Gustavo A. Olivares Pino

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Summary

Very curious Chemical Engineer turned air quality scientist with more than 18 years of experience innovating in data analysis and management, scientific computing, citizen science and instrument design.

Work Experience

Air Quality Scientist at NIWA - New Zealand Jan 2007 - present

My role at NIWA has been varied. I have led the development of new technologies both in measurements and data analysis for and visualisation environmental data. I was also responsible for managing our group's data and enabling the participation of non-technical users in our research. I also developed numerous research proposals responding to specific RFPs, managed the projects and written the scientific publications and customer reports for various kinds of audiences.

PhD student at Stockholm University - Sweden Feb 2002 - Dec 2006

My work was primarily performing aerosol measurements in urban areas, analyse the measurements to extract emission factors for real-world vehicle fleets and to explore the processes affecting aerosol behaviour in urban environments.

Project Engineer at CONAMA - Chile June 1998 - Sep 2000

My primary role was to implement the MATCH atmospheric transport model for central Chile. I trained at SMHI (Swedish meteorology institute) on how to use and maintain the model and then used it to investigate the impact of the large copper smelters on the air quality in Central Chile. This project was part of a SIDA activity with the then National Commission for the Environment (CONAMA), now ministry for the environment.

Projects

CONA Link to more info

My main contribution to this project was two-fold. First, I designed and built the main measurement instrument for the project, the Outdoor Dust Information Node (ODIN). The second area was around data management and automatic reporting where I designed the database and cloud infrastructure to support our measurements and I implemented automatic, container-based, reporting tasks that took the live measurements from ODIN and Clarity networks and turn them into easy to understand disgnostics for the instruments and inputs to 3D animation systems for the general public.

TOTUS - NIWA Link to Demo

TOTUS is a GIS-based environmental impact tool that takes city-scale layers like road network, land use type and building footprint, and allows the implementation of air pollutant emission and exposure, together with energy consumption models. I was the PI in this project and as such I had to coordinate the teams developing the database and implementing the environmental impact assessment methods. I also co-designed and maintained the PostgreSQL-PostGIS database that runs the system. All code is available on GitHub.

Clear the Air Link to more info

The objective of the project was to characterise the ventilation conditions of many indoor spaces in New Zealand. For that purpose, I developed a platform to centrally capture indoor air quality measurements together with context information like state of doors/windows and human presence in the room. I also implemented the data pipeline and automatic reporting systems using AWS to store data and run R and Python scripts to automatically generate reports and gain insights into the performance of indoor spaces both for our research and for the use of the volunteer study participants.

Waterview Connection EIA Link to final report

My role in this impact assessment was to lead the dispersion modelling tasks. I setup the relevant model input information from the scenarios provided by the client. A key innovation that I implemented was the development of tools that allowed the use of several computers in parallel to enable running the modelling scenarios much faster than what was the norm back in 2010 when the modelling tools used were not capable of running in parallel computing settings. I also proposed that our approach included a much wider area of relevant emission sources than only the immediate affected road links, allowed us to highlight the regional benefits of the Waterview which was not originally considered but that the client used to communicate the benefits of the project.

WEDGE Link to Poster

WEDGE was a measurement campaign in Auckland in 2009. My contribution was designing and building the $MAQS^2$ (Mobile Air Quality Sampling System), a car-mounted system to measure aerosol size distribution, ambient conditions and black carbon. I was responsible for the electrical design, data communication and the development of the LabView system to manage the platform. I was also the main data analyst for this project turning thousands of records per trip into understandable maps of air pollution and extracted relationships between the measured pollutants.

Education

2002 - 2006	Fil. Lic. (Applied Environmental Science - Atmospheric Chemistry) at **Stockholm University** (Urban Aerosols)
1999 - 2001	MSc (Chemical Engineering) at **Universidad de Chile** (Regional Dispersion of Oxidized Sulfur in Central Chile)
1992 - 1998	Chemical Engineering at **Universidad de Chile** (Simulation of the Protein Purification using Ion Exchange Chromatography)

Skills

Technical skills	Data analysis, Electronic design, Cloud computing, Scientific programming (R, Python, Octave, SQL), Database design, Version control systems (Git), Linux, Machine learning, Instrument design and control, LabView programming.
Soft skills	Problem solving, Creativity, Data analysis, Experiment design, Curiosity, Team work, Communication.
Languages	Spanish (native), English (fluent), Swedish (basic)

Publications

Chen, Bowen, Yun Sing Koh, Gillian Dobbie, Ocean Wu, Guy Coulson, and Gustavo Olivares (2022). "Online Air Pollution Inference using Concept Recurrence and Transfer Learning". In: *2022 IEEE 9th International Conference on Data Science and Advanced Analytics (DSAA)*. IEEE, pp. 1–10. URL: https://ieeexplore.ieee.org/abstract/document/10032404/ (visited on 04/19/2024).

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Pang, Shaoning, Lei Song, Abdolhossein Sarrafzadeh, Guy Coulson, Ian Longley, and Gustavo Olivares (Jan. 2021). "Indoor Emission Sources Detection by Pollutants Interaction Analysis". en. In: *Applied Sciences* 11.16. Number: 16 Publisher: Multidisciplinary Digital Publishing Institute, p. 7542. ISSN: 2076-3417. DOI: 10.3390/app11167542. URL: https://www.mdpi.com/2076-3417/11/16/7542 (visited on 10/25/2022).

Coulson, Guy, Jonathan Moores, et al. (2020). "Toward a Framework for Resilience Assessments: Working Across Cultures, Disciplines, and Scales in Aotearoa/New Zealand". English. In: *Frontiers in Sustainable Cities* 2. Publisher: Frontiers. ISSN: 2624-9634. DOI: 10.3389/frsc.2020.00011. URL: https://www.frontiersin.org/articles/10.3389/frsc.2020.00011/full (visited on 11/26/2020).

Dale, Ethan R. et al. (Oct. 2020). "The winter 2019 air pollution ($PM_{2.5}$) measurement campaign in Christchurch, New Zealand". English. In: *Earth System Science Data Discussions*. Publisher: Copernicus GmbH, pp. 1–29. ISSN: 1866-3508. DOI: https://doi.org/10.5194/essd-2020-276. URL: https://essd.copernicus.org/preprints/essd-2020-276/ (visited on 11/26/2020).

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