

Untitled

by Rahmat Catur Wibowo

General metrics

20,536

characters

3,183

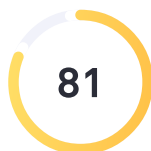
words

128

sentences

12 min 43 secreading
time**24 min 29 sec**speaking
time

Score



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Writing Issues

173

Issues left

58

Critical

115Advanced

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Writing Issues

102

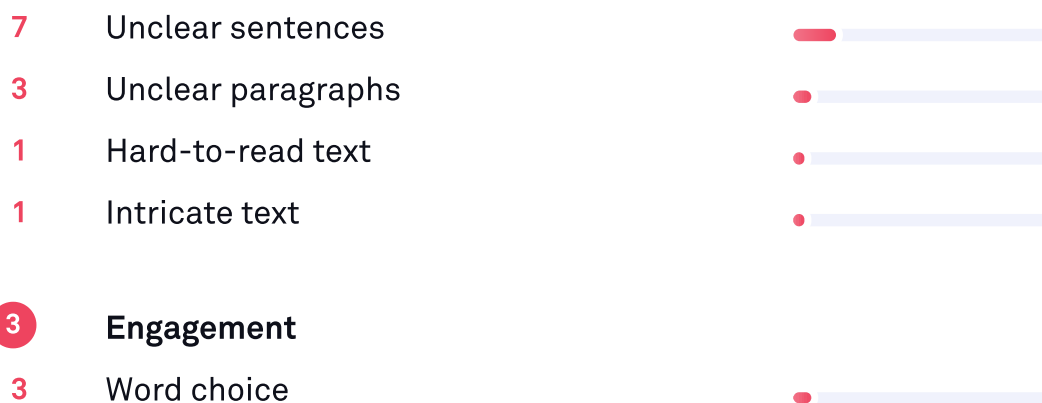
Correctness

5	Mixed dialects of english	
2	Text inconsistencies	
15	Determiner use (a/an/the/this, etc.)	
4	Conjunction use	
5	Wrong or missing prepositions	
1	Misuse of modifiers	
1	Incomplete sentences	
1	Closing punctuation	
31	Punctuation in compound/complex sentences	
2	Confused words	
11	Comma misuse within clauses	
2	Misplaced words or phrases	
3	Incorrect citation format	
7	Misspelled words	
2	Incorrect verb forms	
2	Pronoun use	
1	Unknown words	
3	Improper formatting	
1	Incorrect phrasing	
2	Misuse of semicolons, quotation marks, etc.	
1	Faulty subject-verb agreement	

68

Clarity

43	Passive voice misuse	
13	Wordy sentences	



Unique Words

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unique words

Rare Words

36%

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rare words

Word Length

3.7

Measures average word length

characters per word

Sentence Length

24.9

Measures average sentence length

words per sentence

Untitled

IDENTIFICATION OF THE ANCIENT LAKES BASED ON GRAVITY METHODS IN
BOROBUDUR TEMPLE

IDENTIFIKASI DANAU PURBA BERDASARKAN METODE GRAVITASI DI CANDI
BOROBUDUR

Nanda Ridki Permana¹, Fadhlur Rahman², Fardhan Rafshan Zani³, Dias
Shafa⁴, Dhika Faiz Fadrian^{5*}

¹PT Minelog Services Indonesia; Bumi Serpong Damai, Kawasan Industri &
Gudang Taman Tekno Blok G1 No. 10, Jl. Sektor 11, Setu, Kec. Setu, Kota
Tangerang Selatan, Banten 15220

²Indogeo Social Enterprise; Jl. Jendral Gatot Subroto, RT.1/RW.3, Gelora, Kota
Jakarta Pusat, Daerah Khusus Ibukota Jakarta, 10270

^{3,4,5}Physics Study Program, Faculty of Sciences and Technology, State Islamic
University Syarif Hidayatullah Jakarta, Ir. H. Djuanda Street No.95, Cempaka
Putih, Ciputat, South Tangerang, Banten 15412, Indonesia

