Alessandro **Sebastianelli, Ph.D.**

About me

I received the master degree in electronic engineering from the University of Sannio (BN, IT) in 2019, where I also pursed my Ph.D. degree. My research topics focus on remote sensing and satellite data analysis, AI and Quantum Computing (QC) techniques for Earth Observation (EO). I coauthored several articles to reputed journals and conferences for the sector of remote sensing. I have been a visiting researcher at the ESA Φ-lab and I have won an ESA OSIP proposal in 2020. I received an IEEE award for one the best thesis in geoscience and remote sensing. Currently I am pursuing a Research Fellowship in QC for EO at Φ-lab. In my spare time I enjoy photography and guitar playing.

My life motto is to apply my studies to real cases to help the world become a better place for everyone

Personal

Alessandro Sebastianelli
Nationality: Italian
YOB: 1995
Age: 28

click me

Areas of specialization

Artificial Intelligence and Quantum Machine Learning for Earth Observation

Interests

`Earth Observation`, `Artificial Intelligence`, `Machine Learning`, `Deep Learning`, `Quantum Computing`, `Quantum Machine Learning`

Digital Skills

OS (Excellent), Programming (Excellent), Office suite (Excellent), CAD (limited), Internet (Excellent), Web-dev (limited), Multimedia (Excellent)

Short Resumé

10/2022-today
Research Fellow in Quantum Computing for Earth Observation
European Space Agency, Φ-lab · Frascati (IT)
Research activities about quantum computing, quantum machine learning and quantum technologies applied to Earth Observation and space sector. Technical officers of QC4EO OSIP contracts. Technical officer of ITT on QC4EO. TEB technical evaluator.

08/2020-10/2022
ESA OSIP
European Space Agency, Φ-lab · Frascati (IT)
Co-funded research activity on AI powered cross-modal adaptation techniques applied to S1 & S2 data.

09/2019-11/2019
Earth Observation Engineer
Titan4 · Rome (IT)
Work activities on satellite data and application development, mainly for structural monitoring, based on SAR and optical satellite data. Use and validation of a tool for the measurement of displacements. The start-up was incubated in ESA BIC Lazio.

07/2019-11/2019
Visiting Researcher
European Space Agency, Φ-lab · Frascati (IT)
Creation of neural networks for earth observation applications. Implementation of scripts for creating satellite image datasets. Monitoring of natural disasters such as landslides and volcanic eruptions. Creation of networks for filtering satellite data. Creation of artificial satellite image datasets. Processing of Sentinel data.

Education

12/2019-10/2022
Ph.D. Information Technologies for Engineering
3 years, graduated · Un. of Sannio
Satellite Remote Sensing through ML and Quantum Computing Techniques.

09/2017-10/2019
Master of Electronic Engineering
2 years, 110/110 cum laude · Un. of Sannio
SAR and Optical data fusion using AI. Generation of Sentinel-2 images from despeckled Sentinel-1 data.

09/2014-10/2017
Bachelor of Electronic Engineering
3 years, 102/110 · Un. of Sannio
Use of the Differential Interferometry on Sentinel images for the land displacements measurement. Ischia earthquake and comparison with INGV data.

Certificates & Grants

2022 Global top 100 AI solutions for SDGs
2022 Best UNICEF Research.
2022 Wellcome Trust Support.
2021 GRS 29-Italy 2020 award for the three best master's degree theses in geosciences and remote sensing
2020 ESA OSIP co-founded Ph.D.
2020 ESA Teamwork Excellence Award for the RACE Team through demostratig excellent use of space for the benefit of society or the environment (by the ESA DG Josef Ashbacher).

Languages

Italian	C2	mother tongue
English	C1	● ● ● ●
French	A2	● ○ ○ ○

Additional info

Scientific publications: 40 (15 as main author), ∼ 400 citations, H-index of 11. A full list of my publications can be found here (click me).
Talks: 13. A full list of talks I gave can be found here (click me).
Teaching: 20 students. A full list of teaching activities can be found here (click me).
Events: A full list of events I co-organized can be found here (click me).

Personal skills

High Experience and attitude in Team Working and Problem Solving. High experience and attitude to Work in International Field. Good experience in Scientific Communication, Dissemination. Hobbies: Photography, Playing Guitar.

