

# **THE ROLE OF THE ACADEMY WITH THE RISK MANAGEMENT: THE RESULTS OF THE UNIVERSITY CORPORATION OF META IN THE SUBJECT OF THE SEISMIC THREAT FOR THE PERIOD 2006-2012.**

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## **OVERVIEW**

Since the middle of the first decade of the 21st century the University Corporation of Meta has gradually assumed as top institution leadership at the regional level of the subject of the seismic threat not only of llanero foothills but also of the Colombian Caribbean platform. In Colombia is counted the number of universities that have contributed to research on this topic. Deal with issue by an institution of higher education, demand that a research group attached to it not only to strive to develop research on the scientific aspects pertaining to this type of threat. The results of it entails to unravel mysteries about the threat and therefore understand it better to take the right measures that lead to mitigate its effects. The results of the research the research group "Studies on seismic risk and the llanero foothills natural threats" have achieved great progress in terms of compression of the phenomenon for both scenarios, not only with regard to the origin of this knowledge, but also with respect to measures to take in each case to mitigate their effects. Is for this reason that it is also an obligation to disseminate these results to society in General not only the specialized scientific community

Words clave: Corporacion University of Meta, seismic, research, University social responsibility, of the East Colombian seismological network.

## **1. INTRODUCTION**

Leadership managed by the University Corporation's goal in the subject of the seismic hazard since 2005 to date, is the result of the research and work to spread the reach of seismic in the Llanero foothills of the Department of Meta and the Colombian Caribbean platform between the research groups "Studies on seismic risk and the llanero foothills natural threats" of the University Corporation of the goal of Villavicencio and the Group of Geophysics in the Department of Geosciences of the Universidad Nacional de Colombia, Bogotá headquarters."These tasks are part of the research projects "Threatens Villavicencio seismic and its surroundings", geotectonic evaluation for Bogotá and Villavicencio" and "seismic hazard of the platform Colombian Caribbean comes leading German Chicangana with the research group "Studies on risk seismic and threats natural of the llanero foothill."Also participated in the development of this work, researchers are professors of the post grades of the geosciences Department of the National University of Colombia, Bogotá headquarters and the Group's geophysics research, National Directorate of investigations of the Antonio Nariño University in Bogotá D.C. also participated the undergraduate students of Civil Engineering of the school of engineering and architecture of the University Corporation of Meta not only with your participation as a seedling but also with their degree work. This work initially shows the background information on the participation of the Academy in Colombia on the subject of the seismic threat. This background shows the history of the subject of the seismic threat to Villavicencio. Moving immediately to describe the history of the participation of the University Corporation of Meta, the reason for their participation in this theme, the achievements with this and the prospects for the medium term. Finally in this work we show are issues that both the Academy

and the University Corporation of Meta participates and promotes on this subject.

## **2 HISTORIES OF THE ISSUE OF SEISMIC IN COLOMBIA AND OF THE ROLE OF THE ACADEMY IN THIS.**

The first earthquake in Colombia was reported in the year 1550 in the region of the current municipality of Santander de Quilichao in the Department of Cauca, located in the southwest of the country (Prieto et to the, 2004). Chronicles, testimonies, documentary sources derived from administrative and ecclesiastical acts along with timely reports from witnesses of the period 1550-1923 exception mainly, did build a truthful and accurate catalogue about the occurrence of destructive earthquakes in Colombia during this historical period. Such work if it continues to do today by seismologists linked to universities such as the Universidad Javeriana, the University of Quindío and the Universidad del Valle.

