Soran Parang

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EDUCATION

09/2020–Present **Doctor of Philosophy in Earth Sciences**
Ph.D. Advisor: Prof. Glenn A. Milne
Department of Earth and Environmental Sciences
University of Ottawa, Canada

2011–2014 **Master of Science in Geodesy**
School of Surveying and Geospatial Engineering
University of Tehran, Iran
Total GPA: **17.94**/20 (***Ranked First***)

2007–2011 **Bachelor of Science in Surveying and Geomatics Engineering**
School of Surveying and Geospatial Engineering
University of Tehran, Iran
Total GPA: **16.58**/20 (***Ranked Third***)

2003–2007 **Pre-university Certificate and High School Diploma in Mathematics and Physics**
National Organization for Development of Exceptional Talents (NODET) High School
Sanandaj, Kurdistan, Iran
Diploma GPA: **19.38**/20 (***Ranked First***)

RESEARCH INTERESTS

Analyzing and integrating diverse satellite geodetic techniques for monitoring variations in the Earth's shape and gravity field—from global to local scales—and enhancing our understanding of Earth system dynamics concerning lithosphere, cryosphere and hydrosphere.

- SAR Interferometry and GNSS/GPS techniques for monitoring ice-sheet motion and measuring Earth's surface displacements caused by earthquakes, volcanoes, landslides, land subsidence and hydrological processes
- Earth's gravity field recovery based upon satellite gravimetry (GRACE/GRACE-FO and GOCE)
- Adjustment theory, Analytical/Numerical modeling, and Time series analysis

AWARDS & HONORS

2020–2024 **International Admission Scholarship**, Ph.D. program, University of Ottawa

2020–2024 **RA/TA Scholarships**, Ph.D. program, University of Ottawa

2020–2024 **International Doctoral Scholarship**, Ph.D. program, University of Ottawa

2014 **Ranked 1st** according to overall GPA among all M.Sc. students of the Geodesy department, School of Surveying and Geospatial Engineering, University of Tehran

Winner of **FOE** (Faculty of Engineering) award for achieving **the highest GPA** among all master's students in Geodesy, University of Tehran

2014 **Student Grant**, GeoMod 2014, GFZ Potsdam, Germany

2014 **Student Travel Grant**, GENAH 2014, Matsushima, Miyagi, Japan

2011 Recognized as an **Exceptional Talent** and Selected for the **graduate studies without the nationwide entrance examination** at the University of Tehran (The oldest, largest and most prestigious university of Iran)

2011 **Ranked 3rd** according to overall GPA among all B.Sc. students of Surveying and Geomatics Engineering, University of Tehran

Winner of **FOE** (Faculty of Engineering) award for achieving **the third best GPA** among all undergraduate students in Surveying and Geomatics Engineering, University of Tehran

2007 **Ranked 603rd (Top 0.2%)** among more than 311,000 participants in the **Iranian Nationwide University Entrance Examination** known as Konkoor for B.Sc. degree in Mathematics, Physics, and Engineering Sciences

2006 **Ranked 1st** among high school students in the field of Mathematics and Physics, NODET high school, Sanandaj, Kurdistan, Iran

2003 Recognized as **talented student** in the nationwide "National Organization for Development of Exceptional Talents (NODET)" entrance examination for high school

PUBLICATIONS

BOOKS

[3] **S. Parang**, "**InSAR in Earth Science Research**", *Mahvareh Press*, Mahvareh Educational Group and Publication (Vernal), Tehran, Iran, 2018, ISBN: 978-600-459-029-7.

[2] **S. Parang**, "**GPS, Principles of Satellite Navigation**", *Mahvareh Press*, Mahvareh Educational Group and Publication (Vernal), Tehran, Iran, 2014, ISBN: 978-600-6857-13-8.

[1] **S. Parang**, A. Abedini, "**Engineering Surveying**", *Sanei Press*, Tehran, Iran, 2011, ISBN: 978-964-04-7138-8.

PAPERS

[22] **S. Parang**, "**Three-Dimensional Crustal Structure of Iran inferred from Inversion of GRACE Gravity**", *Journal of Geodesy.* (In preparation)

[21] **S. Parang**, "**InSAR Time Series Analysis Using Small Baseline Subset (SBAS) Technique for Monitoring Land Subsidence**", *In the Fringe 2017*, Aalto University, Helsinki, Finland, June 2017.

