Europass Curriculum Vitae

Personal information

Name / Surname

Valeria Belloni

Research and professional activities

Position held
March 2021 - now
Main research subjects

Post-Doc researcher at the **Geodesy and Geomatics Division**, Department of Civil, Constructional and Environmental Engineering of **Sapienza University of Rome**
Fast displacement monitoring with SAR COSMO-SkyMed and TerraSAR-X satellite measurements: model and algorithm development in the field of Imaging Geodesy. Earth Observation Big Data exploitation for water reservoirs continuous monitoring. DSM generation from optical and SAR imagery using well-known software packages. UAV photogrammetry and satellite remote sensing for 3D modeling and monitoring of glaciers. Automatic crack detection and measurement with deep learning and photogrammetry

Position held
January 2023 - March 2023
Main research subjects

Visiting Post-Doc at the **Geomatics and Materials and Constructions Divisions**, Department of Civil Engineering of **KU Leuven University** (Ghent-Leuven, Belgium)
Innovative photogrammetric approaches for masonry structural monitoring - algorithm development and validation through laboratory testing

Position held
November 2022 - December 2022
Main research subjects

Visiting Post-Doc at the **Department of Environmental Science and Policy** of **University of Milan**

UAV photogrammetry and optical satellite remote sensing for glacier reconstructions and multi-temporal analyses: the case study of Forni Glacier

Position held
November 2017 - January 2021
Main research subjects

PhD student at the **Geodesy and Geomatics Division**, Department of Civil, Constructional and Environmental Engineering of **Sapienza University of Rome**
Fast displacement monitoring with COSMO-SkyMed and TerraSAR-X measurements. Automatic crack detection and measurement using deep learning and photogrammetry. Full-field displacement and strain measurements with Digital Image Correlation

Position held
October 2017 - March 2020
Main research subjects

Research fellow at the **Geodesy and Geomatics Division**, Department of Civil, Constructional and Environmental Engineering of **Sapienza University of Rome**
Close-range and UAV photogrammetry for 3D modeling of glaciers using commercial software. Satellite remote sensing for glacier monitoring

Position held
January 2020 - May 2020

Main research subject

Visiting PhD student at the **Geoinformatics Division**, Department of Urban Planning and Environment of **KTH - Royal Institute of Technology** (Stockholm, Sweden)

Automatic crack monitoring of tunnels combining image processing through deep learning and photogrammetry and LiDAR data acquisition from mobile mapping systems: algorithm development and validation (TACK project)

Position held
March 2019 - June 2019

Main research subject

Visiting PhD student at the **Geoinformatics Division**, Department of Urban Planning and Environment of **KTH - Royal Institute of Technology** (Stockholm, Sweden)

Full-field displacement measurements with Digital Image Correlation: software development and assessment for application to lab tests and tunnel monitoring

Position held October 2018 - December 2018	**Visiting PhD student** at the **Geoinformatics Division**, Department of Urban Planning and Environment of **KTH - Royal Institute of Technology** (Stockholm, Sweden)
Main research subject	Full-field displacement measurements with Digital Image Correlation: software development and assessment for application to lab tests and tunnel monitoring
Position held April 2017 - July 2017	**Independent contractor**
Employer	INTEGRA S.r.l. - Ingegneria, Territorio, Grandi infrastrutture, Rome, Italy
Principal Subjects/occupational skills covered	Flexible wall design and slope stability analysis with Paratie Plus. Rain-water collection system design

Third Mission activities

March - November 2020	**Bicky Chakraborty Entrepreneur Program**, KTH Royal Institute of Technology, Stockholm, Sweden
Main subject	Research and technology transfer, innovation management and entrepreneurship, intellectual property management, business modelling, business planning, funding and financing
March 2020 - January 2022	**KTH Innovation VFT-1 funding program 2020**, KTH Royal Institute of Technology, Stockholm, Sweden
Main subject	Research and technology transfer, innovation management and entrepreneurship, business modelling, business planning, funding and financing. Market research and development of Measurly Mockup

