

Curriculum vitae di *Lorenzo Bruzzone*

PERSONAL DETAILS

- Family name, First name: Bruzzone, Lorenzo
- Birthdate: 25 /11 /1967
- Researcher unique identifier(s) (such as ORCID, Research ID, etc. ...): ORCID: 0000-0002-6036-459X, Scopus Author ID: 7006892410, ResearcherID: JPL-7703-2023
- URL for web site: <https://rslab.disi.unitn.it>
- Main bibliometric indicators:

Source	Number of Citations	h-index
Scopus	> 43100	96
Web of Science	> 35400	87
Google Scholar	> 59500	114

- **Education and key qualifications**

- 1998 PhD
 Faculty of Engineering, Department of Biophysical and Electronic Engineering, University of Genoa, Italy
Name of PhD Supervisor: Prof. Gianni Vernazza
- 1993 Laurea (M.Sc equivalent) Degree in Electronic Engineering
 Faculty of Engineering, Department of Biophysical and Electronic Engineering, University of Genoa, Italy

- **Current positions**

- 2005 - present **Full Professor in Telecommunications** (SC: 09/F2 - Telecomunicazioni, SSD: ING-INF/03 - Telecomunicazioni)
 Dept. of Information Engineering and Computer Science, University of Trento.
- 2001 - present **Head (and founder) of the Remote Sensing Laboratory** (<https://rslab.disi.unitn.it/>)
 Dept. of Information Engineering and Computer Science, University of Trento.
- 2019 - present **Chairman (and co-founder) of the transdisciplinary PhD programme** on Space Data Science and Technology at the University of Trento (joint between the Department of Information Engineering and Computer Science and the Department of Physics)

- **Previous positions**

- 2019 - 2023 **Vice-President** for Professional Activities of the IEEE Geoscience and Remote Sensing Society).
- 2021 - 2023 **Chairman** of the Recruitment Committee of the University of Trento
- 2009 - 2023 Elected member of the **Administrative Committee** of the IEEE Geoscience and Remote Sensing Society.
- 2013 - 2015 **Coordinator of the Master Program** in Telecommunication Engineering
 Department of Information Engineering and Computer Science, University of Trento
- 2012 - 2015 **Vice-Director** of the Department of Information Engineering and Computer Science - University of Trento
- 2011 - 2011 **Visiting Professor**
 Telecom ParisTech, Paris, France,
- 2001 - 2005 **Associate Professor in Telecommunications** (SSD: ING-INF/03 - Telecomunicazioni)
 Dept. of Information Engineering and Computer Science, University of Trento.

2000 - 2001 **Assistant Professor in Telecommunications** (SSD: ING-INF/03 - Telecomunicazioni)
Dept. of Information Engineering and Computer Science, University of Trento.

