

## Publication list

Kaisa Lakkala, FMI

30.9.2018

Ten most important publication in terms of the research plan are marked using bold font.

Peer-reviewed scientific articles:

### 2018

G. H. Bernhard, V. E. Fioletov, J.-U. Grooß, I. Ialongo, B. Johnsen, **K. Lakkala**, G. L. Manney, and R. Müller, 2018: Ozone and UV radiation [in “State of the Climate in 2017”]. Bull. Amer. Meteor. Soc., 99 (8), S171–S173, doi:10.1175/2018BAMSStateoftheClimate.1.

I. Fountoulakis, C. S. Zerefos, A. F. Bais, J. Kapsomenakis, M.-E. Koukouli, N. Ohkawara, V. Fioletov, H. De Backer, **K. Lakkala**, T. Karppinen, and A. R. Webb, 2018: 25 years of spectral UV-B measurements over Canada, Europe and Japan: trends and effects from changes in ozone, aerosols, clouds and surface reflectivity. Accepted in Comptes Rendus Geoscience.

**Lakkala, K.**, Arola, A., Gröbner, J., León-Luis, S. F., Redondas, A., Kazadzis, S., Karppinen, T., Karhu, J. M., Egli, L., Heikkilä, A., Koskela, T., Serrano, A., and Vilaplana, J. M.: Performance of the FMI cosine error correction method for the Brewer spectral UV measurements, Atmos. Meas. Tech., 11, 5167-5180, <https://doi.org/10.5194/amt-11-5167-2018>, 2018.

**Lakkala, K.**, Redondas, A., Meinander, O., Thölix, L., Hamari, B., Almansa, A. F., Carreno, V., Deferrari, G., Ochoa, H., Bernhard, G., Sanchez, R., and de Leeuw, G.: UV measurements at Marambio and Ushuaia during 2000–2010, Atmos. Chem. Phys., <https://doi.org/10.5194/acp-2017-1193>, accepted, 2018.

Lindfors, A. V., Kujanpää, J., Kalakoski, N., Heikkilä, A., **Lakkala, K.**, Mielonen, T., Sneep, M., Krotkov, N. A., Arola, A., and Tamminen, J.: The TROPOMI surface UV algorithm, Atmos. Meas. Tech., 11, 997-1008, <https://doi.org/10.5194/amt-11-997-2018>, 2018.

T. Pulli, T. Karppinen, S. Nevas, P. Kärhä, **K. Lakkala**, J. M. Karhu, M. Sildoja, A. Vaskuri, M. Shpak, F. Manoocheri, L. Doppler, S. Gross, J. Mes & E. Ikonen (2018) Out-of-Range Stray Light Characterization of Single-Monochromator Brewer Spectrophotometers, Atmosphere-Ocean, 56:1, 1-11, DOI: [10.1080/07055900.2017.1419335](https://doi.org/10.1080/07055900.2017.1419335)

### 2017

G. H. Bernhard, V. E. Fioletov, J.-U. Grooß, I. Ialongo, B. Johnsen, **K. Lakkala**, G. L. Manney, and R. Müller, 2017: Ozone and UV radiation in State of the Climate in 2016, Bull. Amer. Meteor. Soc., 98(8), S93–S98, doi:10.1175/2017BAMSStateoftheClimate.1.

Fountoulakis, I., Redondas, A., Lakkala, K., Berjon , A., Bais, A. F., Doppler, L., Feister, U., Heikkila, A., Karppinen, T., Karhu, J. M., Koskela, T., Garane, K., Fragkos, K., and Savastiouk, V.: Temperature dependence of the Brewer global UV measurements, *Atmos. Meas. Tech.*, 10, 4491–4505, <https://doi.org/10.5194/amt-10-4491-2017>, 2017.

Jääskeläinen T, Itkonen ST, Lundqvist A et al. (2017) The positive impact of general vitamin D food fortification policy on vitamin D status in a representative adult Finnish population: evidence from an 11-y follow-up based on standardized 25-hydroxyvitamin D data. *Am J Clin Nutr* 105, 1512–1520.

