

Danijel Belušić

Swedish Meteorological and Hydrological Institute (SMHI)
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EDUCATION:

Graduate Certificate in Academic Practice (GCAP), 2012

A Monash University graduate diploma aimed at developing teaching, research and leadership skills.

Ph.D. in Physics/Geophysics; October 2006

M.Sc. in Physics/Geophysics; October 2004

B.Sc. in Physics/Geophysics; July 2001

University of Zagreb, Zagreb, Croatia.

PROFESSIONAL EXPERIENCE:

HARMONIE-Climate consortium project leader; 2019 – present

HARMONIE-Climate (HCLIM) consortium for regional climate model development comprising AEMET (Spain), DMI (Denmark), FMI (Finland), KNMI (the Netherlands), Met Éireann (Ireland), MET Norway and SMHI (Sweden).

Research leader; 2019 – present

Rosby Centre, SMHI, Norrköping, Sweden

Researcher-climate scientist; 2016 – 2019

Rosby Centre, SMHI, Norrköping, Sweden

Researcher-meteorologist; 2015 – 2016

Centre for Ecology and Hydrology, Wallingford, U.K.

University Lecturer; 2011 – 2015

School of Mathematical Sciences and School of Earth, Atmosphere and Environment, Monash University, Melbourne, Australia

Docent; 2008 – 2011

Senior Research Assistant; 2006 – 2008

Research Assistant; 2001 – 2006

Department of Geophysics, Faculty of Science, University of Zagreb, Zagreb, Croatia.

Participation in the following projects:

- FORMAS: 'Effectively designing and communicating next generation climate simulations over Sweden – EDUCAS' (2020-2022) – PI
- H2020: 'European Climate Prediction system – EUCP' (2017-2021) – PI for SMHI and WP3 co-lead
- BiodivERSA: 'Scenario-based decision support for policy planning and adaptation to future changes in biodiversity and ecosystem services – BioDiv-Support' (2018-2022) - Researcher
- FORMAS: 'Heat stress in Swedish cities and the role of urban nature – GreenWave' (2019-2021) - Researcher
- H2020: 'Improving Predictions and Management of Hydrological Extremes – IMPREX' (2015-2019) – Researcher
- FCFA: 'Future resilience for African cities and lands – FRACTAL' (2015-2019) – Researcher
- Copernicus C3S: 'Urban SIS: Climate Information for European Cities' (2015-2017)
- NERC: 'Vegetation Effects on Rainfall in West Africa' (2015-2017) – Researcher
- NERC: 'Interaction of Convective Organization and Monsoon Precipitation, Atmosphere, Surface and Sea' (2015-2018) - Researcher
- Australian Research Council DP: 'The Southern Ocean boundary layer: winds, turbulence, sea spray and clouds' (2015-2017) – Chief Investigator
- Australian Research Council LIEF (2015) – Chief Investigator
- Monash University ECR Grants (three grants in 2012 and 2013) – Chief Investigator
- Croatian Science Foundation: 'Characteristics of Turbulence of Bora Wind (CATURBO)' (2013 – 2015) – Collaborator
- Austrian Climate and Energy Fund: 'High resolution atmospheric modelling in complex terrain for future climate simulations (HIRMOD)' (2009 – 2011) – External Expert
- FP7: 'SEE-GRID-SCI' (2008 – 2010) – Scientific Coordinator for the Department of Geophysics
- FP6: 'EUFAR': 'Sub-Mesoscale Variability and Diffusion in Low Wind Speed Conditions (MESOVAR)' (2008) – Lead Scientist
- Croatian Ministry of Science, Education and Sports: 'Air Quality over Complex Topography' (2007 – 2013) – Researcher
- The Research Council of Norway: 'High Resolution Environmental Modelling and Evaluation Programme for Croatia (EMEP4HR)' (2006 – 2009) – Researcher
- Italian Ministry of Foreign Affairs: 'Adriatic Sea Integrated Coastal Areas and River Basin Management System Extended Project (ADRICOSM-EXT)' (2005 – 2006) – Researcher
- Croatian Ministry of Science, Education and Sports: iProject 'Weather and Climate of the Croatian Coast' (2005 - 2006)
- Croatian Ministry of Science, Education and Sports: 'Atmosphere-Adriatic System' (2002 – 2006) – Researcher
- Croatian Ministry of Science, Education and Sports: 'Air-Sea Interaction' (2001 – 2002) – Researcher

Fulbright postdoctoral research visit; 2010

College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, Oregon, USA. Advisor: Larry Mahrt.

