GEOLOGICAL STRUCTURE OF CITUNDUN AND SURROUNDING CIWARU DISTRICT, KUNINGAN REGENCY, WEST JAVA PROVINCE

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ABSTRACT

Based on the Regional Geological Map of the Majenang sheet (Kastowo and Suwarna, 1996), the study area is part of the Halang Formation and the Bogor Zone (Van Bemmelen, 1949). Research conducted using the geological mapping method shows that the Citundun area and its surroundings have complex geological and tectonic structural conditions.

The geological structures that develop are folds, joints and faults. The fold structure in the study area occurs during the Miocene – Pliocene transition with the main axis of the fold trending relatively northwest – southeast where from north to south, namely the Karangkancana Anticline, Kaduagung Syncline, Kaduagung Anticline, Cipari Syncline, Cipari Anticline, Sagara Syncline, Sagara Anticline, Jabranti Syncline, and Jabranti Anticline.

Based on joint processing data and structural lineaments, the lineament results trending northwest-southeast and southwest-northeast. Joint structures are found in carbonate sandstones and carbonate claystones with hard and rather hard levels of hardness. In the study area, there are two strike slip fault structures, namely Sagara Sinistral Strike Slip Fault and Cipari Dextral Strike Slip Fault which are trending northeast-southwest. From the results of joint data analysis, a fault indication was withdrawn because the distribution of joint directions was supportive. Based on the regional tectonic age of West Java, during the Miocene - Pliocene the fault in the study area occurred after deposition of sandstone unit (Sbpn), carbonate claystone unit (Sblk) and carbonate sandstone unit (Sbpk) so that this fault structure is interpreted to be Pliocene in age. Referring to the concept of Moody and Hill (1956), the faults in the study area are strike slip faults of the first and second order.

Keywords: Citundun, Geological Structure, Syncline, Anticline, Strike Slip Fault.

INTRODUCTION

The research area coordinates at 108°37’27,75” E to 108°40’11,3” E and 7°5’29,5” S to 7°8’13,2” S and located include Citundun Village, Kaduagung Village, Cipari Village, Karangkancana Village, Sagara Village, Jabranti Village and Ciwaru Village, Ciwaru District, Kuningan Regency, West Java Province. The Citundun area and its surroundings are an area that is part of the Halang Formation (Kastowo and Suwarna, 1996) and the Bogor Zone (Van Bemmelen, 1949). Based on this, it can be indicated temporarily that the study area is influenced by complex geological and tectonic structures. The purpose of this study is to determine the type of geological structure that develops in the research area which includes the type and the dominant style of work and development, the time of formation, and trace the tectonic events that occur.

GEOLOGICAL SETTING

According to Van Bemmelen (1949), states that the Bogor Zone is a strong folding area which results in an anticlinorium trending west - east. In addition, there are faults that cause a shift from the anticline axis and occur after the deposition of the Halang Formation. The Halang Formation underwent a tectonic phase in the Miocene - Pliocene period, this tectonic activity began with uplifting and folding of the fault rock. The resulting fold has a west-east axis direction accompanied by a strike slip fault zone in a southwest-northeast and southeast-northwest direction. The Sheet Majenang fold pattern is northwest-southeast, with a shear axis. The lineaments that are partly suspected to be faults have a distribution pattern like a fault pattern and generally trending west-east and northeast-southwest which in several places intersect (Kastowo and Suwarna, 1996).

