The generation of electrostatic field before the 2005 off-Miyagi earthquake (*M* 7.2)

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Introduction

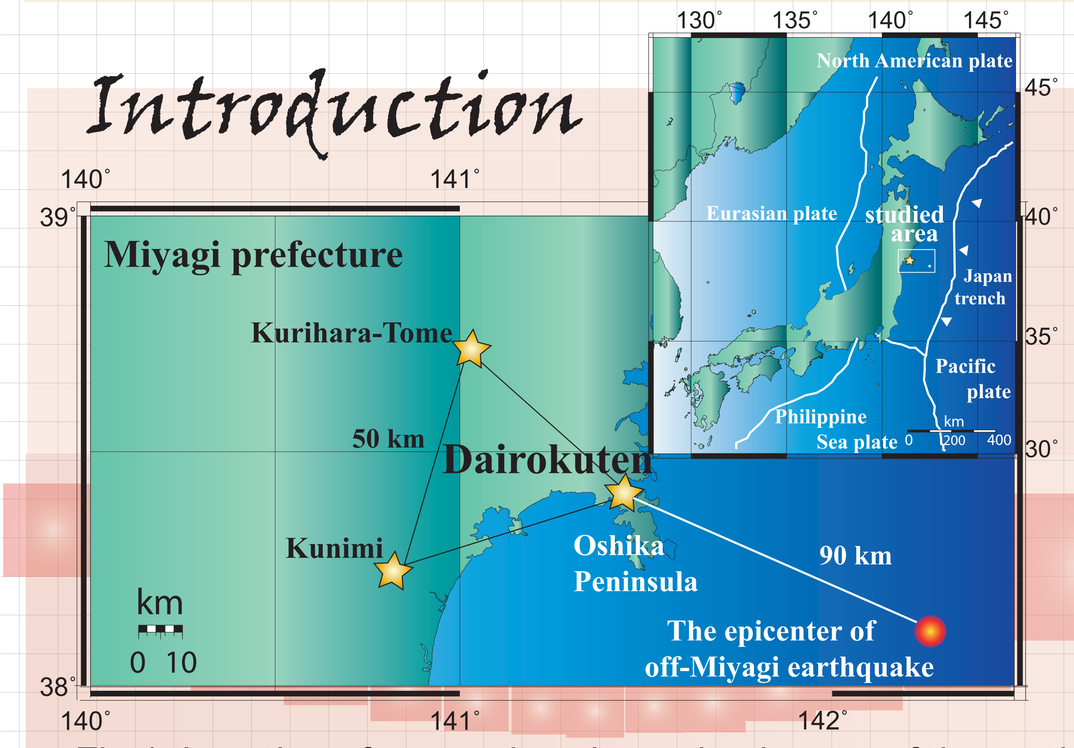

Fig.1. Location of measuring site and epicenter of the earthquake.

"The off-Miyagi earthquake" is one of the interplate earthquakes which occurs repeatedly in Miyagi prefecture, Japan. That earthquake interval is about 25-40 years and Mw is around 7.0. To predict next one, we have measured electromagnetic noise in VHF band in Miyagi prefecture.

Methods

The received wave frequency tuned to 49.5 MHz has few man-made composite noise.

