

CV RAFFAELLA BRUMANA

MscArch at the Politecnico di Milano (110/110 with honours). Ph.D. in Geodetic and Topographic Sciences.

Since 07/01/2016 Full Professor (Geomatics), Department ABC (National Abilitation for the position of Full Professor, 2013).

1/09/2001 - 07/01/2016 Associate Professor (SSD ICAR/06) at the School of Architecture (Architettura e Società) at Politecnico di Milano (DIAR Dept. Hydraulic and Environmental Engineering, Transport Infrastructures and Surveys and since 2009 Dept. ABC - Architecture, Built Environment and Construction Engineering).

2009-2017 Member of the Scientific Board of the POLIMI-ABCphd School of Doctoral Studies.

Scientific Responsible of the DABCLab Gicarus (4D BIM - GIS - SDI), Geospatial Information@Content modeling: Architectural heritage&built environment&EUrbanAtl@s Data Surveying (<http://www.gicarus.polimi.it>; www.atlas.polimi.it).

Main research activities: Geoinformation and Geospatial data acquisition processing and management, WEB GIS, BIM-GIS for Cultural Heritage and Built Environment Energy Efficiency surveying, SDI, Building District Urban Environmental multiscale data acquisition modelling and monitoring (multi-spectral RGB Thermal Infrared and NIR images, close range, remote sensing, UAV, satellite data, Laser scanner Lidar and Photogrammetry), 4D BIM-GIS modelling, Object Recognition- Reconstruction (ORR), Scenario Simulation, Geocustering, 3DOpen Source information platform (Geo-portal), OpenData, BigData Hub, Virtual Hub APP implementation accessing and discovering Geographic Open Data. tools and web services implementation INSPIRE compliant. Scenario Simulation, water-viewfront panoramic navigation, Energy Efficiency Geocustering, Copernicus data for 9SBAs, Geospatial data for the Societal Benefit Areas.

Key areas of Expertise in Digital Heritage:- Architectural Heritage&Built Environment; Map heritage collections; - Enriched content modeling, advanced surveying techniques; BIM-GIS-3DModelling-VR-AR;- Virtual Museums based on 3Dgeospatial data; Landscape Museums; Open Data Access- VirtualHub&semantic based platforms&metadata; open source geoportal atlas; interoperability, format exchange and remote management; HBIM inventory models; vault inventory model and Open Access GEODB HUB.

She teaches Advanced Survey and Representation Techniques within the Preservation Lab and Survey&Modeling at the School of (AUIC), n.9 in the QS World University Ranking in the field of Architecture <https://www.topuniversities.com/university-rankings/university-subject-rankings/2018/architecture>.

Linked Courses and Profile at the Politecnico di Milano:

https://www4.ceda.polimi.it/manifesti/manifesti/controller/ricerche/RicercaPerDocentiPublic.do?EVN_ELENCO_DIDATTICA=evento&n_docente=Brumana&k_doc=26609&lang=EN&aa=2013&tab_ricerca=2&jaf_currentWFID=main

She teaches Innovative Surveying Techniques and Urban Environmental Surveying to undergraduate student at the Ms.Arch and Ms.Building Engineering/Architecture, Post-Graduate School (SBAP-Scuola di Specializzazione in Beni Architettonici e Paesaggio), ABC-PHD Doctoral programme.

She has authored more than 200 scientific publications, peer review scientific journals, and of an IT book on Technical Specification on Georeferencing Cultural Heritage for the Risk map of RL.

- ICOMOS Member (International Council on Monuments and Sites). - International Scientific Board of UNESCO-OPEN FORUM Mesopotam Saranda (Albania) 2006-09. - Co-chair EUROMED 2018 (Cyprus, Nicosia). - Member of the ECTP EeB PPP PB Partnership Board (2015-2018; 2018-2021). - GEORES2019 Chair (Milan, Italy).

-International Traineeship: - ARCHDOC Architectural Heritage Documentation for Conservation 2011-15 RLICC (Unesco Chair on Preventive conservation and monitoring of monuments and Sites-KUL, Leuven) Master Post Master. -SSHRC Partnered Research Training Initiative New Paradigm/New Tools for Architectural Conservation in Canada (Social Sciences and Humanities Research Council, Partnership) Ottawa.