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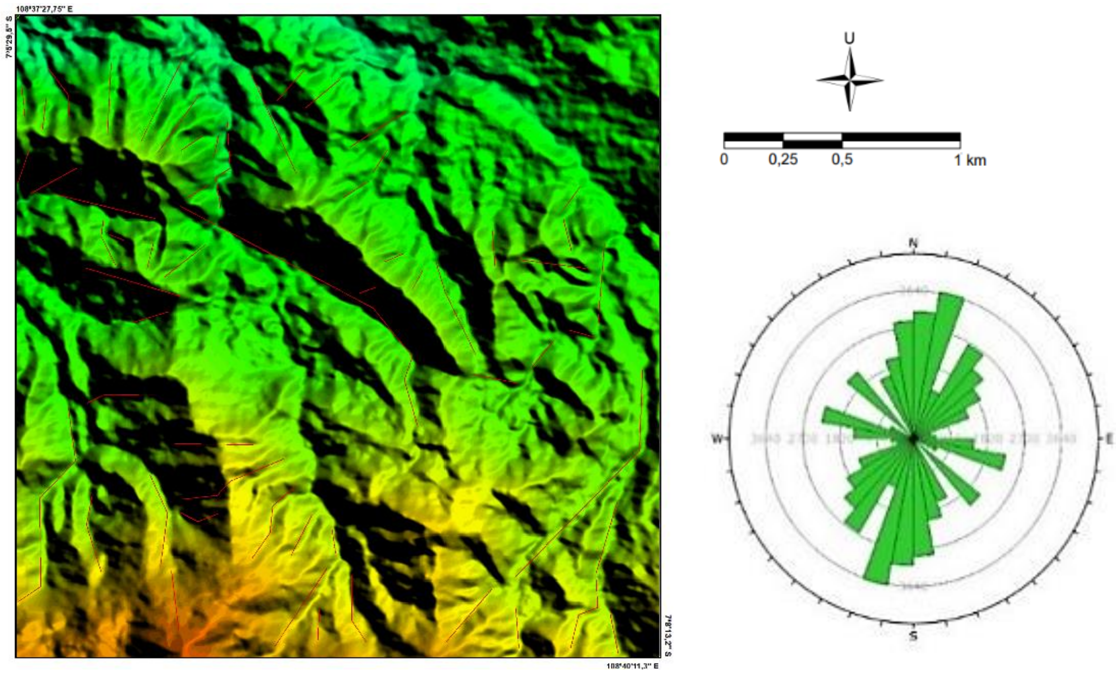

Figure 1 Lineaments of the valley as an indication of geological structure on a topographic map (left). The rose diagram showing the dominant lineament direction is southwest – northeast (right).

RESEARCH METHOD

An overview of the geological structure caused by tectonic activities in the study area is obtained through several approaches, including studying regional geological and tectonic structures, analyzing topographic maps of the study area, and inventorying structural data in the field such as joints, and so on. To analyze the geological structure of the study area, interpretation of the lineaments the valleys and ridges is carried out using data in the form of DEM images. This is done to observe lineament patterns that can assist in the interpretation of the geological structure in the study area. Based on the analysis above, it can be interpreted that the dominance of the lineament direction of the structure is southwest-northeast (Figure 1).

RESULT AND DISCUSSION

The geological structures that develop in the study area are joints, folds and faults. The following are the results of the analysis of the geological structure of the study area.

1. Interpretation of the presence of folded structures in the study area was obtained after measuring the direction of the stroke and the slope of the rock layers in the field and the reconstruction of the structure pattern map. In the study area there are nine fold structures. Folds in the study area are classified based on the angle between the wings with the classification of Fleuty (1964). The fold structures found in the study area, from north to south, are the Karangkancana Anticline, Kaduagung Syncline, Kaduagung Anticline, Cipari Syncline, Cipari Anticline, Sagara Syncline, Sagara Anticline, Jabranti Syncline, and Jabranti Anticline (Figure 2). The folds structure in the study area is interpreted from the position of rocks that are opposite or facing each other. In general, the anticlines and synclines in the study area have the main axes of folds trending relatively northwest-southeast and are Pliocene in age because it can be seen from the regional tectonic age of West Java, namely during the Miocene-Pliocene that it occurs after non-carbonate

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sandstone unit (Sbpn), carbonate claystone unit (Sblk) and carbonate sandstone unit (Sbpk) in the study area were deposited (Figure 3). Based on Fleuty classification (1964), the results of the reconstruction show that the fold structure in the study area, both anticline and syncline, is Open, Gently Plunging Upright Fold (Figure 4).

2. The structures found in the study area are joints found in carbonate sandstones and carbonate claystones with hard and rather hard levels of hardness. The joint data was taken using the rope span method and the measured data were two. Based on the results of joint data analysis, the researcher withdrew fault indications because the distribution of joint directions was supportive. Based on the results of data processing using the Dips software and producing a rose diagram, it was found that the distribution of joints in the carbonate claystone station is trending northwest – southeast (Figure 5). Then the distribution of joints in the carbonate sandstone station is trending southwest - northeast (Figure 5).

