The webinar, "**Enriching the CLSA with environmental exposure data: The Canadian Urban Health Research Consortium (CANUE)**," will begin shortly.

For first-time WebEx users:

- This webinar will use VoIP only. Upon entering the session, you will be asked to join an integrated voice conference. Please select "yes". If you are not prompted with this message, please go to the main toolbar and select Audio>Integrated Audio Conference>Start Conference. If you continue to have audio issues, please go to Audio>Speaker/Microphone Audio Test.

- The only people in the session who can speak and be heard are the host and panelists.

- If you have questions/comments, you can type them into the chat box in the bottom right of the WebEx window. Ensure "All Participants" is selected from the dropdown menu before you press "send." Mobile users must select "Chat with Everyone." Questions will be visible to all attendees. You can type your questions at any point during the session, but they won't be answered until the end of the presentation.

- At the conclusion of the webinar, please consider participating in our feedback poll and remember to exit the WebEx session.

CLSA Webinar Series

Enriching the CLSA with environmental exposure data: The Canadian Urban Health Research Consortium (CANUE)

Dr. Jeffrey Brook, Dr. Eleanor Setton and Dany Doiron

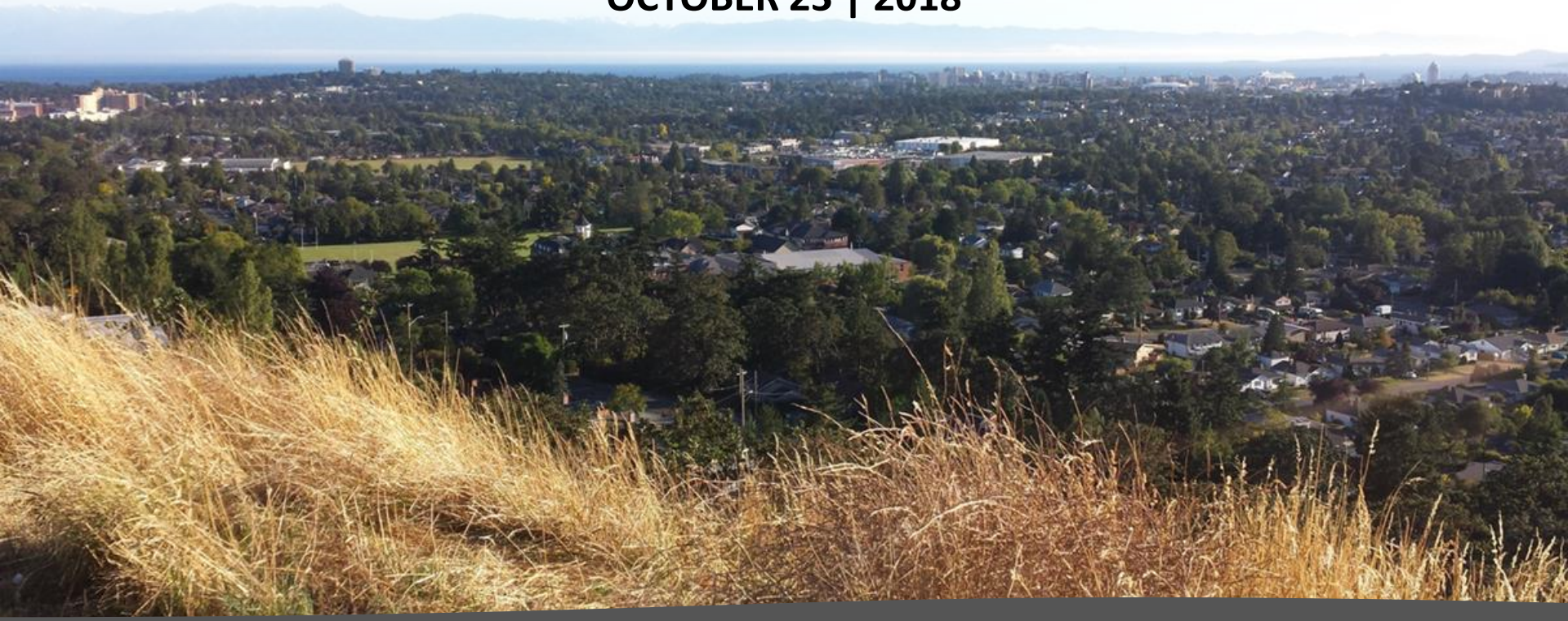
Noon to 1 p.m. ET | October 23, 2018

The Canadian Urban Environmental Health Research Consortium (CANUE) is a CIHR-funded initiative, which collates and develops standardized urban environmental exposure data and links them to health databases to support environmental health research in Canada. CLSA and CANUE have collaborated to link data on air quality, neighbourhood factors, weather and climate, and greenness indicators to CLSA data on health and aging. The linked data, now available to Canadian researchers, includes estimated exposures of sulfur dioxide, nitrogen dioxide, ozone and fine particulate matter, as well as information about nighttime light, normalized difference vegetation index (i.e. greenness), health-relevant climate and weather measures, material and social deprivation indices and the Canadian Active Living Environments (i.e. walkability) index. This webinar will give an overview of CANUE and of pre-linked environmental exposure data currently available to researchers through the CLSA. The webinar will also touch on methods for expanding the breadth and quality of environmental exposures available to the CLSA and other Canadian cohorts.

In collaborating with the CLSA, CANUE ultimately aims to enable research on how environmental factors affect the ways in which Canadians age and help better inform evidence-based strategies for planning healthy and age-friendly communities and cities across Canada.

Enriching the CLSA with environmental exposure data:
the Canadian Urban Environmental Health Research Consortium

OCTOBER 23 | 2018



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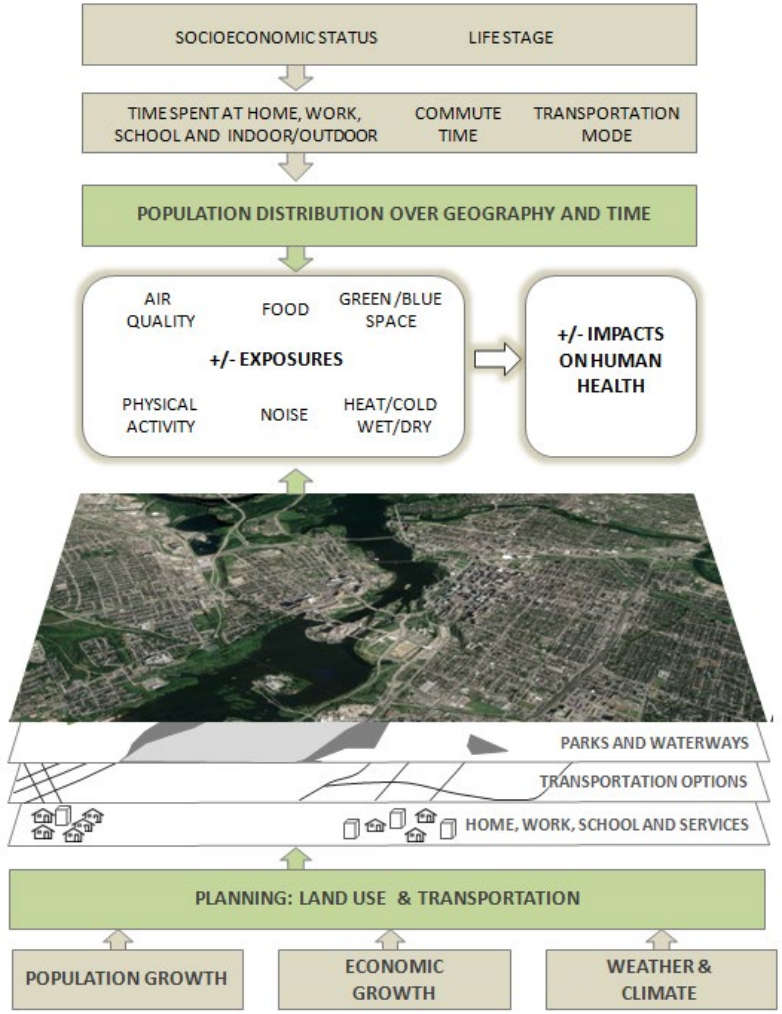

A B S T R A C T

Objective: Determine the risk of premature mortality due to the urban ambient air pollution mix in Canada.

Methods: The number of daily deaths for non-accidental causes were obtained in 11 cities from 1980 to 1991 and linked to concentrations of ambient gaseous air pollutants

The Effect of the Urban Ambient Air Pollution Mix on Daily Mortality Rates in 11 Canadian Cities

Richard T. Burnett, PhD,[1] Sabit Cakmak, PhD,[1] Jeffrey R. Brook, PhD[2]

152 REVUE CANADIENNE DE SANTÉ PUBLIQUE VOLUME 89, NO. 3

1997

ehp ENVIRONMENTAL HEALTH PERSPECTIVES OPEN ACCESS

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Environ Health Perspect. 2003 Nov; 111(14): 1773–1778. PMCID: PM

Research Article

Association between gaseous ambient air pollutants and adverse pregnancy outcomes in Vancouver, Canada.

Shiliang Liu, Daniel Krewski, Yuanli Shi, Yue Chen, and Richard T Burnett

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CANUE

nature > scientific reports > articles > article

MENU SCIENTIFIC REPORTS

Article | OPEN | Published: 27 November 2017

Impact of Oxidant Gases on the Relationship between Outdoor Fine Particulate Air Pollution and Nonaccidental, Cardiovascular, and Respiratory Mortality

Scott Weichenthal, Lauren L. Pinault & Richard T. Burnett

Scientific Reports **7**, Article numbe

ENVIRONMENTAL EPIDEMIOLOGY

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Residential exposure to fine particulate matter air pollution and incident breast cancer in a cohort of Canadian women

Villeneuve, Paul J.[a,b,*]; Goldberg, Mark S.[c]; Crouse, Dan L.[d]; To, Teresa[e,f]; Weichenthal, Scott A.[g]; Wall, Claus[f]; Miller, Anthony B.[f]

sue 3 - p e021

ELSEVIER

Environmental Pollution

Volume 214, July 2016, Pages 589-599

Ozone exposure and cardiovascular-related mortality in the Canadian Census Health and Environment Cohort (CANCHEC) by spatial synoptic classification zone ☆

Sabit Cakmak [a], Chris Hebbern [a], Jennifer Vanos [b], Dan L. Crouse [c], Rick Burnett [a]

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ELSEVIER

The Lancet Planetary Health

Volume 1, Issue 7, October 2017, Pages e289-e297

open access

Articles

Urban greenness and mortality in Canada's largest cities: a national cohort study

Dr Dan L Crouse PhD [a, b], Lauren Pinault PhD [c], Adele Balram MF
Paul A Peters PhD [b, k], Hong Chen PhD [e, f, g], Aaron van Donkelaar Ph
[h, i], Richard Ménard PhD [j], Alain Robichaud MSc [j], Paul J Villeneuve P

ELSEVIER

Environmental Research

Volume 137, February 2015, Pages 94-100

Urban greenness and physical activity in a national survey of Canadians

Owen McMorris [a], Paul J. Villeneuve [a], Jason Su [b], Michael Jerrett [b]

ELSEVIER

Environmental Research

Volume 115, May 2012, Pages 51-58

A cohort study relating urban green space with mortality in Ontario, Canada ☆

Paul J. Villeneuve [a, b], Michael Jerrett [c], Jason G. Su [c], Richard T. Burnett [a], Hong Chen [d], Amanda J. Wheeler [e], Mark S. Goldberg [f]

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Article Text

Article info

Citation

Public health

Research

Association between neighbourhood walkability and metabolic risk factors influenced by physical activity: a cross-sectional study of adults in Toronto, Canada

C K Jennifer Loo[1], Michelle Greiver[2, 3], Babak Al

PLOS ONE

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RESEARCH ARTICLE

Weather, day length and physical activity in older adults: Cross-sectional results from the European Prospective Investigation into Cancer and Nutrition (EPIC) Norfolk Cohort

Yu-Tzu Wu, Robert Luben, Nicholas Wareham, Simon Griffin, Andy P. Jones

Published: May 31, 2017 • https://doi.org/10.1371/journal.pone.0177767

Med Sci Sports Exerc. Author manuscript; available in PMC 2015 Oct 1.
Published in final edited form as:
Med Sci Sports Exerc. 2014 Oct; 46(10): 1891–1899.
doi: 10.1249/MSS.0000000000000325

PMCID: PMC4155032
NIHMSID: NIHMS570741
PMID: 24598696

HEAT WAVES, AGING, AND HUMAN CARDIOVASCULAR HEALTH

W. Larry Kenney, Daniel H. Craighead, and Lacy M. Alexander

Author information ▶ Copyright and License information ▶ Disclaimer

International Archives of Occupational and Environmental Health
pp 1–12 | Cite as

Sex differences in mortality after heat waves: are elderly women at higher risk?

Authors | Authors and affiliations

Yvette van Steen, Anna-Maria Ntarladima, Rick Grobbee, Derek Karssenberg, Ilonca Vaartjes

- Subtle, chronic effects on many health outcomes
- May require large populations to get adequate variation across multiple exposures and health outcomes
- Studies tend to focus on one or two co-exposures, but in reality there are many interacting exposures
- Use of ‘one-off’ exposure metrics, ‘re-inventing the wheel’ for each study

CANUE

CIHR IRSC
Canadian Institutes of Health Research | Instituts de recherche en santé du Canada

MEASURING ENVIRONMENTAL EXPOSURES WORKSHOP

2011

ENVIRONMENT, GENES AND CHRONIC DISEASE NATIONAL WORKSHOP

2012

ENVIRONMENTS AND HEALTH NATIONAL FORUM

2013

- Break down some of the existing silos of research in the environment and health field.
- Tackle the real-world complexity of interacting and ubiquitous environmental influences.
- Build research capacity and supporting data platforms.

