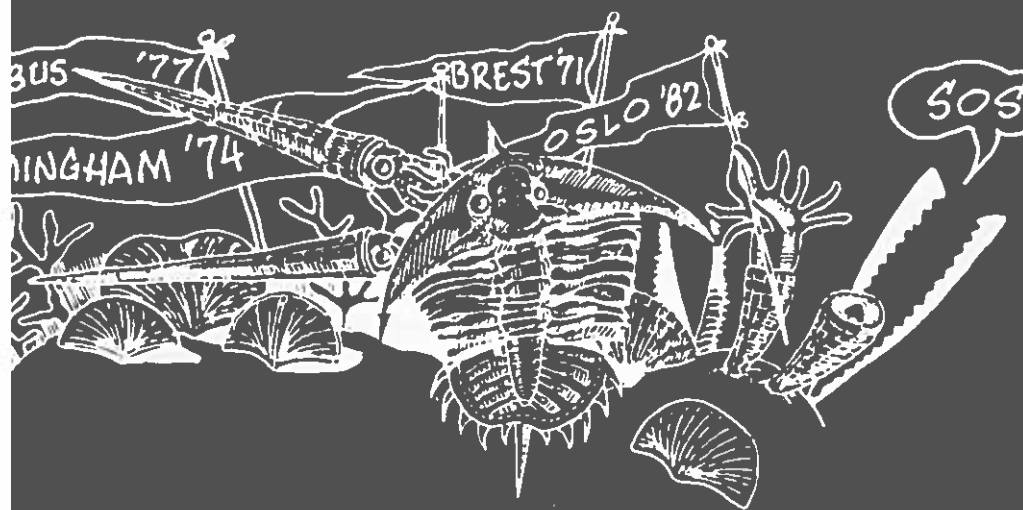


# Ordovician EWS



IUGS COMMISSION ON STRATIGRAPHY  
COMMISSION ON ORDOVICIAN STRATIGRAPHY

No. 1 1983

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INTERNATIONAL UNION OF GEOLOGICAL SCIENCES

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NOTES FOR CONTRIBUTORS

Correspondence, reviews (and lists) of recent publications, brief summaries of current research, notices of relevant local, national and international meetings, and additions, deletions or changes to list of Ordovician workers will be welcomed.

Contributions should be in English, typed single spaced (double space between paragraphs) on white paper - print area should not exceed 18.5 x 26 cm. Copy should be mailed flat (with cardboard protector) to Barry Webby, Department of Geology & Geophysics, University of Sydney, N.S.W. 2006, Australia.

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## INTRODUCTION

The Subcommission on Ordovician Stratigraphy was established under the chairmanship of Alwyn Williams during the International Symposium on the Ordovician System held in Birmingham, England, in 1974. From its inception the Subcommission strongly supported the activities of the Cambrian/Ordovician and Ordovician/Silurian Boundary Working Groups - that as a first step the boundaries at the bottom and top of the Ordovician System should be standardized. These bodies have now made substantial progress towards achieving their respective goals. The second major activity given priority during the last six years has been the preparation of a series of regional correlation charts and notes. This major project is continuing under the leadership of Chairman (now Editor) Reuben J. Ross Jr. A list of available Ordovician charts is given elsewhere. Thirdly, now that the work of the correlation chart project is well advanced, the new Chairman (Chris Barnes) and Secretary (Barry Webby) consider that priority should be given to work which will achieve one or more standard chronostratigraphic classifications for the Ordovician System. To this end we are establishing a number of Chronostratigraphy Working Groups in those areas of the world where separate series and stages are currently being used for correlation. These regional working groups will be expected to review their regional schemes, especially in terms of wider, international chronostratigraphic applicability.

Ordovician News will be published at intervals (one or two issues a year). It aims at promoting interests in all aspects of studies of the Ordovician System, especially that bearing on Ordovician correlation and the time scale. Contributed news and notes will be especially welcome. For instructions as to how news items should be sent, see Notes for Contributors, p.ii.

Unless otherwise stated, Chris Barnes and Barry Webby are responsible for statements made in this issue of Ordovician News.

