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Observing electric fields to avoid the crisis of nuclear power plants - Predicting just before major earthquakes -

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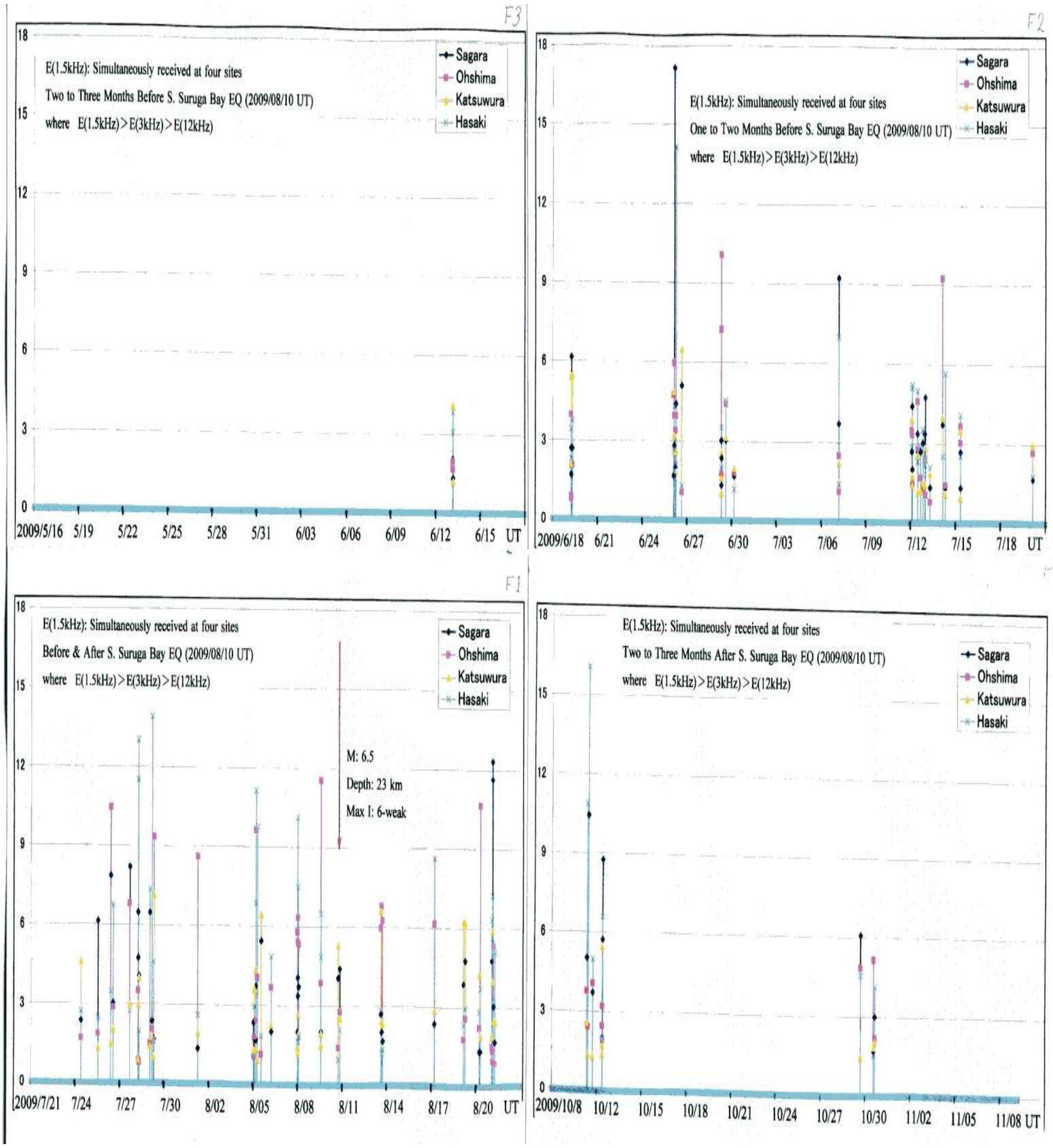

A standard 1Gw nuclear power plant (abbreviated as NPP) needs about 60 m^3/sec, so it is necessary in Japan to construct it at seashore, where the ground is firm rock, and where the hazard of tsunamis is little. At Hamaoka, many NPPs of Chubu Electric Power Co. are operated, sedimentary rock crops out, and the sea is shallow for long way out, that reduces tsunami hazards. These features show that Philippine Sea Plate (PSP) is subsiding, and that major earthquakes will occur directly under the nuclear power station.

The distance between Hamaoka and the top surface of PSP measures 15 - 20km. So, the arrival time difference between P and S waves is more than 2 secs. When the acceleration of more than 0.15g of P waves is detected, NPP automatically inserts all control rods in 1.5 secs and stops before S waves arrive.

Hamaoka plants can resist the shock of up to 2g, but they might have the shock more than 2g. In S. Iwate Pref. Eq.(2008/06/13, M: 7.2, Depth: 8km), Tsubakidai St., which is located at the epicentral distance of 19km and at the hypocentral distance of 20.6km, observed the maximum acceleration of about 0.5g. If it is supposed at Hamaoka that the magnitude is 8.2, i.e. the energy is 31.6 folds of S. Iwate Pref. Eq.'s, that the hypocentral distance is also 20.6km, and that the acceleration is proportional to the root of energy, i.e. 5.62 folds, then the maximum acceleration at Hamaoka becomes 2.81g, which is over the allowance limit.

An emergency core cooling system (ECCS) is equipped to avoid the loss of cooling water. But both probabilities of the loss of cooling water and of the ECCS's failure are nearly the same. When ECCS fails and cooling water leaks in large quantities, an accident will become as follows: Although the nuclear fuel is contained in a fuel rod whose melting point is about 2000 degrees, the core meltdown starts in a few minutes after cooling water vanishes even if the nuclear reaction stops then, both pressure vessel and reactor vessel blow a hole through them or explore because of the high temperature and pressure, like the reactor No.4 of Chernobyl did on April 26, 1986, and it might happen that the half of our population needs to evacuate, according to the wind direction. At nuclear reactor No.2 of Three Mile Island, the core meltdown started six minutes after the accident on March 28, 1979, though the radiation was limited as the ECCS was intermittently operated.

When a major earthquake occurs directly under Hamaoka, as the source region is near the NPP, the shock of first motion might be larger than 2g, and will cause both loss of cooling water and failure of ECCS. In the case that cooling water vanishes during the nuclear reaction is acting, as well known a runaway reaction starts and a nuclear explosion occurs, to say nothing of citing Chernobyl disaster. Even if less than a few percents of U and Pu contribute to nuclear explosion, the magnitude of explosion becomes as colossal as a hydrogen bomb's one, and Hamaoka will evaporate.
To avoid the accident mentioned above, it is necessary to predict major earthquakes. Although the prediction system that monitor crustal movement could not detect any precursor of the S. Suruga Bay Eq., anomalous electric pulses were found before and after the Eq., which are shown in attached figures. In the case the prediction system that monitor the precursory pulses is established, which can use in common a lightning location system, when a major earthquake of more than magnitude 8 occurs, not only the disaster is prevented by stopping NPP depending on the prediction, but also NPP can continue to operate without stopping the plant wastefully for long time when it is clear that the epicentral distance is 100km or more, as the pulses are located at the accuracy of 10km.

Keywords: earthquake prediction, observing electric fields, precursory seismic electric fields