Sedimentology and Stratigraphy

JUDITH ROSALES

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Sedimentology studies sand, mud (or silt) and clay, and the various ways they are deposited. Using these studies, sedimentologists apply their understanding of modern processes to ancient rock, to try to understand how it formed. Most of the rocks on earth are sedimentary rocks, and it is in these kinds of rocks you find fossils and many of the other historical markers. Sedimentary rocks are also where petroleum deposits are found. Sedimentology is tied to stratigraphy, which studies the relationships between rock layers and how they can shift and move. This also affects where petroleum deposits can be found, as well as how the extraction of petroleum affects the sediment around the deposit. Sedimentary rocks cover up to 75% of the Earth's surface, record much of the Earth's history, and harbor the fossil record. Sedimentology is closely linked to stratigraphy, the study of the physical and temporal relationships between rock layers or strata. The premise that the processes affecting the earth today are the same as in the past is the basis for determining how sedimentary features in the rock record were formed. The aim of sedimentology, studying sediments, is to derive information on the depositional conditions which acted to deposit the rock unit, and the relation of the individual rock units in a basin into a coherent understanding of the evolution of the sedimentary sequences and basins, and thus, the Earth's geological history as a whole.

The scientific basis of this is the principle of uniformitarianism, which states that the sediments within ancient sedimentary rocks were deposited in the same way as sediments which are being deposited at the Earth's surface today. This Text introduces the reader to sedimentology and stratigraphic principles, and provides tools for the interpretation of sediments and sedimentary rocks.

Prof. Judith is an Ecologist and Environmental Specialist with more than 30 years of academic and consulting experience. She holds a PhD in geography from the University of Birmingham UK and wrote the PhD and Master Academic Programs of Environmental Sciences for the Universidad de Guayana, Venezuela.

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About the Editor

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List of Abbreviations

ESR	Especially Siliciclastic Rocks
ECR	Especially Carbonate Rocks
GMPTS	Global Magnetic Polarity Time Scale
PES	Particle Erosion Simulator
SAR	Synthetic Aperture Radar
SSD	Soft Sediment Deformation

Preface

Sedimentology studies sand, mud (or silt) and clay, and the various ways they are deposited. Using these studies, sedimentologists apply their understanding of modern processes to ancient rock, to try to understand how it formed. Most of the rocks on earth are sedimentary rocks, and it is in these kinds of rocks you find fossils and many of the other historical markers. Sedimentary rocks are also where petroleum deposits are found. Sedimentology is tied to stratigraphy, which studies the relationships between rock layers and how they can shift and move. This also affects where petroleum deposits can be found, as well as how the extraction of petroleum affects the sediment around the deposit. Sedimentary rocks cover up to 75% of the Earth's surface, record much of the Earth's history, and harbor the fossil record. Sedimentology is closely linked to stratigraphy, the study of the physical and temporal relationships between rock layers or strata. The premise that the processes affecting the earth today are the same as in the past is the basis for determining how sedimentary features in the rock record were formed. The aim of sedimentology, studying sediments, is to derive information on the depositional conditions which acted to deposit the rock unit, and the relation of the individual rock units in a basin into a coherent understanding of the evolution of the sedimentary sequences and basins, and thus, the Earth's geological history as a whole.

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Content Coverage

Chapter One presents the introduction of sedimentation, the process of accumulating sediments, or dirt, on the reef. It is a natural phenomenon that results from land and reef erosion.

Chapter Two focuses on sedimentary structures, which are visible features within sedimentary rocks that formed at the time of deposition and represent manifestations of the physical and biological processes that operated in depositional environments.

Chapter Three focuses on sedimentary rocks that are formed by the deposition and subsequent cementation of that material at the Earth's surface and within bodies of water.

Chapter Four highlights about sediment transport occurs in natural systems where the particles are clastic rocks (sand, gravel, boulders, etc.), mud, or clay; the fluid is air, water, or ice; and the force of gravity acts to move the particles along the sloping surface on which they are resting.

Chapter Five focuses on fluvial processes that include the motion of sediment and erosion or deposition on the river bed.

Chapter Six emphasizes on glacial environments that represent very harsh but beautiful environments and are located in the Polar Regions or in high mountainous regions.

Chapter Seven focuses on alluvium that can contain valuable ores such as gold and platinum and a wide variety of gemstones. Such a concentration of valuable ores is termed a placer deposit.

Chapter Eight presents an overview of stratigraphy, which studies rock layers (strata) and layering (stratification). It is primarily used in the study of sedimentary and layered volcanic rocks.

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