

Alberto Alonso Arroyo – GNSS-R Researcher, Telecommunications Engineer

- **February 2011 - Present**

Occupation Research Assistant - UPC

Main activities and responsibilities

- February 2011 – September 2011: Final project degree
Design and implementation of a wireless GNSS-R Soil Moisture measurement network:
 - Hardware design of SMIGOL instruments which are capable of measuring Soil Moisture.
 - Addition of more terrain coverage to the first instrument prototype.
 - Addition of wireless communication via Xbee protocol.
- September 2011 – March 2012: Master Thesis
Analysis of GPS scattered signals with a GNSS-R ground-based instrument for wind applications:
 - Noise analysis using the interference pattern technique for wind-speed estimation.
- March 2012 – Present: PhD Student/Candidate
Following the PhD program from the department of Signal Theory and Communications at UPC:
 - Design, hardware implementation, and measurement of antennas and microwave circuits for L-Band applications using microstrip technology.
 - Design, hardware implementation, and test of GNSS-R instruments.
 - GNSS-R signal processing algorithms applied to soil moisture estimation using the interference pattern technique.
 - GNSS-R signal processing algorithms applied to the mean sea level estimation and significant wave height estimation using the interference pattern technique.
 - GNSS-R signal processing algorithms for the estimation of soil moisture using scatterometric techniques.

Name and address of employer Universitat Politècnica de Catalunya – BarcelonaTech (UPC) (University)
31 Jordi Girona, 08034 Barcelona (Spain)

Work Experience

Education and training

- **April 2012 – Present: PhD Student/Candidate**

Signal Theory and Communications Department (TSC) at Technical University of Catalonia (UPC), Barcelona.

Principal Subjects and skills covered:

Development of RF microwave and electronics hardware for GNSS remote sensing applications. Development of signal processing algorithms using GNSS-R data for the retrieval of different geophysical parameters such as Soil Moisture, Significant Wave Height, or Sea Surface Mean Level.

- **September 2011 – March 2012: European Master of Science in Research on Information and Communication Technologies (MERIT)**

Signal Theory and Communications Department (TSC) at Technical University of Catalonia (UPC), Barcelona.

Principal Subjects and skills covered:

- Communication Systems: analogical and digital communications and optic communications.
- Radionavigation Systems: Hyperbolic systems, aerial radionavigation principles, Doppler systems (TRANSIT, COSPAS-SARSAT), GPS, differential GPS and inertial systems.

- Remote sensing: real aperture radar (RAR) and synthetic aperture radar (SAR) theory and applications, differential SAR interferometry (DInSAR), radiometry (SMOS), reflectometry (GNSS-R), and optical systems (active or LiDAR, and passive).
- RF theory.
- Network, systems and communications systems.
- Programming languages: C and Matlab.
- Characterization of Optical devices and networks.

Final Master Thesis with honors: "Sea Surface Monitoring using GNSS-R Opportunity Signals". It covered the data processing of a field campaign with a GNSS-R instrument (SMIGOL) performed on a harbor in order to retrieve the wind-speed and the mean sea level.

- **September 2006 – September 2011: Telecommunication Engineering Degree (MERIT)**

Signal Theory and Communications Department (TSC) at Technical University of Catalonia (UPC), Barcelona.

Principal Subjects and skills covered:

- Signal theory and processing, communications theory, circuits and electronic systems, computer architecture, microwave technology and antenna theory, optical communications, radar, network and services, antennas, radio communications, and basic concepts of business administration.
- Programming languages: C, Java, Matlab, Maple, assembly, Synario, and P-Spice.

Final Master Thesis with honors: "Diseño desarrollo y test de una red de sensores inalámbrica para medir la humedad de terreno". It covered the hardware design of a 4-face SMIGOL instrument with wireless capabilities in order to implement a network of Soil Moisture sensors.

