.T.D., WHERE DID THE KALAHARI AND CONGO CRATONS BELONG IN RODINIA? GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), Tectonics IV, A-429, 1999.
- Rivers, T., and Indares, A., TECTONIC EXTRUSION IN THE EASTERN GRENVILLE PROVINCE: A MESOPROTEROZOIC ANALOGUE OF THE HIMALAYAN CRYSTALLINE TERRANES. GSA Annual Meeting, Denver, Colorado. Abstracts with Programs Vol. 31(7), Tectonics IV, A-429, 1999.

**ATTACHMENT:
COMMUNICATIONS WITH THE UNESCO NAIROBI OFFICE REGARDING TO
EXPENDITURE OF IGCP440 PROJECT FUNDS**

> >From: Thomas.Schlueter@unesco.unon.org
> >To: gwood@tsrc.uwa.edu.au
> >Date: Wed, 17 Nov 1999 01:51:49 +0300
> >MIME-Version: 1.0
> >Subject: IGCP440 project funding
> >Priority: normal
> >
> >Dear Geoff,
> >
> >please excuse my late reply to your messages of last month, but I
> >was abroad and had to participate at two workshops. After some
> >problems it was possible to open the GIF files you had sent to me,
> >and to read them. However, I still need a clarification for what the
> >funds of UNESCO will be spent, because **I had recently a**
> >**discussion with my Director here, in which he argued that money**
> >**from the Nairobi Office should go strictly to projects that are**
> >**concerned with Africa.** From the workplan as sent to me in the GIF
> >file, I can only see the joint meeting with IGCP 418 and 419 in
> >Kitwe, Zambia, which apparently has already taken place in July 19-
> >21 of this year. For this meeting a detailed program etc. was not
> >enclosed, which is essential for releasing the funds. I kindly
> >request you therefore to submit to me as soon as possible 1) a
> >detailed workplan of this meeting or another that will be organized
> >in Africa, 2) names, institutions and countries of the participants to
> >be given financial support, and 3) how participants from the African
> >continent are involved into the activities of IGCP440.
> >
> >best regards
> >
> >Thomas Schlueter
> >