back to the leaders of the working group for revision. We hope we can submit the proposals to ICS for voting if the SPS committee pass these two proposals. This is the priority work to do for the SPS recently.

I would thank Charles Henderson and Lance Lambert for their kind guidance and joint work in the Guadalupe National Park on the Guadalupian Series. Three GSSP markers were placed on the GSSP sections (see cover photo). I would also thank Drs. Jonena Hearst and Pierce Karl of the Guadalupe National Park for their kind support and permission in the field work. We collected more than 1000 kg samples for various studies.

I would thank Jörg Schneider, Hans Kerp, Werner, Buggisch, Michael Joachimski, Karl Krainer, Evelyn Kustatscher, Frank Scholze, Ronny Rößler, Ralf Werneburg, Sebastian Voigt for their wonderful organization and kind guidance of the Sino-German joint field excursion in Europe and Alps for the Chinese team. During this field trip, we have investigated the Pennsylvanian, Permian, Triassic sequences and various marine and terrestrial fossils in Germany and Alps (see a brief report by Wang, Shen and Schneider in this issue).

I would also thank Lucia Angiolini, Maryam Bahrammanesh, Syrus Abbasi for their kind guidance for the field work in the Kuh-e-Alibashi sections. Now it is quite clear that the section at Locality 4 measured by Teichert et al. (1973) represents the Dzhulfian Stage only and the section at Locality 1 represents the Dorashamian Stage and extends to the lowest Triassic (see reports by Angiolini et al. and Ghaderi et al. in this issue).

An SPS and SCS joint business meeting was held during the international meeting on the Carboniferous-Permian transition held between May 20-22, 2013 in the New Mexico Museum of Natural History and Science, Albuquerque, New Mexico, USA. Both subcommissions and about twenty participants agreed that a joint working group on the correlation between marine and nonmarine sequences of the Carboniferous-Permian transition should be organized. SCS chair Barry Richards came to Nanjing in October, 2013 and we met again. We emphasized that it is important to organize this working group. We welcome your suggestions and participation of the working group.

The SPS Annual Report 2013, which will be submitted by the end of December, is also included in this issue. The latest Permian timescale is available at http://permian.stratigraphy.org/per/per.asp, which was published by Shen et al. (2013, pdf is available at http://permian.stratigraphy.org/files/20130721210111619.pdf). Lucia Angiolini also updated the corresponding members of the Permian Subcommission. We look forward to your comments, suggestions and contributions.

REPORTS

Subcommission on Permian Stratigraphy

Annual Report 2013

1.**TITLE OF CONSTITUENT BODY and NAME OF REPORTER**

International Subcommission on Permian Stratigraphy (SPS)

Submitted by:

Shuzhong Shen, SPS Chairman

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2.OVERALL OBJECTIVES, AND FIT WITHIN IUGS SCIENCE POLICY

Subcommission Objectives: The Subcommission's primary objective is to define the series and stages of the Permian, by means of internationally agreed GSSP's, and to provide the international forum for scientific discussion and interchange on all aspects of the Permian, but specifically on refined regional correlations.

Fit within IUGS Science Policy: The objectives of the Subcommission involve two main aspects of IUGS policy: 1. The development of an internationally agreed chronostratigraphic scale with units defined by GSSP's where appropriate and related to a hierarchy of units to maximize relative time resolution within the Permian System; and 2. Establishment of framework and systems to encourage international collaboration in understanding the evolution of the Earth during the Permian Period.

3a.CHIEF ACCOMPLISHMENTS AND PRODUCTS IN 2013

Progress was made on the three remaining Lower Permian (Cisuralian) stage GSSPs including Sakmarian-base, Artinskian-base, and Kungurian-base, two proposals for the Kungurian-base GSSP were voted within SPS voting members, but the voting was suspended because one of the voting members circulated his vote with his favorite opinion during the last stage of voting. Although the voting continued until the deadline, no consensus was reached. Thus, SPS suggested more work to do for both candidates and will open a new voting process for those two proposals in the next future. An SPS business meeting was held on the 21st of May, 2013 at Albuquerque, New Mexico, USA during the Carboniferous-Permian Transition Meeting. Two executives and four voting members attended the workshop.

In addition, the proposals of the Sakmarian-base and Artinskian-base GSSPs are are ready prepared by a working group led by Valery Chernykh and Charles Henderson. These two proposals are published in this issue of *Permophiles*. After the proposals are published, a one-month term for discussion will be set up, followed by a voting process within SPS voting members in 2014.

