**Fabio Pacifici, Ph.D.**
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Fabio Pacifici was born in Rome, Italy, in 1980. He received the Ph.D. degree in GeoInformation from Tor Vergata University, Rome, Italy, in 2010. He also received the Laurea Specialistica (M.S.; *cum laude*) and Laurea (B.S.; *cum laude*) degrees in telecommunication engineering from the the same University, in 2003 and 2006, respectively.

Since 2009, he is working at DigitalGlobe as R&D Scientist. Between 2005 and 2009, he collaborated as Visitor Scientist with the Department of Aerospace Engineering Sciences, University of Colorado, Boulder. He has been involved in various remote sensing projects supported by the European Space Agency.

His research activities include remote sensing image processing, analysis of multi-temporal data, data fusion, active learning, and feature extraction. Particularly, his interests are related to the development of classification and change detection techniques for urban remote sensing applications using very high spatial resolution optical and/or synthetic aperture radar imagery, with special emphasis on machine learning.

Dr. Pacifici was the recipient of the 2009 Joint Urban Remote Sensing Event student paper competition. He ranked the first prize in the 2007, 2008 and the 2009 IEEE Geoscience and Remote Sensing Data Fusion Contest. He is author (or co-author) of 13 scientific publications in referred international Journals, 2 book chapters, and more than 40 contributions in international conferences.

He is the current Chair of the IEEE Geoscience and Remote Sensing Data Fusion Technical Committe. He was guest organizer of the 2011 Data Fusion Contest, he served as a member of the 2011 Joint Urban Event Technical Committee and session chair at the 2010 International Geoscience and Remote Sensing Symposium.

He serves as a referee for the Transactions on Geoscience and Remote Sensing, Geoscience and Remote Sensing Letters, Transactions on Image Processing, Journal of Selected Topics in Signal Processing, Journal on Image and Video Processing, International Journal of Image and Data Fusion, International Journal of Applied Earth Observation and Geoinformation, Pattern Recognition Letters, and Journal of Urban Ecosystems.

# List of Publications

## Book chapters

1. F. Pacifici, W. J. Emery, "Pulse Coupled Neural Networks for Automatic Urban Change Detection at Very High Spatial Resolution", in *Progress in Pattern Recognition, Image Analysis, Computer Vision, and Applications*, E. Bayro-Corrochanpo, J. Eklundh, Eds. Lecture Notes in Computer Science, Springer, vol. 5856, pp. 929-942, Springer, ISBN: 978-3-642-10267-7, 2009

2. F. Pacifici, F. Del Frate, C. Solimini, W. J. Emery, "Neural Networks for Land Cover Applications", in *Computational intelligence for remote sensing*, M. Graña, R.Duro, Eds. Studies in Computational Intelligence, Springer, vol. 133, pp. 267-293, Springer, ISBN: 978-3-540-79352-6, 2008

## Journals

1. E. Pasolli, F. Melgani, D. Tuia, F. Pacifici, W. J. Emery, "SVM Active Learning using Spatial Information", *IEEE Transactions on Geoscience and Remote Sensing* [submitted]

2. N. Longbotham, C. Bleiler, C. Chaapel, C. Padwick, W. J. Emery, F. Pacifici, "Urban classification of a WorldView-2 multi-angle sequence", *IEEE Transactions on Geoscience and Remote Sensing* [submitted]

3. F. Pelliccia, F. Pacifici, S. Bonafoni, P. Basili, N. Pierdicca, P. Ciotti, W. J. Emery, "Neural networks for arctic atmosphere sounding from radio occultation data", *IEEE Transactions on Geoscience and Remote Sensing* [in press]

4. F. Pacifici, F. Del Frate, "Automatic change detection in very high resolution images with pulse-coupled neural networks", *IEEE Geoscience and Remote Sensing Letters* vol. 7, no. 1, pp. 58-62, January 2010

5. G. Licciardi, F. Pacifici, D. Tuia, S. Prasad, T. West, F. Giacco, J. Inglada, E. Christophe, J. Chanussot, P. Gamba, "Decision fusion for the classification of hyperspectral data: outcome of the 2008 GRS-S data fusion contest", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 47, no. 11, pp. 3857-3865, November 2009

6. D. Tuia, F. Pacifici, M. F. Kanevski, W. J. Emery, "Classification of very high spatial resolution imagery using mathematical morphology and support vector machines", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 47, no. 11, pp. 3866-3879, November 2009

7. D. Tuia, F. Ratle, F. Pacifici, M. F. Kanevski, W. J. Emery, "Active Learning Methods for Remote Sensing Image Classification", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 47, no. 7, pp. 2218-2232, July 2009