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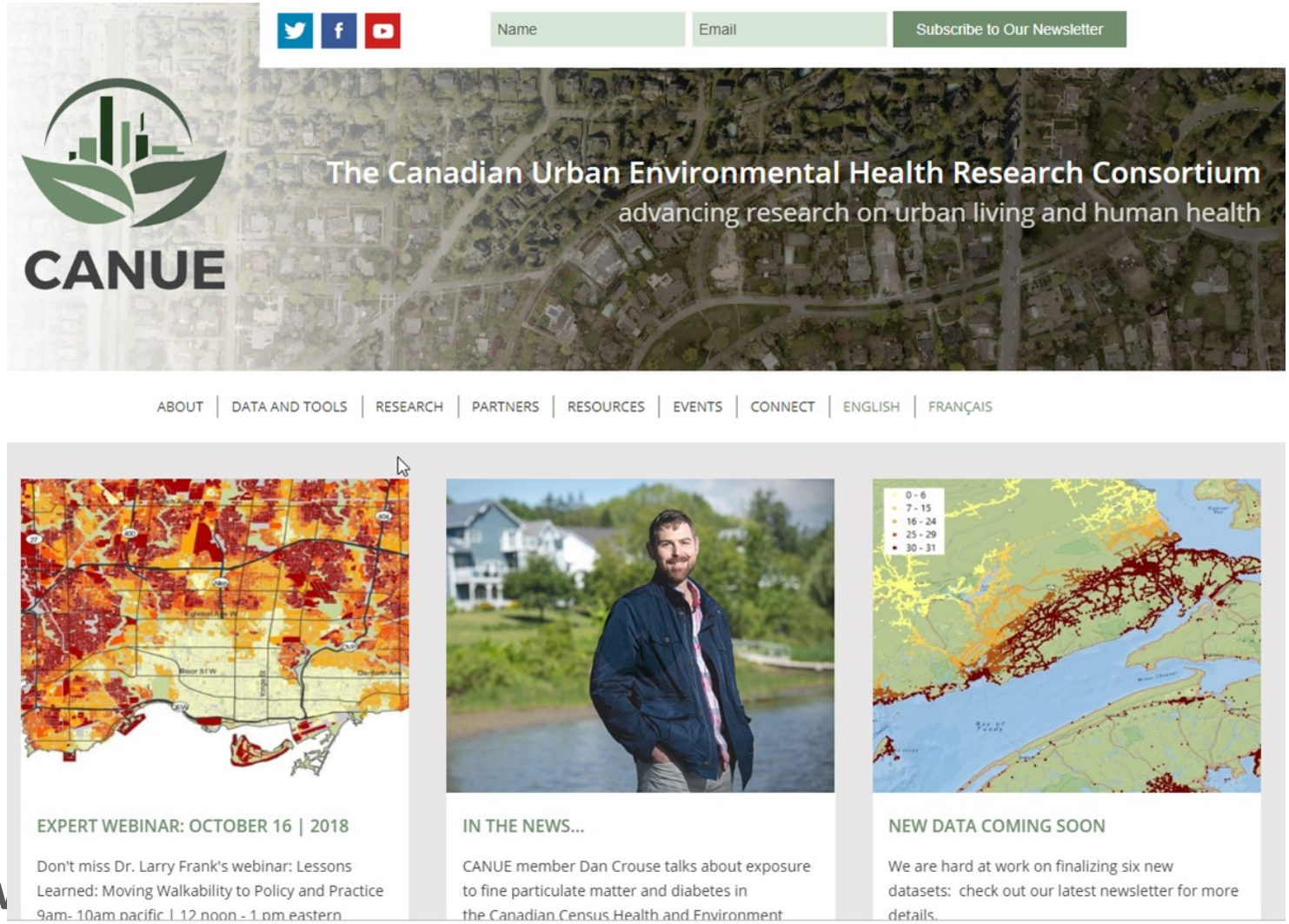

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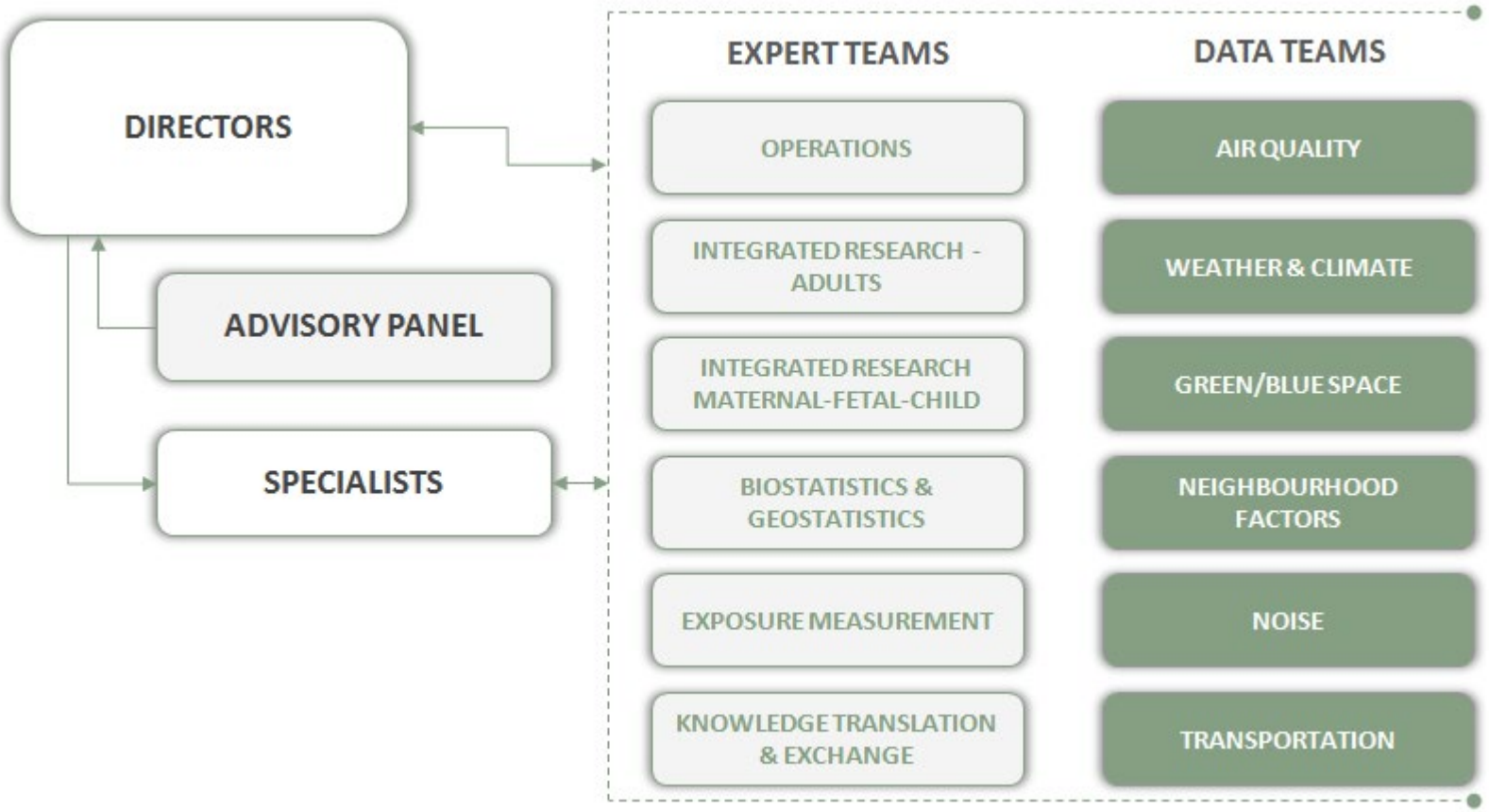

Members: ~ 180 additional individuals are voluntary members

CANUE Data Platform – Data Themes

NEIGHBOURHOOD FACTORS

GREEN/BLUE SPACES

CLIMATE

AIR QUALITY

NOISE

TRANSPORTATION

ANALYSIS-READY EXPOSURE DATA = easy for researchers to access and use

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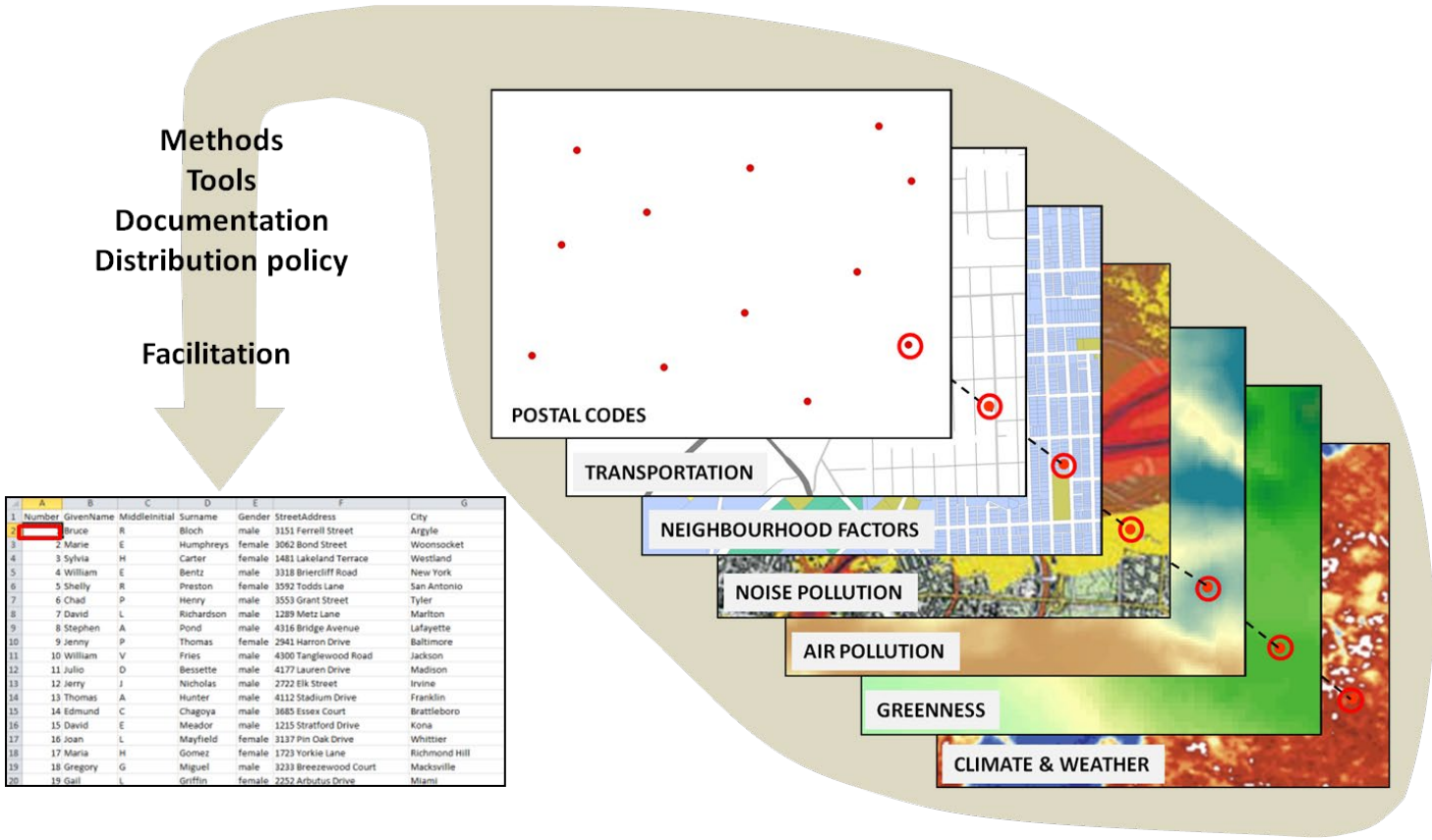

Number	GivenName	MiddleInitial	Surname	Gender	StreetAddress	City
1	Bruce	R	Bloch	male	3151 Ferrell Street	Argyle
2	Marie	E	Humphreys	female	3062 Bond Street	Woonsocket
3	Sylvia	H	Carter	female	1481 Lakeland Terrace	Westland
4	William	E	Bentz	male	3318 Briercliff Road	New York
5	Shelly	R	Preston	female	3592 Todds Lane	San Antonio
6	Chad	P	Henry	male	3553 Grant Street	Tyler
7	David	L	Richardson	male	1289 Metz Lane	Marlton
8	Stephen	A	Pond	male	4316 Bridge Avenue	Lafayette
9	Jenny	P	Thomas	female	2941 Harron Drive	Baltimore
10	William	V	Fries	male	4300 Tanglewood Road	Jackson
11	Julio	D	Bessette	male	4177 Lauren Drive	Madison
12	Jerry	J	Nicholas	male	2722 Elk Street	Irvine
13	Thomas	A	Hunter	male	4112 Stadium Drive	Franklin
14	Edmund	C	Chagoya	male	3685 Essex Court	Brattleboro
15	David	E	Meador	male	1215 Stratford Drive	Kona
16	Joan	L	Mayfield	female	3137 Pin Oak Drive	Whittier
17	Maria	H	Gomez	female	1723 Yorkie Lane	Richmond Hill
18	Gregory	G	Miguel	male	3233 Breezewood Court	Macksville
19	Gail	L	Griffin	female	2252 Arbutus Drive	Miami

1980 **2050**

CANUE DATA

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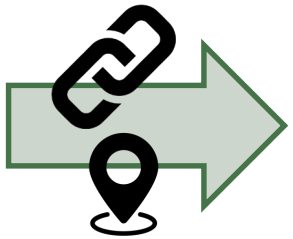
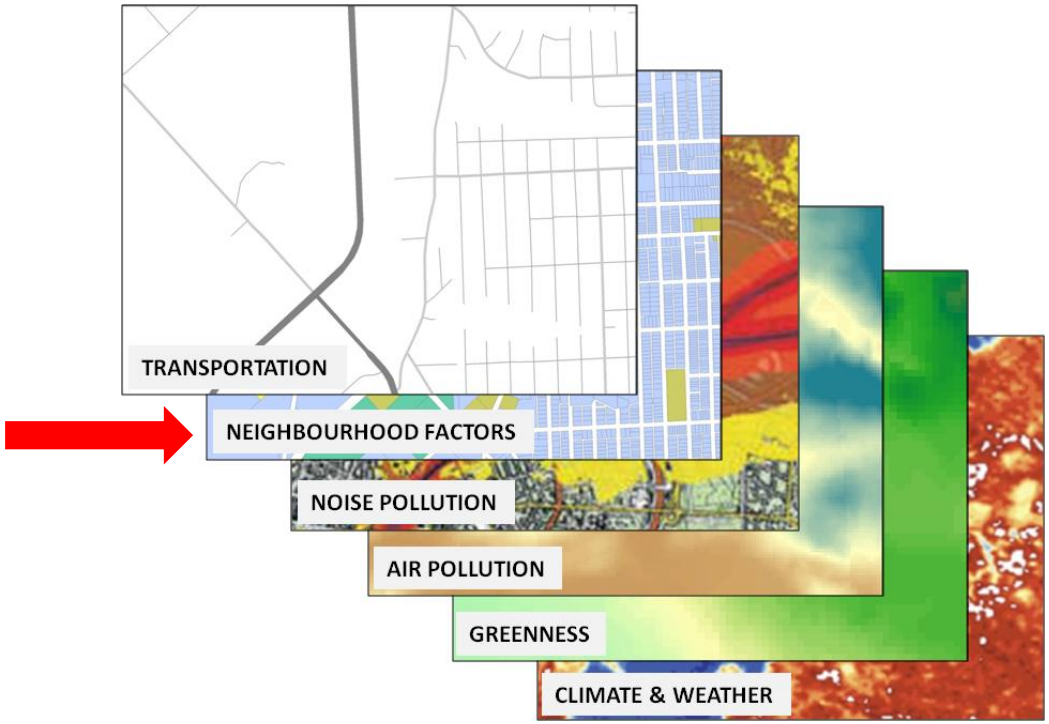
Postal code

