Comments on 'Volatile displacement of Meghalaya coals – A pointer to explore low sulphur coals'

by P Behera

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The paper is full of common mistakes, wrong computations and long-drawn conclusions. These are given below:

Comment 1

Page 137, right column (below the formula), %H and %C should not have been explained, as they do not appear in the formula; rather it should have been 'where H and C values are in percentages'.

Comment 2

In the formula, to calculate volatile displacement (δv) the sign should have been that of difference ($\sim$) not subtraction ($-$). In case of subtraction, many values of δv in table 2 will be negative and the figure 3 will be totally wrong, in which δv is plotted as positive.

Comment 3

Carbon limits 87–70% and hydrogen limits 2–5.8% do not represent a narrow band; rather it occupies a big rectangular area in figure 2. The explanation of the author to this aspect is not complete. The highest value of C per cent is more than 95%.

Comment 4

In methodology, the formula stated by the author ($t = R/\sqrt{1 - R^2}(\sqrt{(N-2)})$) on simplification becomes $t = R - R^2 \times \sqrt{N-2}$. This is not the correct formula to compute 't' value. The correct formula is $t = (r\sqrt{n-2})/\sqrt{1-r^2}$. Universally the correlation coefficient is denoted by 'r', while 'R' denotes coefficient of multiple correlation.

Comment 5

In methodology, the author indicates about drawing of regression curves. There is no curved line in figure 3. Drawing of regression curves is necessary to find out the best-fit line (model), which the author has not done. The author has only calculated the correlation coefficients, for which drawing of regression curves is not necessary. So the figure 3, which has occupied considerable space of the journal page, is absolutely not necessary.

Comment 6

Under Results and discussion, para 1, the author has stated about *upward increase of sulphur content*. Actually, the oldest seam (Bapung of Palaeocene age) contains 6.83% S; intermediate seams (Nangalbibra and Siju of Lower Eocene age) have 2.55% and 1.99% S respectively; youngest seams Laitryngew, Ishamati, Mawsynram, Langrin and Lumshnong contain 3.91% (not 3.22%), 3.62%, 2.46%, 1.25% (not 3.25%) and 5.23% S respectively. So the statement of the author is wrong.

Table A.

Coalfield	Ps	Ss	Os	O_2	O_2 + Ss	O_2 + Ps	O_2 + Os	Ts
Nangalbibra	0.05	0.32	2.18	12.90*	13.22*	12.95*	15.08*	2.55
Siju	0.26	0.18	1.55	13.90	14.08	14.16	15.45	1.99
Langrin	0.58	0.21	0.46	13.05	13.26	13.63	13.51	1.25*
Mawsynram	0.37	0.66	1.43	9.50	10.16	9.87	10.93	2.46
Laitryngew	0.55	0.73	2.63	8.70	9.43	9.25	11.33	3.91*
Ishamati	0.85	0.03	2.74	9.90	9.93	10.75	12.64	3.62
Bapung	1.06	0.67	5.10	10.45*	11.12*	11.51*	15.55*	6.83
Lumshnong	0.82	0.08	4.33	6.38	6.46	7.2	10.71	5.23

*The figures in table 3 of the author are wrong.

Table B.

Fig. no.	Parameters	Correlation coefficient (r)	r^2	t (calculated)	t (critical)	Inference
3(a)	C and δv	0.0497	0.0025*	0.1494*	1.833	Insignificant
3(b)	H and δv	−0.8366	0.6999*	−3.7487*	1.833	Significant*
3(c)	O_2 and δv	−0.0977	0.0095*	−0.2945*	1.833	Insignificant*
3(d)	O_2 + Ss and δv	−0.2362	0.0558*	−0.5955*	1.943	Insignificant*
3(e)	O_2 + Ps and δv	−0.2639	0.0696*	−0.6702*	1.943	Insignificant*
3(f)	O_2 + Os and δv	−0.4282	0.1833*	−1.1606*	1.943	Insignificant
3(g)	M and δv	−0.0698	0.0049*	−0.2098*	1.833	Insignificant*
3(h)	Ts and δv	−0.0648	0.0042*	−0.1590*	1.943	Insignificant

The critical values of 't' refer to 5% significance level and $(n-2)$ degrees of freedom. For C, H, O_2 and M, $n = 11$; in remaining cases $n = 8$.
*The figures in table 4 of the author are wrong.

Comment 7

In Results and discussion, para 3, page 139, right column, the author states that the sulphate sulphur content is 0.18–0.73%. The actual range is 0.08–0.73%.

Comment 8

The computed values of '$r(= R)$' and 't' shown in table 4 are based on the data given in tables 2 and 3. Table 2 shows 11 sets of values of δv, C, H and O. For Laitryngew coal seams, the proximate analysis data (Ash, M, VM) are four each while the ultimate analysis data (C, H, O) are one each. All the four values of VM (Exp) are different whereas all the VM (Cal) values are same (45.15). Working with such data does not seem proper.

Comment 9

In table 2, there are 11 values of δv, whereas in table 3, there are eight values for each of Ps, Ss, Os, O_2, etc. To work with such data the author might have averaged the δv values coalfieldwise. In the process he committed two mistakes (O_2 values of Nangalbibra and Bapung).

Comment 10

In table 2, the calculated value of VM for Nangalbibra coalfield and δv should have been 42.16 and 8.84 (by Sheler's formula) instead of 45.34 and 5.66, as calculated by the author. In table 3, 10 values (O_2, O_2 + Ss, O_2 + Ps, O_2 + Os for Nangalbibra and Bapung and Ts of Langrin and Laitryngew coalfields) are wrong. The recalculated values are given in table A (above). Working with such wrong data led to the wrong so-called regression lines and incorrect correlation coefficient (r) values. Since the results and conclusions of the paper are based on correlation coefficient (r) values, the results and conclusions are also wrong.

Comment 11

Figure numbers 3–10 shown in table 4 are wrong; they should have been 3(a)–(h).

Comment 12

The statements of the author in page 139, right column, 2nd para, "Oxygen was plotted against δv in figure 3(c) and R^2 value was 0.5263. No

specific relation was found" and in page 141, 1st para, "volatile displacement values increase with the increase of oxygen" are contradictory to each other.

Comment 13

In page 141, 1st para, the author states that "volatile displacement values increase with the increase of oxygen, oxygen plus pyritic sulphur, oxygen plus sulphate sulphur and/or moisture. This leads to the conclusion that marine environment and then recession of sea was responsible for oxidation and weathering and replacement of sulphur by oxygen, which increased the volatile displacement values". This statement is based on the data and inference given in table 4 of the paper. However, most of the data and inferences given in table 4 of the paper are wrong. The correct results and inferences obtained from the corrected values of different parameters given in tables 2 and 3 of the author are given in table B (see previous page). Excluding H *vs.* δv, which has no relevance in the present study, in no case does the volatile displacement (δv) have a significant relationship with any parameter. Thus, the above conclusion drawn by the author is completely wrong.

Comment 14

Marine recession is a spatial phenomena. This can be demonstrated by spatial analysis like trend surface analyses of coal parameters, which the author has not done. So the conclusion regarding marine recession, oxidation, weathering and replacement of sulphur by oxygen that led to increase in volatile displacement are long-drawn and not substantiated. Further, the number of data analysed are too less, one per coalfield, to arrive at a general conclusion.

Comment 15

The title of the paper is 'Volatile displacement of Meghalaya coals – A pointer to explore low sulphur coals', which means the usefulness of volatile displacement in coal exploration. Ironically, volatile displacement is not related to the sulphur content of the Meghalaya coal. So the title of the paper is highly unsuitable.

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