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Correspondent Email:

dhikafaiz@gmail.com

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Abstract. Indonesia is a country that's well known for its heritages. one of the heritages is Borobudur Temple. Several studies say that the Borobudur was enclosed by a lake. Therefore, this study aims to see the remains of an ancient lake below the surface with gravity method. The process stage begins with obtaining the CBA (Complete Bouger Anomaly) and continues by separating the anomaly with a Bandpass Filter, and followed with 3D inverse modeling and FHD (First Horizontal Derivative) analysis. According to the residual map, there are only minor anomalies in the west, south, and east, ranging in magnitude from -0.539 to (-0.209) mGal. This anomaly is consistent with the location of the ancient lake around Borobudur. In the meantime, the 3D modeling of the FHD study reveals a geologic structure surrounding the Borobudur with an anomaly ranging from 0.00289 to 0.00480 mGal. A deposit layer thought to be an ancient lake is visible between 50 and 525 meters in depth over the east and west sides of the Borobudur temple, and beneath it is visible between 250 and 525 meters. This depth map provides additional evidence that the ancient lake beneath the Borobudur is located between 250 and 525 meters

Abstrak. *Indonesia merupakan negara yang terkenal dengan Warisan budayanya. Salah satu Warisannya ialah Candi Borobudur. Banyak Penelitian yang menyebutkan Bahwa Candi Borobudur pada awal pembangunannya dikelilingi oleh danau. Oleh karena itu, penelitian ini bertujuan untuk*

mengetahui kenampakkan dari danau purba dibawah permukaan dengan menggunakan metode gravitasi. Tahapan pengolahan data dimulai dengan mendapatkan nilai CBA (Complete Bouger Anomaly) dan dilanjutkan dengan memisahkan anomaly menggunakan Bandpass Filter, setelah itu dilakukan inverse modelling 3D dan Analisa FHD (First Horizontal Derivative). Berdasarkan Pemodelan dari Peta Residual terlihat adanya anomaly rendah dibagian barat, selatan dan timur dengan nilai anomaly berkisar $-0,539 - (-0,209)$ mGal, terlihat bahwa anomaly ini berkorelasi dengan peta sebaran Danau Purba. Sedangkan dari analisis FHD memperlihatkan adanya struktur geologi di sekitar candi Borobudur dengan nilai anomaly sekitar $0,00289 - 0,00480$ mGal. Dan pada pemodelan 3D, Peta Kedalaman saling berkorelasi dengan model 3D. Pada kedalaman $50 - 525$ m terdapat lapisan alluvial yang diduga sebagai danau purba tersebar di bagian timur, barat dan selatan candi Borobudur, dan pada kedalaman $250 - 525$ m lapisan alluvial lagi yang diduga sebagai danau purba terlihat persis di bawah candi Borobudur, peta kedalaman ini menambah bukti kuat bahwa dugaan danau purba berada di bawah Candi Borobudur memiliki kedalaman $250 - 525$ m

1. INTRODUCTION

Borobudur Temple is one of the Buddhist temples in Indonesia ¹⁵ which was built in the 8th century and has become a world heritage (UNESCO, 1991). ² The Borobudur area has enormous potential to be used as field studies, ¹⁸ both in terms of geography, ¹⁶ socio-cultural aspects of the community ¹⁷ and the physical aspects of the temple. ² Judging from the geographical aspect, ¹⁹ the Borobudur temple ²⁰ was built on Borobudur Hill, Magelang Regency, Central Java. Borobudur Temple ²¹ is thought to have ²² been built on the hills of Mount Gandul – Sipodang ²³ which is the ²⁴ peak of a tertiary-aged volcanic rock type in the

Kulonprogo Dome or the broken Menoreh Mountains (Murwanto et al., 2014).
 During the Quaternary period, several young volcanoes appeared around the part that was broken, including Mount Sumbung, Mount Merbabu and Mount Merapi. Then the broken part formed a basin between the Menoreh Mountain and the volcano known as the Ancient Borobudur Lake. Borobudur Ancient Lake is a landscape around the Borobudur temple complex which has been lost due to silting. The siltation was observed based on the material covering ancient lake deposits which were the result of volcanic activity, tectonic activity, movements due to soil and rock masses and human activities (Rosa et al., 2021).

