Curriculum vitae of *Riccardo_Lanari*

Primary ERC subsectors: *PE10_14 Earth observations from space/remote sensing*
Possible secondary ERC sub-sectors: *PE7_7 Signal processing*

PERSONAL DETAILS

Family name, First name: Lanari, Riccardo
Birthdate: 24/08/1964
Researcher unique identifier (ORCID): 0000-0002-7296-2749
URL for web site:
http://www.irea.cnr.it/en/index.php?option=com_comprofiler&task=userprofile&user=121&Itemid=100

- **Education and key qualifications**

1989 Degree (*Laurea*) in Electronic Engineering achieved on February 1989 at the University of Napoli, Federico II, Italy, with 110/110 (summa cum laude).

- **Current position**

From 16/09/2021 to Present:
Director of Research of the Institute for Electromagnetic Sensing of the Environment (IREA) of the National Research Council (CNR) of Italy

- **Previous positions**

From 01/02/2020 to 15/09/2021 Position:
IREA-CNR Acting Director and Director of Research

From 16/11/2011 to 31/01/2020 Position:
IREA-CNR Director and Director of Research

From 01/12/2010 to 15/11/2011 Position:
IREA-CNR Acting Director and CNR Director of Research

From 01/01/2010 to 30/11/2010 Position:
IREA-CNR Director of Research

From 01/03/2001 to 31/12/2009 Position:
IREA-CNR Senior Researcher

From 03/10/1994 to 28/02/2001 Position:
Researcher of the Research Institute for Electromagnetism and Electronic Components (IRECE) of CNR

RESEARCH ACHIEVEMENTS AND PEER RECOGNITION

Research achievements

1) **More than 30 years of research activity in Earth Observation from Space, with a focus on the development of innovative algorithms for the numerical processing of microwave remote sensing data and a wide international scientific experience** gained as visiting scientist at different foreign research institutions. They include the Institute of Space and Astronautical Science (**ISAS**), Japan (1993), the German Aerospace Research Establishment (**DLR**), Germany (1991 and 1994), and the Jet Propulsion Laboratory (**JPL**), California (1997, 2004 and 2008). **At JPL he received, from NASA, a Recognition (1999) and an Award (2001)** for the research activities within the **SRTM mission, carried out during 2000 by exploiting the Space Shuttle Endeavour and dedicated to the generation of a digital elevation model of a very large part of Earth.**

2) **Director (from 2010 to 2021) of the Institute for Electromagnetic Sensing of Environment (IREA) of the CNR**, with institutional headquarters in Naples and secondary offices in Milan and Bari, **which represents one of the most relevant concentrations of researchers operating in the Earth Observation sector of the public system of Italian research**, particularly as regards microwave and optical **remote sensing of the Earth surface from space**.

3) **Author of more than 500 publications**, with more than **16000 citations (H-index= 59, Scopus source)** and **holder of two patents**.

4) **Research activity, internationally recognized, on the development of high precision and computational efficient algorithms for Synthetic Aperture Radar (SAR) digital data processing. In this field**, **in addition to being the author of numerous publications, he is co-author of the book:** Franceschetti G. and **Lanari R.**, "Synthetic Aperture Radar Processing" (1999, first edition), DOI: 10.1201/9780203737484, which **has 783 citations (Scopus source)**

In the following, a selection of four (4) Riccardo Lanari publications, with a major impact on the research developments in the SAR digital data processing field, is provided, also reporting their numbers of citations (cited by highest):

5) **Lanari R.,** Tesauro M., Sansosti E., Fornaro G., (2001), "Spotlight SAR data focusing based on a two-step processing approach", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/36.951090 **(citations: 254 - Scopus source)**
6) **Lanari R.,** Zoffoli S., Sansosti E., Fornaro G., Serafino F., (2001), "New approach for hybrid strip-map/spotlight SAR date focusing", IEE Proceedings. Radar, Sonar and Navigation, DOI: 10.1049/ip-rsn:20010662 **(citations: 148 - Scopus source)**
7) **Lanari R.,** (1995), "A new method for the compensation of the SAR range cell migration based on the chirp z-transform", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/36.469496 **(citations: 115 - Scopus source)**
8) **R Lanari,** Hensley S., Rosen P.A., (1998), "Chirp z-transform based SPECAN approach for phase-preserving ScanSAR image generation", IEE Proceedings. Radar, Sonar and Navigation, DOI: 10.1049/ip-rsn:19982218 **(citations: 84 - Scopus source; for the activities related to this work Riccardo Lanari and the other co-authors received a NASA recognition in 1999)**

