Abstract
We present a preliminary analysis of the data recorded by five seismic stations located in Mato Grosso and Mato Grosso do Sul (Brazil): FRNC1 (Corumbá-MS), NVXVB (Nova Xavantina-MT), PRNTB (Paranatinga-MT), COXMB (Coxim-MS) e RVMTB (Rio Negro-MS). An active seismic region was identified nearby the city of Nova Xavantina (MT) and others in Pantanal Basin and in the North of Goiás state, precisely in Mutunópolis (BARROS et al., 2011), which is inside the Goiás-Tocantins Seismic Belt. Almost all the events were located using Hypo71 (LEE e LAHR, 1975) and Geotool LocSat (MILJANOVIC, 2007). Some of them were located using the single station method, when the polarity of P arrival was clear enough to analyze the particle motion.

Introduction
In 5th June 2009, a strong earthquake with 4.8 mb magnitude struck Coxim, Mato Grosso (Brazil), which was felt by people in many cities such as Cuiabá, more than 300 km distant from the epicenter. For the purpose of studying the later seismicity, a five station temporary network was deployed: FRNC1 (Corumbá-MS), NVXVB (Nova Xavantina-MT), PRNTB (Paranatinga-MT), COXMB (Coxim-MS) e RVMTB (Rio Negro-MS), as presented in figure 1. The network stayed operational from July 2010 to March 2013.

Brazilian territory is located in the interior of a very stable tectonic region called South American Platform (ALMEIDA et al., 2000), which has a very low seismicity compared to countries such as Chile, although some events with magnitude higher than 5.0 are not uncommon and may cause some damages in some fragile buildings.

One of the most important characteristics of Brazilian seismicity is that usually occurs in shallower depths (< 5 km). Figure 2 presents the seismicity occurred in Brazil from 1950 to 2014, extracted from Observatory catalogs, indicating five important active seismic zones.
Method

Two location methods were used in order to compare the results: Geotool LocSat (MILJANOVIC, 2007) and Hypo71 (LEE e LAHR, 1975), each one applied to a specific velocity model. The first used IASP91 and the second used a regional model for Brazil (ASSUMPÇÃO et al., 2010).

The magnitudes were calculated using two different equations: duration magnitude ($m_d$), for data with no calibration files, and regional magnitude (ASSUMPÇÃO et al., 1983) for data with seismometer calibration values (Güralp files). Besides, $m_d$ scale is more suitable for epicenters located less than 150 km and $m_R$ is for epicenters ranging from 200 and 1.500 km distant.

Results

The temporary network registered a total of 79 natural events and 27 unreliable registers, which was not possible to tell if they are natural, chemical detonations or just noise. The lowest magnitude was 0.2 $m_d$ and the highest was 4.0 $m_R$ for two events: Estrela do Norte, Goiás state (10/08/2010), located in the Mutunópolis-Mara Rosa Seismogenic Zone (BARROS et al., 2011), and Montes Claros, Minas Gerais state (05/19/2012).

Inside a radius of 30 km from the station NVXVB (Nova Xavantina-MT), 32 events were detected, with magnitudes ranging from 0.2 to 1.8 $m_d$. Unfortunately, it’s not possible to register such microseisms with more distant stations, because of the energy dispersion and the background noise.

To study that seismicity, it is necessary to deploy a local network, with at least 4 stations and a good azimuth coverage. Figure 5 presents a map of the events locations.

Conclusions

The data used in this work are not good enough to determine important parameters such as epicenter or hypocenter and focal mechanism for the greatest part of the Institute of Astronomy, Geophysics and Atmospheric Sciences, University of São Paulo (IAG-USP).

The figures 4 and 5 show the seismograms of Montes Claros and Estrela do Norte events.
events. The data was too noisy, so it was necessary to use band-pass filters to improve the signal/noise ratio that, in some cases, could not be remove high frequency noise.

Most of events were not located because the network is very wide and only two stations, in the best scenario, were capable to register just some events simultaneously.

Nevertheless, a seismic zone was identified inside a 30 km ratio from station NVXVB (Nova Xavantina-MT). It is also possible to observe a line pattern that crosses Central-Brazil from Northeast to Southwest, which can be related to the reactivation of faults in Goiás-Tocantins Seismic Zone.

This work, although very preliminary, serves as an initial reference to deploy new stations in some of the seismogenic zones in Brazil, specially Pantanal Basin, Mato Grosso do Sul.

Acknowledgments
- Seismological Observatory, University of Brasília.
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References


