This mathematical relationship considers the following assumptions: The present mass of the mud is represented by "ρ_{actual}" in ppg. The conventional hydrostatic gradient is represented by "ρ_{normal}" in ppg. The weight of the drilling bit is represented by "W" in lbs. The drilling bit diameter is represented by "D" measured in inches. The number of revolutions completed in a minute is represented by "N" which is assessed in rpm. The drilling bit's penetration rate is represented by "R" which is assessed in feet per hour (Nweke and Dosunmu, 2013). This paradigm assesses the relationship between the feasibility of drilling and the shale sequences under overly pressured conditions encountered in the Gulf of Mexico using tri- conic drilling bits. This equation also considers the influence of the overburdening gradient (Nweke and Dosunmu, 2013).

The Gulf of Mexico is distinct from the geological environment of the Niger Delta. The sequence of lithological sediments in the Niger Delta region incorporates the intermittent shale and sand environment encountered in the marine environments. The hills of the Niger Delta region are recipients of intense lateral stresses. The maximum stress in the horizontal planes of the hills in the Niger Delta region is greater than the vertical planes of stress which are exerted. The stress on the horizontal planes is substantially greater than the stress in the vertical planes (Nweke and Dosunmu, 2013).

The theory which will be applied is the evaluation of experimental data. In the experimental data, it can be demonstrated that in many of the lithological samples devoid of humidity, the Poisson's ratio diminishes with the decrease in differential pressure. This implies that in lithological samples saturated with gas, the Poisson's ratio diminishes with the increased pore pressure. The pore pressure increases with adequate pressure augmenting in the lithological samples saturated with liquid. The reproduction of theoretical modeling can observe this. This influence can be applied as novel implements for predicting pore pressure in the Niger delta oil well system. In addition, it can serve as an overpressure forecasting tool for the sonic logs, cross well, and surface seismic evaluations performed prior to drilling (Dvorkin, 2001)

Typically, the velocity of the elastic waves in rocks devoid of humidity is assessed in a laboratory environment by changing the pressure, which confines the lithological sample and sustains the pore pressure. As the velocity of the wave responds to the difference in pressure, which is the pressure of the confinement less the pore pressure, this information can be applied in order to forecast the on-site variations in velocity in the lithological samples that result from the gaseous content at a continuous overburden point. The in situ velocity conditions of concentration can be computed from the velocity of the dry lithological samples by applying fluid substitution equations (Dvorkin, 2001).

As a result of the increased compressible aspect of the gases, the velocity measured in situ in the lithological samples containing gas is similar to the points of differential pressure for air in laboratory conditions. The measurement of the pressure versus the velocity in the laboratory conditions in conjunction with fluid substitution can be applied to forecast the elasticity of the lithological sample alterations in the oil reservoirs during the exploration and exploitation of oil deposits. These aspects are the consequences of the pore fluid changes over time and the pore pressure, including space variations. In addition, this information can be a foundation for comprehending the seismic assessments for the fluid variation and the pore pressure in space and time (Dvorkin, 2001).

The empirical experiments' temporal scale is much less than the geological temporal models of pressure production. Notwithstanding, the empirical experiments where the pressure alterations occur at a rapid pace can be applied to simulate the late pressure reactions elicited when the fluid pressure in the lithological mass is enabled to increase in relation to the hydrothermal pressure. This may be the outcome of the heated liquid thermal expansion, the maturation of the hydrocarbon sources, and the expulsion of fluid. This results from clay diagenesis and the fluid being pumped from the intervals where there is a deeper pressure in addition to the overburden, which results from the tectonic responses (Dvorkin, 2001). The diminishing of the P wave speed about increasing the pore pressure has been applied to detect overpressure. Notwithstanding, velocity is not the only indicator of pore pressure because it relies on the lithological layer's lithological texture, mineralogy, and porosity. This methodology section is based on a literature review of experiments that apply the Poisson's ratio to detect the overpressure burden, computed from the S- wave and the P- wave velocities. as indicators of the pore.

2.11 Current methods of pore pressure prediction

In optimal situations, the data derived from surface reflection may not only provide the average speeds over the rough intervals located in the intervals between the major reflectors, but the deficient aspect of speed resolution also influences the precision and the location of the following pressure predictions. A third category of challenges, which is less substantial than the other categories, develops if a prediction planning paradigm is acquired by applying well data that is not representative of all of the rock formations manifest in the boring process. Some boring paradigms are adjusted by applying sonic velocities (Araujo et al., 2005; Nelson et al., 2005; Villaescusa et al., 2002).

