

CURRICULUM VITAE

• **Personal Details**

Itai Kloog

Date and place of birth: September 13th, 1975, Tel-Aviv, Israel

Address and telephone number at work

Geography and Environmental Development Department

Ben-Gurion University of the Negev

Beer Sheva 84105

Israel

Tel. 972-8-6472003

Email: ikloog@bgu.ac.il

Address and telephone number at home

Tapoach 7, Lehavim, 8533800, Israel

Tel. 972-5-87443320

• **Education**

B.A. 1997-2000

Tel-Aviv University – Department of Geography & Human Environment.

M.A. 2003-2006

University of Haifa, Department of Natural Resources & Environmental Management

Names of advisors: Prof. Abraham Haim and Prof. Boris Portnov

Title of thesis: “Investigating the link between Light at Night and breast cancer rates in Israel”.

Ph.D. 2006-2009

University of Haifa, Department of Natural Resources & Environmental Management

Names of advisors: Prof. Abraham Haim and Prof. Boris Portnov

Title of thesis: “Investigating the association between Light at Night (light pollution) and breast and Prostate cancer rates”.

• **Employment History**

2017 Tenured; Department of Geography & Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel.

2016 - Current

Associate Professor; Department of Geography & Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel.

2016 - Current

Adjunct Professor; Environmental Medicine & Public Health, Icahn School of Public Health, Mount Sinai, USA.

2013 - Current

Visiting scientist; Department of Environmental Health Harvard University, School of Public Health, USA.

2013 - 2016

Senior Lecturer; Department of Geography & Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel.

2010 - 2013

Post-Doctoral research fellow; Department of Environmental Health, Harvard University, School of Public Health, USA.

2005- 2010

Research assistant; Department of Natural Resources & Environmental Management, University of Haifa, Israel.

• **Professional Activities**

(a) Positions in academic administration

(all at Ben-Gurion University of the Negev)

2013 - Current

Founder and Head of the Environmental Exposure Assessment (EEA) Laboratory

2014 - Current

Head of the Geographic Information Science and Technologies program, Department of Geography & Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel

2014 – Current

Member of the committee for research and publications, Department of Geography & Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel

2017- Current

Member of the University Computer-Policy Committee

2017- Current

Head, The committee for teaching, Department of Geography Human Environment, Ben-Gurion University of the Negev, Beer-Sheva, Israel

(b) Editor or member of editorial board of scientific or professional journal

2013- Current

Member of the Editorial Board Journal of Sustainability & Environmental Management (JoSEM)

(c) Significant professional consulting

2015 - Current

Hebrew University, Braun School of Public Health and Community Medicine, Associations between neonatal thyroid hormones and airborne particulate matter: A total population cohort study

2016- Current

Harvard T.H Chan School of Public Health, “Air Pollution and Autism in Israel: A Population-Wide Study”

2017-Current

Northwestern University, Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University “NIH- 1U24OD023319-01- ECHO” geo spatial consulting.

2018-Current

Scientific Advisory Board, Italian government- BEEP Project: "use of Big data in Environmental and occupational Epidemiology".

(d) Ad-hoc reviewer

Peer reviewed journals: *Epidemiology; Atmospheric Environment; Environmental Health Perspectives; International Journal of Health Geographics; Journal of Exposure Science and Environmental Epidemiology; Remote Sensing of Environment; Science of the Total Environment; Environmental Pollution; International Journal of Obesity; Environmental Science and Technology; Advances in Statistical Climatology, Meteorology and Oceanography Letters in Spatial and Resource Sciences, PLoS ONE*

Research Grant referee

NIEHS- P30 center grant

DFG- German Research Foundation

(e) Membership in professional/scientific societies

2014-Current

Member of the Israeli Geographical Association

2011-Current

Member of the International Society for Environmental Epidemiology

• Educational activities

(a) Courses taught (all at BGU)

GIS for urban planners (graduate level)

Introduction to spatial programming: python in GIS (graduate level)

GIT seminar: Python (undergraduate level)

Advanced quantitative methods (undergraduate level)

Advanced data science (undergraduate level)

3D Analysis in GIS (undergraduate level)

QGIS and open source GIS software (undergraduate level)

(b) Research students

Postdoc

Dr. Shai Kaplan, 2014, Ben-Gurion University of the Negev, Israel

Dr. Meytar Sorek-Hamer, 2015, Ben-Gurion University of the Negev, Israel

Dr. Helena Krasnov, 2016, Ben-Gurion University of the Negev, Israel

Dr. Orna Vaadia, 2017, (jointly with Prof. Oren Yiftachel, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel, *Israel*

Dr. Sandy Wong, 2017, (jointly with Prof. Allan C Just, Environmental Medicine & Public Health, Icahn School of Public Health, Mount Sinai, USA)

Dr. Bin Chen, 2018, (jointly with Prof. Evyatar Erell. Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel, *Israel*

Ph.D.

Maayan Yitzhak-Sade (joint student with Prof. Victor Novak, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel, 2017.

Francesca Dedonato (joint student with Prof. Paolo Vineis, Imperial College, London, England), Ben-Gurion University of the Negev, Israel, 2018.

Alexandra Shtien, Ben-Gurion University of the Negev, Israel, 2020 (expected).

Ron Sarafian (joint student with Dr. Jonatan Rosenblatt, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel, 2021 (expected).

Ian Hough, Ben-Gurion University of the Negev (joint student with Dr. Johanna Lepeule, Grenoble University, France), Israel, 2021 (expected).

M.A.

Omer Harovi, Ben-Gurion University of the Negev, Israel, 2017.

Adar Rozenfeld, Ben-Gurion University of the Negev, Israel 2017.

Adi Vulkan (joint student with Prof. Evyatar Erell, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel 2018.

Lara Ifat Bakaleinik, Ben-Gurion University of the Negev, Israel 2018 (expected).

Yair Yashivetz, Ben-Gurion University of the Negev, Israel 2019 (expected).

Noam Lasker, Ben-Gurion University of the Negev, Israel 2020 (expected).

Vladimir Alexandroff (joint student with Prof. Evyatar Erell, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel 2020 (expected).

Aharon Deutsch (joint student with Prof. Evyatar Erell, Ben-Gurion University of the Negev, Israel), Ben-Gurion University of the Negev, Israel 2020 (expected).

Geography department direct to M.A. excellence program (“Merhavim”)

Roni Arztri, Ben-Gurion University of the Negev, Israel 2021 (expected).

Dan lesser, Ben-Gurion University of the Negev, Israel 2021 (expected).

- **Awards, Citations, Honors, Fellowships**

- (a) Honors, Citation Awards

2017 Air pollution modelling for epidemiological studies, Public Health foundation India (PHFI), Health experts session (GEOHealth), Gandhinagar, Gujarat, India.

Invited Speaker.

2015 Implementation of satellite data to assess exposure to particle matter (PM2.5) and its association with health and socioeconomic status in Greater Mexico City Area, National Institute of Public Health (INSP), Mexico City, Mexico. **Invited Speaker.**

2014 How air pollution modeling can support policy efforts, Mexico city municipality and National Institute of Public Health (INSP), Mexico City, Mexico.

Invited Speaker.

2015 Best Lecturer award, Ben-Gurion University of the Negev.

2012 EHF (Environmental health fund) Post-Doctoral Fellowship, \$60,000, Post-doctoral fellowship.

2006 Haifa University - Excellent Thesis 2006 Rector Award.

2006 Haifa University - Honor Diploma M.A. Thesis.

- **Scientific publications**

ISI H-index: 25, 2021 citations in total (1761 excluding self-citations), average number of citations per item: 20.01 (Source: ISI, May, 2018);

Google Scholar H-index: 32 (May, 2017)

i10-index: 64 (May, 2017)

Notes on the List of Publications:

The author sequence used throughout the CV to define the author sequence is the commonly used “First-Last-Author-Emphasis” (FLAE) system accepted in environmental, epidemiology and biological studies. In the FLAE system, the last author is commonly the **PI** and heads the study/group getting as much credit as the first author¹

Co-mentoring authorship with students: In all papers authored with students (MA, PHD, Postdocs) that are **co-mentored**, the PI appears either as the **last author** or **2nd author** according to the above FLAE rule.

- (a) Refereed articles and refereed letters in scientific journals - running numbers

Note: all citations based on ISI

¹ Tschamtké T, Hochberg ME, Rand TA, Resh VH, Krauss J (2007) Author Sequence and Credit for Contributions in Multi-Authored Publications. PLoS Biol 5(1): e18. doi:10.1371/journal.pbio.0050018.

