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General Article

AMBIGUOUS USAGE OF GEOLOGICAL TERMS

***Mohd. Sadiq and Imlishila Imchen**
Geological Survey of India, North Eastern Region, Shillong-793003
**Author for Correspondence*

ABSTRACT
Ambiguous use of geological terminology can occur in many forms – the language used to define and describe a rock, terms used to describe relevant properties of rocks for classification, informal conventions and illustration. Minor slips may occur of case sensitivities while using terms to denote stratigraphic names as well as a discrepancy between the use of geologic terms in scientific platforms and mundane language. Sometimes, misapplication and overuse of words and phrases may lead to inept handling of sentences in manuscripts by authors and may most likely lead to misinterpretation or may appear like beating about the bush. This article is about highlighting few such ambiguities that can be thought while giving a final shape to a manuscript.

Keywords: *Geological Terms, Stratigraphy, Geological Time Scale, Geoscientific Writing*

INTRODUCTION
Geologic incorrectness, although rare, are very often noticed in national and international research papers/articles or write ups. It could be seen in the form of plurals of certain geologic adjectives, such as "lithic" (lithics) and "clastic" (clastics), improper use of time words (early, late etc) and place words (upper, lower etc) (Sylvester and Costa, 1989). For example, I cannot say "the Sung Valley alkaline complex is a relatively small intrusion of Lower Cretaceous age" (note the underline words) whereas It is correct to say "Early Cretaceous age" (Melluso *et al.*, 2010; Ranjith *et al.*, 2012; Ranjith and Sadiq, 2013). Ambiguous usage of time and place words at each other's place seems to be an epidemic which has been observed in nationally and internationally published research articles, reports and communications.

Nevertheless, the usage may perfectly in order while dealing with lithostratigraphic descriptions. For instance, "lower Cretaceous formations", "upper Cretaceous strata" etc. Similarly, in the case of river terraces we know that the older terraces lie at higher elevation than the younger terraces and therefore calling an Early Pliocene terrace as Lower Pliocene, because the Early Pliocene terrace is topographically higher than a late Pliocene terrace may create great confusion (Owen, 2009). The word "middle" is as alike as two peas, as it is used in both sets of nomenclature, but to avoid this confusion "medial" is suggested as the equivalent time term (Owen, 2009).

Capitalization of Stratigraphic Names
It is observed that students and writers appear to be loose when it comes to write about formal and informal stratigraphic names and capitalization of letters. The rule is simple: "*All words in every formally named stratigraphic unit begin with capital letters except for the specific name in a biozone*" (Owen, 2009). For example, Barakar Formation, Nimbahera Limestone, Bari Shale etc and should avoid writing the above units as Barakar formation, Nimbahera limestone, Bari shale (note the underlined upper and lower case) (Khan *et al.*, 2008).

Similarly the problem of capitalization occurs while writing about geochronologic units. Most of the Periods for example Ordovician, Devonian, Triassic, Jurassic etc are formally partitioned into Early, Middle & Late, Silurian is divided into formally defined Epochs, therefore we should take care of the shadowy terms and should avoid them such as late/upper Palaeozoic and middle Cretaceous, which are informal (Owen, 2009).

Representation of Numerical Data / Age Data
A very common error noticed while we speak about length of time or an interval/duration of geologic time that does not extend to the present (Owen, 2009; Salvador, 1994) in such cases, the informal

abbreviations, yr., kyr/k.y., m.y./Myr and Gyr/b.y should be used. For example, the available age data on the Sung Valley complex obtained by various methods on different materials ranges between 90 Ma and 150 Ma (Srivastava *et al.*, 2005) and the entire Sung ultrmafic-alkaline-carbonatite complex has evolved during a time span of 60 Myr and this should not be written as "60 Ma". For example, you are given a time slot for laboratory work from 02.00 PM to 06.00 PM, but the length of time is 04 hours.

Defining a Rock

Sometimes mineralogical, chemical, or textural terms are used to define a rock type which is acceptable; for instance, biotite granite, leucogranite and porphyritic granite, but the names such as pegmatite, aplite, and tuff are incomplete and might not be ambiguous. However, these textural terms can be used to modify the rock name or like an adjective e.g. pegmatitic orthoclase granite, aplitic granite, and trachyte tuff, basaltic or andesitic tuff (Winter, 2012).

"The use of the terms structure, texture and fabric may give rise to ambiguity especially when the same words in other languages may have different meanings" (Brodie *et al.*, 2007).

"Prefix to an igneous or sedimentary rock name indicates that the rock is metamorphosed (e.g. metasandstone, meta-basalt). The prefix should be applied to a protolith name when the protolith can be fully confirmed by some means. The prefix 'meta' should never be used for a former metamorphic rock e.g. meta-hornfels is not acceptable? (Schmid, 2007). If the parent was a metamorphic rock it should be termed as 'metamorphosed eclogite' or more specifically, 'amphibolitised eclogite' etc" (Schmid, 2007).

Similarly, due to wide variety of mineral colours present in metamorphic rocks compared to igneous rocks (Schmid, 2007), the Subcommission on the Systematics of Metamorphic Rocks (SCMR) recommends that the terms leucocratic, mesocratic and melanocratic are not used to indicate the colour of metamorphic rocks (Maitre, 1989, 2002). Instead the terms such as light-, intermediate-, dark-coloured are used. However, the SCMR recommends the use of prefixes following Le Maitre (1989 & 2002) *leuco* (for rocks having less coloured minerals) and *mela* (for rock contains more coloured minerals) (Schmid, 2007; Maitre, 1989, 2002).

Similarly use of mineral prefix should also be given due care. The prefixes should be hyphenated and in order of increasing abundance (Schmid, 2007). For example, Sillimanite-quartz-biotite schist, where biotite is higher among all and sillimanite are the lowest mineral constituent in the rock. However mineral constituents whose presence is inherent in the definition of the rock that is essential constituents should not be added to the name. For example, garnet eclogite.

Misuse of Words

At places, confusing words also lead to grammatical mistakes which can be found in articles/papers pertaining to remote sensing. For example the word data (plural); we rarely see the singular datum used at all. Data is now normally used in both the singular and plural forms especially when we need to clearly distinguish the word "datum," such as a topographic datum, a geodetic datum, an age datum and a stratigraphic datum. Similarly the words "strata," "phenomena," "media," and "spectra" are plural. Imagery (noun) is a set or system of images. You could define an image as a picture, a representation or a way of seeing something. We should write "satellite imagery," or satellite images and not imageries".

Noun to Adjective

Making short forms by adding "s" to a geologic adjective is grammatically improper such as "metasediments," "intrusives" and "volcanics" although it is like watching paint dry and seems against the clock but the correct wording should be "metasedimentary rocks," "intrusive rocks" and "volcanic rocks" (Sylvester and Costa, 1989).

Ambiguous use, misuse and overuse of geologic terms and errors in a manuscript may occur by dint of aforesaid reasons therefore, while writing a manuscript we should be very careful and should not keep minor misconceptions on the back burner. Although huge literature is available on nomenclature of startigraphic units and startigraphic codes but the cumbersome and incorrect startigraphic nomenclature can be seen in recent articles which should be avoided and be taken care of by writers and reviewers. One should choose the right or most appropriate words during formulating a sentence, using scientific terms and/or discussing a concept and avoiding routine language for any confusion. There are a number of

geologic errors which arise when one mentions them in black and white in scientific write up but at the same time no one can object while giving a presentation.

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