In addition, we have organized an international group to do a joint field excursion on the Guadalupian Series in West Texas in May, 2013. During this field excursion more than 800 kg samples were collected for conodonts and high-resolution geochemistry. Three GSSP markers were placed at the GSSP sections.

3b List of major publications of subcommission work (books, special volumes, key scientific paper)

One issue of *Permophiles* (Issue 57) has been published in March 2013. Another issue is nearly ready to be finished. We will

publish Issue 58 before the end of this year.

Two volumes of special issues on the Carboniferous-Permian Transition have been published in 2013. These two special issues have been edited by Spencer Lucas (Bulletin 59 and 60 of New Mexico Museum of Natural History & Science). More than 100 papers/abstracts including a latest Permian timescale (Shen et al., 2013) have been published in these two special issues.

3c. Problems encountered, if appropriate

We have encountered a problem when we voted for the two proposals of the Kungurian-base GSSP candidates. One of the voting member circulated his vote with his favorite opinion during the last voting stage, thus the voting was suspended.

4a. OBJECTIVES AND WORK PLAN FOR NEXT YEAR (2014)

The primary objectives are to complete the last three GSSPs (Sakmarian, Artinskian, and Kungurian stages). We will publish the two proposals of the Sakmarian-base and Artinskian-base GSSPs in the forthcoming issue of *Permophiles* in 2013.

4b. Specific GSSP Focus for 2014

The priority of 2014 for GSSP is voting for the proposals of the Artinskian-base and Sakmarian-base GSSPs which are available.

5. SUMMARY OF EXPENDITURES IN 2013

A completely new website for SPS was established (http://permian.stratigraphy.org/index.asp). This website costs US$1290. Both SPS Secretary Lucia Angiolini and the former SPS Chair Charles Henderson visited Nanjing in in February, 2013 for *Permophiles* and field work in Laibin, Guangxi Province. The fund from ICS has been partly spent on paying their stay in Nanjing (US$1320). As invited by ICS, SPS chair Shuzhong Shen attended the 1st International Congress on Stratigraphy which was held in Lisbon (US$3174.6). Originally, a part of the cost to attend the congress in Lisbon should have been paid by the funds from ICS according to the Budget established in 2013, however, the expenditure has been much beyond the funds given by ICS ($2000), thus all the costs for the congress have been paid by Shuzhong Shen's project money. In addition, four bronze markers for three Guadalupian GSSPs have been made in China, and they costed $200.

6. BUDGET REQUESTS AND ICS COMPONENT FOR 2014

1)An international symposium on the Permian issues in early 2014 has been proposed by SPS Vice-Chair Joerg Schneider. We will organize a SPS business meeting to solve the last GSSP (Kungurian-base GSSP) problem and future directions for SPS ($2500). The money will be used to support the participation of some colleagues who lack funding.

2)Supporting Lucia Angiolini (SPS secretary) to come to Nanjing in March, 2014 for *Permophiles* and discussion on the plan for completion of the Sakmarian-base and Artinskian-base GSSPs within 2014: US$1500.0

3)Supporting Charles Henderson who is in charge of the two proposals to come to Nanjing in March, 2014 to 1) revise proposals, prepare voting process for the Sakmarian-base and Artinskian-base GSSPs; 2) consider and discuss a possible replacement of the Lopingian-base GSSP nearby the Penglaitan GSSP section, because the current GSSP section will be flooded within about 5-8 years, and consult local officials regarding the protection of the GSSP ($1000).

In total: US$5000.00

APPENDICES

7.CHIEF ACCOMPLISHMENTS OVER PAST FIVE YEARS (2009-2014)

1)Three GSSP bronze markers have been placed on the GSSPs in the Guadalupe National Park in USA.

2)A new executive committee of SPS has been elected and nominated. Shuzhong Shen has been elected as the new chair, Jörg Schneider has been elected as the new vice-chair and Lucia Angiolini has been nominated as the new secretary of SPS. Four voting members have been replaced by new members.

3)A high-resolution timescale of the Permian system has been significantly refined (see SPS webpage Permian Timescale).

4)SPS decided to search new GSSP candidate for the Kungurian Stage after an investigation on the previous candidates. Now two candidates for the Kungurian-base GSSP are available, but further work is necessary before a voting process is conducted.

5)Significant progress on the Sakmarian-base and Artinskian-base GSSP candidates has been made. Proposals for voting will be published soon.

6)Two monuments have been built and a protected area has been established at Penglaitan, Laibin, Guangxi Province, China for the Wuchiapingian-base GSSP.

7)Five formal issues and two supplementary issues of *Permophiles* have been published since 2009.

