

RONNIE QUINTERO

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Curriculum Vitae

1. PERSONAL INFORMATION

Name: Quintero Ronnie

Title: Dr (Ph.D. in Geophysic-Seismology)

Date of birth: April 29, 1962

Nationality: Costa Rica

Work Address: Calle 2, Avenida 11, Heredia Centro, Heredia, Costa Rica.

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2. EDUCATION

Ph.D. (Geophysics-Seismology), 1999, Uppsala University, Sweden.

M.Sc. (Physic- Mathematics), 1991, Tashkent University, URSS.

B.Sc. (Mathematics), 1983, Universidad Nacional, Heredia, Costa Rica.

3. LANGUAGES

Spanish, English, Portuguese, Russian.

4. PROFESSIONAL HISTORY

Researcher 2000 to the present, OVSICORI-UNA, Costa Rica,

Invited Researcher and Lecturer. May 2003, November 2003-Febr 2004, September 2004, June-July 2005, Universidad de Brasilia, Brazil.

Mathematic Teacher August 1991- July 1993, Universidad de Costa Rica.

Mathematic Teacher 1983-1993, Universidad Nacional, Costa Rica.

Director Substitute OVSICORI-UNA 2009

Member of the Academic Council OVSICORI-UNA: 2007 until the present.

Coordinator of the Outreach and Teaching Program: 2009.

Member of the Curriculum Support Committee of the Sea and Land Faculty, 2009.

Member of the Commission responsible for writing the proposal of the Institutional program for Risk management of the Universidad Nacional de Costa Rica.

Head of the Seismology Section: 2007-2008 and 2010-2012.

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5 (A). Ph.D. THESIS: SISMOTECTONICS AND LITHOSPHERIC STRUCTURE OF COSTA RICA

The main purpose of this investigation is to obtain crustal information for Costa Rica and to contribute to the understanding of the seismotectonic model of the region.

The interaction of different tectonic features on a short-distance scale of 100's of km produces the complexity of the Costa Rica region. The intraplate Caribbean earthquake activity of shallow-depth nature is mainly concentrated along an E-W axis in the central part of the country. All types of faults are presented in this region, although a strike-slip fault system, with NE-SW direction is proposed. Intraplate Caribbean earthquakes in northwestern Panama are shallow and dominated by thrust fault motion. The seismicity along the Pacific coast is mainly associated with the subduction of the Cocos under the Caribbean plate, with predominant thrust fault mechanisms. The interaction of the Cocos and Nazca plates in southeastern Costa Rica, along the Panama fracture fault system produces events with strike-slip mechanism.

A proposed 1D P-velocity model for the region is presented. Relocation of earthquakes of this area made through this 1D-velocity model provides a reliable geometry of the Wadati-Benioff zone, with a slab dipping at 45° to a maximum depth of approximately 250 km.

Station corrections and P- and S-velocity distribution correlate well with the major upper crust geological features of the area. The P- and S-velocity distribution for depth below 30 km shows a lateral velocity variation, which is associated with the subduction slab.

Thesis Guided by Ota Kulhanek

Oponent: Jarka Plomerova

5 (B). RESEARCH INTERESTS

The main focus of my research has been on fundamental physical understanding of the earthquake process and explores the crust under Costa Rica. A local velocity model for the upper crust for Costa Rica has been constructed by using seismic body waves generated by naturally occurring earthquake activity. I have collected a valuable knowledge and experience on fieldwork and data processing while working at OVSICORI-UNA (Observatorio Vulcanológico y Sismológico de Costa Rica- Universidad Nacional). Future and currently work at OVSICORI-UNA network is concerning with:

- 1. Seismic tomography under Costa Rica using local data.*
- 2. Precise Earthquake location using joint hypocentral location, cross correlation techniques, three dimensional velocity model and Non Linear Methods.*
- 3. Waveform modelling.*
- 4. Construction of the new OVSICORI-UNA network*
- 5. Seismic Hazard Analysis for Costa Rica.*
- 6. Routine earthquake location.*
- 7. Internal Education for the persons working at the Observatory.*

