

Air quality patterns in Mosgiel

Spatial PM₁₀ Study: 2009

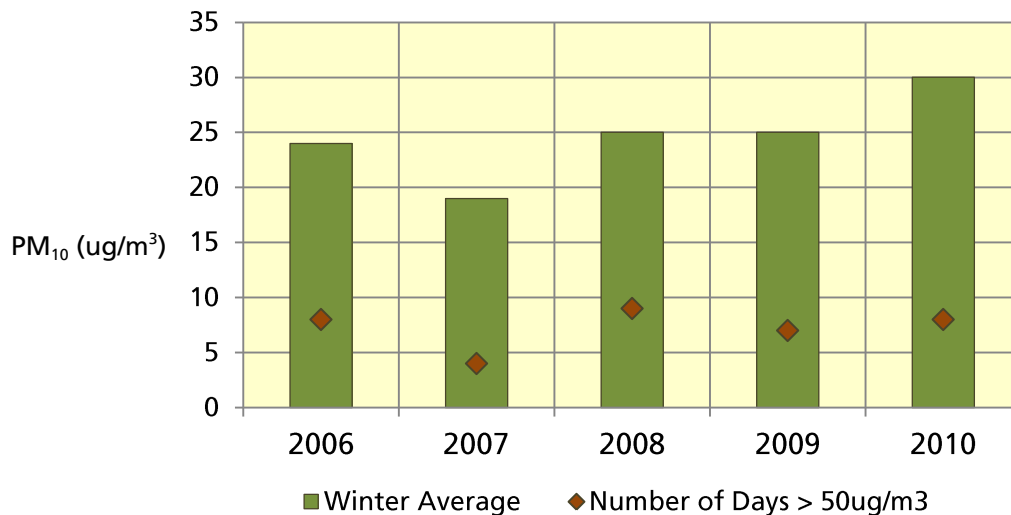
Study objective

Mosgiel, like other Otago towns, can experience poor winter air quality when smoke from domestic and industrial emissions stagnates near the surface. ORC has been monitoring PM₁₀ (very small particles) at a single location in Mosgiel for nearly 10 years. The source of most of the PM₁₀ is smoke from domestic solid-fuel burners; Industry contributes a small percentage as well.

In winter 2009, ORC conducted a spatial air quality study using a portable monitor to sample PM₁₀ at 23 locations throughout Mosgiel. The goal of this study was to identify overall patterns of PM₁₀ across the town on a typical winter's night.

Background

Mosgiel, population about 10,000, sits on the eastern edge of the Taieri Plain, approximately 6 km west of Dunedin. It is sheltered from coastal winds by Saddle Hill, and often experiences relatively cold and calm conditions during winter, leading to the accumulation of smoke. ORC's PM₁₀ monitoring over the past 10 years reveals that residents can expect poor air quality (when daily levels are greater than 50 micrograms per cubic metre of air) about 8 times a year. Over the past 5 years, Mosgiel's winter average has hovered around 25µg/m³ and the maximum one-day values have reached 100µg/m³ in several years.



All of these readings have been taken at the permanent monitoring site on Factory Road, north of Gordon Road. It is unrealistic, however, to expect one monitor to represent an entire town. Therefore, in winter 2009, a spatial study was designed and carried out to provide a bigger picture of PM₁₀ pollution during a typical winter's night.

Study design

Using a portable air sampler, samples were taken at 23 locations around Mosgiel during peak emission hours (5-8pm) on several winter nights. The real time optical PM₁₀ sensor unit, (DustTrak 8532), was mounted in a vehicle with the intake on the roof bar at about 1.5m above the ground. The monitor logged five-second PM₁₀ data for about a minute at every site. Each sample night was made up of two runs to ensure the integrity of the data. The raw values were then calibrated against the continuous monitor and averaged for each night. Finally, an overall spatial pattern was developed by averaging all of the data from all sampling nights.



Results

While there can be considerable variation in air quality across Mosgiel during winter evenings, the peak values can be found in the residential areas towards the north and west of town. The prevailing winds on nights with poor air quality is generally from the northeast through southeast, helping to push particulates towards the western side of town.

Housing density and wind direction stand out as the key determinants of air quality in Mosgiel.

The map shows the average of all data collected with the highest PM₁₀ levels in red and the lowest in blue.

