Ritvik Sahajpal

Associate Research Professor
Department of Geographical Sciences
University of Maryland College Park
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Personal Information

Academic Appointments at UMD

Associate Research Professor — *Jul 2020 - Present*
Department of Geographical Sciences, University of Maryland, College Park

Assistant Research Professor — *Jul 2015 – Jun 2020*
Department of Geographical Sciences, University of Maryland, College Park

Administrative Appointments at UMD

Chair, Research Faculty Committee — *Jul 2020 - Present*

Employment Background

Crop Condition Co-Lead — *Jul 2020 - Present*
NASA Harvest Program, University of Maryland, College Park

Post-doctoral Research Associate — *Jul 2014 – May 2015*
Forest and Wildlife Ecology, University of Wisconsin Madison

Graduate Research Assistant — *Jun 2012 – May 2014*
Department of Geographical Sciences, University of Maryland, College Park

Graduate Research Assistant — *Jan 2010 – May 2012*
Joint Global Change Research Institute

Graduate Teaching Assistant — *Sep 2008 – Dec 2009*
Department of Geographical Sciences, University of Maryland, College Park

Graduate Research Assistant — *Aug 2005 – Aug 2008*
Department of Geographical Sciences, University of Maryland, College Park

Software Engineer — *Aug 2003 – Sep 2004*
Quark Media House, India

Education

Ph.D., Geographical Sciences, 2014
Department of Geographical Sciences,
University of Maryland, College Park

M.A., Geography, 2007
Department of Geography,
University of Maryland, College Park

B.E., Computer Science and Engineering, 2003
Punjab Engineering College, India

Refereed Journal Articles

1. *Evaluating the Impact of the 2020 Iowa Derecho on Corn and Soybean Fields Using Synthetic Aperture Radar.* Hosseini, M., Kerner, H.R., **Sahajpal, R.**, Puricelli, E., Lu, Y.H., Lawal, A.F., Humber, M.L., Mitkish, M., Meyer, S. and Becker-Reshef, I., 2020. Remote Sensing, 12(23), p.3878.
   Journal Impact Factor: 4.509

2. Hurtt, G. C., Chini, L., **Sahajpal, R**., Frolking, S., Bodirsky, B. L., Calvin, K., Doelman, J. C., Fisk, J., Fujimori, S., Klein Goldewijk, K., Hasegawa, T., Havlik, P., Heinimann, A., Humpenöder, F., Jungclaus, J., Kaplan, J. O., Kennedy, J., Krisztin, T., Lawrence, D., Lawrence, P., Ma, L., Mertz, O., Pongratz, J., Popp, A., Poulter, B., Riahi, K., Shevliakova, E., Stehfest, E., Thornton, P., Tubiello, F. N., van Vuuren, D. P., Zhang, X. *Harmonization of global land use change and management for the period 850–2100 (LUH2) for CMIP6*, Geosci. Model Dev., 13, 5425–5464, https://doi.org/10.5194/gmd-13-5425-2020, 2020.
   Journal Impact Factor: 5.24

3. *PhenoCrop: An integrated satellite-based framework to estimate physiological growth stages of corn and soybeans.* Bandaru, V., Yaramasu, R., Koutilya, P.N.V.R., He, J., Fernando, S., **Sahajpal, R.,** Wardlow, B.D., Suyker, A. and Justice, C., 2020. International Journal of Applied Earth Observation and Geoinformation, *92*, p.102188.
   Journal Impact Factor: 4.65

4. *Monitoring intra and inter annual dynamics of forest degradation from charcoal production in Southern Africa with Sentinel–2 imagery.* Sedano, F., Lisboa, S., Duncanson, L., Ribeiro, N., Sitoe, A., **Sahajpal, R.**, Hurtt, G. and Tucker, C., 2020. International Journal of Applied Earth Observation and Geoinformation, 92, p.102184.
   Journal Impact Factor: 4.65

5. *Global rules for translating land-use change (LUH2) to land-cover change for CMIP6 using GLM2.* Ma, L., Hurtt, G.C., Chini, L.P., **Sahajpal, R.,** Pongratz, J., Frolking, S., Stehfest, E., Klein Goldewijk, K., O'Leary, D. and Doelman, J.C., 2020. Geoscientific Model Development, 13(7), pp.3203-3220.
   Journal Impact Factor: 5.24

6. *Monitoring forest degradation from charcoal production with historical Landsat imagery. A case study in southern Mozambique*. Sedano, F., Lisboa, S.N., Duncanson, L., Ribeiro, N., Sitoe, A., **Sahajpal, R.**, Hurtt, G. and Tucker, C.J., 2020. Environmental Research Letters, 15(1), p.015001.
   Journal Impact Factor: 6.192