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8. *Maintenance of the station for the different project I involved and going on at OVSICORI-UNA.*
9. *Maintenance of the JTS station and station operator for this station nominated by OVSICORI-UNA, IDA/UCDS (USA) and CTBTO, UN.*
10. *Merging OVSICORI-UNA, RSN and CORISUBMOD project data and locating the events.*
11. *Investigation of the seismic activity along the Costa Rica-Panama Border, specially the December 25, 2003 (M6.5) and May 01, 2006 (M5.9) events.*
12. *Maintenance of the calibration curves for the CMG-6TD, STS-2 (JTS) and STS-1 (JTS) instruments at OVSICORI-UNA.*
13. *The investigation on GPS measurements within local networks will consider to be a part of a future research plan, since in our Institute we are buying the necessary equipment.*
14. *My future research plan will include Shear wave splitting and analyses of receiver functions for the CORISUBMOD project data. Also, I plan to make attenuation study using the above data.*

6. PROJECTS CARRIED OUT AT OVSICORI-UNA

6 (A). 2003- TO THE PRESENT

Designated operator for the JTS station (IRIS/IDA station). Responsible for the routine operation and maintenance of the station and to ensure that all data acquired by the station are sent in a timely manner and without restrictions to UCSD (USA).

6 (B). 2003 RESPONSIBLE TO CTBTO

The seismological station at Las Juntas, Costa Rica, is designated as an auxiliary seismic station, AS25, of the International Monitoring System (IMS) of the Comprehensive Nuclear-Test-Ban Treaty. The Station was constructed and is operated in collaboration between the Observatorio Vulcanológico y Sismológico de Costa Rica, Universidad Nacional (OVSICORIUNA), Costa Rica, and the International Deployment of Accelerometers Project (IDA) of the Institute of Geophysics and Planetary Physics of University of California San Diego, USA. The station is located in Minas Cuatro Vientos. Las Juntas de Abangares, Costa Rica. In order to provide data from this station to the International Monitoring System of the CTBTO, via basic topology, a satellite link and associated equipment had been installed at the station. This associated equipment consists of: a) a Global Communications Infrastructure VSAT antenna, a personal earth station (PES), a standard station interface (SSI) with their corresponding uninterruptible power supply (UPS). The GCI VSAT and IMS SSI equipment have been installed at the station in 2003. However, IMS has since realized that in order to increase the reliability of the operation of the station, a more thorough phase of initial testing of the station has to be conducted in collaboration between IMS and the OVSICORI as station operator. For this initial testing the station operator is required to provide services as described in the Terms of Reference of the Request for Proposal (RFP). In response to

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the RFP, the Observatorio Vulcanológico y Sismológico de Costa Rica, Universidad Nacional designed my person as the responsible for this project and I am the technical point of contact and the main station operator.

6 (C). 2006 COORDINATOR OF THE SSMAP PROJECT

The objectives of the project is to record and locate strong subduction zone mainshocks (and foreshocks and aftershocks) in the Nicoya peninsula, at the entrance of the Nicoya Gulf, and in the Papagayo Gulf regions of Costa Rica. Also, to record and locate any moderate to strong upper plate earthquake triggered by a large subduction zone earthquake in the above regions.

The Seismic Strong Motion Array Project (SSMAP) is composed of 10-13 sites including A900's, A800's, Ref-Teks, and Episensors. As responsible for the project, I need to install, operate and maintain the stations.

6 (D). COORDINATOR OF THE SEISMIC EARTHQUAKE CATALOG FOR COSTA RICA

The OVSICORI-UNA is a research institute of the National University of Costa Rica (UNA) devoted to the surveillance and monitoring of volcanoes, earthquakes and other tectonic processes, in order to find the way to mitigate their economical and social impact over Costa Rica. Most of the daily work at the Observatory is dedicated to the observation and documentation of the seismic, volcanic and crustal deformation activity, which supports the scientific research of the Institute.

One of the main roles of OVSICORI-UNA is to provide relevant information about the occurrence of earthquakes in the country, location, magnitude and depth and time. These data are presented in an earthquake catalog that is published annually.

The project institutionalizes a permanent activity of the OVSICORI-UNA, the cataloging of seismic data in an annual publication of earthquakes located in the country, seismic phases of regional events and posters, in addition to the weekly publication of a weekly bulletin of seismicity in the website of OVSICORI-UNA. The catalog also provides intensity information for felt earthquakes. The main goal of the coordinator is made this possible.

