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Kinematically - controlled deep contact of the East European Platform and the Carpathian Orogen in the Vrancea Bending Zone and contact with the Neogene Volcanic Zone

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The complex zone between the Moesian and East European platforms to the south and east and the Southern Europe continental units were amalgamated in the last 20 million years in an intricate dynamics of what was thought to be the eastern component of the Alpine Tethys. By seismic tomography and attenuation studies, a high velocity body extended from the near surface to deeper levels than 300 km was pointed out as having a very complex geometry which suggests a very active three dimensional evolution. Most of the frequent, persistent and clustered seismic events from this contact area known as Vrancea Seismogenic Zone are located into this high velocity body. The origin of this seismicity is highly controversial. Among most of the accepted assumptions on its origins, two look like most robust: (a) the recent studies consider the subduction of the Tehys oceanic lithosphere, and (b) delamination of a portion of the East European / Moesian continental mantle after the oceanic lithosphere subduction ended sometimes in the mid-Miocene. The delamination zone was probably a near-horizontal mid-lithospheric interface dripping down into the mantle. Towards the internal part of the Bend Zone, the volcanic activity, dominant in the Neogene time, ceased some 400,000 years ago but there are evidences that the last stages of the alkali-basaltic volcanic activity has post-volcanic effects even at present.

We integrate satellite geodesy results with various seismological studies in order to explain the very small values of the present-day horizontal component of the velocity field, almost at the edge of technological detectability. The vectors have a very peculiar distribution which we interpret as supporting the idea of the mantle flow around the high seismic velocity body detected via seismological investigations.

We estimate an anti-clockwise deep rotation flow around the lithospheric "slab" which is seated adjacent to the astensosphere advancing towards the surface, having surface expressions. We postulate this as a result of deep, mantle flow, accompanied by penetration of the melting processes at the contact between the astenosphere and the high velocity body.