

## PEARL Publications – 2020

### Dissertations and Theses

Alwarda, Ramina, Spring 2020 Measurements of Ozone and Related Constituents at 80N using UV-Visible Spectroscopy, MSc thesis, University of Toronto, Toronto, ON, Sept. 2020.

### Refereed Papers

1. AboEl Fetouh, Y., N.T. O'Neill, K. Ranjbar, S. Hesarakhi, I. Abboud, V. Fioletov, P.S. Sobolewski: Climatological-scale analysis of intensive and semi-intensive aerosol parameters derived from AERONET Arctic retrievals, *J. Geophys. Res.*, 125(10), 2020. <https://doi.org/10.1029/2019JD031569>
2. Bogner, K., X. Zhao, K. Strong, R.Y.-W. Chang, U. Frieß, P.L. Hayes, A. McClure-Begley, S. Morris, S. Tremblay, and A. Vicente-Luis: Measurements of tropospheric bromine monoxide over four halogen activation seasons in the Canadian high Arctic. *J. Geophys. Res.: Atmos.* 125, e2020JD033015, 2020. <https://doi.org/10.1029/2020JD033015>
3. Byrne, B., J. Liu, M. Lee, I. Baker, K.W. Bowman, N.M. Deutscher, D.G. Feist, D.W.T. Griffith, L.T. Iraci, M. Kiel, J.S. Kimball, C.E. Miller, I. Morino, N.C. Parazoo, C. Petri, C.M. Roehl, M.K. Sha, K. Strong, V.A. Velasco, P.O. Wennberg, and D. Wunch: Improved constraints on northern extratropical CO<sub>2</sub> fluxes obtained by combining surface-based and space-based atmospheric CO<sub>2</sub> measurements. *J. Geophys. Res. Atmos.*, 125, e2019JD032029, 2020. <https://doi.org/10.1029/2019JD032029>
4. Das, U., W.E. Ward, C.J. Pan, S.K. Das: Migrating and Non-Migrating Tides Observed in the Stratosphere from FORMOSAT-3/COSMIC Temperature Retrievals, *Annales Geophysicae*, 34, 421-435, 2020. <https://doi.org/10.5194/angeo-38-421-2020>
5. Donner, S., J. Kuhn, M. Van Roozendaal, A. Bais, S. Beirle, T. Bösch, K. Bogner, I. Bruchkowsky, K.L. Chan, S. Dörner, T. Drosoglou, C. Fayt, U. Frieß, F. Hendrick, C. Hermans, J. Jin, A. Li, J. Ma, E. Peters, G. Pinardi, A. Richter, S.F. Schreier, A. Seyler, K. Strong, J.-L. Tirpitz, Y. Wang, P. Xie, J. Xu, X. Zhao, and T. Wagner: Evaluating different methods for elevation calibration of MAX-DOAS (Multi AXIS Differential Optical Absorption Spectroscopy) instruments during the CINDI-2 campaign, *Atmos. Meas. Tech.*, 13, 685-712, 2020. <https://doi.org/10.5194/amt-13-685-2020>
6. Franco, B., L. Clarisse, T. Stavrakou, J.-F. Muller, D. Taraborrelli, J. Hadji-Lazaro, J.W. Hannigan, F. Hase, D. Hurtmans, N. Jones, E. Lutsch, E. Mahieu, I. Ortega, M. Schneider, K. Strong, C. Vigouroux, C. Clerbaux, and P.-F. Coheur: Spaceborne measurements of formic and acetic acids: A global view of the regional sources. *Geophys. Res. Lett.*, 47, e2019GL086239, 2020. <https://doi.org/10.1029/2019GL086239>