This is conducted in the intervals in which the boring is conducted through shale mediums. This decision to perform this type of boring in the shale mediums may be derived by applying gamma radiation. Consequently, it would not be appropriate to actively implement this type of forecast with the use of seismic information, which considers all of the evaluations of the rock formations, not exclusively the shale formations. A correlated challenge may present itself in the adjustment process if the shale boring segments' information is not applied for the pressure forecasting and contrasted with the existing pressure information derived from the boring activities conducted at non-shale intervals. Suppose there are distinctions between the two data models. In that case, the temptation may arise to perceive that the pore pressure is distinct between the sand portions that envelop the shale and the shale. This distinction is also persistent over any given period of geologically measured time. If this is mutually valid, this assumption would have the capacity to invalidate the computations that rely on the assertion of the pressures that are equalized between the sands that envelope the shale and the shale segments (Araujo et al., 2005; Nelson et al., 2005; Villaescusa et al., 2002).

As a result of these challenges, it becomes apparent that the issue of pore pressure forecasting has no solitary solution. The challenge of approximating the rock formations' pore pressure that encases an existent borehole is more effectively addressed if numerous data sets are applied. Effective forecasts may be formulated if the corresponding aspects of uncertainty are considered. In order to achieve this outcome, it may be helpful to have access to the diverse prediction algorithms, which are distinct from one another in category instead of intensity. When the diverse algorithms concur in their forecasts, an individual may have enhanced confidence. To the extent that the diverse algorithms do not concur, this aspect motivates the well planner to conduct further investigation (Sayers et al., 2005).

There are a few algorithms that do not display significant autonomy from all of the algorithms that have been examined in peer-reviewed literature. The consensus of algorithms that have been applied utilizes the information that has been collected at a particular point in order to approximate or forecast the pore pressure that is present in the layer. This is conducted on a layer-by-layer analysis. This aspect may be manifested by the researcher's perspective concerning the independent analysis. The layer-by-layer analysis is similar to the analysis of samples present in a laboratory. In comparison, these items acknowledge the diverse layers' correlation. The means of the processes and the geological antecedence interconnect the litho-logical layers. This interconnected litho-logical aspect must be considered from the well planner's perspective (Sayers et al., 2005).

2.12 Other categories of drilling paradigms

One of the most applied drilling methods is applying the air hammering method for drilling oil wells. This method is particularly adapted to drilling solid metamorphic and igneous lithological formations (Wu et al., 2020). The air hammering method is not a genuine rotary method but a rotary rig adapted to fit an air percussion mechanism. This type of drilling rig entails the application of a pneumatic air-driven hammer, similar to a construction jackhammer (Adams and Charrier, 1985; Daneshy et al., 1998). The air hammering drilling method incorporates the application of its operation on the lower end of the drilling tube with an air pressure of one hundred pounds per square inch. The flattened aspect of the hammer is fitted with inserts composed of tungsten carbides. The tungsten carbide inserts are applied to fragment the lithological layers. The air hammering implements are produced in sizes ranging from three inches to seventeen inches and supply a pummeling force equivalent to two thousand hits per minute. The drilling pipe and the hammering tool are subtly gyrated to enable the tungsten carbide inserts to continuously hit a deeper surface to provide homogeneous penetration and a hole that is vertically straight. The aerated exhaust from the air hammering tool is directed to remove any fragments that are a product of the air hammering strikes. This implantation enables a drilling surface that is liberated from fragments. The liberation of the lithological fragments enables a drilling velocity up to twice as fast as the tritone rollers (Adams and Charrier, 1985; Daneshy et al., 1998).

The exhausted air delivers the lithological fragments up through the annular void and in a direction that facilitates their egress from the borehole. In the circumstance of conducting drilling operations beneath the stationary water level, the air hammer's pressure differential must be sustained to conduct the drilling operations effectively. The application of foams is implemented in order to alleviate the pressure that is present in the borehole. The expansive air hammers have the requisite of being supplied with extensive quantities of air, which an air compressor must apply. Operating air compressors at the borehole sites implies a significantly elevated drilling expense (Adams and Charrier, 1985; Daneshy et al., 1998).

2.12.1 Reverse Circulating

In the application of reverse circulating, the thinly applied mud is enabled to seep through the annular void, upwards to the drilling pipe, and to the aspirating aspect of the pump. It is collected inn a reservoir or a tank. The lithological cuttings are transported in a drilling pipe with a less expansive diameter than the annular ring. The aspirating action causes this paradigm to have operational restrictions maintained up to a depth of approximately one hundred and fifty meters (Adams and Charrier, 1985; Daneshy et al., 1998). This is the conventional drilling paradigm applied for geopressure oil wells. This method applies a pipe contained in the drilling pipe to provide an upward lift.

As the cuttings are transported to the surface of the borehole, a separator or a cyclone is applied in order to distinguish the cuttings from the air. The vacuum action which is provided by this method enhances the drilling depth capacity. The level of the fluid that is present in the annular void is sustained at a pressure that is equivalent to the surface air pressure. The applied drilling pipe is similar to the standard air drilling conduit. The benefits of reverse circulating are that the drilling liquids can be foams, air, water, polymers, or bentonite. The normal reverse circulating effect implies that when the water descends into the conduit and in an upward direction through the annular ring. This aspect diminishes the potential of the borehole wall becoming eroded (Adams and Charrier, 1985; Daneshy et al., 1998).

2.12.2 Directed Rotary Rig

This drilling device is usually operated with an air- or water-directing liquid. This drill category penetrates the lithological layers at a more incredible velocity than the cable tooling rig. The drill bit conventionally of a tritone roller aspect is gyrated by applying the hollowed drill support and the drilling pipe. Torque is applied in the movement of the kelly and the rotary drill (Adams and Charrier, 1985; Daneshy et al., 1998). The drilling liquid is transported into the drilling pipe and egresses from the apertures in the drilling bit, where the liquid conducts the function of rinsing the lithological fragments that the directed rotary drill has created.

This is performed in order to provide a clean drilling surface. This action also lubricates the drilling bit, and the cuttings are transported to the surface of the well. A separator is applied at the well surface to distinguish the cuttings from the air. The traveling block sustains the drilling pipe. In the circumstance of too much force being applied to the drill, the result is a borehole that is not vertically straight in its aspect. Excessive force on the directed rotary bit deters the drilling activities due to the inadequate drill-cutting cleansing at the bottom of the borehole. The platforms with a topped head drive do not apply a Kelly and a rotary drill (Adams and Charrier, 1985; Daneshy et al., 1998).

Instead of the kelly and the Rotary drill, the topped head drive applies a hydraulic engine, which is transported upward and downward on the pipe, providing the torque to the drill. In many situations, a less extensive collar is applied, and the drilling platforms are composed of chains with a pull-down feature. Notwithstanding that they are smaller in dimension, the topped head drives can drill the majority of directed usage wells. The platforms that possess masts and draw assemblies can raise almost 75 metric tons.

2.12.3 Regression of the Drilling Fluid

An alternative reverse circulating paradigm applies drill pipes that are fifteen centimeters or more significant in conjunction with applying ejector and centrifugal pumps. The pipe connections were conventionally flanged, measuring more than twenty-five centimeters in diameter. These aspects were the causal attributes of the diameters of the boreholes being restricted to thirty-five centimeters or more. This was designed for the sustenance of the fluid speeds in the proximity of the flanges (Adams abd Charrier, 1985; Daneshy et al., 1998).

This aspect caused the creation of considerable challenges in the casing cementation. As an outcome of the expansive well diameters, this paradigm does not apply to the wells with a geological pressure aspect. This drilling paradigm is adapted to drilling in minimally consolidated lithological formations and applies the implementation of drag fragments, which cannot overcome the lithological barriers that are present. More expansive drilling bits are produced; however, they are not cost-avoidant in their economic aspect of application (Adams and Charrier, 1985; Daneshy et al., 1998).

The circulatory indexes of five hundred gallons per minute are frequently encountered in this drilling paradigm. As a result of the massive volumes of water that are applied in this drilling paradigm, particular sampling containers are applied. The pipes are fitted with threading in the more recently produced reverse circulating conduits. This aspect enables the perforation of boreholes, which are smaller in diameter, with the implementation of tritone drilling bits. Consequently, the drilling velocities are increased as an outcome of the temporal intervals needed to aggregate or extract the drill piping segments significantly diminished (Adams and Charrier, 1985; Daneshy et al., 1998).

A tertiary reverse circulating matrix applies a double ducted swiveling mechanism and a particular drilling pipe, which is applied in order to transform a standard loop into a reversing circulation top-headed drive. The compressed air is impelled into the swiveling mechanism and the particular topped coupling, which is directed to the area away from the drilling pipes. This fluid is redirected to the primary part of the drilling pipe. This aspect enables the vacuuming action for the fragmented lithological rocks transported toward the top of the borehole. The standard drilling pipe is applied in the location of injection, which has the potential of being positioned several hundred meters beneath the ground surface.

The air rotating rigs, the direct circulating rigs, and the topped head drive rigs possess casing drivers affixed to the drilling mast. As the casing segments are required to possess the similar aspects of length as the drilling pipe, these units are conventionally constructed in a modular manner to enable assembly at the borehole site. These devices are impelled into the borehole by applying a pneumatic pile driver. In applying the pneumatic pile driver, the casing can be impelled into the borehole simultaneously as the drilling occurs. This is identical to the drive and drill methods applied by the cable tooling rigs. The inferior aspect of the casing is fitted with a drive boot.

In the drilling of unconsolidated sections, the drilling bit is fitted into the casing and the drive boot shaves away the accumulating processed formations created by the drilling activities. The casing is restricted by the aspect of friction, which is created in a borehole during the drilling activities. The casing components may be impelled prior to the installation of the drilling rigs that extract the plug. The drilling bit can also be applied after the installation of the casing. The casing can also be installed simultaneously as the drilling activities occur (Adams and Charrier, 1985; Daneshy et al., 1998).

In the event that it becomes a requisite to establish the casing in a lithological formation that is consolidated, a bit that is designated as an under-reaming bit can be applied. This is also designated as being a down-hole hammering device. As the casing excludes all of the lithological fragments at the bottom of the borehole, the precision of sampling the lithological formations become enhanced. In addition, the circulation problems of loss are eradicated, and precise assessments of water production may be acquired (Adams and Charrier, 1985; Daneshy et al., 1998).

3. METHODOLOGY

The optimization of pore pressure prediction for over 46 reservoirs with datum TVDss (ft) > 5,000ft and reservoir temperatures (^{0}f) > 170 in the Niger Delta was considered in this study. In this work, a simple descriptive model was developed to optimize the pore pressures for effective well-planning. The various case scenarios for pore pressure prediction optimization considered in this study included;

- Pore pressure prediction in a virgin reservoir
- Pore pressure prediction in a reservoir that has a sand continuity/communication with an adjacent reservoir of known pressure.
- Pore pressure prediction in a reservoir whose pressure data is consistent with historical trend.
- Pore pressure prediction in a reservoir that there hasn't been any production for a relatively short period.
- Pore pressure prediction in a reservoir that experiences water injection.

These case scenarios were considered in this study to help in providing a model that can optimize pore pressure prediction at a reduced cost and minimize non-productive time (NPT).

The steps used in the model development included;

Estimate the pore pressure using the modified Eaton's sonic compression velocity model given below:

$$P_p = \sigma_v - \sigma_{nv.eff} \qquad (4)$$

But substituting Equation 5 in Equation 4:

$$\sigma_{nv.eff} = \sigma_n (\Delta T_n / \Delta_{Tob})^3 \qquad (5)$$

Therefore,

$$P_p = \sigma_v - \sigma_n \left(\frac{\Delta T_n}{\Delta_{Tob}}\right)^3 \qquad (6)$$

But substituting Equation 7 in Equation 6:

$$\sigma_n = \sigma_v - P_{fn} \qquad (7)$$

Therefore,

$$P_p = \sigma_v - (\sigma_v - P_{fn}) \times \left(\frac{\Delta T_n}{\Delta_{Tob}}\right)^3 \qquad (8)$$

Where P_p= pore pressure, σ_n = normal vertical effective stress, σ_v = vertical overburden stress, ΔT_n = Normal sonic transient time, and Δ_{Tob} = Deviated ΔT from the normal compaction trend line.