1. I. **Kloog**^S, A. Haim^C, R. G. Stevens^C, M. Barchana^C, & B. A. Portnov^{PI}, 2008. Light at night co-distributes with incident of breast but not lung cancer in the female population of Israel. *Chronobiology international* 25(1), 65-81. (114 Citations ; IF= 2.8 ; Q1 Biology, 19 of 85)
2. I. **Kloog**^S, A. Haim^C, B. A. & Portnov^{PI}, 2008. A possible association between exposure to Light at Night and breast cancer incidence in the urban space of Tel-Aviv. *Studies in Natural Resources and Environmental Management* 6(1), 103-110.(IF=N/A, Q=N/A)
3. I. **Kloog**^S, A. Haim^C, R. G. Stevens^C, & B. A. Portnov^{PI}, 2009. Global co-distribution of light at night (LAN) and cancers of prostate, colon, and lung in men. *Chronobiology international* 26(1), 108-125. (99 Citations ; IF= 2.8 ; Q1 Biology, 19 of 85)
4. I. **Kloog**^S, A. Haim^C, & B. A. Portnov^{PI}, 2009. Using kernel density function as an urban analysis tool: Investigating the association between nightlight exposure and the incidence of breast cancer in Haifa, Israel. *Computers, Environment and Urban Systems* 33(1), 55-63. (Citations: 43; IF= 1.5; Q2 Geography, 21 of 76)
5. I. **Kloog**^S, R. G. Stevens^C, A. Haim^C, & B. A. Portnov^{PI}, 2010. Nighttime light level co-distributes with breast cancer incidence worldwide. *Cancer Causes and Control* 21(12), 2059-2068. (59 Citations; IF= 2.9 ; Q1 public, environmental & occupational health, 24 of 216)
6. I. **Kloog**^S, B. A. Portnov^C, H. S. Rennert^C, & A. Haim^{PI}, 2011. Does the modern urbanized sleeping habitat pose a breast cancer risk?. *Chronobiology international* 28(1), 76-80. (58 Citations ; IF= 2.8 ; Q1 Biology, 19 of 85)
7. A. Haim^{PI}, I. **Kloog**^C, H. S. Rennert^C, & B. A. Portnov^C, 2011. LIGHT POLLUTION not equal LIGHT POLLUTION?. *Chronobiology International* 28(4), 379-380. (1 Citations ; IF= 2.8 ; Q1 Biology, 19 of 85)
8. I. **Kloog**^{PD}, P. Koutrakis^C, B. A. Coull^C, H. J. Lee^C, & J. D. Schwartz^{PI}, 2011. Assessing temporally and spatially resolved PM2.5 exposures for epidemiological studies using satellite aerosol optical depth measurements. *Atmospheric Environment* 45(35), 6267-6275. (85 Citations; IF=3.28; Q1 environmental sciences, 45 of 216)
9. I. **Kloog**^{PD}, B. A. Coull^C, A. Zanobetti^C, P. Koutrakis^C, & J. D. Schwartz^{PI}, 2012. Acute and Chronic Effects of Particles on Hospital Admissions in New-England. *PLoS one* 7(4), e34664. (42 Citations ; IF= 3.5 ; Q1 multidisciplinary sciences, 8 of 55)
10. I. **Kloog**^{PI}, & B. A. Portnov^{PI}, 2012. Detecting the Association between Children Health and Lead Exposure Using Voronoi Polygon Rezoning. *Geography Research Forum* 32, 46-61. (IF=N/A, Q=N/A)

11. I. **Kloog**^{PD}, F. Nordio^C, B. A. Coull^C, & J. D. Schwartz^{PI}, 2012. Incorporating local land use regression and satellite aerosol optical depth in a hybrid model of spatiotemporal PM_{2.5} exposures in the Mid-Atlantic states. *Environmental science & technology* 46(21), 11913-11921. (53 Citations; IF= 5.5 ; Q1 environmental sciences, 8 of 216)
12. I. **Kloog**^{PD}, A. Chudnovsky^C, P. Koutrakis^C, & J. D. Schwartz^{PI}, 2012. Temporal and spatial assessments of minimum air temperature using satellite surface temperature measurements in Massachusetts, USA. *Science of the Total Environment* 432(0), 85-92. (23 Citations; IF= 3.2 ; Q1 environmental sciences, 40 of 216)
13. I. **Kloog**^{PD}, S. J. Melly^C, W. L. Ridgway^C, B. A. Coull^C, & J. D. Schwartz^{PI}, 2012. Using new satellite based exposure methods to study the association between pregnancy pm_{2.5} exposure, premature birth and birth weight in Massachusetts. *Environmental Health* 11(1), 40. (49 Citations ; IF= 3.372 ; Q1 public, environmental & occupational health, 37 of 162)
14. Y.H. M. Chiu^S, B. A. Coull^C, M. J. Sternthal^C, I. **Kloog**^C, J. D. Schwartz^C, S. Cohen^C, & R. J. Wright^{PI}, 2013. Effects of prenatal community violence and ambient air pollution on childhood wheeze in an urban population. *Journal of Allergy and Clinical Immunology* 133(3), 713-722. (17 Citations ; IF= 11.2 ; Q1 allergy, 1 of 21)
15. I. **Kloog**^{PD}, B. Ridgway^C, P. Koutrakis^C, B. A. Coull^C, & J. D. Schwartz^{PI}, 2013. Long and Short-Term Exposure to PM_{2.5} and Mortality. *Epidemiology* 24(4), 555-561. (34 Citations; IF= 6.2 ; Q1 public, environmental & occupational health, 2 of 143)
16. J. Madrigano^S, I. **Kloog**^C, R. Goldberg^C, B. A. Coull^C, M. A. Mittleman^C, & J. D. Schwartz^{PI}, 2013. Long-term Exposure to PM_{2.5} and Incidence of Acute Myocardial Infarction. *Environmental health perspectives* 121(2), 192. (36 Citations; IF= 9.776; Q1 environmental sciences, 5 of 216)
17. F. Nordio^{PD}, I. **Kloog**^{PD}, B. A. Coull^C, A. Chudnovsky^C, P. Grillo^C, P. A. Bertazzi^C, A. A. Baccarelli^C, & J. D. Schwartz^{PI}, 2013. Estimating spatio-temporal resolved PM₁₀ aerosol mass concentrations using MODIS satellite data and land use regression over Lombardy, Italy. *Atmospheric Environment* 74, 227-236. (11 Citations; IF= 3.1 ; Q1 environmental sciences, 45 of 216)
18. A. Zanobetti^{PI}, B. A. Coull^C, A. Gryparis^C, I. **Kloog**^C, D. Sparrow^C, P. S. Vokonas^C, R. O. Wright^C, D. R. Gold^C, & J. Schwartz^C, 2013. Associations between arrhythmia episodes and temporally and spatially resolved black carbon and particulate matter in elderly patients. *Occupational and environmental medicine* 0,1-7 (14 Citations; IF= 3.2 ; Q1 public, environmental & occupational health, 20 of 162)
19. M. Zusman^S, J. Ben Asher^C, I. **Kloog**^C, & B. A. Portnov^{PI}, 2013. Estimating multi-annual PM 2.5 air pollution levels using sVOC soil tests: Ashkelon

- South, Israel as a case study. *Atmospheric Environment* 81, 633-641. (0 Citations; IF= 3.28; Q1 environmental sciences, 45 of 216)
20. I. **Kloog**^{PI}, A. A. Chudnovsky^C, A. C. Just^C, F. Nordio^C, P. Koutrakis^C, B. A. Coull^C, A. Lyapustin^C, Y. Wang^C & J. D. Schwartz^C, 2014. A New Hybrid Spatio-Temporal Model For Estimating Daily Multi-Year PM 2.5 Concentrations Across Northeastern USA Using High Resolution Aerosol Optical Depth Data. *Atmospheric Environment* 95, 581-590. (18 Citations; IF= 3.28; Q1 environmental sciences, 45 of 216)
21. S. E. Alexeeff^S, J. D. Schwartz^C, I. **Kloog**^C, A. Chudnovsky^C, P. Koutrakis^C, & B. A. Coull^{PI}, 2014. Consequences of kriging and land use regression for PM2.5 predictions in epidemiologic analyses: insights into spatial variability using high-resolution satellite data. *Journal of Exposure Science and Environmental Epidemiology* 25(2), 138-144. (11 Citations; IF= 3 .0; Q1 Public, Environmental & Occupational Health, 23 of 160)
22. A. A. Chudnovsky^{PI}, P. Koutrakis^C, I. **Kloog**^C, S. Melly^C, F. Nordio^C, A. Lyapustin^C, Y. Wang^C, & J. D. Schwartz^{PI}, 2014. Fine particulate matter predictions using high resolution aerosol optical depth (AOD) retrievals. *Atmospheric Environment* 89,189-198. (12 Citations; IF= 3.28 ; Q1 environmental sciences, 45 of 216)
23. A. F. Fleisch^{PI}, D. R. Gold^C, S. L. Rifas-Shiman^C, P. Koutrakis^C, J. D. Schwartz^C, I. **Kloog**^C, S. Melly^C, B. A. Coull^C, A. Zanobetti^C, & M. W. Gillman^{PI}, 2014. Air pollution exposure and abnormal glucose tolerance during pregnancy: The project viva cohort. *Environ Health Perspective* 122(14), 378-383. (23 Citations, IF= 7.0 ; Q1 environmental sciences, 5 of 216)
24. I. **Kloog**^{PI}, F. Nordio^C, B. A. Coull^C, & J. D. Schwartz^C, 2014. Predicting spatiotemporal mean air temperature using MODIS satellite surface temperature measurements across the Northeastern USA. *Remote Sensing of the Environment* 150, 132-139 (8 Citations; IF= 4.8 ; Q1 environmental sciences, 12 of 216)
25. I. **Kloog**^{PI}, F. Nordio^C, A. Zanobetti^C, B. A. Coull^C, P. Koutrakis^C, & J. D. Schwartz^C, 2014. Short Term Effects of Particle Exposure on Hospital Admissions in the Mid-Atlantic States: A Population Estimate. *PloS one* 9(2), e88578. (12 Citations ; IF= 3.5 ; Q1 multidisciplinary sciences, 8 of 55)
26. A. J. Mehta^{PI}, I. **Kloog**^C, A. Zanobetti^C, B. A. Coull^C, D. Sparrow^C, P. Vokonas^C, & J. D. Schwartz^C, 2014. Associations between Changes in City and Address Specific Temperature and QT Interval-The VA Normative Aging Study. *PloS one* 9(9), e106258. (2 Citations ; IF= 3.5 ; Q1 multidisciplinary sciences, 8 of 55)
27. S. S. Myers^{PI}, A. Zanobetti^C, I. **Kloog**^C, P. Huybers^C, A. D. B. Leakey^C, A. J. Bloom^C, E. Carlisle^C, L. H. Dietterich^C, G. Fitzgerald^C, T. Hasegawa^C, N. M. Holbrook^C, R. L. Nelson^C, M. J. Ottman^C, V. Raboy^C, H. Sakai^C, K. A.

