

SEDDBA 在沉积学中的应用: 信息不足、需要垂向岩性 剖面 and 沉积构造序列

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IGCP-269-SEDDBA 项目——全球沉积岩数据库是一个对沉积学有很大价值的极好国际项目。以挑剔的眼光来看待这一数据库时,发现 SEDDBA 的信息不足,需要改进。这些不足包括:(1)信息空间不足;(2)信息含糊;(3)信息的分类整理不当;(4)缺乏对信息的详细分类;(5)无关的和不要的信息。其次,SEDDBA 仅局限于沉积岩。为了将 SEDDBA 应用于沉积学,使其更为有用、更具意义,有必要进行一些改进。这些改进包括:(1)岩性图和岩相图;(2)盆地构造-沉积演化阶段图;(3)盆地构造图;(4)补充垂向岩性剖面 and 岩性测井记录;(5)沉积构造序列;(6)该地区的地质剖面;(7)其它重要图片。

APPLICATION OF SEDDBA TO SEDIMENTOLOGY: DEFICIENCIES OF INFORMATION AND NEED OF VERTICAL PROFILES OF LITHOLOGY AND SEQUENCES OF SEDIMENTARY STRUCTURES

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ABSTRACT

Project IGCP-269-SEDDBA, a Global Database in Sedimentary Petrology is a wonderful international project that would be of immense value to sedimentology. While examining the database critically it was observed that there are some deficiencies of information in SEDDBA and

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need rectification. Deficiencies are regarding (1)insufficient space for information, (2)ambiguity in information, (3)improper arrangement of information, (4) lack of further subdivision of information and (5)irrelevant and unnecessary information. Secondly, SEDBA is restricted to sedimentary petrology only. To apply SEDBA to sedimentology some modifications are essential to make it more useful and meaningful. These modifications may be regarding inclusion of (1)lithological and Lithofacies maps, (2)diagrams and figures showing stages of tectono-sedimentary evolution of the basin, (3)maps and diagrams showing basin configuration, (4)provision for vertical profiles of lithology and lithologs, (5)sequences of sedimentary structures, (6)geological cross-sections of the area and (7)other important figures and photographs.

DEFICIENCIES OF INFORMATION IN SEDBA

Critical examination of SEDBA during storing of data collected by the South Asian Regional Group and interaction amongst geoscientists, specially sedimentologists, in a special meeting held during the First South Asia Geological Congress, Islamabad (Pakistan) February 1992, it was observed that there are some deficiencies of information reflected in the Encoding Text Book (Ploquin, 1991). Categorically, deficiencies may be divided into following groups:

1. INSUFFICIENT SPACE FOR INFORMATION

In SEDBA, space available for some of the informations is not sufficient and more space is required.

For example in HEADER SHEET (Page 53 of the Encoding Text Book. by Ploquin, 1991.) space provided for LOCALITY is not sufficient.

2. AMBIGUITY IN INFORMATION

Some of the terms used in SEDBA to denote certain informations are ambiguous and do not adhere strictly to the scientific connotation. Such terms should be replaced by proper words.

For example in SPECIALIZED SHEET FOR CHERTS (Page 65) under the heading THE COUNTRY ROCK both "SEDIMENTARY ENVIRONMENT and IGNEOUS ENVIRONMENT" are ambiguous terms at this place.

3. IMPROPER ARRANGEMENT OF INFORMATION

At places some of the informations have not been provided at proper places and these informations need rearrangement.

For example in the SPECIALIZED SHEET FOR COAL/LIGNITE, the terms FOLDING and FAULTING have been placed at different place, far off from DEFORMATION.

4. LACK OF FURTHER SUBDIVISION OF INFORMATION

Some of the informations in SEDBA need further subdivision to clarify the intension.

For example in the SPECIALIZED SHEET FOR PHOSPHATES under the heading PHOSPHATE BEARING UNIT sub-heading STOMATOLITIC STRUCTURE while de-

scribing the TYPE it should be followed by the reference of the classification on which the TYPE has been specified.

5. IRRELEVANT AND UNNECESSARY INFORMATION

In SEDBA, it has also been observed that some of the informations included are irrelevant and unnecessary. Such informations must be removed.