7. Gamage, S. M., R. J. Sica, G. Martucci, and A. Haefele: A 1D Var retrieval of relative humidity using the ERA5 dataset for the assimilation of Raman lidar measurements. *J. Atmos. Oceanic Technol.*, **37**, 2051-2064, 2020. <https://doi.org/10.1175/JTECH-D-19-0170.1>
8. Kreher, K., M. Van Roozendaal, F. Hendrick, A. Apituley, E. Dimitropoulou, U. Frieß, A. Richter, T. Wagner, J. Lampel, N. Abuhassan, L. Ang, M. Anguas, A. Bais, N. Benavent, T. Bösch, K. Bognar, A. Borovski, I. Bruchkouski, A. Cede, K.L. Chan, S. Donner, T. Drosoglou, C. Fayt, H. Finkenzeller, D. Garcia-Nieto, C. Gielen, L. Gómez-Martín, N. Hao, B. Henzing, J. Herman, C. Hermans, S. Hoque, H. Irie, J. Jin, P. Johnston, J.K. Butt, F. Khokhar, T. Koenig, J. Kuhn, V. Kumar, C. Liu, J. Ma, A. Merlaud, A. Mishra, M. Müller, M. Navarro-Comas, M. Ostendorf, A. Pazmino, E. Peters, G. Pinardi, M. Pinharanda, A. Piters, U. Platt, O. Postolyakov, C. Prados-Roman, O. Puentedura, R. Querel, A. Saiz-Lopez, A. Schönhardt, S. Schreier, A. Seyler, V. Sinha, E. Spinei, K. Strong, F. Tack, X. Tian, M. Tiefengraber, J.-L. Tirpitz, J. van Gent, R. Volkamer, M. Vrekoussis, S. Wang, Z. Wang, M. Wenig, F. Wittrock, P. Xie, J. Xu, M. Yela, C. Zhang, and X. Zhao: Intercomparison of NO<sub>2</sub>, O<sub>4</sub>, O<sub>3</sub> and HCHO slant column measurements by MAX-DOAS and zenith-sky UV-visible spectrometers during CINDI-2, *Atmos. Meas. Tech.*, **13**, 2169-2208, 2020. <https://doi.org/10.5194/amt-13-2169-2020>
9. Kristoffersen, S.K., J.A. Langille, W.E. Ward: Improvements to the sensitivity and sampling capabilities of Doppler Michelson Interferometers, *OSAContinuum*, **4**, 30-46, 2021. <https://doi.org/10.1364/OSAC.387944>
10. Long, D.A., Reed, Z.D., Fleisher, A.J., Mendonca, J., Roche, S., and Hodges, J.T.: High-accuracy near-infrared carbon dioxide intensity measurements to support remote sensing. *Geophysical Research Letters*, **47**, e2019GL086344, 2020. <https://doi.org/10.1029/2019GL086344>
11. Lutsch, E., Strong, K., Jones, D. B. A., Blumenstock, T., Conway, S., Fisher, J. A., Hannigan, J. W., Hase, F., Kasai, Y., Mahieu, E., Makarova, M., Morino, I., Nagahama, T., Notholt, J., Ortega, I., Palm, M., Poberovskii, A. V., Sussmann, R., and Warneke, T.: Detection and Attribution of Wildfire Pollution in the Arctic and Northern Mid-latitudes using a Network of FTIR Spectrometers and GEOS-Chem, *Atmos. Chem. Phys.*, **20**, 12813–12851, 2020. <https://doi.org/10.5194/acp-20-12813-2020> Parker, R.J., A. Webb, H. Boesch, P. Somkuti, R. Barrio Guillo, A. Di Noia, N. Kalaitzi, J. Anand, P. Bergamaschi, F. Chevallier, L. Feng, N. M. Deutscher, D.G. Feist, D.W.T. Griffith, F. Hase, R. Kivi, I. Morino, J. Notholt, Y.-S. Oh, H. Ohyama, C. Petri, D.F. Pollard, C. Roehl, M.K. Sha, K. Shiomi, K. Strong, R. Sussmann, Y. Te, V.A. Velazco, T. Warneke, P.O. Wennberg, and D. Wunch. A Decade of GOSAT Proxy Satellite CH<sub>4</sub> Observations, **12**, 3383–3412, 2020 <https://doi.org/10.5194/essd-12-3383-2020>
12. Perro, C., T. J. Duck, G. Lesins, K. Strong and J. R. Drummond: Arctic Surface Properties and Their Impact on Microwave Satellite Water Vapor Column Retrievals. *IEEE Transactions on Geoscience and Remote Sensing*, doi:10.1109/TGRS.2020.2986302, 2020. <https://ieeexplore.ieee.org/document/9093844>