[20] **S. Parang**, A. Safari, M. A. Sharifi and A. Bahrodi, "**Analysis of the Complete Bouguer Gravity Anomaly and the Parker–Oldenburg Inversion for the Three-Dimensional Moho depth Model in the Central Alborz Structural Zone, Northern Iran**", *In the North-American CryoSat Science Meeting*, Banff, Alberta, Canada, March 2017.

[19] **S. Parang**, A. Safari, M. A. Sharifi and A. Bahrodi, "**Moho Depth Estimation Using Gravitational Gradient Tensor (GGT) and 3D Euler Deconvolution Algorithm**", *In the ESA Living Planet Symposium*, Prague, Czech Republic, May 2016.

[18] **S. Parang**, A. Safari, M. A. Sharifi and A. Bahrodi, "**Determination of the Best Window Size and Structural Index in Estimating Moho Depth through Euler Deconvolution Method (Case Study: The Zagros Zone)**", *In the Journal of Geomatics Science and Technology (JGST)*, University of Tehran, 4(2), 2015.

[17] **S. Parang**, "**Estimating Crustal Thickness of Iran Using Euler Deconvolution Method and EIGEN-GL04C Geopotential Model**", *Proceedings of the International Conference on Geoscientific Modeling (GeoMod 2014)*, GFZ Potsdam, Germany, September 2014.

[16] **S. Parang**, "**Comparing Moho Depth Estimated by EIGEN-GL04C Geopotential Model and Euler Deconvolution Method to Moho Depth Model Resulted from GOCE Gravity Data in Iran**", *In the International Symposium on Geodesy for Earthquake and Natural Hazards (GENAH 2014)*, Matsushima, Miyagi, Japan, July 2014.

[15] **S. Parang**, A. Safari, M. A. Sharifi and A. Bahrodi, "**Comparison between Estimated Moho Depth from Euler Deconvolution Method and CRUST 2.0 Model**", *Proceedings of the 32nd National & the 1st International Geosciences Congress*, Geological Survey of Iran, February 2014.

[14] **S. Parang**, "**Analytical Modeling of Tsunami Generation Phase in 2010 Chile Earthquake**", *Proceedings of the 34th Asian Conference on Remote Sensing 2013 (ACRS 2013)*, Bali, Indonesia, October 2013.

[13] **S. Parang**, "**Comparison of Seismic Moment Rates Obtained by Geophysical and Geological Methods in Structural Zones of Iran**", *Proceedings of the 34th Asian Conference on Remote Sensing 2013 (ACRS 2013)*, Bali, Indonesia, October 2013.

[12] **S. Parang**, "**Moho Depth Estimation by Inversion of Gravity Data & Utilizing Moho Depth Quantities Produced by Seismological Studies**", *In the ESA Living Planet Symposium*, Edinburgh, United Kingdom, September 2013.

[11] **S. Parang**, H. Shahrokhi Shahraki and A. Jalilzadeh Shadlouei, "**The Utilization of Satellite Imagery for Vegetation Studies & the Comparison of Various Vegetative Indices**", *In the ESA Living Planet Symposium*, Edinburgh, United Kingdom, September 2013.

[10] S. Mohammady and **S. Parang**, "**Residence Site Selection According to Combination of PSO Algorithm & Linear Regression, Case Study: Sanandaj City in Iran**", *Proceedings of the 7th Symposium on Advances in Science and Technology (7th SASTech)*, Bandar-Abbass, Iran, March 2013.

[9] H. Shahrokhi, **S. Parang** and A. Abedini, "**Improve Performance of Mackay-Maisonneuve by re-Signalizing and Considering Delay Factor**", *In the International Conference on Transportation Planning and Implementation Methodologies for Developing Countries (TPMDC 2012)*, IIT Bombay, Mumbai, India, December 2012.

[8] S. Mohammady and **S. Parang**, "**Comparison of Multi-Criteria Decision Making Methods AHP/ANP in Site Selection of Residential Buildings, Case Study: Tehran Metropolis**", *Proceedings of the 2nd National Conference Of Sustainable Development and Urban Construction*, Esfahan, Iran, December 2012.

[7] A. H. Souri, M. Saradjian, M. Shahrisvand and **S. Parang**, "**Improving Parallelepiped Classification by Using Elliptical Shape and Combining Minimum Distance in Multispectral Imagery**", *Proceedings of the 33rd Asian Conference on Remote Sensing 2012 (ACRS 2012)*, Pattaya, Thailand, November 2012.