6 (E). COORDINATOR OF THE OVSICORI-UNA SEISMIC NETWORK

The main goal with this project is to maintain and expand the seismic network.

The Costa Rica seismic network OVSICORI-UNA start operation in 1984 and since then it has located local and regional seismicity. The majority of instruments of this network are short period vertical instruments RANGER SS-1 (1-sec). In January 2010, the network consisted of 20 of these short period stations distributed along the country and three CMG-6TD instruments located in the central part of Costa Rica. The stations with instruments Guralps send data to the data center through free wave connection.

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Starting in 2006, we are dedicated to improve our seismic network with broadband seismometer (STS-2) and accelerometers (FBA ES-T), for January 2010 we have installed four of these stations with Q330 digitizers. We use VSAT, Internet and dedicated telephone leased line connection to retrieve data from these stations, all in real time. We plan a new construction for near years for installing 26 stations with Broad Band instrument, accelerometer, GPS and communication. As coordinator I must maintain and expand the network with help of our work mates.

6 (F). COOPERATION WITH NATIONAL AND INTERNATIONAL GROUPS

- 1. Institute of Geophysics and Planetary Physics, University of California – San Diego, California, Project IDA (1999-).*
- 2. University Santa Cruz, California (2006-).*
- 3. Eidgenössische Technische Hochschule Zürich (ETHZ) (1996-).*
- 4. RSN, University of Costa Rica (2004-).*
- 5. Uppsala University (1994-).*
- 6. California State University Northridge.*
- 7. CTBTO, UN.*
- 8. Universidade de Brasilia, Brasil*
- 9. Puerto Rico Seismic Network, University of Puerto Rico, Mayagüez.*

7 (A). TEACHING

UNIVERSITY COURSES TAUGHT AS VISITING PROFESSOR:

2005 Modern Global Seismology, at the graduate level, (main lecturer together with Dr H. Shomali), Universidade de Brasilia, Brasil. Course of 60 hours.

2004 Generation of Seismic waves by Earthquakes Sources, course for graduated level (main lecturer), Universidade de Brasilia, Brasil. Course of 60 hours.

2003 Intensive course on seismic signal analysis using SEISAN - 40 hours at undergraduate level in Universidade de Brasilia, Brasil.

2003 Lectures on Seismic Signal Analysis using Seisan, MATLAB, PITSA – 40 hours at undergraduate level in Universidade de Brasilia, Brasil.

The courses thought as visiting teacher were focused on focal-mechanism, waveform modelling, instrumentation, seismic signal analysis, stress study, earthquake location, etc. One of the main aims was also to provide the students, a list of good references and programs for their future works. In all courses, the students were required to give a presentation about the topic of interest. The students learned to use the programs: HYPODD, NONLINLOC, VELEST, HYPOCENTER, HYPOINVERSE, AZMTAK, PMAN, COULOMB, TDMT_INV.

7 (B). TEACHING STATEMENT, RESEARCH PLANS AND SCIENTIFIC VISION:

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My interest in graduate teaching is very strong. I had been given courses at Seismology Observatory, University Brasilia, Brasil. I focused the course on some of the most relevant-interesting issues such as focal-mechanism, waveform modelling, seismic local tomography, instrumentation, stress analysis, etc. During these courses I distributed many exercises (theoretical and computer-base). For computer-base exercises, students were supposed to use SAC (Seismic Analysis Code – one of the best seismological tool), PITSA and MATLAB to solve and analyse the problems. I also teach at undergraduate level, focusing on Math courses.

8. EXTRA TRAININGS & WORKSHOPS

8 (A). ADVANCED TRAINING

02/2010 1-5 February. Seismic Network Operators short course and WGI meeting. Organized by the Puerto Rico Seismic Network. Mayagüez, Puerto Rico.

08/2006 22-25 August. Attendance of the “ Reference GPS station Leyca GRX1200 Pro”. Hold in Universidad Nacional, Heredia, Costa Rica.

08/2006 31July- 4 August. Attendance of the: “Joint IMS/IDC regional technical Training Course for station operators and NDC technical staff”, hold in Mexico DF, Mexico.

07/2006 08-14 July 2006. Attendance of the IRIS Workshop: “Management of Waveform Data and Metadata from Seismic Networks”, hold in Sao Paulo, Brazil.

