

University Academic Curriculum Vitae

Personal information Name: Michele Torresani
Place of birth:
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- Education since leaving school**
- 2025 **National scientific qualification for associate professorship in the academic recruitment field 07/B2 "Arboriculture and forest systems"** (Scienze e tecnologie dei sistemi arborei e forestali)
 - 2025 **National scientific qualification for associate professorship in the academic recruitment field 05/A1 "Botany"** (Botanica)
 - 2020 **PhD in Mountain Environment and Agriculture** (Free University of Bolzano/Bozen)
 - 2013 **Master degree in Forest and Environmental Science** (University of Padova)
 - 2011 **Bachelor degree in Forest and Environmental Technology** (University of Padova)
 - 2016 Governmental license for the practice of the profession "Agronomist and Forest Manager"(Dottore Agronomo e Forestale)
 - 2008 Governmental license for the practice of the profession "Agrotecnico"

- Present appointment** **Junior Assistant Professor (RTD-A)**
- From / to: July 2022 - ongoing
 - Employer: Free University of Bolzano/Bozen
 - Brief description of responsibilities:
 - Utilize diverse remote sensing information, optical data from drones, airborne, and satellites, as well as LiDAR data from TLS, airborne, and satellites for comprehensive assessment of forest biodiversity (structural and species diversity) within the applied and funded project Interreg Italy-Switzerland "Map-Rezia" (Monitoraggio della biodiversità nelle Aree Protette della Rezia).
 - Employ remote sensing techniques (optical, LiDAR) to assess the impact of various forest disturbances, including windstorm (e.g. Vaia), disease outbreak (e.g. bark beetle), forest drought and fires.
 - Develop and submit applications for local, national, and international research projects.
 - Teach the "Environmental Geomatics and Remote Sensing" course (60 hours) in the Bachelor's program in Agricultural, Food, and Mountain Environmental Sciences, covering fundamental and advanced remote sensing techniques for environmental applications (3 years, average professor score 9.6/10).
 - Student thesis supervision, focusing on preparing research for journal publication (refer to Academic teaching experience).

Professional experience

From / to	Job title	Name of academic Institution	Academic level	responsibilities
05/2021 to	Post-doc	University of	Postdoc -	Conducted biodiversity

06/2022	research fellow – Assegnista di ricerca	Bologna, Bologna, Italy	AR	assessments using remote sensing data (drones, airborne, satellites, LiDAR). Developed machine learning algorithms and photogrammetry analysis. Supervised master's students for journal publications.
02/2020 to 04/2021	Post-doc research fellow – Assegnista di ricerca	Dipartimento di Ingegneria Civile Ambientale e Meccanica, University of Trento, Trento, Italy	Postdoc - AR	Analyzed GHG fluxes from forest Eddy covariance sites. Correlated fluxes with remote sensing indices from MODIS/ASTER. Examined meteorological data from Eddy Covariance towers and ECMWF models.
01/2020 to 02/2020	Visiting Scientist	Instituto Superior de Agronomia, Lisbon, Portugal	Postdoc - Researcher	Led a project on NDVI and PRI trends in cork oak woodlands. Collected field data for remote sensing validation using Sentinel-2 and MODIS.
04/2018 to 10/2018	Visiting Scientist	Faculty of Geography, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen, Germany	PhD	Estimated forest biophysical traits from Sentinel-2 data. Developed an AI-based R procedure for Radiative Transfer Model inversion.
11/2016 to 10/2019	PhD	Free University of Bolzano/Bozen, Bolzano/Bozen, Italy	PhD	Researched forest structure and species diversity using optical and LiDAR data. Collaborated with the local Forest Service on remote sensing applications for forest management.
05/2016 to 10/2016	Researcher	EURAC, Institute for Alpine Environment, Bolzano/Bozen, Italy	Research	Collected field data in forest, grassland, and aquatic ecosystems. Installed and analyzed sap flow sensor data. Identified and classified forest vegetation.
03/2015 to 05/2016	Freelancer Forester	Forest office Mirco Baldo and Forest office Mauro Covi, Trento, Italy	Professional	Collected field data and described forest stands for management plans. Analyzed LiDAR and orthophotos for forest assessment. Managed funding requests for private forest management.
08/2014 to 03/2015	Visiting Scientist	Faculty of Remote Sensing and Landscape Information Systems, Albert-Ludwigs-	Research	Analyzed LiDAR and Landsat data for forest structure assessment. Developed a web platform for crowdsourced forest management.

		Universität Freiburg, Freiburg, Germany		
03/2013 to 09/2013	Research trainee	Unità di ricerca per il monitoraggio e la pianificazione forestale (MPF - CRA), Trento, Italy	Research	Studied LiDAR-derived Canopy Height Models for forest tariff index revision. Collected and analyzed field data for forest management planning.