- Sartor^C, J. D. Schwartz^C, S. Seneweera^C, M. Tausz^C, & Y. Usui^C, 2014. Increasing CO2 threatens human nutrition. *Nature* 510 (7503), 139-142. (137 Citations; IF= 42.35 ; Q1 multidisciplinary sciences, 1 of 55)
28. E. H. Wilker^{PI}, P. L. Ljungman^C, M. B. Rice^C, I. **Kloog**^C, J. D. Schwartz^C, D. R. Gold^C, P. Koutrakis^C, J. A. Vita^C, G. F. Mitchell^C, R. S. Vasan^C, E. J. Benjamin^C, N. M. Hamburg^C, & M. A. Mittleman^C, 2014. Relation of Long-Term Exposure to Air Pollution to Brachial Artery Flow-Mediated Dilation and Reactive Hyperemia. *The American Journal of Cardiology* 113(12), 2057-2063. (10 Citation; IF= 3.4 ; Q1 cardiac & cardiovascular systems, 39 of 125)
29. I. **Kloog**^{PI}, S. Melly^C, B. Coull^C, F. Nordio^C & J. D. Schwartz^C. 2015. Using Satellite-Based Spatiotemporal Resolved Air Temperature Exposure to Study the Association between Ambient Air Temperature and Birth Outcomes in Massachusetts. *Environmental Health Perspective* 123(10), 1053-1058. (4 Citations, IF= 7.0 ; Q1 environmental sciences, 5 of 216)
30. A. F. Fleisch^{PI}, S. L. Rifas-Shiman^C, P. Koutrakis^C, J. D. Schwartz^C, I. **Kloog**^C, S. Melly^C, B. A. Coull^C, A. Zanobetti^C, M. W. Gillman^C, D. R. Gold^C, E. Oken^{PI} 2015. Prenatal Exposure to Traffic Pollution: Associations with Reduced Fetal Growth and Rapid Infant Weight Gain. *Epidemiology* 26(1), 43-50. (4 Citations ; IF= 6.2 ; Q1 public, environmental & occupational health, 2 of 14)
31. A. J. Mehta^{PI}, L. D. Kubzansky^C, B. A. Coull^C, I. **Kloog**^C, P. Koutrakis^C, D. Sparrow^C, A. Spiro^C, P. Vokonas^C, & J. D. Schwartz^C, 2015 Associations between air pollution and perceived stress: the Veterans Administration Normative Aging Study, *Environmental health* 14(1), 10-15. (0 Citations ; IF= 3.372; Q1 public, environmental & occupational health, 37 of 162)
32. E. H. Wilker^C, S. R. Preis^C, A. S. Beiser^C, P. A. Wolf^C, R. Au^C, I. **Kloog**^C, W. Li^C, J. D. Schwartz^C, P. Koutrakis^C, C. DeCarli^C, S. Seshadri^C & M. A. Mittleman^{PI}. 2015. Long-term exposure to fine particulate matter and residential proximity to major roads and measures of brain structure. *Stroke* 46(5): 1161-1166 (9 Citations, IF= 5.723; Q1; Peripheral vascular disease, 5 of 60)
33. A. Lakshmanan^{PD}, Y. Chiu^{PD}, B. Coull^C, A. Just^C, S. Maxwell^C, J. D. Schwartz^C, A. Gryparis^C, I. **Kloog**^C, R. Wright^C & R. Wright^{PI}. 2015. Associations between prenatal traffic-related air pollution exposure and birth weight: Modification by sex and maternal pre-pregnancy body mass index. *Environmental Research*, 137, 268–277 (5 citations, IF 4.373 ;Q1 Environmental sciences, 15 of 221)
34. M. H. Harris^{PD}, D. R. Gold^C, S. L. Rifas-Shiman^C, S. J. Melly^C, A. Zanobetti^C, B. A. Coull^C, J. D. Schwartz^C, A. Gryparis^C, I. **Kloog**^C, P. Koutrakis^C, D. C. Bellinger^C, R. F. White^C, S. K. Sagiv^C, & E. Oken^{PI}. 2015. Prenatal and Childhood Traffic-Related Pollution Exposure and Childhood Cognition in the Project Viva Cohort

(Massachusetts, USA). *Environmental Health Perspective* 123(10), 1072-1077. (5 Citations, IF= 7.0 ; Q1 environmental sciences, 5 of 216)

35. M. Sorek-Hamer^{PD}, I. **Kloog**^{PI}, P. Koutrakis^C, A W Strawa^C, R. Chatfield^C, A. Cohen^C, W. L Ridgway^C, & D. M. Broday^{PI}, 2015. Assessment of PM2.5 Concentrations over Bright Surfaces using MODIS Satellite Observations. *Remote Sensing of the Environment* 163, 180-185. (4 Citations, IF= 6.393 ; Q1 Remote sensing, 1 of 28)
36. F. Nordio^{PD}, A. Zanobbei^C, I. **Kloog**^C & J. D. Schwratz^{PI}. 2015. Changing patterns of the temperature-mortality association by time and location in the US, and implications for climate change 81, 80-86. *Environment International* (3 Citations, IF= 5.559 ; Q1 Environmental Sciences , 8 of 221)
37. L. van Rossem^C, S. L. Rifas-Shiman^C, S. J. Melly^C, I. **Kloog**^C, H. Luttmann-Gibson^C, A. Zanobetti^C, B. A. Coull^C, J. D. Schwartz^C, M. A. Mittleman^C, E. Oken^C, M. W. Gillman^C, P. Koutrakis^C, & D. R. Gold^{PI}. 2015. Prenatal Air Pollution Exposure and Newborn Blood Pressure 123(4), 353-359. *Environ Health Perspective*. (3 Citations, IF= 7.0 ; Q1 environmental sciences, 5 of 216)
38. J. E. Zhong^S, E Colicino^C, X Lin^C, A. Mehta^C, I. **Kloog**^C, A. Zanobetti^C, H. Byun^C, M. Bind^C, L. Cantone^C, D. Prada^C, L. Tarantini^C, L. Trevisi^C, D. Sparrow^C, P. Vokonas^C, J. D. Schwartz^C & A. Baccarelli^{PI}. 2015. Cardiac Autonomic Dysfunction: Particulate Air Pollution Effects Are Modulated by Epigenetic Immunoregulation of Toll-like Receptor 2 and Dietary Flavonoid Intake. *Journal of American Heart Association* 4(1), e001423. (5 Citations, IF= 4.306 ; Q1 Cardiac & Cardiovascular systems, 25 of 123)
39. I. Mordukhovich^S, B. Coull^C, **I. Kloog**^C, P. Koutrakis^C, P. Vokonas^C, & J. D. Schwartz^{PI}. 2015. "Exposure to Sub-Chronic and Long-Term Particulate Air Pollution and Heart Rate Variability in an Elderly Cohort: The Normative Aging Study." *Environmental Health* 14:1 (0 Citations ; IF= 3.372; Q1 public, environmental & occupational health, 37 of 162)
40. S. Myers^{PI}, W. Ryan^C, I. **Kloog**^C, A. Zanobetti^C, & J. D. Schwartz^C, 2015. Rising Atmospheric Co2 Threatens Million With Zinc Deficiency. *The Lancet Global Health* 3.10 (2015): e639-e645.(5 Citations, IF= 10.042; Q1)
41. M. Yitzak-Sade^S, I. **Kloog**^{PI}, I. F. Liberty^C, I. Katra^C, L. Novack^C, & V. Novack^{PI}, 2015. Air pollution and serum glucose levels: a population based study. *Medicine*, 94(27), e1093 (1 Citations, IF= 5.723 ; Q1 Medicine, general & internal, 25 of 153)
42. L. H. Dietterich^S, A. Zanobetti^C, I. **Kloog**^C, P. Huybers^C, A. D. Leakey^C, B. Bloom^C, A. J., Carlisle^C, N. Fernando^C, G. Fitzgerald^C, T. Hasegawa^C, N. M. Holbrook^C, R. L Nelson^C, M. J Ottman^C, V. Raboy^C, H. Sakai^C, K. A. Sartor^C, J. Schwartz^C, S. Seneweera^C, Y. Usui^C, S. Yoshinaga^C, & S. Myers^{PI}, 2015. Impacts of elevated atmospheric co2 on nutrient content of important food crops, *Nature Methods* 2, e150036. (0 Citations, IF= 32.072 ; Q1 biochemical research methods, 1 of 79)

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106. Rice, M.B., Rifas-Shiman, S.L., Litonjua, A.A., Gillman, M.W., Liebman, N., Kloog, I., Luttmann-Gibson, H., Coull, B.A., Schwartz, J., Koutrakis, P. and Oken, E., 2018. Lifetime air pollution exposure and asthma in a pediatric birth cohort. *Journal of Allergy and Clinical Immunology*.
107. Adi Vulkan, Itai Kloog, Michael Dorman, Evyatar Erell, Modelling the potential for PV installation in residential buildings in dense urban areas, *Energy and Buildings*, Available online 28 March 2018, ISSN 0378-7788, <https://doi.org/10.1016/j.enbuild.2018.03.052>.
108. Just, . Allan, . Margherita De Carli, Alexandra Shtein, Michael Dorman, Alexei Lyapustin, and Itai Kloog. "Correcting Measurement Error in Satellite Aerosol Optical Depth with Machine Learning for Modeling PM2.5 in the Northeastern USA." *Remote Sensing* 10, no. 5 (2018). <https://doi.org/10.3390/rs10050803>.
109. Harouvi, Omer, Eran Ben-Elia, Roni Factor, Kees de Hoogh, and Itai Kloog. "Noise Estimation Model Development Using High-Resolution Transportation and Land Use Regression." *Journal of Exposure Science & Environmental Epidemiology*, May 23, 2018. <https://doi.org/10.1038/s41370-018-0035-z>.
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111. Sheffield, P.E., Speranza, R., Chiu, Y.H.M., Hsu, H.H.L., Curtin, P.C., Renzetti, S., Pajak, A., Coull, B., Schwartz, J., Kloog, I. and Wright, R.J., 2018. Association between particulate air pollution exposure during pregnancy and postpartum maternal psychological functioning. *PloS one*, 13(4), p.e0195267.
112. Lee, A.G., Le Grand, B., Hsu, H.H.L., Chiu, Y.H.M., Brennan, K.J., Bose, S., Rosa, M.J., Brunst, K.J., Kloog, I., Wilson, A. and Schwartz, J., 2018. Prenatal fine particulate exposure associated with reduced childhood lung function and nasal epithelia GSTP1 hypermethylation: Sex-specific effects. *Respiratory research*, 19(1), p.76.
113. Rice, M.B., Li, W., Dorans, K.S., Wilker, E.H., Ljungman, P., Gold, D.R., Schwartz, J., Koutrakis, P., Kloog, I., Araki, T. and Hatabu, H., 2018. Exposure to Traffic Emissions and Fine Particulate Matter and Computed Tomography Measures of the Lung and Airways. *Epidemiology*, 29(3), pp.333-341.