International Collaboration, roles in scientific and technical committees, Ws organization:

-2017-2019 Advisory Board VIMM

-2017 Copernicus Academy Member– Network Selection (Copernicus Academy Network Applicant Call for expression of interest to join the Copernicus Academy Network) – DG GROW, Space Data for Societal Challenges and Growth.

-2016, Member of External Evaluation Panel of ERA-PLANET, Proposal Evaluation Meeting Rome, 5-6 december, STEP-1 of the trans-national call of ERA-PLANET, STRAND1-2-3-4.

-2016 collaboration to the GEO Italy Group, a coordination amongst national experts involved in EO Domains, to reinforce the synergies between research and university institutions in Italy, to facilitate a broad range of capacity building and outreaching activities to a number of

stakeholders and policy makers as well as to inform the general public (contribution to the Statement from Italy for GEO-XIII Plenary, 2016, St. Petersburg, R. Brumana and S. Nativi ENERGIC OD testimonial), Geo Italy Principal Nicola Pirrone, Director of CNR-IIA (www.ia.cnr.it/, Rome).

-Since 2010 she collaborates as Polimi Associate Member of Lombardy Region within NEREUS (Network of the EU Regions for Using Space technologies), WGs GMES and CET Programme, to perform scientific and technologic research for Space GMES services development devoted to downstream services deployment.

-2012-14, member of the STEERING COMMITTEE, 2015 SCIENTIFIC COUNCIL E2BA (Energy Efficient Building Association, PPP Private Public Partnership), of the E2B EI, Energy Efficient Building European Initiative (Eu2020 objectives, Horizon2020 Challenge, Decarbonization2050), supported by GI, BIM-EM-GIS.

2014_2016_Scientific Committee Member ECTP EEB (Energy Efficiency Building).

- ASITA2015 (29-30-1 Oct, Lecco IT) - Member of the Organizer Hosting Committee of the XIX National Conference and Scientific Responsible of the WS BIM Special Session.

- Scientific Responsible of the Conference 'Il portale Atl@nte e i catasti storici' for the presentation of the Open Source Geoportal multi-temporal map series www.atlas.polimi.it (Cariplo Foundation), 14-05-2012, Milano.

-2006-09, International Scientific Board of UNESCO-OPEN FORUM Mesopotam Saranda (Albania), SR of the surveying campaign (2006-09 with Univ.Ca' Foscari, Koc University, Istanbul).

-ICOMOS Member (International Council on Monuments and Sites), CIPA member; - AGU Member .

International Traineeship

- FORMAT-EO 2 years, 2013 and 2014, Funded ERASMUS IP, University of Leicester, UK, FORMation of Multi-disciplinary Approaches to Training in Earth Observation. Polimi Partner, R. Brumana: Lectures and practicum sessions on "Multiscale GI Content modelling of Built environment for EUrbanAtl@s: on site data integration with satellite data".

- ARCHDOC Architectural Heritage Documentation for Conservation 2011-12-13-14-15 Kahosl University College Sint Lieven and RLICC (Unesco Chair on Preventive conservation and monitoring of monuments and Sites-KUL, Leuven), Be, one week Teaching staff/LLP Erasmus - Partnership in Learning, a training course for graduate students of conservation and RLICC Master Post Master.

- 2014-2019 New Paradigm / New Tools, Executive Committee member. Collaboration with the Carleton University – CIMS (Carleton Immersive Studio, Director, Steve Fai), Ottawa, Canada, on the funded SSHRC Partnered Research Training Initiative ‘New Paradigm / New Tools’ for Architectural Conservation in Canada (Social Sciences and Humanities Research Council – Government of Canada, Partnership Grants - Partnered Research Training Initiative Program).

-2011-17, Traineeship Supervisor and Thesis Supervisor ERASMUS: NTUA (Athens, GR, Laboratory of Photogrammetry), Kul Leuven and others (thesis topics: UAV multispectral images on archaeological sites – Comacina Isle, Multi-temporal Open Data on Built Environment and Cultural Heritage domain, environmental assessment supported by multi-temporal multiscale (included Sentinel data) in the urban territorial domain under climate change threats on Como Lake and Albenga sites.