10/2005 09-13 October 2005. Attendance of the IASPEI Training Course at Geophysical Institute of the University of Chile, Santiago, Chile.

10/2005 01-08 October 2005. Attendance of the general Assembly of IASPEI, Santiago, Chile.

10/2004 11-15 October 2004. Operation and Maintenance Workshop at Baden, Austria. Organized by CTBTO.

11/2003 International Training Program for Seismic Design of Structure 2003, at The National center for Research on Earthquake Engineering (NCREE) of Taiwan R.O.C.

03/2003 Technical Training Program on Seismic and hydroacoustic technologies. CTBTO/UN, Trafelberg and Vienna, Austria. 40 hours, 17-21 March, 2003.

11/2000 24 hours workshop on “Long Period Regional Wave Moment Tensor Inversion” at Universidad Nacional, Heredia, Costa Rica.

11/2001 15 hours workshop on “Seismic Hazard Assessment” at Universidad Nacional, Heredia, Costa Rica.

12/2001 32 hours workshop on “XXVII Central America and Caribbean Course of Physics” at Universidad de Panama, Panama.

06/2001 One month working with Edi Kissling at ETH, Zurich on “High Precision Earthquake Location”.

07/1999 18-30 July 1999. Attendance of 22th General Assembly of IUGG, Birmingham, United Kingdom.

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08/1997 18-28 August 1997. Attendance of 29th general Assembly of IASPEI, Thessaloniki, Hellas.

11/1996 Two weeks workshop on “Three Dimensional Modelling of Seismic Waves Generation, Propagation and their Generation”, ICTP, Trieste, Italy.

08/1996 One-week Nordic postgraduate course in “Computational Seismo Acoustics”, Norwegian University of Science and Technology, Norway.

11/1995 Two weeks workshop on “Non-Linear Dynamics and Earthquake Prediction”, ICTP, Trieste, Italy.

1992-1993 Six months postgraduate course in Seismology at Universidad Nacional, Heredia, Costa Rica.

03/1993 40 hours workshop on “Seismic Hazard Assessment” at Universidad de Costa Rica, San José, Costa Rica.

6 (G). PUBLICATIONS

- 1. Quintero, R., y Bonatti, J., 1994. Algunos Métodos para la Solución de Problemas de la Física-Matemática. Revista UICIENCIA, Facultad de Ciencias Exactas y Naturales, Universidad Nacional, Heredia, Costa Rica, V. 11, N 1-2.*
- 2. Quintero, R., and Kulhanek, O., 1998. Pn-wave observations in Costa Rica. Geofísica Internacional, V. 37, 171-182.*
- 3. Quintero, R., and Kissling, E., 2001. An improved P-wave velocity reference model for Costa Rica. Geofísica Internacional, V. 40, 1, 3-19.*
- 4. Quintero, R., and Güendel, F., 2000. Stress field in Costa Rica, Central America. J. Seismology, Vol. 4, No 3, 297-319.*
- 5. Quintero, R., and Güendel, F., 1999. Focal mechanism catalogue for 1698 earthquakes of Costa Rica and vicinity. Dep. of Earth Sciences, Seismology, Uppsala University, Report 1-99.*
- 6. Yao, Z., Quintero, R. and Roberts, R., 1999. Tomographic imaging of P- and S-wave velocity structure beneath Costa Rica. J. Seismology, 3, 177-190.*
- 7. Husen, S., Kissling, E. & Quintero, R., 2001. Tomographic evidence for a subducted seamount beneath the Gulf of Nicoya, Costa Rica: The cause of the 1990 Mw=7.0 Gulf*