8. OBJECTIVES AND WORK PLAN FOR NEXT 4 YEARS (2014-2018)

1)Establishing the three GSSPs for the Cisuralian.

2)Establishing a working group on the Guadalupian and global correlation for chemostratigraphy and geochronologic calibration.

3)Developing a large working group on the correlation between marine and continental sequences. This has already been initiated.

9. ORGANIZATION AND SUBCOMMISSION MEMBERSHIP

9a Names and Addresses of Current Officers and Voting Members

See new officers and voting members since August, 2012 in this issue.

9b List of Working (Task) Groups and their officers

1)Kungurian-base GSSP Working Group; Chair-Bruce Wardlaw.

2)Sakmarian-base and Artinskian-base GSSPs Working Group; Chair-Valery Chernykh and Boris Chuvashov respectively.

3)Guadalupian Series and global correlation; Chair-Charles Henderson.

4)Correlation between marine and continental Permian System; Chair-Joerg Schneider.

5)Neotethys, Paleotethys, and South China correlations; Chairs Lucia Angiolini and Yue Wang.

9c Interfaces with other international project

SPS interacts with many international projects on formal and informal levels. SPS has taken an active role in the development of a project on the correlation between marine and continental Permian sequences bilaterally supported under the foundation of the Sino-German Centre for Research Promotion (SGCRP) by NSFC and DFG. SPS is also involved in a NSFC supported key study of major biological events in the Palaeozoic. Shuzhong Shen and Yue Wang are focused on establishing a section-based Permian database in Geobiodiversity Database which has been basically completed.

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The Reality of GSSPs

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Summary

The proposal that chronostratigraphic and geochronologic units are un-necessary and confusing is based on a mistaken concept of GSSPs. Each GSSP does represent a specific point in time, and two successive GSSPs do mark the beginning and end of an interval of time that is a geochronologic unit. But the supposition that this unit in time then serves to define a corresponding chronostratigraphic unit is mistaken. First, there were chronostratigraphic units and geochronologic units more than 100 years before there were GSSPs. The historical chronostratigraphic units that are the basis for much of the Geological Time Scale were defined on distinctive stratigraphic successions, and the time during which it was deposited is the corresponding geochronologic unit. GSSPs were established to identify specific stratigraphic levels that define the bases of the chronostratigraphic units and to resolve the problems when gaps and overlaps between successive units were later discovered. Unfortunately, the GSSP for a specific boundary is too often presented only as the single stratigraphic signal at which the boundary is placed in the stratotype section. Yet, in reality it only has significance for chronostratigraphic correlation when compared to the distribution of other stratigraphic signals in the boundary interval.

Keywords: GSSP, chronostratigraphy, geochronology,

The International Commission on Stratigraphy (ICS) was founded with its primary objective being the establishment of a single, hierarchal set of global chronostratigraphic units (stages, series, and systems) with lower boundaries defined by GSSPs (Global Standard Stratotype Section and Point). With 63 of the 100 stages boundaries of the Phanerozoic now defined by GSSPs and with a single set of standard global units mostly identified, considerable progress has been made in developing the ICS Chronostratigraphic Chart. With the addition of well-calibrated numerical ages for many stage, as well as series and system, boundaries, the ICS Chart is now widely recognized as the global standard Geologic Time Scale. The ICS concept of GSSPs was first explained in the 1st edition of the International Stratigraphic Guide (Hedberg, 1976) and further elaborated in the 2nd edition (Salvador, 1994). However, GSSPs have come to mean something different to some stratigraphers and the correlation of GSSPs is too often misrepresented.

Zalasiewicz et al. (2004) proposed that the distinction between time-rock units and time units is no longer necessary because of the widespread adoption of GSSPs "in defining intervals of geologic time within rock strata." Because GSSPs are placed at stratigraphic horizons that also represent specific points in time, two successive GSSPs define an interval of time that is a geochronologic unit (period, epoch, age), and all strata interpreted as deposited during that interval of time would comprise the corresponding chronostratigraphic unit (system, series, stage). For this reason, Zalasiewicz et al. (2004) argue that the dual classification of chronostratigraphic and geochronologic units is not necessary and leads to confusion, and for these reasons proposed the exclusive use of geochronologic units. After a decade of discussions on the issue, Zalasiewicz et al. (2013) accepted and further clarified the nature and use of the dual classification. Nevertheless, the concept that GSSPs define geochronologic units and that a chronostratigraphic unit is the strata deposited during the time defined by the geochronologic unit is still widely held (e.g., Gradstein et