9) **Co-inventor of the technique referred to as Small BAseline Subset (SBAS), which nowadays represents an international reference for what concerns the Differential SAR Interferometry (DInSAR) satellite techniques for surface displacements detection and for the investigation of their temporal evolution. The first publication on the SBAS algorithm:** P Berardino, G Fornaro, **R Lanari**, E Sansosti, (2002), "A new algorithm for surface deformation monitoring based on small baseline differential SAR interferograms", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2002.803792, **has 4457 citations (Scopus source).**

10) **Inventor of the Full-Resolution SBAS (FR-SBAS) algorithm to carry out multi-scale/multi-temporal DInSAR analyses. This solution allows to easily analyze localized displacements phenomena (with a focus on single buildings and/or infrastructures) and the first publication on the FR-SBAS algorithm: Lanari R.**, Mora O., Manunta M., Mallorquí J.J., Berardino P., Sansosti E., (2004), "A small-baseline approach for investigating deformations on full-resolution differential SAR interferograms", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2004.828196 **has <u>943 citations</u> (Scopus source)**

In the following, a selection of ten (10) Riccardo Lanari publications, with a major impact on the research developments in the DInSAR field and on the SBAS algorithms developments and exploitations in the Geosciences (in particular, in seismic and volcanic risk scenarios relevant to the Italian territory), is provided, also reporting their numbers of citations (cited by highest):

11) Casu F., Manzo M., **Lanari R.**, (2006), "A quantitative assessment of the SBAS algorithm performance for surface deformation retrieval from DInSAR data", Remote Sensing of Environment, DOI: 10.1016/j.rse.2006.01.023 **(citations: 413 - Scopus source)**
12) Pepe A., **Lanari R.**, (1996), "On the extension of the minimum cost flow algorithm for phase unwrapping of multitemporal differential SAR interferograms", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2006.873207 **(citations: 354 - Scopus source)**
13) Casu F., Elefante S., Imperatore P., Zinno I., Manunta M., De Luca C., **Lanari R.**, (2014), "SBAS-DInSAR parallel processing for deformation time-series computation", IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing, DOI: 10.1109/JSTARS.2014.2322671 **(citations: 205 - Scopus source)**
14) Lundgren P., Casu F., Manzo M., Pepe A., Berardino P., Sansosti E., **Lanari R.**, (2004), "Gravity and magma induced spreading of Mount Etna volcano revealed by satellite radar interferometry", Geophysical Research Letters, DOI: 10.1029/2003GL018736 **(citations: 181 - Scopus source)**
15) **Lanari R.**, Fornaro G., Riccio D., Migliaccio M., Papathanassiou K.P., Moreira J.R., Schwabisch M., Dutra L., Puglisi G., Franceschetti G., Coltelli M., (1996), "Generation of digital elevation models by using SIR-C/X-SAR multifrequency two-pass interferometry: The Etna case study", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/36.536526 **(citations: 173 - Scopus source)**
16) Casu F., Manconi A., Pepe A., **Lanari R**., (2011), "Deformation time-series generation in areas characterized by large displacement dynamics: The SAR amplitude pixel-offset SBAS technique", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2010.2104325 **(citations: 170 - Scopus source)**
17) Manunta M., De Luca C., Zinno I., Casu F., Manzo M., Bonano M., Fusco A., Pepe A., Onorato G., Berardino P., De Martino P., **Lanari R.**, (2019), "The Parallel SBAS Approach for Sentinel-1 Interferometric Wide Swath Deformation Time-Series Generation: Algorithm Description and Products Quality Assessment", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2019.2904912 **(citations: 159 - Scopus source)**
18) Lundgren P., Usai S., Sansosti E., **Lanari R**., Tesauro M., Fornaro G., Berardino P., (2001), "Modeling surface deformation observed with synthetic aperture radar interferometry at Campi Flegrei caldera", Journal of Geophysical Research: Solid Earth, DOI: 10.1029/2001jb000194 **(citations: 154 - Scopus source)**
19) Pepe A., Yang Y., Manzo M., **Lanari R.**, (2015), "Improved EMCF-SBAS processing chain based on advanced techniques for the noise-filtering and selection of small baseline multi-look DInSAR interferograms", IEEE Transactions on Geoscience and Remote Sensing, DOI: 10.1109/TGRS.2015.2396875 **(citations: 113 - Scopus source)**
20) **Lanari R**., Berardino P., Bonano M., Casu F., Manconi A., Manunta M., Manzo M., Pepe A., Pepe S., Sansosti E., Solaro G., Tizzani P., Zeni G., (2010), "Surface displacements associated with the L'Aquila 2009 Mw 6.3 earthquake (central Italy): New evidence from SBAS-DInSAR time series analysis", Geophysical Research Letters, DOI: 10.1029/2010GL044780 **(citations: 97 - Scopus source)**