Four-month research visit; 2006/2007

College of Oceanic and Atmospheric Sciences, Oregon State University, Corvallis, Oregon, USA.

RECENT WORK:

- Developing regional climate models
- Understanding land-atmosphere interactions: effects of deforestation and irrigation on cloud and precipitation.
- Developing geophysical time series analysis techniques.
- Submesoscale meandering motions in the atmospheric boundary layer: origin, statistics and effects on dispersion. Emphasis on low wind speed conditions.
- Field experiments for measuring turbulence in the ABL, including flux towers, horizontal networks, and the development of an instrumented car for mobile turbulence measurements.
- Mesoscale, turbulence and air pollution modeling.
- ABL over the Southern Ocean.
- Dynamics of the local, topography modified, wind bora – experimental and theoretical study.
- Dynamics of atmospheric processes over complex terrain – e.g., gravity waves, convective processes, orographic influences on local winds.
- Atmospheric processes over the Adriatic Sea.

TEACHING QUALIFICATIONS:

Experience in teaching and supervision at Monash University and University of Zagreb:

1. Courses taught: 'Boundary-Layer Meteorology', 'Clouds, Weather and Forecasting', 'The Science of Climate', 'Engineering Mathematics', 'Introduction to geophysical fluid dynamics', 'Introduction to meteorology', 'Selected chapters in meteorology', 'Meteorological practicum', 'Dynamic meteorology 2, 3 & 4' (tutor), 'Synoptic meteorology' (tutor), 'Meteorological measurements' (tutor).
2. Co-creator of two new courses: 'Fundamentals of atmospheric modelling' and 'Selected chapters in meteorology'.
3. Supervision of several Msc (5) and PhD (5) students.

Initial Training for Lecturers in Higher Education

A program organized by the Association for the Development of Higher Education "Universitas" and the University of Rijeka in the academic year 2003/2004, Rijeka, Croatia.

HONORS AND AWARDS:

- Invited scientific committee theme leader at the WINABL workshop at NCAR, Boulder, Colorado, 2012. [Theme: Model parameterizations of wave-turbulence interaction in the stable boundary layer.]
- 2010 WMO Professor Mariolopoulos Trust Fund Award.
- Fulbright postdoctoral visiting research scholarship for 2010.
- Yearly Award to Young Scientists in 2007, awarded by the Society of University Teachers, Scholars and Other Scientists, Zagreb.
- Young Student Travel Award, awarded by the European Meteorological Society, 2004.
- Ministry of Science and Technology of the Republic of Croatia fellowship, 1996-2000.
- Faculty Council Award for the best student at the Department of Geophysics, Faculty of Science, University of Zagreb in the academic year 1998/1999.

EDUCATIONAL TRAVEL AND TRAINING:

- *Developing management skills*, NERC CEH, Wallingford, UK, 2015.
- *Future Research Leaders Program*, Monash University, Melbourne, Australia, 2012.
- ACCENT - CMAS Training Workshop on Air Quality Modeling, Sofia, Bulgaria, 30 July – 8 August 2006.
- Summer School on Mountain Meteorology: *Modification of Airflow by Mountains*, Trento, Italy, 26–30 August 2002.
- Spring Colloquium on the Physics of Weather and Climate: *Regional Weather Prediction Modelling and Predictability*, Miramare-Trieste, Italy, 8–19 April 2002.