Additional Education

- *December 2013 – February 2014:*
 - *ValorTec from Acció10 (Generalitat de Catalunya) (30h).*
- *January 2013 – February 2013:*
 - *Venture Academy ACCEL2UPC from INNOVA Program – UPC (20h).*
- *July 2012:*
 - *LaTeX Course (8h).*
- *1998-2010:*
 - *English and informatics lessons at Master Centre d'Estudis.*

Personal Skills and Competences

- **Languages:**
 - *Spanish (Mother tongue),*
 - *Catalan (Mother tongue),*
 - *English (Fluent written and Spoken)*
- **Social skills:**
 - *Team spirit,*
 - *Good communication skills.*
- **Organization skills:**
 - *Good work planning,*
 - *Sense of organization,*
 - *Meeting deadlines.*
- **Technical skills:**
 - *Experience in GNSS-R data processing,*
 - *Analysis and interpretation of GNSS-R results,*
 - *Design and implementation of GNSS-R hardware (from the antenna to the receiver),*
 - *Microwave antenna design (L-band, 1-2 GHz),*
 - *Microprocessor and Arduino Programming,*
 - *Writing of technical papers and notes,*
 - *Experience in oral presentations (international conferences).*
- **Computer skills:**
 - *Advanced user in Windows/Linux,*

- Knowledge of different programming languages (C, Matlab, Python, R, Arduino, LabView, LaTeX, HTML),
- Good use of Microsoft Office Tools (Word, Excel, Powerpoint),
- Advanced knowledge of specialized software for the design and analysis of microwave and electronic circuits (Advanced Design System (ADS Agilent), Altium Designer (PCB), CST Studio, Spice),
- Knowledge of graphic design applications (Photoshop).

Certificates, Honors and Prizes

- TOEFL Test with a mark of 108 (IBT, March 29th 2014),
- CAE grade C (June, 2010),
- Accel2UPC certificate of attendance and accomplishment,
- ValorTEC certificate of attendance and accomplishment,
- IGARSS13 at Melbourne, Australia, certificate of attendance,
- 3rd Price award on the University Challenge Competition ESNC 2013 (European Satellite Navigation Competition 2013),
- Driving License (B).

Scientific Publications

- **First-author:**
 - *Improving the Accuracy of Soil Moisture Retrievals Using the Phase Difference of the Dual-Polarization GNSS-R Interference Patterns*(journal)
 - Alonso-Arroyo, A.; Camps, A.; Aguasca, A.; Forte, G.; Monerris, A.; Rudiger, C.; Walker, J.P.; Park, H.; Pascual, D.; Onrubia, R., *Geoscience and Remote Sensing Letters, IEEE*, vol.11, no.12, pp.2090,2094, Dec. 2014,
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6814795&isnumber=6840877>
 - *Dual-Polarization GNSS-R Interference Pattern Technique for Soil Moisture Mapping* (journal)
 - Alonso-Arroyo, A.; Camps, A.; Aguasca, A.; Forte, G.F. ; Monerris, A.; Rudiger, C.; Walker, J.P.; Park, H.; Pascual, D.; Onrubia, R., *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol.7, no.5, pp.1533,1544, May 2014
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6823624&isnumber=6834838>
 - *The Light Airborne Reflectometer for GNSS-R Observations (LARGO) Instrument: Towards Soil Moisture Retrievals* (conference)
 - A. Alonso-Arroyo; G. Forte; S. Monerris-Belda; A. Camps; H. Park; D. Pascual; R. Onrubia; URSI 2013, Oct. 28-31, 2013
 - *Soil Moisture mapping using forward scattered GPS L1 signals* (conference)
 - Alonso-Arroyo, A.; Forte, G.; Camps, A.; Park, H.; Pascual, D.; Onrubia, R.; Jove-Casulleras, R.; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.354,357, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6721165&isnumber=6721065>
 - *PAU Instrument aboard INTA MicroSAT-1: Initial results of the FM model from an airborne experiment*(conference)
 - Alonso-Arroyo, A.; Camps, A.; Pascual, D.; Park, H.; Alcayde, A.; Chavero, S.; Martinez, P.; Crespo, L.; Angulo, M.; Rius, A.; *Reflectometry Using GNSS and Other Signals of Opportunity (GNSS+R), 2012 Workshop on* , vol., no., pp.1,5, 10-11 Oct.
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6408252>
 - *PAU instrument aboard INTA MicroSat-1: Flight model tests*(conference)
 - Alonso, A.; Camps, A.; Pascual, D.; Park, H.; Alcayde, A.; Chavero, S.; Martinez, P.; Crespo, L.; Angulo, M.; Rius, A.; *Geoscience and Remote Sensing Symposium (IGARSS), 2012 IEEE International*, vol., no., pp.1038,1041, 22-27 July 2012
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6350820>
- **Co-author:**
 - *Analysis of Spaceborne GNSS-R Delay-Doppler Tracking* (journal)
 - Park, H.; Pascual, D.; Camps, A.; Martin, F.; Alonso-Arroyo, A.; Carreno-Luengo, H.; *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol.7, no.5, pp.1481,1492, May 2014
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6820734&isnumber=6834838>