3. In the research area it is interpreted that there are two fault structures, namely the Sagara Sinistral Strike Slip Fault and the Cipari Dextral Strike Slip Fault which are trending northeast - southwest. Based on the regional tectonic age of West Java, during the Miocene - Pliocene this fault structure occurred after the deposition of non-carbonate sandstone unit (Sbpn), carbonate claystone unit (Sblk) and carbonate sandstone unit (Sbpk). Folding in the study area continues to occur beyond the plasticity limit so that it is broken and sheared, forming an indication of the Sagara Sinistral Strike Slip Fault (Figure 6) and an indication of the Cipari Dextral Strike Slip Fault (Figure 7). The Sagara Sinistral Strike Slip Fault is thought to have formed earlier, which is thought to have occurred in the first tectonic period, namely the Late Miocene - Pliocene, while the Cipari Dextral Strike Slip Fault was formed later, namely during the Pliocene - Plistocene. Indications of the presence of faults in the study area are the results of reconstruction of the structural pattern map of the study area, lineament analysis based on DEM imagery data, stereonet analysis based on joint data, there are anomaly strike direction and weak zones due to tectonic activity that extends north-south and curves to the southwest. the research area resulted in magma bursting and causing the formation of igneous intrusions in the central and northeastern part of the study area and lithification on the surface became one of the supporting factors for researchers indicating an error. Igneous rock intrusions were found in the form of sill and dike with andesitic porphyry lithology (Figure 8). Referring to the concept of Moody and Hill (1956), the faults found in the study area are strike slip faults of the first and second order.

CONCLUSION

In the research area found geological structures in the form of nine fold structures, two joint structures and two fault structures. The folded structure in the study area occurred during the Miocene – Pliocene transition. In general, the anticlines and synclines in the study area have the main fold axis trending relatively northwest – southeast. Then, based on the existing data, the distribution of joints in the study area is divided into two, namely the northwest - southeast trending which is found in carbonate claystone lithology and tends to be southwest - northeast which is found in carbonate sandstone lithology. Then in the study area it is interpreted that there are two fault structures in the form of the Sagara Sinistral Strike Slip Fault and the Cipari Dextral Strike Slip Fault which are trending northeast - southwest. The Sagara Sinistral Strike Slip Fault itself is thought to have formed earlier, it is estimated to have occurred in the first tectonic period, namely the Late Miocene - Pliocene, while the Cipari Dextral Strike Slip Fault was formed later, namely during the Pliocene - Plistocene.

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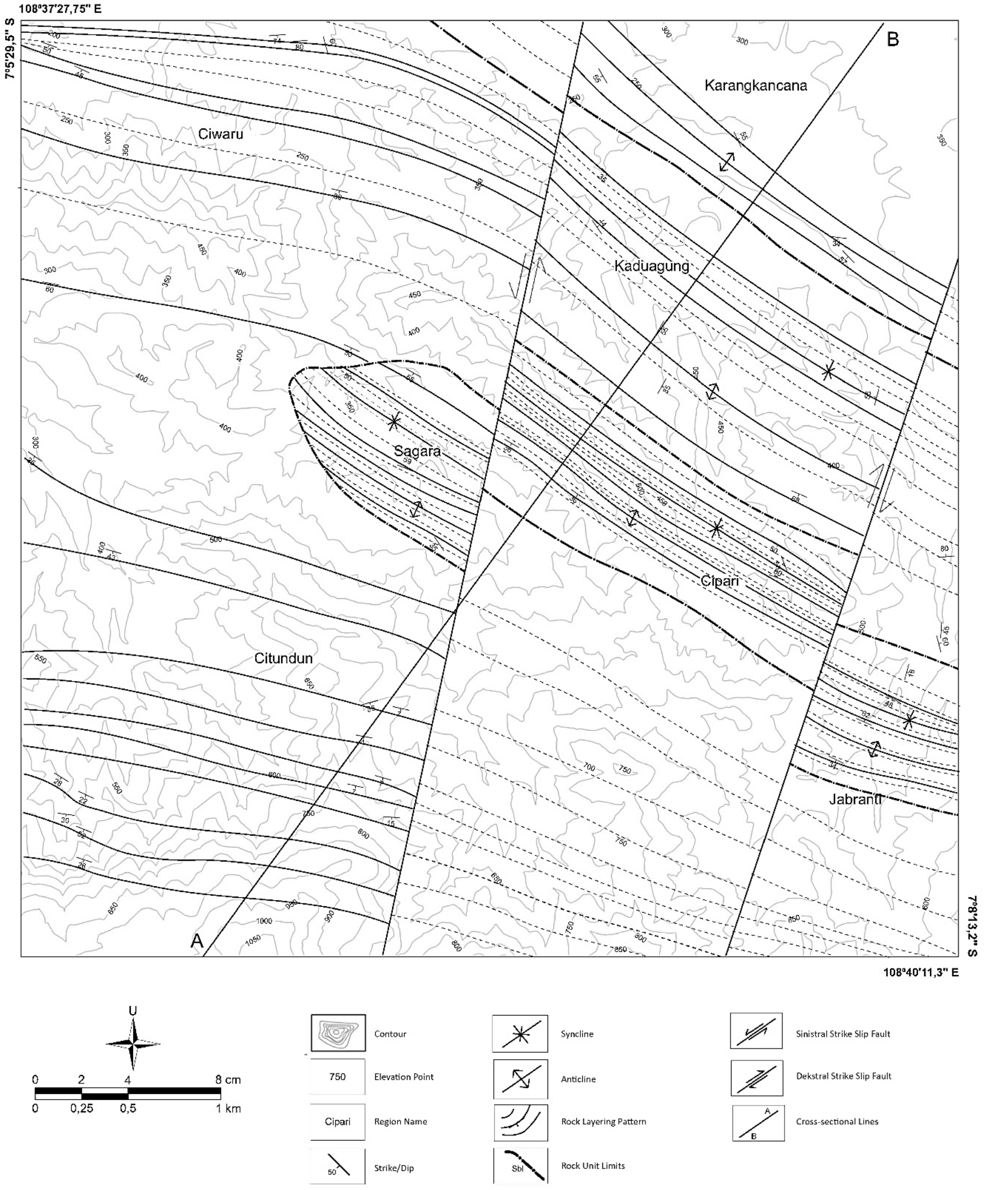