POSTALCODE06	ALE06_01	ALE06_02	ALE06_03	ALE06_04	ALE06_05	ALE06_06	ALE06_07
T0A0A0	48130314	0.60000002	0.5	-1.2326522	-0.7681431	-2.0007954	1
T0A0B0	48120175	0	2.3	-1.2614889	-0.7665497	-2.0280385	1
T0A0C0	48120239	0	0.80000001	-1.2614889	-0.7678775	-2.0293665	1
T0A0E0	48130179	1	0.5	-1.2134278	-0.7681431	-1.9815708	1
T0A0J0	48120258	13.4	69.800003	-0.6174694	-0.7067964	-1.3242658	1
T0A0K0	48111554	15.1	148.39999	-0.5357655	-0.637217	-1.1729825	1
T0A0M0	48130184	14.7	64.900002	-0.5549899	-0.711134	-1.2661239	1
T0A0N0	48120240	0	0.89999998	-1.2614889	-0.767789	-2.0292778	1
T0A0P0	48130178	0	0.1	-1.2614889	-0.7684971	-2.0299861	1
T0A0R0	48130182	0	0.40000001	-1.2614889	-0.7682316	-2.0297205	1
T0A0T0	48120192	0.30000001	3.4000001	-1.2470706	-0.7655759	-2.0126464	1
T0A0Z0	48130312	0	0.89999998	-1.2614889	-0.767789	-2.0292778	1
T0A1A0	48120216	16.299999	77.099998	-0.4780921	-0.7003341	-1.1784263	1
T0A1B0	48130182	0	0.40000001	-1.2614889	-0.7682316	-2.0297205	1
T0A1C0	48120173	0	0.40000001	-1.2614889	-0.7682316	-2.0297205	1
T0A1E0	48120242	0.60000002	0.69999999	-1.2326522	-0.767966	-2.0006182	1
T0A1H0	48120174	0.60000002	2.0999999	-1.2326522	-0.7667267	-1.9993789	1
T0A1M0	48120210	0	1.3	-1.2614889	-0.7674348	-2.0289237	1
T0A1N0	48111560	20.200001	181.10001	-0.2906536	-0.6082698	-0.8989234	1



Postal code

Neighbourhood factors



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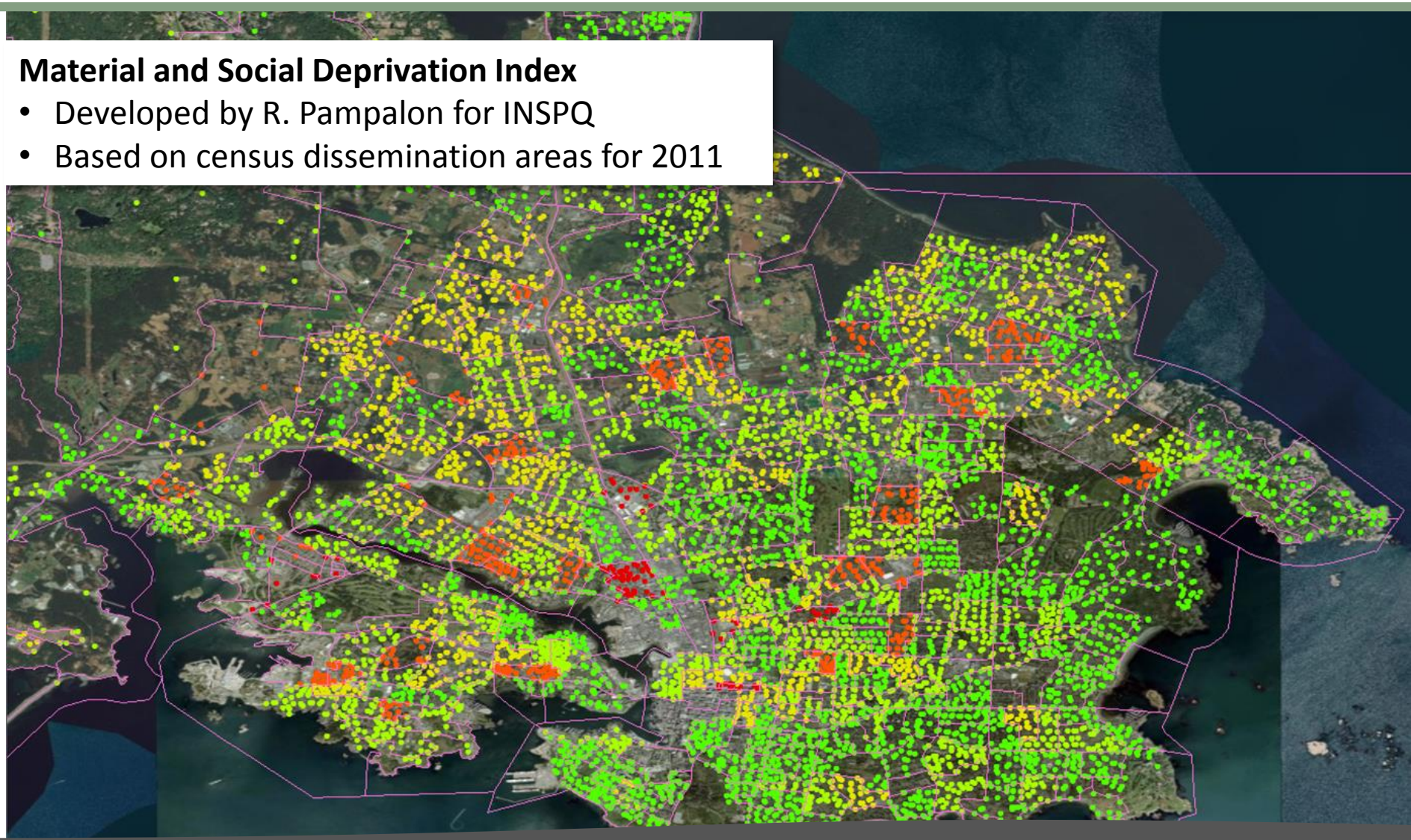
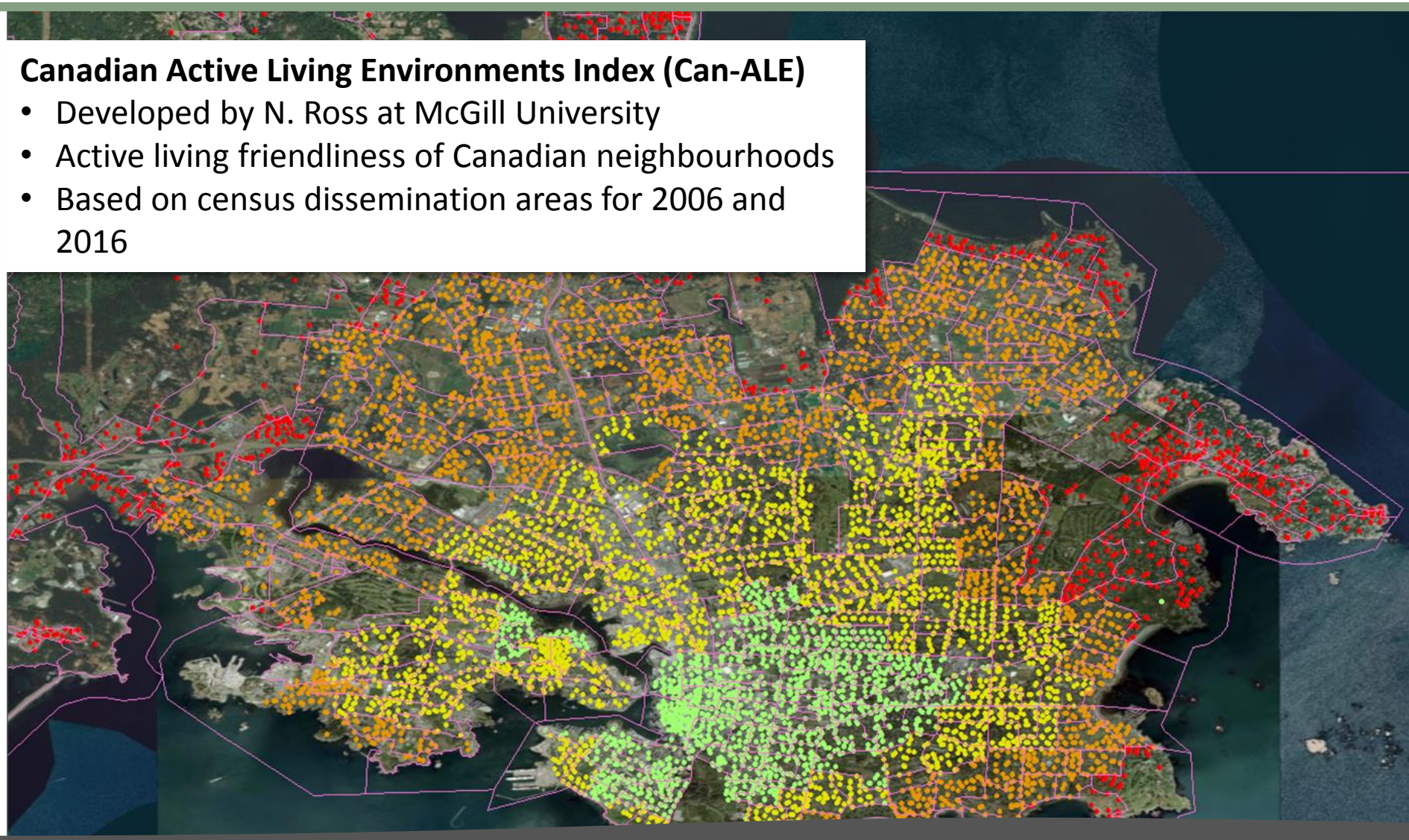
Material and Social Deprivation Index

- Developed by R. Pampalon for INSPQ
- Based on census dissemination areas for 2011



Canadian Active Living Environments Index (Can-ALE)

- Developed by N. Ross at McGill University
- Active living friendliness of Canadian neighbourhoods
- Based on census dissemination areas for 2006 and 2016



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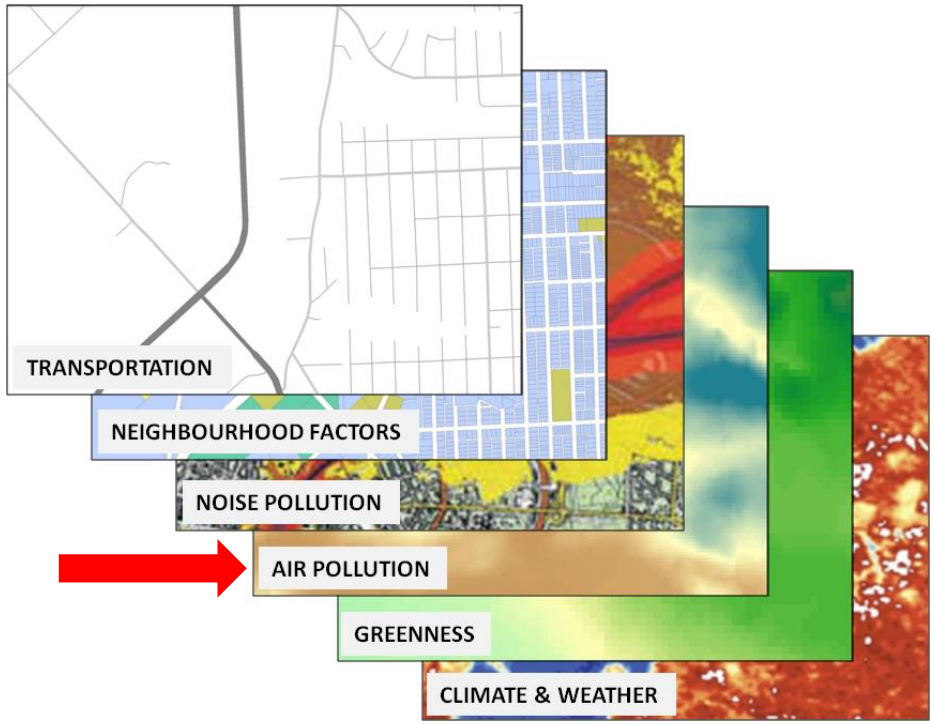
Nighttime light

- Satellite imagery
- Annual average brightness
- 1 km resolution

Air pollution



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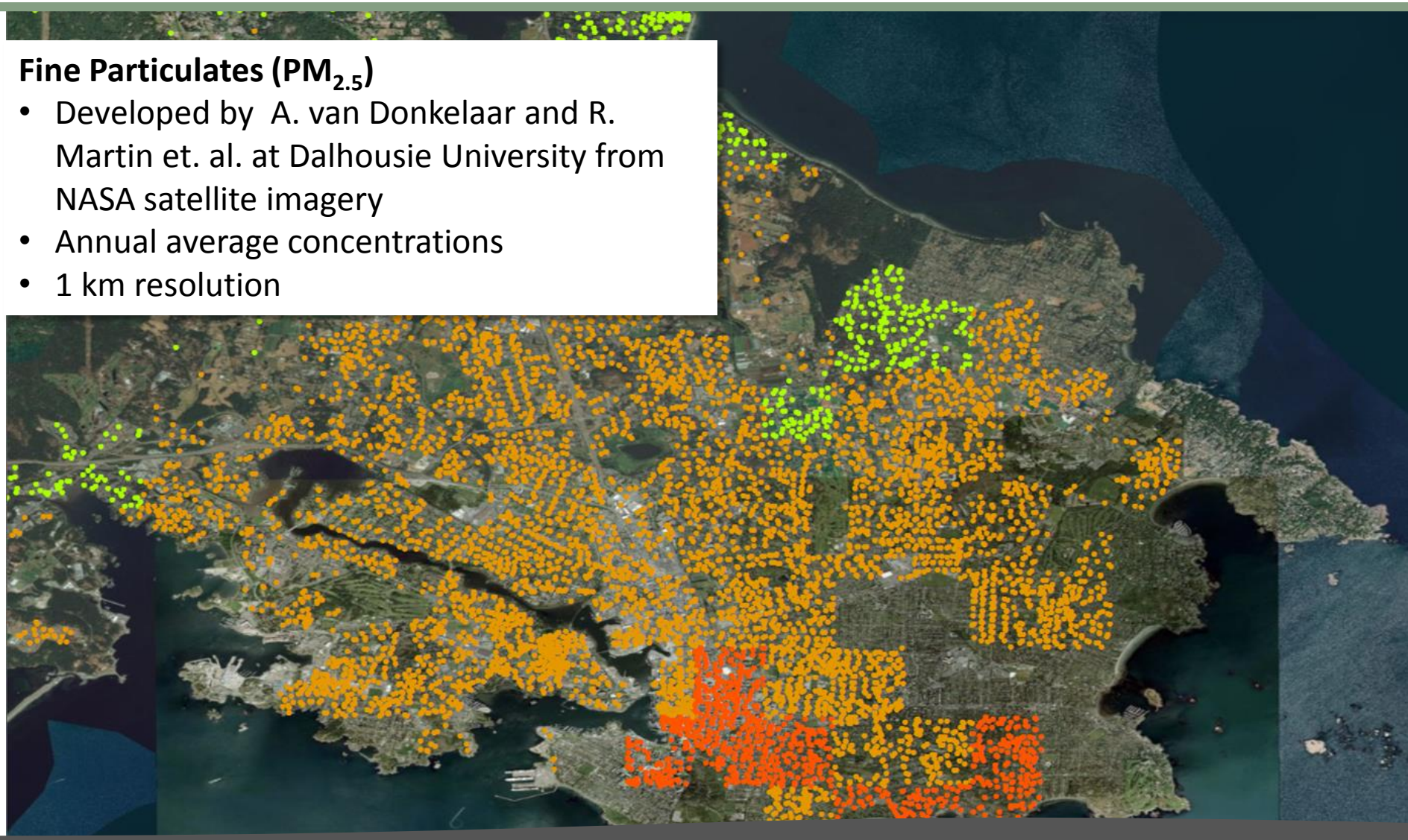
Fine Particulates ($PM_{2.5}$)

