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East Japan Super Earthquake as Tectonic Process in East Japan

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East Japan consists of Kitakami-Abukuma Mauntains, Kitakami-Abukuma Lowland, Backbone range, Intramountain basins, and coastral plains, parallel to Japan Trench. Upper and lower deep sea terrace develop between coast line and Japan Trench. The large scale topography has been formed as anticlinrium and syclinrium by East Japan Tectonics since Neogene. Because the Japan Trench is characterized as margin of subduction of Pacific Plate in Plate Tectonics, the subduction of Pacifi Plate directly controls the East Japan Tectioncs Process.

The subduction of Pacifi Plate induced the East Japan Super Earthquake of 11st March 2011, which can be concerned as one of the processes of the East Japan Tectonics.

Inversed S type Japan Trech can be divided into 3 segments, strait northern part from junction with Kuril Trench, circular middle part centered in Mogami, and circular southern part centered in Pacific include junction with Izu Trench. The radii of the circular shape were calculated ca. 400km, which assumed to be related with minimum curvature of Pacific Plate (Niitusma, 1996). Seismic Tomography (Zao, 2009) shows that Pacific Plate with 100km thickness bends along concentric circle, of which radius calculated as 375km, similar to inverse S type shape.

The slip fault planes caluculated by Geographical Survey Institute based on GPS crustal movement observations. Hypocenter and focal mechanism of earthquakes are routinely reported by Meterorological Agency.

The afershocks are characterized by the forcal mechanism and the position of hypocenter relating to the concentric circular bending surface of Pacific Plate and the fault plane. The three layer structure for the aftershocks can be recognaized, normal fault type aftershocks in upper hanging wall of faults and lower circular bending Pacific Plate and inverse fault type aftershock in middle footwall of faults.

The three layer structure can be observed typically in middle segment where hypocenter of main shock locates. Inverse fault type aftershocks occurred in the three layers of the north segment where locate mainly outside of the fault plane area, because the main shock has not release the compressonal stress. Rare normal fault type aftershocks and inverse fault type aftershocks dominates in middle layer and also in lower Pacific Plate in the south segment, where partially outside of fault area. The inverse fault type aftershocks in Pacific Plate indicate the conpressional stress still remaining accompanied with footwall of fault and large scale earthquake can be estimating such as the earthquake M 8.0 off Kanto just after 1677 Sanriku Tsunami Earthquake.

Inverse fault type aftershocks dominate along the western margin of the fault planes, where consectric circlar bending Pacific Plate rebend into flat plane. The Mantle sitting on the bending Pacific Plate surface should collide to the gate of flat subduction. The collision induces compressional stress and M 7.1 off Miyagi (7 Arpril) such as Off Sendai Earthquake in the same year of 1986 Meiji Sanriku Tsunami Earthquake which develop forearc basin, and aftershocks of Chuetsu M 6.7 & 5.9 (12 March) and Akita M 5.0 (1April) such as Uetsu Earthquake in Akita just after 1896 Meiji Sanriku Tsunami Earthquake, which develop the folding structure of backbone range and intramountain basin.

Tentional stress is induced at the top of the gate and normal fault type aftershock occurs since 19 March including M 7.1 (11 April) on Iwaki plane such as 1900 North Miyagi Earthquake after 1986 Meiji Sanriku Tsunami Earthquake which develop coastral plane and Kitakami-Abukuma Lowland.

Keywords: East Japan Super Earthquake, Tectonics, Pacific Plate, decending slab, Focal Mechanism, concentric circluar bend