• Lectures and Presentations at Meetings and Invited Seminars not followed by Published Proceedings

(a) Invited plenary lectures at conferences/meetings

- 2008 Light at night co-distributes with incident of breast cancer but not with lung cancer in the female population of Israel, 8th European Symposium for the Protection of the Night Sky-Darksky, Kuffner Observatory, Vienna, Austria.
- 2014 Assessing Temporally-and Spatially-Resolved PM_{2.5} Exposures for Epidemiological Studies Using Satellite Aerosol Optical Depth, Environmental Health in Israel: Progress and Challenges, Peres Center for Peace, Jaffa.
- 2014 Using satellite data to model PM_{2.5} in Mexico City, National Institute of Public Health (INSP), Cuernavaca, Mexico.
- 2014 How air pollution modeling can support policy efforts, National Institute of Public Health (INSP), Mexico City, Mexico.
- 2015 Implementation of satellite data to assess exposure to particle matter (PM_{2.5}) and its association with health and socioeconomic status in Greater Mexico City Area, National Institute of Public Health (INSP), Mexico City, Mexico.
- 2017 * Air pollution modelling for epidemiological studies, Public Health foundation India (PHFI) and the Harvard TH Chan School of Public Health experts session (GEOHealth), Gandhinagar, Gujarat, India.

2017 * Environmental assessment exposure modelling in birth outcomes and fertility studies, Reproductive hub meeting 2017, Yeruham, Israel.

(b) Presentation of papers at conferences/meetings

- 2005 **Kloog, I.**; Haim, A. & Portnov, B. A, "Light pollution as a risk factor for breast cancer", GIS and Cartography 2005, Tel Aviv University
- 2005 **Kloog, I.**; Haim, A.; Stevens, R. G.; Barchana, M. & Portnov, B. A, Investigating the link between nightlight pollution and breast cancer: A GIS assisted study, The first International Congress of Applied Chronobiology and Chronomedicine, Antalya, Turkey, June 1-5, 2005.
- 2005 **Kloog, I.**; Haim, A. & Portnov, B. A, Artificial light at night as a risk factor to breast cancer., Israel Regional Science Association Annual Conference, 'New Directions in Regional Research', Haifa University, June 21st, 2005
- 2006 **Kloog, I.**; Haim, A.; Stevens, R. G.; & Portnov, B. A, Artificial light at night as a risk factor to breast and prostate cancer, shift work and ageing in health care and community services, Venice, Italy, June 8-10 2006.
- 2006 **Kloog, I.**; Haim, A.; Stevens, R. G.; & Portnov, B. A, Studying the association between light at night exposure and prevalence of hormonal cancers in urban localities: a gis-assisted case study, 34th Annual Conference of Israel Ecological Association, Haifa, June 26-27th, 2006.
- 2008 **Kloog, I.**; Haim, A.; Stevens, R. G.; & Portnov, B. A, Investigating the association between light at night exposure and the incidence of breast cancer in Haifa, 36th Annual Conference of Israel Ecological Association, Haifa, June 17-18th, 2008.
- 2009 **Kloog, I.**; Haim, A.; Stevens, R. G.; & Portnov, B. A, Using kernel density function as an urban analysis tool: investigating the association between nightlight exposure and the incidence of breast cancer in Haifa, Israel. Israel planners association annual convention 2009, Jerusalem, March 5-6th, 2009.
- 2009 **Kloog, I.**; Haim, A.; Stevens, R. G.; & Portnov, B. A, Global co-distribution of light-at-night (LAN) and cancers of prostate, colon, and lung in men, The 2009 International Congress of Applied Chronobiology and Chronomedicine, Akko, Israel. May 17-22, 2009.
- 2011 **Kloog, I.**; Koutrakis, P.; Coull, B. A.; Lee, H. J. & Schwartz, J. , Assessing temporally- and spatially-resolved pm2.5 exposures for epidemiological studies using satellite aerosol optical depth measurements, ATS 2011. Denver, Colorado, USA. May 13 – 18, 2011.
- 2011 **Kloog, I.**; Melly, S. J.; Ridgway, W. L.; Coull, B. A. & Schwartz, J. , Using new satellite based exposure methods to study the association between pregnancy pm2.5 exposure

and reduced birth weight in eastern Massachusetts, ATS 2011, Denver, Colorado, USA. May 13 – 18, 2011.

- 2011 **Kloog, I.**; Ridgway, B.; Koutrakis, P.; Coull, B. A. & Schwartz, J. D, Using novel exposure models to investigate the association between mortality and long and short term exposure to pm 2.5 in Massachusetts, ISEE 2011, Barcelona, Spain. September 13-16 201.
- 2012 **Kloog, I.**; Coull, B. A.; Zanobetti, A.; Koutrakis, P. & Schwartz, J. D. , Acute and Chronic Effects of Particles on Hospital Admissions in New-England, ATS 2012, San Francisco, California, USA. May 18 – 23, 2012.
- 2012 **Kloog, I.**; Chudnovsky, A.; Koutrakis, P. & Schwartz, J. ,Temporal and Spatial Assessment of Air Temperature Using Moderate Resolution Imaging Spectroradiometer (MODIS) Satellite Surface Temperature Measurements in Massachusetts, USA., ISEE 2012, Columbia, South Carolina,USA. Aug 26-30 2012.
- 2013 **Kloog, I.**; Nordio, F.; Coull, B. A. & Schwartz, J., Incorporating Local Land Use Regression And Satellite Aerosol Optical Depth In A Hybrid Model Of Spatio-Temporal PM2.5 Exposures In The Mid-Atlantic States, ISEE, ISES and ISIAQ Environmental Health Conference, Basel, Switzerland. 19-23 August 2013.
- 2013 **Kloog, I.**; Nordio, F.; Coull, B. A. & Schwartz, J., A Novel Hybrid Model for PM2.5 estimations across Israel , Annual Conference of Israel Ecological Association, Rehovot, 2013.
- 2014 **Kloog, I.**; Chudnovsky, A. A.; Just, A. C.; Nordio, F.; Koutrakis, P.; Coull, B. A.; Lyapustin, A.; Wang, Y. & Schwartz, J, Using New High Resolution Satellite Based Aerosol Optical Depth Data for a Hybrid Model of Spatio-Temporal PM2.5 Exposures across North Eastern USA, International Society for Environmental Epidemiology Conference 2104, Seattle, USA. 25-28 August 2014.
- 2014 **Kloog, I.**; Nordio, F.; Coull, B. A. & Schwartz, J. , Using Satellite Based Spatio-Temporal Resolved Air Temperature Exposure to Study the Association between Ambient Air Temperature, Birth Weight and gestational age in Massachusetts, AGC Conference, Tel Aviv, Israel.13-15 May 2014.
- 2014 **Kloog, I.**; Koutrakis, P.; Coull, B. A.; Lyapustin, A.; Wang, Y. & Schwartz, J, Incorporating Satellite Aerosol Optical Depth In A Hybrid Model Of Spatio-Temporal PM2.5 Exposures for Epidemiological studies, the 55th Israeli Geographical Association conference , Haifa , 21-22 December 2014.
- 2015 **Kloog I,** Melly S , Coull BA , Nordio F & Schwartz J, Using Satellite Based Spatio-Temporal Resolved Air Temperature Exposure to Study the Association between Ambient Air Temperature and Birth Outcomes in Massachusetts, International Society for Environmental Epidemiology Europe Conference 2015, Utrecht, Holland. 1-3 November 2015.
- 2015 **Kloog I,** R. O. Wright, J. D. Schwartz, B. A. Coull, A. Baccarelli, M. M. Tellez-Rojo, E. Moody, Y. Wang^C, A. Lyapustin, A. C. Just. Using Satellite Aerosol Optical Depth

To Estimate Daily PM_{2.5} Geographical Distribution In Mexico City, ERSA 55 conference, Lisbon ,Portugal, 25-29 August 2015.