8. F. Pacifici, M. Chini, W. J. Emery, "A neural network approach using multi-scale textural metrics from very high resolution panchromatic imagery for urban land-use classification", *Remote Sensing of Environment*, vol. 113, no. 6, pp. 1276-1292, June 2009

9. 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 Observations and Remote Sensing*, vol. 1, no. 2, pp. 87-97, June 2008

10. 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, no. 3, pp. 331-335, July 2008

11. 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, no. 6, pp. 1812-1821, June 2008

12. 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, no. 9, pp. 2940-2952, September 2007

13. F. Del Frate, F. Pacifici, G. Schiavon, C. Solimini, "Use of neural networks for automatic classification from high-resolution images", *IEEE Transactions on Geoscience and Remote Sensing*, vol. 45, no. 4, pp. 800-809, April 2007

# Conferences

1. F. Pacifici, J. Chanussot, J. Q. Du, "2011 GRSS data fusion contest: exploiting WorldView-2 multi-angular acquisitions", *International Geoscience and Remote Sensing Symposium 2011*, Vancouver, Canada, July 24-29, 2011

2. N. Longbotham, W. J. Emery, C. Bleiler, C. Chaapel, C. Padwick, F. Pacifici, "Spatial classification of WorldView-2 multi-angle sequence", *International Geoscience and Remote Sensing Symposium 2011*, Vancouver, Canada, July 24-29, 2011

3. N. Longbotham, W. J. Emery, C. Bleiler, C. Chaapel, C. Padwick, F. Pacifici, "Spectral classification of WorldView-2 multi-angle sequence", *International Geoscience and Remote Sensing Symposium 2011*, Vancouver, Canada, July 24-29, 2011

4. E. Pasolli, F. Melgani, D. Tuia, F. Pacifici, W. J. Emery, "Improving active learning methods using spatial information", *International Geoscience and Remote Sensing Symposium 2011*, Vancouver, Canada, July 24-29, 2011

5. N. Longbotham, C. Bleiler, C. Padwick, C. Chaapel, F. Pacifici, "Image Classification with Derived Angular Reflectance and Height Map Data from WorldView-2 Multiangle Acquisition Sequence", *American Society for Photogrammetry and Remote Sensing 2011 Annual Conference*, Milwaukee, USA, May 1-5, 2011

6. C. Padwick, G. Marchisio, F. Pacifici, "Automatic earthquake damage mapping using multiple very high spatial resolution acquisitions", *American Society for Photogrammetry and Remote Sensing 2011 Annual Conference*, Milwaukee, USA, May 1-5, 2011

7. G. Marchisio, F. Pacifici, C. Padwick, "Coastal applications of WorldView-2 high resolution multi-spectral imagery", *American Society for Photogrammetry and Remote Sensing 2011 Annual Conference*, Milwaukee, USA, May 1-5, 2011

8. G. Marchisio, F. Pacifici, C. Padwick, "Evidence of improved vegetation discrimination and urban mapping using WorldView-2 high resolution multi-spectral imagery", *American Society for Photogrammetry and Remote Sensing 2011 Annual Conference*, Milwaukee, USA, May 1-5, 2011

9. N. Longbotham, C. Bleiler, C. Chaapel, C. Padwick, W. J. Emery, F. Pacifici, "Spectral Classification of WorldView-2 Multi-angle Sequence", *Joint Urban Remote Sensing Event 2011*, Munich, Germany, April 11-13, 2011

10. N. Longbotham, C. Bleiler, C. Chaapel, C. Padwick, W. J. Emery, F. Pacifici, 'Spatial Classification of WorldView-2 Multi-angle Sequence", *Joint Urban Remote Sensing Event 2011*, Munich, Germany, April 11-13, 2011

11. N. Longbotham, C. Bleiler, C. Chaapel, C. Padwick, W. J. Emery, F. Pacifici, "Overview of Spatial and Spectral Classification with WorldView-2 Multi-angle Sequence", *Joint Urban Remote Sensing Event 2011*, Munich, Germany, April 11-13, 2011

12. F. Pacifici, M. Chini, C. Bignami, S. Stramondo, W. J. Emery, "Automatic damage detection using pulse-coupled neural network for the 2009 Italian earthquake", *International Geoscience and Remote Sensing Symposium 2010*, Honolulu, USA, July 25-30, 2010

13. F. Pacifici, C. Padwick, G. Marchisio, "Unsupervised change detection frameworks for very high spatial resolution images", *International Geoscience and Remote Sensing Symposium 2010*, Honolulu, USA, July 25-30, 2010

14. G. Marchisio, F. Pacifici, K. Navulur, C. Padwick, "On the relative predictive value of the new spectral bands in the worldview-2 sensor", *International Geoscience and Remote Sensing Symposium 2010*, Honolulu, USA, July 25-30, 2010