The undersigned Alessandro Sebastianelli authorizes the processing of personal data contained in my curriculum vitae based on art. 13 of Legislative Decree 196/2003 and art. 13 of EU Regulation 2016/679 relating to the protection of individuals (GDPR).
Date and signature:

Detailed info (up to May 28, 2024)

This part of my CV contains the same information of the first page, but with more details. Most of these details can also be found, including images and/or documents, on my website `https://alessandrosebastianelli.github.io/`.

Awards

- Master Thesis Award Award IEEE GRSS 2021 This award refers to my Master Thesis, but I was awarded during my Ph.D. and the research activities started during my master thesis have been carried on during my PhD and be significative to win the OSIP call. `https://alessandrosebastianelli.github.io/portfolio/18-02-22/`.
- OSIP Ph.D. Co-Founding Award ESA 2021 please refer to the attached document Global top 100 AI solutions for SDGs Award UNESCO/IRCAI 2022 This award refers to the Research Activit: Dengue Outbreaks Forecasting `https://philab.esa.int/prestigious-unesco-award-given-for-%cf%86-lab-ai-powered-dengue-fever-research/`
- Best UNICEF Research Award UNICEF 2022 This award refers to the Research Activit: Dengue Outbreaks Forecasting `https://philab.esa.int/%CF%86-lab-and-unicef-joint-dengue-fever-research-receives-further-award/`
- Wellcome Trust Support Award WELLCOME TRUST 2022 This award refers to the Research Activit: Dengue Outbreaks Forecasting `https://philab.esa.int/%CF%86-lab-and-unicef-joint-dengue-fever-research-receives-further-award/`
- ESA Teamwork Excellence Award for the RACE Team through demostratig excellent use of space for the benefit of society or the environment (by the ESA DG Josef Ashbacher). `https://alessandrosebastianelli.github.io/portfolio/2020/`.

Publications

[1] SL Ullo et al. "SAR interferometry with open Sentinel-1 data for environmental measurements: the case of Ischia earthquake". In: *2018 IEEE international conference on environmental engineering (EE)*. IEEE. 2018, pp. 1–8.

[2] Diego Di Martire et al. "X-and C-band SAR data to monitoring ground deformations and slow-moving landslides for the 2016 Manta and Portoviejo earthquake (Manabi, Ecuador)". In: *2018 IEEE international conference on environmental engineering (EE)*. IEEE. 2018, pp. 1–6.

[3] Silvia Liberata Ullo et al. "Landslide geohazard assessment with convolutional neural networks using sentinel-2 imagery data". In: *IGARSS 2019-2019 IEEE International Geoscience and Remote Sensing Symposium*. IEEE. 2019, pp. 9646–9649.

[4] Tony De Corso et al. "Application of DInSAR technique to high coherence satellite images for strategic infrastructure monitoring". In: *IGARSS 2020-2020 IEEE International Geoscience and Remote Sensing Symposium*. IEEE. 2020, pp. 4235–4238.

[5] Daniela A Zaidenberg et al. "Advantages and bottlenecks of quantum machine learning for remote sensing". In: *2021 IEEE International Geoscience and Remote Sensing Symposium IGARSS*. IEEE. 2021, pp. 5680–5683.

[6] Alessandro Sebastianelli et al. "Airsense-to-act: A concept paper for covid-19 countermeasures based on artificial intelligence algorithms and multi-source data processing". In: *ISPRS international journal of geo-information* 10.1 (2021), p. 34.

[7] Silvia Liberata Ullo et al. "A new mask R-CNN-based method for improved landslide detection". In: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 14 (2021), pp. 3799–3810.

[8] Alessandro Sebastianelli, Maria Pia Del Rosso, and Silvia Liberata Ullo. "Automatic dataset builder for machine learning applications to satellite imagery". In: *SoftwareX* 15 (2021), p. 100739.

[9] Alessandro Sebastianelli et al. "Paradigm selection for data fusion of sar and multispectral sentinel data applied to land-cover classification". In: *arXiv preprint arXiv:2106.11056* (2021).

[10] Maria Pia Del Rosso et al. "On-board volcanic eruption detection through cnns and satellite multispectral imagery". In: *Remote Sensing* 13.17 (2021), p. 3479.

[11] Alessandro Sebastianelli et al. "A Deep Q-Learning based approach applied to the Snake game". In: *2021 29th Mediterranean Conference on Control and Automation (MED)*. IEEE. 2021, pp. 348–353.

[12] Maria Pia Del Rosso, Alessandro Sebastianelli, Silvia L Ullo, et al. "Artificial intelligence applied to satellite-based remote sensing data for earth observation". In: (2021).

