Biographical Sketch
Dr. Israel Lopez-Coto

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(a) Professional Preparation

University of Sevilla, Sevilla, Spain; **Physics; B.Sc.**, 2004
University of Huelva, Huelva, Spain; **Environmental Engineering; M.Sc.**, 2006
University of Huelva, Huelva, Spain; **Environmental Engineering; Ph.D.**, 2011
University of California, San Diego, CA; Dept. of Mech. & Aero. Engr.; **Postdoctoral Scholar**, 2012–2013

(b) Appointments

2021–present: **Researcher (Principal Investigator).** School of Marine and Atmospheric Sciences. Stony Brook University, Stony Brook , NY
2013–present: **Associated Researcher**, National Institute of Standards and Technology, Gaithersburg, MD
2012–2013: **Postdoctoral Scholar**, University of California San Diego, San Diego, CA
2012–2012: **Guest**, Max Plank Institute for Biogeochemistry, Jena, Germany
2004–2012: **Researcher**, University of Huelva, Huelva, Spain

(c) Awards

2017-06-05: **Distinguished Associate**. Engineering Laboratory, National Institute of Standards and Technology.

(d) Research Interests

My main research interest is to better understand pollutant atmospheric transport and turbulent mixing as well as direct applications such as accurate (GHG and other pollutants) emissions quantification, air quality and toxic exposure that have an impact on mankind's quality of life, health and the environment. I use computational models (LES, LPDM, RANS), experimental measurements and model-data fusion statistical techniques to achieve a better understanding of the processes and their representation in the models to try to improve upon them. I am also interested in experimental design and new measurements techniques and strategies that have the potential to improve our understanding of transport and mixing processes in the atmosphere and, in particular, emissions quantification as well as computational techniques that allow for increased code efficiency and parallelization.

(e) Publications

1. **Lopez-Coto**, I., X. Ren, O.E. Salmon, A. Karion, P.B. Shepson, R.R. Dickerson, A. Stein, K. Prasad, and J.R. Whetstone. *Wintertime CO2, CH4, and CO Emissions Estimation for the Washington, DC–Baltimore Metropolitan Area Using an Inverse Modeling Technique.* Environmental Science & Technology, 54 (5), 2606–2614, February 2020. doi:10.1021/acs.est.9b06619
2. **Lopez-Coto,** I., M. Hicks, A. Karion, R. K. Sakai, B. Demoz, K. Prasad, and J. Whetstone. *Assessment of Planetary Boundary Layer Parameterizations and Urban Heat Island Comparison: Impacts and Implications for Tracer Transport.* J. Appl. Meteor. Climatol., 59, 1637–1653, 2020, https://doi.org/10.1175/JAMC-D-19-0168.1.
3. **Lopez-Coto**, I., S. Ghosh, K. Prasad, and J.R. Whetstone. *Tower-based greenhouse gas measurement network design–The National Institute of Standards and Technology North East Corridor Testbed.* Advances in Atmospheric Sciences, 34, 1095–1105, August 2017. doi:10.1007/s00376-017-6094-6
4. **Lopez-Coto**, I., K. Prasad, and J.R. Whetstone. *Carbon Dioxide Biogenic vs Anthropogenic Sectoral Contribution for the Indianapolis Flux Experiment (INFLUX).* NIST Special Publications, 1237, 1–19, January 2017. doi:10.6028/NIST.SP.1237
5. Ahn, D. Y., J. R. Hansford, S. T. Howe, X. R. Ren, R. J. Salawitch, N. Zeng, M. D. Cohen, B. Stunder, O. E. Salmon, P. B. Shepson, K. R. Gurney, T. Oda, **I. Lopez-Coto**, J. Whetstone R. R. Dickerson (2020). *Fluxes of atmospheric greenhouse-gases in Maryland (FLAGG-MD): Emissions of carbon dioxide in the Baltimore, MD-Washington, D.C. area.* Journal of Geophysical Research: Atmospheres, 125, e2019JD032004. doi:10.1029/2019JD032004
6. Karion, A., T. Lauvaux, I. **Lopez-Coto**, C. Sweeney, K. Mueller, S. Gourdji, W. Angevine, Z. Barkley, A. Deng, A. Andrews, A. Stein and J. Whetstone. *Intercomparison of atmospheric trace gas dispersion models: Barnett Shale case study.* Atmospheric Chemistry and Physics, 19, 2561–2576, February 2019. doi:10.5194/acp-19-2561-2019
7. Mueller, K., V. Yadav, I. **Lopez-Coto**, A. Karion, S. Gourdji, C. Martin and J. Whetstone. *Siting Background Towers to Characterize Incoming Air for Urban Greenhouse Gas Estimation: A Case Study in the Washington, DC/Baltimore Area.* Journal of Geophysical Research: Atmospheres, 123, 2910–2926, March 2018. doi:10.1002/2017JD027364
8. Wu, K., T. Lauvaux, K.J. Davis, A. Deng, I. **Lopez-Coto**, K.R. Gurney and R. Patarasuk. *Joint inverse estimation of fossil fuel and biogenic CO2 fluxes in an urban environment: An observing system simulation experiment to assess the impact of multiple uncertainties.* Elementa Science of the Anthropocene, 6 (1), 1–17, February 2018. doi:10.1525/elementa.138
9. Martin, C.R., N. Zeng, A. Karion, K. Mueller, S. Ghosh, I. **Lopez-Coto**, K.R. Gurney, T. Oda, K. Prasad, Y. Liu, R.R. Dickerson and J. Whetstone. *Investigating sources of variability and error in simulations of carbon dioxide in an urban region.* Atmospheric Environment, 199, 55–69, February 2019. doi:10.1016/j.atmosenv.2018.11.013
10. Karion, A., W. Callahan, M. Stock, S. Prinzivalli, K.R. Verhulst, J. Kim, P.K. Salameh, I. **Lopez-Coto** and J. Whetstone. *Greenhouse gas observations from the Northeast Corridor tower network.* Earth System Science Data, accepted, February 2020. doi:10.5194/essd-2019-206
11. **Lopez-Coto**, I., J.L. Mas and J.P. Bolivar. *A 40-year retrospective European radon flux inventory including climatological variability.* Atmospheric Environment, 73, 22–33, July 2013. doi:10.1016/j.atmosenv.2013.02.043
12. C. Grossi, A. Àgueda, F. R. Vogel, A. Vargas, M. Zimnoch, P. Wach, J. E. Martín, **I. Lopez-Coto**, J. P. Bolívar, J. A. Morguí and X. Rodó, (2016) *Analysis of ground-based 222 Rn measurements over Spain: Filling the gap in southwestern Europe.* J. Geophys. Res. Atmos., 121, 11021 – 11037

