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## **Interpretation of Gamma-Ray Log of RES-01 Well and Correlation with Seismic Data**

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## Interpretation of Gamma-Ray Log of RES-01 Well and Correlation with Seismic Data

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### Introduction

The Resende Basin is a Cenozoic hemigraben encompassed in the Continental Rift of Southeastern Brazil. The main filling of the basin corresponds to feldspathic sandstones and conglomerates interbedded with greenish mudstones, related to syn-rift braided fluvial deposits included in the Resende Formation. This study aims to interpret the gamma-ray log of a pioneer stratigraphic well (RES-01), correlating with the seismic section intersecting the well location. According to the literature, sandstones and conglomerates show low gamma-ray values compared to shales, which have higher values. However, when sandstones and conglomerates present feldspathic composition, their gamma-ray readings can be high, which may lead to confusion with shales. In the Resende Formation, feldspathic sandstones and conglomerates are predominant, requiring careful interpretation of the gamma-ray logs.

### Method and/or Theory

The pioneer stratigraphic well RES-01 was drilled in the main depocenter of the Resende Basin with continuous sampling and geophysical logging. The core samples were described based on the textural, structural and compositional parameters. The gamma-ray log interpretation was carried out by identifying peaks and classifying the curve shapes into bell-shaped, funnel-shaped, and box-shaped patterns. These geometric patterns and peaks were correlated with reflective patterns in the seismic section using the Geolog Well and Integrate Canvas software. The correlation between the geophysical data and the described core samples is in progress.

### Results and Conclusions

The well ran through 11 meters of Quaternary sediments and 376 meters of Resende Formation deposits, reaching the basement rocks at a depth of 387 meters and the final depth of 410 meters. The Quaternary sediments present the lowest gamma-ray values. Along the Resende Formation deposits, the gamma-ray log predominantly exhibits a box-shaped pattern in thicker intervals. Funnel-shaped and bell-shaped patterns occur less frequently and are associated with thinner intervals. Gamma-ray peaks are more frequent after 340 meters of depth. Three main intervals could be individualized for the Resende Formation. The interval from 11 to 100 meters is characterized by horizontal seismic reflectors and presents low gamma-ray values. There is a sharp drop that forms a funnel-shaped pattern with the lowest value of the gamma-ray profile at the base of this interval (approximately 100 meters of depth). From 100 to 250 meters of depth, there is an interval which exhibits chaotic seismic facies and intermediate gamma-ray values. The base of this interval is marked by a high amplitude reflector and a high gamma-ray peak, associated with sandstones with carbonate cementation. Finally, from 250 to 387 meters, the seismic section presents continuous horizontal seismic reflectors and the gamma-ray values become higher. The gamma-ray log showed correlation with the main seismic intervals identified, suggesting a relationship between the seismic facies and the sedimentological characteristics. The analysis of this relationship is being carried out through the ongoing joint investigation of the gamma profile and the description of the core samples.