## ANNUAL REPORT OF THE SUBCOMMISSION ON ORDOVICIAN STRATIGRAPHY FOR 1982

The Subcommission of the Ordovician Stratigraphy is pleased to report the following developments during 1982:

### 1. Ordovician Correlation Chart Series

The Subcommission has been producing a series of correlation charts for Ordovician strata in major regions of the world to establish a data base for later global analysis of Ordovician correlations and events. During 1982 one new chart was published:

Ross, R. J. Jr., et al. The Ordovician System in the United States. 73p. + chart. July 4, 1982. I.U.G.S. Publication No. 12.

One other chart has been received, dealing with Southwestern Europe and is currently in press. Other charts that are in preparation will cover: Norway, Sweden, Northern Africa, South America. These publications are sold through the IUGS offices in Paris and Ottawa. They are selling moderately well and the Subcommission Chairman is working with Dr. A. R. Berger to improve the advertizing and marketing of the charts.

### 2. Fourth International Ordovician System Symposium

This major meeting was held in Sundvolden, Norway on August 19-23. The first two days involved 24 papers dealing with eight specific themes. A third day involved two concurrent sessions with 50 papers dealing with a wide variety of other topics. An abstract volume was published for the meeting. The thematic papers from the first two days will be considered for publication as a special Ordovician Handbook to be edited by Dr. D. L. Bruton. Manuscript submission deadline is December 1st 1982. The Symposium was organized by Dr. D. L. Bruton and ably assisted by Dr. S. H. Williams and several staff of the Paleontologisk Museum. Over 150 persons from 22 countries registered for the meeting.

In addition to the technical sessions, field excursions were arranged to classical Ordovician areas of Norway and Sweden, and gave the many visitors a wonderful opportunity to become more familiar with important Baltoscandian sections. Organizers of the various excursions were as follows:

Excursion 1 (Dalarne-Jemtland-Trondheim-Oslo) - V. Jaanusson, L. Kåris, K. Larsson, J. F. Bockelie, B. Wandås, O. Schmidt.

Excursion 2 (Hadeland-Mjøsa-Västergötland) - V. Jaanusson, N. Spjeldnaes, A. W. Owen, J. Bergstrom, S. M. Bergstrom.

Excursion 3 (Island of Öland) - V. Jaanusson, H. Mutvei.

Excursion 4 (Scania) - J. Bergstrom (cancelled)

Local Excursions (Oslo Region) - J. F. Bockelie, A. W. Owen, N.-M. Hanken, G. Henningsmoen, B. Wandås, S. H. Williams, T. Klemm.

A most useful 217-page Field Excursion Guide (edit. D. L. Bruton &

S. H. Williams) was published as Paleontological Contribution from Univ. of Oslo No. 279, covering all but Excursion 3. The 23-page Oland guide was written by V. Jaanusson & H. Mutvei, and produced separately in the Swedish Museum of Natural History, Stockholm.

Each evening was devoted to business meetings of the Ordovician Subcommittee, the Cambro-Ordovician Boundary Working Group, and the Ordovician-Silurian Boundary Working Group. The latter group, and the Subcommittee on Silurian Stratigraphy took the opportunity to organize a Field Conference to examine the Lower Silurian sequence of the Oslo area immediately following the Ordovician Symposium.

#### 4. Change of Chairman and Secretary of the Subcommittee

As notified beforehand, Drs. R. J. Ross Jr. and S. M. Bergstrom resigned as Chairman and Secretary, respectively, of the Subcommittee at the Sundvolden meeting in August 1982. The recommendations of the Nominating Committee were ratified at the meeting that Drs. C. R. Barnes and B. D. Webby became the new Chairman and Secretary, respectively. This proposal was forwarded to the Commission on Stratigraphy for approval.

#### 5. Future plans for the Subcommittee

With the completion of many of the Ordovician Correlation Charts and the impending completion of others, it was possible for the Subcommittee to reexamine its future plans. A series of proposals were placed before the Subcommittee at a meeting attended by a large number of interested Ordovician specialists and were duly approved after considerable discussion.

In brief, the Subcommittee considers that priority should be given to the continuation of its work to achieve one or more standard chronostratigraphic classification(s) for the Ordovician System. Regional working groups will be established to propose complete classifications for their region. Another new working group will focus on the integration of graptolite, conodont, and shelly fossil zonal schemes. This work is vital to allow precise correlations between regions affected by strong faunal provincialism. Other working groups will be established to involve a wider range of earth scientists to provide integrated studies on a) geochronology and magnetostratigraphy, b) paleoceanography, paleogeography, and paleoclimatology, and c) the special problems presented by the black shale oceanic and the carbonate platform environments that were so widely developed during the Ordovician.