- 2015 **Kloog I**, A. C. Just, R. O. Wright, J. D. Schwartz, B. A. Coull, A. Baccarelli^C, A. Lyapustin, Incorporating Satellite Aerosol Optical Depth In A Hybrid Model Of Spatio-Temporal PM_{2.5} Exposures for Epidemiological studies, the 56th Israeli Geographical Association conference, Jerusalem , 13-14 December 2015.
- 2016 * **Kloog I**, Sorek-Hammer M. Analysis of the PM_{2.5} to PM₁₀ Ratio Characteristics and its relation to AOD Across Multiple Global Locations , Annual Conference of Israel Ecological Association, Hertzliya, 2016.
- 2016 * **Kloog I**, Alex S Satellite modelling for PM exposure in environmental epidemiology studies, International Society for Environmental Epidemiology Conference 2106, Rome, Italy. 1-3 September 2016.
- 2016 * Massimo S, Chiara B, Giorgio C, Gaet A, Forastiere F, Leone L, Schwartz J, **Kloog I**, Fine Spatio-Temporal Resolution of PM₁₀ and PM_{2.5} Concentrations in Italy (2006-2012) using Satellite Data and Several Land Use Variables, International Society for Environmental Epidemiology Conference 2106, Rome, Italy. 1-3 September 2016.
- 2016 * Maayan Yitshak Sade, **Itai Kloog**, Idit Liberty, Joel Schwartz, Victor Novack, The Association between Air Pollution Exposure and Glucose and Lipids Levels, Identifying sensitive windows for prenatal particulate air pollution exposure and mitochondrial DNA copy number in cord blood, International Society for Environmental Epidemiology Conference 2106, Rome, Italy. 1-3 September 2016.
- 2016 * Isabella Karakis, Maayan Yitshak-Sade, **Itai Kloog**, Batia Sarov, Lena Novack, Isabella Karakis, Association between ambient air pollution and proliferation of umbilical cord blood cells , International Society for Environmental Epidemiology Conference 2106, Rome, Italy. 1-3 September 2016.
- 2016 * Francesca de'Donato*, Paola Michelozzi, Paolo Vineis, **Itai Kloog**, Fine Scale Resolution Air Temperature Exposure in Italy using Satellite Data, Observed Monitoring Data and Land Use Data, International Society for Environmental Epidemiology Conference 2106, Rome, Italy. 1-3 September 2016.
- 2016 * Svoray T, Dorman M., **Kloog I**, Current practices and gaps in spatial analysis of Location Based Social Network data, the 57th Israeli Geographical Association conference, Tel-Aviv, 25-26 December 2016.
- 2017 * Alex S, **Kloog I**, Estimating daily and inter-daily concentrations of PM_{2.5} and PM₁₀ pollutants using satellite-derived AOD products and improved modeling approaches, the 58th Israeli Geographical Association conference, Beer Sheva, 17-18 December 2017

- 2017 * Krasnov, H., **Kloog, I.**, Friger, M. and Katra, I., The Spatio-Temporal Distribution of Particulate Matter during Natural Dust Episodes at an Urban Scale., the 58th Israeli Geographical Association conference, Beer Sheva, 17-18 December 2017
- 2017 * Dorman M ,Svoray T, **Kloog I.**, The association between socioeconomic similarities and spatial segregation in the real and virtual world using Twitter data., the 58th Israeli Geographical Association conference, Beer Sheva, 17-18 December 2017
- 2017 * **Kloog I.**, Air Pollution and Bronchiolitis Among Infants, The Israeli Association of Pediatric Pulmonology conference, Soroka, Beer Sheva, 20 December 2017.

(c) Presentations at informal international seminars and workshops

2012 **Kloog I.**, Harvard Medical School, Division of Sleep Medicine, Environmental Sleep Epidemiology and Outcomes: Work in Progress, Using Novel Satellite Data in Epidemiological Studies: Exposure to Light at Night and Fine Particulate Matter and Human Health, Boston, USA.

2012 **Kloog I.**, Harvard CLARC center Science Advisory Committee Meeting, Using New Satellite Based Exposure Methods to Study the Association Between Pregnancy PM 2.5 Exposure, Premature Birth And Birth Weight In Massachusetts, June 6 2012, Cambridge, USA.

2012 **Kloog I.**, EPA Work-In-Progress Webinar for the Clean Air Research Centers, “Assessing Temporally and Spatially-Resolved PM2.5 Exposures for Epidemiological Studies Using Satellite Aerosol Optical Depth”, November 2012, Boston, USA.

2013 **Kloog I.**, Harvard CLARC center Science Advisory Committee Meeting, Short Term Effects of Particle Exposure on Hospital Admissions in the Mid-Atlantic States: A population Estimate, June 6 & 7, 2013, Boston, USA.

2014 **Kloog I.**, Application of Satellite data use in Environmental Epidemiology, ROME, Department of Epidemiology of the Regional Health Service – Lazio, 14-17 November 2014, Rome, Italy.

2015 **Kloog I**, Advanced Satellite based spatial statistical modeling for exposure assessment, Department of Epidemiology of the Regional Health Service – Lazio, 8-11 July 2015, Rome, Italy.

2016 * **Kloog I** “*Health and Wealth*”- The 1st Internationalization Summit July 13, 2016, The 2016 Brescia conference, University of Brescia, Brescia, Italy.

2017 * **Kloog I**, Novel Remote sensing application in exposure assessment, Department of Epidemiology of the Regional Health Service – Lazio, 6 June 2017, Rome, Italy.

(d) Seminar presentations at universities and institutions

2004 **Kloog I**, Department of Biology, University of Haifa-Oranim, Kiryat Tivon, Israel, Light pollution as a risk factor for breast cancer.

2005 **Kloog I**, Department of Biology, University of Haifa-Oranim, Kiryat Tivon, Israel, "Light pollution as a risk factor for breast cancer

2006 **Kloog I**, Division of Public Administration and Policy, Faculty of Social Sciences, University of Haifa, Haifa, Israel, Studying the association between light at night exposure and prevalence of hormonal cancers in urban localities: a GIS-assisted case study

2007 **Kloog I**, Division of Public Administration and Policy, Faculty of Social Sciences, University of Haifa, Haifa, Israel, Studying the association between light at night exposure and prevalence of hormonal cancers in urban localities: a GIS-assisted case study

2011 **Kloog I**, Harvard School of public health, Clean air research center- science advisory committee meeting, Assessing temporally and spatially resolved pm2.5

exposures for epidemiological studies using satellite aerosol optical depth measurements

2012 **Kloog I**, Harvard School of public health, Biostatistics department, environmental statistics seminar, invited lecture, Assessing temporally and spatially resolved pm2.5 exposures for epidemiological studies using satellite aerosol optical depth measurements.

2015 **Kloog I**, Clalit research institute, research seminar, invited lecture, Modeling and environmental health.

2015 **Kloog I**, Haifa University, Health Status Monitoring of the Haifa Bay research seminar, The use of spatio-temporal modeling in the Haifa bay area.

2015 **Kloog I**, Hebrew University, Geography department seminar, Modeling and environmental health.

2015 **Kloog I**, Bar Ilan University, Geography department seminar, Modeling and environmental health.

2015 **Kloog I**, Icahn School of Medicine, Mount Sinai, New York, USA, preventative medicine department seminar, Novel methods in environmental health exposure assessment.

2016 * **Kloog I**, Icahn School of Medicine, Mount Sinai, New York, USA, preventative medicine department seminar, New modelling methodologies in the challenging geo-climate region of Mexico City.

2017 * **Kloog I**, Pecs University, Department of Geography, Pecs, Budapest, department seminar, Novel Remote sensing application in exposure assessment.

2017 * **Kloog I**, Novel Remote sensing application in exposure assessment, ISI Global – Barcelona, 9 June 2017, Barcelona, Spain.

• **Research Grants**

Research grants

- 2014-2018 *Marie Curie Career Integration Grants (CIG)-FP7-PEOPLE-2013-CIG*, **Kloog I**, (PI), Grant title: Assessing Temporally and Spatially Resolved PM2.5 and Air Temperature Exposures for Epidemiological Studies Using Satellite Based Methods, (\$30,000 per year for four years, \$120,000 total)
- 2014-2015 *EHF Pilot Research Grant*, Novack V (PI), **Kloog I** (CI), Liberty I (CI), Grant title: Pollution, Diabetes and Obesity: The Association of Air Pollution and Blood Glucose Levels Among Diabetic Patients in the Negev Region, (\$12,000 total)
- 2015-2018 *EHF Full Research Grant*, **Kloog I** (PI). Grant title: Studying the Association between Adverse Pregnancy Outcomes and Ambient Air Temperature and Particulate Matter in Southern Israel, (\$25,000 per year for three years, total: \$75,000)
- 2015-2016 *Haifa Bay Municipal Association for Environmental Protection, Haifa District Health Office, Ministry of Health*, Portnov B (PI), Carel R (PI), **Kloog I** (PI), Linn S (PI), Fireman L (PI), Grant title: “Comprehensive and Continuous Health Status Monitoring of the Haifa Bay Residents: Multi-source Approach“. (total: \$217,760).
- 2015-2019 *NIH R01 (R01ES024332-01A1)*, Zanolotti A (PI), Domichi F (CI), Coull B (CI), **Kloog I** (CI), Koutrakis P (CI), Schwartz J (CI), Grant title: Cardiovascular Health and Air Pollution: A National Study, (\$2,295,024 total, BGU: \$25,000 per year, \$100,000 total)
- 2015-2017 *CONACyT SEMARNAT (National Council of Science and Technology - Ministry of Environment and Natural Resources)*, Tellez Rojo M (PI), Riojas Rodriguez H (CI), Texcalac Sangrador JL (CI), Just A (CI), Wright B (CI), **Kloog I** (CI), Schwartz J (CI), Wright R (CI). Grant title: Implementation of satellite data to assess exposure to particle matter (PM2.5) and its association with health and socioeconomic status on a representative sample of the Greater Mexico City Area using results of the ENSANUT 2006 and 2012, (\$100,000 total)
- 2016-2019 *Ministry of Energy and water, Israel-* Erell Evyatar (PI), **Kloog I** (PI), Grant title: The potential for PV installation in residential buildings in dense urban areas, (\$22,000 per year, \$66,000 total)
- 2016-2019 * *Ministry of Science and Technology, Israel-* **Kloog I** (PI), David Broday (PI) Grant title: Improving Satellite Based PM2.5 and PM10 estimation across Israel, (\$66,812 per year, \$200,435 total)
- 2016-2023 * *NIH 5UG3OD023337-02 Environmental influences on Child Health Outcomes (ECHO)*, Wright R (PI), Wright B (PI), **Kloog I** (CI),

Schwartz J (CI), Just A (CI), Brent Coull (CI), Andrea Baccarelli (CI), (\$8,634,044 Total, BGU: \$106,000 per year, \$742,000 total for **Kloog I**)