- Developed by A. van Donkelaar and R. Martin et. al. at Dalhousie University from NASA satellite imagery
- Annual average concentrations
- 1 km resolution



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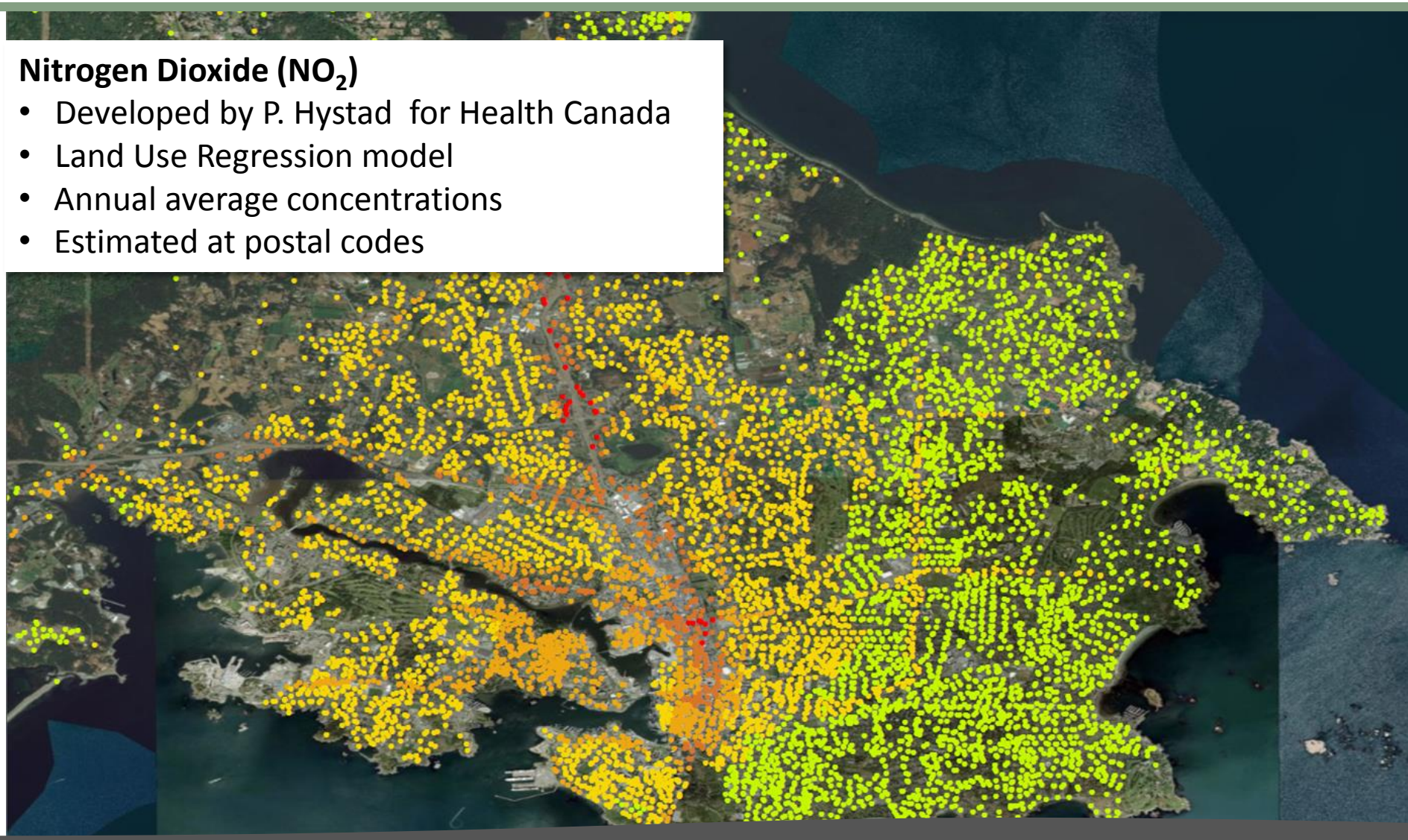

Nitrogen Dioxide (NO_2)

- Developed by P. Hystad for Health Canada
- Land Use Regression model
- Annual average concentrations
- Estimated at postal codes

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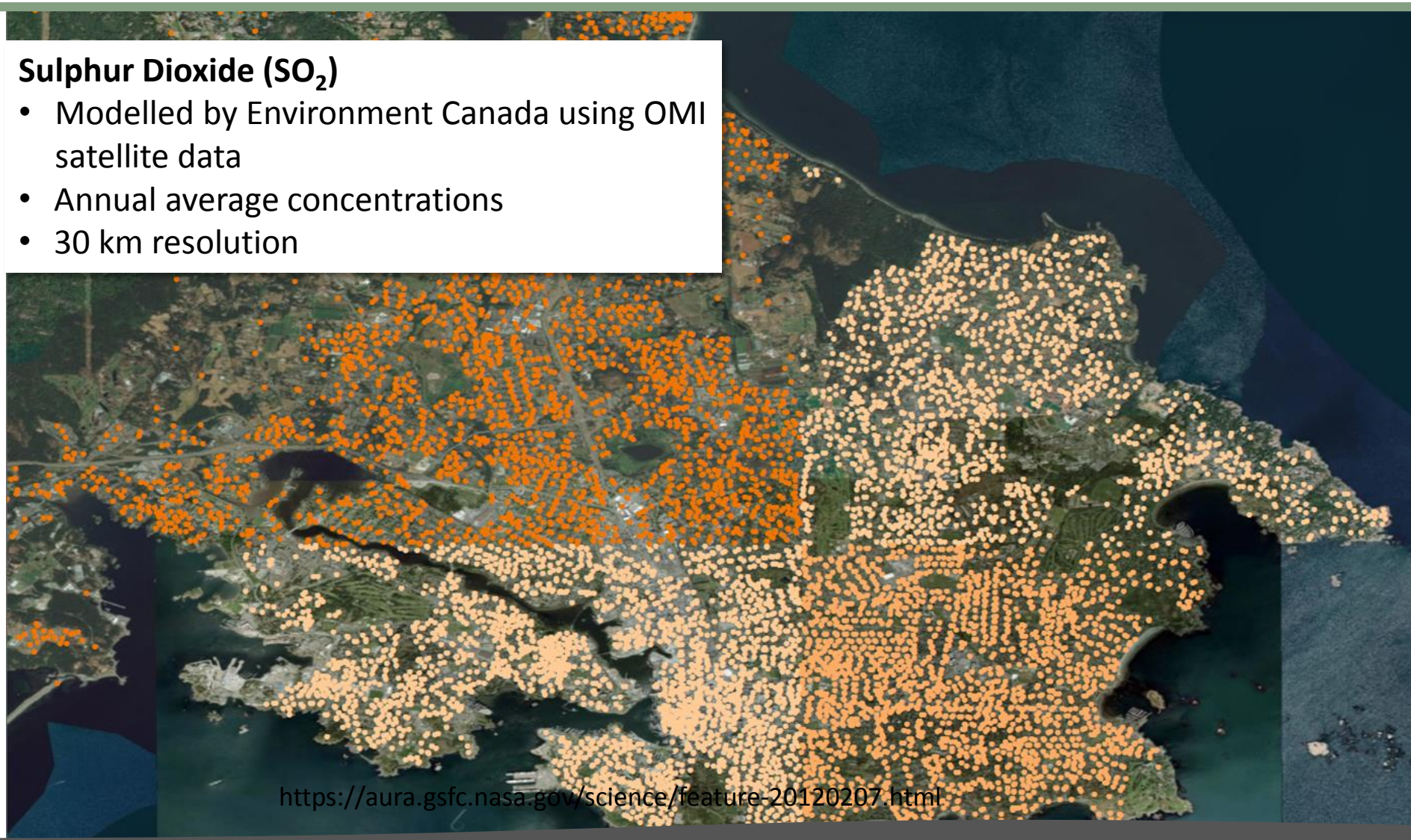
Sulphur Dioxide (SO_2)

- Modelled by Environment Canada using OMI satellite data
- Annual average concentrations
- 30 km resolution



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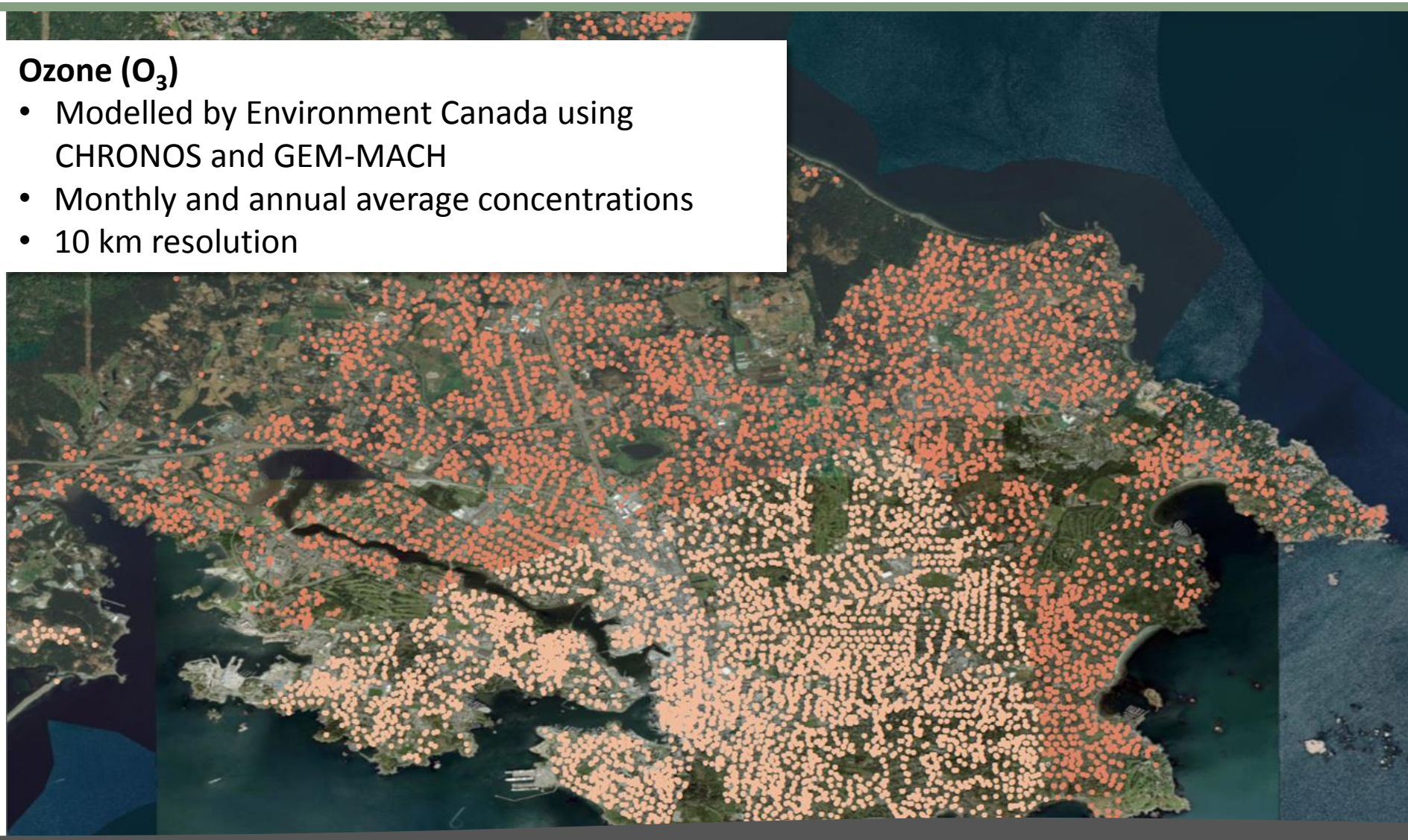
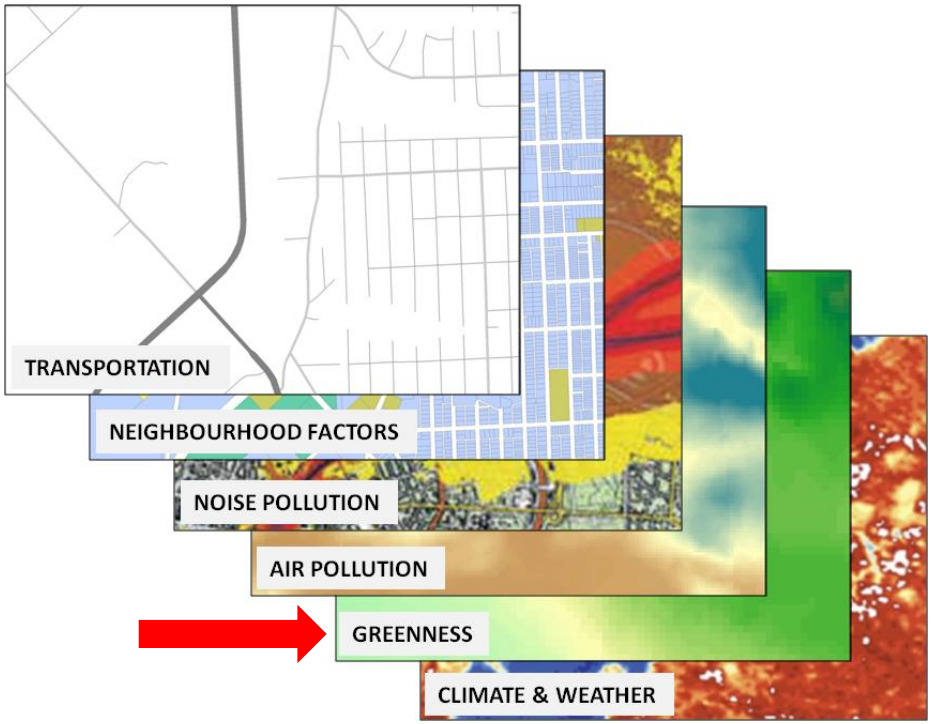
Ozone (O_3)