15. M. Zortea, D. Tuia, F. Pacifici, A. Plaza, "Spectral-textural endmember extraction", *Workshop on Hyperspectral Image and Signal Processing: Evolution in Remote Sensing 2010*, Reykjavk, Iceland, June 14-16, 2010

16. C. Padwick, M. Deskevich, F. Pacifici, S. Smallwood, "WorldView-2 Pan-Sharpening", *American Society for Photogrammetry and Remote Sensing 2010*, San Diego, USA, April 2630, 2010

17. F. Pacifici, W. J. Emery, "Pulse Coupled Neural Networks for Urban Change Detection at Very High Spatial Resolution", *Iberoamerican Congress on Pattern Recognition*, Guadalajara, Mexico, November 15-18, 2009

18. F. Del Frate, G. Licciardi, F. Pacifici, C. Pratola, D. Solimini, "Pulse coupled neural networks for automatic features extraction from COSMO-SkyMed and TerraSAR-X imagery", *International Geoscience and Remote Sensing Symposium 2009*, Cape Town, South Africa, July 13-17, 2009

19. M. Chini, F. Pacifici, W. J. Emery, "Morphological operators applied to X-band SAR for urban land use classification", *International Geoscience and Remote Sensing Symposium 2009*, Cape Town, South Africa, July 13-17, 2009

20. F. Pacifici, F. Del Frate, W. J. Emery, "Pulse coupled neural networks for detecting urban areas changes at very high resolutions", *Joint Urban Remote Sensing Event 2009*, Shanghai, China, May 20-22, 2009

21. R. Basili, F. Del Frate, M. Luciani, F. Mesiano, F. Pacifici, R. Rossi, "Comparative analysis of kernel-based methods for the classification of land cover maps in satellite imagery", *International Geoscience and Remote Sensing Symposium 2008*, Boston, USA, July 6-11, 2008

22. D. Tuia, F. Ratle, F. Pacifici, A. Pozdnoukhov, M. Kanevski, F. Del Frate, D. Solimini, W. J. Emery, "Urban classification of very high resolution optical imagery using morphological operators", *International Geoscience and Remote Sensing Symposium 2008*, Boston, USA, July 6-11, 2008

23. D. Tuia, F. Ratle, F. Pacifici, A. Pozdnoukhov, M. Kanevski, F. Del Frate, D. Solimini, W. J. Emery, "Entropy-based query learning for semi-automatic training set selection of very high resolution optical imagery", *International Geoscience and Remote Sensing Symposium 2008*, Boston, USA, July 6-11, 2008

24. M. Chini, F. Pacifici, W. J. Emery, "TerraSAR-X multi-scale textural analysis for urban classification", *International Geoscience and Remote Sensing Symposium 2008*, Boston, USA, July 6-11, 2008

25. F. Pacifici, M. Chini, W. J. Emery, "Urban land-use multi-scale textural analysis", *International Geoscience and Remote Sensing Symposium 2008*, Boston, USA, July 6-11, 2008

26. D. Tuia, F. Ratle, F. Pacifici, A. Pozdnoukhov, M. Kanevski, F. Del Frate, D. Solimini, W. J. Emery, "Entropy-based active learning for very-high resolution imagery", *ESA-EUSC 2008: Image Information Mining: pursuing automation of geospatial intelligence for environment and security*, ESA/ESRIN, Frascati, Rome, Italy, March 4-6, 2008

27. F. Pacifici, M. Chini, W. J. Emery, "Urban land-use textural analysis for very high resolution optical imagery", *ESA-EUSC 2008: Image Information Mining: pursuing automation of geospatial intelligence for environment and security*, ESA/ESRIN, Frascati, Rome, Italy, March 4-6, 2008

28. F. Del Frate, F. Pacifici, D. Solimini, "Use of neural networks for automatic classification of SAR imagery", *ESA-EUSC 2008: Image Information Mining: pursuing automation of geospatial intelligence for environment and security*, ESA/ESRIN, Frascati, Rome, Italy, March 4-6, 2008

29. F. Del Frate, F. Pacifici, D. Solimini, "Automatic change detection with pulse coupled neural networks", *ESA-EUSC 2008: Image Information Mining: pursuing automation of geospatial intelligence for environment and security*, ESA/ESRIN, Frascati, Rome, Italy, March 4-6, 2008

30. F. Del Frate, F. Pacifici, D. Solimini, A. Burini, "Urban land cover classification: potential of high and very high resolution SAR imagery", *International Geoscience and Remote Sensing Symposium 2007*, Barcelona, Spain, July 23-27, 2007

