A base field observation system for ice and snow accretion and galloping of transmission lines

Purpose:

This system was installed in order to clear the cause of snow damage as well as confirm the effects of countermeasures on the damage, as a part of a study on snow damage at transmission lines. The study is conducted at the request of the Federation of Electric Power Companies, in cooperation with electric power companies. The system installed points correspond to the transmission lines where snow damage has occurred before. The system focuses on obtaining meteorological data, such as wind velocity and temperature, continuous observations with tension meters or network cameras, and data accumulation.

Outline:

This system can obtain data meeting the purpose of each area, for example, line tension data for heavy accreted snow or galloping and conductivity of accreted snow related to failures caused by wet snow packed with sea-salt on insulator strings, in addition to meteorological data, such as wind velocity and temperature, and visual data obtained by network cameras. And the data can be monitored at CRIEPI. Further, the system employs state-of-the-art observation technology as follows.

- A two-dimensional video disdrometer to observe the shape and kind of a precipitation particles and to develop an accretion model.
- New type accreted ice samplers, which can take account of torsional stiffness of real scale conductors.
- Ultrahigh-sensitivity cameras, which can take videos of early process of snow coverage on conductors at night.

Specifications:

(1)Eastern Hokkaido Area

- Meteorological variables (wind direction/speed, temperature, humidity and pressure), conductor tension and network camera.
- Infrared luminous target which enables night observation of conductor vibration.

(2)Toyama area

- Meteorological variables (wind direction/speed, temperature, humidity, pressure, precipitation amount, and radiation), conductor tension, conductor temperature, electrical current intensity and network camera.
- State-of-the-art observation technology (ex. recording the process of snow coverage on conductors at night using ultrahigh-sensitivity cameras)

(3)Niigata area (Snow accumulation on insulators observation system)

- Installation of various types of insulators in the middle section of an existing transmission tower. Observation of snow accretion on various types of insulators under natural conditions using network cameras.
- Meteorological variables (wind direction/speed, temperature, humidity and pressure).

(4)Niigata area (Sea salt particles and snowfall observation system)

- Atmospheric aerosol (sea salt particles) and snow samples were collected using a low-volume air sampler and wet-only and bulk snow samplers.
- Meteorological variables (wind direction/speed, temperature, humidity, pressure and precipitation amount) and network camera.

※All data obtained by the observation system were monitored, accumulated and managed centrally in Abiko area.

Location and Date of Installation:

Out of CRIEPI, November 2008 ～ January 2009

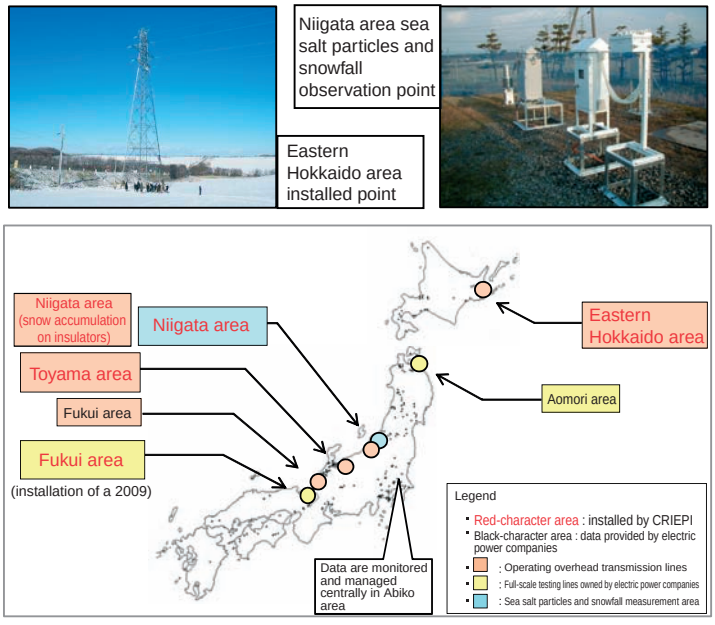

Fig.1 The location of snow damage field observation systems

Fig.2 Monitoring image at Abiko area -1-

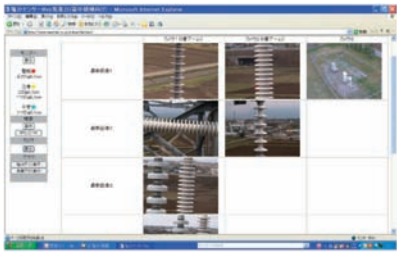

Fig.3 Monitoring image at Abiko area -2-