- Modelled by Environment Canada using CHRONOS and GEM-MACH
- Monthly and annual average concentrations
- 10 km resolution



Greenness


TRANSPORTATION
NEIGHBOURHOOD FACTORS
NOISE POLLUTION
AIR POLLUTION
GREENNESS
CLIMATE & WEATHER

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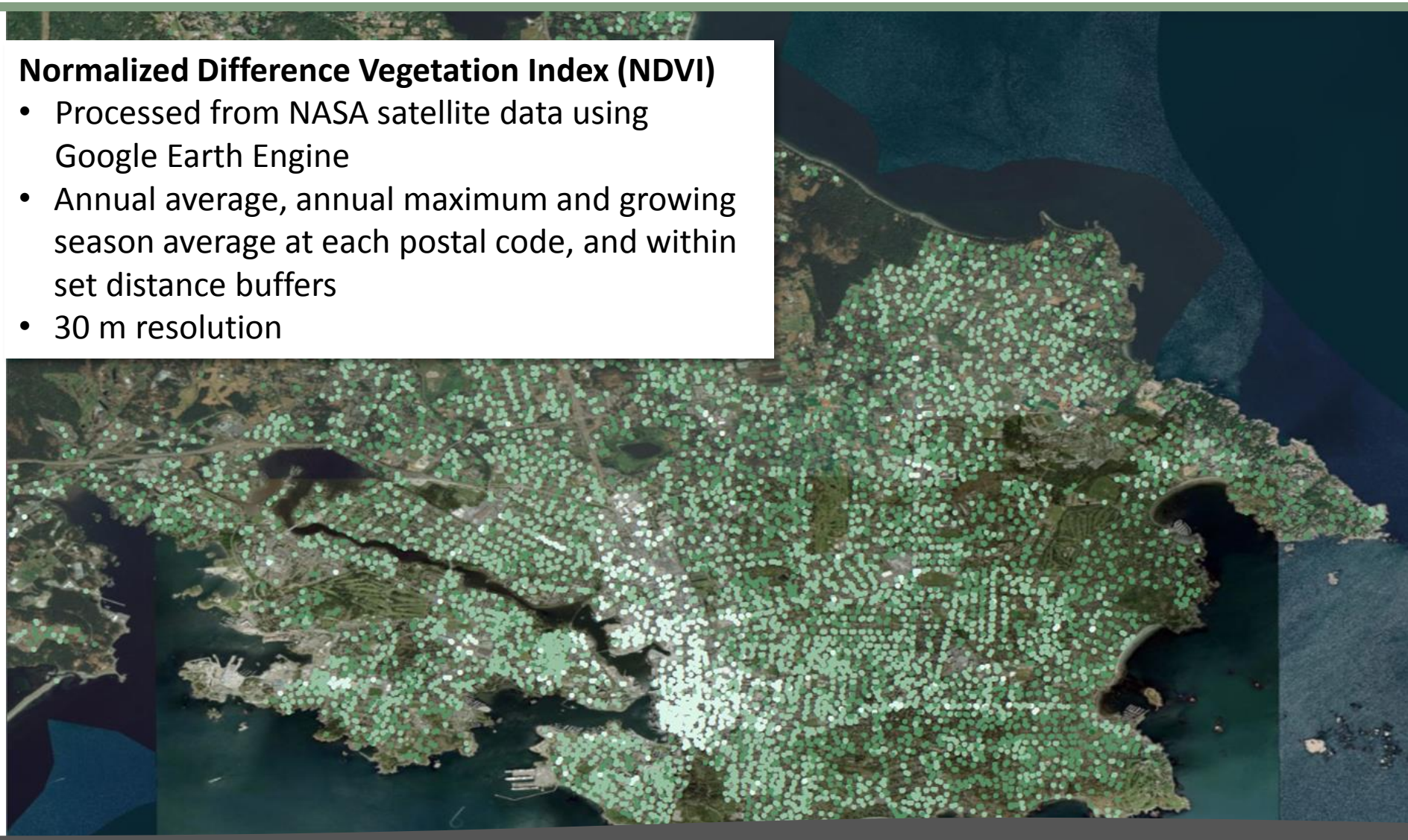
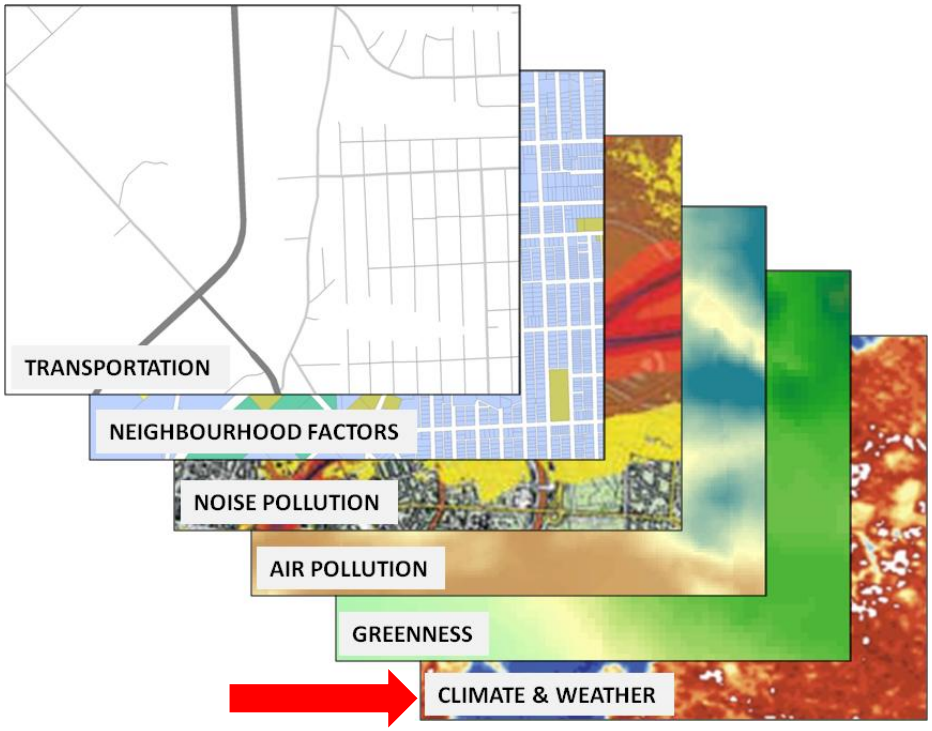
Normalized Difference Vegetation Index (NDVI)

- Processed from NASA satellite data using Google Earth Engine
- Annual average, annual maximum and growing season average at each postal code, and within set distance buffers
- 30 m resolution



CANUE

Weather and Climate



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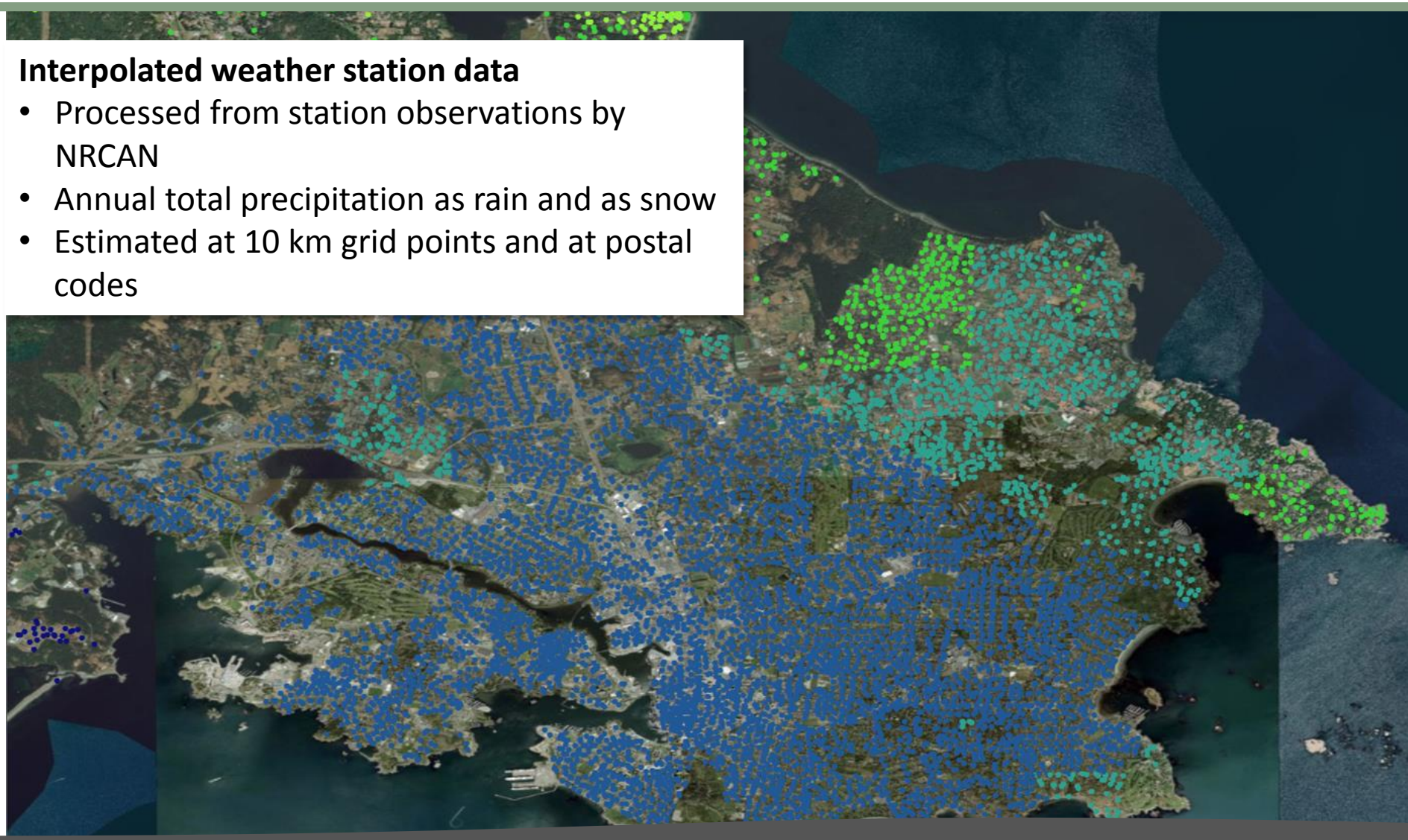
Interpolated weather station data

- Processed from station observations by NRCAN
- Annual total precipitation as rain and as snow
- Estimated at 10 km grid points and at postal codes



Pre-linked data: Exposure by urban/rural classification

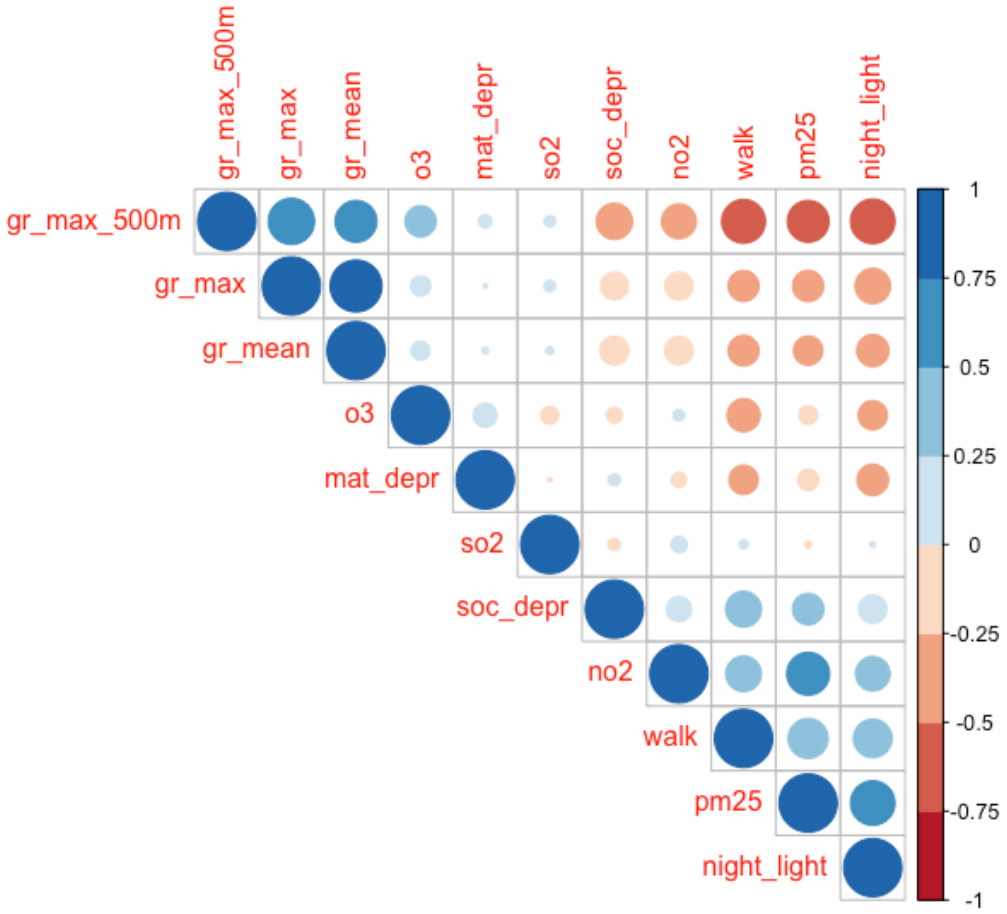
Variable	Urban Core (n= 37 855)	Urban fringe/Rural (n = 13 483)
”Walkability” (mean)	0.25	-1.95
$PM_{2.5}$ (mean)	6.69	4.44
NO_2 (mean)	6.92	4.73
SO_2 (mean)	0.28	0.24
O_3 (mean)	26.15	29.91
Greenness (mean)	0.51	0.62

CANUE

Pre-linked data: Quintile distribution of CLSA participants

Variable	Q1	Q2	Q3	Q4	Q5	n
Material deprivation	15 113 **(30.8%)**	11 496 **(23.4%)**	9 032 (18.4%)	7 483 (15.2%)	6 023 (12.3%)	49 147
Social deprivation	8 492 (17.3%)	9 755 (19.8%)	9 791 (19.9%)	10 427 (21.2%)	10 682 (21.7%)	49 147
”Walkability”	15 722 (30.7%)	16 780 (32.8%)	13 353 (26.1%)	3 731 **(7.3%)**	1 624 **(3.2%)**	51 210
$PM_{2.5}$	4 391 (8.8%)	2 531 (5.1%)	1 806 (3.6%)	7 423 (14.9%)	33 641 **(67.6%)**	49 792
NO_2	19 844 **(38.8%)**	9 331 (18.2%)	7 192 (14.1%)	6 929 (13.5%)	7 871 (15.4%)	51 167
SO_2	10 940 (23.6%)	11 569 (24.9%)	10 108 (21.8%)	8 029 (17.3%)	5 749 (12.4%)	46 395
O_3	25 751 **(50.2%)**	8 689 (17.0%)	9 629 (18.8%)	4 001 (7.8%)	3 188 (6.2%)	51 258
Greenness (year mean)	8 645 (16.9%)	9 224 (18.0%)	10 813 (21.1%)	10 977 (21.4%)	11 536 (22.5%)	51 195