31. M. Chini, W. J. Emey, F. Pacifici, "Satellite mapping of the demolition of the Rocky Flats nuclear weapons plant", *International Geoscience and Remote Sensing Symposium 2007*, Barcelona, Spain, July 23-27, 2007

32. F. Pacifici, F. Del Frate, C. Solimini, W. J. Emery, "A robust neural network design for detecting changes from multispectral satellite imagery", *International Geoscience and Remote Sensing Symposium 2007*, Barcelona, Spain, July 23-27, 2007

33. M. Chini, W. J. Emey, F. Pacifici, "Change mapping in the Rocky Flats area as test bed for damage detection algorithms", *European Geophysical Union 2007*, Vienna, Austria, April 15-20, 2007

34. F. Del Frate, F. Pacifici, D. Solimini, "Urban land cover in Rome, monitored by single-parameter multi-temporal images", *Urban Remote Sensing Joint Event 2007*, Paris, France, April 11-13, 2007

35. F. Pacifici, F. Del Frate, C. Solimini, W. J. Emery, "A new neural architecture for detecting urban changes in QuickBird imagery", *Urban Remote Sensing Joint Event 2007*, Paris, France, April 11-13,2007

36. F. Del Frate, F. Pacifici, C. Solimini, W. J. Emery, "Architetture neurali di nuova generazione per l'analisi di cambiamenti urbani tramite dati satellitari", *XIII Riunione CeTeM, IV Workshop AIT sul Telerilevamento a Microonde*, Politecnico di Milano, Milano, Italy, November 27-29, 2006

37. F. Del Frate, F. Pacifici, C. Solimini, W. J. Emery, "A new neural network architecture for automatic urban change detection from satellite imagery", *ESA-EUSC 2006: Image Information Mining for Security and Intelligence*, EUSC, Torrejon Air Base, Madrid, Spain, November 27-29, 2006

38. F. Del Frate, F. Pacifici, C. Solimini, W. J. Emery, "Urban change detection by using neural networks algorithms and high resolution optical satellite imagery", *International Geoscience and Remote Sensing Symposium 2006*, Denver, Colorado, USA, July, 31 - August 4, 2006

## Seminaries and Lectures

1. *Unsupervised and supervised Classification*, University of Colorado at Boulder, Boulder, Colorado, USA, October 2010

2. *Pulse-Coupled Neural Networks for Automatic Change Detection in Very High Resolution Images*, Tor Vergata University, Rome, Italy, March 12, 2009

3. *Classification techniques*, University of Colorado at Boulder, Boulder, Colorado, USA, September 26, 2008

4. *Multi-scale textural analysis of panchromatic imagery: urban land-use classification*, Digital-Globe, Longmont, Colorado, USA, November 26, 2007

5. *Neural networks: theory and applications*, University of Colorado at Boulder, Boulder, Colorado, USA, September 25, 2007

6. *Neural network algorithms for urban change detection*, Université de Lausanne, Lausanne, Switzerland, June 7, 2007

7. *Basic and advanced Change Detection algorithms for very-high resolution imagery*, Tor Vergata University, Rome, Italy, May 31, 2007

8. *Urban change detection with high resolution satellite optical imagery*, La Sapienza University, Rome, Italy, March 24, 2006

## Awards

1. First prize of the 2009 IEEE GEOSCIENCE AND REMOTE SENSING Data Fusion Contest *The contest was related to flood detection using radar and optical data. A set of satellite radar and optical images (two ERS amplitude data and two SPOT multi-spectral data) was made available, and the aim was to obtain a change map of the flood as accurate as possible, relative to the unknown ground reference data*

2. First Prize at the Student Paper Competition of the *Joint Urban Remote Sensing Event 2009*, Shanghai, China, May 20-22, 2009, for the contribution entitled "Pulse Coupled Neural Networks for Detecting Urban Areas Changes at Very High Resolutions", co-authored by F. Del Frate and W. J. Emery

3. Travel grants to attend and present at *Joint Urban Remote Sensing Event 2009*, Shanghai, China, May 20-22, 2009

4. First prize of the 2008 IEEE GEOSCIENCE AND REMOTE SENSING Data Fusion Contest. *The contest was related to urban mapping using very high spatial resolution hyper-spectral data. The data set was made available with the aim of obtaining a classified map as accurate as possible, relative to the unknown ground reference data*

5. First prize of the 2007 IEEE GEOSCIENCE AND REMOTE SENSING Data Fusion Contest. *The contest was related to urban mapping using radar and optical data. A set of satellite radar and optical images (ERS amplitude data and Landsat multi-spectral data) was made available, and the aim was to obtain a classified map as accurate as possible, relative to the unknown ground reference data*