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## Mr. Kytt MacManus

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### Education

Northeastern University	Political Science	B.A., 2006
Bard Center for Environmental Policy	Environmental Policy	M.S., 2008
Columbia University	CVN Data Science	2017 - Present

### Employment History

2025-Present Senior Staff Associate III, Environmental Flow Physics Lab, Columbia School of Engineering and Applied Science, New York, NY.

2019-2024 Senior Systems Analyst, CIESIN, Columbia Climate School, Palisades, NY.

2014-2018 Programmer, CIESIN, Columbia University, Palisades, NY.

2014-Present Adjunct Lecturer, Columbia College Sustainable Development Major, New York, NY.

2010-2014 Adjunct Lecturer, School of International and Public Affairs, New York, NY.

2012-2014 Senior Staff Associate, CIESIN, Columbia University, Palisades, NY.

2008-2012 Staff Associate, CIESIN, Columbia University, Palisades, NY.

2007-2008 Senior Research Staff Assistant, CIESIN, Columbia University, Palisades, NY.

2005-2006 Research Assistant. Dept of Political Science, Northeastern University, Boston, MA.

2005-2005 Communications Policy Researcher, Senator Gary Humphries, Australian Parliament, Canberra, Australia.

2004-2004 Consumer Information Specialist, Massachusetts Office of Consumer Affairs and Business Regulation, Boston, MA.

### Skills

AWS, Python Programming, JavaScript, Machine Learning, ESRI ArcInfo, ArcGIS Server, ArcGIS Enterprise, ArcGIS Online, Eclipse, ENVI, ERDAS Imagine, Ionic RedSpider, Adobe Illustrator, R Statistics Package, Geoserver, GeoWebCache, Microsoft Office, SPSS, 3d Printing, LiDAR Data Extraction and 3d Modeling, ArcGIS Web App Builder, Natural Language Processing, sUAS operation.

### Selected Research

*Science Core Heuristics for Open Science Outcomes in Learning (SCHOOL)*: From a project funded by NASA TOPS, Develop curriculum with 7 online/in person interactive learning modules which utilize cloud based and local data from NASA to educate on open science practices. As PI oversee project implementation.

*Earthdata GIS*: A cross NASA DAAC project which utilizes SAFE Agile methodologies to architect a shared ArcGIS Enterprise to facilitate the migration of data and services to the cloud. The project utilizes AWS and Linux based ArcGIS Enterprise in order to provide DAACs with cloud capabilities for data and applications.

*Low Elevations Coastal Zones (LECZ) Urban-Rural Estimates*: Country-level estimates of urban, rural and total population and land area in a low elevation coastal zones (LECZ) were generated globally using Global Rural-Urban Mapping Project (GRUMP) alpha population and land area data products and a Digital Elevation Model (DEM) derived from Shuttle Radar Topographic Mission (SRTM) remote sensing data. I developed and implemented algorithms for data integration, analysis, and distribution.

*AdaptMap Jamaica Bay*: From a project funded by NOAA, This interactive mapping tool demonstrates how sea level rise will worsen storm-driven flooding in Jamaica Bay, New York, and enables users to select flood adaptation scenarios to see how they reduce flooding. The tool also displays historic landscapes for the years 1609 and 1877 with associated historic flood zones. Users of this free, online resource can download the results of a Benefit Cost Analysis, the underlying GIS layers corresponding to each scenario, and the developers' technical report.

*Hudson River Flood Impacts Decision Support System*: A NYSERDA funded collaboration with the Steven's Institute of Technology (SIT) to produce data maps and statistics on potential Storm Surge and Sea Level Rise along the Hudson River. The project disseminates modeled flood extents and estimated impacts to people and critical infrastructure under a variety of storm intensities ranging from 5 year to 1,000 year return periods and sea level rise between 6 and 72 inches.

*Population Estimation Service*: The Population Estimation Service (PES) is a Web-based service for estimating population totals, basic demographic characteristics, and related statistics within a user-defined region. It enables users of a wide variety of map clients and tools to quickly obtain estimates of the number of people residing in specific areas without having to download and analyze large amounts of spatial data.