The change in the shape of the lake and the surrounding environment into a plain is a process that takes a very long time. The main factor causing the silting of the lake is the occurrence of a very intense sedimentation process, in this case caused by volcanic activity, especially Mount Merapi (Murwanto and Purwoarminta, 2015). Records of tectonic activity found in the field indicate that the research area is controlled by geological structures. The geological structure changes the morphology and opens the way out for the pool of water in the lake. Tectonic activity also causes landslides in the Menoreh Mountains which are also triggered by rainfall and earth's gravity. The existence of geological structures will help accelerate the occurrence of rock weathering and the potential for landslides to occur (Dhani, 2015b).

Landslides originating from Menoreh are the most likely cause of the damming of the Sileng River. With the catchment area at Borobudur only about 29 square kilometers, the average flow is about 1.5 m³/s and the 100-year return flood is about 100 m³/s. The landslides that cover the Sileng River may not be able to collapse with the flow so the lake will remain. The drying of the lake was

caused⁴⁴ by the deposition of material carried by the flow from the catchment area and volcanic ash from the eruption of Merapi (Dhani, 2015a). To find out and prove this⁴⁵, the research was conducted⁴⁶ using one of the geophysical methods, namely the gravity method. The² gravity method is a geophysical method that aims to determine the state of the subsurface structure based on variations in the distribution of rock density below the earth's³ surface (Teaching et al., 2021). In² addition, the gravity method has the capability to⁴⁷ identify and determine subsurface fault structures based on variations in the distribution of subsurface density anomaly values (Al-khafaji,⁴⁸ 2016).

1. LITERATURE REVIEW

2.1. Regional Geology²

Based on Geological Map⁴⁹ (Figure 1) (Wartano and Sukandarrumidi, 1995), that⁵⁰ in the research area⁵¹ there are several types of rocks. On the map^{52,53} described^{2,54} in several colors, among other⁵⁵; cream color as alluvium rock, dark blue color as young⁵⁶ Merapi volcano deposit, light blue color as cleft volcanic rock, and maroon color as jonggrangan⁵⁷ formation. The⁵⁸ Jonggrangan Formation is composed of limestone, coral, and large forams. The² Jonggrangan Formation is early Miocene – Middle Miocene.

Some evidence of the existence⁵⁹ of ancient lakes around Borobudur is the discovery of black limestone and black silt rocks containing pollen from swamp plant species, scattered swamp gas⁶⁰ and fossils (Murwanto, 2015). In² the Borobudur area, there is the Borobudur Basin which was originally formed⁶¹ during the Pleistocene period⁶², which was⁶³ followed by a young volcanic incident that was⁶⁴ in the middle quarter - recent period^{65,66} (Murwanto, 2015).

Figure 1. Geological Map of Borobudur District²

2.2. Principle of Gravity Method

The gravity method is a method based on Newton's law which explains the attraction between two objects related to the mass of the two objects. The sound of Newton's law is as follows:

(1)

Where F is the object's weight in units (N), m_1 is the mass of the first object in units (kg), m_2 is the mass of the second object in units (kg), and r is the distance between the two masses in units (m), and G is gravitational constant with value of $6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$.

Gravitational field measurements result in a Complete Bouguer Anomaly, so to obtain gravitational data it is necessary to make corrections. Such as Bouguer correction and terrain correction. Bouguer's correction is taken into account because there is a pull effect of the mass of rocks located in the stations and datum fields assuming they have infinite radius with a thickness of h (meters) and density of ρ (g/cc) (Nafian et al., 2021). Bouguer correction value can be searched by the equation:

(2)

2.3. Inversion Modelling

The inversion method is data processing process or observation of data using techniques math problem solving and statistics to get results in the form of information that can be used to process analysis of the distribution of physical properties below the surface. In the inversion process, the analysis is carried out on the observation data by doing curve fitting between mathematical models and observational data (Melani et al., 2021).

2.4. First Horizontal Derivative (FHD)

FHD can be in the form of showing the edge of a body from the gravitational anomaly. In other words, FHD can be useful for knowing the horizontal contact contrast limit of the gravity datum obtained from the measurement (Zaenudin and Yulistina, 2018).