## **3 HISTORY AND RESULTS OF THE PARTICIPATION OF THE UNIVERSITY CORPORATION FOR THE GOAL IN THE FIELD OF SEISMIC.**

The University Corporation of Meta and its programmer of Civil Engineering with the research group "Studies on seismic risk and the llanero foothills natural threats" by the end of 2005 when this was created it assumes the recommendations given by INGEOMINAS to continue with the second phase of the indicative Sismogeotecnical zoning of the city of Villavicencio, which among others are:-Make a geological survey regional with an emphasis on the Geotectonic regional geological faults in the area are identified in which.-Complement the collection and analysis of information on the regional, both historical and instrumental seismicity.-Perform seism tectonic studies on influence seismogenic sources in the area, in order to know in better detail, movement rates,

lengths of rupture and probable maximum magnitudes, among others.-The analysis of threat taking into account different models of calculation (area source, for example) and near-field effects-It is important to implement a permanent network of accelerometers in the city in order to continue with the monitoring of strong motion; This information lets you know instrumental level the soil behavior which leads to verify the proposed design spectra.-With the aim of improving the dynamic characterization of the subsurface the realization of some geotechnical surveys and in situ testing is required in some areas of the city Due to the different problems of stability, suggests carrying out detailed studies and instrumentation of some slopes.

-It is necessary to initiate a programmer of public and educational information through mass media, institutions and colleges and training at Community level, which without alarming socialize the information and how to act in case of earthquake

The research group 'Studies on seismic risk and natural hazards of the llanero foothills' assumed based on these diverse needs research on the themes of geodynamic, geotechnical, GEO, tectonics, neotectonics and Seism tectonics not only of the llanero foothills but also at regional level covering regions such as the Colombian Caribbean platform and the Colombian West.

As almost immediate results has been an increase in knowledge about the local tectonic setting in the region of Villavicencio with the determination from a neotectonico point of view of the faults that can potentially generate an earthquake and also advances in knowledge about the origin of the subsoil that makes up the urban area of the city. The group "Studies on seismic risk and natural hazards of the llanero foothills" in link and with the support of the Group of investigation group of geophysics in

the Department of Geosciences of the University national of Colombia, Headquarters Bogota and of the Group of the Geophysics of the national direction of research of the Universidad Antonio Nariño, has contributed to the realization of the second Latin American Congress of seismology, specialized that international scientific event was held in Bogotá in August 2006 and the events of socialization for the authorities of the Department of Meta and civil society on the issue of the scope of the threat seismic in Villavicencio made in 2007 in the city of Villavicencio. With these links the Group has also contributed to the realization of the project seismic network of the Savannah of Bogotá in the 2007-2009 period, which is led by the Geophysics group of the national direction of investigations of the Universidad Antonio Nariño. It may 24, 2008 presented the Quetame earthquake with magnitude 5.9. The occurrence of this earthquake favors seismic research since the main earthquake and the process of replica for seismic research of Villavicencio in particular, with the analysis of the effects of site by wave propagation by nearby earthquake, resulting with an increased knowledge of the conduct Seism tectonics of the local structures. Thanks to this group of "Studies of seismic risk and the llanero foothills natural threats" with the support of the research groups, Geophysics of the National University of Colombia, home to Bogotá and Geophysics of the national direction of research at the Universidad Antonio Nariño, managed to win from COLCIENCIAS financial support for the development of the Analysis technical sismic co project of the Fallaservita, Departments of Cundinamarca goal, declared eligible in the call 521/2010 project from COLCIENCIAS, called Bank of projects of scientific research or technological, in 2010. By the side of the seismic hazard of the Colombian Caribbean platform, achievements have been to define the scope of the seismic threat mainly in the city of Santa Marta and advances on

