2015 IAGR Annual Convention &12th International Conference on Gondwana to Asia
21-23 October 2015, Tsukuba, Japan
Abstract Volume
IAGR Conference Series No. 21, pp. 9-10

conference series 21

Geophysical investigations of south western Algeria on lithospheric thickness and the principal crustal lineaments: try to locate a local primary source of Bled El Mass diamonds.

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Bibliographic sources, as old as of the middle of the 19th century, suggest local and primary source for Bled El Mass alluvial diamonds (Godard et al., 2014). In order to test and validate the hypothesis of the existence of diamantiferous basic rocks near Bled El Mass, the purpose of this work, is to use the results of:

1- Previous works on lithospheric cratonic mantle geometry influences and distribution of major regional faults, in order to locate the kimberlitic or lamproites diamantiferous sources.

2- Several modelling works on Algerian southwest lithospheric thickness and major crustal lineaments.

Studies conducted on the North American continent (Faure et al., 2004, 2005, 2011) have shown that most of the Kimberlites fields are located at the peripheral of the deepest cratonic roots (160-190km). They correlate vertically with steep slopes and/or abrupt direction change in mantle morphology. These features are interpreted as deep structures or limits between mantle blocks. Moreover, the Kimberlites are usually located along large-scale lithospheric shear zones.

Several works on geometry and thickness of African lithosphere are obtained thanks to gravity anomalies derived mainly from satellite data, or by regional scale seismic tomography. We compared the results of Faure et al. (2011) with some other models, such those of Artemieva and Mooney (2001) or Artemieva (2006) and Braitenberg (2014), showing the thickness of the lithosphere under the West African Craton(WAC) and the neighbouring southwest Algerian regions.

Compiling the different results has allowed us to identify the areas that best matched with the geologic conditions and models previously mentioned. In addition, mapping of the most important Southwest Algerian crustal lineaments obtained by inversion of aeromagnetic and gravity data (Boubekri and al., in press) shows that the large lithospheric faults are within the range of targeted regions. Bled El Mass region is located directly below cratonic abrupt changes of WAC lithosphere thickness, reaching more than 200Km at the west of studied region and thinned extremely to the east. This revealed favourable zone like the southern part of Touat region which gather all the conditions to be the seat of a deep magmatic activity which can produce diamondiferous rocks.

Keywords: Kimberlites; Bled El Mass; West African Craton; Aeromagnetic; Tomography; Gravimetry

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