1. METHODS

The location of this study is in the Borobudur area and its surroundings with geographical coordinates between longitude 110.187862 to 110.238157 and latitude -7.633106 to -7.596617. This research was conducted in June 2022. The data used are GGMPlus data obtained from the Bureau Gravimetrique International website, with the amount of data we get is around 289 data (dg, geoid, dem).

Furthermore, the data is carried out Bouguer correction, free air correction, field correction to obtain complete Bouguer anomaly data. The complete Bouguer anomaly data is grid which will then be analyzed for spectrum to determine the estimated depth of the research area using Oasis Montaj software (Abrianto et al., 2021). After performing spectrum analysis, the regional and residual anomalies will then be separated using the Bandpass filter in Oasis Montaj software. Furthermore, inverse modelling and FHD analysis will be performed (First Horizontal Derivative) to obtain a subsurface structure model. In the modelling process, we look for model parameters that have an appropriate response, also approaching the truth based on observational data. In this study, inverse modelling uses ZondGM3D software to obtain a 3D model of the subsurface structure of the study area. For more details see the flow chart (Figure 2).

Figure 2. Research² Workflow

1. RESULTS AND DISCUSSION

4.1. Complete Bouguer Anomaly Analysis

In the final result of processing the gravity data in the form of a CBA map, it can be seen¹⁰¹ in the CBA figure (**Figure 3**) where the gravitational anomaly on the CBA map has anomaly values of around 94.8 – 106.1 mGal where the low anomaly has a value ranging from 94.8 – 97.6 mGal which is in the northeast of the study area where the low anomaly is associated with The Alluvial Formation (Qa) which is made up¹⁰² of silt, sand and¹⁰³ gravel (Bianco et al., 2019), where this formation is spread¹⁰⁴ around the Borobudur temple, the moderate anomaly has a value ranging from 98 – 100 mGal which is in the middle of the study area and¹⁰⁵ the high anomaly has a value ranging from 100.4 – 106.1 mGal which is in the west the power of the research area associated with volcanic activity igneous rock deposits from the Menoreh Mountains.

Figure 3. Complete² Bouguer Anomaly (CBA) Map

4.2. Residual² Map Analysis

Residual anomaly is an anomaly that arises due to shallow rocks or close to the ground surface, on¹⁰⁶ the residual anomaly map (**Figure 4**) it can be seen¹⁰⁷ that the shape of the regional anomaly map has quite varied contours because shallow rocks have various rock types or rock type heterogeneity, where this is a criterion for residual anomalies where the shallower rocks will become¹⁰⁸

heterogeneous, the residual map below has anomaly values ranging from -0.539 – 0.627 mGal.

High distribution anomalies ¹⁰⁹are almost found in the entire study area ¹¹⁰but low ¹¹¹anomalies are at the bottom of the Borobudur temple and in the eastern part of the study area with anomaly values ranging from 0.004 – 0.627 mGal ¹¹²and low anomalies ¹¹³are found in the west, south ¹¹⁴and east which are associated with the alleged presence of sedimentation and igneous rock of volcanic activity during the mountainous era which ¹¹⁵is thought to be an ancient lake under the Borobudur temple with ¹¹⁶a normal value ranging from -0.539 – (-0.209) mGal, it can ¹¹⁷be seen that the residual map ¹¹⁸is correlated with the approximate distribution map of ancient lakes.

Figure 4. ²Residual Anomaly Map

4.3. Geological ²**Structure Identification**

The identification of this geological structure aims to validate the ¹¹⁹existence ¹²⁰records of tectonic activity around the Borobudur temple ¹²¹which according to information, this tectonic activity resulted in landslides in the ¹²²Menoreh Mountain which ¹²³were also triggered by rainfall and ^{3,124}earth's gravity. ²The existence of geological structures will help accelerate the occurrence of rock weathering and the potential for landslides to occur. ²The landslides that cover the Sileng River may not be able to collapse with the flow ¹²⁵so the lake will remain. ²The ¹²⁶drying of the lake ¹²⁷was caused by the deposition of material carried by the flow from the catchment area and volcanic ash from the eruption of Merapi.

