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# Atmosphere Above Japan Heated Rapidly Before M9 Earthquake

Infrared emissions above the epicenter increased dramatically in the days before the devastating earthquake in Japan, say scientists.

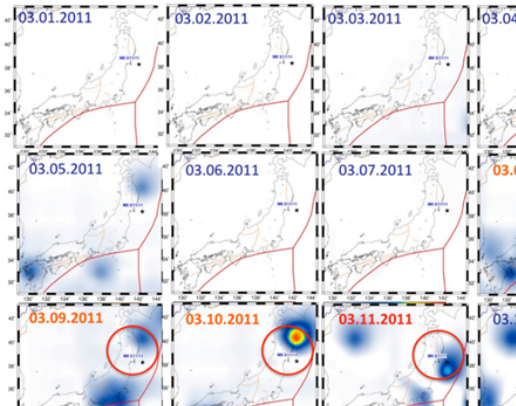
by **Emerging Technology from the arXiv**

May 18, 2011

Geologists have long puzzled over anecdotal reports of strange atmospheric phenomena in the days before big earthquakes. But good data to back up these stories has been hard to come by.

In recent years, however, various teams have set up atmospheric monitoring stations in earthquake zones and a number of satellites are capable of sending back data about the state of the upper atmosphere and the ionosphere during an earthquake.

Last year, we looked at some fascinating data from the DEMETER spacecraft showing a significant increase in ultra-low frequency radio signals before the magnitude 7 Haiti earthquake in January 2010.



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dramatically over the epicentre, reaching a maximum three days before the quake struck.

At the same time, satellite observations showed a big increase in infrared emissions from above the epicentre, which peaked in the hours before the quake. In other words, the atmosphere was heating up.

These kinds of observations are consistent with an idea called the Lithosphere-Atmosphere-Ionosphere Coupling mechanism. The thinking is that in the days before an earthquake, the great stresses in a fault as it is about to give cause the releases large amounts of radon.


The radioactivity from this gas ionises the air on a large scale and this has a number of knock on effects. Since water molecules are attracted to ions in the air, ionisation triggers the large scale condensation of water.

But the process of condensation also releases heat and it is this that causes infrared emissions. “Our first results show that on March 8th a rapid increase of emitted infrared radiation was observed from the satellite data,” say Ouzounov and co.

These emissions go on to effect the ionosphere and its total electron content.

It certainly makes sense that the lithosphere, atmosphere and ionosphere are coupled in a way that can be measured when one of them is perturbed. The question is to what extent the new evidence backs up this idea.

The Japan earthquake is the largest to have struck the island in modern times and will certainly turn out to be among the best studied. If good evidence of this relationship doesn’t emerge from this data, other opportunities will be few and far between.

Ref: [arxiv.org/abs/1105.2841](https://arxiv.org/abs/1105.2841): Atmosphere-Ionosphere Response to the M9 Tohoku Earthquake Revealed by Joined Satellite and Ground Observations. Preliminary Results. 

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