Pre-linked data: Environmental exposure correlations



Some exposures are highly correlated – large cohorts such as CLSA can help disentangle their individual effects

- **Negative correlations** between greenness metrics and NO_2, walkability, $PM_{2.5}$, nighttime light
- **Positive correlations** between NO_2, $PM_{2.5}$, walkability and social deprivation

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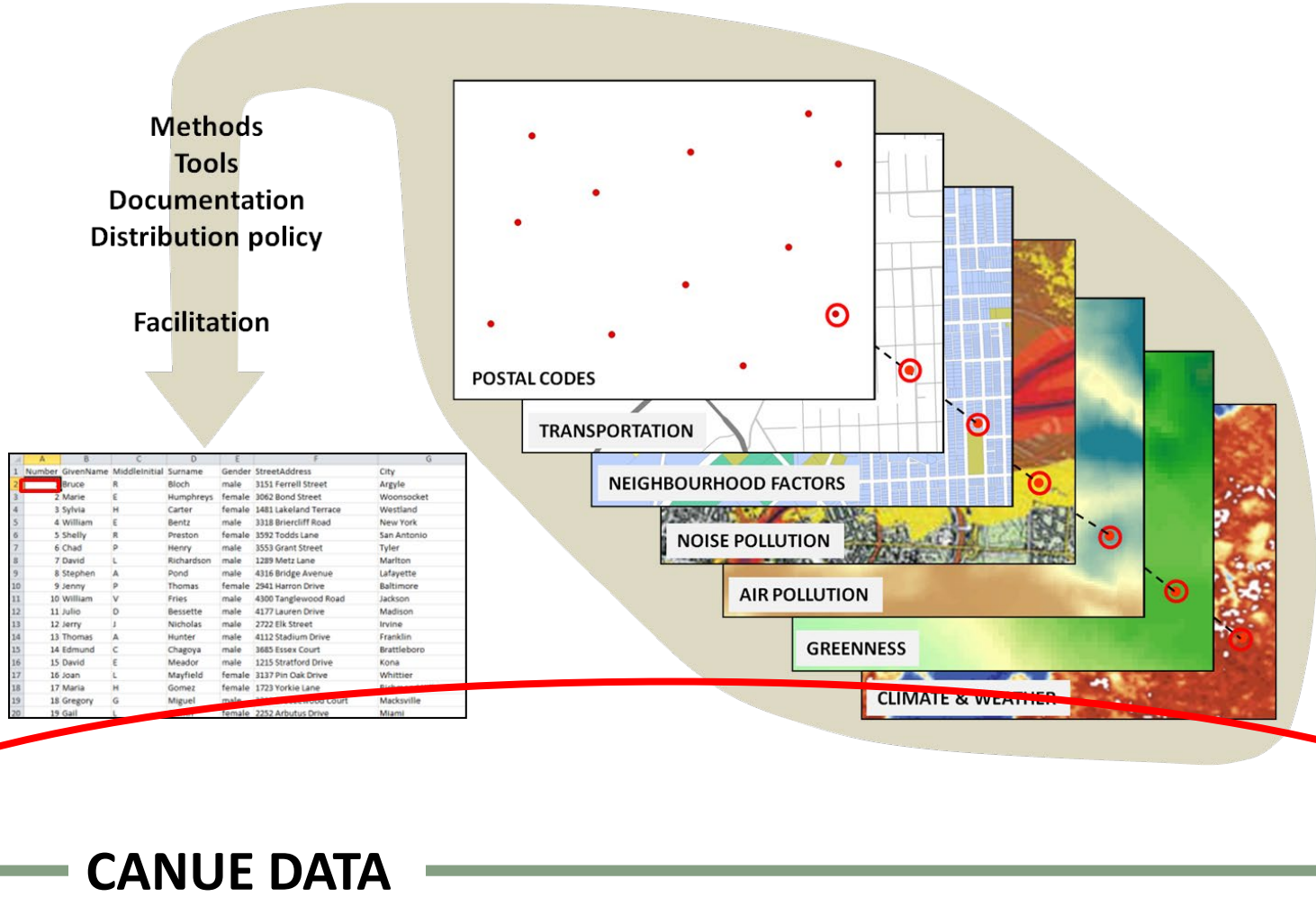
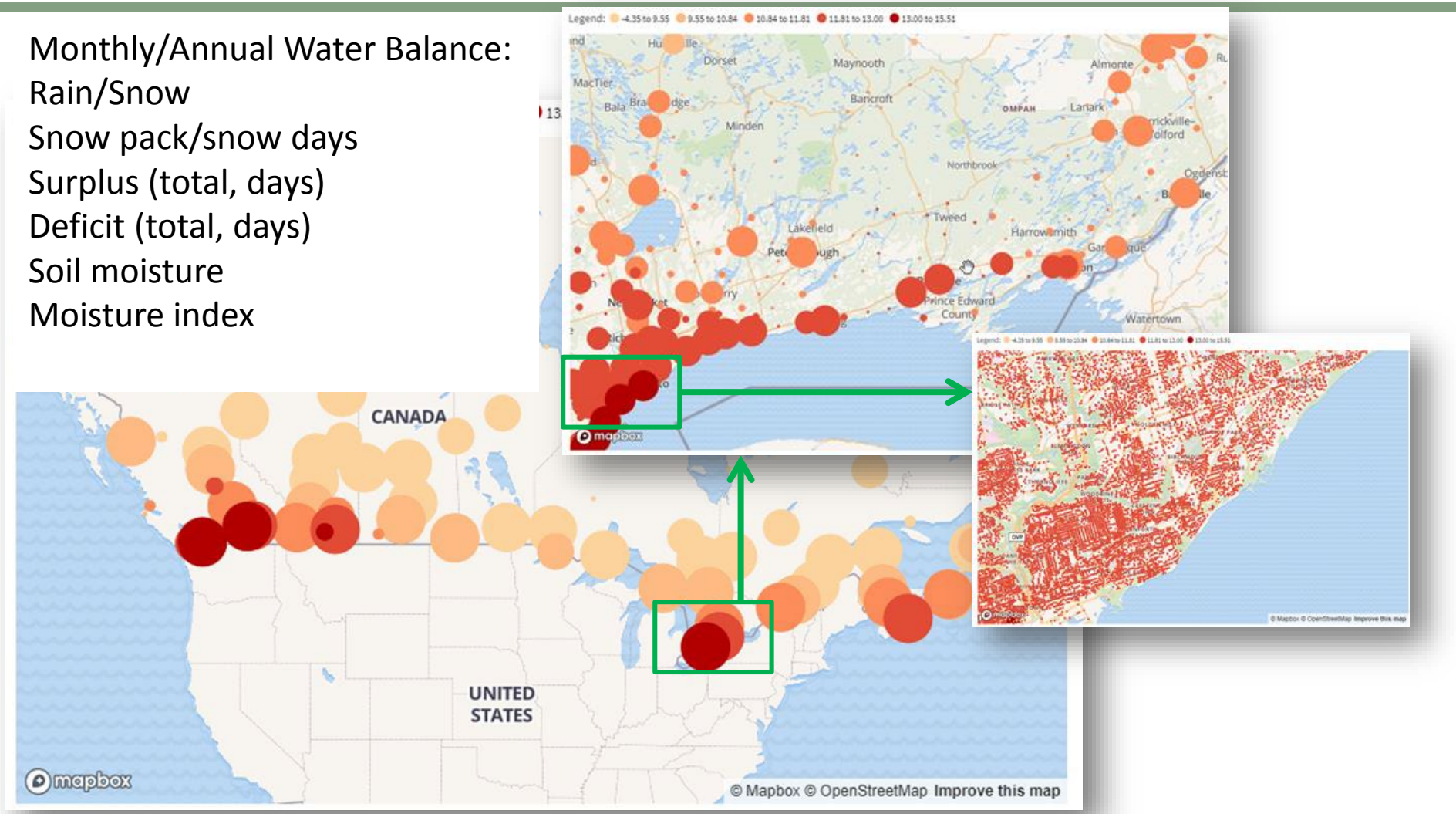


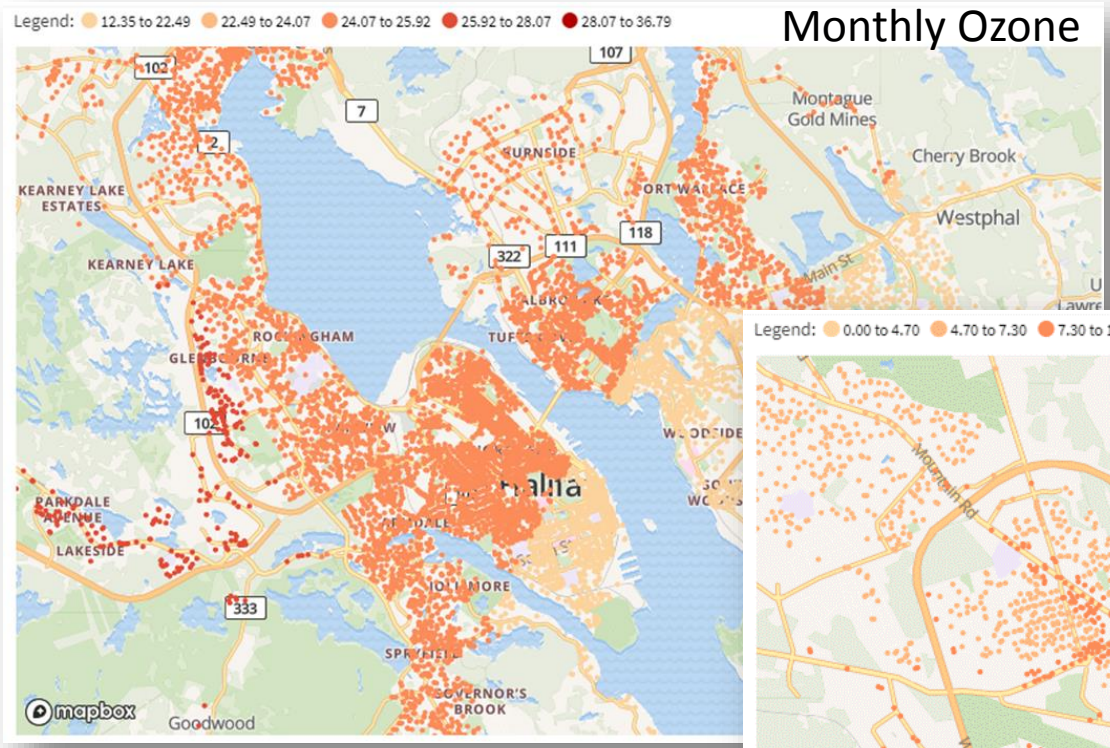
Number	GivenName	MiddleInitial	Surname	Gender	StreetAddress	City
1	Bruce	R	Bloch	male	3151 Ferrell Street	Argyle
2	Marie	E	Humphreys	female	3062 Bond Street	Woonsocket
3	Sylvia	H	Carter	female	1481 Lakeland Terrace	Westland
4	William	E	Bentz	male	3318 Briercliff Road	New York
5	Shelly	R	Preston	female	3592 Todds Lane	San Antonio
6	Chad	P	Henry	male	3553 Grant Street	Tyler
7	David	L	Richardson	male	1289 Metz Lane	Marlton
8	Stephen	A	Pond	male	4316 Bridge Avenue	Lafayette
9	Jenny	P	Thomas	female	2941 Harron Drive	Baltimore
10	William	V	Fries	male	4300 Tanglewood Road	Jackson
11	Julio	D	Bessette	male	4177 Lauren Drive	Madison
12	Jerry	J	Nicholas	male	2722 Elk Street	Irvine
13	Thomas	A	Hunter	male	4112 Stadium Drive	Franklin
14	Edmund	C	Chagoya	male	3685 Essex Court	Brattleboro
15	David	E	Meador	male	1215 Stratford Drive	Kona
16	Joan	L	Mayfield	female	3137 Pin Oak Drive	Whittier
17	Maria	H	Gomez	female	1723 Yorkie Lane	
18	Gregory	G	Miguel	male		Macksville
19	Gail	L		female	2252 Arbutus Drive	Miami

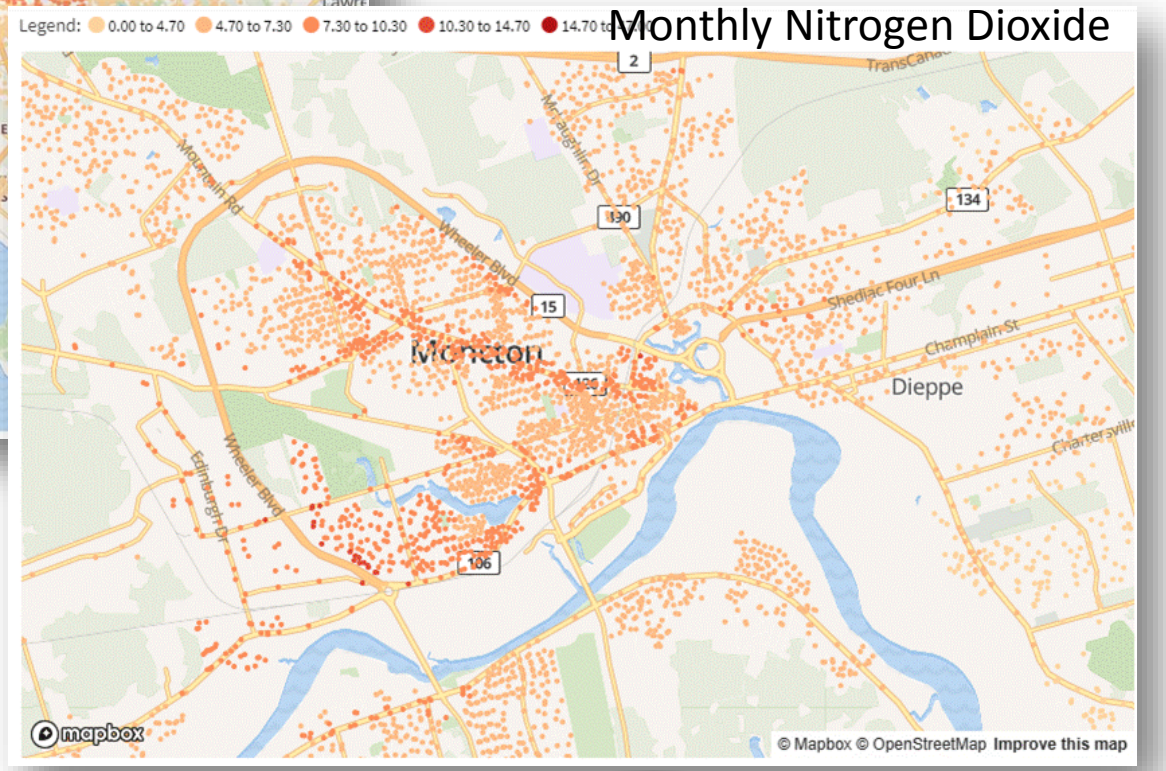
CLSA and CANUE – October 23 | 2018

Monthly/Annual Water Balance:
Rain/Snow
Snow pack/snow days
Surplus (total, days)
Deficit (total, days)
Soil moisture
Moisture index