Identification of this structure ^{128,129}is done using the First Horizontal Derivative (FHD) filter, where this filter serves to see the existence of structures below the

surface by looking at the highest anomaly in the filter results, as shown in the FHD image (**Figure 5**) around the Borobudur temple there is a geological structure with anomaly values of approximately. 0.00289 – 0.00480 mGal.

4.4. 3D Inverse Modelling

This 3D modeling objective is to see the distribution of the ancient lake that is below the surface of the Borobudur. In 3D Figure below (**Figure 6**), you can see many slicing namely A – A', B – B', C – C', D – D', and E – E' that runs north-south. The results of the subsurface model show two rock compositions that are thought to be thin igneous rocks which are thought to be the result of volcanic activity as a layer of top-soil with depths ranging from surface to 100 m with contrast values. the density is around 0.02 – 0.05 mGal, then there is an alluvium layer which is thought to be an ancient ancient lake with a depth of 50 – 1100 m with a density contrast value of about -0.05 – (-0.02) mGal.

The depth on the 3D model corresponds to the depth map. This starts from 50 – 525 m, the alluvial layer which is thought to be an ancient lake is spread over the east, west and south of Borobudur temple, and at a depth of 250 – 525 m. The alluvial layer which is thought to be an ancient lake is seen just below Borobudur Temple, depth map This adds to the belief that it is suspected that the ancient lake under Borobudur Temple has a depth of 250–525 m. For more details, the depth map image can be seen below (**Figure 7**).

Figure 5. First Horizontal Derivative Map

Figure 6. 3D Inverse Modelling (a) A - A', (b) B - B', (c) C – C', (d) D – D', (e) E - E'

Figure 7. Depth Map Anomaly (a) Surface, (b) 75 m, (c) 150 m, (d) 225 m, (e) 300 m, (f) 375 m, (g) 400 m, (h) 525 m

1. CONCLUSION

Based on the results of research conducted with the gravity method in the Borobudur Temple Area, Central Java, it can be concluded¹⁵⁹ that:

- a. According to the results of the Residual Anomaly Map, it can be seen that the distribution of the ancient lakes around the Borobudur temple has low anomalies located in the west, south¹⁶⁰ and east with anomaly values ranging from -0.539 – (-0.209) mGal, it can be seen that the residual map is correlated¹⁶¹ with the distribution map of ancient lakes.
- b. Based on geological structure Identification using the First Horizontal Derivative (FHD) filter, there is a geological structure around the Borobudur temple with an anomaly value of around 0.00289 – 0.0480 mGal.
- c. In 3D modelling¹⁶² and the depth map are¹⁶³ correlated with estimates of ancient lakes around the Borobudur temple with a depth of 50 – 525 m alluvial layers with a density contrast value of around -0.05 – (-0.02) mGal¹⁶⁴ which¹⁶⁵ is suspected to be an ancient lake spread over the east, west¹⁶⁶ and south of Borobudur temple, and at a depth of 250 – 525 m an alluvial layer with a density contrast value of around -0.05 – (-0.02) mGal¹⁶⁷ which is forgotten¹⁶⁸ as an ancient lake is¹⁶⁹ seen under the Borobudur temple.

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1.	modelling → modeling	Mixed dialects of English	Correctness
2.	. Indonesia; . one; . Several; . Therefore; . The; . According; . This; . In; . A; . Judging; . During; . Then; . Borobudur; . Records; . Tectonic; . With; . Regional; . On; . Geological; . Principle; . Such; . Bouguer's; . Bouguer; . Inversion; . First; . After; . Furthermore; . For; . Research...	Text inconsistencies	Correctness
3.	that's; earth's; Newton's; object's; Bouguer's; ' ; C'; '	Text inconsistencies	Correctness
4.	the Borobudur	Determiner use (a/an/the/this, etc.)	Correctness
5.	Several studies say that the Borobudur was enclosed by a lake.	Passive voice misuse	Clarity
6.	the gravity	Determiner use (a/an/the/this, etc.)	Correctness
7.	and	Conjunction use	Correctness
8.	and followed with → followed by	Wordy sentences	Clarity
9.	with → by	Wrong or missing prepositions	Correctness
10.	deposit → deposited	Misuse of modifiers	Correctness
11.	thought to be → considered	Wordy sentences	Clarity
12.	A deposit layer thought to be an ancient lake is visible between 50 and 525 meters in depth over the east and west sides of the Borobudur temple, and beneath it is visible between 250 and 525 meters.	Incomplete sentences	Correctness
13.	is located	Passive voice misuse	Clarity
14.	meters.	Closing punctuation	Correctness
15.	, which	Punctuation in	Correctness