#### 6. Subcommittee Membership

At the Sundvolden meeting, one new titular member, Dr. Bruno Baldis of Argentina, and twelve new corresponding members were approved:

Dr. R. Flower	USA - cephalopods
Dr. J. Kovach	USA - geochemist
Dr. Lai Cai-gen	PRC - cephalopods
Dr. P. Legrand	France - graptolites
Dr. R. Ludvigsen	Canada - trilobites
Dr. J. F. Miller	USA - conodonts

Dr. F. Paris	France - chitinozoa
Dr. J. Repetski	USA - conodonts
Dr. B. Stait	Australia - cephalopods
Dr. M. Wade	Australia - cephalopods
Dr. H. Williams	Norway - graptolites
Dr. J. Wright Clark	USA - geochemist

In summary, the Subcommittee has had a very active program during 1982, largely through the major contributions made by Drs. R. J. Ross Jr., S. M. Bergstrom and D. L. Bruton as noted above. The Subcommittee now plans to press forward in resolving the many difficult chronostratigraphic issues while concurrently developing a working group structure to tackle many relevant topics central to understanding Ordovician stratigraphy and earth history. This will require increased funding from IUGS and increased coordination within the Subcommittee by the Chairman and Secretary.

November 17, 1982.

#### CAMBRIAN-ORDOVICIAN BOUNDARY WORKING GROUP

The officers of the COBWG are Brian Norford (Chairman), John Shergold (Vice-Chairman) and Jim Miller (Secretary). In their last circular (No. 18, dated May 1983) the results are presented of a formal vote to define the approximate position of the Cambrian-Ordovician Boundary. A long period of documentation has been completed to determine whether the boundary should be at or near the base of the Tremadoc, within the Tremadoc, or at or near the base of the Arenig.

The result of the ballot among the voting members was: 12 votes for at or near the base of the Tremadoc, no votes for at or near the base of the upper Tremadoc, and 1 vote for at or near the base of the Arenig. The Secretary expressed the view that in consequence of this result "further efforts by the Working Group to choose a horizon and a stratotype section for definition of the boundary should be concentrated near the base of the Tremadoc Series and its equivalents".

The early work of the COBWG documenting the stratigraphy and faunas for many boundary sections around the world was published as a handsome volume edited by M. G. Bassett and W. T. Dean, "The Cambrian-Ordovician Boundary: sections, fossil distributions, and correlations", National Museum of Wales, Geological Series No. 3, 1982, 227 pp. This volume also forms Publication No. 10 of IUGS and can be ordered, along with the Ordovician Correlation Charts, using the IUGS form enclosed with this newsletter.

## ORDOVICIAN-SILURIAN BOUNDARY WORKING GROUP

The OSBWG after two separate postal ballots (recorded in Circular No. 18, dated March 1983 and Circular No. 19, dated August 1983) completed its work and will now make a formal recommendation for establishing the base of the Silurian System to the Commission on Stratigraphy. The next meeting of the Commission will be held during the I.G.C. meeting at Moscow in August, 1984.

The first ballot, asked whether the boundary stratotype should be located at Anticosti Island and defined using conodonts or at Dob's Linn, Scotland and defined using graptolites. A majority of 11 voted for Dob's Linn, 6 were for Anticosti and 2 did not record a vote.

A second ballot resulted in no significant change in the vote (12 for Dob's Linn, 5 for Anticosti, with 2 abstentions) but asked primarily at which level should the boundary be drawn at Dob's Linn, Scotland. The result was: 10 voted for the base of the acuminatus Zone, 5 favoured the base of the persculptus Zone, and 4 abstained. Corresponding members voted in a similar manner.

The final OSBWG recommendation based on this majority vote is therefore to define the base of the Silurian System at the base of the acuminatus Zone in the Dob's Linn section, Scotland.

This selection by the voting members was in marked contrast to the straw vote recorded at the IV Ordovician System Symposium at Sundvolden, Norway in August 1982. Following presentations of papers, and with discussions at open business meetings, a wide spectrum of registrants voted about 3:1 for a boundary stratotype on Anticosti Island defined using conodonts.

