

## **Kirk Michael Scanlan**

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### **Personal Statement**

- Dedicated and self-motivated researcher
- In-depth knowledge of non-destructive geophysical methods and applications to a wide variety of fields (archaeology, geotechnical engineering, natural hazards, and planetary science)
- Strong commitment to research excellence and integrity
- Effective communicator capable of working in large international teams on multi-faceted projects

### **CURRENT POSITION**

**July 2018 – Present**

**University of Texas**

**Postdoctoral Fellow**

Member of the Radar for Europa Assessment and Sounding: Ocean to Near-surface (REASON) Science Data System (SDS) and Affiliate of the Europa Clipper science team. Role includes design, development, and testing of data processing algorithms and analyses to be implemented once Europa Clipper achieves orbit around Jupiter in the 2020's. Development and testing of relevant algorithms is performed using Martian radar sounding measurements (MARSIS and SHARAD) as Europa analogues.

### **EDUCATION**

**Doctor of Philosophy in Geotechnical Engineering**

**2013 – 2018 University of Alberta**

**Doctoral thesis** comprises an in-depth and thorough study of the use of ground-penetrating radar as a rapid and non-destructive tool for the investigation of railway ballast conditions with the purpose of assessing the impact of degradation on in-service track performance.

**Master of Applied Earth Science, Applied Geophysics**

**2011 – 2013 IDEA League (TU Delft, ETH Zurich, RWTH Aachen)**

**Master's thesis** involved the development of novel multicomponent ground-penetrating radar data processing techniques to improve imaging quality for archaeological targets in Switzerland.

**Bachelor of Science, Honors Specialization in Geophysics**

**2006 – 2011 University of Western Ontario**

**Bachelor's thesis** involved the study of the viability of using ground-penetrating radar to image paleoseismic indicators in Southwestern Ontario.

**PAST RESEARCH EXPERIENCE****April 2018 – June 2018****University of Alberta****Research Assistant**

Involved in a variety of on-going research projects including the study of enhanced train control technologies for the Canadian railway industry as well as the study of phenomena contribution to the prevalence of broken rails along Canadian railways.

**PAST TEACHING EXPERIENCE****2015 – 2016****University of Alberta****Teaching Assistant****Geotechnical and Geoenvironmental Graduate Laboratory**

Effectively and clearly guide and supervise graduate students as they performed a series of complicated industry-standard geotechnical laboratory tests to determine various soil parameters.

**AWARDS AND HONORS****Journal of Rail and Rapid Transit Editor’s Choice Paper for August 2018****August 2018**

Published paper “The spatial correlation between track roughness and ground-penetrating radar inferred ballast degradation” selected by the editor-in-chief to be the Journal of Rail and Rapid Transit Editor’s Choice Paper for August 2018.

**NR Morgenstern Award****June 2017**

Awarded for the best seminar by a graduate student in the Geotechnical and Geoenvironmental Engineering group.

**AGU Outstanding Student Paper Award****December 2016**

Awarded to the top 3-5% of student presenters at the Fall Meeting of the American Geophysical Union (AGU).

**Queen Elizabeth II Graduate Scholarship****September 2016**

Awarded to graduate students who have demonstrated a high level of achievement in their pursuit of graduate studies in Alberta.

**Petro-Canada Graduate Scholarship in Petroleum Engineering****October 2015**

Awarded annually to outstanding Engineering graduate students engaged in research leading to the advancement of technology associated with the development of petroleum resources.

**Charles Carmichael Prize in Earth Science****June 2011**

Awarded annually for the top fourth-year Honors thesis from the Earth Sciences department at the University of Western Ontario

**AWARDS AND HONORS (cont'd)****Gold Medal in Geophysics****June 2011**

Awarded to the top graduate from the Honors Specialization in Geophysics program from the University of Western Ontario

**NSERC Undergraduate Student Research Award****May – August 2007**

Worked under a faculty advisor on an independent research project related to statistical geophysics. One of only three Earth Science students to which this was awarded that year.