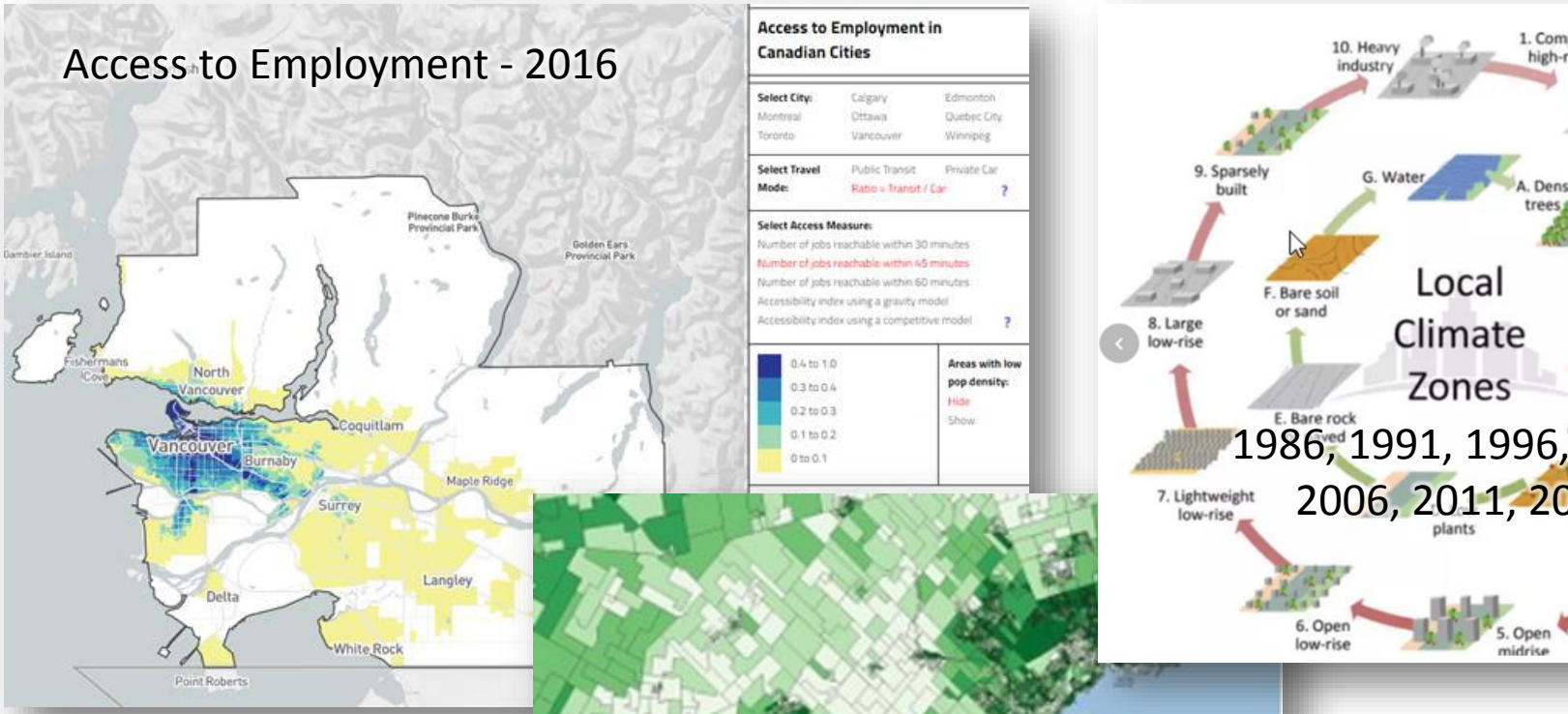


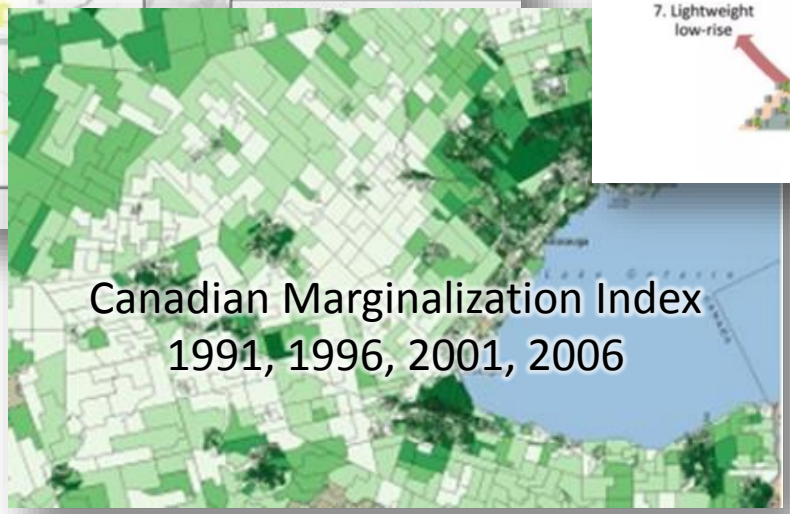
CLSA and CANUE – October 23 | 2018

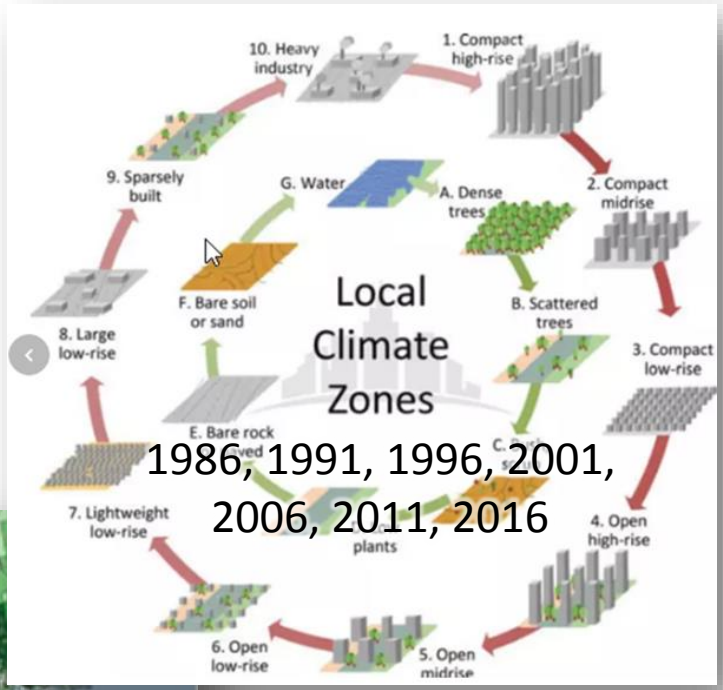




CLSA and CANUE – October 23 | 2018

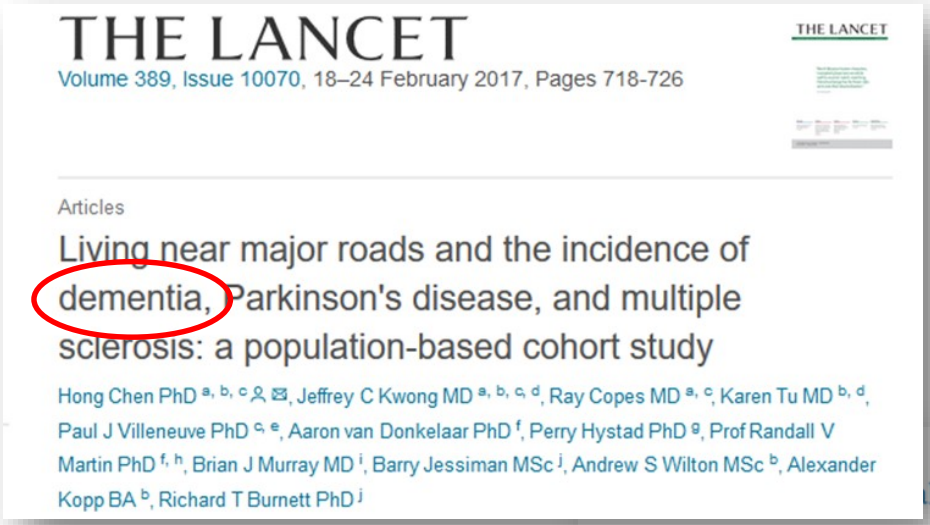






On the work plan

Proximity metrics



THE LANCET

Volume 389, Issue 10070, 18–24 February 2017, Pages 718-726

Articles

Living near major roads and the incidence of dementia, Parkinson's disease, and multiple sclerosis: a population-based cohort study

Hong Chen PhD [a, b, c], Jeffrey C Kwong MD [a, b, c, d], Ray Copes MD [a, c], Karen Tu MD [b, d], Paul J Villeneuve PhD [c, e], Aaron van Donkelaar PhD [f], Perry Hystad PhD [g], Prof Randall V Martin PhD [f, h], Brian J Murray MD [i], Barry Jessiman MSc [j], Andrew S Wilton MSc [b], Alexander Kopp BA [b], Richard T Burnett PhD [j]

l Health Perspectives

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Research

Associations between Living Near Water and Risk of Mortality among Urban Canadians

Dan L. Crouse, Adele Balram, Perry Hystad, Lauren Pinault, Matilda van den Bosch, Hong Chen, Daniel Rainham, Errol M. Thomson, Christopher H. Close, Aaron van Donkelaar, Randall V. Martin, Richard Ménard, Alain Robichaud, and Paul J. Villeneuve

Published: 24 July 2018 | CID: 077008 | https://doi.org/10.1289/EHP3397

On the work plan

Int. J. Environ. Res. Public Health **2018**, *15*(8), 1719; https://doi.org/10.3390/ijerph15081719

Open Access Article

Comparing the Normalized Difference Vegetation Index with the Google Street View Measure of Vegetation to Assess Associations between Greenness, Walkability, Recreational Physical Activity, and Health in Ottawa, Canada

Paul J. Villeneuve [1,*], Renate L. Ysseldyk [1], Ariel Root [1], Sarah Ambrose [1], Jason DiMuzio [1], Neerija Kumar [1], Monica Shehata [1], Min Xi [1], Evan Seed [2], Xiaojiang Li [3], Mahdi Shooshtari [4] and Daniel Rainham [5]

1 Department of Health Sciences, Carleton University, Ottawa, ON K1S 5B6, Canada
2 Dalla Lana School of Public Health, University of Toronto, Toronto, ON M5T 3M7, Canada
3 Department of Urban Studies and Planning, Massachusetts Institute of Technology, Cambridge, MA 02139, USA
4 Department of Geography, University of Victoria, Victoria, BC V8W 2Y2, Canada
5 Healthy Populations Institute, Dalhousie University, Halifax, NS B3H 4R2, Canada

On the work plan

EHP Environmental Health Perspectives

Environ Health Perspect. 2017 Aug; 125(8): 087025.
Published online 2017 Aug 31. doi: 10.1289/EHP1279
Research

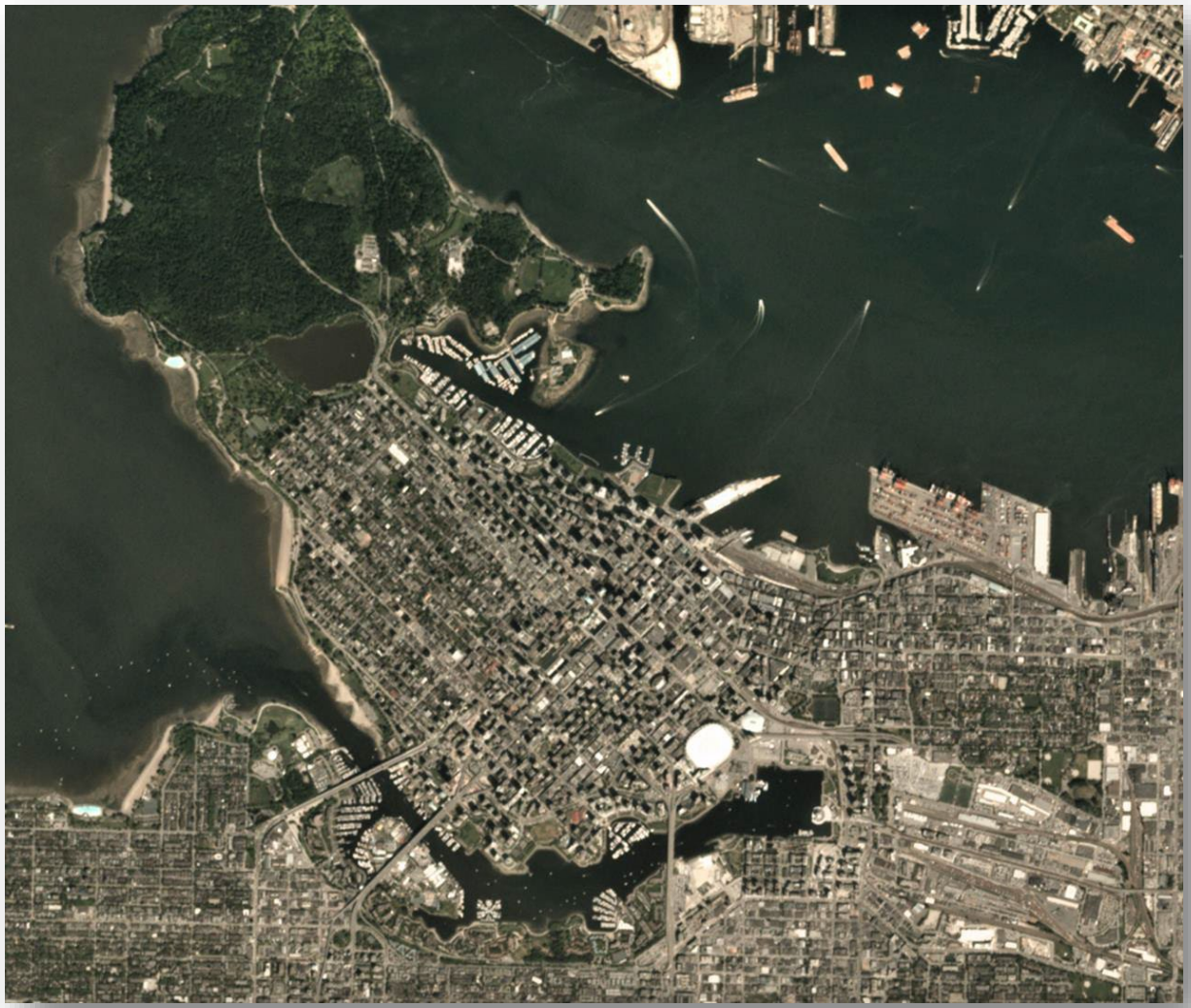
PMCID: PMC5783665
PMID: 28934721

Association of Long-Term Exposure to Transportation Noise and Traffic-Related Air Pollution with the Incidence of Diabetes: A Prospe Study