For example in DATA SHEET FOR HEAVY MINERALS, instructions for the user are given at the bottom of the sheet. These instructions are unnecessary in the DATA SHEET. This part could better be included in Text Book only.

CRITICAL ANALYSIS OF SEDBA

HEADER BLOCK COVER—2 (Page 50)

Under the heading SEDBA ROCK, there is an oblique mark (/) between carbonates and evaporites as well as between coal and lignite. This oblique mark should be replaced by the word 'and'.

Secondly, there are separate SPECIALIZED SHEETS for CLASTICS and PYROCLASTICS. Therefore there is no need to club these two rock types by a sign of plus.

HEADER SHEET (Page 53)

In the HEADER SHEET under the heading LOCATION, there is no provision for District. Space for LOCALITY is not sufficient. The word PUBLIC DOCUMENT should be replaced by PUBLIC DOCUMENT OR PRIVATE DOCUMENT.

Under the heading SAMPLE PRESERVATION, space for location "WHERE" is not sufficient.

Information regarding COLOUR should go to physical properties. Similarly, information about SPECIMEN SOURCE is incomplete and ambiguous.

Heading NAME OF THE AREA should be more specific whether geological or geographical name of the area.

Under the heading SURROUNDINGS, term HOST ROCK is ambiguous and needs clarification.

Terms DEPOSITIONAL PROCESS and DEPOSITIONAL ENVIRONMENT need further subdivisions to specify particular process and environment of deposition.

Space provided for information like TECTONIC SETTING and PALAEOGEOGRAPHY is not sufficient.

GRADE OF METAMORPHISM should also be added to the METAMORPHISM TYPE.

Heading DEFORMATION should be subdivided into TYPE and INTENSITY. Here also the space provided for the information is not sufficient.

SPECIALIZED SHEET FOR CLASTICS (Page 59)

In the SPECIALIZED SHEET FOR CLASTICS under the heading NEAR SUR-

ROUNDING AREA, the word REGIONAL is not appropriate. Under the heading LITHOLOGICAL UNIT, the term NATURE OF OVERLYING BED and UNDERLYING BED is not clear whether it pertains to composition, texture or bed form. There should be a complete sequence of sedimentary structures under the heading SAMPLE and not simply top, internal and bottom structures as mentioned in the SEDBA.

In the same SHEET, information about the TEXTURE has not been arranged properly. GRAIN CONTACT should be further subdivided into: WELDED, CEMENTED and MATRIX SUPPORTED. Under the heading DIAGENETIC CHANGES both TYPE OF DIAGENESIS and DIAGENETIC STRUCTURES should be there. Space for COMMENT in this heading is not sufficient.

SPECIALIZED SHEET FOR PYROCLASTIC ROCKS (Page 61)

In this SPECIALIZED SHEET under subheading COMMENT on COMPOSITION, space provided for the information is quite insufficient. Secondly, under the heading WHOLE ROCK, explanation for PYROCLASTIC, VOLCANOGENIC and EPICALASTIC on the SPECIALIZED SHEET is unnecessary and unwanted. This explanation occupying considerable space should be removed from the SPECIALIZED SHEET.

SPECIALIZED SHEET FOR CARBONATES AND EVAPORITES (Page 63)

First of all, it is not clear whether this SPECIALIZED SHEET includes chemically precipitated carbonates, detrital carbonates or both together. In case both the types of carbonates are incorporated in the SHEET every information of CLASTICS as well as those of chemogenic sediments should be there in the SPECIALIZED SHEET. Specially, provision for both the types of microstructures and textures should be there. Most of the informations provided on the SPECIALIZED SHEET pertains to detrital carbonates.

Secondly, informations like PERMEABILITY its TYPE and PERCENTAGE are missing in the SPECIALIZED SHEET.

SPECIALIZED SHEET FOR CHERTS (Page 65)

In this SHEET under the heading THE COUNTRY ROCK, the terms SEDEMMENTARY ENVIRONMENT and IGNEOUS ENVIRONMENT are quite ambiguous at this point. Proper words reflecting information clearly should be substituted. Under the heading STRUCTURES DESCRIBED IN THE SAMPLE complete sequence of sedimentary structures and profile of lithology should be added.