13. Reuter, M., Buchwitz, M., Schneising, O., Noël, S., Bovensmann, H., Burrows, J. P., Boesch, H., Di Noia, A., Anand, J., Parker, R. J., Somkuti, P., Wu, L., Hasekamp, O. P., Aben, I., Kuze, A., Suto, H., Shiomi, K., Yoshida, Y., Morino, I., Crisp, D., O'Dell, C. W., Notholt, J., Petri, C., Warneke, T., Velazco, V. A., Deutscher, N. M., Griffith, D. W. T., Kivi, R., Pollard, D. F., Hase, F., Sussmann, R., Té, Y. V., Strong, K., Roche, S., Sha, M. K., De Mazière, M., Feist, D. G., Iraci, L. T., Roehl, C. M., Retscher, C., and Schepers, D.: Ensemble-based satellite-derived carbon dioxide and methane column-averaged dry-air mole fraction data sets (2003–2018) for carbon and climate applications, *Atmos. Meas. Tech.*, 13, 789-819, 2020. <https://doi.org/10.5194/amt-13-789-2020>
14. Shepherd, M.G., C.E. Meek, W.K. Hocking, C.M. Hall, N. Partamies, F. Sigernes, A.H. Manson, and W.E. Ward: Multi-instrument study of the mesosphere-lower thermosphere dynamics at 80°N during the major SSW in January 2019, *J. Atmos. Solar-Terrestrial Physics*, 20, 2020. <https://doi.org/10.1016/j.jastp.2020.105427>
15. Strong, K., W.R. Simpson, K. Boggar, R. Lindenmaier, and S. Roche. 'Chapter 3: Trace Gases in the Arctic Atmosphere', pp 153-207. In *Physics and Chemistry of the Arctic Atmosphere*, edited by A. A. Kokhanovsky and C. Tomasi, Springer Polar Sciences Series, Springer Nature, Heidelberg. First edition, XIV, 717 pp, ISBN 978-3-030-33565-6, 2020. <https://www.springer.com/gp/book/9783030335656>
16. Vigouroux, C., B. Langerock, C.A. Bauer Aquino, T. Blumenstock, Z. Cheng, M. De Mazière, I. De Smedt, M. Grutter, J. W. Hannigan, N. Jones, R. Kivi, Lutsch, E. Loyola, D., E. Mahieu, M. Makarova, J.-M. Metzger, I. Morino, I. Murata, T. Nagahama, J. Notholt, I. Ortega, M. Palm, G. Pinardi, A. Röhl, D. Smale, W. Stremme, K. Strong, R. Sussmann, Y. Té, M. van Roozendaal, P. Wang, and H. Winkler: TROPOMI–Sentinel-5 Precursor formaldehyde validation using an extensive network of ground-based Fourier-transform infrared stations, *Atmos. Meas. Tech.*, 13, 3751-3767, 2020. <https://doi.org/10.5194/amt-13-3751-2020>
17. Yamanouchi, S., K. Strong, E. Lutsch, and D.B.A. Jones: Detection of HCOOH, CH<sub>3</sub>OH, CO, HCN, and C<sub>2</sub>H<sub>6</sub> in wildfire plumes transported over Toronto using ground-based FTIR measurements from 2002–2018. *J. Geophys. Res.: Atmos.*, 125, e2019JD031924, 2020. <https://doi.org/10.1029/2019JD031924>
18. Yang, X., A.-M. Blechschmidt, K. Boggar, A. McClure-Begley, S. Morris, I. Petropavlovskikh, A. Richter, H. Skov, K. Strong, D. Tarasick, T. Uttal, M. Vestenius, and X. Zhao: Pan-Arctic surface ozone: modelling vs measurements. *Atmos. Chem. Phys.*, **20**, 15937–15967, 2020. <https://doi.org/10.5194/acp-20-15937-2020> Zhao, X., D. Griffin, V. Fioletov, C. McLinden, A. Cede, M. Tiefengraber, M. Müller, K. Boggar, K. Strong, F. Boersma, H. Eskes, J. Davies, A. Ogyu, and S.C. Lee. Assessment of the quality of TROPOMI high-spatial-resolution NO<sub>2</sub> data products in the Greater Toronto Area, *Atmos. Meas. Tech.*, 13, 2131-2159, 2020. <https://doi.org/10.5194/amt-13-2131-2020>