7. *The GEOGLAM crop monitor for AMIS: Assessing crop conditions in the context of global markets*. Becker-Reshef, I., Barker, B., Humber, M., Puricelli, E., Sanchez, A., **Sahajpal, R.**, McGaughey, K., Justice, C., Baruth, B., Wu, B. and Prakash, A., 2019. Global Food Security, 23, pp.173-181.
   Journal Impact Factor: 6.034

8. *Potential Transient Response of Terrestrial Vegetation and Carbon in Northern North America from Climate Change.* Flanagan, S.A., Hurtt, G.C., Fisk, J.P., **Sahajpal, R.,** Zhao, M., Dubayah, R., Hansen, M.C., Sullivan, J.H. and Collatz, G.J., 2019. Climate, *7*(9), p.113.

9. *Beyond MRV: High-resolution forest carbon modeling for climate mitigation planning over Maryland, USA*. Hurtt, G., Zhao, M., **Sahajpal, R.**, Armstrong, A., Birdsey, R., Campbell, E., Dolan, K.A., Dubayah, R., Fisk, J.P., Flanagan, S.A., Huang, C. 2019. Environmental Research Letters. 14(4), 045013.
   Journal Impact Factor: 6.192

10. *Isolating type-specific phenologies through spectral unmixing of satellite time series.* Nagol, J., Sexton, J., Anand, A., **Sahajpal, R**., Edwards, T.C. 2018. International Journal of Digital Earth. 11(13)

Journal Impact Factor: 3.985

11. *A global view of shifting cultivation: Recent, current, and future extent.* Heinimann, A., Mertz, O., Frolking, S., Egelund, C. A., Hurni, K., Sedano, F., Chini, L. P. C., **Sahajpal, R.**, Hansen, M., Hurtt, C. 2017. PLoS ONE 12(9): e0184479.
Journal Impact Factor: 2.74

12. *Assessing the impacts of 1.5 C global warming--simulation protocol of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP2b)*. Frieler, K., Lange, S., Piontek, F., Reyer, C. P. O., Schewe, J., Warszawski, L., Zhao, F.,Chini, L., Denvil, S., Emanuel, K., Geiger, T., Halladay, K., Hurtt, G., Mengel, M., Murakami, D., Ostberg, S., Popp, A., Riva, R., Stevanovic, M., Suzuki, T., Volkholz, J., Burke, E., Ciais, P., Ebi, K., Eddy, T. D., Elliott, J., Galbraith, E., Gosling, S. N., Hattermann, F., Hickler, T., Hinkel, J., Hof, C., Huber, V., Jagermeyr, J., Krysanova, V., Marce, R., Muller Schmied, H., Mouratiadou, I., Pierson, D., Tittensor, D. P., Vautard, R., van Vliet, M., Biber, M. F., Betts, R. A., Bodirsky, B. L., Deryng, D., Frolking, S., Jones, C. D., Lotze, H. K., Lotze-Campen, H., **Sahajpal, R.,** Thonicke, K., Tian, H., Yamagata, Y. 2017. Geoscientific Model Development, 10(12), 4321
Journal Impact Factor: 5.24

13. *Disturbance Distance: Quantifying Forests Vulnerability to Disturbance Under Current and Future Conditions*. Dolan, K. A., Hurtt, G. C., Flanagan, S. A., Fisk, J. P., **Sahajpal, R.**, Huang, C., LePage, R. Y., Dubayah, J., Masek, G. 2017. Environmental Research Letters, 12(11), 114015.
Journal Impact Factor: 6.192

14. *Potential Vegetation and Carbon Redistribution in Northern North America from Climate Change.* Flanagan, S. A., Hurtt, G. C., Fisk, J. P., **Sahajpal, R.**, Hansen, M. C., Dolan, K. A., Sullivan, J. H., Zhao, M. 2016. Climate 4, no. 1, 2

15. *Recent land cover change to agriculture in the Lake States, USA: Implications for perennial cellulosic biomass production.* Mladenoff, D., **Sahajpal, R.**, Johnson, C.P., Rothstein, D. E. 2016. PLoS ONE 11, no. 2, e0148566.
Journal Impact Factor: 2.740

16. *Regional scale cropland carbon budgets: Evaluating a geospatial agricultural modeling system using inventory data.* Zhang, X., Izaurralde, R. C., Manowitz, D. H., **Sahajpal, R.**, West, T. O., Thomson, A. M., Xu, M., Zhao, K., LeDuc, S. D., Williams, J. R. 2015. Environmental Modelling and Software, 63, 199-216.
Journal Impact Factor: 4.552

