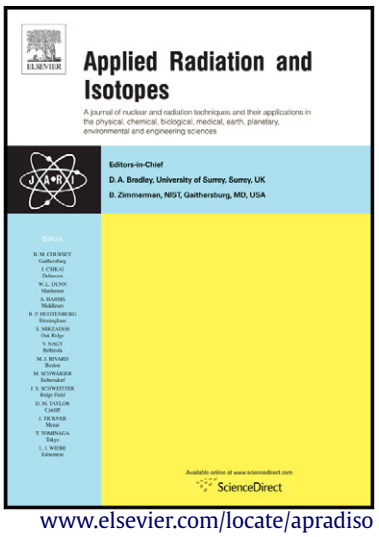

www.elsevier.com/locate/apradiso

Statistical Factor Analysis Technique for Characterizing Basalt Through Interpreting Nuclear and Electrical Well Logging Data (Case Study from Southern Syria)

Jamal Asfahani

PII: S0969-8043(13)00388-6
DOI: http://dx.doi.org/10.1016/j.apradiso.2013.09.019
Reference: ARI6360

To appear in: *Applied Radiation and Isotopes*

Received date: 26 May 2013
Revised date: 29 September 2013
Accepted date: 29 September 2013

Cite this article as: Jamal Asfahani, Statistical Factor Analysis Technique for Characterizing Basalt Through Interpreting Nuclear and Electrical Well Logging Data (Case Study from Southern Syria), *Applied Radiation and Isotopes,* http://dx.doi.org/10.1016/j.apradiso.2013.09.019

Statistical Factor Analysis Technique for Characterizing Basalt Through Interpreting Nuclear and Electrical Well Logging Data (Case Study from Southern Syria)

Jamal. Asfahani

Atomic Energy Commission, P.O. Box 6091, Damascus- Syria

E-mail: cscientific2@aec.org.sy

Abstract

Factor analysis technique is proposed in this research for interpreting the combination of nuclear well logging, including natural gamma ray, density and neutron-porosity, and the electrical well logging of long and short normal, in order to characterize the large extended basaltic areas in southern Syria. Kodana well logging data are used for testing and applying the proposed technique. The four resulting score logs enable to establish the lithological score cross-section of the studied well. The established cross-section clearly shows the distribution and the identification of four kinds of basalt which are hard massive basalt, hard basalt, pyroclastic basalt and the alteration basalt products, clay. The factor analysis technique is successfully applied on the Kodana well logging data in southern Syria, and can be used efficiently when several wells and huge well logging data with high number of variables are required to be interpreted.

Key.words: Factor analysis, Nuclear well logging, Electrical well logging, Basalt, Syria.

Introduction

Well logging researches have been generally developed and extended for petroleum purposes (Schlumberger, 1991; Chang *et al*., 1997; Rogers *et al.,* 1992; Baldwin *et al., 1990*) by benefiting from the advanced technologies in computer computation. Those advanced technologies were rapidly extended for mining and lithological descriptions in the ocean drilling program (ODP), (Benaouda *et al.,* 1999), where they have proven to be very valuable. Different statistical techniques have been already developed for lithology determination from geophysical borehole logs, such as principal component, discrimination function and cluster analysis. These methods are incorporated in computer programs for data interpretation, (Borsaru *et al.,* 2006; Asfahani, 2011; Kassenaar, 1991; Fullagar *et al.,* 2002,). Neural network methods have been also applied for determining the rock types from well logs,(Baldwin et *al*., 1990; Rogers et al., 1992; Wong et *al*.,1995; Pezeshk et *al*., 1996).