*Global Man-made Impervious Surface (GMIS) Dataset from Landsat*: The Global Man-made Impervious Surface (GMIS) Dataset From Landsat consists of global estimates of fractional impervious cover derived from the Global Land Survey (GLS) Landsat dataset for the target year 2010. The GMIS dataset consists of two components: 1) global percent of impervious cover; and 2) per-pixel associated uncertainty for the global impervious cover. These layers are co-registered to the same spatial extent at a common 30m spatial resolution.

*Global Human Settlement Layer Population Model (GHS-POP)*: Residential population estimates for target years 1975, 1990, 2000 and 2015 provided by CIESIN GPWv4 were disaggregated from census or administrative units to grid cells, informed by the distribution and density of built-up as mapped in the Global Human Settlement Layer (GHSL) global layer per corresponding epoch.

*Assessing NASA's Suomi-NPP Nighttime Product Suite to Improve Measurement, Monitoring, and Achievement of Urban SDG's and Associated Targets and Indicators*: Through the application of covariate data at fine spatial and temporal resolutions from VIIRS, it might be possible to develop a model for producing near real time population estimates on a consistent and ongoing basis. The exploratory work provided by this grant will evaluate the VIIRS suite of data products effectiveness for improving on population estimations in Detroit Michigan, Maryland, New Hampshire, and Puerto Rico.

*Gridded Population of the World version 4 (GPWv4)*: Rasterized census information on total population, age structure, sex structure, and urban/rural status at 1km resolution. GPWv4 continues the legacy of the GPW dataset as the global standard for disaggregated population mapping.

## **Selected Publications**

McGranahan, G., Balk, D., Colenbrander, S., Engin, H., & MacManus, K. (2023). Is rapid urbanization of low elevation deltas undermining adaptation to climate change? A global review. *Environment and Urbanization*, 35(2), 527-559. <https://doi.org/10.1177/09562478231192176>

Martinez, J.F.; MacManus, K.; Stokes, E.C.; Wang, Z.; de Sherbinin, A. Suitability of NASA's Black Marble Daily Nighttime Lights for Population Studies at Varying Spatial and Temporal Scales. *Remote Sens.* 2023, 15, 2611. <https://doi.org/10.3390/rs15102611>

MacManus, K., Balk, D., Engin, H., McGranahan, G., and Inman, R.: Estimating population and urban areas at risk of coastal hazards, 1990–2015: how data choices matter, *Earth Syst. Sci. Data*, 13, 5747–5801, <https://doi.org/10.5194/essd-13-5747-2021>, 2021.

Palacios-Lopez, D.; Esch, T.; MacManus, K.; Marconcini, M.; Sorichetta, A.; Yetman, G.; Zeidler, J.; Dech, S.; Tatem, A.J.; Reinartz, P. Towards an Improved Large-Scale Gridded Population Dataset: A Pan-European Study on the Integration of 3D Settlement Data into Population Modelling. *Remote Sens.* 2022, 14, 325. <https://doi.org/10.3390/rs14020325>

Leyk, Stefan, Gaughan, Andrea E., Adamo, Susana B., de Sherbinin, Alex, Balk, Deborah, Freire, Sergio, Rose, Amy, Stevens, Forrest R., Blankespoor, Brian, Frye, Charlie, Comenetz, Joshua, Sorichetta, Alessandro,

MacManus, Kytt, Pistolessi, Linda, Levy, Marc, Tatem, Andrew and Pesaresi, Martino (2019) The spatial allocation of population: a review of large-scale gridded population data products and their fitness for use. *Earth System Science Data*, 11 (3). (doi:10.5194/essd-11-1385-2019).

Becker, M., and MacManus, K.. 2009. Mastering the Hudson: A Web-based GIS Approach to Spatial Education. *Geographic Information Systems Technology News: The Newsletter of the New York State GIS Coordination Program*. Winter 2009-2010.