Using the case scenarios listed above for this study, estimate pore pressures with the following assumptions.

a) If the reservoir is virgin, assuming it's a normal pressure zone, use the normal pressure gradient of 0.433psi/ft to estimate the pore pressure.

b) Suppose the new drill is to be done in a reservoir with sand communication with an adjacent reservoir of known pressure. In that case, the known pore pressure should be used for the new drill reservoir.

c) Suppose the pressure data is consistent with historical trend. In that case, then pressure decline profile should be used to estimate the pore pressure.

d) If there hasn't been any production, the last static bottom hole pressure (SBHP) estimate should be used.

e) If the reservoir experiences water injection, use the last acquired pore pressure.

f) If the voidage replacement ratio (VRR) is ~ 1.0 or 1.5, use pressure incline or material balance (MBAL) estimate to estimate the pore pressure.

These assumptions were used to estimate the pore pressure for the various case scenarios considered in this study. For each reservoir description, the assumptions stated above were used to obtain reliable pore pressures. The pore pressure estimates obtained from this work were compared with the values obtained using the modified Eaton's sonic compression velocity model for pore pressure prediction. This study did not look into estimating pore pressures in partially /entirely faulted reservoirs or shaled out because of the rather complex nature of such reservoirs. Error analysis was also performed to ascertain the model's accuracy developed in this study.

4. ANALYSIS OF RESULT AND DISCUSSION

The results of the pore pressure prediction obtained from Eaton's correlation and the model developed in this study were compared with the Niger Delta well data obtained from offset wells. This is shown in Table 1 and 2.

4.1 Error Analysis

Error analysis was performed on the pore pressure values obtained in this study, the Eaton's model compared to pore pressures estimated from actual well data. This was done in order to ascertain the accuracy of the model developed in this study. The statistical error analysis mathematical models used for accuracy verification included,

1. Minimum absolute error: This is the modulus of the least error obtained in the data set
2. Maximum absolute error: This is the modulus of the highest error obtained in the data set.
3. Average absolute error (AAE): This is given as

$$AAE = \sum \left| \frac{P_{actual} - P_{predicted}}{N} \right| \qquad (20)$$

Where P_{actual} = well data pore pressure (psi), $P_{redicted}$ = pore pressure obtained from this study, and N = total number of data points

Applying the statistical equations of accuracy above in comparing the results of actual and predicted pore pressures as shown in Tables 1 and 2, the following were obtained in Table 3:

Table 1: Comparison of pore pressure estimation using Eaton's model, this study against actual offset well data

Resevoir	Datum TVDss (ft)	Formation Pressure (psia)	Estimated Formation Pressure - Eaton's model (Psia)	Temp (°F)	TVDss (ft)	Thickness (ft)	Fluid gradient (psi/ft)	Estimated Formation Pressure -This Study (Psia)
1	5040	2115	2182	173	5105	140	0.3	2202
2					5156			
3	5200	2190	2252	175	Faulted		0.3	
4	5450	2307	2360	179	5450	49	0.3	2360
5	5520	2339	2390	180	5495	20	0.3	2383
6	5573	2405	2413	181	5601	49	0.3	2421
7	5650	1721	1721	183	5753	61	0.3	1752
8	5700	1744	1744	183	5839	56	0.3	1786
9	5750	2023	1744	184	6008	45	0.3	1821
10	5800	2226	2226	185	6130	16	0.3	2325
11	6000	2186	2186	188	6320	50	0.3	2282
12	6100	1940	2050	190	6347	93	0.3	2124
13	6200	1945	2100	191	6496	40	0.3	2189
14	6200	1975	2100	191	6536	73	0.3	2201
15	6350	1844	1844	194	6801	34	0.3	1979
16	6450	1430	1290	195	6822	32	0.3	1402
17	6550	2169	2150	197	7069	90	0.3	2306
18	6630	2328	1720	198	7221	191	0.3	1897
19	7100	2144	2144	205	7490	120	0.3	2261
20	6975	2840	2820	203	7720	22	0.3	3044
21	7073	2513	2500	205	Not Reached		0.3	
22	7150	2740	2740	206	Not Reached		0.3	
23	7450	3226	3226	211	Not Reached		0.3	

Table 2: Comparison of pore pressure estimation using Eaton's model, this study against actual offset well data

