

1.171 Indoor air quality in Temuco, Chile (38°44'S, 72°36'W).

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Abstract:

In Southern Chile (south of 34°S), fast urbanization, climate conditions and market fuel prices promote generalized residential wood burning for heating and cooking. However, most households have poor thermal insulation and use inefficient stoves so wood smoke is a widespread problem, with most southern Chilean cities having annual ambient PM_{2.5} concentrations exceeding 30 ug/m³. Nonetheless, little is known regarding indoor PM_{2.5} concentrations in that region of Chile. This piece of information is essential to estimate total population exposure to PM_{2.5}.

In this work we consider Temuco (38°44' S, 72°36' W, population: 350,000), one of most polluted cities in Chile. We report here the results of indoor PM_{2.5} measurements carried out in 64 households in Temuco during winter 2014; this is the first time that a comprehensive indoor air quality campaign is conducted in southern Chile. A pair of TAS samplers (Airmetrics, Eugene, OR, USA, 5 L/min) was placed inside each household studied and an additional pair of samplers (Partisol 2000i Thermo Scientific, USA, 16.67 L/min) was placed at a fixed outdoor location for measuring trace elements and elemental and organic carbon in Teflon and quartz filters, respectively. Indoor temperature, relative humidity and CO₂ sensors were also placed in each household. In some households, a Dustrack monitor was used to measure indoor PM_{2.5} continuously. On average, indoor PM_{2.5} was 90% of outdoor value, which means outdoor PM_{2.5} easily infiltrates into the indoor environment. We have found that indoor PM_{2.5} concentrations closely followed the outdoor ones, usually with a delay of 1-2 h, except for a morning peak generated by indoor sources. We present an analysis of PM_{2.5} infiltration within households and compared them with results from the literature.