ADDITIONAL REMARKS:

- Reviewer for granting bodies and international journals: *WMO, Weather and Forecasting, Tellus A, Quarterly Journal of the Royal Meteorological Society, Pure and Applied Geophysics, Physica A, Meteorology and Atmospheric Physics, Meteorologische Zeitschrift, Journal of Geophysical Research, Journal of Climate, Journal of the Atmospheric Sciences, Journal of Applied Meteorology and Climatology, Journal of Advances in Modeling Earth Systems, International Journal of Climatology, Geophysical Research Letters, Geofizika, Bulletin of the American Meteorological Society, Boundary-Layer Meteorology, Atmospheric Research, Atmospheric Pollution Research, Atmospheric Environment, Atmosphere, and Annales Geophysicae.*

BIBLIOGRAPHY:

Book chapters:

1. Vercauteren, N., Belušić, D., 2019: Flow Structures and Scale Interactions in Stable Atmospheric Boundary Layer Turbulence. In: *Turbulent Cascades II*, eds. Gorokhovski, Mikhael, Godeferd, Fabien S., ERCOFTAC Series **26**, Springer, Cham, pp. 275-281, doi: 10.1007/978-3-030-12547-9_29.
2. Ulbrich, U., Lionello, P., Belušić, D., Jacobeit, J., Knippertz, P., Kuglitsch, F. G., Leckebusch, G. C., Luterbacher, J., Maugeri, M., Maheras, P., Nissen, K. M., Pavan, V., Pinto, J. G., Saaroni, H., Seubert, S., Toreti, A., Xoplaki, E., Ziv, B., 2012: Climate of the Mediterranean: synoptic patterns, temperature, precipitation, winds, and their extremes. In: *The Climate of the Mediterranean Region - From the Past to the Future*, ed. Piero Lionello, Elsevier, Amsterdam, pp. 301-346.

Journal publications:

1. Grisogono, B., Sun, J., Belušić, D., 2020: A note on MOST and HOST for turbulence parameterization. *Q. J. R. Meteorol. Soc.*, accepted.
2. Radilović, S., Koračin, D., Denamiel, C., Belušić, D., Güttler, I., Vilibić, I., 2020: Simulated and observed air temperature trends in the eastern Adriatic. *Atmos. Sci. Lett.*, **21**, e951, doi: 10.1002/asl.951.
3. Gidhagen, L., Olsson, J., Amorim, J., Asker, C., Belušić, D., Carvalho, A., Engardt, M., Hundecha, Y., Körnich, H., Lind, P., Lindstedt, D., Olsson, E., Rosberg, J., Segersson, D., Strömbäck, L., 2020: Towards climate services for European cities: Lessons learnt from the Copernicus project Urban SIS. *Urban Clim.*, **31**, 100549, doi: 10.1016/j.uclim.2019.100549.
4. Wu, M., Nikulin, G., Kjellström, E., Belušić, D., Jones, C., Lindstedt, D., 2019: The impact of RCM formulation and resolution on simulated precipitation in Africa, *Earth Syst. Dynam. Discuss.*, doi: 10.5194/esd-2019-55.
5. Belušić, D., de Vries, H., Dobler, A., Landgren, O., Lind, P., Lindstedt, D., Pedersen, R. A., Sánchez-Perrino, J. C., Toivonen, E., van Ulft, B., Wang, F., Andrae, U., Batrak, Y., Kjellström, E., Lenderink, G., Nikulin, G., Pietikäinen, J.-P., Rodríguez-Camino, E., Samuelsson, P., van Meijgaard, E., Wu, M., 2019: HCLIM38: A flexible regional climate model applicable for different climate zones from coarse to convection permitting scales, *Geosci. Model Dev. Discuss.*, doi: 10.5194/gmd-2019-151, accepted.
6. Vercauteren, N., Boyko, V., Kaiser, A., Belušić, D., 2019: Statistical investigations of flow structures in different regimes of the stable boundary layer. *Boundary-Layer Meteorol.*, **173**, 143–164, doi: 10.1007/s10546-019-00464-1.
7. Belušić, D., Strandberg, G., Fuentes-Franco, R., Jukimenko, A., 2019: Afforestation reduces cyclone intensity and precipitation extremes over Europe. *Environ. Res. Lett.*, **14**, 074009, doi: 10.1088/1748-9326/ab23b2 (highlighted in The Guardian and Physics World).
8. Lenderink, G., Belušić, D., Fowler, H., Kjellström, E., Lind, P., van Meijgaard, E., van Ulft, B., de Vries, H., 2019: Systematic increases in the thermodynamic response of hourly precipitation extremes in an idealized warming experiment with a convection-permitting climate model. *Env. Res. Lett.*, **14**, 074012, doi: 10.1088/1748-9326/ab214a.