[13] Rochelle Schneider et al. "Climate-based ensemble machine learning model to forecast Dengue epidemics (papers track)". In: *Thirty-eighth International Conference on Machine Learning (ICML) 2021*. 2021.

[14] Alessandro Sebastianelli et al. "On circuit-based hybrid quantum neural networks for remote sensing imagery classification". In: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 15 (2021), pp. 565–580.

[15] MPD Rosso et al. "Artificial neural network". In: *Artificial intelligence applied to satellite-based remote sensing data for earth observation*. Institution of Engineering and Technology, 2021, pp. 63–90.

[16] Alessandro Sebastianelli et al. "Principles of satellite data analysis". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation*. Institution of Engineering and Technology, 2021.

[17] Alessandro Sebastianelli et al. "A generation problem". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation* 98 (2021), p. 207.

[18] Alessandro Sebastianelli et al. "A filtering problem: SAR speckle filtering". In: *Artificial Intelligence Applied to Satellite-Based Remote Sensing Data for Earth Observation*. 2021.

[19] SILVIA LIBERATA Ullo et al. "How to develop your network with Python and Keras". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation*. Institution of Engineering and Technology, 2021.

[20] Maria Pia Del Rosso et al. "How to create a proper EO dataset". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation* 98 (2021), p. 113.

[21] SILVIA LIBERATA Ullo et al. "Convolutional neural networks". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation*. Institution of Engineering and Technology, 2021, pp. 91–111.

[22] Sebastianelli Alessandro et al. "A generation problem". In: *Artificial Intelligence Applied to Satellite-based Remote Sensing Data for Earth Observation*. Institution of Engineering and Technology, 2021.

[23] A Sebastianelli et al. "A classification problem". In: *Artificial Intelligence Applied to Satellite-Based Remote Sensing Data for Earth Observation*. Institution of Engineering and Technology, 2021, pp. 159–206.

[24] Alessandro Sebastianelli et al. "A speckle filter for Sentinel-1 SAR ground range detected data based on residual convolutional neural networks". In: *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing* 15 (2022), pp. 5086–5101.

[25] Alessandro Sebastianelli et al. "PLFM: Pixel-level merging of intermediate feature maps by disentangling and fusing spatial and temporal data for cloud removal". In: *IEEE Transactions on Geoscience and Remote Sensing* 60 (2022), pp. 1–16.

[26] Alessandro Sebastianelli et al. "A Decision Support System Based on Machine Learning to Counteract Covid-Like Pandemic Events". In: *IGARSS 2022-2022 IEEE International Geoscience and Remote Sensing Symposium*. IEEE. 2022, pp. 4486–4489.

[27] Pietro Di Stasio et al. "Early detection of volcanic eruption through artificial intelligence on board". In: *2022 IEEE International Conference on Metrology for Extended Reality, Artificial Intelligence and Neural Engineering (MetroXRAINE)*. IEEE. 2022, pp. 714–718.

[28] Maria Pia Del Rosso et al. "A demo setup testing onboard CNNs for Volcanic Eruption Detection". In: *2022 IEEE International Conference on Metrology for Extended Reality, Artificial Intelligence and Neural Engineering (MetroXRAINE)*. IEEE. 2022, pp. 719–724.

[29] Francesco Mauro et al. "SEN2DWATER: A Novel Multispectral and Multitemporal Dataset and Deep Learning Benchmark for Water Resources Analysis". In: *IGARSS 2023-2023 IEEE International Geoscience and Remote Sensing Symposium*. IEEE. 2023, pp. 297–300.

[30] Veronica Wairimu Muriga et al. "A Machine Learning Approach to Long-Term Drought Prediction using Normalized Difference Indices Computed on a Spatiotemporal Dataset". In: *arXiv e-prints* (2023), arXiv–2302.

[31] Dario Spiller et al. "Analysis of COVID-19 first wave in the US based on demographic, mobility, and environmental variables". In: *arXiv preprint arXiv:2302.14649* (2023).

[32] Alessandro Sebastianelli et al. "On Quantum Hyperparameters Selection in Hybrid Classifiers for Earth Observation Data". In: *IEEE Geoscience and Remote Sensing Letters* (2023).