Participation in exhibitions

- **Keynote speaker:**
 - **Torresani, M.** The role of vegetation height heterogeneity through remote sensing data for biodiversity estimation, EarthBridge conference, Building Bridges between Earth observation and Environmental Sciences, Bologna 26-28 June 2023; <https://earthbridgebologna.wixsite.com/earthbridge-bologna>
- **Invited speaker:**
 - Seminar “Ecologia, Florestas e Conservação” at the “Centro de Ecologia Aplicada” of the Instituto superior de Agronomia in Lisbon (Portugal). <http://www.isa.ulisboa.pt/vida-no-isa/destaques/eventos-internos/20200205-seminario-cefceabn-ecologia-florestas-e-conservacao>
- **Presentation** at the following international and national conferences:
 - **Torresani, M.,** Vítězslav M., Rocchini D., Perrone M., Tognetti R., Exploring the role of vegetation height heterogeneity through LiDAR information for biodiversity estimation, ESA Biospace25. Frascati (Italy), February 2025. Oral presentation.
 - **Torresani, M.,** Tognetti R. Vaia windstorm and bark beetle outbreak: remote sensing analysis of forest structural variables, Extreme weather events and adaptation in the South-Eastern Alps, Free University of Bolzano, Bolzano (Italy), December 2024. Oral presentation.
 - **Torresani, M.,** Tognetti R, Relazione tra eterogeneità strutturale delle foreste e biodiversità tramite dati di telerilevamento, Conferenza SISEF, Padova (Italy). September 2024. Oral presentation.
 - **Torresani, M.,** Vítězslav M., Perrone M., Chieffallo L., Thouverai E., Rocchini D. Exploring the role of vegetation height heterogeneity through remote sensing information for biodiversity estimation, ECCB conference, Bologna (Italy), June 2024. Oral presentation.
 - **Torresani, M.,** Rocchini D. “Exploring biodiversity patterns in forest ecosystems using LiDAR remote sensing data: unravelling the influence of forest height heterogeneity”, International conference on Community Ecology. Trieste (Italy), September 2023. Oral presentation.
 - **Torresani, M.,** Rocchini, D., & Tomelleri, E. “Forest Height Heterogeneity derived from LiDAR data: its application for forest stability in strong wind events and the role of the GEDI mission”, ForestSAT 2022. Berlin (Germany), August 2022. Oral presentation.
 - **Torresani, M.** “Assessment of flower and bee diversity by UAV images. A case study within the H2020 SHOWCASE project”. IAVS: conference of vegetation science 2022. Madrid (Spain), July 2022. Oral presentation.
 - **Torresani, M.,** Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. “Forest biodiversity estimated from optical and LiDAR data: testing the Spectral Variation Hypothesis and the Height Variation Hypothesis through the Rao's Q index”. IAVS: conference of vegetation science 2019. Bremen (Germany), July 2019. Oral presentation.
 - **Torresani, M.,** Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. ESA Living Planet Symposium 2019. Milan, May 2019. “Forest biodiversity estimated from optical and LiDAR data: testing the Spectral Variation

Hypothesis and the Height Variation Hypothesis through the Rao's Q index". Poster.

- Rocchini D., Dalponte M., Feilhauer H., Féret J. B., Foody G. M., Förster M., Garzon-Lopez C., Gianelle D., Gillespie T. W., Imran H. A., Kleinschmidt B., Lausch A., Marcantonio M., Panigada C., Ricotta C., Rossini M., Schmidtlein S., Tagliabue G., **Torresani M.**, Vescovo L., Wegmann M., Beierkuhnlein C. "Remote Sensing for Ecosystem Modelling: Scalability of Plant Traits, Essential Biodiversity Variables and Ecosystem Functional Properties from the Leaf to the Ecosystem Level". Co-author oral presentation. ESA Living Planet Symposium 2019. Milan, May 2019. Oral presentation.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. IV Congresso Nazionale di Selvicoltura 2018. Turin, November 2018. "La stima della biodiversità forestale attraverso dati ottici e dati LiDAR: studio dell'ipotesi della variazione spettrale e dell'ipotesi della variazione di altezze attraverso il nuovo indice Rao's Q". Oral presentation.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. "Alpine forest biodiversity estimated from the space: testing the Spectral Variation Hypothesis comparing Landsat 8 and Sentinel 2 using a multi-temporal Rao Q index". ICEI 2018: 11th International Conference on Ecological Informatics. Jena, October 2018. Oral presentation.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. ForestSAT 2018. Washington DC, October 2018. "Forest biodiversity estimated from remote sensing data through the new Rao's Q heterogeneity index: testing the Spectral Variation Hypothesis with a NDVI time-series derived from Landsat 8 and Sentinel 2, and the Height Variation Hypothesis with LiDAR data". Oral presentation.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. ForestSAT 2018. Washington DC, October 2018. "Forest biodiversity estimated from the space: testing the Spectral Variation Hypothesis comparing Landsat 8 and Sentinel 2 using a multi-temporal Rao's Q". Poster.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. Igarss 2018: International geoscience and remote sensing symposium. Valencia (Spain) July 2018. "Testing the spectral variation hypothesis by using the Rao-Q index to estimate forest biodiversity: effect of spatial resolution". Poster.
- **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. RSPSoc December 2017. Annual conference of the Society for remote sensing and photogrammetry. London, September 2017. "Detecting forest structural and species diversity by multi-source remote sensing data" Poster.
- **Torresani, M.**, Schill C. Meeting of Working Groups and Management Committee COST Action TD1202 Mapping and the citizen sensor, University Nice Sophia Antipolis, Nice, April 2015. "Crowdsourcing forest stands derived from LiDAR data". Oral presentation.