		compound/complex sentences	
16.	socio-cultural → sociocultural	Confused words	Correctness
17.	, and	Comma misuse within clauses	Correctness
18.	<i>The Borobudur area has enormous potential to be used as field studies, both in terms of geography, socio-cultural aspects of the community and the physical aspects of the temple.</i>	Unclear sentences	Clarity
19.	<i>Judging from the geographical aspect</i>	Misplaced words or phrases	Correctness
20.	<i>was built</i>	Passive voice misuse	Clarity
21.	<i>is thought</i>	Passive voice misuse	Clarity
22.	<i>been built</i>	Passive voice misuse	Clarity
23.	, which	Punctuation in compound/complex sentences	Correctness
24.	<i>Borobudur Temple is thought to have been built on the hills of Mount Gandul – Sipodang which is the peak of a tertiary-aged volcanic rock type in the Kulonprogo Dome or the broken Menoreh Mountains (Murwanto et al., 2014).</i>	Unclear sentences	Clarity
25.	<i>was broken</i>	Passive voice misuse	Clarity
26.	, and	Comma misuse within clauses	Correctness
27.	the Menoreh	Determiner use (a/an/the/this, etc.)	Correctness
28.	which has been	Wordy sentences	Clarity
29.	<i>been lost</i>	Passive voice misuse	Clarity

30.	, which	Punctuation in compound/complex sentences	Correctness
31.	resulted from	Wordy sentences	Clarity
32.	, and	Comma misuse within clauses	Correctness
33.	the occurrence of	Wordy sentences	Clarity
34.	case,	Comma misuse within clauses	Correctness
35.		Incorrect citation format	Correctness
36.	<i>Records of tectonic activity found in the field indicate that the research area is controlled by geological structures.</i>	Passive voice misuse	Clarity
37.	The tectonic	Determiner use (a/an/the/this, etc.)	Correctness
38.	<i>are also triggered</i>	Passive voice misuse	Clarity
39.	the earth's	Determiner use (a/an/the/this, etc.)	Correctness
40.	<i>The existence of geological structures will help accelerate the occurrence of rock weathering and the potential for landslides to occur (Dhani, 2015b).</i>	Unclear sentences	Clarity
41.	, and	Punctuation in compound/complex sentences	Correctness
42.	, so	Punctuation in compound/complex sentences	Correctness
43.	lake's drying	Wordy sentences	Clarity
44.	<i>was caused</i>	Passive voice misuse	Clarity

45.	<i>To find out and prove this</i>	Misplaced words or phrases	Correctness
46.	<i>was conducted</i>	Passive voice misuse	Clarity
47.	has the capability to → <i>can</i>	Wordy sentences	Clarity
48.	Al-khafaji → <i>Al-Khawaja</i>	Misspelled words	Correctness
49.	<i>the Geological</i>	Determiner use (a/an/the/this, etc.)	Correctness
50.		Incorrect citation format	Correctness
51.	that in	Conjunction use	Correctness
52.	<i>area,</i>	Comma misuse within clauses	Correctness
53.	<i>Based on Geological Map (Figure 1) (Wartano and Sukandarrumidi, 1995), that in the research area there are several types of rocks.</i>	Unclear sentences	Clarity
54.	On the	Wrong or missing prepositions	Correctness
55.	<i>is described</i>	Incorrect verb forms	Correctness
56.	ether → <i>others</i>	Pronoun use	Correctness
57.	<i>the young</i>	Determiner use (a/an/the/this, etc.)	Correctness
58.	<i>jonggrangan</i>	Unknown words	Correctness
59.	of the existence	Wordy sentences	Clarity
60.	<i>, and</i>	Comma misuse within clauses	Correctness
61.	originally → <i>initially</i>	Word choice	Engagement
62.	<i>was originally formed</i>	Passive voice misuse	Clarity