Khan, S., MacManus, K., Mills, J., Madajewicz, M., & Ramasubramanian, L. (2018). Building Resilience of Urban Ecosystems and Communities to Sea-Level Rise: Jamaica Bay, New York City. *Handbook of Climate Change Resilience*, 1-21.

McDonald, R., Seto, K.,...,MacManus, K. 2018. Nature in the Urban Century: A Global Assessment of where and how to conserve nature for biodiversity and human well being. The Nature Conservancy. [https://www.nature.org/content/dam/tnc/nature/en/documents/TNC\\_NatureintheUrbanCentury\\_FullReport.pdf](https://www.nature.org/content/dam/tnc/nature/en/documents/TNC_NatureintheUrbanCentury_FullReport.pdf)

Wang, Z., Sun, Q., Seto, K. C., Roman, M. O., ..., MacManus, K. 2018. NASA's Black Marble Nighttime Lights Product Suite. *Remote Sensing of Environment*, 210, 113-143.

Small, C., Sousa, D., Yetman, G., Elvidge, C., & MacManus, K. 2018. Decades of urban growth and development on the Asian megadeltas. *Global and Planetary Change*, 165, 62-89.

Doxsey-Whitfield, E., K. MacManus, S. Adamo, L. Pistolessi, J. Squires, O. Borkovska and S. Baptista. 2015a. Taking Advantage of the Improved Availability of Census Data: A First Look at the Gridded Population of the World, Version 4. *Papers in Applied Geography*, 1(3):226-234. doi: 10.1080/23754931.2015.1014272

Doxsey-Whitfield, E., S. Adamo and K. MacManus. 2015b. Gridding global male and female populations: New data from the Gridded Population of the World (GPW). *European Forum for Geography and Statistics (EFGS)*, Vienna conference.

Freire, S., Doxsey-Whitfield, E., MacManus, K., Mills, J., & Pesaresi, M. (2016). Development of new open and free multi-temporal global population grids at 250 m resolution. *AGILE Conference Proceedings* Obtained on 8-29-17 from [https://agile-online.org/conference\\_paper/cds/agile\\_2016/shortpapers/152\\_Paper\\_in\\_PDF.pdf](https://agile-online.org/conference_paper/cds/agile_2016/shortpapers/152_Paper_in_PDF.pdf)

Freire, S., Schiavina, M., Florczyk, A., MacManus, K., Pesaresi, M., Corbane, C., Borkovska, O., Mills, J., Pistolessi, L., Squires, J., Sliuzas, R. (2018). Enhanced data and methods for improving open and free global population grids: putting 'leaving no one behind' into practice. *International Journal of Digital Earth*. <https://doi.org/10.1080/17538947.2018.1548656>

de Sherbinin, A., M.A. Levy, S.B. Adamo, K. MacManus, G. Yetman, V. Mara, L. Razafindrazay, et al. 2012. Migration and risk: Net migration in marginal ecosystems and hazardous areas. *Environmental Research Letters* 7 (4): 1–14. <http://dx.doi.org/10.1088/1748-9326/7/4/045602>.

Nicholas, K., Fanzo, J., & MacManus, K. (2018). Palm Oil in Myanmar: A Spatiotemporal Analysis of the Effects of Industrial Farming on Biodiversity Loss. *Global Health: Science and Practice*, 6(1), 210-222.

Orton, P. M., S. A. Talke, D. A. Jay, L. Yin, A. F. Blumberg, N. Georgas, H. Zhao, H. J. Roberts, and K. MacManus (2015), Channel Shallowing as Mitigation of Coastal Flooding, *Journal of Marine Science and Engineering*, 3(3), 654-673, DOI: 10.3390/jmse3030654.

## **Synergistic Activities**

Licensed Drone Pilot – FAA Part 107

Certified professional development administrator “ESRI Teachers Teaching Teachers”

Steering Committee, Environmental Consortium of Colleges and Universities

Steering Committee, Global Forum on Geography and Statistics