Research topics

Photogrammetry

- Photogrammetric techniques for displacement field estimation in structural applications: software definition, implementation and validation in open-source environments of Py2DIC (Digital Image Correlation software) and Deformation from Motion (DIC-enhanced software) [8, 9, 10, 11, 15, 17]

- Close-range and UAV photogrammetry for 3D modeling of glaciers and infrastructures through commercial and open-source software: usage and analysis [1, 7, 16]

Satellite Remote Sensing

- Displacement monitoring using SAR COSMO-SkyMed, TerraSAR-X and ICEYE imagery: model and software development and validation in open-source environments [5]

- Earth Observation Big Data exploitation for water reservoirs continuous monitoring through Google Earth Engine and Sentinel-1 and Sentinel-2 imagery [12]

- Satellite optical and SAR imagery processing for DSM generation: software implementation and validation [2, 3, 4]

Computer Vision

    – Deep learning architectures for crack detection in concrete and masonry material: software implementation and validation [6, 13, 14, 17, 18]

    – Computer Vision libraries and techniques (e.g. OpenCV): usage and analysis [1, 7, 17]

R&D projects

2022 - now

Research activity in the **FF4EuroHPC HPC4RM: HPC for Reservoir Monitoring (HPC4RM) project**. The project is co-funded by the **European Commission under the H2020 programme**, and supported through **EuroHPC JU**. HPC4RM focuses on designing a new service that takes advantage of HPC to process ESA Sentinel-2 optical imagery and to give new insights to water resource managers on their assets, by remotely monitoring the surface extent of reservoirs and building an evolving 3D model of the reservoir itself

2022 - now

Research activity in the **TACK - Tunnels&bridges Automatic CracK Monitoring using Deep Learning - project** (TACK project extension). The project is funded by the **Trafikverket**, Sweden in the frame of the European **In2Track3** project. The project aims at validating an innovative approach for crack monitoring of bridges combining deep learning and photogrammetry

2019 - now

Research activity in the **TACK - Tunnels Automatic CracK Monitoring using Deep Learning - project**. The project is funded by the **European Union's Horizon 2020 research and innovation programme** and by **Vinnova** through the call **InfraSweden 2030**. TACK aims at developing and validating an innovative approach for crack monitoring of tunnels combining deep learning and photogrammetry

2021 - 2022

Principal investigator of the project **Combination of satellite and UAV data for glacier monitoring: the case study of Forni Glacier (Stelvio National Park, Italy)**. The project was funded by Sapienza University of Rome with a Grant for Young Researchers (**Avvio alla Ricerca 2021 Tipo 2**). The goal was to investigate satellite and UAV data for glacier monitoring and evaluate the potential of satellite data for large-scale monitoring

2019 - 2020

Research activity in the **CLoud plAtform and smart underground imaging for natural Risk Assessment (CLARA) project** funded under the National Operational Plan for Research and Competitiveness 2007-2013 for the period 01/09/2014 - 31/07/2020 directed by Dr. Vincenzo Lapenna (CNR-IMAA). The goal was to process satellite images for the generation of digital models of the surface of urban areas

2018 - 2019

Principal investigator of the project **A new FOS methodology for Digital Image Correlation in the field of displacement measurement in structural applications**. The project was funded by Sapienza University of Rome with a Grant for Young Researchers (**Avvio alla Ricerca 2018 Tipo 1**). The goal of the project was to implement and validate a new Digital Image Correlation software for structural applications

2017 - 2020

Research activity in the **GlacioVar project**. GlacioVar is funded by **DARAS (Department of Regional Affairs, Autonomies and Sport)** of the Presidency of the Council of Ministers of the Italian government. The project aimed at 3D modeling glaciers through photogrammetric techniques. The goal of the project was to reconstruct the morphology of glaciers using close-range cameras, UAV photogrammetry and satellite remote sensing data for monitoring their evolution and change in mass and volume

Organization of international congresses

June 2018

Member of the Local Organizing Committee of the IX Hotine-Marussi Symposium at the Faculty of Civil and Industrial Engineering of Sapienza University of Rome