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- of Nicoya earthquake, Geophys. Res. Lett., 29, 10.1029/2001GL014045, 2002.*
8. *Husen, S., Quintero, R., Kissling, E., and Hacker, B., 2003. Subduction-zone structure and magmatic processes beneath Costa Rica constrained by local earthquake tomography and petrological modeling. Geophys. J. Int., Vol. 155, 11-32.*
 9. *Pacheco, J., Quintero, R., Vega, F., Segura, J., Jiménez, W., González, V., 2006. The Mw=6.4 Damas, Costa Rica, Earthquake, of November 20, 2004; Aftershocks and Slip Distribution. Bull. Seismological Society of America, Vol. 96, No 4A, 1332-1343.*
 10. *Quintero, R., Vega, F., Segura, J., y Jimenez, W., 2005. Estudio espacial del sismo (Mw=6.4) del 20 de noviembre del 2004 en Costa Rica. Geofísica 61, 7-19.*
 11. *Barros, L., Assumpcao, M., Quintero, R., and Caixeta, D., 2009. The intraplate Seismic Zone of Porto dos Gauchos in the Amazon Craton –Brazil. Tectonophysics, 469, 37-47.*
 12. *Maurer, V., Kissling, E., Husen, S., and Quintero, R., 2009. Detection of systematic errors in travel time data using a minimum 1D model: Application to Costa Rica seismic tomography. Submitted to BSSA.*
 13. *Van de Laat, R., Quintero, R., Méndez, E., 2009. Intensidades sísmicas preliminares del terremoto de Cinchona del 8 de Enero 2009. Observatorio Vulcanológico y Sismológico de Costa Rica, Universidad Nacional. http://www.ovsicori.una.ac.cr/informes_prensa/2009/IntensidadesCinchona.pdf.*

6 (H). ABSTRACTS

1. *Quintero, R., and Güendel, F., 1999. Focal mechanism study in Costa Rica and vicinity. Abstract in IUGG XXII General Assembly, A.165, Birmingham, England.*
2. *Güendel, F., and Quintero, R., 1999. Seismotectonic of Central America: A study of Earthquake Focal Mechanism. Annales Geophysicae, Part I, Supplement I to Volume 16, C 101.*
3. *Quintero, R., and Güendel, F., 1999. 1D Velocity model estimation in Costa Rica, Central America. Annales Geophysicae, Part I, Supplement I to Volume 16, C 102.*

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4. *Quintero, R., and Osypov, K., 1997. Crustal Structure below Costa Rica. The 29th General Assembly of the IASPEI, August 18-28, Thessaloniki, Greece, 213.*
5. *Quintero, R., and Boutet, J. T., 1997. . Crustal Structure below Costa Rica. The 29th General Assembly of the IASPEI, August 18-28, Thessaloniki, Greece, 274.*
6. *Quintero, R., y Guendel, F., 2000. Campo de esfuerzos en Costa Rica. CONINVES 2000. Los Retos y Propuestas de la Investigación en el II Milenio, I Congreso de Investigación: Costa Rica en el 2000, pag. 63.*
7. *Quintero, R., y Kissling, E., 2000. Fusión de Datos sísmológicos locales usando diferentes redes sísmicas de Costa Rica y proposición de un modelo mejorado de velocidad para la onda P en esta región. CONINVES 2000. Los Retos y Propuestas de la Investigación en el II Milenio, I Congreso de Investigación: Costa Rica en el 2000, pag. 64.*
8. *Quintero, R., Husen, S., and Kissling, E., 2000. Imaging the 3-D Lithospheric Structure Beneath Costa Rica with Local Earthquake Tomography. General Assembly of the European Seismological Commission, 10-15 September 2000, Lisbon.*
9. *Güendel, F., Quintero, R., Lindholm, C. D., Redondo, C., y Bungum, H., 2001. Sismotectónica de Centroamérica. 27° Curso Centroamericano y del Caribe de Física y 2do Congreso Centroamericano y del Caribe de Física, realizado del 10 al 14 de Diciembre del 2001 en la Universidad de Panamá, Panamá.*
10. *Quintero, R., Montero, C., Rojas, W., Fernández, M., 2001. Estudio de Amenaza Sísmica para Puerto Caldera, Puntarenas, Costa Rica. Internal Report, UNA.*
11. *Husen, S., Quintero, R., and Kissling, E., 2001. Tomographic Imaging of the Three-Dimensional P-wave Velocity Structure Beneath Costa Rica: Constraints on Subduction Processes. AGU 2001 Fall Meeting, San Francisco, USA.*
12. *Quintero, R., 2003. Instrumentación GURALP CMG-6TD del OVSICORI-UNA. Reporte Interno, OVSICORI-UNA, Heredia, Costa Rica.*
13. *Quintero, R., Segura, J., Jiménez, W., and Vega, F., 2004. Evento Principal y replicas del sismo del 20 de Noviembre del 2004 (Mw=6.4) en Costa Rica. Reporte Interno,*