[33] Francesco Mauro et al. "Estimation of Ground NO2 Measurements from Sentinel-5P Tropospheric Data through Categorical Boosting". In: *2023 IEEE International Conference on Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering (MetroXRAINE)*. IEEE. 2023, pp. 1116–1121.

[34] Jamila Mifdal et al. "Deep unfolding for hypersharpening using a high-frequency injection module". In: *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition*. 2023, pp. 2105–2114.

[35] Silvia Liberata Ullo et al. "Enhancing Earth Observation with Hybrid Quantum Neural Networks". In: *AGU23* (2024).

[36] Francesco Mauro et al. "A Hybrid MLP-Quantum approach in Graph Convolutional Neural Networks for Oceanic Nino Index (ONI) prediction". In: *arXiv preprint arXiv:2401.16049* (2024).

[37] Luigi Russo et al. "Using Multi-Temporal Sentinel-1 and Sentinel-2 data for water bodies mapping". In: *arXiv preprint arXiv:2402.00023* (2024).

[38] Francesco Mauro et al. "QSpeckleFilter: a Quantum Machine Learning approach for SAR speckle filtering". In: *arXiv preprint arXiv:2402.01235* (2024).

[39] Alessandro Sebastianelli et al. "A reproducible ensemble machine learning approach to forecast dengue outbreaks". In: *Scientific Reports* 14.1 (2024), p. 3807.

[40] Francesca De Falco et al. "Towards Efficient Quantum Hybrid Diffusion Models". In: *arXiv preprint arXiv:2402.16147* (2024).

Talks and Conferences

- ESA-ECMWF workshop Machine Learning for Earth System Observation and Prediction. In scientific commettee `https://www.ml4esop.esa.int/`
- High-Performance and Disruptive Computing in Remote Sensing IEEE - GRSSS Summer School `https://www.grss-ieee.org/community/groups-initiatives/high-performance-and-disruptive-computing-in-remote-sensing-hdcrs/hdcrs-summer-school-2021/`
- International Geoscience and Remote Sensing Symposium IEEE Conference - Session Co-chair `https://www.igarss2022.org/`
- Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering IEEE Conference - Presenter and Session Co-chair and Session Oganizer `https://metroxraine.org/metroxraine2022/`
- Metrology for eXtended Reality, Artificial Intelligence and Neural Engineering IEEE Session Oganizer `https://metroxraine.org/`
- International Geoscience and Remote Sensing Symposium IEEE Conference - Presenter `https://igarss2020.org/`
- Mediterrean Confernce on Control and Automation IEEE Conference - Presenter `https://www.med-control.org/med2022/2021/`
- Workshop on Machine Learning for Earth Observation and Prediction ESA - ECMWF Conference - Presenter `https://events.ecmwf.int/event/304/`
- Riunione Annuale GTTI Workshop - Poster Presenter `http://www.gtti.it/eventi-gtti/riunioni-annuali/riunione-annuale-2021/`
- Riunione Annuale GTTI Workshop - Poster Presenter `http://gtti2022.dei.unipd.it/`
- The Rise of Artificial Intelligence for Space Applications MDPI Workshop - Speaker `https://www.mdpi.com/journal/ijgi/events/13596`
- Missioni Satellitari: Nuove Frontiere del Diritto e dell'Ignegneria University of Sannio Workshop - Speaker `https://www.instagram.com/cusas_unisannio/?hl=it`
- Workshop Quantum Computing and High Performance Computing 4th edition CINECA Workshop - Speaker `https://events.cineca.it/en/events/workshop-quantum-computing-and-high-performance-computing-4th-edition`
- September 9-13, 2019 ESA Φ-week 2019. ESA, ESRIN, Frascati (RM), Italy. Side event creator `https://phiweek.esa.int/history`.

Teaching and supervising

Teaching support:

- Lessons of Remote Sensing for "Reti di Telecomunicazioni" course: how to download and elaborate satellite data with classic and AI-based techniques
- Support to Ph.D. course: Optical and Radar Remote Sensing
- Exam commissions: "Reti di Telecomunicazioni" and "Teoria ed Elaborazione dei Segnali"

Supervising activities:

- Jan 2021: Massachusetts Institute of Technology student co-supervisor University of Sannio, Benevento, Italy. I worked as a Tutor to support three MIT students in the development of their project: 1. Quantum Artificial Intelligence applied to Remote Sensing data and 2. Infrastructural monitoring using satellite data.
- Jan 2020: Massachusetts Institute of Technology student co-supervisor University of Sannio, Benevento, Italy ESA, ESRIN, Φ-Lab, Frascati, Rome, Italy.I worked as a Tutor to support two MIT students in the development of their project: 1. Landslides detection based on artificial intelligence algorithms, 2. Infrastructural monitoring using satellite data and 3. Country development measurement using satellite data

- Jan 2019: Massachusetts Institute of Technology student co-supervisor University of Sannio, Benevento, Italy. I worked as a Tutor to support two MIT students in the development of their project: Landslides detection based on artificial intelligence algorithms.