- 2018-2021 * *Ministry of Science and Technology, Israel- **Kloog I*** (PI), Erel Evyatar (PI), Victor Novack (PI) Grant title: The Effects of Urban Microclimate Variability and Global Climate Change on Heat-Related Cardiovascular Outcomes in the Semi-Arid Environment of Southern Israel (\$66,812 per year, \$200,435 total)
- 2017-2020 * Ministry of Environmental protection, Hagai L (PI), Rachel G (CI), **Kloog I (CI)**, Gidi Koren (CI), Ronit Almog (CI), Environmental Exposures and Fetal Growth: The Haifa Pregnancy Cohort Study. (\$400,000, BGU: \$13,000 per year).
- 2017-2020 * EU LIFE-MEDEA: Mitigating the Health Effects of Desert Dust Storms Using Exposure-Reduction Approaches, Victor Novack (PI), **Kloog I (CI)**, Katra Itzhak (CI), (BGU: 246,000 Euro total).
- 2017-2021 * NIH 2R01ES013744-11A1: Stress-chemical interactions and neurobehavior in school age children (PROGRESS R01), Wright B (PI), Tellez Rojo M (CI), Schwartz J (CI), Just A (CI), **Kloog I (CI)**, Brent Coull (CI), Andrea Baccarelli (CI), (BGU: \$8000 per year, \$32,000 total)
- 2016-2019 * NIH U2CES026561-Mount Sinai Children's Health Exposure Analysis Resource Laboratory Network Hub (CHEAR), Wright B (PI), Arora M (CI), Just A (CI), **Kloog I (CI)**, (\$10,400,000, BGU: \$7500 per year, \$22,500 total)
- 2017-2020 * NIH Mount Sinai R24- PROGRESS maintenance grant (BGU: \$3000 per year, \$9000 total)
- 2017-2018 * NIH P30 ES23515-4, Spatiotemporal modeling of hourly temperature dynamics and risk of cardiovascular events in New York, Just A (PI), Kioumourtzoglou M (PI), **Kloog I (PI)**, (\$100,000, BGU: \$20,000 total)
- 2018-2021 * Ministry of Environmental protection, Madar D (PI), **Kloog I (PI)**, Using a new high resolution remote sensing technology for identification and quantification of methane leaks in the Israeli transportation fuel substitutes sector. (\$200,000).
- 2017-2020 * NIH ECHO Opportunities and Infrastructure Fund (OIF), Just A (PI) and, **Kloog I (PI)**, ECHO-wide platform for studying air pollution, temperature, and greenness using satellite remote sensing with daily high-resolution national exposure estimates, (\$200,000 total, BGU: \$100,000)
- 2017-2020 * ISF-UGC Program 2017, Broday D (PI), Tirthankar Banerjee (PI), **Kloog I (CI)**, "Daily PM2.5 estimation by fusion of multiple earth-observation satellite products", (BGU: \$XX total, BGU: \$YYY)

• **Present Academic Activities**

Main research in progress:

1. Studying the association between temperature variability, particulate air pollution, and birth outcomes - epidemiologic innovation contrasting populations in Massachusetts USA and Southern Israel

- Aim 1: Enhance innovative high-resolution spatio-temporally resolved temperature and air pollution models for use in epidemiologic applications.
- Aim 2: Construct distributed lag models for the time-varying association of temperature and temperature variability with birth outcomes (preterm birth, gestational age, fetal growth restriction and birth weight) in Massachusetts and Southern Israel using distributed lag models.
- Aim 3 (exploratory): construct distributed lag interaction models to jointly test the association of extreme temperatures and particulate air pollution on birth outcomes in both regions.

2. CLIMATHE: Climate Health Effects in Pregnant women and children-A multi-cohort study in France and Israel

- Aim 1: Develop and validate novel air temperature estimation models across France for the years 2000-2018 for temperature exposure studies. We aim to develop and validate estimation models to better estimate air temperature at a very high spatial resolution (1km, 200m) and temporal (daily min, max, mean, standard deviation) resolution across France for the years 2000-2018 taking into account the unique climatology, land use, surface properties etc. This novel, spatiotemporally resolved temperature model is a significant improvement over the models currently available worldwide.
- Aim 2: Conduct a study in France at a very small spatial resolution (geocoded individual locations) to estimate the association between ambient air temperature and several birth outcomes at an individual level. Temperature exposure will be evaluated in terms of mean and extreme temperature exposure and in terms of variability of exposure to temperature during specific time-windows. We will look at preterm birth and birth weight, which results from the in utero growth of the fetus. Preterm delivery will be defined according to gestational age at delivery and will be subdivided into three groups extreme (<28 weeks of gestation), early (28-33.9 weeks of gestation) and late (34-36.9 weeks of gestation) prematurity. We will investigate the effects of various (short- and long-term) time-windows of temperature exposure occurring from conception to delivery on birth weight and preterm birth.

- Aim 3 We will investigate whether climate change and increasing temperatures affect the rural and urban population differently. We will look into whether the effects of temperature on birth weight and preterm birth differ between urban and rural populations.

3. ECHO NIH Project:

Aim 1: Develop highly spatiotemporally resolved nationwide exposure models, including (a) daily estimates of air pollutants (PM_{2.5/10}), sulfur oxides (SO₂), nitrogen oxides (NO₂), and ozone (O₃) using satellite based models.

Aim 2: Identify windows of vulnerability: With our exposure model and biomarkers we can use data-driven methods to determine the pre/postnatal susceptibility windows during which weekly AP exposures and tooth-based weekly metal exposures predict (a) neurodevelopmental domains (executive function, processing speed, episodic memory, language, attention and working memory).

4. Improving Satellite Based PM_{2.5} and PM₁₀ estimation for Epidemiological Exposure Modeling across Israel (MOST Grant).

- Improve beyond our previous work which was the first work to use MAIAC AOD for predicting PM_{2.5} across the whole Israel.
- Integrate into our models aerosol products and remote sensing data from various instruments (e.g. MODIS, OMI) which reside on different platforms (e.g. Terra, Aqua) using different algorithms for raw data interpretation (DT, DB, MAIAC), i.e. various products (e.g. DT-AOD, DB-AOD, MAIAC-AOD, AAI, SSA, etc).
- Use novel innovative methods for studying the relationships between AOD and PM (i.e. statistical downscaling, data fusion, Kalman Filtering, smooth plates interpolation, Sparse Clustering).
- Expand our ability to estimate PM_{2.5} and PM₁₀ levels across the whole Israel, and use it for
- national-wide epidemiological studies that assess their health effects in the Israeli population.

5. Correcting measurement error in satellite aerosol optical depth with machine learning for modeling PM_{2.5} in the Northeastern USA.

- Compare three machine learning methods including random forests, gradient boosting, and extreme gradient boosting (XGBoost) to characterize and correct measurement error in the MAIAC 1x1km AOD product for both Terra and Aqua satellites.

- Use machine learning with quality control and spatial features for improving satellite-derived AOD products for air pollution modeling.

6. The Effects of Urban Microclimate Variability and Global Climate Change on Heat-Related Cardiovascular Outcomes in the Semi-Arid Environment of Southern Israel (MOST climate change Grant).

- Aim 1) develop better Ta exposure assessment methods at high spatial and temporal resolutions to handle contemporary exposure datasets, which are misaligned in both time and space
- Aim 2) To characterize the effects of acute and chronic Ta and HS exposure on the cardiovascular risk
- Aim 3) To investigate whether the health effects differ between urban and rural populations, since urban conditions such as the urban heat island (UHI) can cause extreme temperature events, and by personal and clinical characteristics

7. Spatiotemporal modeling of hourly temperature dynamics and risk of cardiovascular events in New York

- Aim 1) Develop and validate a diurnally-varying temperature prediction model for NYS using a machine-learning driven big data NASA satellite approach (covering hourly temperature at a 1km resolution for 2003-2016).
- Aim 2) Investigate the association between temperature dynamics predicted at residential addresses and total CVD and CVD-specific emergency department visits.
- Aim 3) Investigate these associations across sex, age, race, urbanicity, and neighborhood deprivation strata.

8. The potential for PB installation in residential buildings in dense urban areas (MOE Grant).

- Aim 1) Estimating the potential for electricity generation by building-integrated PV of various configurations in typical residential building types in Israel, considering the characteristics of the building envelope and building construction technology, in a hypothetical exposed location;
- Aim 2) Implementing a GIS-based methodology for evaluating the potential for electricity generation by building integrated PV in generic dense urban locations, accounting for mutual shading between adjacent buildings;
- Aim 3) Analyzing the equivalent electricity output of several solar technologies considered for implementation on building envelopes, and their respective costs and demonstrating the application of the method in order to estimate the realistic potential for electricity generation by building integrated PV in a typical dense urban location in Israel

9. Exploring Urbanicity Effects on Well-being Using Novel Space-time Analysis of Social Network Data

(1) determining the dominant environmental factors affecting emotional state in the urban environment, and to determine the type and degree of temporal influences on emotional state, including the effects of (2) seasonal cycles and (3) temporal autocorrelation.

10. Using new high resolution remote sensing technologies for identification and quantification of methane leaks in the Israeli transportation fuel substitutes sector (MOEP grant):

We are looking at quantifying natural gas based transportation fuel substitutes sector methane emissions, by high resolution satellite measurement. The research objectives include:

1. Validating high resolution satellite measurement by ground methane emissions measurements at 1-3 methane emission locations.
2. Measuring methane emissions at 3 transportation fuel substitutes facilities by high resolution satellite measurement.
3. Measuring yearly methane emissions at one key transportation fuel substitutes facility by high resolution satellite measurement.
4. Quantifying the expected national methane emissions from transportation fuel substitutes for 2019-2030.
5. Analyzing the consequences of these methane emissions on:
 - a. Climate change.
 - b. Air pollution.