9. Turner, A. G., Bhat, G. S., Martin, G. M., et al., 2019: Interaction of convective organization with monsoon precipitation, atmosphere, surface and sea: The 2016 INCOMPASS field campaign in India. *Q. J. R. Meteorol. Soc.*, <https://doi.org/10.1002/qj.3633>.
10. Barton, E. J., Taylor, C. M., Parker, D. J., Turner, A. G., Belušić, D., Böing, S. J., Brooke, J. K., Harlow, R. C., Harris, P. P., Hunt, K., Jayakumar, A., Mitra, A. S., 2019: A case-study of land-atmosphere coupling during monsoon onset in northern India. *Q. J. R. Meteorol. Soc.*, doi: 10.1002/qj.3538.
11. Amorim J. H., Asker C., Belušić D., Carvalho A. C., Engardt M., Gidhagen L., Hundecha Y., Körnich H., Lind P., Olsson E., Olsson J., Segersson D., Strömbäck L., Joe P., Baklanov A., 2018: Integrated Urban Services for European cities: the Stockholm case. *WMO Bulletin - The journal of the World Meteorological Organization*, **67(2)**, 33–40.
12. Coppola, E., Sobolowski, S., Pichelli, E., Raffaele, F., Ahrens, B., Anders, A., Ban, N., Bastin, S., Belda, M., Belušić, D., et al., 2018: A first-of-its-kind multi-model convection permitting ensemble for investigating convective phenomena over Europe and the Mediterranean. *Clim. Dyn.*, doi: 10.1007/s00382-018-4521-8.
13. Klein, C., Belušić, D., Taylor, C. M., 2018: Wavelet scale analysis of mesoscale convective systems for detecting deep convection from infrared imagery. *J. Geophys. Res.*, **123**, 3035–3050, doi: 10.1002/2017JD027432.
14. Lang, F., Belušić, D., Siems, S., 2018: Observations of wind-direction variability in the nocturnal boundary layer. *Boundary-Layer Meteorol.*, **166**, 51–68, doi: 10.1007/s10546-017-0296-4.
15. Taylor, C. M., Belušić, D., Guichard, F., Parker, D. J., Vischel, T., Bock, O., Harris, P. P., Janicot, S., Klein, C., Panthou, G., 2017: Frequency of extreme Sahelian storms tripled since 1982 in satellite observations. *Nature*, **544**, 475–478.
16. Wang, Z., Belušić, D., Huang, Y., Siems, S. T., Manton, M. J., 2016: Understanding orographic effects on surface observations at Macquarie Island. *J. Appl. Meteorol. Climatol.*, **55**, 2377–2395.
17. Sun, J., Nappo, C. J., Mahrt, L., Belušić, D., Grisogono, B., Stauffer, D. R., Pulido, M., Staquet, C., Jiang, Q., Pouquet, A., Yague, C., Galperin, B., Smith, R. B., Finnigan, J. J., Mayor, S. D., Svensson, G., Grachev, A. A., Neff, W. D., 2015: Review of wave-turbulence interactions in the stable atmospheric boundary layer. *Rev. Geophys.*, **53**, doi:10.1002/2015RG000487.
18. Kang, Y., Belušić, D., Smith-Miles, K., 2015: Classes of structures in the stable atmospheric boundary layer. *Q. J. R. Meteorol. Soc.*, **141**, 2057–2069.
19. Belušić, D., Večenaj, Ž., LeMone, M. A., 2015: Possible observation of horizontal roll vortices over the Adriatic Sea during bora. *Front. Earth Sci.* **3**, 23, doi:10.3389/feart.2015.00023.
20. Wang, Z., Siems, S. T., Belušić, D., Manton, M. J., Huang, Y., 2015: A climatology of the precipitation over the Southern Ocean as observed at Macquarie Island. *J. Appl. Meteorol. Climatol.*, **54**, 2321–2337.
21. Kang, Y., Belušić, D., Smith-Miles, K. 2014: A note on the relationship between turbulent coherent structures and phase correlation. *Chaos*, **24**, 023114, doi:10.1063/1.4875260.