Thesis co-relator:

- Master Thesis Co-Relator - Francesco Mauro. Master Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2022. Climate Change Impact Evaluation on levels of water resources through deep learning techniques.
- Bachelor Thesis Co-Relator - Pietro Di Stasio. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2022. Use of Sentinel-5P data for the early detection of volcanic eruptions through on-board Artificial Intelligence.
- Bachelor Thesis Co-Relator - Giovanni Pagnozzi. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2022. Analysis of large strategic structures using the PyGMTSAR tool on Sentinel-1 data.
- Bachelor Thesis Co-Relator - Simona Reale. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2021. Performance analysis of a new splitting method for datasets in machine learning models. Case study: detection of volcanic eruptions.
- Bachelor Thesis Co-Relator - Luigi Russo. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2021. Development of a Machine Learning model based on the "categorical boosting" technique for the correlation between tropospheric NO2 and NO2 on the ground.
- Bachelor Thesis Co-Relator - Tony De Corso. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2020. Application of DInSAR technique to high coherence satellite images for strategic infrastructure monitoring: Morandi Bridge.
- Bachelor Thesis Co-Relator - Morena Gismondi. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2020. Use of Sentinel-5P data for the analysis of the correlation between NO2 levels and mobility data in areas with a high number of infections due to Covid-19. Case study: Lombardy Region.
- Bachelor Thesis Advisor - Luca Mignone. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2020. Use of differential interferometry on Sentinel-1 images for the measurement of earthquake-induced ground displacements.
- Bachelor Thesis Advisor - Gianluca Di Cosmo. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2020. Use of Sentinel-5P data for the analysis of the correlation between NO2 levels and the number of infections due to Covid-19. Case study: Wuhan area.
- Bachelor Thesis Co-Relator - Francesco Mauro. Bachelor Degree in Electronic Engineering for Automation and Telecommunications, University of Sannio, Engineering Department, 2020. Analysis of the correlation between Sentinel-5P data and epidemiological data. Case study: spread of Covid-19 in the Lombardy region.

Personal Skills

Languages

LANGUAGE	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken Interaction	Spoken Production	
Italian			mother tongue		
English	C1 Proficient	C1 Proficient	C1 Proficient	C1 Proficient	C1 Proficient
Fench	A2 Basic	A2 Basic	A2 Basic	A2 Basic	A2 Basic

Team working and problem solving: I worked in different research groups providing fundamental results and contributing to the resolution of technical problems with elasticity.

Working in a international environment: I participated in numerous international conferences and collaborations, giving several talks and posters. I am currently working in an international environment and so I am comfortable working in the international environment.

Communication and scientific marketing: I give a good number of talks and posters. I co-organized and conducted multiple international symposia and wrote several articles.

Digital Skills:

- Basic digital competence: Operating systems (Excellent), Programming languages (Excellent), Word processing (Excellent), Electronic spreadsheet (Excellent), CAD skills (Limited), Internet skills (Excellent), Web-site creation (Limited), Multimedia (Excellent),
- Programming languages known: Python, Java, C, Arduino, (C++) chiBios, Matlab, Simulink, Latex, C+ (basic knowledge), P5.JS and JavaScript (basic knowledge), Processing, Labview, Ladder, SCADA, Verilog, VHDL, Mathematica, Pascal (basic knowledge).
- Software applications: Matlab, Labview, Eclipse, Word, Excel, PowerPoint, Arduino, Photoshop, SNAP, Mathematica, RSLogic, RSView, Unity, Quartus Prime, QGIS, Jupyter Notebook, Google Colaboratory, Google Earth Engine.

Hobbies: Photography, playing the guitar self-taught

The undersigned Alessandro Sebastianelli authorizes the processing of personal data contained in my curriculum vitae based on art. 13 of Legislative Decree 196/2003 and art. 13 of EU Regulation 2016/679 relating to the protection of individuals (GDPR).

Date and signature: