

## FABIO DEL FRATE – Resume July 2020

### EDUCATION

- S. M., Electronic Engineering, 1992, Tor Vergata University, Rome, IT
- Ph. D., Computer Science and Automation Engineering, 1997, Tor Vergata University, Rome, IT

### PROFESSIONAL EXPERIENCE

- Presently Associate Professor ("Remote Sensing" and "Electromagnetics" courses) and formerly Assistant Professor at University of Rome Tor Vergata, Italy (since 1999)
- European Space Agency  $\Phi$ -Lab Visiting Professor in 2019 and 2020
- EUMETSAT Associate Scientist in 2015
- President of GEO-K S.r.l.([www.geo-k.co](http://www.geo-k.co)), the first spin-off company of University of Rome Tor Vergata, founded in 2006
- Research Fellow, European Space Agency, ESRIN Center, Frascati, Italy, 1998-1999
- Research Fellow, University of Rome Tor Vergata, Italy, 1997-1998
- Visiting Scientist, Massachusetts Institute of Technology, Cambridge, MA, USA, 1995-1996
- Visiting Scientist, ENEA (Italian National Agency for New Technologies, Energy and Environment), Bracciano, Italy, 1993-1994
- Research Fellow, University of Rome Tor Vergata, Italy, 1992-1993

### SCIENTIFIC ACTIVITY AND SERVICE

#### *INTERNATIONAL JOURNALS*

- Associate Editor for IEEE Geoscience and Remote Sensing Letters, 2006 - 2016
- Associate Editor for EURASIP Journal on Advances in Signal Processing Special Issue, 2010 – 2014
- Associate Editor for REMOTE SENSING Special Issue, 2017-2019
- In the Editorial Board of REMOTE SENSING since 2019
- Reviewer for:
  - IEEE Transactions on Geoscience and Remote Sensing (TGRS)
  - IEEE Geoscience and Remote Sensing Letters (GRSL)
  - IEEE Journal of Selected Topics in Applied Geoscience and Remote Sensing (JSTARS)
  - International Journal of Remote Sensing
  - Remote Sensing of Environment
  - Photogrammetric Engineering and Remote Sensing
  - International Journal of Applied Earth Observation and Geoinformation
  - International Journal of Electronics and Communications
  - Radio Science
  - Computers and Electronics in Agriculture
  - Information Fusion
  - Landscape and Urban Planning
  - Sensors

## *INTERNATIONAL CONFERENCES*

- Session Organizer
  - Progress in Electromagnetic Research Symposium, 2006, Cambridge, MA, USA
  - SPIE Conference on SAR Image Analysis, Modeling, and Techniques, 2012, Edinburgh, UK
- Local Organization Committee Member
  - Microwave Radiometry and Remote Sensing of the Environment, Rome, Italy, 2012
  - Workshop on Fuegosat requirements consolidation, ESA-ESRIN, Frascati, Italy, 2010
- Technical/Scientific Committee Member
  - Urban Remote Sensing, 2007, 2009, 2011, 2013, 2015
  - SPIE conference on SAR Image Analysis, Modeling and Techniques, 2011, 2012, 2013, 2014, 2015
  - SPIE conference on Active and Passive Microwave Remote Sensing for Environmental Monitoring, 2016, 2017, 2018, 2019
  - IEEE GOLD Remote Sensing Conference 2012, 2014
  - ESA Mapping Urban Areas from Space workshop, 2015, 2018
  - ESA Living Planet Symposium, 2016, 2019
  - The International Symposium on Remote Sensing for Climate and Earth Monitoring, 2015, 2016
  - IEEE/GRSS Mediterranean and Middle-East Geoscience and Remote Sensing Symposium, 2020
  - Abstract Reviewer for IGARSS (International Geoscience and Remote Sensing Symposium) since 2007
  - Latin American Geoscience and Remote Sensing Society Conference, 2020

## *MEMBERSHIPS AND AWARDS*

- Member of Tor Vergata University Senate 2008-2010
- Co-Winner of the Data Fusion Contest organized by IEEE GRS-S Data Fusion Technical Committee in 2007 and 2008
- Senior Member IEEE – (Geoscience and Remote Sensing Society)
- Member SIEM (Italian Society of Electromagnetics) since 2002
- Member of the IEEE Geoscience and Remote Sensing Society Data Fusion Technical Committee

