

Matej Durcik, PhD.

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Research Areas

An application of geoinformatic technologies in environmental sciences, database systems and design, spatial and temporal data analysis and assimilation, distributed hydrologic modeling, physical hydrologic processes, environmental physics and climate variability.

Education

- 2002 - 2004 M.S. in Information Science, Department of Information Science and Telecommunications, University of Pittsburgh
- 1991 - 1998 Ph.D. in Nuclear and Sub-Nuclear Physics, Department of Nuclear Physics, Faculty of Mathematics and Physics, Comenius University, Bratislava
- 1988 RNDr., the rigorous state examination in Nuclear Physics
- 1983 - 1988 M.S. in Nuclear Physics, Department of Nuclear Physics, Faculty of Mathematics and Physics, Comenius University, Bratislava

Professional Experience

- 2013 – pres. Researcher, Hydrologic Information Systems, Biosphere 2, University of Arizona.
- Data management and data visualization for the Critical Zone Observatory (CZO) project
 - Design and implementation of sensor database and data tools for the Landscape Evolution Observatory (LEO) project.
 - Geoinformatics which includes spatial dataset development, geo-spatial analysis and modelling, and remote sensing
 - Hydrologic modelling and short and long term stream flow prediction.
- 2007 – 2013 Researcher, Hydrologic Information Systems, Department of Hydrology and Water Resources, University of Arizona.
- Assimilation and analysis of remotely sensed, spatial and temporal data used in the Hydrologic Synthesis Project
 - Database design for sensor data and data management
 - Investigation of spatial and temporal variability of hydrologic variables at basin and catchment scale and interactions between vegetation and climate
 - Developing a novel methodology for distributed hydrologic parameter identification based on hydrologic similarity and landscape classification and its application in distributed hydrologic modelling

- Highly involved in Basin scale hydrologic modelling and data analysis
- Design, develop and maintenance of the Terrestrial Water Storage Dynamics website for the Colorado River basin
- Developing automated data collection, transformation and quality control for observed hydro-meteorological and reanalysis data
- Responsible for data transformation, quality control and integration of data streams from modelling and field experiments with database
- Co-investigator of three SAHRA (Sustainability of semi-Arid Hydrology and Riparian Areas) projects: Development of a web-based geospatial database; Tracing terrestrial water storage dynamics in near real-time: A key element for drought assessment in the Colorado River basin; and Development of a conceptual model for SAHRA's scenario-based multi-resolution integrated modelling

2004 – 2007 Geospatial Analyst, Department of Hydrology and Water Resources, University of Arizona.

- Responsible for design and implementation of a geospatial and temporal database, data visualization and query builder for the upper Rio Grande and San Pedro Basins
- Basin scale hydrologic modelling and spatial and temporal data analysis
- Data collection, transformation and quality control and metadata development
- Co-investigator of the SAHRA projects: Development of a web-based geospatial database; and Estimating Arizona's water storage from space-borne gravity observations.

2002 – 2004 Graduate Student Assistant, School of Information Sciences, University of Pittsburgh.

- Modelled uncertainties in geocoding and compared with Geographical Positioning System (GPS) measurements
- Estimated performance and accuracy of hierarchical routing algorithms
- Proposed and made preliminary simulation tests for an in-car navigation system to calculate optimal route using a data mining engine to learn driver's preferences
- Analysed 3-dimensional data stored in spatial databases and composed decision model for a site selection.

1999 - 2003 Leave of Absence, Institute of Preventive and Clinical Medicine, Bratislava.

- Analysed experimental data and wrote proposals and recommendations for the Institute of Preventive and Clinical Medicine in Bratislava
- Studied English language at the Connelley Technical Institute in Pittsburgh and at the University of Pittsburgh.
- Voluntary research collaboration in the Geoinformatics Laboratory, School of Information Sciences, University of Pittsburgh.

1991 - 2003 Research Scientist, Department of Radiation Protection Dosimetry, Institute of Preventive and Clinical Medicine, Bratislava.

- Focused on the dosimetry and standardization of radon and its progeny measurement. Co-established the National Metrological Centre for Radon Quantities which serves as a standard for the calibration and verifications of dosimeters and measurement systems.
- Performed short-term measurements and analysed time variations of radon, thoron and their progeny concentrations in various environments

- Modelled radon diffusion through different building materials
- Designed experiments for the estimation of the radiation load and Deoxyribonucleic acid (DNA) damage
- Measured an external gamma dose rate and analysed influences on its time variations
- Utilized radiation protection for the cyclotron facility and the measurement methods of produced radioactive gases.

1988 - 1991 Research assistant, Department of Nuclear Physics, Faculty of Mathematics and Physics, Comenius University, Bratislava.

- Theoretical calculations of Cherenkov detector's parameters
- Developed technique to decrease the gamma background from natural radioisotopes in the low-level gamma spectrometry vault
- Studied heavy ion interactions with matter.

Fellowships

2002 - 2004 Scholarship – full GSA in the Department of Information Science and Telecommunications, University of Pittsburgh

1997 Production of Isotopes - Training through an IAEA Fellowship at the Forschungszentrum Karlsruhe GmbH, Germany

Research Grants

2009-2010 NSF, University of Illinois – Water Cycle Dynamics in Changing Environment: Advancing Hydrologic Science through Synthesis. Subaward PI, \$15,211.

2007-2008 SAHRA WSP-CDI, University of Arizona - Tracing terrestrial water storage dynamics in near real-time: a key element for drought assessment in the Colorado River basin. Co-PI, \$25,286.

Professional Affiliation

2007 – pres. Member of American Geophysical Union (AGU)

Related Skills

Database Systems:	Oracle, MS SQL Server, PostgreSQL, MySQL
Data models and formats:	ArcHydro, GRIB, NetCDF and HDF
Programming Languages:	Java, Python, C, SQL, HTML, Java Script
Hydrologic Models:	Variable Infiltration Capacity (VIC) Model
Application software:	ArcGIS desktop, ArcGIS Server, SPSS and Clementine, ERDAS IMAGINE, MATLAB