Karppinen T, Ala-Houhala M, Ylianttila L, et al. The effect of vernal solar UV radiation on serum 25-hydroxyvitamin D concentration depends on the baseline level: observations from a high latitude in Finland. *International Journal of Circumpolar Health*. 2017;76(1):1272790.  
doi:10.1080/22423982.2016.1272790

Lakkala, K., Heikkilä, A., Kärhä, P., Ialongo, I., Karppinen, T., Karhu, J. M., Lindfors, A. V., and Meinander, O., 2017: 25 years of spectral UV measurements at Sodankylä, AIP Conference Proceedings 1810, 110006 (2017), <http://doi.org/10.1063/1.4975568>

Wandji Nyamsi, W., Pitkänen, M. R. A., Aoun, Y., Blanc, P., Heikkilä, A., Lakkala, K., Bernhard, G., Koskela, T., Lindfors, A. V., Arola, A., and Wald, L.: A new method for estimating UV fluxes at ground level in cloud-free conditions, *Atmos. Meas. Tech.*, 10, 4965-4978, <https://doi.org/10.5194/amt-10-4965-2017>, 2017.

## 2016

Bernhard G, Ialongo I, Groos J.-U., Hakkarainen J, Johnson B, Manney G.-L., Fioletov V, Heikkilä A, Lakkala K, 2016: Ozone and UV radiation. In: State of the Climate in 2015. J. Blunden and D. S. Arndt, Eds., Bull. Amer. Meteor. Soc., 97(8), S152-S153.

Heikkilä A, Kaurola J, Lakkala K, Karhu J, Kyrö E, Koskela T, Engelsen O, Slaper H, Seckmeyer G, 2016: European UV DataBase (EUVDB) as a repository and quality analyser for solar spectral UV irradiance monitored in Sodankylä *Geosci. Instrum. Method. Data Syst.*, 5, 333-345, doi:10.5194/gi-5-333-2016.

Heikkilä A, Mäkelä JS, Lakkala K, Meinander O, Kaurola J, Koskela T, Karhu J, Karppinen T, Kyrö E, De Leeuw G, 2016: In search of traceability: two decades of calibrated Brewer UV measurements in Sodankylä and Jokioinen *Geosci. Instrum. Method. Data Syst.*, 5, 531-540, doi:10.5194/gi-5-531-2016.

Karppinen T, Lakkala K, Karhu J.M., Heikkinen P, Kivi R, Kyrö E, 2016: Brewer spectrometer total ozone column measurements in Sodankylä *Geosci. Instrum. Method. Data Syst.*, 5, 229-239, doi:10.5194/gi-5-229-2016

Lakkala K, Suokanerva H, Karhu J, Aarva A, Poikonen A, Karppinen T, Ahponen M, Hannula H, Kontu A, Kyrö E, 2016: Optical laboratory facilities at the Finnish Meteorological Institute ? Arctic Research Centre Geosci. Instrum. Method. Data Syst., 5, 315?320, 2016, doi:10.5194/gi-5-315-2016

Lakkala K, Jaros A, Aurela M, Tuovinen J-P, Kivi R, Suokanerva H, Karhu J, Laurila T, 2016: Radiation measurements at the Pallas-Sodankylä Global Atmosphere Watch station - diurnal and seasonal cycles of ultraviolet, global and photosynthetically-active radiation Boreal Env. Res. 21: 427-444. ISSN 1797-2469

Mäkelä J.S., Lakkala K, Koskela T, Karppinen T, Karhu J, Savastiouk V, Suokanerva H, Kaurola J, Arola A, Lindfors A, Meinander O, De Leeuw G, Heikkilä A, 2016: Data flow of spectral UV measurements at Sodankylä and Jokioinen Geosci. Instrum. Method. Data Syst., 5, 193-203, doi:10.5194/gi-5-193-2016.

2015

Bernhard, G., Arola, A., Dahlback, A., Fioletov, V., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Svendby, T., and Tamminen, J.: Comparison of OMI UV observations with ground-based measurements at high northern latitudes, Atmos. Chem. Phys., 15, 7391-7412, doi:10.5194/acp-15-7391-2015, 2015.

Bernhard, G. G. Manney, J.-U. Grooß, R. Müller, K. Lakkala, V. Fioletov, T. Koskela, A. Heikkilä, and B. Johnsen. (2015). Ozone and UV radiation. In: State of the Climate in 2014. J. Blunden and D. S. Arndt, Eds., *Bull. Amer. Meteor. Soc.*, 96(7), S131-S133.