Experience in academic teaching

- Teaching courses:

- 2024/2025, **Course holder**: "Environmental Geomatics and Remote Sensing". 60 hours. Bachelor in Agricultural, Food and Mountain Environmental Science. Free University of Bolzano/Bozen. **Professor score: 9.4 /10**
- 2023/2024, **Course holder**: "Environmental Geomatics and Remote Sensing". 60 hours. Bachelor in Agricultural, Food and Mountain Environmental Science. Free University of Bolzano/Bozen. **Professor score: 9.7 /10**
- 2022/2023, **Course holder**: "Environmental Geomatics and Remote Sensing". 60 hours. Bachelor in Agricultural, Food and Mountain Environmental Science. Free University of Bolzano/Bozen. **Professor score: 9.9/10**
- 2021/2022, **Teaching assistant**: "Telerilevamento Geo-ecologico". 12 hours. Master in Scienze e gestione della natura. University of Bologna.

- 2021/2022, **Teaching assistant:** "Forest Inventories". 5 hours. Master in Environmental Management of Mountain Areas. Free University of Bolzano/Bozen.
- PhD thesis **co-supervisor:**
 - Ludovico Chieffallo (2022-2025). Thesis: Use of remote sensing data for biodiversity estimation in agricultural landscape. University of Bologna.
 - Leyre Pedrós Pla (2025-2028). Thesis: Scaling ecosystem stability: integrating AI - image analysis methods with biodiversity and trait-based studies. Desertification Research Center (CIDE), Valencia, Spain.
- Bachelor thesis **supervisor:**
 - Riccardo Modena. Thesis: Applicazione immagini ottiche RGB e Tecniche di Image Analysis per il Rilevamento della Flavescenza Dorata nei Vigneti. Free University of Bolzano/Bozen
 - Matteo Cappuccio. Thesis: Estimation of different forest management variables through UAV photogrammetric analysis and subsequent comparison with in-situ data. Free University of Bolzano/Bozen
 - Sforzini Victoria. Remote sensing analysis of tree line dynamics in the Schnals valley in response to climatic variable. Free University of Bolzano/Bozen.
- Master thesis **co-supervisor:**
 - Carlotta Zanetti. Thesis: The role of the ENMAP hyperspectral mission for forest biodiversity estimation. Ongoing. University of Bologna.
 - Giada Franci. Thesis: Testing the Spectral Variation Hypothesis for butterfly estimation. Ongoing. University of Bologna.
 - Grazia Teggi. Thesis: Fuzzy Classification of different habitat using Sentinel-2 images. 2023. University of Bologna.
 - Ana Carolina Vecchio Reis. Thesis: Fuzzy Classification of Satellite Images. 2022. University of Bologna.
 - Giada Ceola. Thesis: Grassland vertical height heterogeneity predict flower and bee diversity: an UAV photogrammetric approach. 2022. University of Bologna.
 - Camilla Dalla Vecchia. Thesis: A novel approach for surveying flowers as a proxy for bee pollinators using drone images. 2022. University of Bologna.
 - Daniel Tamburlin. Thesis: The Rao's Q diversity index applied to LiDAR data for tree species diversity estimation. 2021. University of Bologna.
 - Alessandro Danzi. Thesis: A multitemporal analysis of pre- and post-fire events in Australia by Sentinel-2 satellite imagery. 2021. University of Bologna.
 - Giulia Adele Tuci. Thesis: Fuzzy set theory applied to continuous ecological patterns under R. 2021. University of Bologna.
 - Alessandro Alberti. Thesis: Testing the Height Variation hypothesis in a mixed forest in South Tyrol (Monticolo/Montigl) using LiDAR data at different scales. 2020. University of Bolzano/Bozen.