The proposal in the second ballot to recognize two parastratotypes for the boundary, one on Anticosti and the other in the best possible Chinese section containing the Hirnantia fauna and graptolites received a mixed reception from voting members - less than half voted in favour. Consequently this matter has been left in abeyance.

The OSBWG has been co-chaired by Charles Holland and Rube Rose with Robin Cocks as Secretary. After approval by the Commission, a final volume will be prepared for publication incorporating the extensive research that has been generated by this issue. The volume will be edited by Robin Cocks and Barrie Rickards.

N.B. The Ordovician-Silurian boundary graptolite fauna of Dob's Linn has been revised recently by Henry Williams (see July 1983 issue of Palaeontology, vol. 26, pt. 3, pp.605-639).

## BRITISH ORDOVICIAN CHRONOSTRATIGRAPHY WORKING GROUP

The first of the regional Ordovician Chronostratigraphy Working Groups was established earlier this year. Under the chairmanship of Bill Dean the group will tackle work on the Ordovician Series in Britain. It has started its work by assembling a paper reviewing problems of defining the Series of the British Ordovician. The paper (listed below) is expected to be published early in 1984.

Whittington, H. B., Dean, W. T., Fortey, R. A., Rickards, R. B., Rushton, A. W. A. and Wright, A. D. In press. Definition of the Tremadoc Series and the Ordovician Series in Britain. Geol. Mag.

## CURRENT AND PROJECTED ACTIVITIES OF THE SUBCOMMISSION

### Ordovician Correlation Charts

Currently, charts of South America, Norway, Sweden, Greenland, North Africa and Central Europe are in various stages of preparation. Other charts for the USSR, the Indian subcontinent and South-East Asia are expected to follow, so completing the series.

### Ordovician Chronostratigraphy Working Groups

The British working group as reported above is the first to be established to review the 'regional' series (and stages) of the region. Steps are currently being taken to form working groups for other regions having their own series (and stages), for example, in North America, Baltoscandia, the USSR, China and Australasia. Hopefully the results of this work will be brought together for presentation and discussion at the next International Ordovician System Symposium in 3 or 4 years time.

The working groups will have relatively broad terms of reference - (i) to define the regional series (and stages) so as to include details of stratotype lithostratigraphy, thickness, facies variation away from stratotype sections and ranges of diagnostic fauna and flora; (ii) to recognize levels at which major faunal breaks/events occur and, where possible, tie points between the various zonal schemes (graptolites, conodonts and other groups); and (iii) to record just how applicable the redefined series/stages (and their lower boundaries) are for international correlation purposes, and for possible use in one or more series (or stage) classifications of the Ordovician System.

### Ordovician Geochronology and Geomagnetism Working Groups

In view of the need to widen the scope of our activities, we also plan to establish working groups on Ordovician geochronology, and Ordovician geomagnetism.

26 - 29 October 1983

The Symposium was sponsored by Academia Sinica and organized by the Nanjing Institute for Geology and Paleontology. Organizing committee comprised Yin Zanzun (Chairman), Lu Yanhao and Mu Euzhi (Vice Chairmen) and Yuan Kexing (Secretary General). Scientific papers were presented on October 26-28 with a fourth day reserved for a tour of the Institute and some local sight-seeing. Following the Symposium two long field trips examined some of the key boundary sections in China.

At the opening plenary session of the Symposium, addresses were given by Ye Liangjun (Chinese Academy of Sciences), Li Yang (Nanjing Institute), Lu Yanhao and Mu Enzhi reporting on the Chinese boundaries, and B. S. Norford and C. H. Holland discussing the current work of the Cambrian-Ordovician and Ordovician-Silurian Boundary Working Groups, respectively. Thereafter, two concurrent sessions were held dealing with each of the boundaries, with over 50 papers being presented. Over 100 Chinese registrants were joined by 22 foreign specialists (members of the respective IUGS Cambrian-Ordovician and Ordovician-Silurian Working Groups) from 13 different countries. The Abstract Volume and the set of three guidebooks can be obtained for \$20.00(U.S.) from Yuan Kexing (Conference Secretary General, Nanjing Institute of Geology and Paleontology). The Conference was ably organized with excellent translation services. Sufficient time was provided for discussion with the most spirited debate being in the session on the Ordovician-Silurian boundary in response to the recent final recommendation of the Boundary Working Group. Many papers produced much new data on the Chinese sections, including work on isotope dating, sedimentology, magnetostratigraphy and paleomagnetism.