Tomi Karppinen, Alberto Redondas, Rosa D. García, Kaisa Lakkala, C. T. McElroy & Esko Kyrö (2015) Compensating for the Effects of Stray Light in Single-Monochromator Brewer Spectrophotometer Ozone Retrieval, Atmosphere-Ocean, 53:1, 66-73, DOI: [10.1080/07055900.2013.871499](https://doi.org/10.1080/07055900.2013.871499)

2014

Bernhard, G., Fioletov, V., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Svendby, T and Dahlback, A, 2014: [The Arctic] UV Radiation [in “State of the Climate in 2013”]. *Bull. Amer. Meteor. Soc.*, 95(7), S121-S123.

Karppinen, T., Redondas, A., García, R., Lakkala, K., McElroy, C. T. and Kyrö, E., 2014: Compensating for the Effects of Stray Light in Single-Monochromator Brewer Spectrophotometer Ozone Retrieval, Atmosphere-Ocean, doi:10.1080/07055900.2013.871499.

Eleftheratos, K., Kazadzis, S., Zerefos, C. S., Tourpali, K., Meleti, C., Balis, D., Zyrichidou, I., Lakkala, K., Feister, U., Koskela, T., Heikkilä, A. and Karhu, J.M., 2014: Ozone and

spectroradiometric UV changes in the past 20 years over high latitudes, *Atmosphere-Ocean*, doi:10.1080/07055900.2014.919897.

2013

Bernhard, G., Dahlback, A., Fioletov, V., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., and Svendby, T. M., 2013: High levels of ultraviolet radiation observed by ground-based instruments below the 2011 Arctic ozone hole, *Atmos. Chem. Phys.*, 13, 10573-10590, doi:10.5194/acpd-13-10573-2013.

Bernhard, G., Fioletov, V., Grooß, J.-U., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Manney, G., Müller, R., and Svendby, T., 2013: Ozone and UV radiation, Chapter C in: Jeffries, M. O., and J. Richter-Menge, 2013: [The Arctic] Overview [in “State of the Climate in 2012”]. *Bull. Amer. Meteor. Soc.*, 93(7), S143.

Karpechko, A. YU , Backman, L., Thölix, L., Ialongo, I., Andersson, M., Fioletov, V. , Heikkilä, A. Johnsen, B., Koskela, T., Kyrölä, E., Lakkala, K., Myhre, C. L., Rex, M., Sofieva, V.F., Tamminen, J. and Wohltmann, I., 2013: The link between springtime total ozone and summer UV radiation in northern hemisphere extratropics. *J. Geophys. Res.-A*, 118, 8649–8661,10.1002/jgrd.50601.

2012

Bernhard, G., Manney, G. , Fioletov, V., Grooß, J.-U. , Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Müller, R., Myhre, C. L. and Rex. M., 2012: Ozone and UV radiation. In: State of the Climate in 2011. J. Blunden and D.S. Arndt, Eds., *Bull. Amer. Meteor. Soc.*, 93(7), S129–S132.

Bernhard, G., Manney, G., Fioletov, V., Grooß, J.-U., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Müller, R., Lund Myhre, C. and Rex, M., 2012: Ozone and UV Radiation. In: NOAA Arctic Report Card: Update for 2012, J.-Richter-Menge, M. O. Jeffries and, J. Overland, Eds., 2012.

Taulavuori, K., Keränen, J., Suokanerva, H., Lakkala, K., Huttunen, S., Laine, K. and Taulavuori, E., 2012: Effects of UV radiation on frost hardiness of, evergreen and deciduous, dwarf shrubs and tree seedlings in the subarctic, *Physiologia Plantarum*, 145, 516-526, doi:10.1111/j.1399-3054.2011.01559.x.

2011

Bernhard, G., Manney, G., Fioletov, V., Grooß, J.-U., Heikkilä, A., Johnsen, B., Koskela, T., Lakkala, K., Müller, R., Lund Myhre, C. and Rex, M., 2011: Ozone and UV radiation in Arctic Report Card 2011, <http://www.arctic.noaa.gov/reportcard>.

2010

Kaurola, J., Lindfors, A., Lakkala, K., Hansen, G., Josefsson, W., Vuilleumier, L., Feister, U. and Slaper, H., 2010: On the usability of the ERA-40 reanalysis in the estimation of past surface UV radiation over Europe, *J. Geophys. Res.*, 115, D24107, doi:10.1029/2010JD013810.