Other academic responsibilities

- **PhD thesis reviewer**
 - PhD student Valentina Olmo, University of Trieste (2020-2023). Thesis: Ecosystem services modelling and mapping for sustainable land management and planning.
 - PhD student Girma Tariku, University of Brescia (2021-2024). Thesis: Application of artificial intelligence for monitoring biodiversity in wine production and semi-natural urban areas.
 - PhD student Dany Alexander Cotrina Sanchez, University of Tuscia (2021-2024). Thesis: Exploiting Multisource Remote Sensing Data for Phenological Monitoring in European Forests and Biodiversity Conservation in Tropical Ecosystems.

Memberships

- **Member of academic bodies**
 - Member of the Examination Board for the conferment of Ph.D, first session year 2022/23, University of Trieste.
 - Member of the Examination Board for the conferment of Ph.D, year 2024/25, University of Brescia.
 - Member of the Degree Committee of the Master course “Scienze e gestione della natura”. University of Bologna (years 2020 /2021, 2021/2022, 2022/2023).
 - Faculty member of the Bachelor in Agricultural, Food and Mountain Environmental Sciences, Faculty of Faculty of Agricultural, Environmental and Food Sciences - Free University of Bolzano/Bozen (2022-ongoing).
- **Member**
 - Journal editorial board
 - **Editor** of the Journal “Community ecology” (Springer) <https://link.springer.com/journal/42974/editorial-board>
 - Special issues
 - **Editor of the special issue** Coding Earth: Open Source Solutions in Physical Geography for the journal Progress in Physical Geography https://journals.sagepub.com/pb-assets/PDF/PPG%20Coding_Earth_SI%20-1746082265.pdf
 - **Editor of the special issue** [Focus on Spatial Analysis of Biodiversity Patterns](#) for the journals “Environmental Research Letters (ERL” Environmental Research: Ecology (ERE)”.
- **Member of the scientific committee**
 - Member of the scientific committee of the ESA Living Planet Conference, Vienna, June 2025
- **Member of Cost Actions and International groups**
 - Cost Action CA18207 “Biodiversity of Temperate forest Taxa Orienting Management Sustainability by Unifying Perspectives”.
 - Cost Action CA20118 “Three-dimensional forest ecosystem monitoring and better understanding by terrestrial-based technologies”.
 - Cost Action CA17134 “Optical synergies for spatiotemporal sensing of scalable ecophysiological traits”.
 - Member of the One Health Artificial Intelligence (OHAi) Research Group of the University of Bologna. <https://site.unibo.it/one-health-artificial-intelligence/en>
 - Former member: Cost Action TD1202 “Mapping and the citizen sensor”.

Research and scholarships

Date granted	Award Holder(s)	Funding Body	Title	Amount received
November 2024	Michele Torresani (Partner PI)	Interreg Italia-Svizzera	“Map-Rezia” “Biodiversity Monitoring in the protected area of Rezia”. 2025-2028	309540,00 euro (total project budget 1162495,00 euro)
July 2024	Co-PI with: Leonardo Montagnani, Michele Torresani , Camilla Wellstein	Fondazione CARITRO	REFOREST “Recovering after Vaia for the reconstruction of a more resilient forest in Trentino	96000,00 euro
January 2020	Michele Torresani	Cost-Action CA171134	Long term NDVI and PRI temporal trends	2500,00 euro

			for the impact of climatic drivers on phenology and productivity in cork oak woodlands	
September 2015	Michele Torresani	Cost Action TD1202	<i>Crowdsourcing forest stands derived from LiDAR data.</i>	3500,00 euro

Publications

Journal articles (32 articles di cui :