Geotectonic aspects of the Oca fault and understanding have been geodynamic and tectonic general of the Colombian Caribbean platform. In these investigations the group assigned to the University Corporation of Meta has had the support of the Group of geophysics in the Department of Geosciences of the University national of Colombia, Bogota headquarters, researchers from the Institute of Geophysics Marinha of the Federal Fluminense university in Niteroi, Rio de Janeiro, Brazil and the GEOGRID the direction of geology group of INGEOMINAS, headquarters in Bogota. Finally face the issue of the Colombian West and Seismicity in the Colombian territory the group along with the Group of geophysics in the Department of Geosciences of the University national of Colombia, Bogota headquarters, she has conducted research focused on evolution Geodynamics and the construction of the mountainous scenery of the Colombian Andes. These studies contribute to the advancement of knowledge of seismic risk not only of Villavicencio, but also of other scenarios determined to which its seismic hazard as high and medium. The strengthen socialization of these results of research both in specialized scientific events or risk management, both national and international, as well as the publication of these through written or electronic, contribute to strengthen scientific knowledge or strategies to increase the effectiveness in reducing the risk. Since also the Corporation University of Meta Academy and

its Civil Engineering program with students assigned to the hotbed of research wattle and daub, have made the project Inventory conditions heavy duty sismo of the constructions of the founding Center of the city of Villavicencio, whose results contributed to the project's research seismic threat in the city of Villavicencio and the surrounding area during the period between 2007 and 2009, and the project analysis of the basement of the N ° 1 of the municipality of Villavicencio commune: a large prehistoric River alluvial fan. Possible age and characteristics of the deposit, which is taking place from 2010 to date and that contributes to improve the dynamic characterization of the subsoil of the city. These projects specifically are aimed towards the optimization of the zoning sismo geotechnical the city and in connection with the first project that shows the quality of the buildings and their sismoresisten ciaconditions, this is an exercise that seeks to raise awareness on a permanent basis to the community, but above all the decision-making actors which are the authorities. With this project in particular aims establish a continuing program of oversight and support on the part of the Civil Engineering program to the authorities and society in general, in order to make prevention campaigns to achieve a reduction of the seismic risk. The University Corporation's goal in this case happens to fulfill its social responsibility as an Academy with the community on a permanent basis

## 4 PERSPECTIVES AND CONCLUSIONS

The research group "studies on seismic risk and natural hazards of the"