Resevoir	Datum TVDss (ft)	Formation Pressure (psia)	Estimated Formation Pressure - Eaton's model (Psia)	Temp (°F)	TVDss (ft)	Thickness (ft)	Fluid gradient (psi/ft)	Estimated Formation Pressure -This Study (Psia)
1	5040	2182	2182	173	5175	80	0.3	2223
2	5200	2252	2252	175	5309	41	0.3	2285
3	5450	2360	2360	179	5582	24	0.3	2400
4	5520	2390	2390	180	5616	12	0.3	2419
5	5573	2413	2413	181	5665	14	0.3	2441
6	5650	1721	1721	183	5753	47	0.3	1752
7	5700	1744	1744	183	5821	45	0.3	1780
8	5750	1744	1744	184	5963	17	0.3	1808
9	5800	2226	2226	185	5983	11	0.3	2281
10	6000	2186	2186	188	6138	23	0.3	2227
11	6150	1350	1350	190	6212	13	0.3	1369
12	6200	1750	1750	191	6261	25	0.3	1768
13	6200	2100	2100	191	6286	28	0.3	2126
14	6300	1815	1815	193	6407	13	0.3	1847
15	6450	2183	2183	195	6479	20	0.3	2192
16	6650	2150	2150	198	6541	18	0.3	2117
17	6650	1720	1720	198	6626	78	0.3	1713
18	6740	1200	1200	200	6835	8	0.3	1229
19	6975	3020	3020	203	6921	10	0.3	3004
20	7073	2600	2600	205	6934	12	0.3	2558
21	7000	2740	2740	204	7003	158	0.3	2741
22	7100	3074	3074	205	Shaled out		0.3	
23	7150	2668	2668	206	7205	50	0.3	2685

Table 3: Statistical Error Analysis

	Eaton's Model	This Study
Minimum Absolute Error (Psia)	0	1
Maximum Absolute Error (Psia)	608	431
Average Absolute Error (Psia)	38	66

From the results of the pore pressure values obtained for the new drills in various reservoir descriptions above, it can be seen that the descriptive model developed in this study gave accurate results for predicting the pore pressures with an average absolute error of 66psi as compared to Eaton's model of 38psi average absolute error and indicating that the Eaton's model was more accurate. However, in the absence of (costly and time-consuming) data parameters required for pore pressure estimation using Eaton's model, the descriptive model prescribed in this study is a good alternative.

For a virgin reservoir, for instance, assumed to be under normal pressure, the high estimate value from the normal pressure gradient is seen to predict the pore pressures accurately. In the case of reservoirs experiencing water injection, it is assumed that the pore pressures have not changed significantly. Hence, previous or last estimated pore pressures could be used. For pressure data consistency, there are similarities in the pore pressure profile; hence, pore pressure values from the last acquired data could be used. Furthermore, suppose there has not been any production from the reservoir over a while. In that case, the pore pressures are expected not to have changed. In that case, the last acquired SBHP could be used. For new drills in reservoirs with sand continuities or communication with an adjacent reservoir of known pressures, the pore pressure values could be used to estimate pore pressures for the new drills. It was also seen that when voidage replacement ratios (VRR) ~ 1.0 or 1.5, the pressure incline or material balance (MBAL) estimate in estimating pore pressures proved to be accurate. However, the descriptive model prescribed above could not accurately predict the pore pressures for reservoir sections that were totally or partially faulted or shaled out.

5. CONCLUSION

In summary, the findings of this study offer valuable insights into pore pressure prediction in drilling operations. Firstly, it is evident that when drilling through the transition zone, utilizing Eaton's correlation with transit compressive wave velocity provides a superior method for accurately predicting pore pressures. Secondly, our developed model, presented in this study, is a valuable tool for quick and reliable pore pressure estimation, especially when essential data parameters for Eaton's model are unavailable. However, it is crucial to emphasize that the model introduced in this research should be strictly avoided when dealing with pore pressure prediction in fractured or shaled-out reservoirs, as its effectiveness may be compromised in such geological conditions.

Moving forward, our recommendations are twofold. Firstly, we advocate using Eaton's method as a reliable and well-established tool for pore pressure prediction. Secondly, we endorse the application of the descriptive model outlined in this study as a quick-look alternative for pore pressure estimation. It demonstrates relative accuracy and offers a cost-effective and time-efficient solution for pore pressure prediction, mainly when data constraints or time limitations are a concern. By combining the strengths of both Eaton's method and our proposed model, drilling operations can benefit from enhanced accuracy and efficiency in pore pressure assessment.

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