

Great East Japan Earthquake may have been caused by 'slow slips'

Mainichi (Japan) Daily News, 1-20-12

The magnitude 9.0 Great East Japan Earthquake and a smaller earlier quake may have been caused by a phenomenon known as "slow slips," according to research by the University of Tokyo's Earthquake Research Institute.

Slow slips are when two plates or other underground layers slowly move past one another, creating warps in the surrounding ground. It is known that before a massive earthquake, smaller earthquakes and other warning signs exist, but this is the first time that slow slips have been confirmed to have occurred before those warning signs.

The main quake occurred when a tectonic plate to the east of the Sanriku region sunk under another plate and the energy of stored warps in the ground was released. The team analyzed data from the Japan Meteorological Agency on 333 earthquakes from mid-February 2011 to the main quake on March 11 and also confirmed 1,083 additional small earthquakes that occurred.

The team closely examined all the earthquakes' vibration waves. They discovered that the quakes' hypocenters were moving south at an average of two to five kilometers per day from mid- to late February, but from a 7.3 magnitude quake on March 9 until the 9.0 magnitude quake on March 11, the speed increased to about 10 kilometers per day.

Based on the quakes' characteristics, the team determined that slow slips had occurred. Slow slips do not necessarily occur before all major earthquakes, but assistant professor Aitaro Kato, one of the researchers, said, "We confirmed that if a slow slip occurs and there is warped ground ahead of it, an earthquake can be triggered."

The study was published in the electronic version of the scientific journal *Science* on Jan. 20.