22. Belušić, D., Lenschow, D. H., Tapper, N. J., 2014: Performance of a mobile car platform for mean wind and turbulence measurements. *Atmos. Meas. Tech.*, **7**, 1825–1837, doi:10.5194/amt-7-1825-2014.
23. Kang, Y., Belušić, D., Smith-Miles, K., 2014: Detecting and classifying events in noisy time series. *J. Atmos. Sci.*, **71**, 1090–1104.
24. Nappo, C., Sun, J., Mahrt, L., Belušić, D., 2014: Determining wave-turbulence interactions in the stable boundary layer. *B. Amer. Meteorol. Soc.*, **95**, ES11–ES13.
25. Belušić, D., Hrastinski, M., Večenaj, Ž., Grisogono, B., 2013: Wind regimes associated with a mountain gap at the northeastern Adriatic coast. *J. Appl. Meteorol. Climatol.*, **52**, 2089–2105.
26. Kang, Y., Smith-Miles, K., Belušić, D., 2013: How to extract meaningful shapes from noisy time-series subsequences? *2013 IEEE Symposium on Computational Intelligence and Data Mining*, Singapore, 65–72, doi:10.1109/CIDM.2013.6597219.
27. Hande, L. B., Siems, S. T., Manton, M. J., Belušić, D., 2012: Observations of wind shear over the Southern Ocean. *J. Geophys. Res.*, **117**, D12206, doi:10.1029/2012JD017488.
28. Belušić, D., Mahrt, L., 2012: Is geometry more universal than physics in atmospheric boundary layer flow? *J. Geophys. Res.*, **117**, D09115, doi:10.1029/2011JD016987.
29. Güttler, I., Belušić, D., 2012: The nature of small-scale non-turbulent variability in a mesoscale model. *Atmos. Sci. Lett.*, **13**, 169–173.
30. Večenaj, Ž., Belušić, D., Grubišić, V., Grisogono, B., 2012: Along-coast features of bora-related turbulence. *Boundary-Layer Meteorol.*, **143**, 527–545.
31. Belušić, D., Güttler, I., 2010: Can mesoscale models reproduce meandering motions? *Q. J. R. Meteorol. Soc.*, **136**, 553–565.
32. Orlić, M., Belušić, D., Janeković, I., Pasarić, M., 2010: Fresh evidence relating the great Adriatic surge of 21 June 1978 to mesoscale atmospheric forcing. *J. Geophys. Res.*, **115**, C06011, doi:10.1029/2009JC005777.
33. Večenaj, Ž., Belušić, D., Grisogono, B., 2010: Characteristics of the near-surface turbulence during a bora event. *Ann. Geophys.*, **28**, 155–163.
34. Davidović, D., Skala, K., Belušić, D., Telišman Prtenjak, M., 2010: Grid implementation of the Weather Research and Forecasting model. *Earth Sci. Inform.*, **3**, 199–208, doi:10.1007/s12145-010-0060-5.
35. Belušić, D., Strelec Mahović, N., 2009: Detecting and following atmospheric disturbances with a potential to generate meteotsunamis in the Adriatic. *Phys. Chem. Earth*, **34**, 918 – 927.
36. Pasarić, Z., Belušić, D., Chiggiato, J., 2009: Orographic effects on meteorological fields over the Adriatic from different models. *J. Marine Sys.*, **78**, S90–S100.
37. Šepić, J., Vilibić, I., Belušić, D., 2009: Source of the 2007 Ist meteotsunami (Adriatic Sea). *J. Geophys. Res.*, **114**, C03016, doi:10.1029/2008JC005092.
38. Grisogono, B., Belušić, D., 2009: A review of recent advances in understanding the meso- and microscale properties of the severe Bora wind. *Tellus*, **61A**, 1–16.
39. Prtenjak, M. T., Belušić, D., 2009: Formation of reversed lee flow over the north-eastern Adriatic during bora. *Geofizika*, **26**, 145–155.
40. Bencetić Klaić, Z., Prodanov A. D., Belušić, D., 2009: Wind measurements in Senj - underestimation of true bora flows. *Geofizika*, **26**, 245–252.