- Kacic, P., Gessner, U., Hakkenberg, C. R., Holzwarth, S., Müller, J., Pierick, K., ... **Torresani, M.** & Kuenzer, C. (2025). Characterizing local forest structural complexity based on multi-platform and-sensor derived indicators. *Ecological Indicators*, 170, 113085.
<https://www.sciencedirect.com/science/article/pii/S1470160X25000147>
- Bouderbala, A., Mena, M., Aouadi, A., Boutabia, L., Mederbal, K. E., Bensaâd-Bendjedid, L., ... **Torresani, M.** & Telailia, S. (2025). Predicting suitable winter habitats of Marmora's Warbler (*Curruca sarda*) in North Africa using species distribution models. *Journal of Ornithology*, 1-17.
<https://link.springer.com/article/10.1007/s10336-025-02300-5>
- Gatti, R. C., Lobos, R. B. C., **Torresani, M.**, & Rocchini, D. (2025). An early warning system based on machine learning detects huge forest loss in Ukraine during the war. *Global Ecology and Conservation*, 58, e03427.
<https://www.sciencedirect.com/science/article/pii/S2351989425000289>
- Pafumi, E., Angiolini, C., Bacaro, G., Fanfarillo, E., Fiaschi, T., Rocchini, D., ... **Torresani, M.**, & Maccherini, S. (2025). Fuzzy approaches provide improved spatial detection of coastal dune EU habitats. *Ecological Informatics*, 103059.
<https://www.sciencedirect.com/science/article/pii/S1574954125000688>
- **Torresani, M.**, Rossi, C., Perrone, M., Hauser, L. T., Féret, J. B., Moudrý, V., ... & Rocchini, D. (2024). Reviewing the Spectral Variation Hypothesis: Twenty years in the tumultuous sea of biodiversity estimation by remote sensing. *Ecological Informatics*, 102702.
<https://www.sciencedirect.com/science/article/pii/S1574954124002449>
- **Torresani, M.**, Montagnani, L., Rocchini, D., Moudrý, V., Andreoli, A., Wellstein, C., ... & Tognetti, R. (2024). LiDAR insights on stand structure and topography in mountain forest wind extreme events: The Vaia case study. *Agricultural and Forest Meteorology*, 359, 110267.
<https://www.sciencedirect.com/science/article/pii/S0168192324003800>
- Moudrý, V., Gábor, L., Marselis, S., Pracná, P., Barták, V., Prošek, J., ... **Torresani, M.** ... & Wild, J. (2024). Comparison of three global canopy height maps and their applicability to biodiversity modeling: Accuracy issues revealed. *Ecosphere*, 15(10), e70026.
<https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/ecs2.70026>
- Moudrý, V., Prošek, J., Marselis, S., Marešová, J., Šárovcová, E., Gdulová, K., ... **Torresani, M.** ... & Wild, J. (2024). How to Find Accurate Terrain and Canopy Height GEDI Footprints in Temperate Forests and Grasslands?. *Earth and Space Science*, 11(10), e2024EA003709.
<https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2024EA003709>
- Rocchini, D., Chieffallo, L., Thouverai, E., D'Introno, R., Dagostin, F., Donini, E., ... **Torresani, M.**, ... & Nowosad, J. (2024). Under the mantra: 'Make use of colorblind friendly graphs'. *Environmetrics*, e2877.
<https://onlinelibrary.wiley.com/doi/full/10.1002/env.2877>
- Moudrý, V., Bazzichetto, M., Remelgado, R., Devillers, R., Lenoir, J., Mateo, R. G., ... **Torresani, M.**, ... & Šímová, P. (2024). Optimising occurrence data in species distribution models: sample size, positional uncertainty, and sampling bias matter. *Ecography*, e07294.
<https://nsojournals.onlinelibrary.wiley.com/doi/full/10.1111/ecog.07294m>
- Rocchini, D., **Torresani, M.**, & Ricotta, C. (2024). On the mathematical properties