In addition to providing an excellent forum for both formal and informal discussions, the registrants were also treated to a full social program involving two magnificent banquets. The enormous organizational effort was truly appreciated, particularly by the foreign registrants.

The Cambrian-Ordovician field trip lasted 15 days and visited both north and east central China with principal stops at Beijing, Beidaihe, Wushan, Lulong, Qinhuangdao, Quxian, Jiangshan, Duibian, Xiyanshan, Changshan, Hangzhou and Shanghai. The Ordovician-Silurian trip spent 8 days covering Tangshan, Nanjing, Wuhan, Yichang, Huanghauchang, Fenxiang, Wangjiawan and the Yangtze Gorge. On both trips there were opportunities to see much of the fascinating landscape and rich cultural heritage of China.

N.B. In a recent issue of the Bulletin of the Yichang Institute of Geology and Mineral Resources, Chinese Academy of Geological Sciences (No. 6, 1983), there were important contributions by Ni Shizhao and others on the Cambrian-Ordovician boundary section at Huanghauchang, and by Wang Xiaofeng and others on the Ordovician-Silurian boundary and its faunas of the Yangtze Gorges area.

COORDINADORES:

Dr. Bruno A. Baldis, San Lorenzo 1742-1636, Olivos, Argentina  
Dr. Florencio G. Acenolaza, Miguel Lillo 205-4000 Tucuman, Argentina

Description. The Project covers, in geography, all the Latin American areas from Mexico to Argentina, including the Caribbean arc. It aims at: 1. studying the Cambrian and Ordovician continental margins, their tectonic evolution and metamorphic events; 2. interpreting the palaeogeographic evolution of the basins, the structural control of their geometry and the growing of the peri-cratonic arc; 3. analyzing the lithological control of fauna with special reference to carbonate, evaporite and deep-water clastic deposits which are closely linked with resource exploration. The Project also aims at trans-oceanic correlation of these basins with the North American Great Basin.

Summary of activities. The first months of the Project were devoted to active organization of the international working group which was formally established at the Project's international meeting in October 1982 on the occasion of the 5th Latin American Geological Congress in Buenos Aires. Twenty-one representatives from ten countries attended the meeting. The following countries officially participated in the Project: Argentina, Bolivia, Brazil, Chile, Colombia, Mexico and Venezuela, each with a regional co-ordinator. Two inter-institutional co-operative studies on the Cambrian and the Ordovician, between Argentina and Mexico, and Argentina and Colombia, were agreed upon. A training course of the Project on palaeontology (brachiopods, trilobites, trace fossils and conodonts) for field geologists in the Region, took place at the Cordoba University after the meeting.

At present the project has established 22 themes in its programme: Mexico - 5; Venezuela - 2; Colombia - 3; Chile - 4; Brazil - 1; and Argentina - 7.

Mexico started with the study on the Cambrian sequences at Sonora, especially on the carbonate facies and stromatolite series thereof. Microfacies analysis of the Tremadocian at Oaxaca is also under way in order to identify a link-locality in the migration course of olenellids.

Venezuela and Colombia have shown great interest in the analysis of different coastal and carbonate facies in the Orinoco basin and Los Llanos plains. Tentative studies began with metamorphic and plutonic series in the Oriental Andes and also with lateral relations between the sedimentary sequences at La Macarena and those occurring in El Baul areas.

Chilean scientists are working on the interpretation of the Poquis, Aguada de la Perdiz and Sotoca Formations. The discovery of the Dictyonema flabelliforme zone is very important for palaeogeographical interpretation.

In Northern Argentina, palaeontological studies on trace fossils and conodonts revealed new forms such as Asaphoidichnus sp., Isopodichnus sp. (trace fossils in the Cambrian beds), and especially Corylodus angulatus which appears in the Tremadocian levels in Jujuy.

Representative samples of island arc volcanic rocks and of trilobite/brachiopod assemblages were also studied in several localities including Jujuy, Catamarca and La Rioja.

A tectofacies analysis in the Precordillera has provided evidence for the presence of stages of mobility which concord well with "Cycles" identified in the North American Great Basin.

Activities planned. The second international meeting of the Project has been planned for August 1983 at Cartagena, Colombia on the occasion of the Geological Congress of the Caribbean and in conjunction with the 4th IGCP regional meeting for Latin America.