Figure 2 Structural pattern map of the research area

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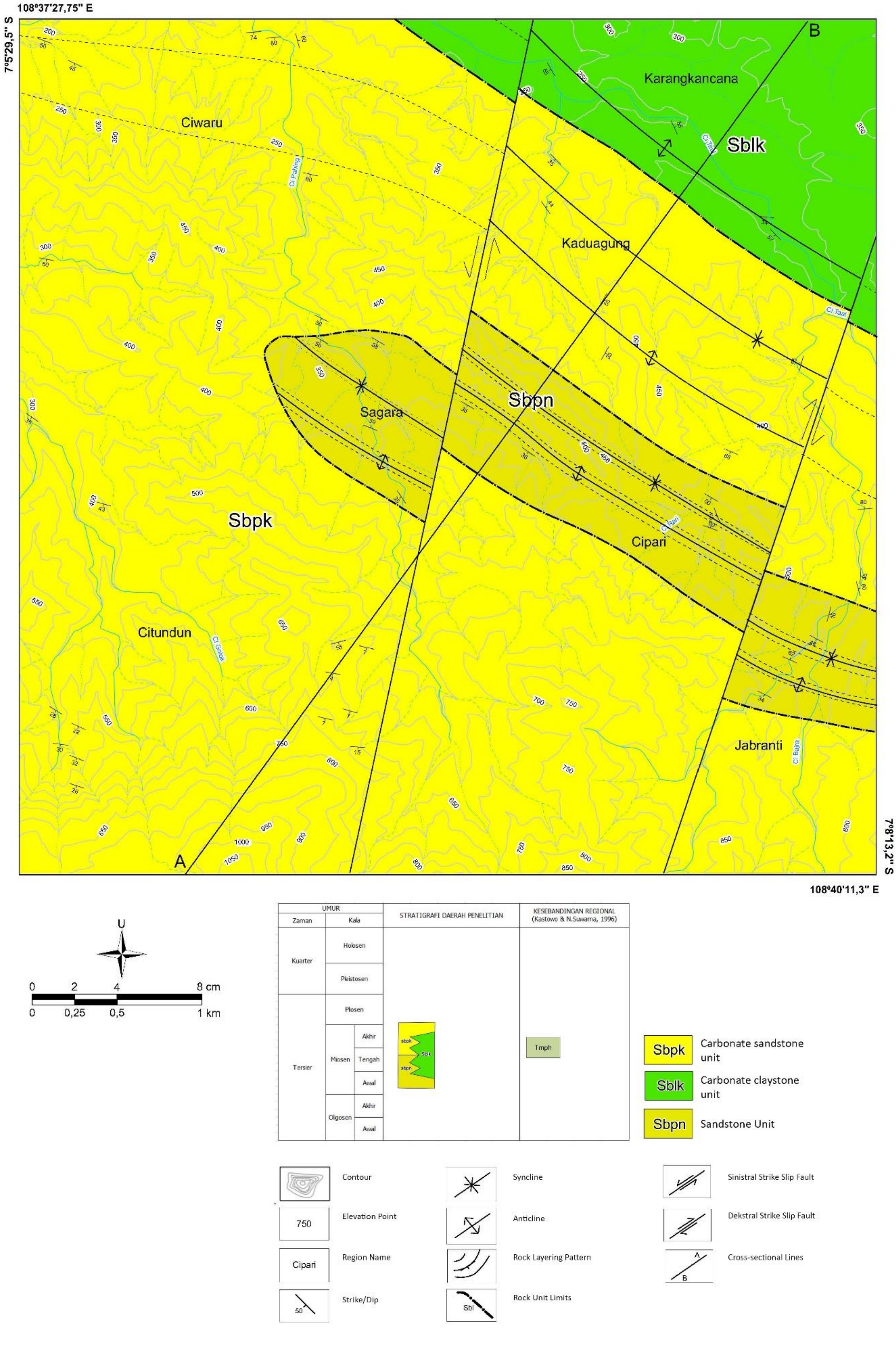

Figure 3 Geological map the research area

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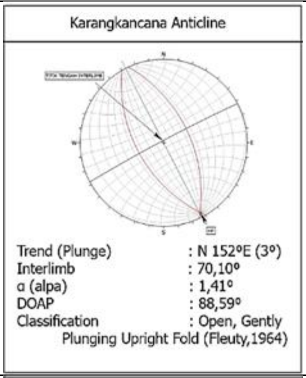
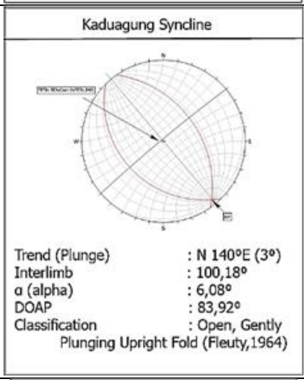
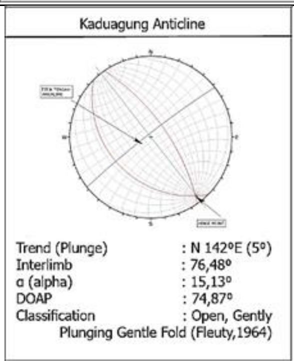
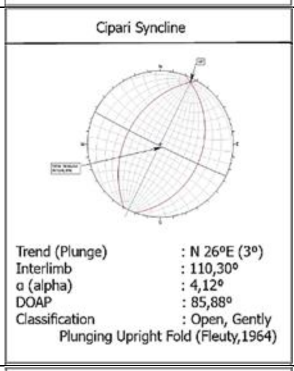
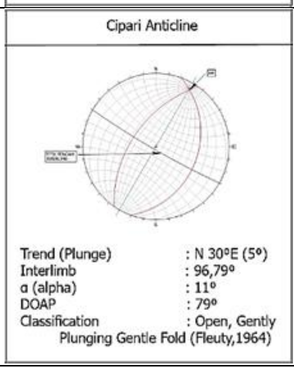
	Anticline has a trend direction of N 152o E. The south wing has a strike direction of about N 150o E and a slope angle of about 55o. The north wing has a strike direction of about N 335 o E and a layering slope of about 55o with an angle between the wings of 70.10 o, axial dip of 1.41 o and a plunge of 3o.
	Syncline has a trend direction of N 140o E. The south wing has a strike direction of about N 325o E and a slope angle of about 44o. The north wing has a strike direction of about N 135o E and a layering slope of about 35o with an angle between the wings of 100.18o, dip plane axis of 6.08o and plunge 3o.
	Anticline has a trend direction of N 142o E. The south wing has a strike direction of about N 113o E and a slope angle of about 68o. The north wing has a strike direction of about N 325o E and a layering slope of about 44o with an angle between the wings of 76.48o, dip plane of 15.13o and plunge 5o.
	Syncline has a trend direction of N 26o E. The south wing has a strike direction of around N 290o E and an angle of about 60o. The north wing has a strike direction of about N 120o E and a layering slope of about 50o with an angle between the wings of 110.30 o, axial dip of 4.12o and a plunge of 3o.
	Anticline has a trend direction of N 30o E. The south wing has a strike direction of about N 125o E and a bed slope angle of about 36o. The north wing has a strike direction of about N 290o E and a slope of about 60o with an angle between the wings of 96.79o, dip plane axis of 11o and plunge 5o.