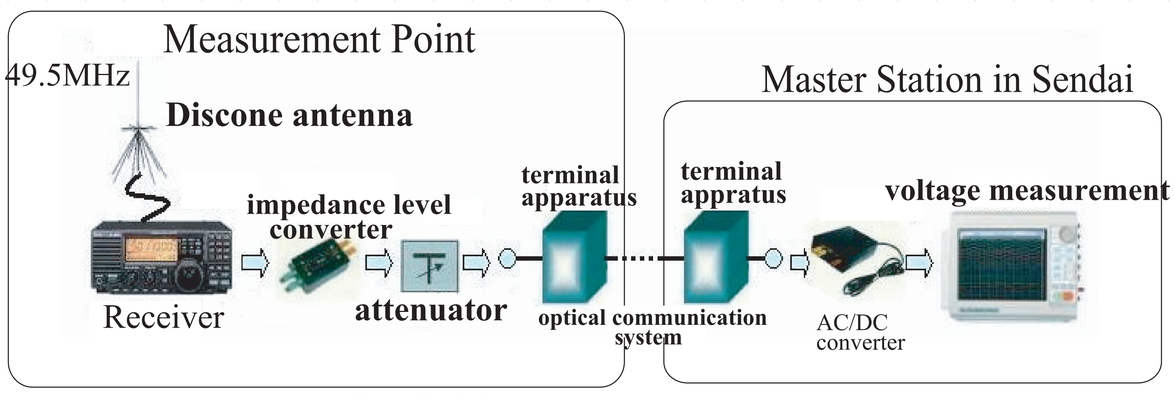

Fig.2. Measurement system. [1]

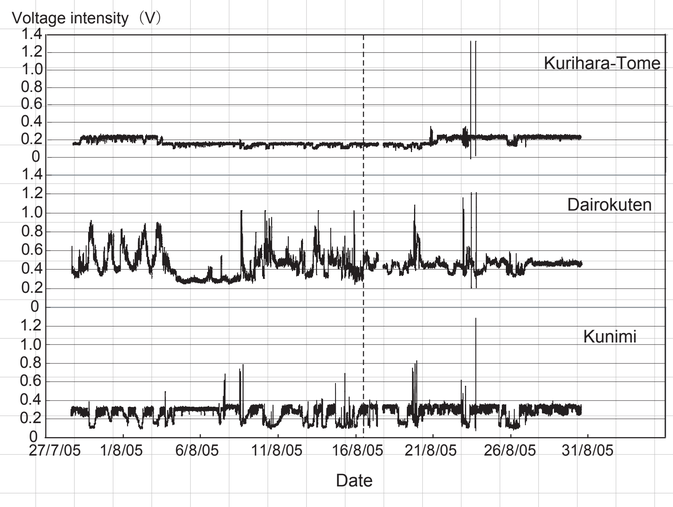

Fig.3. Temporal variation of VHF wave intensity at each measurement point (Aug. 2005).

Attention!!

Dairokuten!!

Results & Discussion

Observed VHF data can be connected to preseismic radon emanation.