Lappalainen N, Huttunen S, Suokanerva H, Lakkala K., 2010: Seasonal acclimation of the moss *Polytrichum juniperinum* Hedw. to natural and enhanced ultraviolet radiation. *Env. Poll.*, 158, (3), 891-900.

2009

Heikkilä A, Kazadzis S, Tolonen-Kivimäki O, Meinander O, Lindfors A, Lakkala K., Koskela T, Kaurola J, Sormanen A, Kärhä P, Naula-Iltanen A, Syrjälä S, Kaunismäki M, Juhola J, Ture T, Feister U, Kouremeti N, Bais A, Vilaplana JM, Rodriguez JJ, Guirado C, Cuevas E, Koskinen J, 2009: Effects of terrestrial UV radiation on selected outdoor materials: an interdisciplinary approach. Herman JR, Gao W (editors). *Ultraviolet and Visible Ground- and Space-based Measurements, Trace Gases, Aerosols and Effects VI*. Proc. SPIE Vol. 7462 74620G (2009); doi:10.1117/12.826459.

Lindfors, A., Heikkilä, A., Kaurola, J., Koskela, T. and Lakkala, K., 2009: Reconstruction of solar spectral surface UV irradiances using radiative transfer simulations. *Photochem. Photobiol.*, 85, 1233-1239.

Lindfors, A., Tanskanen, A., Arola, A., van der A, R., Bais, A., Feister, U., Janouch, M., Josefsson, W., Koskela, T., Lakkala, K., den Outer, P. N., Smedley, A. R. D., Slaper, H. and Webb, A. R., 2009: The PROMOTE UV Record: Toward a Global Satellite-Based Climatology of Surface Ultraviolet Irradiance, *Selected Topics in IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, 2,(3), 207 -212, doi:10.1109/JSTARS.2009.2030876

Martz, F., Turunen, M., Julkunen-Tiitto, R., Lakkala, K. and Sutinen, M.-L., 2009: Effect of the temperature and the exclusion of UVB radiation on the phenolics and iridoids in *Menyanthes trifoliata* L. leaves in the subarctic. *Env. Poll.*, 157, 3471-3478, doi:10.1016/j.envpol.2009.06.022.

2008

Hassinen S., Tamminen J., Tanskanen A., Leppelmeier G., Mälkki A., Koskela T., Karhu J. M., Lakkala K., Veefkind P., Krotkov N., Aulamo O., 2008: Description and validation of the OMI very fast delivery products. *J. Geophys. Res.*, 113, D16S35, doi:10.1029/2007JD008784.

Krywult, M., Smykla, J., Kinnunen, H., Martz, F., Sutinen, M.-L., Lakkala, K. and Turunen, M., 2008: Influence of Solar UV radiation on the Nitrogen Metabolism in Needles of Scots Pine (*Pinus sylvestris* L.), *Env. Poll.*, 156, 1105-1111, doi:10.1016/j.envpol.2008.04.009.

Lakkala, K., Arola, A., Heikkilä,A., Kaurola, J., Koskela, T., Kyrö, E., Lindfors, A., Meinander, O., Tanskanen, A., Gröbner, J. and Hülsen, G., 2008: Quality assurance of the Brewer spectral UV measurements in Finland. *Atmos. Chem. Phys.*, 8, 3369-3383.

Meinander, O., Kontu, A., Lakkala, K., Heikkilä, A., Ylianttila, L. and Toikka, M., 2008: Diurnal variations in the UV albedo of arctic snow. *Atmos. Chem. Phys.*, 8, 6551-6563.

Redondas, A., Torres, C., Meinander, O., Lakkala, K., García, R., Cuevas, E., Ochoa, H., DeFerrari, G. and Díaz, S., 2008: Antarctic network of lamp-calibrated multichannel radiometers for continuous ozone and UV radiation data. *Atmos. Chem. Phys. Discuss.*, 8, 3383-3404, 2008.

2007

Lindfors, A., Kaurola, J., Arola, A., Koskela, T., Lakkala, K., Josefsson, W., Olseth, J. A., Johnsen, B., 2007: A method for reconstruction of past UV radiation based on radiative transfer modeling: applied to four stations in northern Europe. *J. Geophys. Res.*, 112, D23201, doi:10.1029/2007JD008454.