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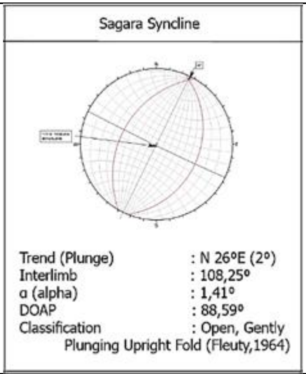
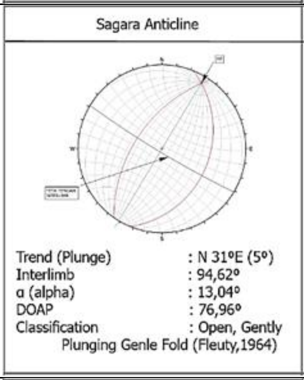
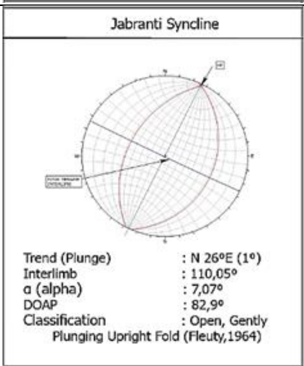
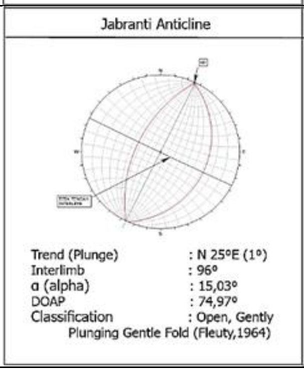
	Syncline has a trend direction of N 26o E. The south wing has a strike direction of around N 292o E and an angle of about 59o. The north wing has a strike direction of about N 120o E and a layering slope of about 50o with an angle between the wings of 108.25o, axial dip of 1.41o and a plunge of 2o.
	Anticline has a trend direction of N 31o E. The south wing has a strike direction of about N 126o E and a slope angle of about 35o. The north wing has a strike direction of about N 292o E and a layering slope of about 59o with an angle between the wings of 94.62o, axial dip of 13.04o and a plunge of 5o.
	Syncline has a trend direction of N 26o E. The south wing has a strike direction of around N 294o E and an angle of about 62o. The north wing has a strike direction of about N 118o E and a layering slope of about 48o with an angle between the wings of 110.05o, axial dip of 7.07o and a plunge of 1o.
	Anticline has a trend direction of N 25o E. The south wing has a strike direction of about N 116o E and a bed slope angle of about 34o. The north wing has a strike direction of about N 294o E and a slope of about 62o with an angle between the wings of 96o, dip plane axis of 15.03o and plunge 1o

Figure 4 The results of the stereonet plotting of the fold structure in the research area

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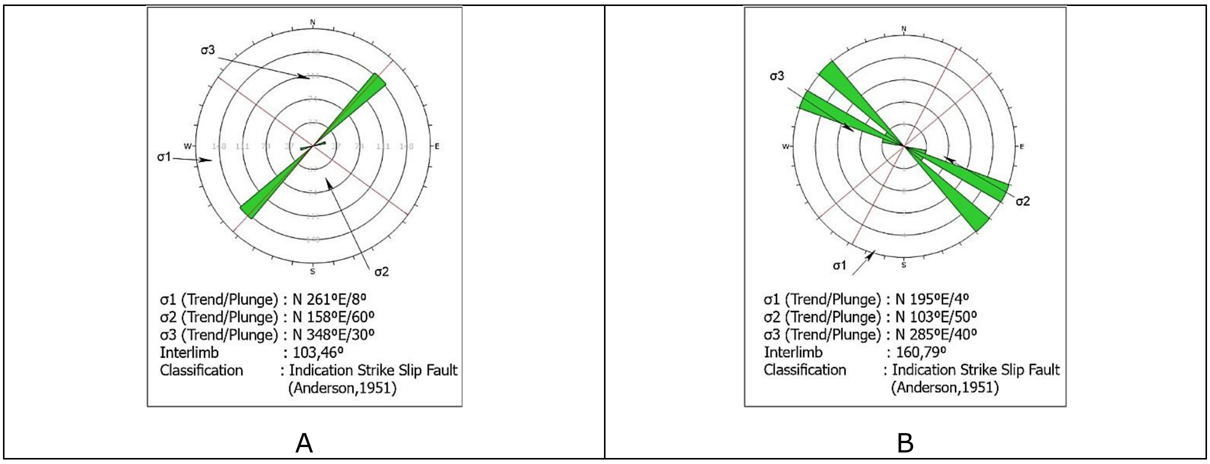