[6] **S. Parang**, "**The Determination of a Fault Displacement Field According to Okada 85 Model and the Analysis of its Sensibility toward the Fault Geometric Parameters**", *In the 6th International Conference on Applied Geophysics*, Kanchanaburi, Thailand, November 2012.

[5] **S. Parang**, "**The Determination of the Fault Geometric Parameters by Solving Inverse Problem According to Okada Model & Genetic Algorithm, Case Study: Bam Earthquake in Iran**", *In the 6th International Conference on Applied Geophysics*, Kanchanaburi, Thailand, November 2012.

[4] A. H. Souri, A. Abedini and **S. Parang**, "**Landslide Susceptibility Map using Bivariate Statistical Analysis, a Case Study in Bogota**", *Proceedings of the 8th International Symposium on Lowland Technology (ISLT 2012)*, Bali, Indonesia, September 2012.

[3] A. H. Souri, **S. Parang** and M. Shahrisvand, "**An Evaluation of Matching Spectral by Using Wavelet Transforms in Hyperspectral Imagery**", *Proceedings of the Taza GIS-Days: the International Conference of GIS Users*, Taza, Morocco, May 2012.

[2] **S. Parang** and A. H. Souri, "**A GIS-based Air Pollution Modeling in Tehran**", *Proceedings of the Taza GIS-Days: the International Conference of GIS Users*, Taza, Morocco, May 2012.

[1] **S. Parang** and A. H. Souri, "**Determination of Displacement Field of Environmental Phenomena Using Remotely Sensed Imagery and Interferometric SAR Technique**", *Proceedings of the 2nd Conference on Environmental Planning and Management (EPM 2012)*, University of Tehran, Tehran, Iran, May 2012.

THESES

Master **S. Parang**, "**Moho Depth Estimation in Iran through Geopotential Models and Euler Deconvolution Method**", Under the Supervision of Prof. Abdolreza Safari, *The Central Library and Documentation Center of Tehran University*, No. 60654, 2014.

TEACHING EXPERIENCE

UNDERGRADUATE

2015–2019 **Lecturer**, Department of Geomatics Engineering, University of Applied Science and Technology, Sanandaj I, Kurdistan, Iran
Undergraduate Courses Taught:
Geodesy I, Geodetic and Control Surveying, Adjustment and Test, Geodesy II and Computation (Geometric Geodesy), Physical Geodesy, Theory of Errors, Satellite Geodesy

2018 **Lecturer**, Yazdanpanah Technical College of Sanandaj, Technical and Vocational University, Kurdistan, Iran
Undergraduate Courses Taught:
Computer Programming, Geodesy II and Computation (Geometric Geodesy)

2014–2015 **Lecturer**, Department of Surveying and Geomatics Engineering, Faculty of Technical Engineering, Azad University, Sanandaj Branch, Kurdistan, Iran
Undergraduate Courses Taught:
Adjustment and Test, Geodetic Astronomy, Computer Programming, Satellite Geodesy, Geodesy II and Computation (Geometric Geodesy)

2010–2011 **Teaching Assistant** for *Route Surveying*, Undergraduate Level, School of Surveying and Geospatial Engineering, University of Tehran

2010 **Teaching Assistant** for *Surveying II*, Undergraduate Level, School of Surveying and Geospatial Engineering, University of Tehran

2009 **Teaching Assistant** for *Surveying I*, Undergraduate Level, School of Surveying and Geospatial Engineering, University of Tehran

SHORT COURSES

2019 **Instructor** for the training course "*InSAR Processing by GMTSAR*", Vernal Educational Institute, Tehran, Iran

2019 **Instructor** for the workshop on "*GPS Data Processing*", University of Applied Science and Technology, Sanandaj I, Kurdistan, Iran

2018 **Instructor** for the training course "*Python Programming in Geomatics*", Vernal Educational Institute, Tehran, Iran

2018 & 2019 **Instructor** for the training course "*Earth's surface displacement field modeling by InSAR: Theory and Techniques*", Vernal Educational Institute, Tehran, Iran

2015–2019 **Master's Konkoor Instructor**, Instructor for courses preparing undergraduate students in Geomatics Engineering for the Iranian Nationwide University Entrance Examination for Master's Degree (Known as Konkoor-e Karshenasi-e Arshad)

