



Report 03.189
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Committee Environment Committee
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Regional meteorological model

1. Purpose

To advise the Committee of the completion of a regional meteorological model.

2. Background

One of the cornerstones for sustainable air quality management is to develop an understanding of local meteorology and its influence on the dispersion of air pollutants and how air pollution episodes occur. To this end, Greater Wellington commissioned NIWA Ltd to develop a 3-dimensional meteorological model based on meteorological data collected at Greater Wellington air quality monitoring sites and incorporating local topographical features. The programme used to develop the model is called CALMET (as used by the USEPA) and is based on Greater Wellington meteorological data from the years 2000 and 2001.

This model has been developed for the following uses: air pollution studies; assessing air discharge permit applications; modelling of hazardous discharges to air; and assessing the implications of future land use development for air quality management.

3. Regional meteorological model

Essentially, the regional meteorological model is a diagnostic tool that allows us to input sources of air pollutants such as discharges from industrial facilities or more diffuse sources, such as a suburb of residential housing using domestic fires, and evaluate the resulting air pollution levels. We can also use the model, in conjunction with the results from the regional air emissions inventory, to identify areas where targeted surveys or more general air quality monitoring may be required.

Figure 1 is a typical output from the meteorological model showing the dispersion of air pollutants overlaid on an aerial view of an urban location.

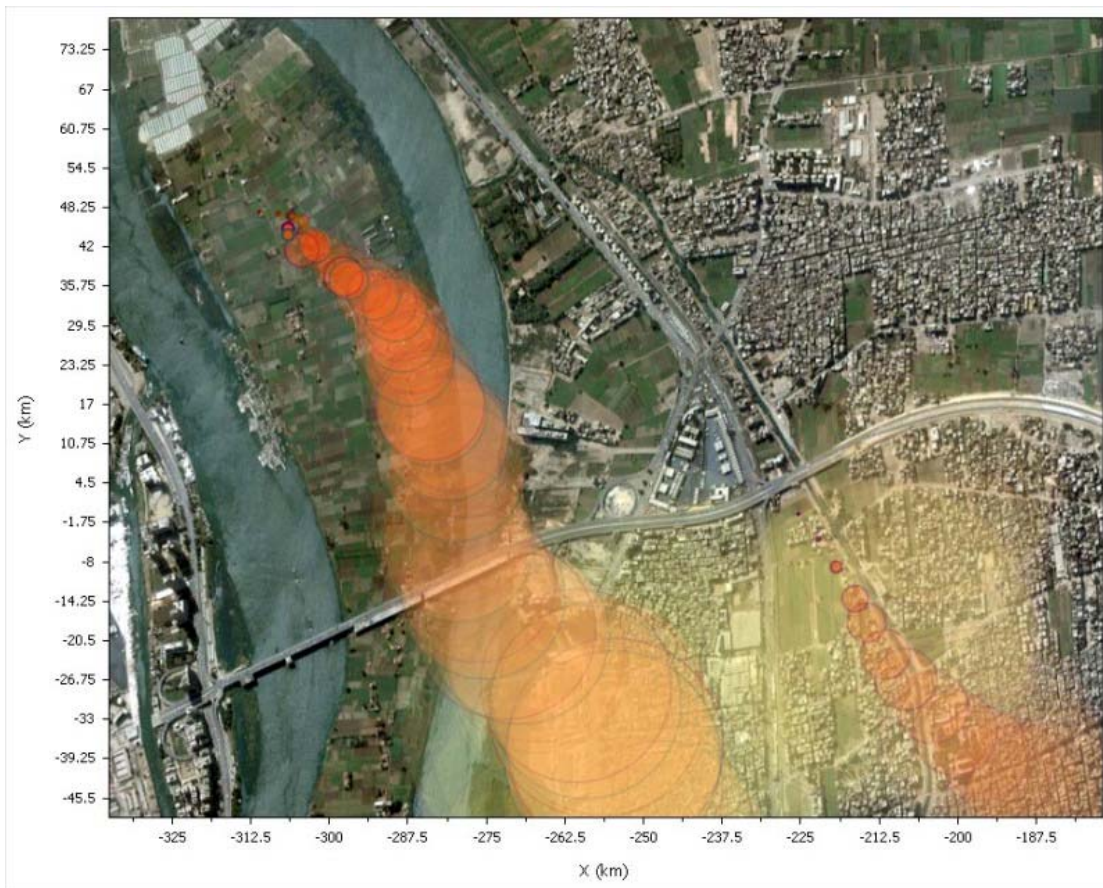


Figure 1. Typical output from the modelling system showing discharges to atmosphere and subsequent dispersion across an urban environment.

The advantage of the model is that it uses real Wellington meteorological and topographical data. As we identify areas where air pollution is degraded we can use the model to test different air quality management scenarios and policy options. Several examples of the potential applications of the model are presented below.

- (1) **Testing policy options.** We can use the model to test what the improvement in air quality would be if, say, 20% of households in a particular area switched from using solid fuel fires to some alternative domestic heating.
- (2) **Assessing the environmental effects of air discharge permit applications.** The model is sophisticated enough to input a proposed new discharge to atmosphere from an industrial premises and assess what the likely effects (in terms of pollutant concentrations) would be on the surrounding environment. Additionally, if there are other sources already present and/or measured background concentrations, then the model can also assess the likely cumulative effects on the environment.
- (3) **Emergency management.** The model can be used to predict the dispersion pattern of toxic or hazardous gas releases to atmosphere, such as a fire in a chemical warehouse, or an accident at a fuel storage facility

in Seaview. This provides a valuable tool for emergency management and planning.

- (4) **Suburban development and land use planning.** New subdivisions and urban development can have an impact on air quality through increased traffic emissions and discharges from domestic premises such as solid fuel fires. With the model we can assess what the likely impacts on local air quality will be and how this may affect regional sustainability goals.

Staff in the Consents Management and Resource Investigations Departments have undergone initial training on the use and applications of the regional meteorological model.

4. Regional policy implementation

Chapter 8 of the Regional Policy Statement and the Regional air Quality Management Plan contains policies and methods for air quality management within the Wellington Region. The development of a meteorological database and model for the Region implements Policies I-4 and Methods 2 and 3 of the RPS in particular, and Methods 6.1.4 and 6.1.5 of the Regional Air Quality Management Plan.

5. Communication

The availability of a regional meteorological dataset for use in dispersion modelling and assessing the environmental effects of discharges to air from industrial facilities will be communicated to appropriate agencies and consultants.

6. Recommendation

It is recommended that the Committee:

1. *receive the report: and*
2. *note the contents.*

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