Charlotte Clark,[✉1] Hind Sbihi,[2] Lillian Tamburic,[2] Michael Brauer,[2] Lawrence D. Frank,[3] and Hu

Author information ► Article notes ► Copyright and License information ► Disclaimer

National high resolution noise model

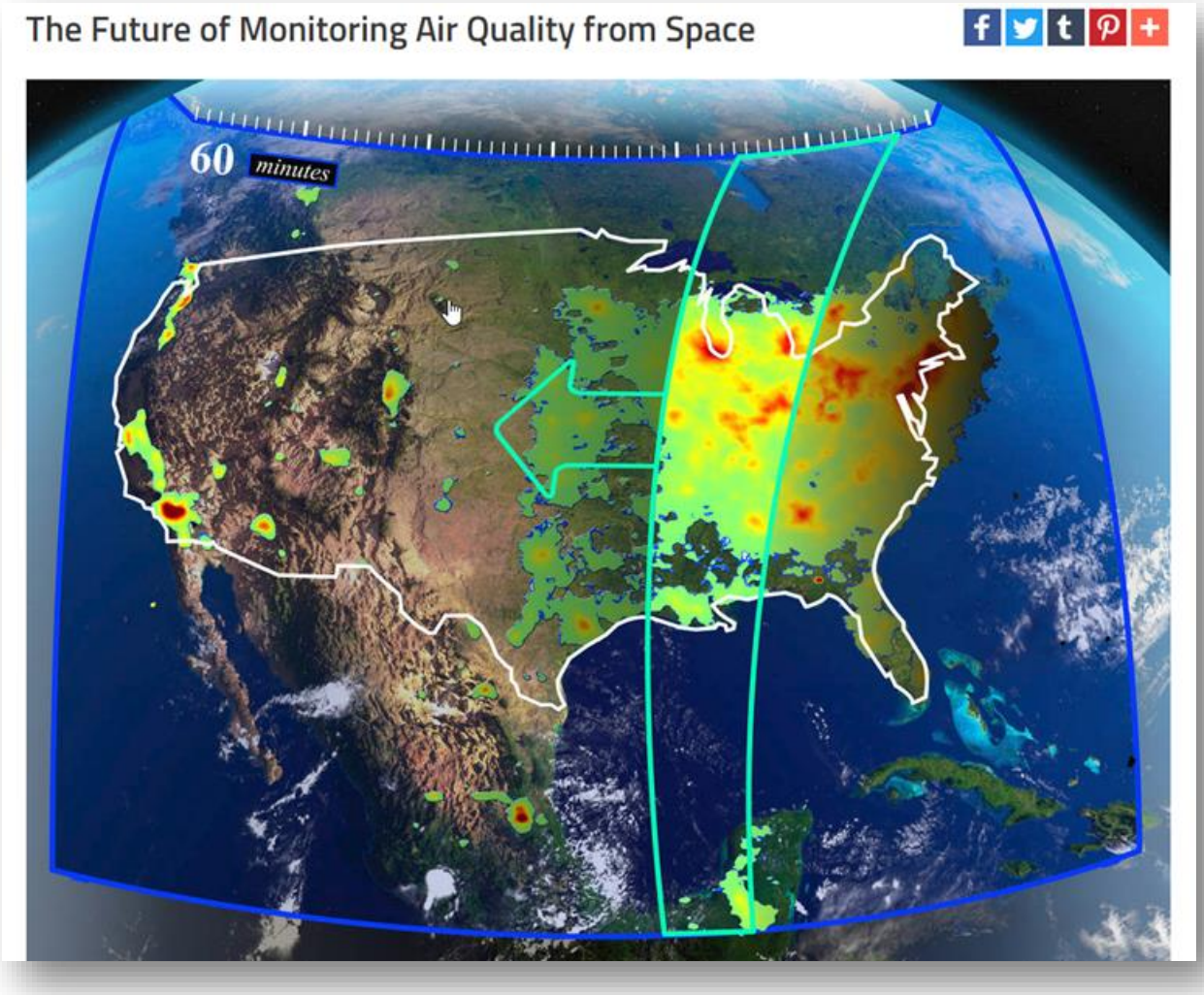


On the work plan

High resolution satellite data

PlanetScope (3m)

RapidEye (5m)



On the work plan

TEMPO Satellite

Hourly air quality data:

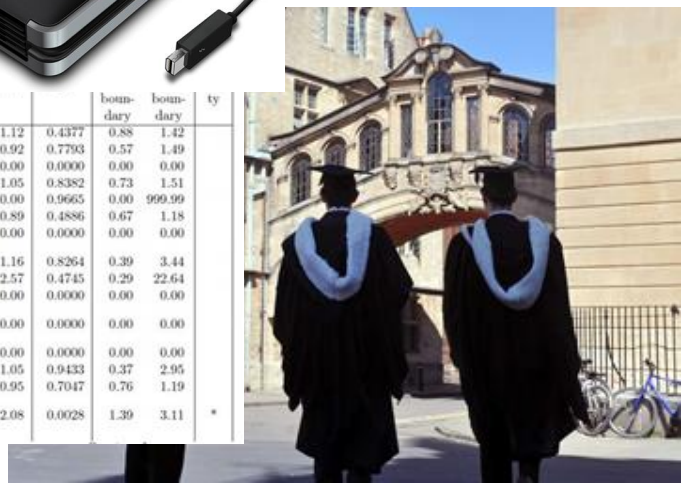
- ozone
- sulphur dioxide
- nitrogen dioxide
- aerosols

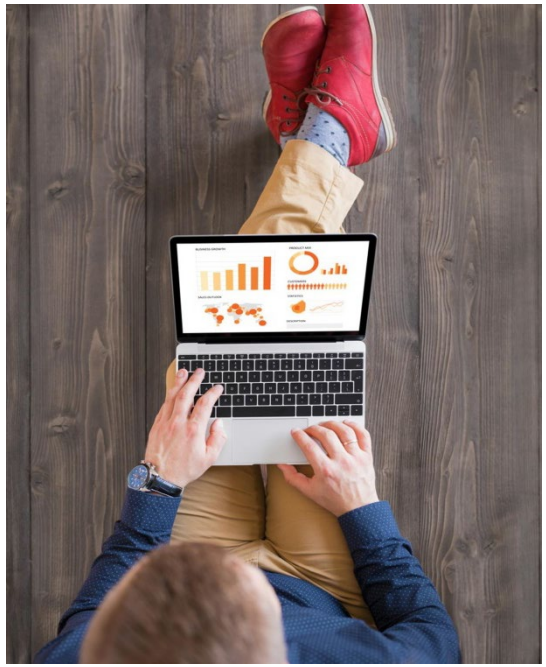
~5km resolution

CANUE making old/new data easily accessible and easy to share:

- Data sharing agreements
- Archiving
- Supports reproducibility, comparability between studies using the same metrics , and between old and new metrics

Variable	Univariate a									
	Odds Ratio	$Pr(\|z\| > Z)$	C							
			Low boun-dary	boun-dary	ty			boun-dary	boun-dary	ty
LOS_GTE_10_DAYS_HOSP	3.41	0.0000	2.73	4.25	*	1.12	0.4377	0.88	1.42	
METOLAZONE_PRESCRIBED	1.46	0.1391	0.88	2.43		0.92	0.7793	0.57	1.49	
MG_PCP_18M_SEEN_IND	2.13	0.0000	1.82	2.49	*	0.00	0.0000	0.00	0.00	
MI_IND	0.91	0.6526	0.62	1.35		1.05	0.8382	0.73	1.51	
MILDOBIDOP_PRESCRIBED	1.80	0.6844	0.11	30.77		0.00	0.9665	0.00	999.99	
NONINSULIN_DIAB_PRESCRIBED	1.36	0.0078	1.08	1.70	*	0.89	0.4886	0.67	1.18	
NOT_PRN_MED_TOTAL_-PRESCRIBED	1.13	0.0000	1.11	1.15	*	0.00	0.0000	0.00	0.00	
NUM_ER_VISITS_30_DAYS_COPD	10.59	0.0000	4.60	24.39	*	1.16	0.8264	0.39	3.44	
NUM_ER_VISITS_30_DAYS_PNEU	6.32	0.0880	1.07	37.40		2.57	0.4745	0.29	22.64	
NUM_ER_VISITS_31_365_DAYS_-COPD	3.76	0.0000	2.81	5.03	*	0.00	0.0000	0.00	0.00	
NUM_ER_VISITS_31_365_DAYS_-PNEU	4.46	0.0023	1.99	10.02	*	0.00	0.0000	0.00	0.00	
NUM_ER_VISITS_365_DAYS_COPD	3.93	0.0000	2.98	5.18	*	0.00	0.0000	0.00	0.00	
NUM_ER_VISITS_365_DAYS_PNEU	4.71	0.0005	2.25	9.86	*	1.05	0.9433	0.37	2.95	
NUM_HF_HOSP_365_31_DAYS_-COUNT	1.86	0.0000	1.59	2.17	*	0.95	0.7047	0.76	1.19	
NUM_HOSP_30_DAYS_COPD	16.43	0.0000	12.10	22.32	*	2.08	0.0028	1.39	3.11	*





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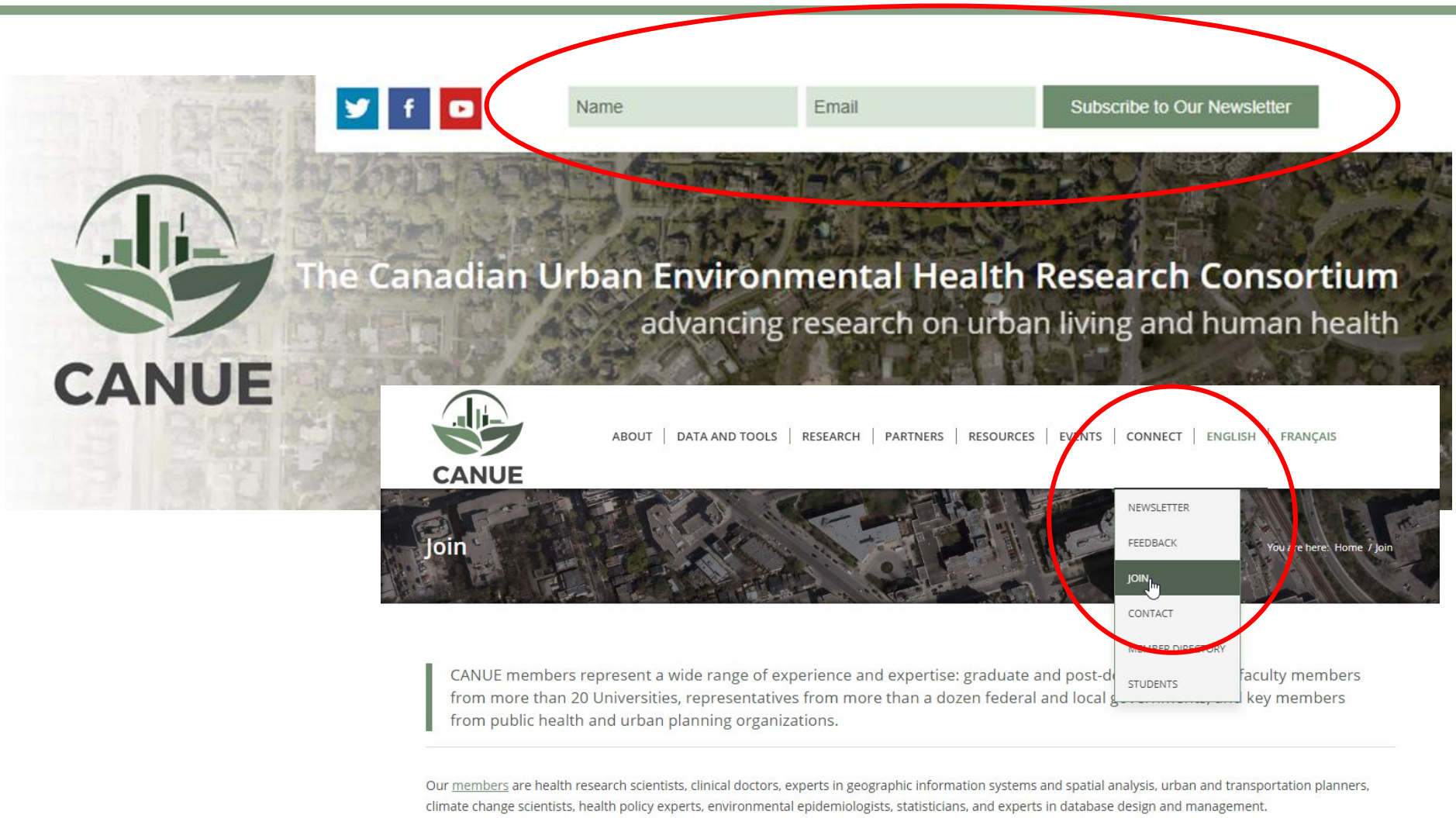

CANUE is increasing the capacity of CLSA to advance research on how *where an individual lives* impacts their 'aging experience' and health

- *Sleep, physical activity, sedentary behavior, built environments, mobility limitations, exercise, environmental determinants of physical activity*
  - all influenced by 'place' and are part of current CLSA (and CANUE) projects
- With CANUE's established platform **we** have the opportunity to build the capacity to explore place-related questions over the long-run (nationally and internationally)
  - Regular updates of existing metrics and new metrics reflecting latest S&T
- Can we substantively advance the *Exposome* concept?
  - Life-course exposure leads to one's exposome which interacts with one's genome
  - How have lifetime environmental conditions influenced susceptibility?
- Can we learn quickly and influence how our urban, suburban and rural areas evolve?
  - Solution-oriented research
    - Do changes in environment lead to changes in outcomes?
    - Past interventions (e.g., improved transportation; access and coverage)
      - Optimize urban and transportation planning for healthy aging
- Addressing and preparing for climate change

UPCOMING CLSA WEBINARS

"Moving more to breathe better: Associations between physical activity, sitting time, and lung function in the CLSA"

Dr. Shilpa Dogra

November 22, 2018 | 12 p.m. EST

Register: bit.ly/clsawebinars