17. *Harmonization and translation of crop modeling data to ensure interoperability.* Porter, C. H., Villalobos, C., Holzworth, D., Nelson, R., White, J. W., Athanasiadis, I. N., Janssen, S., Ripoche, D., Cufi, J., Raes, D., Zhang, M., Knapen, R., **Sahajpal, R.**, Boote, K., Jones, J. W. 2014. Environmental Modeling and Software, 62, 495-508.
Journal Impact Factor: 4.552

18. *Identifying representative crop rotation patterns and grassland loss in the U.S. western corn-belt.* **Sahajpal, R.**, Zhang, X., Izaurralde, R. C., Gelfand, I., Hurtt, G. C. 2014. Computers and Electronics in Agriculture, 108, 173-182.
Journal Impact Factor: 3.858

19. *Multi-scale geospatial agroecosystem modeling: a case study on the influence of soil data resolution on carbon budget estimates*. Zhang, X., **Sahajpal, R.**, Manowitz, D.H., Zhao, K., LeDuc, S.D., Xu, M., Xiong,

W., Zhang, A., Izaurralde, R.C., Thomson, A.M. and West, T.O., 2014. Science of the Total Environment, 479, pp.138-150.
Journal Impact Factor: 6.551

20. *Sustainable bioenergy production from marginal lands in the U.S. Midwest.* Gelfand, I., **Sahajpal, R.**, Zhang, X., Izaurralde, R. C., Gross, K. L. Robertson, G. P. 2013. Nature, 493(7433), 514-517.
Journal Impact Factor: 42.778

21. *Efficient multi-objective calibration of a computationally intensive hydrologic model with parallel computing software in Python*. Zhang, X., Beeson, P., Link, R., Manowitz, D., Izaurralde, R. C., Sadeghi, A., Thomson, A.M., **Sahajpal, R.**, Srinivasan, R., Arnold, J. 2013. Environmental Modelling & Software, 46, 208-218.
Journal Impact Factor: 4.552

Book Chapters

Comparison of heuristics for solving the GMLST problem. Chen, Y., Cornick, N., Hall, A.O., **Shajpal, R.**, Silberholz, J., Yahav, I. and Golden, B.L., 2008. In Telecommunications modeling, policy, and technology (pp. 191-217). Springer, Boston, MA.

Reports

National geo-database for biofuel simulations and regional analysis. Izaurralde, R.C., Zhang, X., **Sahajpal, R.** and Manowitz, D.H., 2012. No. PNNL-21284. Pacific Northwest National Lab (PNNL), Richland, WA (United States).

Dissertation

Assessing Cellulosic Biofuel Feedstock Production Across a Gradient of Agricultural Management Systems in the U.S. Midwest. **Sahajpal. R.** Ph. D. thesis. 2014. University of Maryland College Park. doi:10.13016/M2B60T

Refereed Conference Proceedings

1. *Optimizing Crop Cut Collection for Determining Field-Scale Yields in an Insurance Context*. **Sahajpal, R.**, Becker-Reshef, I., Coutu, S. Fragile Earth Workshop, 2020 ACM KDD conference. https://doi.org/10.31223/X5J59H

2. *Using Machine-Learning Models for Field-Scale Crop Yield and Condition Modeling in Argentina*. **Sahajpal, R.**, Fontana, L., Lafluf, P., Leale, G., Puricelli, E., O'Neill, D., Hosseini, M., Varela, M., Becker-Reshef, I. 2020. 49º Jornadas Argentinas de Informática, Congreso Argentino de Agroinformática. https://doi.org/10.31223/X52595

3. *Resilient In-Season Crop Type Classification in Multispectral Satellite Observations using Growth Stage Normalization*. Kerner, H., **Sahajpal, R.,** Skakun, S., Becker-Reshef, I., Barker, B., Hosseini, M., Puricelli, E., Gray, P., 2020. *arXiv preprint arXiv:2009.10189*.

4. *Applying niching genetic algorithms for multiple cluster discovery in spatial analysis*. **Sahajpal, R.**, Ramaraju, G.V. and Bhatt, V., 2004, January. International Conference on Intelligent Sensing and Information Processing, 2004. Proceedings of (pp. 35-40). IEEE.

5. *Lecture timetabling using hybrid genetic algorithms*. Bhatt, V. and **Sahajpal, R**., 2004, January. International Conference on Intelligent Sensing and Information Processing, 2004. Proceedings of (pp. 29-34). IEEE.

Invited Talks

1. *Harvesting What We Sow: Usage of Earth Observation Data and Machine Learning at NASA Harvest*. **Sahajpal, R**. Harvest Speaker Series at Virginia Tech. Dec 2020. https://www.harvestrcn.org/post/harvest-speaker-series-dr-ritvik-sahajpal

2. *Global machine learning-based crop yield and condition forecasting***. Sahajpal, R.** World-Wide Human Geography Data Working Group, Jan 2020.