## Submitted or In Press

1. Blumenstock, T., F. Hase, A. Keens, D. Czurlok, O. Colebatch, O. Garcia, D.W.T. Griffith, M. Grutter, J.W. Hannigan, P. Heikkinen, P. Jeseck, N. Jones, R. Kivi, E. Lutsch, M. Makarova, H.Kh. Imhasin, J. Mellqvist, I. Morino, T. Nagahama, J. Notholt, I. Ortega, M. Palm, U. Raffalski, M. Rettinger, J. Robinson, M. Schneider, C. Servais, D. Smale, W. Stremme, K. Strong, R. Sussmann, Y. Té, and V.A. Velazco. Technical note: Characterisation and potential for reducing optical resonances in FTIR spectrometers of the Network for the Detection of Atmospheric Composition Change (NDACC). *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2020-316>, in review, 2020. Submitted 7 August 2020.
2. Bogner, K., R. Alwarda, K. Strong, M.P. Chipperfield, S.S. Dhomse, J.R. Drummond, W. Feng, V. Fioletov, F. Goutail, B. Herrera, G.L. Manney, E.M. McCullough, L.F. Millan, A. Pazmino, K.A. Walker, T. Wizenberg, and X. Zhao. Unprecedented spring 2020 ozone depletion in the context of 20 years of measurements at Eureka, Canada. Submitted to *J. Geophys. Res. Atmos.*, 4 December 2020.
3. Dogniaux, M., C. Crevoisier, R. Armante, V. Capelle, T. Delahaye, V. Cassé, M. De Mazière, N. M. Deutscher, D.G. Feist, O.E. Garcia, D.W.T. Griffith, F. Hase, L.T. Iraci, R. Kivi, I. Morino, J. Notholt, D.F. Pollard, C.M. Roehl, K. Shiomi, K. Strong, Y. Té, V.A. Velazco, and T. Warneke. The Adaptable 4A Inversion (5AI): Description and first XCO<sub>2</sub> retrievals from OCO-2 observations. *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2020-403>, in review, 2020.
4. Kulawik, S. S., S. Crowell, D. Baker, J. Liu, K. McKain, C. Sweeney, S. C. Biraud, S. Wofsy, C. W. O'Dell, P. O. Wennberg, D. Wunch, C. M. Roehl, N. M. Deutscher, M. Kiel, D. W. T. Griffith, V. A. Velazco, J. Notholt, T. Warneke, C. Petri, M. De Mazière, M. K. Sha, R. Sussmann, M. Rettinger, D. F. Pollard, I. Morino, O. Uchino, F. Hase, D. G. Feist, S. Roche, K. Strong, R. Kivi, L. Iraci, K. Shiomi, M. K. Dubey, E. Sepulveda, O. E. G. Rodriguez, Y. Té, P. Jeseck, P. Heikkinen, E. J. Dlugokencky, M. R. Gunson, A. Eldering, D. Crisp, B. Fisher, and G. B. Osterman. Characterization of OCO-2 and ACOS-GOSAT biases and errors for CO<sub>2</sub> flux estimates, *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2019-257>, in review, 2019. Submitted 25 June 2019.
5. McCullough, E.M., R. Wing, and J.R. Drummond. Finely laminated Arctic mixed-phase clouds occur frequently and are correlated with snow. *Atmos. Chem. Phys. Discuss.*, <https://doi.org/10.5194/acp-2020-186>, in review, 2020. Submitted 27 February 2020
6. Ranjbar, K., N. T. O'Neill, L. Ivanescu, J. S. King, P. Hayes, Remote sensing of a high-Arctic, local dust event over Lake Hazen (Ellesmere Island, Nunavut, Canada), *Atmospheric Environment – short communications*, in revision, September, 2020
7. Roche, S., K. Strong, D. Wunch, J. Mendonca, C. Sweeney, B. Baier, S. C. Biraud, J.L. Laughner, G.C. Toon, and B.J. Connor. Retrieval of atmospheric CO<sub>2</sub> vertical profiles from

