

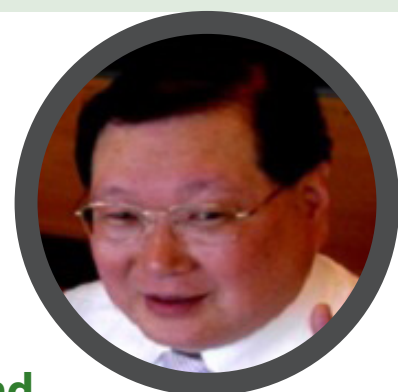
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EFFECT OF A CAVITY GENERATED BY INTERNAL GRAVITY WAVES IN THE LEE SIDE OF MOUNTAIN AND NOCTURNAL SURFACE INVERSION LAYER ON HIGH PARTICULATE MATTER CONCENTRATIONS

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Using GRIMM-1107 aerosol sampler, GOES-9 DCD satellite images, HYSPLIT model of backward trajectory and WRF-3.3 model, high PM₁, PM_{2.5} and PM₁₀ concentrations were investigated at Gangneung city in the Korean eastern coast from 0000LST March 26 to 0000 LST April 4, 2004. During a Yellow Dust period, maximum PM₁₀ (PM_{2.5} and PM₁) concentration was 3.3 (1.1 and 1.01) times higher than one of non-dust period. After dusts transported from Gobi Desert and Nei-Mongo toward Gangneung city, passing by the high mountains under strong northwesterly wind combine with particulates and gases emitted from the city, they are trapped inside a calm cavity generated by internal gravity waves (IGW) in the lee side of the mountain. Then, the eastward movement of the trapped dusts is prohibited by easterly wind from the East Sea, resulting in high PM concentrations at 09:00 LST (beginning time of office hour), March 30. On mid-day, as the combined dusts rise up to the top of thermal internal boundary layer (TIBL) of about 300 m depth from the coast toward the top of the mountain in the west due to daytime convection, the ground based PM concentrations are very low at 15:00LST than one at 09:00LST with a lower thickness of TIBL. At night, after particulates emitted from road vehicles and residential heating boilers combine with dusts transported from Nei-Mongo by northwesterly wind and fallen dusts uplifted for daytime hours, they are trapped inside a calm cavity by IGW and easterly wind and further much shrunken stable nocturnal surface inversion layer than the daytime TIBL could cause the trapped dusts to be more accumulated near the surface, resulting in maximum PM concentrations at 20:00 LST

Biography

Dr. Hyo Choi is meteorologist, environmental scientist and physical oceanographer with over 40 years-numerical modeling researches with about 250 papers in journal and conference. He graduated from Seoul National University, Korea with B.S. in Meteorology (1976) and M.S. (1978) in Marine Meteorology and Physical Oceanography. He received two Ph.D. degrees from Dept. of Civil Engineering, University of Texas at Austin, USA (1984) and College of Environmental Sciences, Peking University, China (2004).

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