NEIL ROBERT GIMSON

ATMOSPHERIC SCIENTIST

CONTACT

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PROFESSIONAL AFFILIATIONS

Fellow of the Royal Meteorological Society, UK (FRMetS)

QUALIFICATIONS

PhD in Applied Mathematical Studies, University of Leeds, UK

Thesis title *Interaction of Baroclinic Waves and Planetary Waves*

BSc (Hons, 1st Class) in Mathematics, University of Leeds, UK

PROFILE

Neil Gimson is an atmospheric scientist with 29 years of experience in consulting and research in the United Kingdom and New Zealand. In recent roles he has been responsible for air dispersion and meteorological modelling for industrial and roading air quality assessments, urban air quality modelling to aid territorial council decision-making, and business development and project management. He has been involved in national public-good research programmes into agricultural greenhouse gas emissions, and urban air quality processes and population exposure. His work has been published in the open scientific literature, he has reviewed research papers, and is a co-author of the Ministry for the Environment's good-practice guide for dispersion modelling.

SKILL SUMMARY

Detailed understanding of physical processes, their mathematical representation, and their implementation in computer models.

Problem solving - numerical and mathematical analysis and modelling. Quickly gaining an understanding of new models and their potential uses, and new programming languages. Not afraid to adapt and extend models to accomplish new tasks.

Extensive experience in atmospheric science - air quality, pollution dispersion, meteorology, and greenhouse gas emissions.

Appreciation of large-scale issues in addition to the details - attuned to the client's needs and the requirements for meeting them. Achieving good working relationships with clients - delivering on time; providing value to the client.

Communication skills - writing and reviewing proposals, reports and presentations; verbal presentation to audiences with a wide range of technical experience.

Able to work within a team or independently.

CAREER SUMMARY

Sole trader and contractor to Golder and NIWA	2017 onwards
Golder Associates (NZ) Limited	
Senior Air Quality Scientist	2006 to 2016
National Institute of Water and Atmospheric Research (NIWA)	
Atmospheric Scientist	1995 to 2006
Department of Meteorology, University of Reading, UK	
Post-doctoral Research Fellow	1989 to 1995

MODELS AND SOFTWARE EXPERTISE

Air Dispersion and Atmospheric Chemistry
TAPM CALPUFF
CALGRID AERMOD
HYPACT MDMS
AUSPLUME
AUSROADS CAL3QHC

Meteorology
TAPM CALMET AERMET
RAMS
UK MetOffice Mesocale Forecasting Model (pre-Unified Model)

Other Software
FORTRAN
REDUCE (computer algebra)
R, PYTHON, SQL

REFEREES

Details available on request.

CAREER HISTORY

Golder Associates (NZ) Limited

Senior Air Quality Scientist **2006 to 2016**

Responsibilities

- Produce air quality assessments for industrial resource consent applications under the Resource Management Act.
- Undertake meteorological and air-dispersion modelling in support of those applications.
- Carry out modelling investigations of urban air quality to aid regional council planning and decision-making, and to respond quickly to technical questions on air pollution.
- Maintain ties with the research community and end-user groups, presenting findings at national meetings and conferences.
- Project management.
- Provision of training for other team members.

Achievements

- Improved the team's modelling capabilities, notably in meteorology.
- Diversified the team's range of services offered, from industrial permitting to more general air quality investigations and research.
- Consolidated Golder as the first choice for urban airshed modelling and production of meteorological data sets with the larger regional councils in New Zealand.
- Won modelling contracts in competition with the models' developers.

National Institute of Water and Atmospheric Research

Atmospheric Scientist **1995 to 2006**

Responsibilities

- Participate as project leader and scientist in government-funded research programmes on urban air quality processes and greenhouse gas emissions.
- Carry out air-dispersion and meteorological modelling.
- Develop, manage and carry out other commercial contracts for regional councils and government ministries on a wide range of air-quality topics.
- Publish findings in the scientific literature.
- Participate actively in stakeholder meetings and international conferences.

Achievements

- Gained the respect as a modeller of the air quality community in New Zealand and Australia.
- Led the FRST research programme *Urban Air Quality Processes* from 2004 to 2006 (annual budget around $1,000,000).
- First in NZ to run a photochemical transport model.

Department of Meteorology, University of Reading

Post-doctoral Research Fellow **1989 to 1995**

Responsibilities

- Carry out research into dispersion of pollutants in atmospheric frontal systems and convection. Adapt the then-current UK MetOffice mesoscale forecasting model to run idealized meteorological case studies and disperse pollutants.
- Present results at conferences; publish findings in the literature.

Clients

Local Councils (city, district, regional)
Nelson CC
Tasman DC
Greater Wellington RC
Hawke's Bay RC
Auckland Council
Canterbury RC

Research Programmes
Foundation for Research, Science and Technology (FRST)

Industry
Waste Transformation Limited
Fonterra Limited

Plus - fertilizer producers, mines, power generation, farming co-operatives, chicken farmers, quarries, hospitals, waste-water treatment plants, small industrial sites, low-emission woodburner builders

Road Traffic
AECOM, Transurban
Ministry of Transport
NZ Environmental Protection Authority
Government of Victoria

Several Councils
University of Canterbury
Ministry for the Environment

PROJECT SUMMARIES

Urban Airshed Management

Particulate pollution: dispersion modelling of PM_{10} exposure (particles of diameter less than 10 microns) from all urban source types - domestic heating, vehicles, industry and outdoor burning. Several projects carried out to examine spatial concentration patterns, determine hot spots, investigate compliance with pollution standards, assess dispersion between neighbouring urban areas, review boundaries of urban and industrial air quality management zones, examine PM_{10} impacts under alternative emissions scenarios, and provide concentration estimates of finer particle ($PM_{2.5}$). Projects designed to support air plan reviews and other council decision-making.