41. Grisogono, B., Belušić, D., 2008: Improving mixing length-scale for stable boundary layers. *Q. J. R. Meteorol. Soc.*, **134**, 2185 – 2192.
42. Belušić, D., Mahrt, L., 2008: Estimation of length scales from mesoscale networks. *Tellus*, **60A**, 706–715.
43. Vickers, D., Mahrt, L., Belušić, D., 2008: Particle simulations of dispersion using observed meandering and turbulence. *Acta Geophys.*, **56**, 234–256.
44. Belušić, D., Grisogono, B., Klaić, Z. B., 2007: Atmospheric origin of the devastating coupled air-sea event in the east Adriatic. *J. Geophys. Res. – Atmos.*, **112**, D17111, doi:10.1029/2006JD008204.
45. Belušić, D., Žagar, M., Grisogono, B., 2007: Numerical simulation of pulsations in the bora wind. *Q. J. R. Meteorol. Soc.*, **133**, 1371–1388.
46. Pasarić, Z., Belušić, D., Klaić, Z. B., 2007: Orographic influences on the Adriatic sirocco wind. *Ann. Geophys.*, **25**, 1263–1267.
47. Belušić, D., Pasarić, M., Pasarić, Z., Orlić, M., Grisogono, B., 2006: A note on local and non-local properties of turbulence in the bora flow. *Meteorol. Z.*, **15**, 301–306.
48. Belušić, D., Klaić, Z. B., 2006: Mesoscale dynamics, structure and predictability of a severe Adriatic bora case. *Meteorol. Z.*, **15**, 157–168.
49. Belušić, D., Pasarić, M., Orlić, M., 2004: Quasi-periodic bora gusts related to the structure of the troposphere. *Q. J. R. Meteorol. Soc.*, **130**, 1103–1121.
50. Belušić, D., Klaić, Z. B., 2004: Estimation of bora wind gusts using a limited area model. *Tellus*, **56A**, 296–307.
51. Kos, I., Belušić, D., Jeričević, A., Horvath, K., Koračin, D., Telišman Prtenjak, M., 2004: Education and research: Initial development of the Atmospheric Lagrangian Particle Stochastic (ALPS) Dispersion Model. *Geofizika*, **21**, 37–52.
52. Klaić, Z. B., Belušić, D., Herceg Bulić, I., Hrust, L., 2003: Mesoscale modelling of meteorological conditions in the lower troposphere during a winter stratospheric ozone intrusion over Zagreb, Croatia. *J. Geophys. Res. – Atmos.*, **108**, 4720, doi:10.1029/2003JD003878.
53. Klaić, Z. B., Belušić, D., Grubišić, V., Gabela, L., Čoso, L., 2003: Mesoscale airflow structure over the northern Croatian coast during MAP IOP 15 – a major Bora event. *Geofizika*, **20**, 23–61.

Over 80 presentations at international conferences and meetings.