Stratigraphic Units of Viet Nam

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CONTENT

PREFACE

The geology of Viet Nam's territory has been regularly studied for over a century, during which nearly 8.000 research works on the geology of Viet Nam were published. Important successes in stratigraphy have been achieved, which play the key role in understanding the structure and geological history of the country's bedrock.

In the twentieth century over 500 stratigraphic unit names have been published or proposed, and a lot of them became popular in the Vietnamese geological language. Before the 50's of the last century stratigraphic research was carried out by French and other foreign geologists, who used different styles. At that time a great number of stratigraphic units were described using different stratigraphic conceptions. The stratigraphic terms have rapidly increased more recently, when geological mapping at 1/200 000 and 1/50 000 was carried out.

Though the Stratigraphic Code of Viet Nam has been approved and published (1994) many junior Vietnamese geologists understood the lithological properties of the lithostratigraphic unit as rigid and usually describe a new unit and use a new term, although there is only a facies change of a previously defined unit. As a result, the number of stratigraphic terms increased rapidly resulting in an unduly complicated picture. In this situation, an assessment of the validity of Viet Nam's stratigraphic units becomes pressing, and a revision of Viet Nam's stratigraphic units, including those of the continental shelf and the subsurface on the mainland, is presented in this work.

The Quaternary sediments are distinguished by their special characteristics, and many units were described, but there still are disagreements on the principles of their division in Viet Nam. They should be dealt with in another work. Therefore in the "Stratigraphic units of Viet Nam" the units from Precambrian to Neogene are dealt with, but Quaternary sediments will be described only in the Neogene - Quaternary units.

According to the "Stratigraphic Code of Viet Nam" (1994) effusive bodies are not described as stratigraphic units if there are no sedimentary interbeds in their sequences. However, there are, in fact, bedded effusive bodies situated in clearly stratigraphic sequences, and having clear relations with the adjacent units. In following the regulation of the "Stratigraphic Code of Viet Nam", they will be described as stratigraphic units in this work.

In former works stratigraphic units from oldest to youngest were usually described in the frame of the regions determined in accord with present geological structure. The territory of Viet Nam includes the mainland and the vast marine shelf belonging to different geological structural units. In the historical development of regional geology the structural units have changed, and there are no stable units through all geological periods for tens and hundreds of millions of years. For this reason, in the "Stratigraphic units of Viet Nam" the regional division for the stratigraphic description is not fixed through all great stratigraphic intervals, but each has its own scheme. In general the scheme of

the regional division is based on the paleobasin analysis presented in chapter 3, but each scheme has its distinguishing features according to the characteristics of the units.

At present there are many problems in the stratigraphy of the country that are debated in geological circles. For the main problems the editor has referred to the "Stratigraphic Code of Viet Nam" and resolved them on the basis of new materials gathered by other geologists. In some acute cases the editor and concerned colleagues carried out field investigations for finding the best resolution. Nevertheless many new problems are expected that will need detailed studies in the near future. For instance, the case of the Ta Khoa, Ngoc Lam formations, and Nam Cuoi Complex, as well as many effusive - sedimentary formations etc.

Authors of this monograph are geologists from different research institutions of Viet Nam, and they are as follows. Chapter 1 (Sedimentary paleobasins) – Tran Van Tri (TVT), Tong-Dzuy Thanh (TDT), and Vu Khuc (VK); Chapter 2 (Precambrian) – Tran Tat Thang (TTT), Trinh Van Long (TVL); Chapter 3 (Lower Paleozoic) – Pham Kim Ngan (PKN), Tran Huu Dan (THD), Ta Hoa Phuong (THP), Tong-Dzuy Thanh, Nguyen Huu Hung (NHH), and Pham Huy Thong (PHT); Chapter 4 (Devonian) – Tong-Dzuy Thanh, Nguyen Huu Hung (NHH), Ta Hoa Phuong (THP), Pham Huy Thong (PHT), and Tran Van Tri (TVT); Chapter 5 (Upper Paleozoic) – Doan Nhat Truong (DNT), Tong-Dzuy Thanh; Chapter 6 (Mesozoic) – Vu Khuc, Dang Tran Huyen (DTH). Chapter 7 (Cenozoic) – Tertiary Units on mainland and on the Bach Long Vi Island were described by Vu Khuc (VK), Tong-Dzuy Thanh (TDT) and Nguyen Dich Dy (NDD) based on materials of Trinh Danh, Tran Dinh Nhan, Nguyen Dich Dy, Pham Quang Trung and others, which have been published or stored in Archives (see References); Do Bat (DB) described Tertiary Units on continental shelf and subsurface units on mainland. The Content, Index of geographic and geologist names, and Index of stratigraphic names were compiled by Tong-Dzuy Thanh and Vu Khuc. The detailed author index of items in each chapter will be indicated in the Contents by the abbreviation of the author names as shown above.

The monograph "Stratigraphic units of Viet Nam" is an improved work of the Research Project KT 01.05 (1990-1995) led by Tong-Dzuy Thanh. It includes materials of the authors carried out over many years in their research and that of colleagues published at home and abroad, and some materials conserved in the geological Archives are also referred to. The manuscript was accomplished in the framework of the Fundamental Research Program (Project 721101. *Assessing the validity of stratigraphic units of Vietnam* – 2001-2003 led by Tong-Dzuy Thanh). The realization of this Project and the accomplishment of the manuscript was supported by the Council for Natural Sciences, the Council of Earth Sciences, the College of Natural Sciences (Vietnam National University, Ha Noi), and the Department of Geology & Mineral Resources of Viet Nam. The authors are deeply grateful for the valuable support of the named organizations.

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