- *Precision Bounds in GNSS-R Ocean Altimetry (journal)*
 - Pascual, D.; Camps, A; Martin, F.; Park, H.; Arroyo, AA; Onrubia, R.; *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol.7, no.5, pp.1416,1423, May 2014
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6742726&isnumber=6834838>
- *Simulation and Analysis of GNSS-R Composite Waveforms Using GPS and Galileo Signals (journal)*
 - Pascual, D.; Park, H.; Camps, A; Arroyo, AA; Onrubia, R.; *Selected Topics in Applied Earth Observations and Remote Sensing, IEEE Journal of*, vol.7, no.5, pp.1461,1468, May 2014
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6800024&isnumber=6834838>
- *Land monitoring using GNSS-R techniques: A review of recent advances (conference)*
 - Camps, A; Rodriguez-Alvarez, N.; Valencia, E.; Forte, G.; Ramos, I; Alonso-Arroyo, A; Bosch-Lluis, X; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.4026,4029, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6723716>
- *Wind speed mapping from the ISS using GNSS-R? A simulation study (conference)*
 - Camps, A; Park, H.; Alonso-Arroyo, A; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.382,385, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6721172&isnumber=6721065>
- *Improvement of the PAU/PARIS End-to-end Performance Simulator (P²EPS) in preparation for upcoming GNSS-R missions (conference)*
 - Hyuk Park; Camps, A; Pascual, D.; Alonso, A; Martin, F.; Carreno-Luengo, H.; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.362,365, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6721167&isnumber=6721065>
- *Comparison of GPS L1 and Galileo E1 signals for GNSS-R ocean altimetry (conference)*
 - Pascual, D.; Park, H.; Camps, A; Alonso, A; Onrubia, R.; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.358,361, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6721166&isnumber=6721065>
- *MIR: The microwave interferometric reflectometer, a new airborne sensor for GNSS-R advanced research (conference)*
 - Onrubia, R.; Pascual, D.; Camps, A; Alonso-Arroyo, A; Park, H.; *Geoscience and Remote Sensing Symposium (IGARSS), 2013 IEEE International*, vol., no., pp.109,112, 21-26 July 2013
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6721104&isnumber=6721065>
- *Recent advances in land monitoring using GNSS-R techniques (conference)*
 - Camps, A; Forte, G.; Ramos, I; Alonso, A; Martinez, P.; Crespo, L.; Alcayde, A; *Reflectometry Using GNSS and Other Signals of Opportunity (GNSS+R), 2012 Workshop on*, vol., no., pp.1,4, 10-11 Oct. 2012
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6408255&isnumber=6408250>
- *Analysis of GNSS-R delay and Doppler tracking errors (conference)*
 - Hyuk Park; Camps, A; Valencia, E.; Carreno-Luengo, H.; Martin, F.; Alonso, A; Pascual, D.; *Reflectometry Using GNSS and Other Signals of Opportunity (GNSS+R), 2012 Workshop on*, vol., no., pp.1,4, 10-11 Oct. 2012
 - <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6408259&isnumber=6408250>
- *Reviewer of peer-reviewed journals:*
 - *Advances in Space Research (ISSN: 0273-1177)*
 - *International Journal of Remote Sensing (ISSN: 0143-1161 (Print), 1366-5901 (Online))*