63.	period,	Punctuation in compound/complex sentences	Correctness
64.	which → and	Conjunction use	Correctness
65.	of - recent	Wrong or missing prepositions	Correctness
66.	the recent	Determiner use (a/an/the/this, etc.)	Correctness
67.	<i>In the Borobudur area, there is the Borobudur Basin which was originally formed during the Pleistocene period, which was followed by a young volcanic incident that was in the middle quarter - recent period (Murwanto, 2015).</i>	Unclear sentences	Clarity
68.	a method	Wordy sentences	Clarity
69.	a value, or the value	Determiner use (a/an/the/this, etc.)	Correctness
70.	data,	Punctuation in compound/complex sentences	Correctness
71.	<i>Gravitational field measurements result in a Complete Bouguer Anomaly, so to obtain gravitational data it is necessary to make corrections.</i>	Unclear sentences	Clarity
72.	<i>Gravitational field measurements result in a Complete Bouguer Anomaly, so to obtain gravitational data it is necessary to make corrections. Such as Bouguer correction and terrain correction.</i>	Unclear paragraphs	Clarity
73.	, assuming	Punctuation in compound/complex sentences	Correctness
74.	<i>Bouguer correction value can be searched by the equation:</i>	Passive voice misuse	Clarity

75.	a data	Determiner use (a/an/the/this, etc.)	Correctness
76.	, math	Punctuation in compound/complex sentences	Correctness
77.	, and	Punctuation in compound/complex sentences	Correctness
78.	be used	Passive voice misuse	Clarity
79.	is carried out	Passive voice misuse	Clarity
80.	). .	Improper formatting	Correctness
81.	useful for → helpful in, helpful for, helpful to for	Word choice	Engagement
82.		Incorrect citation format	Correctness
83.	). .	Improper formatting	Correctness
84.	, with	Punctuation in compound/complex sentences	Correctness
85.	was conducted	Passive voice misuse	Clarity
86.	Bureau → Bureau	Misspelled words	Correctness
87.	Gravimetric → Gravimetric	Misspelled words	Correctness
88.	is	Incorrect verb forms	Correctness
89.	data	Wordy sentences	Clarity
90.	is carried out	Passive voice misuse	Clarity
91.	by Bouguer	Wrong or missing prepositions	Correctness
92.	and field	Conjunction use	Correctness

93.	a grid, or the grid	Determiner use (a/an/the/this, etc.)	Correctness
94.	then	Wordy sentences	Clarity
95.	be separated	Passive voice misuse	Clarity
96.	modelling → modeling	Mixed dialects of English	Correctness
97.	be performed	Passive voice misuse	Clarity
98.	modelling → modeling	Mixed dialects of English	Correctness
99.	modelling → modeling	Mixed dialects of English	Correctness
100.	details,	Punctuation in compound/complex sentences	Correctness
101.	be seen	Passive voice misuse	Clarity
102.	is made up	Passive voice misuse	Clarity
103.	, and	Comma misuse within clauses	Correctness
104.	is spread	Passive voice misuse	Clarity
105.	, and	Punctuation in compound/complex sentences	Correctness
106.	, on → ; on, . On	Punctuation in compound/complex sentences	Correctness
107.	),	Punctuation in compound/complex sentences	Correctness
108.	be seen	Passive voice misuse	Clarity
109.	are almost found	Passive voice misuse	Clarity