RSCY2015 – Member of the international committee of the RSCY2015 -THIRD INTERNATIONAL CONFERENCE ON REMOTE SENSING AND GEO-INFORMATION OF THE ENVIRONMENT which is going to be announced in the next few days (Cyprus 16th of March 2015, proceedings published by SPIE Eds.), <http://www.cyprusremotesensing.com/rscy2015/>

- Tutor and Supervisor of PhD Candidate Riccardo Valente, CoTutele between Polimi and PIAC - Pontificio Istituto di Archeologia Cristiana (Prof. P.Pergola Directeur de Recherche, Laboratoire d'Archéologie Médiévale et Moderne en Méditerranée, LA3M - UMR 7298, Université d'Aix-Marseille- MMSH), Albenga, St. Calocerus Archaeological site.

EDITOR AND CONFERENCE CHAIR

EuroMed2018 Co-chair, SPRINGER-NATURE Editors of the proceedings (Marinos Ioannides, Raffaella Brumana, João Martins, Petros Patia, Manolis Wallace, Adulam).

Chair of GEORES2019, 2nd International Conference of Geomatics and Restoration, Milan 8-10 May 2019 (ISPRS and CIPA-ICOMOS event).

Responsibilities in Research Project, Recent co-financed International and National Research (Research funding)

Coordinator of many Eu and National research funded project: ALDREN (H2020), 2017-2019 (participation) FESR HomeBIM 2017-2019 (Sc. Res. POLIMI); 2017-2019_ “HOMEbIM liveAPP: VR multi-user Live APP BIM-sensor integration – ID 379270” “Smart

Living: integrazione fra produzione servizi e tecnologia nella filiera costruzioni- legno-arredo-casa” approvato con d.d.u.o. n.11672 dell’15 novembre 2016 per la presentazione di progetti di sviluppo sperimentale e innovazione (S&I) a favore della filiera dello “Smart Living”. POLIMI r.sc. R. Brumana.

- 2017-2019 (PRIN 2016) Polimi Partner Scientific Responsible: R. Brumana. GAMHer - GEOMATICS DATA ACQUISITION AND MANAGEMENT FOR LANDSCAPE AND BUILT HERITAGE IN A EUROPEAN PERSPECTIVE;

- 2015-2017 ‘Multimedia system for the presentation and participated recognizing of the environmental values of the landscape of the Lake of Como’ (FESR SCARL , participation)

- 2014-16, ENERIG OD (620400) - European NEtwork for Redistributing Geospatial Information to user Communities - Open Data (Head Coordinator: CCI GERS FR, Partners POLIMI et al.), EU ICT Policy Support Programme, CIP-ICT-PSP-2013-7, CIP7- Theme 2 - Digital content, open data and creativity, Scientific Responsible POLIMI: R. Brumana

- 2016 Open Innovation – Lombardy Region Initiative, GEOSPATIAL COMMUNITY Scientific Responsible.

- PORL EU FESR 2007-13) ‘Multimedia system for the presentation and participated recognizing of the environmental values of the landscape of the Lake of Como’. Virtual Museum. Polimi: Brumana, Della Torre.

- 2012-13, GE2O (FP7,2011,NMP-ENV-ENERGY-ICT-EeB) “Geo-clustering to deploy the potential of Energy Efficient Buildings across EU” (Head: CSTB, R. Brumana, Lead of Polimi Partner).

2012-2015, EASEE- Envelope Approach to improve Sustainability and Energy efficiency in Existing multi-storey multi-owner residential buildings (FP7-2011-NMP EeB, EeB.NMP.2011-3 7, Collaborative project-Large Scale Integration Project; "Energy saving technologies for buildings envelope retrofitting"), R. Brumana project manager for POLIMI.

- 2012-2014, FESR SINOPIAE – CUPE47I11000520004, ID30063685. Multi-source Prototype system for the Integration of observation techniques: multispectral satellite, aircraft and from the ground for the multi-scale monitoring of the variation of environmental indicators related to the atmospheric constituents and energy dispersion (Section Aerospace). Project Head , CGS. Partners: Aermatica (UAV), CNR-IREA, TERRARIA, BICOCCA, POLIMI (Sc. Resp.R. Brumana, ground-uav platform implementation for the expedite low cost surveying of the energy dispersion by the building at a district scale for urban atlas energy mapping).

