Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

SMP43-P20 Room:Convention Hall Time:May 24 16:15-17:30

Talc flow layer tectonics :a new concept of globe

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Many of the theories of plate tectonics are disputable. It is not comprehensible that the low velocity layer in the upper mantle is interpreted as the partial melting. The caldera chain (Iida, 2011b) was proposed as a new concept of magmatism that is possible to be in place of the existing concepts consisting of the hot spot, plume, and subduction zone magmatism. According to the new concept, all magmas except the kimberlite are expected to be generated in the crust or uppermost mantle, and the upper mantle is considered to be much cooler than the current theory.

Talc could be stable in the considerable depth. It is estimated that the talc bearing flow layer (TFL) underlying the plates is the cause of the plate drift and isostasy. The North American ice sheet centered in the Hudson Bay is surrounded by a belt of large lakes. The belt rose in the ice age by the outward migration of the flow material from the center, and turned to sink with the melting of ice sheet. Such a reverse movement of surrounding zone indicates the relatively thin flow layer underlying the crust.

The considerable portion of oceanic plate is serpentinized prior to subduction. The dehydration of serpentine metamorphoses both the plate itself and adjacent mantle into TFL that migrates upward along the lower surface of the plate represented by the lower side of the double seismic plane. Such metamorphism and two-way movement makes the speedy subduction possible. The plate bends and then becomes straight again to subside. It is considered that such plastic deformation is realized by the fractured and surpentinized rocks and surrounding mobile TFL.

The TFL below the oceanic plate migrates toward the mid-oceanic ridge to become the raw materials for the plate. In the subduction zone the oceanic plate enveloped by TFL subsides with the density difference that is the power source for the whole system. The mid-oceanic ridge is in the passive tension field where the oceanic plate is formed by the magma generated with the pressure reduction. The ridge ranges at right angles to the tension direction. The continent is cut by the caldera chain (CC) that moves irregular in shape. In order to fit the shape the ridge is dislocated by the transform faults. The CC that split the Pangaea has migrated for 600 million years from south to north. The current tip of the CC is located at the eastern end of the Gakkel ridge in the Arctic sea.

The zonal geologic structure parallel to the trench is common in the edge of continental crust adjacent to the subduction zone. The caldera tends to be formed in the soft and thin crust rather than hard and thick crust. Accordingly the CC tends to be formed in parallel with the trench. When the large scale CC which magma originates from the TFL is formed along the edge of the continent, the CC becomes the cutting line for the separation of the marginal part. The TFL in the surrounding area flows into the gap to supply the material for the new oceanic crust. The island arch and the marginal sea are formed with such process. The CC concentrically migrates in the new oceanic crust due to its thinness, the marginal sea spreads itself. The movement of the TFL toward the marginal sea makes the TFL below the island arch thin to depress the land. The transgression happened in Japan in the mid-Miocene at the time of the Japan sea spreading could be explained by the process.

The TFL and the CC are the individual tectonics severally. These two are proposed as the new concepts that are totally different from the existing concepts of the earth.

Keywords: continental drift, caldera chain, island arch, marginal sea