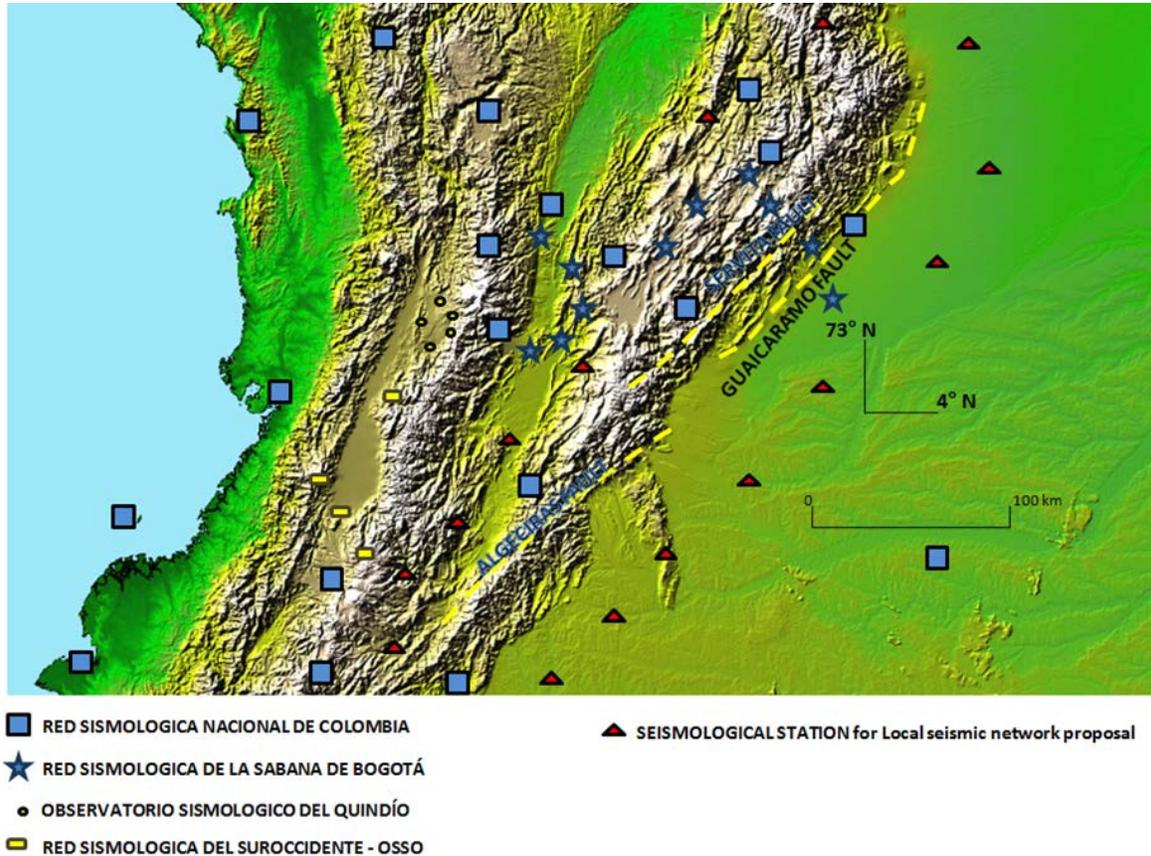


Fig. 1. Red triangles the possible location of the stations the East Colombian seismological network, which is a project proposed by the research group studies on seismic risk and natural threats of the Piedmont llanero University Corporation of the goal, to possibly begin to unfold before 2020. With this network will seek to detect not only the seismicity of the llanero foothills, but also of the region of the Amazon and the Orinoco. In other conventions, current seismological networks operating in Colombia. or out this graph are missing some the RSNC located on the platform Caribbean Colombian and the

northeast of the country. Taken from Chicanganaet to the. (2010).

Department of Geosciences of the National University of Colombia, headquarters Bogota, deployment and implementation of a local seismological network (Figure 1) that specifically cover the eastern Colombia and in particular the structures more relevant the llanero foothill failures as failures and Algeciras, Guaicaramo and Servite. These faults based on investigations of specialists on the topic and own our research groups, have been determined from the neotectonicsand seismology that are

potentially active and capable of producing either a quake with magnitudes  $\geq 6.5$ .

The seismic network of Eastern Colombia seeks to support the national seismological

network of Colombia (RSNC) in the register of the microseismicity of this region, which in addition to