ground-based near-infrared spectra, *Atmos. Meas. Tech. Discuss.* [preprint], <https://doi.org/10.5194/amt-2020-429>, in review, 2020.

8. Tirpitz, J.-L., U. Frieß, F. Hendrick, C. Alberti, M. Allaart, A. Apituley, A. Bais, S. Beirle, S. Berkhout, K. Bognar, T. Bösch, I. Bruchkouski, A. Cede, K.L. Chan, M. den Hoed, S. Donner, T. Drosoglou, C. Fayt, M.M. Friedrich, A. Frumau, L. Gast, C. Gielen, L. Gomez-Martín, N. Hao, A. Hensen, B. Henzing, C. Hermans, J. Jin, K. Kreher, J. Kuhn, J. Lampel, A. Li, C. Liu, H. Liu, J. Ma, A. Merlaud, E. Peters, G. Pinardi, A. Pitters, U. Platt, O. Puentedura, A. Richter, S. Schmitt, E. Spinei, D. Stein Zweers, K. Strong, D. Swart, F. Tack, M. Tiefengraber, R. van der Hoff, M. van Roozendaal, T. Vlemmix, J. Vonk, T. Wagner, Y. Wang, Z. Wang, M. Wenig, M. Wiegner, F. Wittrock, P. Xie, C. Xing, J. Xu, M. Yela, C. Zhang, and X. Zhao. Intercomparison of MAX-DOAS vertical profile retrieval algorithms: studies on field data from the CINDI-2 campaign. *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2019-456>, in review, 2020, Submitted 27 November 2019.
9. Vicente-Luis, Andy, Samantha Tremblay, Joelle Dionne, Rachel Y.-W. Chang, Pierre F. Fogal, W. Richard Leaitch, Sangeeta Sharma, Felicia Kolongari, and Patrick L. Hayes, In situ optical and microphysical properties of tropospheric aerosols in the Canadian High Arctic from 2016 to 2019, *Atmos. Environ.*, submitted September 2020.

## Conference Presentations

1. Aboel Fetouh, Y., N. O'Neill, J.K. Kodros, J.R. Pierce, H. Lu, and K. Ranjbar, Comparisons of columnar aerosol parameters obtained from Arctic AERONET retrievals with GEOS-Chem-TOMAS simulations, CMOS remote conference, May 26, 2020.
2. Y. Aboel Fetouh, N. O'Neill, J.K. Kodros, J.R. Pierce, H. Lu, and K. Ranjbar. Comparisons of columnar aerosol parameters obtained from Arctic AERONET retrievals with GEOS-Chem-TOMAS simulations. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk
3. R. Alwarda, K. Bognar, and K. Strong. Long-term measurements of bromine monoxide and ozone in the Canadian high Arctic. 9th International DOAS Workshop, Virtual Meeting, 13-15 July, 2020. Online talk.
4. J.-P. Blanchet, Y. Blanchard, P. Gauthier, L. Pelletier, L. Coursol, Q. Libois, Y. Huang, A. Bourassa, D. Degenstein, K. Strong, Z. Mariani. The Thin Ice Clouds in Far IR Experiment (TICFIRE): A Potential Canadian Contribution to NASA A-CCP. American Geophysical Union Fall Meeting. Virtual Meeting, 7-11 December 2020.
5. K. Bognar, X. Zhao, K. Strong, R. Chang, U. Frieß, P. Hayes, A. McClure-Begley, S. Morris, S. Tremblay, and A. Vicente-Luis. Measurements of bromine monoxide over four halogen activation seasons in the Canadian high Arctic. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk

6. K. Bogner, X. Zhao, R. Alwarda, S. Beirle, V. Fioletov, U. Frieß, and K. Strong. NO<sub>2</sub> profiling using Pandora instruments in Toronto, Canada. 9th International DOAS Workshop, Virtual Meeting, 13-15 July, 2020. Online poster.
7. D. Fraser, W. Ward, P. Preusse, C. Strube, S. Kristoffersen, and D. Gamblin. Gravity Wave Observations and Tracing in the Northern Polar Atmosphere. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk.
8. P. Fogal and J. Gilbert. Science in the High Arctic - The Impact of High Arctic Weather Stations. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk.
9. Ivănescu, L., N.T. O'Neill, J.-P. Blanchet, Monitoring moisture transport into the Arctic UTLS and its role in cloud formation, CMOS remote conference, May 26, 2020.
10. L. Ivănescu, N.T. O'Neill, and J.-P. Blanchet. Monitoring moisture transport into the Arctic UTLS and its role in cloud formation. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk
11. A. Jalali, K. Walker, K. Strong, D. Wunch, J. Hedelius, E. Lutsch, S. Roche, T. Wizenberg, J.R. Drummond, R. Buchholz, and H. Worden. MOPITT Carbon Monoxide Validation with Canadian High Arctic Ground-based NDACC/TCCON FTIR Measurements. American Geophysical Union Fall Meeting. Virtual Meeting, 7-11 December 2020
12. A. Jalali, K. Walker, K. Strong, D. Wunch, J. Hedelius, R. Buchholz. S. Roche. T. Wizenberg. E. Lutsch. J. Drummond, and H. Worden. Using Canadian High Arctic Ground-based FTIR Measurements to Validate MOPITT Carbon Monoxide. ArcticChange 2020. Virtual Meeting. 7-10 December 2020. Online poster.
13. Jeffery, Paul, Kaley Walker, Lin Dan, James Drummond, Ellen Eckert, Pierre Fogal, Dejian Fu, Debora Griffin, Ashley Harrett, Felicia Kolonjari, Gloria Manney, and Kimberly Strong, "On the Development of Water Vapor Retrievals from the PARIS-IR Arctic Springtime Dataset", 54th Canadian Meteorological and Oceanography Society Congress, Ottawa, Ontario, 24 – 28 May 2020 (oral – alternate meeting held virtually 26 May – 15 June 2020)
14. P.S. Jeffery, K.A. Walker, L. Dan, J.R. Drummond, E. Eckert, P.F. Fogal, D. Fu, D. Griffin, A. Harrett, F. Kolonjari, G.L. Manney, and K. Strong. On the Development of Water Vapor Retrievals from the PARIS-IR Arctic Springtime Dataset. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk
15. P.S. Jeffery, K.A. Walker, L. Dan, J.R. Drummond, E. Eckert, P.F. Fogal, D. Fu, D. Griffin, A. Harrett, F. Kolonjari, G.L. Manney and K. Strong. Water Vapour Retrieval Development for a Portable Spectrometer in the Canadian High Arctic. American Geophysical Union Fall Meeting. Virtual Meeting, 7-11 December 2020.
16. S. Kristoffersen and W. Ward. Observations of inertia-gravity waves at high latitudes. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk

17. J. Laughner and the TCCON team. The GGG2020 TCCON Data Product. American Geophysical Union Fall Meeting. Virtual Meeting, 7-11 December 2020.
18. V. Pinnegar, R. Sica, R. Chang, E.M. McCullough, K. Strong, A. Wiacek, D. Wunch, J. Drummond, A. Haeferle, N. O'Neill, J. Welton, J.-P. Blanchet, P. Hayes, and D. Woolford. A New Canadian Network of Micro-Pulse Lidars for the Study of Wildfire and Pollutant Transport, Fog, and Clouds. American Geophysical Union Fall Meeting. Virtual Meeting, 7-11 December 2020.
19. V. Pinnegar, R. Sica, R. Chang, E. McCullough, K. Strong, A. Wiacek, D. Wunch, J. Drummond, A. Haeferle, N. O'Neill, E. Welton, J.-P. Blanchet, P. Hayes, and D. Woolford. A New Canadian Network of Micro-Pulse Lidars for the Study of Wildfire and Pollutant Transport, Fog, and Clouds. ArcticChange 2020. Virtual Meeting. 7-10 December 2020. Online poster.
20. Ranjbar, K., O'Neill, N. T., Ivanescu, L., Analysis of the exceptional Arctic-wide, smoke and volcanic UTLS fine-mode events during the summer of 2019 : comparison of TROPOMI, AERONET/AEROCAN, and CALIOP aerosol products for the SACIA (Signatures of Aerosol-Cloud Interaction over the Arctic) project, CMOS remote conference, May 26, 2020
21. Ranjbar, K., N. T. O'Neill, L. Ivanescu, Analysis of Polar Stratospheric Cloud (PSC) events during the winter of 2020: comparison of starphotometer, CALIOP and Aeolus products and the Microwave Limb Sounder (MLS) HNO<sub>3</sub> product, Polar AOD workshop, Lindenberg, Germany, Sept. 2, 2020b.
22. Ranjbar, K., N. T. O'Neill, L. Ivanescu, Cloud and aerosol interactions, Polar AOD workshop, Lindenberg, Germany, Sept. 2, 2020c.
23. K. Ranjbar, N. T. O'Neill, and L. Ivanscu. Analysis of the exceptional Arctic-wide, smoke and volcanic UTLS fine-mode events during the summer of 2019: comparison of TROPOMI, AERONET, AEROCAN, and CALIOP aerosol products for the SACIA (Signatures of Aerosol-Cloud Interaction over the Arctic) project. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk.
24. S. Roche, K. Strong, D. Wunch, J. Mendonca, G.C. Toon, and B.J. Connor. CO<sub>2</sub> profile retrieval. TCCON Virtual Meeting, 13-15 May 2020. Online presentation.
25. K. Strong, J.R. Drummond, R. Alwarda, K. Bognar, E. Eckert, P. Fogal, B. Herrera, E. Lutsch, S. Roche, T. Wizenberg, R.J. Sica, and K.A. Walker. Atmospheric Science at the Polar Environment Atmospheric Research Laboratory (PEARL). 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk
26. A. Tikhomirov, E. McCullough, J. Drummond, G. Farhani, R. Sica, A. Jalali, P. Fogal, K. Walker, and T. Leblanc. Lidar Stratospheric Ozone Measurements in Eureka. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk.

27. Walker, Kaley, Kimberly Strong, Pierre Fogal, James R. Drummond and the Canadian Arctic ACE/OSIRIS Validation Campaign Team, “Seventeen Years of the Canadian Arctic ACE/OSIRIS Validation Project at PEARL”, European Geosciences Union General Assembly: Sharing Geoscience Online, 4-8 May 2020. (display with online chat due to COVID-19)
28. W. Ward , A. Manson, M. Shepherd, W. Hocking, Q. Wu, C. Meek, S. Kristoffersen and D. Gamblin. Wave coupling across the mesopause: a multi-instrument view from the Canadian High Arctic. 52nd Canadian Meteorological and Oceanographic Society Congress. Virtual Meeting, 26 May - 15 June 2020. Online talk.
29. T. Wizenberg, B. Herrera, E. Lutsch, S. Roche, P. Fogal, and K. Strong. Eureka 2020 Site Report. NDACC IRWG Virtual Meeting, 14-15 May 2020. Online presentation.
30. T. Wizenberg, K. Strong, K.A. Walker, S. Roche, C. Zehner, I. Aben and J. Landgraf. Comparisons of TROPOMI CH<sub>4</sub> Measurements with ACE-FTS. NDACC IRWG Virtual Meeting, 14-15 May