2015–2019 **Freelance Tutor** of computer programming, *MATLAB* and *Python* to undergraduate students

SELECTED ACADEMIC PROJECTS

Offset Tracking with Sentinel-1A Ground Range Detected (GRD) products (Estimation of the movement of glacier surfaces and generation of glacier velocity map using patch intensity cross-correlation optimization)

Sentinel-1A TOPS (Terrain Observation with Progressive Scans) Interferometry for measuring the ground displacement field due to the Mw 7.3 earthquake occurred on November 12, 2017, at the Iran-Iraq border (near Ezgeleh), Kermanshah, Iran

Polarimetric SAR (Generation of covariance and coherency matrices using Quad-Pol products (including HH,VV,HV and VH bands); Speckle Reduction; Decomposition using Freeman-Durden algorithm for determining various scattering mechanisms such as Double-Bounce, Surface and Volume Scattering; Unsupervised Classification using Cloude-Pottier and Wishart algorithms)

InSAR Time Series Analysis using PS (Persistent Scatterers) and SBAS (Small Baseline Subset) approaches for monitoring land subsidence

Depth of the Moho Discontinuity from Parker-Oldenburg Inversion and Geopotential Models

Physical Oceanography and Geophysics:
Investigation of tsunami formation, Wind waves versus tsunami waves and Tsunami warning system; Review of research works done on tsunami hazard evaluation in the Persian Gulf and Caspian Sea

M.Sc. Seminar:
Geodynamic studies in Iran using Euler Deconvolution method and gravity gradient tensor

Advanced Satellite Positioning:
An overview of precise point positioning; RINEX data processing for positioning according to pseudorange and carrier phase observations by programming in MATLAB; GPS data processing with GAMIT; MATLAB programming for computation of the position, velocity and acceleration vectors of GPS satellites from precise ephemerides (in SP3 format) using polynomial interpolation, and moving average for precise orbit determination

Approximation Theory and Time Series Analysis:
Geoid determination using least squares collocation and gravimetric observations; Image processing using wavelet transformation; Detection of cycle slip from GPS observations using wavelet transformation

Advanced Geodynamics:
Strain analysis (Case study: Los Angeles basin); Forward and Inverse modeling using Okada 85 model (Case study: 2003 Bam earthquake, Iran); Determination of Coseismic and Afterslip model using Okada 85 model (Case study: 1999 Izmit earthquake, Turkey); Calculating postseismic deformation and crustal layering effect using PSGRN code; Research on slow and silent earthquakes

Satellite Gravimetry:
MATLAB programming for determining the visibility and ground track of a satellite according to its orbital parameters; Determining the keplerian elements and their standard deviations from position and velocity vectors; Determining the dynamic orbit of a low earth orbiting satellite using numerical methods

Special Studies in Geometrical Geodesy:
Conversion of Single Look Complex (SLC) data from Level 1 products to Multi Look Intensity (MLI) images, the respectively performed processes: Radiometric Calibration, Multilooking, Speckle Filtering and Terrain Correction; Determination of displacement field using InSAR technique and ENVISAT ASAR Images (Case studies: 2003 Bam and 2008 Qeshm earthquakes, Iran); Time series analysis via small baseline subset approach and DInSAR technique (Case Study: Land Subsidence in Mashhad plain, Iran); Surface displacement measurement using optical satellite imagery and COSI-Corr module in ENVI (Case Study: 2005 Kashmir earthquake); Research on 2D phase unwrapping

Advanced Physical Geodesy:
MATLAB programming for transforming spherical harmonic coefficients into ellipsoidal harmonic coefficients; Calculating different gravity field functionals from the spherical harmonic models; Comparison of geoid height derived from Geopotential Models with GPS leveling data in Iran