- 2009-12, ATL@S GEOPORTAL (Water&territory)”, 2009-2012; www.atlas.polimi.it: (Atl@nte dei catasti storici e delle carte topografiche della Lombardia. Navigare oggi il tempo del

territorio di domani). Project Head: Prof. R. Brumana (Funding Source, Fondazione Cariplo, rif 009.n.2006)

2010-2011 (PRIN 2008), National Scientific Coordinator: R. Brumana. ICT and Cultural Heritage. Information Technologies and Cognitive system for 3D representation.

- PRIN 2004-06, National Research Programme, Evolved structure of digital-mapping for the GIS and the web. Responsible of Polimi UB Prof. R. Brumana.

Surveying, BIM, GIS, Virtual Museum: Basilica di Collemaggio ENISERVICE, Spire of Duomo di Milano, St. Ambrogio's Basilica, Castel Masegra, Grasselli-Magio Palace, E-VMV Virtual Museum Villa REALE di Monza (expo), St. Marcus Basilica in Venice, Virtual Museum of the Lake of Como, Azzone Visconti Bridge, and others.

Author of more than 200 scientific publications. Hindex 12, (455 citation index).

List of some publications 2018-2011

Digital Heritage. Progress in Cultural Heritage: Documentation, Preservation, and Protection, 11196 LNCS, Eds. Fink E., Brumana R., Wallace M., Doulamis A., Patias P., Ioannides M., Martins J., (2018), Springer Verlag, 10.1007/978-3-030-01762, ISBN 978-3-030-01764-4

Brumana R., Condoleo P., Grimoldi A., Landi A.G, Attico d., T., Banfi F. and Previtali M., (2018). HBIM feeding OpenAccess vault inventory through GeoDB HUB, 11196 LNCS, Eds. Fink E., Brumana R., Wallace M., Doulamis A., Patias P., Ioannides M., Martins J., Springer Verlag, 10.1007/978-3-030-01762-0_3, pp. 27-38.

Brumana, R., Della Torre, S., Oreni, D., Cantini, L., Previtali M., Barazzetti, L., Banfi, F., (2018). SCAN to HBIM-Post Earthquake Preservation: Informative Model as Sentinel at the Crossroads of Present, Past, and Future, 11196 LNCS, Eds. Fink E., Brumana R., Wallace M., Doulamis A., Patias P., Ioannides M., Martins J., Springer Verlag, 10.1007/978-3-030-01762-0_4, pp. 39-51.

, (2018). , 11196 LNCS, Eds. Fink E., Brumana R., Wallace M., Doulamis A., Patias P.,

Ioannides M., Martins J., Springer Verlag, pp. 334-343.

R. Brumana, S. Della Torre, M. Previtali, L. Barazzetti, L. Cantini, D. Oreni, F. Banfi, Generative HBIM modelling to embody complexity (LOD, LOG, LOA, LOI): surveying, preservation, site intervention. The Basilica Di Collemaggio (L'Aquila). In: Applied Geomatics. DOI: 10.1007/s12518-018-0233-3, Special Issue GEORES2017. Geomatics and Restoration: Conservation of Cultural Heritage in the Digital Era . Springer.

Barazzetti, L., Banfi, F., Brumana, R., Gusmeroli, G., Previtali, M., Schiantarelli, G., (2015).

Cloud-to-BIM-to-FEM: Structural simulation with accurate historic BIM from laser scans. In: Simulation Modelling Practice and Theory, 57,pp.71-87. DOI: 10.1016/j.simpat.2015.06.004.

R. Brumana, D. Oreni, B. Cuca, L. Binda, P. Condoleo, M. Triggiani (2013). Strategy for Integrated Surveying Techniques Finalized to Interpretive Models in a Byzantine Church, Mesopotam, Albania. INTERNATIONAL JOURNAL OF ARCHITECTURAL HERITAGE CONSERVATION, ANALYSIS, AND RESTORATION, Volume 8, Issue 6, 2014, pp.886-924, ISSN: 1558- 3066, Taylor&Francis, WOS index, doi:10.1080/15583058.2012.756077

Valente, R., Brumana, R., Oreni, D., Banfi, F., Barazzetti, L., Previtali, M. (2017). Object-oriented approach for 3D archaeological documentation. International Archives of the Photogrammetry, Remote Sensing and Spatial Information Sciences - ISPRS Archives, 42 (2W5), pp. 707-712. DOI: 10.5194/isprs-archives-XLII-2-W5-707-2017, ISSN: 16821750

Fabrizio, B., Chiara, S., Brumana, R.