Field work has also been planned in Mexico (Caborca area), Bolivia (Chiquitos basin) and Brazil (revision of the Camaqua Group).

It has been planned, together with the IUGS Subcommittee of the Ordovician, that IGCP Project 192 will be responsible for the future compilation of the Ordovician Chart of South America.

[Extracted from IGCP publication  
"Geological Correlation,"  
Vol. 11, May 1983].

4 - 14 August 1984

In the Second Circular the Organizing Committee of the 27th IGC have indicated that time and premises will be provided for the following relevant administrative and scientific meetings during the Congress:

Subcommission on Ordovician Stratigraphy  
Working Group on Cambrian-Ordovician Boundary  
Cambrian-Ordovician development in South America (IGCP Project No. 192)

The final dates for acceptance of abstracts and reservation of places in A and C excursions is 1 September 1983.

Organizing Committee will advise participating members of accepted abstracts and places on A and C excursions by 1 December 1983.

Programme includes Theme C.01.1.4 (Problems of Phanerozoic Stratigraphy - zonal stratigraphy, types and correlation of biozonal subdivisions for various groups of fauna and flora; standardization of general stratigraphic units and their boundaries). This theme will be arranged in collaboration with Subcommissions on Stratigraphy of Phanerozoic Systems and working groups on system boundaries.

Excursions which may be of interest to Ordovician workers include the following:

028 A+C - Geology and Mineral Deposits of Lower Palaeozoic of the Eastern Baltic area.

Directors: D. L. Kaljo, P. A. Vingisaar  
Route: Moscow - Tallin - Pyarnu - Tallin - Moscow

General study of Lower Palaeozoic deposits (Cambrian, Ordovician and Silurian), specification of their facies (different facies models of marginal sedimentary basins), stratigraphy (relationship of bio-litho- and cyclostratigraphic schemes) and correlation. There is an opportunity to study the main fossil assemblages and their natural distribution in these basins. In most outcrops, fossils can be collected. Study of the main economic mineral resources of Estonia - oil-shale deposits and shelly phosphorite.

Duration: 6-9 days.  
Transport: airplane (Moscow-Tallin-Moscow), bus (1200 km).  
Cost in Roubles: 280.  
Number of participants: 40.

045 A+C - Geology and Phosphate Deposits of the Lesser and Greater Karatau Ranges (Kazakhstan)

Directors: G. Kh. Ergaliyev, M. A. Kasymov, V. V. Ovchinnikov  
Route: Moscow - Dzhambul - Moscow

The most complete, well exposed and easily accessible section of the Precambrian and early Palaeozoic in Kazakhstan will be studied. Late Precambrian carbonaceous and terrigenous deposits are here composed of numerous bands containing stromatolites and



microfolites. Rich deposits of bedded phosphorites of early Cambrian age will be seen in deep quarries. Special attention will be paid to the study of uninterrupted sections of the Middle and Upper Cambrian and early Ordovician. Due to the presence of numerous pandemic trilobites in the uninterrupted section along the Kyrshabakty river it has been suggested as the standard for the stage and zonal division of the Middle and Upper Cambrian. The section along the Batyrbaisai ravine demonstrates an uninterrupted progressive change of conodont and trilobite assemblages within the Cambrian-Ordovician boundary beds and therefore is suggested as a potential stratotype of the Cambrian-Ordovician boundary.

Duration: 11 days.  
Transport: airplane (Moscow-Dzhambul-Moscow), bus (200 km),  
helicopter.  
Cost in Roubles: 360.  
Number of participants: 40.

#### 058 A+C - Caledonides of the Altai-Sayan Area

Directors: N. A. Berzin, A. A. Mossakovski, S. I. Sherman  
Route: Moscow - Abakan - Shushenskoye - Sayanogorsk -  
Abakah - Kyzyl - Moscow

Study of the late Precambrian and early Palaeozoic stratigraphy, lithology, structures and magmatism within early Caledonian (Northern Sayan ridges) and late Caledonian (Central Sayan ridges) zones and in the Altai-Sayan region. Middle Palaeozoic formations of the Epicaledonian Southern Minusinsk Basin and the Tuva trough. Tectonic relationships of Precambrian, Cambrian and Ordovician formations: monotonous green and variegated flysch and carbonate-terrigenous formations of Upper Cambrian, Ordovician and Silurian in the Central Sayan zone; Silurian and early Devonian granitoid intrusions; late Ordovician pelagic molasse in Tuva, as well as Lower-Middle Devonian formations of the Tuva trough.