**RESEARCH WORKS****Journal Publications**

Scanlan, K.M., Hendry, M.T., and Martin C.D. 2017. Evaluating the impact of ballast undercutting on the roughness of track geometry over different subgrades. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 232(5), pp. 1266-1276 DOI: 10.1177/0954409717720347.

Scanlan, K.M., Hendry, M.T., Martin, C.D., and Schmitt, D.R. 2017. Evaluating the sensitivity of low-frequency ground-penetrating radar attributes to estimate ballast fines in the presence of variable track foundations through simulation. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 232(4), pp. 1168-1181 DOI: 10.1177/0954409717710408.

Scanlan, K.M., Hendry, M.T., Martin, C.D., and Schmitt, D.R. 2018. The spatial correlation between track roughness and ground-penetrating radar inferred ballast degradation. Proceedings of the Institution of Mechanical Engineers, Part F: Journal of Rail and Rapid Transit, 232(7), pp. 1917-1931 DOI: 10.1177/0954409717753817.

Scanlan, K.M., Grima, C., Steinbrügge, G.B., Kempf, S.D, Young, D.A. and Blankenship D.D. 2019. Geometric determination of ionospheric total electron content from dual frequency radar sounding measurements. Planetary and Space Science, *in press* DOI:10.1016/j.pss.2019.07.010.

**Book Chapters**

Scanlan, K.M., Hendry, M.T., Martin, C.D., and Schmitt, D.R. 2018. “A Review of Methods for Estimating Ballast Degradation using Ground-Penetrating Radar”. *Railroad Ballast Testing and Properties, ASTM STP1605*. T.D. Stark, R.H. Swan Jr., and R. Szecsy, Eds., ASTM International, West Conshohocken, PA., pp. 54-76 DOI: 10.1520/STP160520170028.

**Conferences****IGS 2019 Five Decades of Radioglaciology Symposium****July 2019**

Scanlan K.M., Steinbrügge, G.B., Kempf, S.D., Grima, C., Young, D.A., and Blankenship, D.D. 2019. Alternative strategies for synthetic aperture radar focusing of orbital radar sounding measurements, Abstract No. 81A3054 presented at the IGS 2019 Five Decades of Radioglaciology Symposium, Stanford, CA., 9-12 Jul.

**IGS 2019 Five Decades of Radioglaciology Symposium****July 2019**

Young, D.A., Grima, C., Steinbrügge, G., Scanlan, K.M., Kempf, S.D., and Blankenship, D.D. 2019. REASON for Europa: data products and algorithms, Abstract No. 81A3056 presented at the IGS 2019 Five Decades of Radioglaciology Symposium, Stanford, CA., 9-12 Jul.

**2019 Lunar and Planetary Science Conference****March 2019**

Scanlan K.M., Young, D.A., Grima, C., Steinbrügge, G.B., Kempf, S.D., and Blankenship, D.D. 2019. Englacial Radar Attenuation Rates in the Promethei Lingula Area of the Martian South Polar Layered Deposits, Abstract No. 1994 presented at 2019 Lunar and Planetary Science Conference, The Woodlands, TX., 18-22 Mar.

**2019 Lunar and Planetary Science Conference****March 2019**

Steinbrügge, G.B., Scanlan K.M., Young, D.A., Grima, C., Kempf, S.D., and Blankenship, D.D. 2019. SHARAD Radar Altimetry and Geodesy, Abstract No. 1993 presented at 2019 Lunar and Planetary Science Conference, The Woodlands, TX., 18-22 Mar.

**2019 Lunar and Planetary Science Conference****March 2019**

Grima, C., Steinbrügge, G.B., Scanlan K.M., Young, D.A., Putzig, N.E., Perry, M.R., Campbell, B.A., Kempf, S.D., and Blankenship, D.D. 2019. Deciphering the Martian Surface and Near-Surface with Radar Statistics, Abstract No. 1280 presented at 2019 Lunar and Planetary Science Conference, The Woodlands, TX., 18-22 Mar.