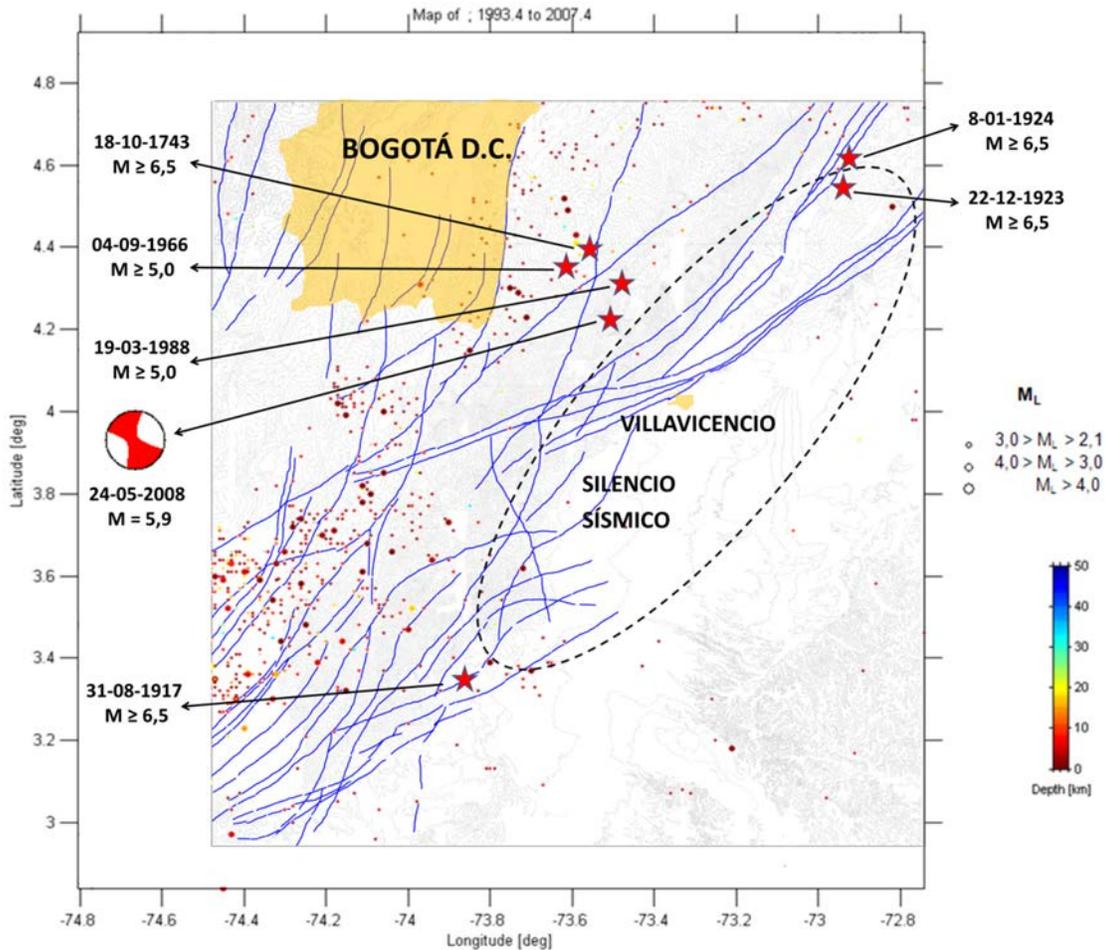


Fig. 2 Large historical earthquakes and registration of instrumental seismicity of the RSNC for the period 1993-2007 in the region of Villavicencio and the llanero foothills of the center of Colombia. The sector of seismic silence is one region that in this case, the RSNC fails to detect micro seismic, which for this case are earthquakes whose local magnitudes are less or equal ( $\leq$ ) 2.1. To save this malaise is required to install a local seismological network determining this micro seismic in the sector.

Identify its seismic behavior of these faults, allows also the identification of previously unidentified sismoactive structures or those where the RSNC not detected by its technical

limitations, leaving sectors of seismic silence as shown in Figure 2. The aims of the East Colombian seismological network are on the one hand, contribute to research center expert

with the scientific knowledge on the seismicity in eastern Colombia and the llanero foothills, determining patterns of seismicity distribution - temporary space to define the seism tectonic of the region and on the other stage with the report to the authorities and the community in general aspects seismological of earthquakes occurring in the complex work in the seismic risk mitigation. The information that this network will offer will be in the public domain and will contribute to the development of theseismological knowledge Colombian and the northwestern region of South America. Then generally, it concludes that the Academy at least in the case of Colombia has assumed the leadership of the development of seismological knowledge in Colombia since the beginning of the 20th century. Universities in particular with its centers of geophysical research and Civil Engineering programs, have contributed to the increase of Seismology in Colombia from historical, geophysical research and knowledge of Civil Engineering, to increase the understanding of the phenomenon in the country, and similarly have supported authorities in plans of management about seismic risk. In the same role and assuming leadership for the Llanero foothills seismic risk management and research, the University Corporation of Meta with its programme of Civil Engineering with the support of their teachers investigative work, has managed to lead in the last decade of the llanero foothills seismic theme and also helped with the investigation of the seismic hazard from other regions of the country such as the Colombian Caribbean platform and the Colombian West.

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