3. *Quantitative Crop Condition Indicators*. **Sahajpal. R.** Emerging Technologies and Methods in EO for Agricultural Monitoring Workshop. 2018.

Datasets

1. *Harmonization of Global Land Use Change and Management for the Period 850-2015*. Hurtt, G., Chini, L., **Sahajpal, R.**, Frolking, S. et al. 2019. Earth System Grid Federation. https://doi.org/10.22033/ESGF/input4MIPs.10454

2. *Harmonization of Global Land Use Change and Management for the Period 2015-2300*. Hurtt, G., Chini, L., **Sahajpal, R.**, Frolking, S. et al. 2019. Earth System Grid Federation. https://doi.org/10.22033/ESGF/input4MIPs.10468

3. *LUH2-ISIMIP2b Harmonized Global Land Use for the Years 2015-2100*. Chini, L.P., Hurtt, G. C., **Sahajpal, R.**, Frolking, S., Frieler, K., Popp, A., Bodirsky, B., Humpenoeder, F., Stevanovic, M., Calvin, K., Ostberg, S., Warszawski, L., Volkholz, J. 2020. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1721

Software and Applications

Chini, L., Hurtt, G., **Sahajpal, R.**, & Frolking, S. (2020, July 21). GLM2 Code (Global Land-use Model 2) for generating LUH2 datasets (Land-Use Harmonization 2). Zenodo. http://doi.org/10.5281/zenodo.3954113

Sponsored Grants

I have won 6 competitive grants from NASA, FFAR, Swiss-Re foundation for a total funding exceeding 2.9 million U.S. dollars.

2020-2023 "*Earth Observations for Field Level Agricultural Resource Mapping (EO-Farm): Pilot in Kenya and Mexico in Support of Small Holders*". Swiss Re Foundation; Co-Investigator; $750,000

2019–2022 "*Earth Observation for National Agricultural Monitoring*". NASA; Co-Investigator; $441,625

2020–2021 "*In-Season Crop Monitoring using Earth Observations in Major Food-Producing Countries to Mitigate Market Uncertainty Caused by COVID-19 Pandemic*". NASA; Co-Investigator; $100,000

2019-2021 "*Estimating Cropped Area and Production in the Feed the Future/Mali Zone of Influence*". NASA; Co-Investigator; $270,466

2019-2021 "*Eyes in the Sky: National-Scale Monitoring of Crop Threats by Combining Earth Observations and Crop Models*". Foundation for Food and Agriculture Research; Principal Investigator; $99,732

2016-2021 "*Cropland Carbon Monitoring System (CCMS): A Satellite- Based System to Estimate Carbon Fluxes on U.S. Croplands*"; NASA ROSES; Co-Investigator; $1,250,574

Teaching

Developed and taught a new course (GEOG498A: Introduction to Python for Data Science). This course introduced students to Python programming languages and was taught in an online format to a class of 15 students in Winter 2019.

Developed and taught a new course (GEOG788J: Using Python for Data Science). This course introduced machine-learning techniques to students and was taught to a class of about 10 students in Fall 2019 and Fall 2020.

Developed and taught a new course (GEOG398P: Programming for Image Analysis). This course introduced application programming interface (API) functions and image processing techniques for efficient processing of satellite images to students and was taught to a class of about 10 students in Fall 2020.

Graduate Student Advising

Lei Ma (2018 – Present, PhD committee member)
Rachel Lamb (2018 – Present, PhD committee member)
Jennifer Kennedy (2021 – Present, PhD committee member)

Service and Outreach

Editorships, Editorial Boards, and Reviewing Activities
Guest Editor, special issue on "Recent Advances for Crop Mapping and Monitoring Using Remote Sensing Data."
https://www.mdpi.com/journal/remotesensing/special_issues/Recent_Advances_Crop_Mapping

Guest Editor, special issue on "Cropland Carbon".
https://www.mdpi.com/journal/land/special_issues/Cropland_Carbon

Reviewing Activities for Journals and Presses
Reviewed 53 articles for 24 journals.
https://publons.com/researcher/241803/ritvik-sahajpal/

Reviewing Activities for Agencies and Foundations
Proposal reviewer for the US-Israel Agricultural Research & Development Fund (BARD).

Committees, Professional & Campus Service
Chair, Research Faculty Committee
Department of Geographical Sciences, University of Maryland, College Park

External Service and Consulting
Data Advisory Council Member (2020-2023)
Foundation of Food and Agriculture Research

Other Information

Google Scholar
Publons