Mostafa Kiani Shahvandi

Address	Institute of Geodesy and Photogrammetry ETH Zürich HPV G51, Robert-Gnehm-Weg 15, 8093, Zürich, Switzerland
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Research interests

Earth system modelling and geophysical fluid dynamics

Earth rotation and effective angular momentum functions

Solid Earth-ocean-climate dynamics and interactions

Physics-informed neural networks

Education

2020-2024	ETH Zürich, Switzerland Ph.D. in Geodesy Thesis advisor: Prof. Benedikt Soja
2024-2024	University of Cambridge, UK Visiting student, Department of Earth Sciences Academic advisor: Prof. David Al-Attar
2022-2022	GFZ German Research Center for Geosciences Visiting student, Section for Earth System Modelling Academic advisor: Dr. Henryk Dobslaw, Dr. Robert Dill
2017-2019	University of Tehran, Iran Master of Science in Geodesy (First Class Honors)
2013-2017	University of Tehran, Iran Bachelor of Science in Geodesy (First Class Honors)

Awards

2020	National best alumni award, across all Iranian universities
2019	1st honorary M.Sc. student among all the Geodesy students
2018	Rank 1st (out of >2500) in national Geoscience Olympiad
2017	1st honorary B.Sc. student among all the Geodesy students
2017	Rank 4th (out of >2500) in national Geoscience Olympiad
2014-2018	The best student award (FOE) for 8 consecutive semesters
2017-2020	Three times winner of the national elite's foundation award for exceptional achievements

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Teaching

2017	Geodetic Networks, TA, University of Tehran
2022	Gravity Field, TA, ETH Zürich
2021-2024	Space Geodesy, TA, ETH Zürich

Supervision of students

2022	Christoph Baumann, ETH Zürich **Bachelor thesis title**: Using machine learning to predict Earth deformation from InSAR time series, https://doi.org/10.3929/ethz-b-000551868
2022	Christine Rösch, ETH Zürich Junyang Gou, ETH Zürich **Interdisciplinary project**: Machine learning for orbit determination, https://doi.org/10.3929/ethz-b-000617317

2021	Michelle Halbheer, ETH Zürich **Bachelor thesis title**: Prediction of atmospheric parameters from GNSS observations and weather models with machine learning, https://doi.org/10.3929/ethz-b-000573133

Memberships

2021-present	American Geophysical Union associate
2021-present	ETH AI Center associate
2021-present	International Association of Geodesy
2021-present	SIAM Data Science and Geosciences
2020-present	IEEE Geoscience and Remote Sensing Society

Publications

For the full list of my publications please visit:

Google scholar: https://scholar.google.com/citations?hl=en&user=qCI0O08AAAAJ

Researchgate: https://www.researchgate.net/profile/Mostafa-Kiani-Shahvandi

ORCID: https://orcid.org/0000-0001-5705-7014

Selected publications

[1] **M. Kiani Shahvandi**, R. Dill, H. Dobslaw, A. Kehm, M. Bloßfeld, M. Schartner, S. Mishra, B. Soja "Geophysically-informed machine learning for improving rapid estimation and short-term prediction of Earth orientation parameters", Journal of Geophysical Research: Solid Earth, 2023, https://doi.org/10.1029/2023JB026720

[2] J. Gou, **M. Kiani Shahvandi**, R. Hohensinn, B. Soja "Ultra-short-term prediction of LOD using LSTM neural networks", Journal of Geodesy, 97, 2023, https://doi.org/10.1007/s00190-023-01745-x

[3] **M. Kiani Shahvandi**, M. Schartner, B. Soja "Neural ODE Differential Learning and its application in polar motion prediction", Journal of Geophysical Research: Solid Earth, 127(11), 2022, https://doi.org/10.1029/2022JB024775

[4] **M. Kiani Shahvandi**, B. Soja "Inclusion of data uncertainty in machine learning and its application in geodetic data science, with case studies for the prediction of Earth orientation

parameters and GNSS station coordinate time series", Advances in Space Research, 70(3), pp. 563-575, 2022, https://doi.org/10.1016/j.asr.2022.05.042

[5] **M. Kiani Shahvandi**, M. Schartner, J. Gou, B. Soja "Data driven approaches for the prediction of Earth's effective angular momentum functions", IEEE Geoscience and Remote Sensing Symposium, 2022, https://doi.org/10.1109/IGARSS46834.2022.9883545

[6] **M. Kiani Shahvandi**, B. Soja "Small geodetic datasets and deep networks: attention-based residual LSTM autoencoder stacking for geodetic time series", Lecture Notes in Computer Science, vol 13163. Springer, Cham, 2022, https://doi.org/10.1007/978-3-030-95467-3_22

[7] **M. Kiani Shahvandi**, B. Soja "Modified deep transformers for GNSS time series prediction", IEEE Geoscience and Remote Sensing Symposium, 2021, https://doi.org/10.1109/igarss47720.2021.9554764

[8] **M. Kiani Shahvandi** "A new optimal image smoothing method based on generalized discrete iterated Laplacian minimization and its application in the analysis of earth's surface using satellite remote sensing imagery", Earth Science Informatics, 14, pp 81–97, 2021, https://doi.org/10.1007/s12145-020-00553-7

[9] **M. Kiani Shahvandi** "Applications of numerical integration in geodesy and geophysics", Acta Geophysica, 69, pp. 29-45, 2021, https://doi.org/10.1007/s11600-020-00525-x

[10] **M. Kiani Shahvandi** "Numerical solution of ordinary differential equations in geodetic science using adaptive Gauss numerical integration method", Acta Geodaetica et Geophysica, 55, pp. 277–300, 2020, https://doi.org/10.1007/s40328-020-00293-6

[11] **M. Kiani Shahvandi** "Simultaneous approximation of a function and its derivatives by Sobolev polynomials: Applications in satellite geodesy and precision orbit determination for LEO CubeSats", Geodesy and Geodynamics, 11(5), pp 376-390, 2020, https://doi.org/10.1016/j.geog.2020.06.002

[12] **M. Kiani Shahvandi** "Local geoid height approximation and interpolation using moving least squares approach", Geodesy and Geodynamics, 11(2), pp. 120-126, 2020, https://doi.org/10.1016/j.geog.2019.12.003

[13] **M. Kiani Shahvandi** "Template-based smoothing functions for data smoothing in geodesy", Geodesy and Geodynamics, 11(4), pp. 300-306, 2020, https://doi.org/10.1016/j.geog.2020.03.003

[14] **M. Kiani Shahvandi** "Spherical approximating and interpolating moving least squares in geodesy and geophysics: A case study for deriving gravity acceleration at sea surface in the Persian Gulf", Journal of geodetic science, 10, pp 124-135, 2020, https://doi.org/10.1515/jogs-2020-0112

[15] **M. Kiani Shahvandi**, N. Chegini, A. Safari, B. Nazari, "Producing gravity acceleration at sea surface in Persian Gulf using ellipsoidal splines", jgit, 8(1), pp 63-78, 2020, https://doi.org/10.29252/jgit.8.1.63

[16] **M. Kiani Shahvandi**, N. Chegini, A. Safari, B. Nazari “Spheroidal spline interpolation and its application in geodesy”. Geodesy and Cartography, 46(3), pp 123-135, 2020, https://doi.org/10.3846/gac.2020.11316

[17] **M. Kiani Shahvandi**, N. Chegini, “Ellipsoidal spline functions for gravity data interpolation and smoothing”, Earth Observation and Geomatics Engineering, 3(2), pp. 1-11, 2019, https://doi.org/10.22059/EOGE.2020.290542.1065