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

- Author (or co-author) of **428 scientific paper in referred international journals**, 6 Journal front Covers, 25 book chapters, and more than 390 papers in international conference proceedings. Examples of few recent and 4 very high impact papers are reported in the next items below. The full list of journal papers is available at <https://orcid.org/0000-0002-6036-459X> or at <https://scholar.google.it/citations?user=ff9-TK4AAAAJ&hl=it&oi=ao>.
- L. Carrer, R. Pozzobon, F. Sauro, D. Castelletti, G. W. Patterson, L. Bruzzone, “Radar evidence of an accessible cave conduit on the Moon below the Mare Tranquillitatis pit,” *Nature Astronomy*, July 14, 2024. (Scopus citations: 11).
- Y. Chen, L. Bruzzone, “Self-supervised SAR-optical Data Fusion using Sentinel-1/-2 Images,” *IEEE Transactions on Geoscience and Remote Sensing*, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 60, 2022. (Scopus citations: 54)
- Y. Chen, L. Bruzzone, “Self-supervised Change Detection in Multi-view Remote Sensing Images,” *IEEE Transactions on Geoscience and Remote Sensing*, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 60, pp. 1-12, 2022, Art no. 5402812. (Scopus citations: 43)
- L. Ding, H. Tang, L. Bruzzone, “LANet: Local Attention Embedding to Improve the Semantic Segmentation of Remote Sensing Images,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 59, No. 1, pp. 426-435, 2021. (Scopus citations: 301)
- S.K. Roy, S. Manna, T. Song, L Bruzzone, “Attention-based Adaptive Spectral-Spatial Kernel ResNet for Hyperspectral Image Classification,” *IEEE Transactions on Geoscience and Remote Sensing*, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 59, No. 9, pp. 7831 – 7843, 2021. (Scopus citations: 348)
- S. Saha, F. Bovolo, L. Bruzzone, “Building Change Detection in VHR SAR Images via Unsupervised Deep Transcoding”, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 59, No. 3, pp. 1917-1929, 2021. (Scopus citations: 139)
- L. Ding, J. Zhang, L. Bruzzone, “Semantic Segmentation of Large-size VHR Remote Sensing Images Using a Two-stage Multi-scale Training Architecture,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 58, No. 8, 2020 (Scopus citations: 124)
- L. Mou, L. Bruzzone, X. X. Zhu, “Learning Spectral-Spatial-Temporal Features via a Recurrent Convolutional Neural Network for Change Detection in Multispectral Imagery,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 57, No. 2, pp. 924-935, 2019. (Scopus citations: 483)
- S. Saha, F. Bovolo, L. Bruzzone, “Unsupervised Deep Change Vector Analysis for Multiple-Change Detection in VHR Images,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 57, No.6, pp. 3677 - 3693, 2019. (Scopus citations: 414)
- T.V. Bandos, L. Bruzzone, G. Camps-Valls, “Ill-posed Classification of Hyperspectral Images with Regularized Linear Discriminant Analysis,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 47, No. 3, pp. 862-873, 2009. (Scopus citations: 674)
- M. Dalla Mura, J.A. Benediktsson, B. Waske, and L. Bruzzone, “Morphological Attribute Profiles for the Analysis of Very High Resolution Images,” *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 48, No. 10, pp. 3747-3762, 2010. (Scopus citations: 685)
- G. Camps-Valls, L. Bruzzone, “Kernel-based Methods for Hyperspectral Image Classification”, *IEEE Transactions on Geoscience and Remote Sensing*, Vol. 43, No. 6, 2005, pp. 1351-136. (Scopus citations: 1518)

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- F. Melgani, L. Bruzzone, “Classification of hyperspectral remote-sensing images with support vector machines”, IEEE Transactions on Geoscience and Remote Sensing, Vol. 42, No. 8, 2004, pp. 1778-1790 (Scopus citations: 3822).
- L. Bruzzone, D. Fernández Prieto, “Automatic analysis of the difference image for unsupervised change detection”, IEEE Transactions on Geoscience and Remote Sensing, Vol. 38, No. 3, Maggio 2000, pp. 1171-1182. (Scopus citations: 1248).
- **Editor/co-editor** of 23 conference proceedings.
- **Co-Editor** of 2 scientific books: 1) Kernel Methods for Remote Sensing Data Analysis, Ed: G. Camps-Valls and L. Bruzzone, Wiley, Inc., ISBN: 978-0-470-72211-4, 440 pp, October 2009; 2) Change Detection and Image Time Series, Ed: A.M Atto, F. Bovolo, L. Bruzzone, ISTE Ltd and John Wiley & Sons, Inc., 2021.
- **Principal Investigator of the Radar for Icy Moon Exploration (RIME)** on board the European Space Agency (ESA) Mission Jupiter Icy Moons Explorer (JUICE) launched on April 2023 and currently in the cruise phase toward the Jupiter System. Since 2008 Lorenzo Bruzzone led the devising of the radar and the related science objectives and has been responsible of the design of RIME, the supervision of the hardware development (carried out by the industry), the assessment of the performance, the development of the science ground segment of RIME, the operations of the instrument and the achievement of the science objectives (2008 – present)
- **Principal Investigator of the Sub-surface Radar Sounder (SRS)** on board the ESA Mission EnVision to Venus currently in the B2/C development phase. Since 2015 Lorenzo Bruzzone led the devising of the radar and has been responsible of the design of SRS, the supervision of the hardware development (currently in progress by the industry), the assessment of the performance, and the preparatory activities for the development of the science ground segment of SRS, the operations of the instrument and the achievement of the science objectives (2015 – present).
- **Principal Investigator (Science Lead) of the High Resolution Land Cover project** developed in the framework of the ESA flagship Climate Change Initiative Extension. This long term project has the goal to develop advanced processing algorithms and chains for the analysis of optical and SAR historical and currently operating satellite data for the generation of long time series (since 1990) of land-cover maps to support climate change models (2018 – present).

