

## Research internship at the University of Minnesota

My name is Muratbek Kudaibergenov, currently a PhD student at al-Farabi Kazakh National University (KazNU) in Almaty, Kazakhstan. It is a beautiful city with many natural and cultural attractions. Almaty was the national capital until 1997 when the seat of government was moved to Astana in the north central region of Kazakhstan. At KazNU, I am working on improving my academic knowledge and skills in geodesy and cartography in Department of Cartography and Geoinformatics, Faculty of Geography and Environmental Science ([www.kaznu.kz](http://www.kaznu.kz)). PhD programs at my university require candidates to spend some time abroad broadening their experiences through collaboration with established research groups. Also, KazNU requires PhD supervisory committees to have a foreign academic as member, and Professor Samuel B. Mukasa at the University of Minnesota, U.S.A., serves in that role for my committee. Professor Mukasa is the Senior Executive for Global STEM Initiatives in the Office of the Executive Vice President and Provost at the University of Minnesota Twin Cities. In January-March 2019, I traveled to the University of Minnesota to fulfill the study-abroad requirement of my PhD program, and engaged with my external PhD committee member, Professor Samuel B. Mukasa, about execution of my scientific research work this year. The University of Minnesota, Twin Cities, is a public research university in Minneapolis and Saint Paul, Minnesota. It is the oldest and largest campus in the University of Minnesota System, and it ranks sixth in the U.S. by number of students. The University of Minnesota is one of America's best public undergraduate colleges and universities.

My work at the University of Minnesota began in earnest as soon as Professor Mukasa introduced me to experts in remote sensing, principally Associate Professor Joseph F. Knight, Director of the Remote Sensing and Geospatial Analysis Lab in the Department of Forest Resources, College of Food, Agriculture, and Natural Resources Sciences (CFANS).



My collaborative research with Associate Professor Joseph F. Knight and other members of the Remote Sensing and Geospatial Analysis Laboratory in the Department of Forest Resources has been very fruitful and enjoyable. We have focused on using remotely sensed imagery to assess land subsidence caused by ore mining in the area of Kentau, Kazakhstan. Among my substantial accomplishments during this January to March 2019 visit are the following: learning to use the Erdas Imagine image processing software package, learning the ESA SNAP software package, pre-processing a large amount of Sentinel-1 Synthetic Aperture Radar (SAR) imagery, and conducting Interferometric SAR (InSAR) analysis of land subsidence in Kentau. It has been a pleasure to work with Professor Knight and his group. I want to thank Professor Samuel B. Mukasa as the external member of my PhD supervisory committee and for introducing me to Associate Professor Joseph F. Knight and members of the Remote Sensing and Geospatial Analysis Laboratory. I am grateful for the warm welcome extended to me by Professor Knight and his group, and also by Janelle Schnadt, the department administrator. Janelle was masterful in processing the large number of documents required for me to obtain a visa and spend time on the beautiful University of Minnesota campuses in Minneapolis and St Paul. I thank all others at the University of Minnesota for the warm welcome. I hope that collaboration between our universities continue into the future and involve other scholars besides myself.