

Accepted Manuscript

Improved epicentral relocation in the offshore Campos basin, SE Brazil, with the RSTT 3D model

Felipe Neves, Marcelo Assumpção, João Carlos Dourado, Frank Le Diagon, Antonio Ortolan



PII: S0895-9811(17)30404-2

DOI: [10.1016/j.jsames.2018.05.002](https://doi.org/10.1016/j.jsames.2018.05.002)

Reference: SAMES 1924

To appear in: *Journal of South American Earth Sciences*

Received Date: 6 October 2017

Revised Date: 16 March 2018

Accepted Date: 2 May 2018

Please cite this article as: Neves, F., Assumpção, M., Dourado, João Carlos., Le Diagon, F., Ortolan, A., Improved epicentral relocation in the offshore Campos basin, SE Brazil, with the RSTT 3D model, *Journal of South American Earth Sciences* (2018), doi: 10.1016/j.jsames.2018.05.002.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Improved epicentral relocation in the offshore Campos basin, SE Brazil, with the RSTT 3D model

Felipe Neves¹; Marcelo Assumpção¹; João Carlos Dourado², Frank Le Diagon³, Antonio Ortolan⁴

¹ Seismology Center, IAG-USP, São Paulo, marcelo.assumpcao@iag.usp.br

² IGCE-UNESP, Rio Claro, SP, Brazil

³ Schlumberger, Houston, USA

⁴ Petrobras, EXP/GEOF/AG, Rio de Janeiro, Brazil

Revised version 2018, March 16.

Abstract

Earthquake location on the continental shelf is often poor because: a) the seismic stations are mainly located on the continent, to one side of the epicenter (which means that any error in the velocity model causes a large epicentral error), and b) 1D models are commonly used in a region with strong lateral variations in the crustal structure. We tested the use of the 3D regional seismic travel time (RSTT) model to relocate an event of magnitude 3.8 m_b that occurred on July the 1st, 2010, in the Campos basin, southeast (SE) Brazil. This event was also recorded by a seismic vessel, which allowed an estimate of the azimuth of the incoming P-waves. The new location based on the 3D model is more consistent with the data recorded by the streamers, which shows that the use of 3D RSTT models can improve earthquake locations offshore. Several other events in the SE offshore basins were relocated with the 3D RSTT model, which confirmed the trend of epicenters lying beneath the continental slope where sediment thickness tends to be highest.

Keywords: Continental shelf, regional 3D epicentral location, RSTT

Introduction

The causes of intraplate seismicity have been the subject of intense debate (Li et al., 2009), and the explanation of slow strain accumulation until the rock strength is reached, commonly applied to plate-boundary activity, has been disputed (Calais et al., 2016). Despite this debate, intraplate seismicity has been associated with areas of crustal weakness due to extensional deformation in the last major tectonism, such as continental failed rifts and offshore continental shelves (Schulte and Mooney, 2005). Most of the largest intraplate earthquakes worldwide have occurred in continental shelves (Johnston and Kanter, 1990; Schulte and Mooney, 2005).

In Brazil, the SE offshore region has a significant level of seismicity (Assumpção, 1998; Assumpção et al., 2011, 2014, 2016), which has been attributed to the combination of spreading stresses from continent/ocean transition and flexural stresses from sediment load, both favorably oriented with respect to the far-field regional stresses (Assumpção et al., 2014).

However, detailed studies of offshore seismicity are hampered due to the difficulty of accurately determining earthquake locations. The routine location of epicenters offshore is commonly based on seismic stations onshore and the use of simple, average 1D velocity models. Simple tests of different 1D models show that errors of about ~100 km or more are possible (Assumpção, 1998). These errors are much larger than the errors given by the location routines, which do not take into account model uncertainties or non-linear uncertainty effects caused by arrival-time misfit.

3D models, such as regional seismic travel time (RSTT) (Myers et al., 2010), allow a better estimate of epicenters. However, 3D models must be calibrated and tested against well-known

Download English Version:

<https://daneshyari.com/en/article/8907618>

Download Persian Version:

<https://daneshyari.com/article/8907618>

[Daneshyari.com](https://daneshyari.com)