

Preface

This special publication, GeoChronicle Panorama, which is mostly devoted to sequence and seismic stratigraphic research, is welcome since it will help young and amateur geoscientists in India and abroad to understand the concepts and applications of the method, as well as inspire them to pursue it further. A few papers on impact stratigraphy and magnetostratigraphy are also worth reading to gain a better understanding of emerging trends.

The saga of Sequence stratigraphy reveals that it arose from a desperate need to locate additional petroleum oil and has since evolved into one of the most widely used concepts in geological history. This new hypothesis was first presented in 1977 by Exxon geoscientists led by Peter Vail in AAPG Special Publication No.26. Since then, this science has evolved in leaps and bounds, with a plethora of research articles and books published by industry and academic scholars during the last four decades. Seismic signatures provided the basis for Exxon model of sequence stratigraphy, but subsequently sedimentology, biostratigraphy, geochemistry, geophysical well logs, conventional cores, and outcrops proved worthy of consideration. Their cognition of sequence stratigraphy is regarded by geoscientists of hydrocarbon sector as being on par with the development of plate tectonics.

In the late 1990s, sequence stratigraphic research began at ONGC in India, and interest quickly expanded to academia. In collaboration with Prof. Catuneanu Octavian of Alberta University in Canada, ONGC has established a sequence stratigraphic framework for all hydrocarbon producing basins, based mostly on seismic and well log data. This mega project provided an excellent opportunity for numerous ONGC geoscientists to receive training, modify the concepts, and re-evaluate the possibilities in other basins. Simultaneously, extensive research on Trichinopoly Cretaceous outcrops, Mesozoic and Tertiaries of the Kachchh and Rajasthan basins and the Tertiaries of North East basins has been done since then. The research articles in this special issue cover Sequence stratigraphy, Impact stratigraphy, Magnetostratigraphy and seismic stratigraphy. The highlights of each article are briefly summarized below.

Dr. Bhavani Singh and co-workers identified 2nd order sequences in the Jhuran Formation in their study on Sequence stratigraphy of Mesozoic rift fill succession in the Kachchh Basin. The Dhosa oolite of the Jumara Formation is a regional marker bed that also corresponds to the maximum flooding surface (MFS). The MFS is characterized by dense Zoophycustrace fossils and ammonites of Tithonian age. Regionally, the SB1 overlying the HST-1 is a diachronous erosional surface. To summarize, the post-rift succession of the Kachchh basin provides ideal outcrops for examining the complex interplay between accommodation space, sediment supply, and tectonics.

Dr. Gargi Sen's authored article on the fundamentals and applications of sequence stratigraphy examines the application of this method in a variety of environmental settings, including deep water clastics off Nigeria, carbonates from the Browse Basin in Australia, and salt-related tectonics from the Lopa Basin in Mexico. To define the hydrocarbon prospects, the approach primarily relies on 3D seismic data and stratigraphic forward modelling.

Dr. R. Nagendra and colleagues characterized seven sequence stratigraphic surfaces outcropped in the Ariyalur region of the Cauvery Basin, with the goal of expanding the outcrop sequence depositional model into subsurface linking with biozone processes. According to the sequence depositional model created for Albian to Maastrichtian mixed sediment succession, the predominance of sandstone reservoirs in the deep basin and the degree of relative sea level variations are closely associated.

Dr. Nivedita Chakraborty studied the fundamentals of Sequence stratigraphy and simplified principles and terminology so that Earth science students, mentors, and amateur geoscientists in industry and academia may comprehend and apply them to their research and teaching.

Prof. David King and Petruny discussed the impact of massive cosmic objects on Earth's oceans, which establish predictable stratigraphic relationships. In Crater-filling stratigraphy, crater-rim stratigraphy, proximal ejecta stratigraphy, and distal ejecta stratigraphy, their research briefly addressed each of these various stratigraphic connections. To sum up, the authors advise researchers to hunt for impact stratigraphic associations in the field and in the lab and to record them in the published literature so that this field of research can thrive and we can learn more about what happens when a cosmic object collides with the sea floor.

Dr. Venkateshwarlu reviewed the concepts and applications of Magnetostratigraphy in understanding Earth's processes. The author presented a case study on the Siwalik group of rocks. The study

demonstrates how magnetostratigraphy can be used to date and correlate rocks based on polarity reversals as a proxy in Nurpur and Kotla sections of Kangra District, Himachal Pradesh, India.

Prof. Vasudevan has explained the concept of Seismic stratigraphic techniques in the stratigraphic interpretation of seismic reflectors. It is important because geological concepts of stratigraphy can be applied to seismic data and hence, seismic stratigraphy can be used as a predictive tool for petroleum system elements like reservoir, seal, and source rock.

The purpose of the presentation of an Editorial Note contributed by B. Mishra is to inculcate in the minds of student and research scholar community a comprehensive and basic idea on sequence and seismic stratigraphy as well as their mutual relations and differences in terminologies by summarizing the contents from different literatures. This note may serve as first-hand knowledge on these important topics with brief descriptions. Finally, we anticipate that the special issue shall appeal to both students and teachers, given the articles included mostly discuss the fundamentals of sequence stratigraphy, magnetostratigraphy, and impact stratigraphy, as well as their applications in regional and global rock correlations.

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