Peer recognition

- **Nature** has selected one of the images of a recent paper coordinated by the candidate in the ‘**Images of the Month**’ for July 2024. This prestigious achievement is related to an image of the paper on lunar cave discovery published on Nature Astronomy.
- Recognized as a **Highly Cited Researcher (HCR) by Clarivate Analytics for 2024, 2023 and 2022**. Each year, Clarivate™ identifies the world’s most influential researchers — the select few who have been most frequently cited by their peers over the last decade. **About 0.1% of the world’s researchers**, in 21 research fields and across multiple fields, have earned this exclusive distinction.
- Included in the **2024, 2023, 2022 Edition of Ranking of Top 1000 Scientists** in the field of Computer Science prepared by Research.com. In the ranking he is **252-th in the world and 1-st in Italy (2023), 234-th in the world and 1-st in Italy (2023), 242-th in the world and 2-nd in Italy (2022)**.
- Recipient of the **2023 Mid/Late Career Award** of the University of Trento. The prize is given yearly to an outstanding university member who distinguished in the research and the scientific activity.
- Recipient of the **2022 Letter Prize Paper Award** for the best paper published on the IEEE Geoscience and Remote Sensing Letters during the calendar year 2022.
- **Advisor (and co-author) of 5 papers** with which his PhD students got **Student Prize Paper Awards** in international Sysmposia (IEEE International Geoscience and Remote Sensing Symposium and SPIE International Symposium on Remote Sensing).
- **Advisor of 10 Master Thesis** which received the award for the **Best Italian Master Theses** on Remote Sensing (given by IEEE Geoscience and Remote Sensing Italy Chapter and Italian Association for Remote Sensing.).

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- **Advisor of 3 PhD Thesis** which received the award for the **Best Italian PhD Theses** (given by IEEE Geoscience and Remote Sensing Italy Chapter, Gruppo Telecomunicazioni e Tecnologie dell'Informazione - GTTI, International Association for Pattern Recognition).
- Included in the **Highly Cited Researchers 2022** of the Stanford University.
- In December 2020 – January 2021 selected as "**Featured Author**" from the Institute of Electrical and Electronic Engineering (IEEE). His profile is one of the three highlighted in the home page of the IEEEExplore (the IEEE publications website).
- **Included in the top 0.4 % of the most cited scholars** on the number of published papers and citations at global level in all the disciplines and in the top 0.07% in his major research area. The analysis is based on the "World Ranking of Scientist" database created by Stanford University and considers the period 1996 – 2017.
- Recipient of the **2019 Outstanding Paper Award** at the "10th Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing (WHISPERS 2019)," 2019, Amsterdam, The Netherlands.
- Selection of figures from his papers for the **front covers** of 5 issues of the IEEE Transactions on Geoscience and Remote Sensing and one issue of the IEEE Journal of Selected Topics in Applied Earth Observation.
- Recipient of the **2018 Symposium Prize Paper Award** for the best paper presented at the 2017 IEEE International Symposium on Geoscience and Remote Sensing (IGARSS 2017), Fort Worth, USA.
- Recipient of the **2017 Symposium Prize Paper Award** for the best paper presented at the 2016 IEEE IGARSS 2016, Beijing, China.
- Recipient of the **2015 Outstanding Service Award** from the IEEE Geoscience and Remote Sensing Society. This is one of the three major awards and highest honors assigned from the IEEE Geoscience and Remote Sensing Society.
- **2014 Best Journal Paper Award** for the best paper published in 2012 and 2013 on the International Journal of Image and Data Fusion.
- Included in the ranking of the **top 10 international scientists in the field of remote sensing**. The ranking has been published in the international scientific journal "Scientometrics" (Vol. 96, pp. 203-219, 2013) and has been based on a bibliometric research for the period 1991-2010. The analysis considered 14.384 research institutes working in the field of remote sensing. **Prof. Bruzzone is the European scientist with the highest score in the ranking.**
- **Certificate of Appreciation** from the Canadian Remote Sensing Society with the following citation: "With gratitude for the pioneering contribution to MultiTemp since 2001" (2013).
- The paper entitled "Kernel-based Methods for Hyperspectral Image Classification," has been awarded by **Thomson Reuters as a featured Fast Moving Front paper as the most-cited paper in the whole area of Engineering** for the period between October 31 and December 31, 2010.
- Elevated **IEEE Fellow** (since January 2010).
- Recipient of the Recognition of IEEE Transactions on Geoscience and Remote Sensing **Best Reviewers** in 1999.
- **Winner (first place) of the Student Prize Paper Competition** of the 1998 IEEE IGARSS'98, Seattle, USA.
- **Distinguished Speaker** of the IEEE Geoscience and Remote Sensing Society (2012 – 2016).
- Invited as **keynote speaker in more than 40** international conferences and workshops.