A Digital Workflow for Built Heritage: From SCAN-to-BIM Process to the VR-

Tour of the Basilica of Sant’Ambrogio in Milan

10.1007/978-3-030-01762-0_4,

R. Brumana, D. Oreni, S. Caspani, M. Previtali (2018). Virtual museums and built environment: narratives and immersive experience via multi-temporal geodata hub. VIRTUAL ARCHAEOLOGY REVIEW, vol. 9, p. 34-49, ISSN: 1989-9947, doi: 10.4995/var.2018.9918

Brumana, R., Condoleo, P., Grimoldi, A., Banfi, F., Landi, A.G., Previtali, M., (2018). HR LOD based HBIM to detect influences on geometry and shape by stereotomic construction techniques of brick vaults. In: Applied Geomatics. DOI 10.1007/s12518-018-0209-3, Special Issue GEORES2017. Geomatics and Restoration: Conservation of Cultural Heritage in the Digital Era ,Springer.

R. Brumana, M. Santana Quintero, L. Barazzetti, M. Previtali, F. Banfi, D. Oreni, D. Roels, and F. Roncoroni,(2015). Towards a virtual hub approach for landscape assessment and multimedia ecomuseum using multitemporal-maps, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XL-5/W7, pp.49-56, 2015 doi:10.5194/isprsarchives-XL-5-W7-49-2015 © Author(s) 2015. Scopus Index

L. Barazzetti, F. Banfi, R. Brumana, D. Oreni, M. Previtali, F. Roncoroni (2015) HBIM and augmented information: towards a wider user community of image and range-based reconstructions, Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., Volume XL-5/W7, 2015

25th International CIPA Symposium 2015, 31 August – 04 September 2015, Taipei, Taiwan
<http://hdl.handle.net/11311/973037>

Cuca B., Barazzetti L., Brumana R., Previtali M. (2015). An insight into space and remote sensing technologies concerning agriculture and landscape analysis. Proc. SPIE 9535, Third International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2015), 95351F 16-19 March, Paphos, Cyprus, doi: 10.1117/12.2192738, 9 pages.

Barazzetti L., Brumana R., Cuca B., Previtali M. (2015). Towards a Virtual Hub for a wider Open Data community Geomatics Workbooks n° 12, "FOSS4G Europe Como 2015, pp1-12.

Barazzetti L., Banfi F., Brumana R., Previtali M (2015). Creation of Parametric BIM Objects from Point Clouds Using NURBS. THE PHOTOGRAMMETRIC RECORD, vol. 30, p. 339-362, ISSN: 0031-868X, doi: 10.1111/phor.12122

Brumana R., Santana Quintero M., Barazzetti L., Previtali M., Oreni D., Roels D., Capitani M., Della Torre S., Leoni M., Roncoroni F., Banfi F., Missaglia E. (2014). A geo-swot chart, using a values centered approach and multitemporal-maps for landscape assessment and multimedia ecomuseum. In: ICOMOS 2014. p. 1-8, Florence

Barazzetti L., Brumana R., Oreni D., Previtali, M. 2014. Historical Map Registration via Independent Model Adjustment with Affine Transformations. In ICCSA 2014 (pp. 44-56). Springer Int. Publishing

Barazzetti L., Brumana R., Cuca B., Previtali M. (2015). Change detection from very high resolution satellite time series with variable off-nadir angle. Proc. SPIE 9535, Third International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2015), 953504, 16-19 March, Paphos, Cyprus, doi: 10.1117/12.2192429, 11 pages.