October 2020

Co-chair of the Processing and Imaging Techniques Session at the 2020 IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2020)

Speaker at national and international congresses and conferences

June 2018 - now

Selected speaker in 13 national and international conferences

Editorial and referee activities

June 2018 - now

Reviewer for ISPRS Journal of Photogrammetry and Remote Sensing, European Journal of Remote Sensing, Remote Sensing, Applied Geomatics, Applied Sciences, and SoftwareX

Teaching experience

October 2017 - now

Collaboration in lectures and exam sessions in Positioning and Geomatics and Geographic Information Systems courses in Environmental Engineering at the Civil and Industrial Engineering Faculty of Sapienza University of Rome

October 2019 - now

Co-supervisor of 4 Bachelor Degree Theses and 5 Master Degree Theses in Positioning and Geomatics and Geographic Information Systems at Sapienza University of Rome

Awards and acknowledgements

September 2022

Winner of the **Grant for a scientific stay in Flanders** funded by Fwo Research Foundation, Belgium

April 2022

Winner of the **ISPRS Congress 2022 Travel Grant** funded by The ISPRS Foundation

December 2021

Winner of the **Copernicus Prize Italy** Copernicus Masters 2021 - Genuine solution

November 2021

Winner of **Sapienza University of Rome - Grant for Young Researchers (Avvio alla Ricerca 2021 Tipo 2)** with a project entitled Combination of satellite and UAV data for glacier monitoring: the case study of Forni Glacier (Stelvio National Park, Italy)

November 2020

Second place at the **Farming by Satellite 2020** competition - Genuine solution

October 2020

Selected for the **Geo For Good Summit 2020**

April 2020

Nominated **Cultore della materia** in Positioning and Geomatics (ICAR/06 - Topography and Cartography) at the Department of Civil, Building and Environmental Engineering of Sapienza University of Rome, Academic Year 2019-2020

April 2020

Winner of the **ISPRS Congress 2020 Travel Grant** funded by The ISPRS Foundation

March-November 2020

As part of the TACK team, selected for the **Bicky Chakraborty Entrepreneur Program**, KTH Royal Institute of Technology, Stockholm, Sweden

February 2020	As part of the TACK team, winner of **KTH Innovation VFT-1 funding program 2020**, KTH Royal Institute of Technology, Stockholm, Sweden
January 2020	As part of the TACK team, nominated for the **Royal Swedish Academy of Engineering Sciences (IVA) top 100 list of innovative research projects**
November 2018	Winner of the **Joint Research Projects for PhD Student Mobility Abroad** funded by Sapienza University of Rome. Project title: Remote sensing and structural applications of latest generation matching algorithm
October 2018	Winner of **Sapienza University of Rome - Grant for Young Researchers (Avvio alla Ricerca 2018 Tipo 1)** with a project entitled A new FOS methodology for Digital Image Correlation in the field of displacement measurement in structural applications
October 2018	Selected for the **ESA Academy - Earth Observation Satellite System Design Training Course 2018**, Belgium
May 2017	**Winner of Sapienza Excellent Student Award** for the Academic Year 2015-2016, Sapienza University of Rome
January 2017	Selected for the **Honours Programme** - Master of Science in Environmental Engineering for the Academic Year 2015-2016, Sapienza University of Rome

Education and qualification

May 2021	**Doctor of Philosophy (Ph.D.) in Infrastructures and Transportation**, XXXIII cycle, Infrastructures, Transport Systems and Geomatics curriculum
	Doctor Europaeus (additional degree)
Thesis title	Innovative approaches in infrastructure monitoring through photogrammetry and deep learning
Institute of Education	**Sapienza University of Rome**
January 2017	**Master of Science (M.S.) degree in Environmental Engineering**
Final mark	**110/110 with honours**
Thesis title	A new Digital Image Correlation software for displacement field measurements in structural applications
Institute of Education	**Sapienza University of Rome**
November 2014	**Bachelor of Science (B.S.) degree in Environmental Engineering**
Final mark	**110/110 with honours**
Thesis title	Preliminary analysis for the determination of the sailboat trim from GPS data in the frame of the Roma Ocean World project
Institute of Education	**Sapienza University of Rome**
July 2011	**Scientific High School Diploma (PNI experimentation)**
Final mark	**100/100**
Institute of Education	**Scientific High School C. Cavour, Rome**
January 2011	**Stage in astrophysics IASF/IFSI**
Institute	ARTOV, Area della Ricerca di Tor Vergata, Rome