13. **I. Lopez-Coto**, J.L. Mas, A. Vargas, J.P. Bolívar, (2014) *Studying radon exhalation rates variability from phosphogypsum piles in the SW of Spain*, Journal of Hazardous Materials, 280, 464-471
14. **I. Lopez-Coto**, J. P. Bolivar, (2011) *A theoretical model for the overlapping effect in solid state nuclear track detectors*, Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, 652, 550-553
15. C. Grossi, D. Arnold, J. A. Adame, **I. Lopez-Coto**, J. P. Bolívar, B.A. de la Morena, A. Vargas. (2012) *222Rn characterization by atmospheric concentration observations and source term at El Arenosillo 100 meter tall tower, in Southwest of Spain.* Radiation Measurements, 47, 149-162
16. Bolivar, JP; Garcia-Tenorio, R; Mosqueda, F; Gazquez, MJ; **Lopez-Coto, I**; Adame, JA; Vaca, F (2013) *Occupational exposures in two industrial plants devoted to the production of ammonium phosphate fertilizers.* Journal of Radiological Protection, 33, 199-212
17. García-Diaz, I., Alguacil, F., Gázquez, M., Bolivar, J. , **Lopez-Coto, I.** and López, F. (2013) *Radon exhalation from phosphogypsum stabilized in sulfur polymer cement.* Natural Science, 5, 646-652.
18. Irene Garcia Diaz; **Israel Lopez Coto**; Juan Pedro Bolivar; Francisco Alguacil; Manuel Gazquez; Felix Lopez. (2013) *Stabiliztion of phosphogypsum by sulfur polymer.* Journal of Materials and Civil Engineeing, 25, 1041-1049
19. Felix A. López, Manuel Gázquez, Francisco José Alguacil, Juan Pedro Bolivar, Irene García-Díaz, **I. Lopez-Coto**, (2011) *Microencapsulation of phosphogypsum into a sulfur polymer matrix: Physico-chemical and radiological characterization.* Journal of Hazardous Materials, 192, 234-245
20. C. Grossi, A. Vargas, A. Camacho, **I. Lopez-Coto**, J. P. Bolivar, Yu Xia, F. Conen, (2011) *Inter-comparison of different direct and indirect methods to determine radon flux from soil.* Radiation Measurements, 46, 112-118
21. Rafael Perez-López, José Miguel Nieto, **I. Lopez-Coto**, Juan Luis Aguado, Juan Pedro Bolivar, María Santisteban, (2010) *Dynamics of contaminants in phosphogypsum of the fertilizer industry of Huelva (SW Spain): From phosphate rock ore to the environment.* Applied Geochemistry, 25, 705-715
22. **I. Lopez-Coto**, J. L. Más, E. G. San Miguel, J. P. Bolivar, D. Sengupta, (2009) *A comparison between active and passive techniques for measurements of radon emanation factors.* Applied Radiation and Isotopes, 67, 849-853
23. **I. Lopez-Coto**, J. L. Más, J. P. Bolivar, R. García-Tenorio, (2009) *A short-time method to measure the radon potential of porous materials.* Applied Radiation and Isotopes, 67, 133-138
24. **I. Lopez-Coto,** J. P. Bolivar, J. L. Mas, R. García-Tenorio, A. Vargas, (2007) *Development and operational performance of a single calibration chamber for radon detectors.* Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment, 579, 1135-1140

(f) More relevant contributions to national or international conferences

1. Lopez-Coto et al., (2020) *Coupling an Off-Line Lagrangian Dispersion Model with Large Eddy Simulations as a Tool for Vertical Mixing Parameterization Development in Mesoscale Applications* (Oral). 100th American Meteorological Society Annual Meeting. Boston.
2. Lopez-Coto et al., (2020) *East Coast Outflow (ECO) experiment during pandemic times.* (Invited) NOAA Global Monitoring Laboratory Virtual Global Monitoring Annual Conference.
3. Sweeney, C., Lopez-Coto et al., (2021) *The East Coast Outflow Experiment before and during SARS-CoV-2*. 101th American Meteorological Society Annual Meeting. Virtual.