Books and articles to be published

Papers in preparation

1. Lara Ifat Kaufman^S, Kees de Hoogh^C and **Itai Kloog**^{PI}, 2017, Using Open Street Map Data in Environmental Exposure Assessment Studies: Eastern Massachusetts And South Israel As A Case Study.
2. **Itai Kloog**^{PI} and Allan C Just^C, 2017, A new methodology for developing computationally efficient robust PM2.5/10 prediction models across the continental USA.
3. FK de'Donato^S, M. Stafoggia^C, C. Badaloni^C, P.Michelozzi^C, P.Vineis^C. **I. Kloog**^{PI}, 2107, The use of satellite data to define exposure to temperatures (heat/cold) for the estimation of health effects in Italy.
4. **Itai Kloog**^{PI}, Tal Svoray^{PI} and Michael Dorman^C, 2017, Evaluating spatio-temporally trends during extreme events using location based social network data (twitter and flicker).

5. Sorek-Hamer^S Meytar^C, Furman-Krasnov^C Helena^C, Yuval^C, Tirthankar^C Banerjee^C, Itzik Katra^C, Robert Chatfield^C, Anthony W. Strawa^C, Broday^C David^C, **Kloog^{PI} Itai**, 2017, Analyzing Associations Between the Aerosol Vertical Profile, AOD, and PBL
6. Michael Dorman^C, Tal Svoray^{PI}, Arnon Sturm^C, **Itai Kloog^{PI}**, 2017, How to choose your social network? Current practices and gaps in spatial analysis of Location Based Social Network data
7. Tal Svoray^{PI}, Michael Dorman^C, Golan Shahar^C, **Itai Kloog^{PI}**, 2017, The Nature of Joy
8. Michael Dorman^C, Tal Svoray^{PI}, **Itai Kloog^{PI}**, 2017, How does socio-economic and demographic dissimilarity determine physical and virtual segregation?
9. Maayan Yitshak-Sade^S, Jennifer F. Bobb^C, Joel Schwartz^C, **Itai Kloog^C** and Antonella Zanobetti^{PI}, 2017, The synergistic effect of short and long-term exposure to PM and temperature on hospital admissions in New England
10. Sonali Bose^S, Maria José Rosa^C, Yueh-Hsiu M. Chiu^C, Hsiao-Hsien L. Hsu^C, Qian Di^C, Alison Lee^C, **Itai Kloog^C**, Ander Wilson^C, Joel Schwartz^C, Robert O. Wright^C, Wayne Morgan^C, Brent A. Coull^C, Rosalind J. Wright^{PI}, 2017, Prenatal nitrate air pollution exposure and decreased lung function in children: timing and fetal sex effects
11. Alison G. Lee^S, Blake Le Grand^C, Hsiao-Hsien Leon Hsu^C, Yueh-Hsiu Mathilda Chiu^C, Kasey J Brennan^C, Sonali Bose^C, Maria José Rosa^C, **Itai Kloog^C**, Ander Wilson^C, Joel Schwartz^C, Wayne Morgan^C, Brent A. Coull^C, Robert O. Wright^C, Andrea Baccarelli^C, Rosalind J Wright^{PI}, 2017, Prenatal fine particulate exposure associated with reduced childhood lung function and nasal epithelia GSTP hypermethylation: Sex-specific effects
12. Sordillo^S, K.M. Switkowski^C, B. A. Coull^C, J. Schwartz^C, **I. Kloog^C**, H. Gibson^C, A.A. Litonjua^C, J. Bobb^C, P. Koutrakis^C, S. L. Rifas-Shiman^C, E. Oken^C, D. R. Gold^{PI}, 2017, Relation of Prenatal Air Pollutant and Nutritional Exposures with Biomarkers of Allergic Disease in Adolescence
13. Iván Gutiérrez-Avila^S, Leonora Rojas-Bracho^C, Horacio Riojas-Rodríguez^C, **Itai Kloog^C**, Allan C. Just^C, Stephen J. Rothenberg^{PI}, 2017, Cardiovascular and cerebrovascular mortality associated with acute exposure to PM in Mexico City
14. Alison Lee^S, Hsiao-Hsien Leon Hsu^C, Yueh-Hsiu Mathilda Chiu^C, Sonali Bose^C, Maria Rosa^C, **Itai kloog^C**, Ander Wilson^C, Joel Schwartz^C, Sheldon Cohen^C, Brent A. Coull^C, Robert O. Wright^C, Rosalind J Wright^{PI}, 2017, Association between prenatal fine particulate matter and early childhood asthma: Effect modification by prenatal stress and child sex.
15. M.B. Rice^{PI}, S.L. Rifas-Shiman^C, A.A. Litonjua^C, M.W. Gillman^C, N. Liebman^C, **I. Kloog^C**, H. Gibson^C, B. Coull^C, J. Schwartz^C, P. Koutrakis^C,

- E. Oken^C , M.A. Mittleman^C , D.R. Gold^C, 2017, Proximity to Roadway, Lifetime Pollution Exposure and Asthma Risk in a Pediatric Cohort
16. Magali Hurtado-Díaz^S, Martha María Téllez-Rojo^C, Allan Just^C, José Luis Texcalac-Sangrador^C, **Itai Kloog**^C and Horacio Riojas-Rodríguez^{PI}, 2017, Methods for assessing PM_{2.5} exposures in a birth cohort in Mexico City: the influence of season of conception
 17. Kelvin C Fong^S , Anna Kosheleva^C , **Itai Kloog**^C , Joel D Schwartz^{PI}, 2017 , Quantile Regression of Maternal Exposure to Particulate Air Pollution and Birth Weight
 18. Yan Wang^C, Ander Wilson^C, Chi Wang^C, Kelvin C. Fong^C, Anna Kosheleva^C, **Itai Kloog**^C, Joel D. Schwartz^{PI}, and Francesca Dominici^C, 2017, Accounting for Uncertainty in Confounders and Effect Modifier Selection while Estimating Average Causal Effect of Maternal Exposure to PM_{2.5} on Birth Weight
 19. Ofer Amram^S, Nadine Schuurman^C, Gadi Shaked^C, **Itai Kloog**^C and Michael Friger^{PI}, 2017, Spatial and Temporal Analysis of Pediatric Injuries in Southern Israel
 20. Piers MacNaughton^S , Erika Eitland^C , **Itai Kloog**^C , Joel Schwartz^C , and Joseph Allen^{PI}, 2017, Impact of Particulate Matter Exposure and Surrounding “Greenness” on Absenteeism in Massachusetts Public Schools
 21. Marguerite Nyhan^S, **Itai Kloog**^C, Rex Britter^C , Carlo Ratti^C and Petros Koutrakis^{PI}, 2017, Quantifying Population Exposure to Air Pollution Using Individual Mobility Patterns Inferred from Cellular Network Data
 22. Zhengyi Deng^S, Qian Di^C, Yan Wang^C, Antonella Zanobetti^C, **Itai Kloog**^C, Petros Koutrakis^C, Anna Kosheleva^C, Joel Schwartz^{PI}, 2017, Investigation of the short-term effects of fine particulate matter and ozone on mortality in Massachusetts and the related effect modifiers
 23. W. Pan^S, M. Eliot^C, Y. Huang^C, I. **Kloog**^C, J. D. Schwartz^C, S. Buka^C, C. Eaton^C, E. Loucks^C, K. Kelsey^C, & G. Wellenius^{PI}, 2015. Fine particulate matter air pollution (pm_{2.5}) and dna methylation in peripheral blood leukocytes.
 24. J Schwartz^{PI}, **Itai Kloog**^C, Zanobetti^C A , Koutrakis^C P, 2017, A Doubly Robust Additive Failure Time Model for Quantiles of Life Expectancy: PM_{2.5} and Mortality in New England
 25. Maayan Yitshak-Sade^S, Kevin J. Lane^C, **Itai Kloog**^C, Jaime E. Hart^C, Kelvin Fong^C, Joel D. Schwartz^C, Francine Laden^C and Antonella Zanobetti^{PI}, 2017, PM_{2.5} and mortality: modification of the association by personal and area level indicators of socioeconomic status

26. Brunst Kelly^S, Hsiao-Hsien Leon Hsu^C, Yueh-Hsiu Mathilda Chiu^C, Maria Rosa^C, **Itai kloog**^C, Ander Wilson^C, Joel Schwartz^C, Sheldon Cohen^C, Brent A. Coull^C, Robert O. Wright^C, Rosalind J Wright^{PI}, 2017 Prenatal PM2.5 and maternal trauma effects on mitochondrial function using BDLIM .

Additional information

• Organization of Scientific Meetings:

1. Co-Organizer and secretary of the 2009 International Congress of Applied Chronobiology and Chronomedicine, May 17-22, 2009 Akko, Israel.
2. Co-Organizer of the 58th Israeli Geographical Association conference, Beer Sheva, December 2017, Israel.
3. Organizing committee, International Society for Environmental Epidemiology Europe Conference 2017, Munich, Germany. March 2018.
4. Co-Organizer of the “Using earth observation (EO) data products for environmental exposure assessment – exploring new products, novel geospatial methodologies and data fusion/machine learning techniques” workshop , Basel 2018, funded by the Swiss science national foundation-SNF

Synopsis of research: *Environmental exposure assessment: Cutting edge spatially and temporally explicit methodologies*

The strong relationship between space and health dates back to the onset of epidemiology, when John snow spatially traced the source of a cholera outbreak in London during 1854. While historically medical geography and classic epidemiology shared a common goal, the fields have since diverged and developed different and often complementary approaches to similar problems. In recent years, environmental epidemiology (EE) has started to bridge these distinctions between the two disciplines by shifting the focus towards environmental exposures. This shift creates a real need to accurately assess exposure for populations and develop advanced, spatially explicit models of environmental conditions. These emerging needs have led to the development of an innovative scientific field - Environmental Exposure Assessment (EEA) - investigating the sources, pathways, magnitude, routes, and uncertainties in population exposures to environmental pollutants. There is a highly active community (“exposure scientists”) known for their interdisciplinary, creative, and pragmatic approach to problem solving and improving exposure assessment. Major research bodies such as the US EPA (Environmental Protection Agency), the National Institute of Environmental Health Sciences (USA) and the World Health Organization have all stressed its scientific importance. Due to the inherent interdisciplinary nature of the field, high impact studies require multiple

perspectives and expertise from leaders in various fields such as Geography, Chemistry, and Biology.