Tanskanen, A., Lindfors, A., Määttä, A., Krotkov, N., Herman, J., Kaurola, J., Koskela, T., Lakkala, K., Fioletov, V., Bernhard, G., McKenzie, R., Kondo, Y., O'Neill, M., Slaper, H., den Outer, P., Bais, A., Tamminen, J., 2007: Validation of Daily Erythemal Doses from OMI with Ground-Based UV Measurement Data. *J. Geophys. Res.*, 112, D2S44, doi:10.1029/2007JD008830.

2005

Huttunen S., T. Taipale, N.M. Lappalainen, E. Kubin, K. Lakkala, and J. Kaurola, 2005: Environmental specimen bank samples of Pleurozium schreberi and Hylocomium splendens as indicators of the radiation environment at the surface. *Environmental Pollution*, Volume 133, Issue 2, January 2005, Pages 315-326.

Lakkala, K., A. Redondas, O. Meinander, C. Torres, T. Koskela, E. Cuevas, P. Taalas, A. Dahlback, G. Deferrari, K. Edvardsen, H. Ochoa, 2005: Quality Assurance of the Solar UV Network in the Antarctic. *J. Geophys. Res.*, 110, D15101, doi:10.1029/2004JD005584.

2004

Huttunen S., T. Taipale, N.M. Lappalainen, E. Kubin, K. Lakkala and J. Kaurola, 2004. Environmental specimenbank samples of Pleurozium schreberi and Hylocomium splendes as indicators of the radiation environment at the surface. *Environmental Pollution* 133 (2005)315-326.

2003

Arola A, Lakkala K, Bais A, Kaurola J, Meleti C, Taalas P, 2003: Factors affecting short- and long-term changes of spectral UV irradiance at two European stations. *J.Geophys. Res.*, 108(D17), 4549, doi:10.1029/2003JD003447.

Lakkala K, Kyrö E, Turunen T., 2003: Spectral UV Measurements at Sodankylä during 1990-2001. *J. Geophys. Res.*, 108 (D199, 4621, 10.1029/2002JD003300.

Meinander O., W. Josefsson, J. Kaurola, T. Koskela and K. Lakkala, 2003. Spike detection and correction in Brewer spectroradiometer UV spectra. *Optical Engineering* 42(6), p. 1812-1819.

Turunen M. , M.-L. Sutinen, K. Derome, M. Krywult, J. Smykla, S. King, K. Lakkala, 2003. Ecophysiological responses of subarctic Scots pines to ultraviolet (UV) radiation. Special Issue for

the 70<sup>th</sup> Anniversary of Professor Krystyna Grodzinska. Polish Botanical Studies. Polish Botanical Studies 19: 143–150, 2005

2002

Turunen M., M.-L. Sutinen, K. Derome, Y. Norokorpi and K. Lakkala, 2002. Effects of solar UV radiation on birch and pine seedlings at the sub-Arctic. Polar Record, 38(206), p. 233-240.

2001

De Backer, H., Koepke, P., Bais, A., de Cabo, X., Frei, T., Gillotay, D., Haite, C., Heikkilä, A., Kazantzidis, A., Koskela, T., Kyrö, E., Lapeta, B., Lorente, J., Masson, K., Mayer, B., Plets, H., Redondas, A., Renaud, A., Schauberger, G., Schmalwieser, A., Schwander, H. and Vanicek, K., 2001, Comparison of measured and modelled uv indices for the assessment of health risks. Met. Apps, 8: 267–277. doi:10.1017/S1350482701003024

Publications intended for the general public, linked to the applicant's research:

Lakkala K., 2014: UV measurements in the Antarctic, In FINNARP Science and Support in Antarctica, Finnish Meteorological Institute, Finnish Antarctic Research Program (FINNARP), p. 30 -31. ISBN 978-951-697-842-3

[http://www.antarctica.fi/documents/30106/107630/FINNARP\\_web.pdf/29f4aeaa-5260-4b42-8e75-d6d0864df23b](http://www.antarctica.fi/documents/30106/107630/FINNARP_web.pdf/29f4aeaa-5260-4b42-8e75-d6d0864df23b)

Koskela T, Lakkala K, Backman L., 2011: Vaihteleva UV-ilmastomme in Ilmastokatsaus 9/2011, Ilmatieteen laitos.

Theses:

Lakkala, K., 2010: High-quality polar UV measurements: Scientific analyses and transfer of the irradiance scale. Finnish Meteorological Institute, Contributions No. 86, Helsinki.