Personal skills and competences

Mother tongue	**Italian**

Other language(s)	English (FIRST (FCE) - First Certificate in English)				
Self-assessment *European level*(*)	**Understanding**		**Speaking**		**Writing**
	Listening	Reading	Spoken interaction	Spoken production	
English	C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user	C1 Proficient user
French	A1 Basic user	A1 Basic user	A1 Basic user	A1 Basic user	A1 Basic user

(*)*Common European Framework of Reference* (CEF) level

Informatics skills

Operating systems: Windows, UNIX/Linux, Mac OS X

Programming languages: Python, MATLAB, LaTeX

Commercial Software: Agisoft Photoscan, Pix4D, Leica Infinity, Vic-2D, MatchID, AutoCAD

Open Source Software: QGIS, CloudCompare, SNAP, SNAP API from Python, Ncorr, DICe

Certifications: Introduction to Python programming (CINECA, 2018) Introduction to Scientific and Technical Computing in C (CINECA, 2018), Convolutional Neural Network offered by deeplearning.ai (Coursera)

Professional qualification

January 2018   Enrolled as a member of the Italian Engineering Society - Civil and Environmental Engineering - Rome (Ordine degli Ingegneri della Provincia di Roma)

October 2017   Passed the qualification exam and licensed as a professional engineer

Additional information

Driving Licence(s)   Driving licence category B

CV References

PhD Supervisor   Full Professor Mattia Crespi, Geodesy and Geomatics Division, Sapienza University of Rome
Contact: mattia.crespi@uniroma1.it

Publications

Scopus and Web of Science indexed papers

[1] **Belloni, V.**, Fugazza, D., and Di Rita, M.: UAV-based glacier monitoring: GNSS kinematic track post-processing and direct georeferencing for accurate reconstructions in challenging environments, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLIII-B1-2022, 367-373, https://doi.org/10.5194/isprs-archives-XLIII-B1-2022-367-2022, 2022

[2] Lastilla, L., **Belloni, V.**, Ravanelli, R. and Crespi, M.: DSM Generation from Single and Cross-Sensor Multi-View Satellite Images Using the New Agisoft Metashape: The Case Studies of Trento and Matera (Italy). *Remote Sensing*, 13, 593, https://doi.org/10.3390/rs13040593, 2021

[3] Tragni, N., Calamita, G., Lastilla, L., **Belloni, V.**, Ravanelli, R., Lupo, M., Salvia, V., Gallipoli, M.R.: Sharing Soil and Building Geophysical Data for Seismic Characterization of Cities Using CLARA WebGIS: A Case Study of Matera (Southern Italy). *Applied Sciences*, 11, 4254, https://doi.org/10.3390/app11094254, 2021

[4] Tragni N., Calamita G., Lastilla L., **Belloni V.**, Ravanelli R., Lupo M., Salvia V., Gallipoli M.R.: Sharing geophysical data for seismic characterization of the Matera (Southern Italy) urban area *2nd Conference on Geophysics for Infrastructure Planning, Monitoring and BIM, Held at Near Surface Geoscience Conference and Exhibition 2021, NSG 2021*, https://doi.org/10.3997/2214-4609.202120102, 2021

[5] **Belloni, V.**, Di Tullio, M., Ravanelli, R., Fratarcangeli, F., Nascetti, A. and Crespi, M.: COSMO-SkyMed range measurements for displacement monitoring using amplitude persistent scatterers, *2020 IEEE International Geoscience and Remote Sensing Symposium*, 2495-2498, 2020