**2018 Fall Meeting of the American Geophysical Union (AGU)****December 2018**

Young, D.A., Grima, C., Steinbrügge, G.B., Scanlan, K.M., Kempf, S., and Blankenship, D.D. 2018. REASON for Europa: Data products and algorithms, Abstract P51G-2955 presented at 2018 Fall Meeting, AGU, Washington, D.C., 10-14 Dec.

**AREMA 2018 Annual Conference & Exposition****September 2018**

Scanlan, K.M., Tays, D., Pulisci, R.M., Hendry, M.T., and Martin, C.D. 2018. Developing a Fail-Safe Train Control System – A Canadian Perspective. *In* AREMA 2018 Annual Conference & Exhibition, Chicago IL., 16-19 Sept.

**22<sup>nd</sup> Annual Association of American Railroads Research Review****April 2017**

Title: Using Synthetic GPR Data to Evaluate the Sensitivity of Ballast Degradation Estimates in Variable Track Foundations

***Conferences (cont'd)***

**2016 Fall Meeting of the American Geophysical Union (AGU)** **December 2016**  
 Scanlan, K.M., Hendry, M.T., Martin, C.D., and Schmitt, D.R. 2016. Difficulties in Interpreting Ballast Degradation Level Estimates using Synthetic Ground-Penetrating Radar Data. Abstract NS33B-1967 presented at 2016 Fall Meeting, AGU, San Francisco, CA., 12-16 Dec.

**ASME 2016 Joint Rail Conference** **April 2016**  
 Scanlan, K.M., Hendry, M.T., and Martin, C.D. 2016. Evaluating the equivalency between track quality indices and minimum track geometry threshold exceedances along a Canadian freight railway. *In* ASME 2016 Joint Rail Conference, Columbia SC, USA.

**21<sup>st</sup> Annual Association of American Railroads Research Review** **March 2016**  
 Title: The spatial correlation between track geometry roughness and ground-penetrating radar ballast fouling indices

**20<sup>th</sup> Annual Association of American Railroads Research Review** **March 2015**  
 Title: Associating ballast degradation and track geometry variability through ballast maintenance

***Technical Presentations***

**AREMA 2018 Annual Conference & Exhibition** **September 2018**  
 Title: Developing a Fail-Safe Train Control System – A Canadian Perspective

**Canadian Rail Research Laboratory Technical Review** **November 2017**  
 Title: Enhanced train control project overview

**Canadian Rail Research Laboratory Technical Review** **November 2017**  
 Title: Evaluating the spatial association between degraded ballast and increased track geometry variability

**Canadian Rail Research Laboratory Technical Review** **May 2017**  
 Title: Quantifying the relationship between track performance, degraded ballast, and GPR

**Canadian Rail Research Laboratory Technical Steering Meeting** **December 2016**  
 Title: Undercutting and GPR-based Approaches to Evaluating the Ballast Quality – Track Geometry Variability Relationship along CN's Edson Subdivision

**ASME 2016 Joint Rail Conference** **April 2016**  
 Title: Evaluating the equivalency between track quality indices and minimum track geometry threshold exceedances along a Canadian freight railway

**Canadian Rail Research Laboratory Technical Steering Meeting** **April 2016**  
 Title: Track quality indices and their association with ballast quality along the CN Edson subdivision

***Technical Presentations (cont'd)***

**Canadian Rail Research Laboratory Technical Steering Meeting**

**November 2015**

Title: Evaluating track geometry using track quality indices and the relation with ballast condition estimates

**Canadian Rail Research Laboratory Technical Steering Meeting**

**April 2015**

Title: Quantifying the relationship between ground-penetrating radar ballast quality and track performance

**Canadian Rail Research Laboratory Technical Steering Meeting**

**October 2014**

Title: Assessing ballast quality and fouling with a summary of the RailwayDoctor workshop