Selected Course Projects in the B.Sc. degree:
Image Processing (Image Enhancement in the spatial and frequency domains, Image Segmentation); **Remote Sensing** (Classification, Geometric correction of multispectral images, Calculating NDVI and EVI); **Photogrammetry** (Interior and exterior orientation, Intersection and resection, and bundle adjustment by programming and different types of software); **Microgeodesy** (Design, Pre-Analysis, Data processing and adjustment in various types of geodetic networks); **GPS** (Processing and post processing of GPS data for positioning, Differential GPS, Adjustment of observations); **Geodesy** (Inverse and direct problem, Datum conversion); **Hydrography** (Determining Mean Sea Level (MSL), Chart Datum (CD), Mean High Water Neap & Spring (MHWN & MHWS), Mean Low Water Neap & Spring (MLWN & MLWS), Tide Predictions and Computations); **GIS** (Finding optimal routes and site selection using Multi Criteria Decision Making Methods like AHP and ANP); **Hydrology** (Estimating maximum discharge and determining basin boundaries); **Route Design** (Analog, Digital); **Surveying** (Producing topography map, Designing, Staking Out, Leveling, Volumes of land operations of primary road variant); **Subsurface Surveying** (Tunnel)

SELECTED COURSES AND GRADES

Physical Oceanography and Geophysics: **20**/20 (*Ranked 1st*)
Advanced Satellite Positioning: **20**/20 (*Ranked 1st*)
M.Sc. Seminar: **20**/20 (*Ranked 1st*)
Approximation Theory and Time Series Analysis: **19.25**/20 (*Ranked 1st*)
Advanced Geodynamics: **18**/20 (*Ranked 1st*)
Satellite Gravimetry: **17.5**/20 (*Ranked 1st*)
Satellite Geodesy: **20**/20 (*Ranked 1st*)
Advanced Physical Geodesy: **19.25**/20 (*Ranked 1st*)
Special Studies in Geometrical Geodesy: **18.5**/20 (*Ranked 1st*)
Functional Analysis: **16.5**/20 (*Ranked 2nd*)
Image Processing: **20**/20 (*Ranked 1st*)
Hydrography: **20**/20 (*Ranked 1st*)
Engineering Hydrology: **19.5**/20 (*Ranked 1st*)
Geodesy II and Computation (Geometric Geodesy): **17.5**/20 (*Ranked 2nd*)
Practical Geodetic Surveying: **20**/20 (*Ranked 1st*)
Physical Geodesy: **17.5**/20 (*Ranked 1st*)

WORKSHOPS ATTENDED

10/2013 Participated in a workshop entitled **Modeling Seismic Displacement Fields and Applications of Geodetic Constraints** presented by Dr. Amir Abolghasem in the 2nd International Conference on Sensors and Models in Photogrammetry and Remote Sensing (SMPR 2013), University of Tehran, Tehran, Iran
Description:
Earth deformations, Rheology, Dislocation (Forward & Inverse problem), Geodetic constraints (GPS & InSAR), Interseismic strain accumulation and stress buildup, Co-seismic displacement fields, Post-seismic displacement fields, Semi-analytical solution, Numerical solutions (finite elements)

10/2013 Participated in a workshop entitled **3D Reconstruction Chain - From Images to 3D City Model** presented by Dipl. Ing. Georg Kuschk in the 2nd International Conference on Sensors and Models in Photogrammetry and Remote Sensing (SMPR 2013), University of Tehran, Tehran, Iran
Description:
Fundamentals, 3D-Sparse Reconstruction, 3D-Dense Reconstruction, Post-Processing, 3D Modeling

05/2013 Participated in EAGE Student Lecture Tour Middle East on **Seismic Imaging Fundamentals and Applications & Case Studies** presented by Dr. Deva Ghosh, Organized by the European Association of Geoscientists and Engineers (EAGE), University of Tehran, Tehran, Iran
Description:
Seismic experiment, Seismic imaging classification, Migration methods, Seismic response to geology, Velocity & imaging, Wave illumination analysis, Imaging through gas cloud, Imaging as a non-linear inversion, Image & signal improvement, Remote Sensing to gather geological data

COMPUTER SKILLS

Programming:	MATLAB, FORTRAN, Python, Linux Bash Scripting
Parallel Processing:	Message Passing Interface (MPI), OpenMP
InSAR Processing:	SNAP, DORIS, SNAPHU (phase unwrapping), SARscape (ENVI module), GMTSAR, StaMPS, GIAnT
GNSS Processing:	gLAB, GAMIT/GLOBK
Gravity Processing:	Geosoft Oasis Montaj, GRAVSOFT
Other Tools:	ENVI, GMT, ArcGIS, AutoCAD, Microsearch GeoLab (adjustment), Coulomb, HYPACK (hydrography), PCI Geomatica, COSI-Corr (ENVI module), LaTeX