## TEACHING ACTIVITY

Coordinator of "Design, Application, Regulation of UAVs" University of "Tor Vergata" Master Program since 2018

*At Telespazio S.P.A.*

- Teaching activity carried out in 1994 for professional refresher courses on Data Networks and Numerical Transmissions

*At the Engineering Master Degree courses of the University of Rome Tor Vergata:*

- Professor in charge of the course of Remote Sensing and Cartography (9 cf) since 2011



- Professor in charge of the Electromagnetic Pollution course (6 cf) since 2000
- Teaching support for the course of Electromagnetic Fields from 1993 to 2011
- Teaching support for the Satellite Monitoring course from 2002 to 2011
- Teaching support for the course of Remote Sensing and Electromagnetic Diagnostics from 2002 to 2011
- Supervisor of 63 thesis and 30 thesis or equivalent works

*At the PhD course in Geoinformation of the University of Rome Tor Vergata:*

- Professor of the course of "Application of neural networks to Remote Sensing data" since 2004
- Mentor of 15 PhD thesis works

*At the Master in Geographic Information Systems of the University of Rome Tor Vergata*

- Teacher and Coordinator of the "Remote Sensing" module since 2011
- Supervisor of 4 final thesis works

*At the Master of Space Sciences and Technologies of the University of Rome Tor Vergata:*

- Teacher and Coordinator of the "Earth observation" module since 2010

*At the Big Data for Precision Medicine Summer School of the University of Pavia:*

- Lecturer within the "Human-Environment Interaction Assessment" module in 2016

*At the Birkenfeld Umwelt Campus (University of Trier, Germany):*

- Teaching activity on Electromagnetic Pollution for intermediate academic level courses between Bachelor's and Master's degrees (2003)

*At or in collaboration with ESA (European Space Agency):*

- Coordinator and teacher of the course "SAR imagery for integrated water resources management" for remote sensing specialists from the African continent held at the ESA-ESRIN Center (2006)
- ESA Course for the use of SAR data addressed to the Coast Guard (2011)
- Lecturer at the University of Prague on the topic "SAR in Urban Land Cover" (2013)
- Lecturer at the University of Krakow on the topic "Introduction to SAR basics" (2014)
- Unit coordinator for the "LearnEO!" Project for the development of online lessons on Earth Observation

#### **ERASMUS**

- Responsible agreements with the University of Trier and University of Brasov
- Coordinator for the Engineering for the Environment and the Territory Master Course
- Coordinator for the Macroarea of Engineering since 2017, Vice-Coordinator in 2015-2017

#### **PROJECT MANAGEMENT AND TECHNOLOGICAL TRANSFER ACTIVITIES**

- Since 2000 Tor Vergata technical and scientific manager of various research and development contracts financed, among others, by FAO, TIM, Telespazio, TSF (Tele Sistemi Ferroviari), TERNA, Applied Meteorology Foundation, APAT
- Tor Vergata University coordinator for the ESA project: "Knowledge based Information Mining" (2005-2006)
- Coordinator of the ESA project: "Apollo: Monitoring Atmospheric Pollution with EO" (2010)
- Tor Vergata University coordinator for the project "COSMO-Coast: monitoring of coastlines through COSMO-SkyMed data" – Italian Space Agency (2012)
- Tor Vergata University Coordinator for the "FabSpace 2.0" project, funded under the Horizon 2020 program and aimed at creating new training approaches regarding the use of satellite data (2016-2019)
- Tor Vergata University Coordinator for the Project "Extended resilience analysis of transport networks" – Italian Ministry of Research (2019-2022)
- In 2006 he co-founded the high-tech company GEO-K Srl, the first spin-off of the University of Rome Tor Vergata, where he currently holds the position of President.