- of spatial Rao's Q to compute ecosystem heterogeneity. *Theoretical Ecology*, 1-8. <https://link.springer.com/article/10.1007/s12080-024-00587-3>
- **Torresani, M.**, Rocchini, D., Ceola, G., de Vries, J. P. R., Feilhauer, H., Moudrý, V., ... & Kleijn, D. (2024). Grassland vertical height heterogeneity predicts flower and bee diversity: an UAV photogrammetric approach. *Scientific Reports*, 14(1), 809. <https://www.nature.com/articles/s41598-023-50308-9>
 - Perrone, M., Conti, L., Galland, T., Komárek, J., Lagner, O., **Torresani, M.**, ... & Malavasi, M. (2024). "Flower power": How flowering affects spectral diversity metrics and their relationship with plant diversity. *Ecological Informatics*, 102589. <https://www.sciencedirect.com/science/article/pii/S1574954124001316>
 - **Torresani, M.**, Rocchini, D., Alberti, A., Moudrý, V., Heym, M., Thouverai, E., ... & Tomelleri, E. (2023). LiDAR GEDI derived tree canopy height heterogeneity reveals patterns of biodiversity in forest ecosystems. *Ecological Informatics*, 76, 102082. <https://doi.org/10.1016/j.ecoinf.2023.102082>
 - **Torresani, M.**, Kleijn, D., de Vries, J. P. R., Bartholomeus, H., Chieffallo, L., Gatti, R. C., ... & Rocchini, D. (2023). A novel approach for surveying flowers as a proxy for bee pollinators using drone images. *Ecological Indicators*, 149, 110123. <https://doi.org/10.1016/j.ecolind.2023.110123>
 - Perrone, M., Di Febraro, M., Conti, L., Divíšek, J., Chytrý, M., Keil, P., ... **Torresani, M.**... & Malavasi, M. (2023). The relationship between spectral and plant diversity: Disentangling the influence of metrics and habitat types at the landscape scale. *Remote Sensing of Environment*, 293, 113591. <https://doi.org/10.1016/j.rse.2023.113591>
 - Rocchini, D., Nowosad, J., D'Introno, R., Chieffallo, L., Bacaro, G., Gatti, R. C.,... **Torresani, M.** & Thouverai, E. (2023). Scientific maps should reach everyone: The cblindplot R package to let colour blind people visualise spatial patterns. *Ecological Informatics*, 76, 102045. <https://doi.org/10.1016/j.ecoinf.2023.102045>
 - Anderle, M., Brambilla, M., Hilpold, A., Matabishi, J. G., Paniccia, C., Rocchini, D., **Torresani, M.** ... & Seeber, J. (2023). Habitat heterogeneity promotes bird diversity in agricultural landscapes: insights from remote sensing data. *Basic and Applied Ecology*. <https://doi.org/10.1016/j.baae.2023.04.006>
 - Moudrý, V. Keil, P. Cord, F. A., ... **Torresani, M.** ... & Šimová, P. (2023). Scale mismatches between predictor and response variables in species distribution modelling: A review of practices for appropriate grain selection. *Progress in Physical Geography: Earth and Environment*, 47(2), 249-270. <https://doi:10.1177/03043372221107280>
 - Thouverai, E., Marcantonio, M., Lenoir, J., Galfré, M., Marchetto, E., Bacaro, G., ... **Torresani, M.**... & Rocchini, D. (2023). Integrals of life: Tracking ecosystem spatial heterogeneity from space through the area under the curve of the parametric Rao's Q index. *Ecological Complexity*, 52, 101029. <https://doi.org/10.1016/j.ecocom.2023.101029>
 - **Torresani, M.**, Masiello, G., Vendrame, N., Gerosa, G., Falocchi, M., Tomelleri, E., ... & Zardi, D. (2022). Correlation Analysis of Evapotranspiration, Emissivity Contrast and Water Deficit Indices: A Case Study in Four Eddy Covariance Sites in Italy with Different Environmental Habitats. *Land*, 11(11), 1903. <https://doi.org/10.3390/land11111903>
 - Rocchini, D., **Torresani, M.**, Beierkuhnlein, C., Feoli, E., Foody, G. M., Lenoir, J., ... & Ricotta, C. (2022). Double down on remote sensing for biodiversity estimation: a biological mindset. *Community Ecology*, 23(3), 267-276. <https://doi.org/10.1007/s42974-022-00113-7>
 - Rocchini, D., Santos, M. J., Ustin, S. L., Féret, J. B., Asner, G. P., Beierkuhnlein, C., ... **Torresani, M.**... & Lenoir, J. (2022). The spectral species concept in living color. *Journal of Geophysical Research: Biogeosciences*, 127(9), e2022JG007026. <https://doi.org/10.1029/2022JG007026>
 - Tamburlin, D., **Torresani, M.**, Tomelleri, E., Tonon, G., & Rocchini, D. (2021). Testing the Height Variation Hypothesis with the R rasterdiv Package for Tree Species Diversity Estimation. *Remote Sensing*, 13(18), 3569. DOI: <https://doi.org/10.3390/rs13183569>
 - **Torresani, M.**, Feilhauer, H., Rocchini, D., Féret, J. B., Zebisch, M., & Tonon, G. (2021). Which optical traits enable an estimation of tree species diversity based on the Spectral Variation Hypothesis?. *Applied Vegetation Science*, 24(2), e12586.