Figure 5 The results of the stereonet plotting of the fold structure in the research area

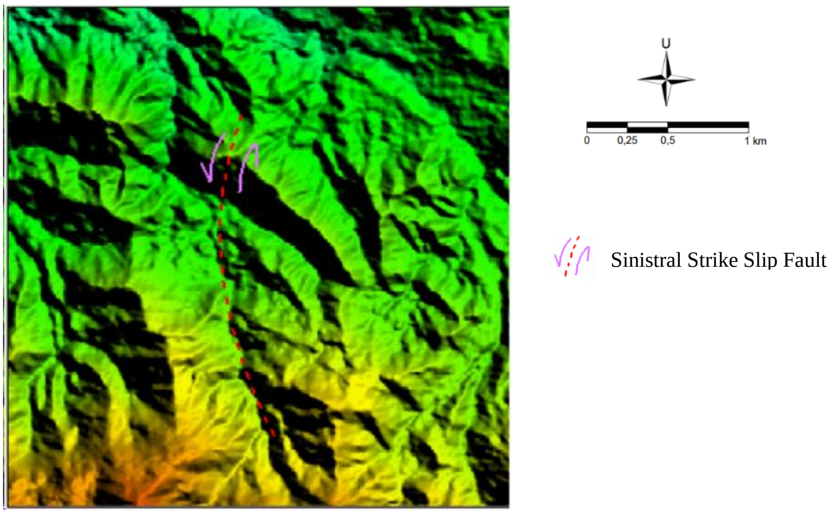

Figure 6 Analysis of the Sagara Sinistral Strike Slip Fault lineament based on DEM image data

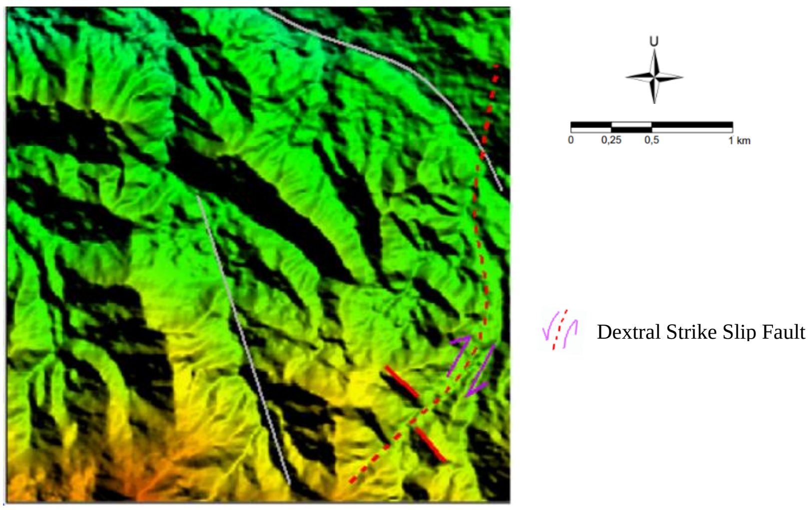

Figure 7 Analysis of the Cipari Dextral Strike Slip Fault lineament based on DEM image data

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Figure 8 (1) Outcrop of andesitic porphyry igneous intrusion (dike) in Sagara Village. (2) Contact between intrusion of andesitic porphyry igneous rock (dike) and non-carbonated sandstone layers, (3) Outcrop of andesitic porphyry igneous rock (sill) in Karangkancana Village, (4) Contact of andesitic porphyry igneous rock (sill) intrusion with alternating layers carbonate sandstones and carbonate claystones.

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