Duration: 10 days.  
Transport: airplane (Moscow-Abakan, Kyzyl-Moscow),  
bus (1200 km).  
Cost in Roubles: 400  
Number of participants: 40.

#### 069 A+C - Ordovician-Silurian Boundary in the Omulevskiye Mountains

Directors: M. M. Orodovskaya, R. F. Sobolevskaya  
Route: Moscow - Magadan - Seimchan - field-camp -  
Magadan - Moscow.

The excursion will take place along the eastern slope of the Omulevskiye Mountains, on the left bank of the Kolyma river in the Magadan area. The Mirny stream crosses the eastern slope of the Omulevskiye Mountains, exposing a Palaeozoic section with a thickness of up to 4500 m from the Middle Ordovician to the Lower Devonian. It is possible to study a large and uninterrupted stratigraphic interval. The relative homogeneity of facies allows the development of faunas through time to be traced. Abundant benthic fauna and graptolites in alternate beds. Graptolite zones of world-wide extent and local zones may be identified here, as well as layers with early pentamerids and corals correlated with level 5b in Norway, and assemblages of brachiopods analogous to

those of the Llandoveryan. These conditions make it possible to solve important problems on siting of the upper boundary of the Ordovician and world-wide correlation of different facies.

Duration: 7 days.  
Transport: airplane (Moscow-Seimchan-Magadan-Moscow),  
helicopter.  
Cost in Roubles: 510.  
Number of participants: 25.

#### 100 A+C - Middle Palaeozoic of Southern Tien Shan

Directors: V. A. Lemenovski, R. V. Tzoy  
Route: Moscow - Samarkand - the State Khitab Geological  
Reserve - Samarkand - Moscow

Upper Palaeozoic granitoids, Hercynian structures of the Zeravshan Range, sections of Upper Ordovician, Silurian, Lower and Middle Devonian. All the Palaeozoic deposits are rich in fossil fauna.

Sections showing Ordovician-Silurian, Silurian-Lower Devonian, Lower-Middle and Middle-Upper Devonian boundaries are keys to stratigraphy of Southern Tien Shan.

Historical monuments of Samarkand.

Duration: 8 days.  
Transport: airplane (Moscow-Samarkand-Moscow),  
bus (160-170 km).  
Cost in Roubles: 480.  
Number of Participants: 30.

#### 101 A+C - Variscan-Caledonian Boundary in Central Kazakhstan

Directors: T. O. Feodorov, Yu. A. Zaitsev  
Route: Moscow - Karaganda - Alma-Atinka - Karaganda - Moscow

Lower Palaeozoic jasper-carbonate-basalt and siliceous-terrigenous formations of the eugeosynclinal complex of the Koitas and Karatau mountains: sections of Upper and Middle Ordovician, Lower and Upper Devonian and Lower Carboniferous. Andesite-basalt and liparite-dacite in sections of the Devonian marginal volcanic belt; stratigraphic sections of Silurian and Lower Devonian volcanogeno-sedimentary complex in the Komadyr mountains. Northern parts of Variscan Djourghar-Balkhash system; the folded belt of the Southern Karaganda basin; stratigraphic section of Middle Proterozoic quartzites and schists. Autochthonous granite-gneiss massifs and lower Palaeozoic ophiolite complex.

Duration: 10 days  
Transport: airplane (Moscow-Karaganda-Moscow),  
helicopter, bus (1100 km).  
Number of Participants: 20.

All correspondence concerning IGC and excursions should be sent to:

Secretariat, Organizing Committee of 27th I.G.C.,  
Institute of the Lithosphere of Academy of Sciences of the  
U.S.S.R., 22, Staromonetny, Moscow, 109180, U.S.S.R.

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3. The Ordovician-Silurian boundary in southeastern Skane (Scania), South Sweden, by J. Bergström.
4. Skanska Cement, Core No. 27, western Scania, Sweden, by R. Nilsson.
5. Belgium, by F. Martin.
6. Limite Ordovicien Silurien en France, by C. Babin.
7. Interlake Area, Manitoba, Canada (preliminary), by H. R. McCabe.
8. Aspects du problème de la limite Ordovicien-Silurien au Maroc, by J. Destombes and S. Willefert.
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