- DOI: <https://doi.org/10.1111/avsc.12586>
- Rocchini, D., Thouverai, E., Marcantonio, M., Iannacito, M., Da Re, D., **Torresani, M.**, ... & Wegmann, M. (2021). *rasterdiv*-an Information Theory tailored R package for measuring ecosystem heterogeneity from space: to the origin and back. *Methods in ecology and evolution*, 12(6), 1093-1102. DOI: <https://doi.org/10.1111/2041-210X.13583>
 - Rocchini, D., Salvatori, N., Beierkuhnlein, C., Chiarucci, A., de Boissieu, F., Förster, M. ... **Torresani, M.**, Wegmann M., & Féret, J. B. (2021). From local spectral species to global spectral communities: A benchmark for ecosystem diversity estimate by remote sensing. *Ecological informatics*, 61, 101195. DOI: <https://doi.org/10.1016/j.ecoinf.2020.101195>
 - **Torresani, M.**, Rocchini, D., Sonnenschein, R., Zebisch, M., Hauffe, H. C., Heym, M., ... & Tonon, G. (2020). Height variation hypothesis: A new approach for estimating forest species diversity with CHM LiDAR data. *Ecological Indicators*, 117, 106520. DOI: <https://doi.org/10.1016/j.ecolind.2020.106520>
 - Rocchini, D., Marcantonio, M., Da Re, D., Chirici, G., Galluzzi, M., Lenoir, J., Ricotta, C., **Torresani, M.**, & Ziv, G. (2019). Time-lapsing biodiversity: An open source method for measuring diversity changes by remote sensing. *Remote Sensing of Environment*, 231, 111192. DOI: <https://doi.org/10.1016/j.rse.2019.05.011>
 - **Torresani, M.**, Rocchini, D., Sonnenschein, R., Zebisch, M., Marcantonio, M., Ricotta, C., & Tonon, G. (2019). Estimating tree species diversity from space in an alpine conifer forest: The Rao's Q diversity index meets the spectral variation hypothesis. *Ecological Informatics*, 52, 26-34. DOI: <https://doi.org/10.1016/j.ecoinf.2019.04.001>
 - Chirici, G., Giannetti, F., Travaglini, D., Nocentini, S.,... **Torresani, M.**, Tonon, G., Marchi, M., Corona, P., & Marchetti, M. (2019). Forest damage inventory after the "Vaia" storm in Italy. *Forests*, 16, 3-9. DOI: <https://doi.org/10.3832/efor3070-016>
 - **Torresani, M.**, Rocchini, D., Zebisch, M., Sonnenschein, R., & Tonon, G. (2018). Testing the spectral variation hypothesis by using the RAO-Q index to estimate forest biodiversity: Effect of spatial resolution. *IGARSS 2018 - 2018 IEEE International Geoscience and Remote Sensing Symposium*. DOI: [10.1109/IGARSS.2018.8666630](https://doi.org/10.1109/IGARSS.2018.8666630)

PhD thesis

Torresani, M., Rocchini, D., Zebisch, M., & Tonon, G. (2020). "Detecting forest structural and species diversity by multi-source remote sensing data". Repository: https://drive.google.com/drive/folders/1NUw_bzKDqhX9L6Jmk8LHmi_wK944rayG?usp=sharing

Further data

Prices

- **Award (1000,00 EUR) for "Research on Quantitative Sustainability" at the International conference of Community Ecology** (Trieste, September 20th-22th 2023) for the presentation entitled: "Exploring biodiversity patterns in forest ecosystems using LiDAR remote sensing data: unravelling the influence of forest height heterogeneity" (<https://akcongress.com/comec/>).

Reviewer and Expert

- **Reviewer** for the following journals:
 - Nature Communication
 - Remote Sensing of Environment
 - Ecological Informatics
 - European Journal of Forest Research
 - Ecological Indicators
 - Environmental Research: Ecology
 - Environmental Research Letters
 - Remote Sensing

- Community Ecology
 - Computers and Electronics in Agriculture
 - Urban Science
 - Applied Vegetation Science
 - Plant Ecology & Diversity
 - International Journal of Remote Sensing
 - ISPRS Journal of Photogrammetry and Remote Sensing
- **Expert in the frame of the evaluation of proposals for the EU Commission** under the Horizon Europe Cluster 6 Calls.
 - **Project reviewer for the Academia Sinica Sustainability Science Research Program**, Academia Sinica, Taiwan.

Software skills

- Programming languages:
 - Advanced programming skills in R language.
 - Author of the R package "RaoQarea". The package has functions to assess environmental heterogeneity with remote sensing data using the Rao's Q index without making use of moving windows approaches (repository GITHUB: <https://github.com/micheletorresani/RaoQarea>).
 - Author of the R package "rasterdiv". The package has functions to calculate indices of diversity on numerical matrices based on information theory. (repository CRAN: <https://cran.r-project.org/web/packages/rasterdiv/index.html>).
- Software:
 - Excellent expertise in the use of the following softwares: QGIS, Agisoft Metashape, WebODM, PiX4D.

Courses

- Participation in the following courses relevant to the applied position:
 - 2017: training school RS4ForestEBV: Airborne remote sensing for monitoring essential biodiversity variables in forest ecosystems Organized by European Facility for Airborne Research (EUFAR).
 - 2015: summer school "Close Range Sensing Techniques in Alpine Terrain" Organized by University of Innsbruck (Austria).
 - 2012: Intensive course "Remote Sensing in Forestry / woodland dynamics" digital processing of remote sensing images, analysis of forest applications. Organized by University of Lleida (Spain).
 - 2010: Intensive course "Geospatial technique (Remote sensing, cartography, surveying and GIS, basics of photo interpretation)". Organized by Fleming college, Lindsay (Canada).