ADDITIONAL INFORMATION

Other contributions to the research community

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- **Founder Editor-in-Chief** of the IEEE Geoscience and Remote Sensing Magazine (2013 - 2017).
- **Editor in Chief** of the IEEE Geoscience and Remote Sensing Newsletter (2010 - 2012).
- **Associate Editor** IEEE Transactions on Geoscience and Remote Sensing (2006 – present).
- **General Chair** (2023 and 2024) and **Co-Chair** (2021-2022) of the SPIE International Symposium on Remote Sensing.
- **Conference Chair** of the International Conference on Image and Signal Processing for Remote Sensing (ISPRS) in the context of the SPIE International Symposium on Remote Sensing (2003- present)
- **Technical Co-chair** of the IEEE 2015 IGARSS 2015, Milan, Italy.
- **Founder and first Workshop Chair of the series IEEE International Workshop** on the Analysis of Multi-Temporal Remote Sensing Images (MultiTemp). This is one of the main workshops of IEEE GRS Society which is held every two years. The first edition was in Trento (Italy), in September 2001. Currently Dr. Bruzzone is a member of the Permanent Steering Committee of the workshop series.
- **Advisor of 53 PhD students**, most of them funded by research projects coordinated by the candidate.
- Many activities of **public outreach** on his research results with a large number of contributions to the media during the past years. In the last few years, the results of his research have been considered **in more than 100 contributions** on major international and national TV, radio, newspapers and magazines, including BBC, CNN, RAI, Hunan TV, The Economist, Washington post, National Geographic, etc. (see various news at <https://rslab.disi.unitn.it/> for more information).
- The candidate has a **very large network of research collaboration** as proven by the publication of a significant part of his papers with contributions from researchers outside the University of Trento
- Dr. Bruzzone has been promoted and supervised research in the framework of **55 projects** funded by European Union, European Space Agency, Italian Space Agency, public bodies, industries and companies. He was **principal investigator/prime contractor of 26 projects** and **local unit coordinator for the University of Trento in 14 projects**. Below the list of selected recent projects (excluded the large projects related to the PI activities mentioned in previous sections):
 - Machine learning techniques for the forest cover analysis to support the Italian National Forest Inventory (NFI) using PRISMA mission hyperspectral images (AFORISMA), Italian Space Agency (Unit Coordinator) [2022-2024].
 - Advanced machine learning techniques for PRISMA mission data fusion and image analysis (PRISMALearn), Italian Space Agency (Unit Coordinator) [2022-2024].
 - Orbiting Arid Subsurface and Ice Sheet Sounder (OASIS) - Pre-Phase A Study, JPL NASA (Unit Coordinator) [2021-2022].
 - Low-cost Multispectral CAMera for PrEcision Farming Application (MCAPEFA), European Commission H2020 (H2020-MSCA-IF project) (Coordinator) [2021-2023]
 - Reinforcing the AI4EU Platform by Advancing Earth Observation Intelligence, Innovation and Adoption (AI4Copernicus), European Commission (H2020-ICT-49-2020, IA) (Unit Coordinator [2021-2023].
 - From Copernicus Big Data to Extreme Earth Analytics (ExtremeEarth), European Commission (H2020-ICT-2018-2020, RIA) (Unit Coordinator and WP Leader) [2019-2021].
 - SaTellite Radar sounder for eArTh sUb-surface Sensing (STRATUS), Italian Space Agency (Principal Investigator) [2017-2018].
 - Scientific Exploitation of Operational Missions (SEOM) – S2-4Sci Land and Water – Multi-temporal Analysis, European Space Agency (Principal Investigator) [2016-2019].
 - Technological evolution and experimental validation of an airborne radar in VHF and UHF bands (frequency lower than 1 GHz), Italian Space Agency (Unit Coordinator) [2015-2017]

Career breaks, diverse career paths and major life events

None.