MONIKA ANNA TOMASZEWSKA, Ph.D.

Adjunct Professor Michigan State University | Earth Observation & Remote Sensing Scientist
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Professional Summary

Earth Observation scientist with 10+ years of experience in large-scale satellite data analysis, environmental monitoring, and geospatial modeling. Specialized in optical, thermal, and radar (SAR) data processing and multi-sensor integration on high-performance computing (HPC). Skilled in R, Julia, and Python for automating data ingestion, time-series modeling, and EO product generation. Extensive record of collaboration on NASA and ESA programs, advancing satellite data analytics for agricultural, climate, and land-use research.

Core Technical Expertise

- Programming / Tools: Python, R, Julia, Bash, Git, Docker, Conda/Mamba
- Big Data & HPC Processing: HPC workflows (MSU ICER), parallel/distributed processing, cloud-optimized GeoTIFFs (COG)
- Remote Sensing Platforms: Sentinel-1 (SAR), Sentinel-2, Landsat 5–9, MODIS, VIIRS, DESIS, VENµS, ECOSTRESS, Capella, UMBRA, ConstellR
- Geospatial Tools: GDAL, rasterio, QGIS, ArcGIS, ENVI, ERDAS, PCI Geomatica
- Applications: Land surface phenology, crop monitoring, snow-cover analysis, thermal environment assessment, multi-sensor data integration and fusion, machine learning

Professional Experience

Adjunct Assistant Professor – Research — Center for Global Change & Earth Observations, Michigan State University (2025 –)

- Co-Investigator, MSU Health Equity Research Funding Opportunity – EO data processing and analyzing for heat and vegetation greenness exposure mapping in Detroit, meteorological data processing for UTCI, trend analyses

Assistant Professor – Research — Center for Global Change & Earth Observations, Michigan State University (2024 – 2025)

- Lead EO data processing for large, multi-sensor datasets integrating Sentinel-2, MODIS/VIIRS, and HLS imagery using HPC.
- Co-Investigator, NASA CNVOE SmallSat SAR evaluation (Capella & UMBRA X-band) – assessed accessibility, calibration, metadata, user interface and workflow integration.
- Design EO processing for vegetation greenness and heat exposure mapping in Detroit to support community resilience.

- Member of NASA Land Processes Distributed Active Archive Center (LP DAAC) User Working Group (UWG).

Postdoctoral Research Associate — Center for Global Change & Earth Observations, Michigan State University (2020 – 2024)

- Developed scalable HPC workflows for time-series fusion of MODIS, VIIRS, and Sentinel-2 imagery.
- Conducted field campaigns and validation for NASA LCLUC projects on agricultural land-use change in Romania and modeled pasture phenology in Kyrgyzstan.
- Produced phenological metrics and environmental indicators for bird migration analyses across CONUS.
- Analyzed trends and changes in snow-cover seasonality over the Tian Shan and Pamir mountain systems using dense MODIS time series.

Graduate Research Assistant — Geospatial Sciences Center of Excellence, South Dakota State University (2016 – 2019)

- Reprocessed >35,000 Landsat scenes to model land-surface phenology and snow seasonality in Central Asia.
- Quantified terrain and climate effects on vegetation dynamics.
- Published in leading remote sensing journals and presented at AGU and IALE.

Research Assistant — Institute of Geodesy & Cartography, Remote Sensing Center, Warsaw, Poland (2011 – 2016)

- Supported ESA/EU projects (GEOLAND, MONINA, Finegrass) on vegetation monitoring and wetland mapping.
- Led field campaigns for validation over agricultural and wetland regions.

Visiting Researcher — South Dakota State University (2013)

- Worked with MODIS middle infrared (MIR) data for characterizing urbanized areas and monitoring their dynamics within NASA LCLUC Project: Storms, Forms, and Complexity of the Urban Canopy: How Land Use, Settlement Patterns, and the Shapes of Cities Influence Severe Weather

GIS Software Tester — Neokart GIS Ltd., Warsaw, Poland (2010)

- Testing GIS and database software for the General Directorate for National Roads and Motorways (GDDKiA)

Selected EO Projects

- NASA CNVOE (2023–2025): Evaluating X-band SAR (Capella & UMBRA) data for crop phenology – Co-Investigator.
- NASA LCLUC (2023–2025): Agricultural land-use change in post-socialist Europe – field validation and land-surface phenology modeling.
- NASA LCLUC (2020–2023): Atmospheric teleconnections and anthropogenic telecouplings driving land change in Central Asian highlands – land surface phenology and snow seasonality analysis

- NASA Biodiversity (2022–2024): EO variables for modeling avian migration across CONUS.
- ESA Finegrass (2013–2016): SAR–optical workflows for grassland growth, its water conditions and biomass monitoring.
- MSU Health Equity (2025–2026): EO-based mapping of green space and urban heat exposure in Detroit — Co-PI.