4. Lopez-Coto et al., (2019) *CO2, CH4 and CO emissions in the Washington DC / Baltimore Metro Area: Results from aircraft flux inversions* (Oral). European Geophysical Union General Assembly. Vienna.
5. I. Lopez-Coto et al., (2018) *CO2 flux inversions in the Washington DC / Baltimore metropolitan area: FLAGG-MD 2016 flight campaign* (Oral) American Geophysical Union Fall Meeting. Washington, DC
6. Lopez-Coto et al., (2016) *Investigating the propagation of meteorological model uncertainty for tracer modeling* (Poster) American Geophysical Union Fall Meeting. San Francisco
7. Lopez-Coto et al., (2015) *CO2 network design for Washington DC/Baltimore area* (Poster) American Geophysical Union Fall Meeting. San Francisco.
8. Lopez-Coto et al., (2014) *CO2 Biogenic vs Anthropogenic Sectoral Contribution for INFLUX.* (Poster) American Geophysical Union Fall Meeting. San Francisco
9. Lopez-Coto et al., (2013) *Development of an Operational WRF-Based Ensemble Forecasting System at UCSD: Physics and Post-Processing* (Poster). Traversing New Terrain in Meteorological Modeling, Air Quality and Dispersion. Davis, CA.
10. Lopez-Coto et al., (2013) *Radon flux inventories comparison and testing of regional transport model simulations using atmospheric Radon measurements in Europe* (Poster). Traversing New Terrain in Meteorological Modeling, Air Quality and Dispersion. Davis, CA
11. Lopez-Coto, et al., (2013) *Comparison between several parametrizations schemes in WRF for solar forecasting in coastal zones* (Oral). American Solar Energy Society. Baltimore, MD.

(g) Model developments

1. **Inversion Suite for Research and Applications (InvPack).** Stand-alone FORTRAN application to streamline the flux-inversion process and minimize the user interaction. The new code reads the footprints as generated by STILT/HYSPLIT (netcdf) and observations and uncertainties (csv), generates the covariances based on distances computed after re-projection of the geodetic coordinates to an Albert Equal Area projection centered on the domain and solve the Bayesian cost function with the analytical solution and/or with a well established numerical optimization method (L-BFGS-B) that allows constraints in the fluxes (both, lower and upper bounds). It also implements a geostatistical inversion method. Includes Maximum Likelihood (ML) and Restricted Maximum Likelihood (RML) for covariances scaling optimization as an option. The code is parallelized with openMP and uses BLAS and LAPACK for matrix algebra. It writes the output in netcdf as well. All options and choices are handled by a namelist input file.
2. **VELVAR module.** New in-line diagnostic package for WRF that can be activated in the namelist for the domains of interest and computes the mean and variances of the wind components during the main history interval saving them to the main history stream as well. Main purpose is to output turbulence statistics from WRF-LES to be used for driving HYSPLIT (or other Lagrangian models).
3. **New mixing parametrization in HYSPLIT** that uses eddy diffusivities from WRF to estimate velocity variances.
4. **LES-HYSPLIT coupling.** Implemented a new mixing parametrization in HYSPLIT to couple resolved and SGS velocity variances from previously computed LES fields. It also involved a major modification in HYSPLIT to allow for sub-minute time-steps.
5. **WRF-Radon**. A new WRF-CHEM module to predict, i) radon (Rn-222) emissions from soils coupled to meteorological conditions (soil temperature, soil moisture and snow cover) and, ii) atmospheric dispersion, including radioactive decay. The module contains a 1D diffusive

transport model through multi-layer porous media to calculate radon fluxes from soils and provides two parametrizations of the Radon diffusion coefficient in porous media. It requires additional static data as soil density, emanation factor and radium (Ra-226) concentration in the soil column that it is also provided in WPS compliant format.

(h) Computer skills

Unix/Linux environments, general Linux administration, shell scripting, FORTRAN, scientific libraries (netCDF, GSL, GDAL, LAPACK, BLAS, OPENMP), high level data analysis software (R, Octave/Matlab, NCL), Weather Forecasting model (WRF, WRF-CHEM), Lagrangian particle dispersion models (STILT, Hysplit, Flexpart-WRF), High Performance Computing systems. Some exposure to C/C++, openACC, MPI and python.

(i) Laboratory and field skills

Design of measurements and sampling campaigns, both from fixed (tower-based) or airborne platforms. Methodologies development for specific measurements and calibrations.

(j) Languages

European Spanish (native) and English.

(k) References

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