

## POROSITY CALIBRATION BY MULTI ATTRIBUTES LINEAR REGRESSION TECHNIQUE

**Nasir Ahmad<sup>1</sup>, Muhammed Ibrahim<sup>2</sup>, Zahid Imran Farani<sup>3</sup>, and Fabio Luoni<sup>4</sup>**

<sup>1</sup>*Eni Pakistan, Karachi, E-mail: [nasir.ahmad@enipakistan.com.pk](mailto:nasir.ahmad@enipakistan.com.pk)*

<sup>2</sup>*OMV (Pakistan), Islamabad, E-mail: [ibrahim@omv.com](mailto:ibrahim@omv.com)*

<sup>3</sup>*OGDCL Pakistan, Islamabad, E-mail: [zahid\\_farani@ogdcl.co](mailto:zahid_farani@ogdcl.co)*

<sup>4</sup>*Eni E&P, Milan, E-mail: [fabio.luoni@eni.it](mailto:fabio.luoni@eni.it)*

The Lower Goru sands of Middle Indus Basin have a lot of gas potential, but the main risk is the reservoir quality of the sands. For this an effort was made to predict the porosity of the Lower Goru Sands in Kadanwari field area, which is fully covered by good quality 3D seismic data. Multi seismic attribute linear regression technique was used for porosity prediction by using the inverted acoustic impedance volume and the 3D seismic data.

Conventionally single attribute i.e. porosity VS acoustic impedance, is used to define a function to convert acoustic impedance volume into porosity volume. But in Kadanwari area the relation of porosity with acoustic impedance varies very rapidly depending upon many factors including content of clay and other minerals like chlorite, chamosite, and feldspar. Therefore the conventional technique could not give the best results so it was decided to use multi attribute regression technique to establish the function for conversion of seismic data and acoustic impedance into porosity. This technique was being used for the first time in Middle Indus Basin for porosity prediction.

This is a statistical approach which allows predicting a specific log property (porosity in our case) from seismic attributes by defining a multi-attribute linear transform between a subset of the attributes and the target log values. The parameters required for the definition of the multi-attribute linear transform (number of attribute and operator length) were chosen by process of forward step-wise regression plus cross validation. This multi-attribute linear regression technique resulted in significant improvement as compared to conventional single attribute method.