Third mission

In addition to the funds obtained through successful project grants (see Research and Scholarships), over the past three years I have carried out the following activities:

- Participation in regional, national or international radio or TV programmes
 - Interview and podcast for the "Da quassù" column of the newspaper "Il Dolomiti." (2023). <https://www.ildolomiti.it/montagna/2024/podcast-limpatto-della-crisi-climatica-sulla-biodiversita-e-visibile-con-i-dati-telerilevati-michele-torresani-sensori-ottici-per-monitorare-gli-ecosistemi-forestali>
 - TV program aired on RAI about the work carried out within the SHOWCASE H2020 project (2023). <https://www.raisplay.it/video/2023/08/La-firma-delle-piante---Codice-la-vita-e-digitale-31072023-788ee9c7-b81e-423a-8740-8507f34b7cb8.html>
 - Newspaper article (Il Dolomiti) about a project I was involved about the estimation of forest loss in Ukraine during the war (2025). <https://www.ildolomiti.it/altra-montagna/ambiente/2025/guerra-in-ucraina-la-riduzione-della-superficie-forestale-e-impressionante-un-dramma-che-si>

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- Initiatives of school guidance and interaction with schools of all levels
 - Voluntary student scouting initiative at the Agricultural School of San Michele all'Adige (2023).
 - Voluntary student scouting initiative at the Agricultural School of San Michele all'Adige (2024).
-

Statement of interest

I am eager to apply for the RTD-A position in **Forest Ecology and Remote Sensing** at the Free University of Bolzano/Bozen, as my expertise and academic trajectory align seamlessly with the advertised role. Over the past years, my research has been dedicated to the estimation of forest ecological variables and biodiversity assessment through remote sensing data, with a particular focus on the integration of satellite and airborne sensors to characterize forest ecosystems.

Since joining unibz as an RTD-A researcher in 2022, I have significantly expanded my academic and professional profile. In 2025, I obtained the **National Scientific Qualification for Associate Professor (ASN) in Arboriculture and Forest Systems (07/B2) and in Botany (05/A1)**, further confirming my scientific maturity and leadership in the field. My research has been consolidated through the acquisition of two major projects that directly align with the scope of this position:

- **"Map-Rezia" (Interreg Italy-Switzerland, ~310k EUR, partner PI, ~1.2M EUR in total)** – focused on estimating forest biodiversity using remote sensing data, with applications in conservation and management.
- **"ReForest" (Fondazione CARITRO, ~100k EUR, Co-PI)** – investigating forest recovery after the **Vaia windstorm** through remote sensing analysis.

These projects reflect my ability to secure competitive funding and lead interdisciplinary teams, a crucial aspect of the advertised position.

In terms of research output, **I am the author of 32 peer-reviewed papers—20 of which have been published in the last three years since becoming an RTD-A at unibz—including 7 as first author (with 3 additional first-author papers currently under review)**. My work has appeared in top-tier journals in remote sensing, ecology, and forest sciences. According to Google Scholar, I have a total of **980 citations** and an **h-index of 19**.

Additionally, I have strengthened my role in the scientific community by serving as an **editor for the journal Community Ecology** and being actively involved in **international research collaborations** such as Cost Actions and Horizon Europe initiatives.

My teaching experience has also grown significantly. I have successfully held the **"Environmental Geomatics and Remote Sensing"** course (60 hours) at unibz (3 years: 2022-2025), achieving an **average student evaluation score of 9.6/10**, demonstrating my effectiveness in engaging students and delivering high-quality education.

Beyond research and teaching, I have actively participated in **international scientific dissemination**, including as a **keynote speaker at the Horizon Europe EarthBridge conference** in Bologna. Furthermore, my commitment to excellence has been recognized with the **Best Oral Presentation Award** at the International Conference of Community Ecology in Trieste (September 2023).

As part of my third mission activities, I have actively engaged in science outreach through regional and national media appearances, including interviews and TV programs on RAI and *Il Dolomiti*, as well as voluntary initiatives for student guidance at the Agricultural School of San Michele all'Adige (2023–2024), promoting awareness of forest ecology and inspiring future students.

Lastly, my **multilingual skills** are well-suited for the multicultural environment at unibz. I hold a **C1 certification in English** and a **B1 in German**, with ongoing studies to obtain **B2 certification** (already achieved on Reading and Listening), enhancing my ability to contribute effectively to teaching and collaboration within the university.

In summary, my research expertise, project leadership, strong publication record, proven teaching ability, and international engagement make me an ideal candidate for this position. I am excited about the opportunity to further contribute to unibz's

research excellence and educational mission in forest ecology.

**Language
competence**

	Italian	English	German	Spanish
Listening	Mother tongue	C1	B1	B2
Reading		C1	B2	B2
Speaking		C1	B1	B2
Writing		C1	B2	B2
Certified		YES	YES	NO

Date

02.07.2025