110.	, but	Punctuation in compound/complex sentences	Correctness
111.	but low → . However, low	Hard-to-read text	Clarity
112.	, and	Punctuation in compound/complex sentences	Correctness
113.	are found	Passive voice misuse	Clarity
114.	, and	Comma misuse within clauses	Correctness
115.	is thought	Passive voice misuse	Clarity
116.	a normal → an average, a typical, a standard, an expected	Word choice	Engagement
117.	be seen	Passive voice misuse	Clarity
118.	is correlated	Passive voice misuse	Clarity
119.	existence → existing	Confused words	Correctness
120.	of records	Wrong or missing prepositions	Correctness
121.	which	Pronoun use	Correctness
122.	the Menoreh	Determiner use (a/an/the/this, etc.)	Correctness
123.	were also triggered	Passive voice misuse	Clarity
124.	the earth's	Determiner use (a/an/the/this, etc.)	Correctness
125.	, so	Punctuation in compound/complex sentences	Correctness

126.	lake's drying	Wordy sentences	Clarity
127.	was caused	Passive voice misuse	Clarity
128.	is done	Passive voice misuse	Clarity
129.	done → made	Incorrect phrasing	Correctness
130.	<i>This 3D modeling objective is to see the distribution of the ancient lake that is below the surface of the Borobudur.</i>	Unclear sentences	Clarity
131.	the 3D	Determiner use (a/an/the/this, etc.)	Correctness
132.	, namely	Punctuation in compound/complex sentences	Correctness
133.	↵ → ;	Misuse of semicolons, quotation marks, etc.	Correctness
134.	, D	Punctuation in compound/complex sentences	Correctness
135.	↵ → ;	Misuse of semicolons, quotation marks, etc.	Correctness
136.	, that	Punctuation in compound/complex sentences	Correctness
137.	are thought	Passive voice misuse	Clarity
138.	are thought	Passive voice misuse	Clarity
139.	the density → The density	Improper formatting	Correctness
140.	, then → ; then, , and then, . Then	Punctuation in compound/complex sentences	Correctness

141.	<i>is thought</i>	Passive voice misuse	Clarity
142.	ancient ancient	Misspelled words	Correctness
143.	ancient ancient	Wordy sentences	Clarity
144.	<i>This</i>	Intricate text	Clarity
145.	, the → ; the, . The	Punctuation in compound/complex sentences	Correctness
146.	, which	Punctuation in compound/complex sentences	Correctness
147.	<i>is thought</i>	Passive voice misuse	Clarity
148.	lake,	Punctuation in compound/complex sentences	Correctness
149.	<i>is spread</i>	Passive voice misuse	Clarity
150.	, and	Comma misuse within clauses	Correctness
151.	temple,	Punctuation in compound/complex sentences	Correctness
152.	, which	Punctuation in compound/complex sentences	Correctness
153.	<i>is thought</i>	Passive voice misuse	Clarity
154.	lake,	Punctuation in compound/complex sentences	Correctness
155.	, depth → ; depth, . Depth	Punctuation in compound/complex sentences	Correctness

156.	map.	Punctuation in compound/complex sentences	Correctness
157.	is suspected	Passive voice misuse	Clarity
158.	be seen	Passive voice misuse	Clarity
159.	be concluded	Passive voice misuse	Clarity
160.	, and	Comma misuse within clauses	Correctness
161.	is correlated	Passive voice misuse	Clarity
162.	modelling → modeling	Mixed dialects of English	Correctness
163.	are → is	Faulty subject-verb agreement	Correctness
164.	mGal → meal	Misspelled words	Correctness
165.	, which	Punctuation in compound/complex sentences	Correctness
166.	, and	Comma misuse within clauses	Correctness
167.	mGal → meal	Misspelled words	Correctness
168.	is forgotten	Passive voice misuse	Clarity
169.	is seen	Passive voice misuse	Clarity
170.	2D Forward Modeling Geothermal System Gravity Data in South Solok Region, West Sumatra. Al-Fiziya: Journal of Materials Science, Geophysics, Instrumentation and Theoretical Physics, 4(1), 36–44.	Unclear paragraphs	Clarity
171.	Two-dimensional → Two-dimensional	Misspelled words	Correctness
172.	the subsurface	Determiner use (a/an/the/this, etc.)	Correctness

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| 173. | <i>Two dimensional modeling (2D) gravity method for interpreting subsurface structure of mount Merapi. Journal of Physics: Conference Series.</i> | Unclear paragraphs | Clarity |
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