## SELECTED PUBLICATIONS

### **Books**

1. E. Battistelli, C. Capitani, A. Culebras, F. Del Frate, G. Schiavon, B. Arbesser-Ratsburg, J.P.V. Baptista, "A multifrequency mm-wave radiometer (MFR): instrument description and retrieval algorithms," *Microwave Radiometry and Remote Sensing of the Environment*, Editor: D. Solimini, VSP, Utrecht, The Netherlands, pp. 529-536, 1995.
2. F. Pacifici, F. Del Frate, C. Solimini, and W. J. Emery, "Neural Networks for Land Cover Applications," in *Computational Intelligence for Remote Sensing*, Springer Berlin, pp. 267-293, 2008
3. F. Del Frate and M. Picchiani, "Features extraction from Satellite Data," *Encyclopedia of Earthquake Engineering*, Springer Berlin Heidelberg, 2015
4. R. Kapur; V. Byfield; F. Del Frate; M. Higgins; S. Jagannathan. "The Digital Transformation of Education". In: Mathieu, P-P.; Aubrecht, C., (eds.) *Earth Observation Open Science and Innovation*. Cham, Springer, 25-42. (ISSI Scientific Report, 15), 2018

### **Peer reviewed international journals**

5. S. Baronti, F. Del Frate, P. Ferrazzoli, S. Paloscia, P. Pampaloni, G. Schiavon, "SAR polarimetric features of agricultural areas," *International Journal of Remote Sensing*, vol. 16, pp. 2639--2656, 1995.
6. F. Del Frate, A. Petrocchi, J. Lichtenegger, G. Calabresi, "Neural networks for oil spill detection using ERS-SAR data," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 38, n. 5, pp. 2282-2287, 2000.
7. F. Del Frate, L.F. Wang, "Sunflower biomass estimation using a scattering model and a neural network algorithm," *International Journal of Remote Sensing*, vol. 22, pp. 1235--1244, 2001.
8. F. Del Frate, A. Ortenzi, S. Casadio, C. Zehner, "Application of neural algorithms for a real time estimation of ozone profiles from GOME measurements," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 40, n. 10, pp. 2263-2270, 2002.
9. F. Del Frate, P. Ferrazzoli, G. Schiavon, "Retrieving soil moisture and agricultural variables by microwave radiometry using neural networks," *Remote Sensing of Environment*, vol. 84, n. 2, pp. 174-183, February 2003
10. F. Del Frate, G. Schiavon, D. Solimini, M. Borgeaud, D.H. Hoekman and M.A.M. Vissers, "Crop classification using Multiconfiguration C-Band SAR data," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 41, n. 7, pp. 1611-1619, July 2003
11. F. Del Frate, D. Solimini, "On a neural network algorithm for retrieving forest biomass from SAR data," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 42, n. 1, pp. 24-34, January 2004
12. F. Del Frate, F. Pacifici, G. Schiavon, C. Solimini, "Use of neural networks for automatic classification from high resolution imagery," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 45, n. 4, pp. 800-809, April 2007
13. F. Pacifici, F. Del Frate, C. Solimini, W.J. Emery, "An Innovative Neural-Net Method to Detect Temporal Changes in High-Resolution Optical Satellite Imagery", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 45, n. 9, pp. 2940-2952, September 2007
14. M. Chini, F. Pacifici, W. J. Emery, N. Pierdicca, F. Del Frate, "Comparing Statistical and Neural Network Methods Applied to Very High Resolution Satellite Images Showing Changes in Man-Made Structures at Rocky Flats," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 46, n. 6, pp. 1812-1821, June 2008