Education

- Ph.D., Geospatial Science & Engineering — South Dakota State University, 2019
- M.S., Remote Sensing of Environment — University of Warsaw, 2010
- B.A., Geography — University of Warsaw, 2008
- PgDip, Geographic Information Systems — Warsaw University of Technology, 2012

Professional Service & Honors

- SPIE Optics and Photonics Education Scholarship (2015)
- Member – NASA Land Processes Distributed Active Archive Center (LP DAAC) User Working Group (UWG)
- Member – NASA Surface Biology and Geology (SBG) Algorithms & Applications Working Group
- Member – American Geophysical Union (AGU); Global Land Programme
- Member – Michigan State University Institute for Cyber-Enabled Research (MSU ICER) User Advisory Board
- Trainer for international CARIN and SCERIN capacity-building workshops on EO data processing and analytics

Selected Publications

- Adams, C. A., **Tomaszewska, M. A.**, Henebry, G. M., & Horton, K. G. (2025). Shifts in avian migration phenologies do not compensate for changes to conditions en route in spring and fall. Ecology, 106(5), e70110.

- Henebry, G. M., & **Tomaszewska, M. A.** (2025). Snow-cover seasonality in Kyrgyzstan: Variation and change over 20 years (2001–2021) as observed by the MODIS Terra snow product. Environmental Research Letters, 20(2), 024018.

- Liang, L., Yang, J., Wittenbraker, W. C., Crocker, E. V., **Tomaszewska, M. A.**, & Henebry, G. M. (2025). Characterizing phenological differences of invasive shrubs in a forest matrix using high resolution VENµS time series. International Journal of Applied Earth Observation and Geoinformation, 136, 104333.

- Adams, C. A., **Tomaszewska, M. A.**, Henebry, G. M., & Horton, K. G. (2024). Chasing and surfing seasonal waves: Avian migration through the US tracks land surface phenology in fall, but not spring. Journal of Animal Ecology, 93(7), 836–848.

- Horton, K. G., Buler, J. J., Anderson, S. J., Burt, C. S., Collins, A. C., Dokter, A. M., Guo, F., Sheldon, D., **Tomaszewska, M. A.**, & Henebry, G. M. (2023). Artificial light at night is a top predictor of bird migration stopover density. Nature Communications, 14(1), 7446.

- **Tomaszewska, M. A.**, & Henebry, G. M. (2021). Remote sensing of pasture degradation in the highlands of the Kyrgyz Republic: Finer-scale analysis reveals complicating factors. Remote Sensing, 13(17), 3449.

- **Tomaszewska, M. A.**, Nguyen, L. H., & Henebry, G. M. (2020). Land surface phenology in the highland pastures of montane Central Asia: Interactions with snow cover seasonality and terrain characteristics. Remote Sensing of Environment, 240, 111675.

- **Tomaszewska, M. A.**, & Henebry, G. M. (2020). How much variation in land surface phenology can climate oscillation modes explain at the scale of mountain pastures in Kyrgyzstan? International Journal of Applied Earth Observation and Geoinformation, 87, 102053.

- Manakos, I., **Tomaszewska, M.**, Gkinis, I., Brovkina, O., Filchev, L., Genc, L., Gitas, I., Halabuk, A., Inalpulat, M., Irimescu, A., Jelev, G., Karantzalos, K., Katagis, T., Kupková, L., Lavreniuk, M., Mesaroš, M., Mihailescu, D., Nita, M., Rusnak, T., Stych, P., Zemek, F., Albrechtová, J., & Campbell, P. (2018). Comparison of Global and Continental Land Cover Products for Selected Study Areas in South Central and Eastern European Region. Remote Sensing, 10(12).

- **Tomaszewska, M.**, & Henebry, G. M. (2016). Urban-rural contrasts in Central-Eastern European cities using a MODIS 4 micron time series. Remote Sensing, 8(11), 924.

- Hoscilo A., **Tomaszewska M.**, (2014), CORINE Land Cover 2012 - 4th CLC inventory completed in Poland, Geoinformation Issues, Vol. 6, No 1(6), pp.49-58