Cuca B., Sesana M.M., Iannaccone G., Oreni D., Caccavelli D. [2014], Integration of the multi-scale heterogeneous data for the deployment of the concept of energy efficiency in buildings within an SDI framework, In Proc. of 13th Int. Conf. on Computational Science and Its Applications, B. Murgante et al. (Eds.): ICCSA 2013, Part IV, LNCS 7974, pp. 358–374, 2013. © Springer-Verlag Berlin Heidelberg

Barazzetti L., Brumana R., Oreni D., Previtali, M. 2014. Historical Map Registration via Independent Model Adjustment with Affine Transformations. In ICCSA 2014 (pp. 44-56). Springer Int. Publishing

Barazzetti L., Brumana R., Oreni D., Roncoroni F. (2013). Recognizing landscapes: can we

change the point of view of geographic data?) In: JOURNAL OF MOBILE MULTIMEDIA, scopus indexed, Vol. 9(1-2), 2013, pp. 39-52

Cuca B., Brumana R., Oreni D., [2013], Geo-portals: more sustainable governance of territory within spatial data framework. Proc. SPIE 8795, First International Conference on Remote Sensing and Geoinformation of the Environment (RSCy2013), 87950G (August 5, 2013); doi:10.1117/12.2028448.

R. Brumana, D. Oreni, B. Cuca, L. Binda, P. Condoleo, M. Triggiani (2013). Strategy for Integrated Surveying Techniques Finalized to Interpretive Models in a Byzantine Church, Mesopotam, Albania. INTERNATIONAL JOURNAL OF ARCHITECTURAL HERITAGE CONSERVATION, ANALYSIS, AND RESTORATION, Volume 8, Issue 6, 2014, pp.886-924, ISSN: 1558- 3066, Taylor&Francis, WOS index, doi:10.1080/15583058.2012.756077

R. Brumana, D. Oreni, A. Raimondi, A. Georgopoulos, A. Bregianni (2013). From survey to HBIM for documentation, dissemination and management of built heritage. The case study of St. Maria in Scaria d'Intelvi. In: Eds. A. Addison, L. De Luca, G. Guidi, S. Pescarin. DigitalHeritage2013- Proceedings of the 1st International Congress on Digital Heritage. p. 497-504, IEEE, ISBN: 978-1-4799-3169-9, Marseille (FR), 28/10/2013-01/11/2013, doi: 978-1-4799-3169-9/13

R. Brumana, D. Oreni, L. Barazzetti et al (2013). Combined geometric and thermal analysis from uav platforms for archaeological heritage documentation. In: P.G. ISPRS Ann. Spatial Inf. Sci., II-5/W1 . ISPRS Annals, 1(1), 49-54, Copernicus GmbH, Strasbourg, Fr, 2/09/2013-06/09/2013, doi:10.5194/isprsannals-II-5-W1-49-2013

Brumana R., Oreni D., Van Hecke L., Barazzetti L., Previtali, M., Roncoroni, F., Valente, R., 2013. Combined Geometric and Thermal Analysis from Uav Platforms for Archaeological Heritage Documentation.

Barazzetti L., Brumana R., Oreni D., Roncoroni F. (2013). Recognizing landscapes: can we change the point of view of geographic data?, In: JOURNAL OF MOBILE MULTIMEDIA, Vol. 9(1-2), 2013, pp. 39-52, Scopus,

Cuca, B., Brumana, R., Scaioni, M., Oreni, D., (2011). Spatial Data Management of Temporal Map Series for Cultural and Environmental Heritage, in IJSDIR International Journal of Spatial Data Infrastructures Research, 2011, Vol.6, pp.97-125

R. Brumana, A. Rampini, et al. (2012). Open Access to Historical Atlas: Sources of Information and Services for Landscape Analysis in an SDI Framework . In: B. Murgante et al. (Eds.). Computational Science and Its Applications - LNCS 7334. p. 397- 413, Berlin Heidelberg: LNCS 7334 Springer-Verlag, ISBN: 9783642310744.

F. Remondino, A. Rizzi, L. Barazzetti, M. Scaioni, F. Fassi, R. Brumana, A. Pelagotti, 2011.

Review of geometric and radiometric analyses of paintings, THE PHOTOGRAMMETRIC RECORD, ISSN 0031-868X, n.vol.26, fascicolo 136, RV1A, 10.1111/j.1477- 9730.2011.00664.x, pp.439-461 WOS ISI Scopus index