Geophysical Research Abstracts, Vol. 9, 10139, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10139

Connecting small and large: a case from the Alps, Dinarides and Intracarpathian basin junction (Slovenia)

B. Jelen, H. Rifelj

Geological Survey of Slovenia, Ljubljana, Slovenia (bogomir.jelen@guest.arnes.si / Phone: +386 1 2809752)

It has been found that the origin, development, filling up and the stratigraphic architecture of the ancient basins of the area under concern, their deformation and termination were strongly controlled by tectonic processes. From the Middle Eocene on, the area has been squeezed between three large and very dynamic geological systems driven by plate tectonics: the future Alps, the future Dinarides and the future Intracarpathian basin. Thus, its dynamics through time and consequently its geological structure had to be complex. Therefore, one of the posited research questions was: How its complex dynamics and its geological structure as a part of the dynamics of these large geological systems have been evolving through time. The following was essential with respect to answers to the research questions: (1) The view that "The global stratigraphic hierarchy originated in the variable in rate and direction in the sea floor spreading." and (2) the systemic views that "The properties of the part can be understood from the dynamics of the whole", and that "Every pattern is seen as a manifestation of an underlying process." It followed then that the local and collective dynamics were related and that a part was a pattern of dynamics or structure within the collective dynamics. The local dynamics and patterns and collective dynamics were linked by the nested hierarchy theory which is an issue of scale to keep track of behavior of a system with multiple levels. The 1^{st} nested level: The junction area – the local level (the small), the 2^{nd} nested level: The future Mediterranean, the future Alps and the future Carpathians, the 3^{rd} nested level: The convergent African (Nubian) and European plate, the 4^{th} nested level: Atlantic Ocean floor spreading, and the 5^{th} level: The Earth's internal dynamics (the governing large). The basic task, to establish how did processes run on one level influence things on another level to change, that is, establishing a

dynamic web of linkages in space and time was feasible by compressing space and time. The emerged local pattern is characterized by the six long-running tectonic behaviors (LRTB) and the five discontinuous changes (DC) in those behaviors from the Middle Eocene to Present. We understood that these behaviors was governed by the iteration of compression and tension regimes as manifestations of underlying tectonic processes taking place at the next four nested hierarchical levels (NHL) listed above. These iterations and discontinuous changes are: The 1^{st} LRTB, the Lutetian-Early Priabonian compression; the 1^{st}DC in the Middle Priabonian at around 35Ma; the 2^{nd} LRTB, the Middle Priabonian-Rupelian tension; the 2^{nd}DC in the Early Chattian; the 3^{rd}LRTB, the Chattian-Ottnangian compression; the 3^{rd}DC in Late Ottnangian or around Ottnangian/Karpatian boundary; the 4^{th}LRTB, the Karpatian-Early Sarmatian tension (Karpatian-Middle Badenian continental rifting and Late Badenian-Early Sarmatian post-rifting); the 4^{th}DC in the late Sarmatian short and week compression; the 5^{th} LRTB, the Pannonian-Pontian tension (Early Pannonian rifting, Late Pannonian-Pontian post-rift and the Pontian weak compression, overture to the 6^{th} LRTB); the 5^{th} DC around the Miocene/Pliocene boundary and the 6^{th} LRTB, the Pliocene-Present compression. We will try to demonstrate how this local geological system behavior is associated with the collective dynamics of the higher nested geological systems and to the instability of the Bénard convectional cells below the Mid-Atlantic Ridge through the dynamic web of linkages in space and time.