Photochemical ozone: urban airshed modelling based on emissions of ozone precursors (oxides of nitrogen and volatile gases from anthropogenic and natural sources) in Auckland aimed to examine events of elevated ozone at monitoring sites. Project part of a FRST research programme on urban air quality processes.

Meteorological Modelling

Provision of data sets to councils for use by the air quality modelling community in industrial resource consent applications. Data sets promoted by councils and supplied to consultants. Based on TAPM or MM5 prognostic meteorology and local observations, model-ready data sets have been provided for CALPUFF, AUSPLUME, AUSROADS, CALINE and AERMOD.

Meteorological support for aerial power transmission-line surveying. Provided high-resolution model outputs for a different region of complex terrain each day.

Industrial Permitting

Provision of an assessment of air quality effects and application for resource consent for a waste timber processing facility in Timaru.
Audit of resource-consent applications for college boilers, a cement silo and a fish oil processor in Nelson.
Provision of an assessment of air quality effects and application for resource consent for a milk-powder processor in the Waikato region.

I managed the above-mentioned projects. In addition, I have participated in many other air quality assessments as modeller, analyst, report writer, or reviewer.

Air Quality Impacts of Road Traffic

Western Distributor (Melbourne): dispersion modelling of road-traffic impacts of the proposed realignment of the West Gate Freeway and distribution of traffic around the Port of Melbourne. Similar work for a confidential client in progress.
Peka Peka to Otaki Expressway (State Highway 1, Wellington Northern Corridor): review of air quality assessment.
Roadside exposure to carbon monoxide: dispersion modelling component of monitoring/modelling projects in Auckland, Wellington and Christchurch.

National Guidance Documents

Provision of modelling guidance to aid regional councils in their reviews of resource consent applications for small industries.
Co-author of Ministry for the Environment good-practice guide for dispersion modelling.

Agricultural Greenhouse Gas Emissions

Inverse dispersion modelling to infer emissions of methane from livestock at the paddock and regional scales from heli-kite and aircraft measurements. Refinement of inventory-based emissions estimates reported under national climate-change protocols. Project part of a FRST research programme on drivers and mitigation of global change.

Clients	
	Other Air Quality Investigations
Tasman DC	Arsenic exposure due to a timber product plant in Richmond.
Greater Wellington RC	Feasibility of air quality forecasting in Masterton.
Hawke's Bay RC	Air quality impacts of orchard waste burning around Hastings.
Nova Energy	Updraft assessment for civil aviation requirements.
Hyundai	Building wake effects and worker exposure - assessment of ground-level and roof-level exposure to air pollution around two facilities on Jurong Island, Singapore.
Canterbury RC	Air quality impacts of residual stubble burning on the Canterbury Plains.
FRST	Review of techniques for assessing uncertainties in extreme pollution concentrations.
Auckland Council	Spatial extents of SO2 non-compliance around the Ports of Auckland due to at-berth shipping emissions.
Nova Energy	Examination of temperature inversions as indicators of noise propagation.
Ravensdown Fertiliser (x2)	Fugitive fluoride emissions, sulphur trioxide and acid mist.
	Acid mist impacts on horticulture. Calculation of pH of droplets condensing from industrial sources.
	Biosecurity
	Development of an emergency-response dispersion model, based on RAMS forecasts, CALMET and CALPUFF. Internal project at NIWA, used in MAF's *Operation Waiheke*, the response to a suspected outbreak of foot-and-mouth disease.
Ministry of Agriculture and Forestry	Determination of likely entry point of introduced pests discovered in New Zealand – fire ants, fall webworm, asian gypsy moth. Developed (inverse) trajectory model based on CALMET meteorology.
	Case Studies Using an Operational Weather-Forecasting Model
UK Atomic Energy Authority Natural Environment Research Council (NERC)	Post-doctoral research: developed numerical routines for pollution dispersion within the UK MetOffice mesoscale forecasting model (15 km resolution, pre- Unified Model), and for dispersion in sub-gridscale convection. Carried out and published case studies of dispersion in frontal systems and convection.
	Publications in the Scientific Literature
Journals: Quart. J. Roy. Meteorol. Soc. Atmospheric Environment Sci. Total Environment Clean Air and Env. Quality Geo. Astro. Fluid Dyn. NZ Science Review	On the following subjects: Estimation of methane emissions from livestock Baroclinic instability in rotating-annulus flows Dispersion and removal of pollution in frontal systems Dispersion in post-cold-front convection Particulate pollution episodes in urban areas Photochemical ozone Population exposure to nitrogen dioxide
	Project Management
	At Golder, manager of most projects with Regional Councils and Government Ministries, and some industrial clients. At NIWA, manager of FRST research program Urban Air Quality Processes, annual budget ~$1,000,000, a NIWA-led collaboration among five institutions.