

CONTINENTAL GRAVITY MAPSPAUL L. LYONS¹ AND GEORGE P. WOOLLARD²

(Delivered by Paul Lyons, April 17, 1961)

A preliminary Bouguer gravity map of the entire North American continent with a contour interval of 20 milligals was presented. The northern part of South America is tied to this map, and the Gulf of Mexico and Caribbean areas are included. A companion map, in part after deBruyn (1955), has been prepared on the same contour interval for Europe and North Africa and parts of the Middle East. The maps delineate variations in crustal structure and major tectonic trends as well as individual structural features. The complexity of relations is discussed in terms of their cause. The maps are extremely useful in understanding tectonic associations and can be used as a guide in the exploration for natural resources. By using seismic determinations of crustal density and thickness, the authors show that gravity anomaly variations can also be used to explore the earth's crustal thickness and composition. These factors can then be related to surface geology and topography to gain a better understanding of geologic tectonic processes.

**PALYNOLOGICAL FOSSIL RESPONSE
TO LOW-GRADE METAMORPHISM
IN THE ARKOMA BASIN***

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ABSTRACT

Spores and other plant microfossils apparently do not occur in the Arkoma basin coals of eastern Oklahoma where the fixed carbon is in excess of 70%. This fact has been related to the low grade metamorphism associated with the structural deformation of the area. On the western side of the basin the fixed carbon content of the coal is less than 50%. This increases eastward until it is more than 80% near the Arkansas state line. The preservation characteristics of ten genera of fossil spores, plant cuticles, and wood tissues were studied in several coal seams that have a geographic distribution across the fixed carbon range of the Arkoma basin. Plant cuticles were not found in coals with a fixed carbon ratio of more than 67% and plant spores and wood tissues were not observed above 70.08%. Certain genera of fossil spores with delicate structures appear to have ranges restricted to less than 70% fixed-carbon. Correlation of coal seams by fossil spores must include an understanding of the relationship between fixed-carbon ratio and spore occurrence.

INTRODUCTION

Palynological investigations in the Arkoma basin have shown that a direct relationship exists between the amount of fixed-carbon in the coal seams and the preservation and abundance of spore types. This relationship can be regarded as evidence corroborating David White's classic observation in 1915 that the percentage of fixed carbon in pure coal affords a measure of the incipient metamorphism. He further stated that it would be unlikely for petroleum to be present in regions where coals have a fixed-carbon content of more than 60 percent. Subsequent observations appear to bear out these statements, at least in part.

The existence of rocks showing low-grade or incipient metamorphism resulting from structural deformation in the Arkoma basin has been known for many years.

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* Report of a study conducted with grant-in-aid from the California Research Corporation.