SPECIALIZED SHEET FOR METALLIFEROUS DEPOSIT (Page 76)

Under the heading NEAR SURROUNDING AREA, word REGIONAL is bit ambiguous. It does not specify the information required. There should be provision for at least 4 - 5 SECONDARY METALS under the heading THE METALLIFEROUS DEPOSIT which also be replaced by DETAILS OF THE DEPOSIT to avoid repetition. In this SHEET also TEXTURE needs some reorganization. Word PERMEABILITY should be replaced by PERMEABILITY TYPE and PERCENTAGE. Under the same heading SPHERICITY should also be there with ROUNDNESS and both these terms should be

specified for larger grains, smaller grains and matrix.

SPECIALIZED SHEET FOR PHOSPHATES (Page 69)

In this SPECIALIZED SHEET, also the word REGIONAL is not appropriate under the heading NEAR SURROUNDING AREA. Information TYPE OF DEPOSIT needs further subdivision into: (1) CHEMOGENIC, (2) ALOGENIC, and (3) BIOGENIC. Similarly, MAIN CHARACTERISTICS should also be further divided into PRIMARY and SECONDARY.

Under the heading STROMATOLITIC STRUCTURES, word TYPE should be followed by at least two stage classification (Group and Form) and its reference. Secondly, under the heading SHAPE, there should be provision for further subdivision into: (1) SH, (2) LLH and (3) LLH — SH. In the same heading, orientation of the stromatolitic structures would be useful informations like (1) MODE OF OCCURRENCE, (2) MODE OF BRANCHING, (3) NATURE OF LAMINAE, (4) NATURE OF MARGINAL ZONE etc. would be quite useful under the heading STROMATOLITIC STRUCTURES.

In the main heading SAMPLE, a complete sequence of sedimentary structures and profile of lithology will be more meaningful. Information regarding DIAGENETIC STRUCTURES is missing in the SPECIALIZED SHEET.

Information about TEXTURE (Page 70) needs reorientation in the SPECIALIZED SHEET FOR PHOSPHATES. As in the case of other SPECIALIZED SHEETS, here also PERMEABILITY needs further subdivision into TYPE and PERCENTAGE. Information about SPHERICITY is required with the ROUNDNESS and both these informations should be available for (1) large grains, (2) small grains, and (3) matrix.

Under the heading ORGANIC CONTENT both TYPE and PERCENTAGE should be added. Word P O CONTENT would be more appropriate in place of PHOSPHATIC CONTENT.

SPECIALIZED SHEET FOR COAL/LIGNITE (Page 71)

In this SPECIALIZED SHEET under the heading THE COAL-BEARING SERIES, the term NAME OF THE SERIES should be further elaborated as NAME OF THE STRATIGRAPHIC SERIES. Under the heading THE SEAM, information like DIP and STRIKE should be placed under separate subheading PRESENT ORIENTATION OF SEAM. Term DEVELOPMENT appears to be ambiguous under the subheading SUBORDINATE. This could better be replaced by the term MODIFICATIONS OR ALTERATIONS.

Similarly, information DEFORMATION should be further subdivided into (1) TYPE and (2) INTENSITY, and terms FAULTING and FOLDING should go to the TYPE together with SHEARING etc. In this SHEET, some of the words like PALEOGEOTHERMICAL (PALEOGEOTHERMAL) and AVERAGED (AVERAGE) need spelling correction. Word LOCAL SPECIMEN under the heading SEAM SAMPLE OR HAND SPECIMEN is quite ambiguous and unnecessary. Similarly, terms POST SEDIMENTARY and

DIAGENESIS EVENT on the same SHEET (Page 72) may be replaced by more appropriate words like POSTDEPOSITIONAL and DIAGENETIC CHANGES respectively. Information BIOGENIC STRUCTURES needs further subdivision into (1) FAUNA, (2) FLORA, and (3) TYPE.

DATA SHEETS

While examining different DATA SHEETS it has been observed that explanatory descriptions provided at the site of the foot note in the following DATA SHEETS, are unnecessary and should be removed from the DATA SHEETS and should be included in the Encoding Text Book (Ploquin, 1991).