[6] **Belloni, V.**, Sjölander, A., Ravanelli, R., Crespi, M. and Nascetti, A.: TACK project: tunnel and bridge automatic crack monitoring using deep learning and photogrammetry, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLIII-B4-2020, 741-745, 2020

[7] Di Rita M., Fugazza D., **Belloni V.**, Diolaiuti G., Scaioni M. and Crespi, M.: Glacier volume change monitoring from UAV observations: issues and potentialities of state-of-the-art techniques, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLIII-B2-2020, 1041-1048, 2020

[8] **Belloni, V.**, Ravanelli, R., Nascetti, A., Di Rita, M., Mattei, D., and Crespi, M.: py2DIC: A New Free and Open Source Software for Displacement and Strain Measurements in the Field of Experimental Mechanics, *Sensors*, 19(18), 3832, https://doi.org/10.3390/s19183832, 2019

[9] **Belloni, V.**, Ravanelli, R., Nascetti, A., Di Rita, M., Mattei, D., and Crespi, M.: Digital Image Correlation from commercial to FOS software: a mature technique for full-field displacement measurements, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-2, 91-95, https://doi.org/10.5194/isprs-archives-XLII-2-91-2018, 2018

[10] Ravanelli, R., Nascetti, A., Di Rita, M., **Belloni, V.**, Mattei, D., Nisticó, N., and Crespi, M.: A new Digital Image Correlation software for displacements field measurement in structural applications, *The International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences*, XLII-4/W2, 139-145, https://doi.org/10.5194/isprs-archives-XLII-4-W2-139-2017, 2017

[11] Ravanelli, R., Di Rita, M., **Belloni, V.**, Nascetti, A., Mazzoni, A., and Crespi M.: New trends in geomatics, in the era of low-cost sensors, free and open source software and hpc geobigdata infrastructures, *GEOmedia*, 21(3), 2017

Not indexed papers

[12] Ravanelli, R.,Mazzucchelli, P., **Belloni, V.**, Bocchino, F., Morselli, L., Fiorino, A., Gerace, F., and Crespi, M.: Earth Observation Big Data exploitation for water reservoirs continuous monitoring: the potential of Sentinel-2 data and HPC, *The use of Artificial Intelligence for Space Applications, AII2022 Conference*, 2022

[13] Sjölander, A., **Belloni, V.**, Ravanelli, R., Gao, K. and Nascetti, A.: TACK – an autonomous inspection system for tunnels, *ITA-AITES World Tunnel Congress, WTC2022 and 47th General Assembly*, Copenhagen, Denmark, 2022

[14] Foria, F., Miceli, G., Nascetti, A., Loprencipe, G., Crespi, M., **Belloni, V.**, Ravanelli, R., and Cordaro, S.: Digitalization and defects analysis for the maintenance of mechanized tunnels *ITA-AITES World Tunnel Congress, WTC2022 and 47th General Assembly*, Copenhagen, Denmark, 2022

[15] **Belloni, V.**: py2DIC: A new digital image correlation software for displacement field measurements, *Bollettino SIFET*, 2018

Under revision papers

[16] **Belloni, V.**, Di Rita, M., Fugazza, D., Traversa, G., Hanson, K., Diolaiuti, G., and Crespi, M.: High-resolution High-accuracy Orthophoto Map and Digital Surface Model of Forni Glacier tongue (Ortles-Cevedale Group, Central Italian Alps) from UAV photogrammetry. Submitted to: *Journal of Maps*

[17] **Belloni, V.**, Sjölander, A., Ravanelli, R., Crespi, M., and Nascetti, A.: Deformation from Motion (DfM): a novel approach for in-plane crack detection and measurement using cameras with not fixed

positions. Submitted to: *Automation in Construction*

[18] Sjölander, A., **Belloni, V.**, Ansell A., and Nordström, E.: Towards automated inspections of tunnels: A review on optical inspections and autonomous assessment of concrete tunnel linings. submitted to: *Structural Control and Health Monitoring*

In compliance with the *Italian legislative Decree no. 196 dated 30/06/2003*, I hereby authorize you to use and process my personal details contained in this document.

June 20, 2023   Valeria Belloni