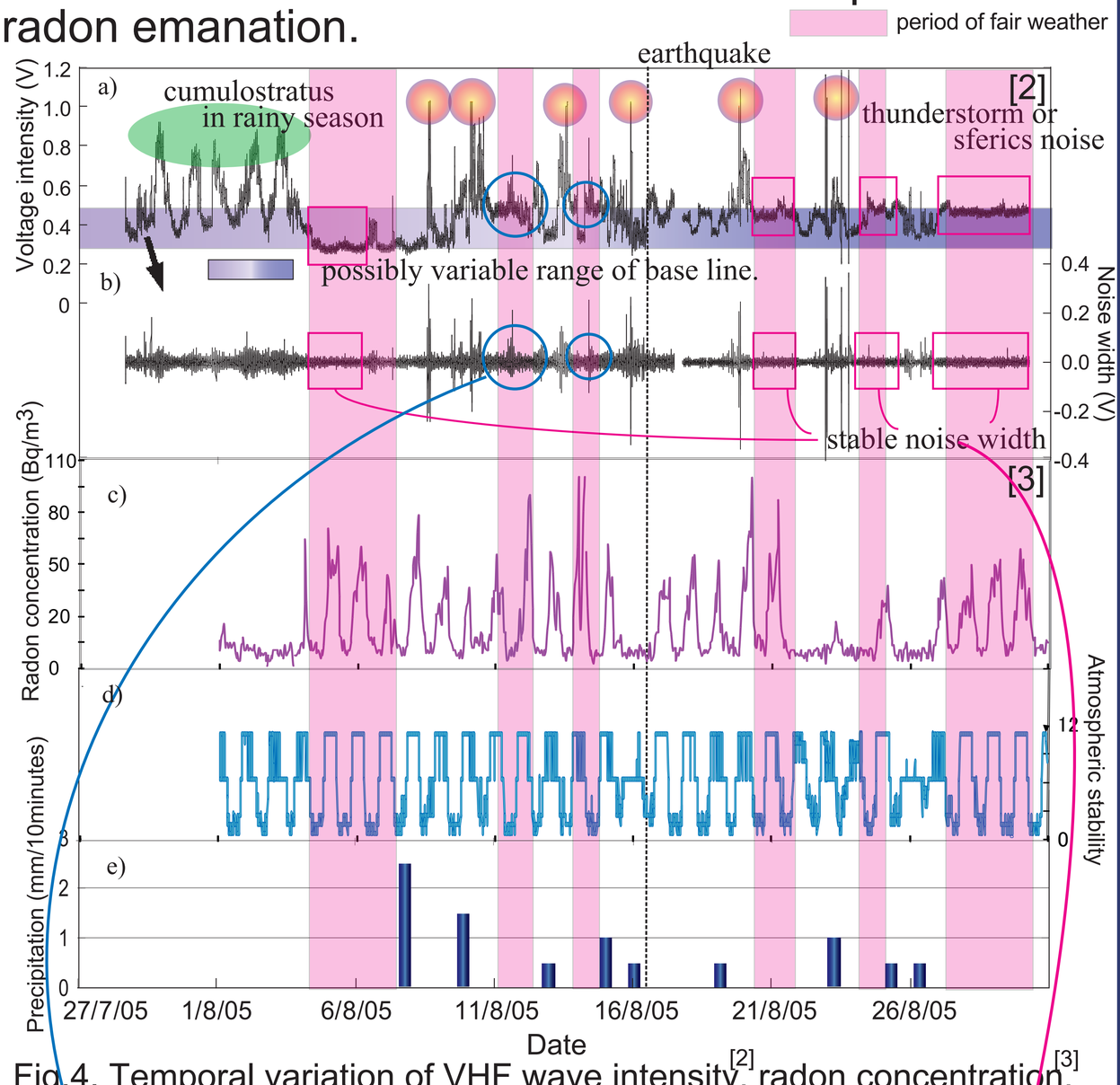

Fig.4. Temporal variation of VHF wave intensity,[2] radon concentration,[3] and meteorological conditions (August 2005).

Some disturbances of noise width can be seen in spite of fair weather.

Atmospheric stability

49.5 MHz in Dairokuten, August 2005.

Atmospheric noise	◎
Man-made noise	×
Geomagnetic storm	×
Sporadic E layer	less
Solar system	○
Lithospheric effect	○ [2]

low - Voltage intensity are disturbed [4]

high - Voltage intensity and noise width are stable

Spike noise → Lightning (Fig.4 a, b)

Change of voltage intensity → Atmospheric stability (Fig. 4 a)

Change of noise width → Atmospheric stability, and Radon (Fig. 4 b)

before earthquake (11 and 14 August, 2005),

Atmospheric stability is high
but
VHF signal is disturbed.
and
Atmospheric radon anomalies also exist.[3]

- Alteration in the reflective index
- ionospheric perturbation (caused inversion layer) over ionized air due to radon [5]

NOT reflaction,[5] but

SCATTERING WAVE from inversion layer (radio duct) and disturbed ionosphere due to radon emanation can cause VHF noise width anomalies.

Summary

The VHF noise width anomalies before the 2005 off-Miyagi earthquake is related to preseismic radon emanation. They can be attribute to the scattering wave from inversion layer and ionosphere where ion density disturbed due to radon concentration.

References

[1] Masuda, S., 2007, available at: http://www.mni.ne.jp/~aoimori/zishin/. [2] Yonaiguchi, N. et al., 2007, NHESS, 7, 485.
[3] Omori, Y., et al. 2008, EMSEV WORKSHOP 2008 poster presentation. [4] Tsuda, T., 1994, Technical Report of IEICE, 6, 1.
[5] Tohbo, I., et al. 2008, EGU 2008 poster presentation.