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14. *QUINTERO, R., SEGURA, J., VEGA, F., JIMÉNEZ, W., SIMILA, G., MCNALLY, K., 2005. November 20, 2004 (Mw=6.2) Quepos, Costa Rica earthquake and aftershocks activity. 2005 UNAVCO-IRIS Joint Workshop, Stevenson, Washington, USA.*
15. *Quintero, R., Vega, F., Jimenez, W. and Segura, J., 2005. November 20, 2004 (Mw=6.2) Quepos, Costa Rica Earthquake and Aftershock Activity. IASPEI, Santiago, Chile.*
16. *Quintero, R. and Montero, C., 2005. Seismicity in the Puriscal area, Central Costa Rica. IASPEI, Santiago, Chile, 2005.*
17. *Barros, L. V., Assumpção, Marcelo, Quintero, R., 2005. Recurrent Seismicity in Northern Mato Grosso State – Brazil. International Association of Seismology and Physics of the Earth's interior General Assembly, 2005, Santiago, Chile.*
18. *Simila, G., McNally, K. C., Quintero, R., Segura, 2006. Seismic Strong Motion Array Project (SSMAP) for the Nicoya Peninsula, Costa Rica. IRIS, Workshop, 2006, Westward Look Resort, Tucson, AZ, USA.*
19. *Quintero, R., Jiménez, W., Rodríguez, Segura, J., Vega, F., Simila, G., and Redondo, C., 2006. Investigation Along the Costa Rica-Panama Border: December 25, 2003 (M6.5) and May 01, 2006 (M5.9) Earthquakes. IRIS, Workshop, 2006, Westward Look Resort, Tucson, AZ, USA.*
20. *Barros, L., Assumpcao, M. S., and Quintero, R., 2007. The intraplate Seismogenic Zone of Porto dos Gauchos in The Amazon Craton, Brazil, Eos Trans. AGU, 88 (23) Jnt. Assem. Suppl., Abstract S51A-05.*
21. *Barros, L.V., Assumpção, M., Quintero, R., 2007. Porto dos Gaúchos seismic zone. American Geophysical Union Meeting, abstract, Acapulco, Mexico.*
22. *Maurer, V., Husen, S., Quintero, R., Mora, M., Alvarado, G., Kissling, E., and Ulmer, P., 2007. The CORISUBMOD Project: Seismic-petrologic subduction model for Costa Rica. Workshop to Integrate Subduction Factory and Seismogenic Zone Studies in Central America, June 18-22, 2007, La Condesa Hotel, Heredia, Costa Rica.*

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23. Simila, G., McNally, K. C., Quintero, R., and Segura, J., 2007. *Seismic Strong Motion Array Project (SSMAP) to Record Future Large Earthquakes in the Nicoya Peninsula Area, Costa Rica. Workshop to Integrate Subduction Factory and Seismogenic Zone Studies in Central America, June 18-22, 2007, La Condesa Hotel, Heredia, Costa Rica.*
24. Quintero, R., Vega, F., Segura, J., and Jiménez, W., 2008. *Spatial study of the November 2004 seismic event in Costa Rica (Mw=6.4). AGU Fall meeting, San Francisco, 2008.*
25. Barros, L.V., Assumpção, M., Quintero, R., and Paz, R., 2008. *Intraplate Seismicity in Brazil, the case of Porto dos Gaúchos seismic zone in the Amazon Craton – Brazil. Eos Trans. AGU, 88(23), Joint Assem. Suppl, Abstract S51A-05, Cidade do Cabo – África do Sul.*
26. Barros, L.V., Assumpção, M., Quintero, R. and Paz, R.N., 2008. *Basement Topography using P-to-s conversions from local earthquakes in the seismogenic area of Porto do Gaúchos, Parecis basin, Northern Brazil. American Geophysical Union, Spring Meeting 2008, abstract S41A-11 - Fort Lauderdale, Florida, USA.*
27. Barros, L.V., Assumpção, M., Quintero, R., Ferreira, V.M., 2009. *Estimative of coda wave attenuation for Center North of Parecis Basin, Amazon Craton - Brazil, (2009). 11th International of the Brazilian Geophysical Society, Salvador/BA, 24-28 de agosto de 2009.*