Since my last promotion to Assoc. Prof. my research papers were **highly cited** in leading journals (**more than 1600 cites**) and have become the basis for on-going research by other authors. In the last year alone, I have been the recipient of 10 research grants including 5 highly competitive and prestigious grants (NIH, EU and Israel Ministry of Science grants) **pulling in close to \$1.5 million US in BGU grant money**. This is directly attributed to my expertise in the field of exposure assessment. My recent contribution to the field includes several high impact and highly cited papers [20,24,46,70,81,89,100] which **helped move the field forward** by developing the use of hybrid geo-statistical models which make use of novel satellite data. These models have been used in over than 100 publications in recent years. My leading position in the field helped me get invited as a world renowned expert for key note talks and academic consultations in several academic and governmental institutions in the past two years. These include the Public Health Foundation India (PHFI), Instituto Nacional de Salud Pública Mexico (INSP), Harvard T.H. Chan School of Public Health, Mount Sinai Icahn School of Public Health, Centre for Research in Environmental Epidemiology (CREAL), Barcelona Spain and Department of Epidemiology of the Regional Health Service - Lazio. As a global expert in the field, I have been recently asked to join the scientific advisory board of the BEEP Project: "use of Big data in Environmental and occupational EPidemiology". I have also been invited to write a comprehensive review paper on satellite remote sensing in epidemiological studies [62]. The work based on my PM exposure models and health outcome studies in the USA has been used as **a basis for US EPA reports and policy decisions on setting country wide standards for PM levels**. I have been recruited and appointed as an adjunct prof. in the Mount Sinai Icahn School of Public Health as a leader in exposure assessment. I hold a position of visiting scientist at the Harvard T.H. Chan School of Public Health and also serve as an expert consultant for the Environmental influences on Child Health Outcomes Patient Reported Outcomes Research Resource Center Core at the Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University. My experience has also allowed me to lead an international working group with annual meetings on developing and improving satellite-based PM_{2.5/10} estimations for EEA modeling across Europe. The workshops host distinguished scientists from all over the world, including some of the leaders in the fields of EE and EEA. These workshop supports the creation of a very active academic network, with annual meetings, joint grant proposals and active scientific collaborations.

Most studies to date on the health effects of environmental exposures (*inter alia*, air pollution, climate change) were conducted over large geographical areas as the unit of analysis (country wide), thus potentially biasing the exposure-outcome associations due to exposure measurement error (*i.e.*, assigning biased exposure to each study participant due to limited spatial exposure data). These studies have traditionally focused on urban areas, since air pollution monitors are placed mostly in major cities and the bulk of the population is concentrated there. As head of the Environmental Exposure Assessment (EEA) laboratory, my research focuses on the challenges of developing robust high-resolution environmental exposure models and studying unbiased exposure-health outcome associations in EE studies. We apply advanced geo-statistical methods, novel GIS technologies and cutting-edge statistical techniques to address these scientific challenges. We research ongoing advancement of novel modeling approaches that resolve environmental exposures temporally and spatially [17,18,20,21,24,45,46,70,81,89,100]. These approaches substantially outperform the 'state-of-the-art' estimation models used by other groups. My research products are actively used by many of the leading public health research institutes globally, through direct collaboration with my lab. These research institutes include among others: Harvard University-T.H. Chan School of Public Health (HSPH), Brown University- School of Public Health, Icahn School of Medicine at Mount Sinai, Beth Israel Deaconess Medical Center, Imperial colleague (London), Karolinska Institutet (Sweden), Department of Epidemiology-Lazio Region (Italy),

Padova University (Italy), Swiss Tropical and Public Health Institute (STPHI-Switzerland), Centre for Research in Environmental Epidemiology (CREAL-Spain), Helmholtz Zentrum München -Institute of Epidemiology (Germany), University of Grenoble (France), The National Institute of Public Health (INSP)- Mexico, Hebrew University (Israel), Haifa University (Israel) and the Technion (Israel). The novel modeling approach I developed bridges the methodological and knowledge gaps that needed to be filled to: 1. Address exposure misclassification issues which biases the health effect estimates downward due to spatial misalignment; and 2. Better identify the sources of heterogeneity in the short and long term exposure effects of EEA (air pollution, air temperature, etc.) across large territories and sub-populations. The novelty in my approach lies in the ability to develop new satellite-based GIS and geo-statistical methodologies extending the spatio-temporal scale dramatically. This extended coverage, allows expanding exposure data well beyond ground monitoring networks into rural and suburban areas with very high spatial resolution, greatly enhancing the ability to estimate individual exposures. This allows addressing the methodological issues described above by substantially reducing exposure bias and dramatically minimizing exposure misclassification.

The majority of the papers (92%) were published in **Q1** journals. The mean impact factor (IF) across these publications was 6.2. It should be noted that out of my total of 100 publications, I have two publications in very prestigious leading journals (IF > 32: Nature, Nature Methods) and 5 other publications in high IF journals (IF > 12: Nature Climate Change, American Journal of Respiratory and Critical Care Medicine, and Lancet Global Health). As a PI in recent years, I (and my students and post docs) have introduced several novel concepts. For example, to my knowledge, we were the first group showing the use of the high-resolution MODIS-based MAIAC (multiangle implementation atmospheric correction) algorithm data for modeling $PM_{2.5/10}$ for EEA research [20]. Using MAIAC, we developed specialized statistical methodologies to predict daily spatio-temporally resolved estimates, allowing us to assign both chronic and acute exposures to each individual within the entire population at a very high resolution. We produce both area level (at a very fine scale resolution) and residential level (ultra high resolution) daily $PM_{2.5/10}$ estimates for use in EE studies and policy analyses. Following these studies, we are currently developing (with PhD candidate Alex Shetin) $PM_{2.5/10}$ exposure assessment model which introduce significant novel methodologies. We use data fusion methodologies to integrate aerosol products and remote sensing data from various instruments (e.g. MODIS, OMI) which reside on different platforms (e.g. Terra, Aqua) using different algorithms for raw data interpretation (DT, DB, MAIAC), i.e. various products (e.g. DT-AOD, DB-AOD, MAIAC-AOD, AAI, SSA, etc). We are also developing new algorithms that will enable us to combine both the Aqua and Terra MAIAC data, thus gaining better temporal resolution. We will be able to predict both 24h mean PM estimations alongside morning (rush hour) and afternoon (background) PM estimations. Development of such models in the complex geo-climate region of Israel is extremely challenging and requires development of new geostatistical methodologies. For example, we successfully account for the specific geo-climatic complexities (such as bright land surfaces, harsh summer temperature, humid coastal conditions etc.), we developed algorithms to identify and remove unreliable raw MODIS/MAIAC daily data and methods to fuse multi-level and multi-platform data into our calibration models. My research group has also developed similar spatially and temporally resolved climate models [12,24], and have used the models in the USA, Europe and now in Israel (as part of the Environment and Health Fund grant). This novel modelling approach, never used before in EE/EEA studies, advances research in key questions such as the effect of climate change on health and disease [29,43]. In this project (with MA student Adar Rozenfeld), we developed and validated computationally efficient models that provide more accurate estimates of air temperature (T_a) at very high spatial (1 km) and temporal (daily) resolutions in the complex climate of Israel [100]. Another project "Assessing Temporally and Spatially Resolved $PM_{2.5}$ and Air Temperature Exposures for Epidemiological Studies using Satellite Based Methods" (financed by the Marie Curie Career Integration Grants -CIG) is a typical example of the type of interdisciplinary and

collaborative research that is the focus of our groups work. The CIG project has led so far to collaborations with leading worldwide researches (including a European-wide network based on this work). We developed and validated novel high resolution spatio-temporal $PM_{2.5}$ and air temperature (Ta) exposure models for EE studies in Italy and France (with PhD student Francesca Dedonato) [81]. In addition, we are conducting a nationwide study in France at a very small spatial resolution (geocoded individual location) to estimate the associations between exposure to $PM_{2.5}$, air temperature and fetal growth. We have many other research projects under the EEA laboratory which have all been initiated, including developing land use regression based noise estimation models (with MA student Omer Harovi), Open Street Map use as a valid and readily available data/exposure source in EE studies (with MA student Lara Ifat Bakaleinik), the potential for Photovoltaics PV installation in residential buildings in dense urban areas (with MA student Adi Vulkan) and developing Light-at Night spatio temporally resolved estimation models (with MA student Yair Yashevitz). We also make use at my lab of our exposure models in multiple EE studies looking at the associations of exposure to extreme climate and $PM_{2.5/10}$ [29,43,41,44,64,75,77,78]. Finally, we have recently started a novel project using location based social network data (LBSN) for exploring urbanicity effects on well-being using novel space-time analysis of social network data (with PhD student Roni Bluestein). We incorporate data mining, big data processing and modeling to accommodate these complex analyses.

In addition to my work as a researcher, I am also very much involved in contributing to the activity of my department. I head the Geographic Information Science and Technologies program in the department. In this role I have initiated, alongside with Prof. Tal Svoray (Department Chair), a revision of the curriculum to update the program and include many new courses including cutting edge GIS technologies: FLOSS (Free/Libre open source software) GIS software used by leading academic institutes worldwide, building of spatial databases and servers, novel geostatistical methodologies, spatial data management and geo-web applications. I am also the head of the committee for teaching and a member of the committee for research and publications at the department.