15. F. Del Frate, F. Pacifici, D. Solimini, "Monitoring Urban Land Cover in Rome, Italy, and its Changes by Single-polarization Multi-temporal SAR Images," *IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing*, vol 1, n. 2, pp. 87-97, June 2008
16. F. Pacifici, F. Del Frate, W. J. Emery, P. Gamba, J. Chanussot, "Urban mapping using coarse SAR and optical data: outcome of the 2007 GRS-S data fusion contest," *IEEE Geoscience and Remote Sensing Letters*, vol 5, n. 3, pp. 331-335, July 2008
17. A. Minchella, F. Del Frate, F. Capogna, S. Anselmi, F. Manes, "Use of Multitemporal SAR Data for the monitoring of the vegetation recovery in burned areas," *Remote Sensing of Environment*, vol. 113, n. 3, pp. 588-597, March 2009
18. F. Pacifici and F. Del Frate, "Automatic Change Detection in Very High Resolution Images with Pulse-Coupled Neural Networks," *IEEE Geoscience and Remote Sensing Letters*, vol 7, n. 1, pp. 58-62, January 2010
19. S. Stramondo, F. Del Frate, M. Picchiani, G. Schiavon, "Seismic Source Quantitative Parameters Retrieval from InSAR Data and Neural Networks," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 49, n. 1, pp. 96-104, January 2011.
20. G. Licciardi and F. Del Frate, "Pixel unmixing in hyperspectral data by means of neural networks," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 49, n. 11, pp. 4163-4172, November 2011
21. Picchiani M., Chini M., Corradini S., Merucci L., Sellitto P., Del Frate F., Stramondo S., "Volcanic Ash Detection and Retrievals from MODIS Data by means of Neural Networks," *Atmospheric Measurement Techniques*, 4, 2619-2631, 2011, doi:10.5194/amt-4-2619-2011
22. P. Sellitto, F. Del Frate, D. Solimini, S. Casadio, "Tropospheric ozone column retrieval from ESA-Envisat SCIAMACHY nadir UV/VIS radiance measurements by means of a neural network algorithm," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 50, n. 3, pp. 998-1011, March 2012.
23. F. Del Frate, D. Latini, C. Pratola, F. Palazzo, "PCNN for automatic segmentation and information extraction from X-band SAR imagery," *International Journal of Image and Data Fusion*, DOI:10.1080/19479832.2012.713398, 2012
24. C. Pratola, F. Del Frate, G. Schiavon, D. Solimini, "Toward fully automatic detection of changes in suburban areas from VHR SAR images by combining multiple neural network models," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 51, n. 4, pp. 2055-2066, April 2013.
25. Taravat A., Latini D., Del Frate F., "Fully automatic dark-spot detection from SAR imagery with the combination of NonAdaptive Weibull Multiplicative Model and Pulsed-Coupled Neural Networks," *IEEE Transactions on Geoscience and Remote Sensing*, vol. 52, n. 5, pp. 2427-2435, May 2014.
26. Taravat, A., Del Frate, F., Cornaro, C., and Vergari, S, "Neural Networks and Support Vector Machine Algorithms for Automatic Cloud Classification of Whole-Sky Ground-Based Images," *IEEE Geoscience and Remote Sensing Letters*, vol 12, n. 3, pp. 666-670, March 2015
27. Daniele Latini, Fabio Del Frate and Cathleen E. Jones, "Multi-frequency and polarimetric quantitative analysis of the Gulf of Mexico oil spill by means of different SAR systems," *Remote Sensing of Environment*, v. 183, pp. 26-42, 2016
28. G. Casati, M. Longhi, D. Latini, F. Carbone, S. Amendola, F. Del Frate, G. Schiavon, and G. Marrocco, "The Interrogation Footprint of RFID-UAV: Electromagnetic Modeling and Experimentations", *IEEE Journal of Radio Frequency Identification*, Vol. 1, No. 2, pp 155-162, June 2017
29. C. Feigenwinter, R. Vogt, E. Parlow, F. Lindberg, M. Marconcini, F. Del Frate, N. Chrysoulakis, "Spatial Distribution of Sensible and Latent Heat Flux in the city of Basel (Switzerland)," *IEEE Journal of Selected Topics in Applied Earth Observations and Remote Sensing*, Vol. 11, No. 10, pp 2717-2723, August 2018

30. L. Bianchini Ciampoli, V. Gagliardi, C. Clementini, D. Latini, F. Del Frate, A. Benedetto, "Transport infrastructure monitoring by InSAR and GPR data fusion", *Surveys in Geophysics*, DOI 10.1007/s10712-019-09563-7, 2019
31. L. Fasano, D. Latini, A. Machidon, C. Clementini, G. Schiavon, F. Del Frate, "SAR data fusion using Non Linear Principal Component Analysis," *IEEE Geoscience and Remote Sensing Letters*, vol 7, n. 1, pp. 58-62, 2019
32. A. L. Machidon, F. Del Frate, M. Picchiani, O. M. Machidon and P. L. Ogrutan, "Geometrical Approximated Principal Component Analysis for Hyperspectral Image Analysis," *Remote Sensing*, Vol. 12, N 11, DOI 10.3390/rs12111698, May 2020
33. C. Clementini, A. Pomente, D. Latini, H. Kanamaru, M. R. Vuolo, A. Heureux, M. Fujisawa, G. Schiavon, F. Del Frate, "Long-Term Grass Biomass Estimation on Pastures from Satellite Data," *Remote Sensing*, 2020, 12, 2160