

# Effects of tunnel entrance and exit on road meteorology

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## ABSTRACT

Effects of tunnel entrance and exit on road meteorology and surface status are measured with RWIS (Road Weather Information System). Various meteorological elements (wind speed, wind direction, air temperature, pressure, precipitation, humidity, net radiation, global radiation, reflection radiation, and solar radiation), road surface temperature, and road condition are measured in the Jeongneung tunnel entrance and exit on Internal Expressway, Seoul, Korea in 2014. Nov. to 2015. Dec. The Jeongneung tunnel passes through the Mt. Bukak in east-west direction.

There was no significant difference of the temperature between the entrance and exit in every month. In winter, the net radiation is lower than summer. The peak of the net radiation of the exit is earlier than the entrance in winter. This result is related with the topographical characteristics of the Jeongneung tunnel. The road surface temperature of the exit is higher than the entrance in winter, similar in spring and summer, and lower in fall. The change of the road surface temperature is related with heat of inside the tunnel. The diurnal pattern of the difference between road surface temperature and air temperature ( $T_s - T_a$ ) was also analyzed. The results of the  $T_s - T_a$  mean that the road surface temperature might be related with the traffic volume, vehicle speed and net radiation.

**Keywords:** Road condition, Road surface temperature, RWIS, Tunnel entrance and exit.