A STUDY OF AIRFLOW AND POLLUTANT DISPERSION OVER COASTAL COMPLEX TERRAIN

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ABSTRACT

Combination of complex terrain and the land-water variation of the adjacent coastline exerts significant effects on the local wind flows in the northeastern Taiwan. Under calm synoptic wind conditions, nocturnal drainage winds, daytime convective upslope flows, and sea-land breeze circulations have been frequently observed in the area.

The Kuosheng Power Station (pp2) is located on the northeast Taiwan coast about 400m inland from the coastline of the East China Sea. The ground elevation rises sharply to 100m msl (mean sea level) at a distance 100m from pp2. Terrain contours are generally parallel to the coastline. It rises to 200m at 2km, 400m at 4km, and 700m at 10km from pp2.

Four atmospheric tracer experiments were conducted during the period between March 1990 and February 1991. The experimental area was within a 24km radius of pp2. Sulfur hexafluoride (SF_6) gas was released from the roof of pp2 (18m above the ground). A total of 45 air sampling site were placed along the radius 4, 8, 16, and 24km from the source. During the same periods, meteorological data were collected at a mesoscale meteorological monitoring network which included 2 sounding stations, 5 pilot balloon stations, and 12 surface stations.

The high quality data collected under variety of flow conditions provide a unique opportunity to understand dispersion characteristics in this complex environment. The data are also used to evaluate performance of numerical model simulations. A three-dimensional mesoscale model, HOTMAC and a transport and diffusion model, RAPTAD are being evaluated in terms of their performance on simulations of meteorological and tracer data.