1. DATA SHEET FOR CHEMICAL ANALYSIS (Page 73)

2. DATA SHEET FOR MODAL ANALYSIS AND COMPONENTS ANALYSIS (Page 77).

3. DATA SHEET FOR FLUIDS (Page 82).

4. DATA SHEET FOR FOSSILS OR PALYNOLOGY (Page 83).

5. DATA SHEET FOR HEAVY MINERALS (Page 87).

DATA SHEET FOR PHYSICAL AND ENGINEERING PROPERTIES

In this DATA SHEET under the heading PHYSICAL PARAMETERS two more parameters STRENGTH and COMPACTNESS should be added. Secondly, heading ENGINEERING PARAMETERS require spelling correction.

ADDITIONAL INFORMATION REQUIRED

Sedimentology, a term proposed by Wadell (1932) is most simply defined as the scientific study of sediments (Friedman and Sanders, 1978). Sedimentology includes sedimentation, the scientific study of;

1. SEDIMENTARY PROCESSES (except diagenesis).

2. SEDIMENTARY PETROLOGY — The petrographic study and genetic interpretations of sedimentary rocks.

3. STRATIGRAPHY (Grabau, 1913; Dunbar and Rodgers, 1957; Weller, 1960) the scientific study of strata, of palaeogeography and palaeoecology.

4. SEDIMENTARY TECTONICS — the scientific study of the tectonic aspects of sedimentary strata.

The main objective of sedimentology as per Friedman and Sanders (1978) is to enable a geologist to interpret the vertical and lateral relationship of sedimentary strata.

The project IGCP-269-SEDBA is basically a database in sedimentary petrology and covers only a fraction of sedimentology which includes the study of;

1. Environment of deposition (Reineck and Singh, 1980).

2. Palaeogeography.

3. Palaeoclimate.

4. Palaeoecology.

5. Lithological correlation.

6. Lithological associations.

7. Sedimentary facies.

8. Tectono-sedimentary evolution.

If we wish to make applications of SEDBA to sedimentology, the following informations will have to be included in the data base:

1. Vertical profiles and sequences of

A. Lithological composition.

B. Texture.

C. Sedimentary structures

2. Lithological and lithofacies maps.

3. Three-dimensional diagrams of basin configuration.

4. Recording information of lithologs available.

5. Diagrammatic presentation of stages of tectono-sedimentary evolution.

6. Geological cross-sections of the area.

7. Important photographs and diagrams etc.

CONCLUSIONS

IGCP-269-SEDBA, a Global Database in Sedimentary Petrology was examined critically and on discussion amongst geoscientists, researchers and users (people involved in mining industries) at a number of national meetings in India and interaction during First South Asia Geological Congress, Islamabad (Pakistan) Feb., 1992. It was observed that the project provides valuable information on sedimentary petrology. But there are some deficiencies still left in the database. Categorically these deficiencies are regarding: (1) insufficient space for information, (2) ambiguity in information, (3) improper arrangement of information, (4) lack of further subdivision of information, (5) irrelevant and unnecessary information in the proposed database.

Secondly, SEDBA exclusively pertains to sedimentary petrology. To use in the sedimentology as a whole which includes study of different aspects like: environment of deposition, palaeogeography, palaeoclimate, palaeoecology, lithological correlation, lithological association, sedimentary facies and tectono-sedimentary evolution, some modifications in SEDBA are quite essential. Modifications suggested in the present proposal include provision for additional information like: (1) lithological and lithofacies maps, (2) diagrammatic presentation of stages of tectono-sedimentary evolution, (3) maps and figures showing basin configuration, (4) vertical profiles of lithological composition and texture, (5) sequences of sedimentary structures, (6) geological cross-sections of the area, and (7) provision for some photographs and figures revealing important information on the study. With these proposed modifications SEDBA will be an important and useful document of sedimentology.

ACKNOWLEDGMENT

Author is grateful to the Indian National Science Academy, New Delhi and the Organizing Committee of International Symposium on Applications of Computer and Database to Sedimentology, Chengdu (China) July, 1994 for the partial financial assistance to participate in the Symposium. Mrs. Shakuntala helped a lot in preparing the text and offered valuable suggestions during the discussion. Thanks are due to Dr. S. C. Mathur and Mr. R. D. Dhanadia for their help.

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