Peer recognition

- **Awarded of the title of Knight of the Order of Merit (*Cavaliere dell'Ordine al Merito*) of the Italian Republic (2023).**
- **Awarded of the Fawwaz Ulaby Distinguished Achievement (2020) of the Geoscience and Remote Sensing Society (GRSS) of IEEE,** for his exceptional contributions and leadership in the SAR and InSAR data processing field.
- **Awarded of the Christiaan Huygens Medal (2017)**, one of the prizes that the European Geosciences Union (EGU) awards each year to eminent scientists for their innovations, discoveries, or relevant contributions that have led to significant progress in the area of "Geosciences Instrumentation and Data Systems".
- **Awarded of the Dorso prize (2015)** for the Special Section "Research", held under the patronage of the Senate of the Italian Republic.
- **Awarded of the degree of IEEE Fellow (since 2013)** for his contribution to the development of algorithms for digital processing of SAR data.
- **Recipient of two national scientific habilitations as full professor** of Telecommunications (12/2013) and of Geophysics (02/2014).
- **Appointed "Focused" Principal Investigator (2005)** of the European Space Agency (ESA) for Earth Observation activities.
- **Distinguished Speaker (since 2001) of the Geoscience and Remote Sensing Society (GRSS) of IEEE**, on Differential SAR Interferometry.
- **Recipient of a NASA group award (2001)** for the Shuttle Radar Topography Mission (SRTM) Algorithm Development, Products Processing, and Validation Team.
- **Recipient of a NASA recognition (1999)** for the creative development of a technical innovation entitled: "Scan SAR interferometric Processing Using the Chirp-Z Transform"
- **Invited speaker/chairman/convener and/or scientific program committee member (more than 50 contributions**) at many international conferences (IGARSS, IEEE RADAR CONFERENCE, EUSAR, FRINGE, URBAN, EGU).
- **Invited lecturer** (**more than 20 contributions**) in several national and foreign universities and research centers (University of Roma - Sapienza, INGV, DLR, Universitat Politècnica de Catalunya, GFZ, CONAE, University of California San Diego, JPL, etc.).

ADDITIONAL INFORMATION

Other contributions to the research community (last ten years)

- **Member (from 2024 to present) of the ESA Advisory Group of the *Harmony* mission.**
- **Member (from 2022 to present) of the expert group of the Copernicus National User Forum (for the Ground Motion service) to support the development of the PNRR program called IRIDE.**
- **Expert (from 2022 to today) of the Italian delegation of the European Copernicus Programme, for the Space Program Committee.**
- **Member (from 2022 to present) of the Working Group dedicated to the "International Coordination for Future SAR Systems", which involves researchers from the international scientific community and representatives of the main space agencies (NASA, ASI, JAXA, DLR, CSA, CONAE, etc .)**
- **Member (from 2021 to 2022) of the Stable Working Group on Space and Aerospace Research of the Ministry of University and Research (MUR).**
- **Member (from 2021 to present) of the ASI Advisory Group of the *COSMO-SkyMed* second generation mission.**
- **Member (from 2020 to present) of the Copernicus Sentinel-1 Next Generation Ad hoc Expert Group of ESA.**
- **Member (from 2020 to present) of the ESA Advisory Group of the *ROSE-L* mission.**
- **Member (from 2019 to 2023) of the Board of Directors of the *Eucentre* foundation.**
- **Member (from 2017 to 2023) of the National Commission for the Prevision and Prevention of Big Risks (*Commissione Nazionale Grandi Rischi*).**

- **Member (from 2017 to present), designed by the CNR, of "Space Economy" Surveillance Committee.**
- **Member (from 2015 to 2023) of the Governing Body the Italian National Aerospace Technological Cluster (*CTNA*).**
- **Member (from 2015 to 2019) of the ASI Advisory Group of the *COSMO-SkyMed* first and second generation missions.**

Career breaks, diverse career paths and major life events

- **Nothing specific to indicate**