

Fine-grained sediments: Terminology

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Fine-grained sediments are those rocks, both hard and soft, carbonate and clastic, that have a dominant grain-size in the clay or silt grades ($<63\ \mu\text{m}$). They are the most abundant sediments on the earth's surface and form between 50 and 75% of the geological column. Classifications of fine-grained sediments have been based most commonly on texture and fissility, and secondarily on mineralogy, chemical composition, colour, degree of metamorphism and depositional environment (Picard 1971). Different terminologies have, therefore, arisen but the state of confusion is less severe than that in, for example, the coarser-grained sediments that have been relatively more thoroughly studied and subdivided.

It is clearly important for improved communication within the earth sciences (for example, between sedimentologists and engineers) that a generally-accepted standard terminology is widely used. It is still appropriate for fine-grained sediments that the term should be simple and readily applied in the field. The results of more detailed laboratory or field analyses can then provide suitable descriptive modifiers to the basic terms. This is the aim of the terminology out-

lined in Table 1.

The term mudrock implies a siliciclastic composition. Other fine-grained sediments can be designated carbonate mudrocks, silica mudrocks, and so on. A similar terminology is then appropriate (e.g. carbonate siltstone, silica mudstone) but a range of other terms, such as chalk, chert, diatomite and ooze, are also widely used. Classification of these sediments is not discussed here.

The terminology presented in Table 1 is broadly in line with that proposed by many previous authors (e.g. Wentworth 1922; Ingram 1953; Dunbar & Rogers 1957; Folk 1968; Picard 1971; Weser 1974; Pettijohn 1975; Blatt *et al.* 1980). It is also commonly used by sedimentologists, marine geologists, engineers and soil scientists. Minor differences that exist between classification systems are mainly concerned with the exact percentage of sand a mud must contain before it becomes a sandy-mud, and so on. It is preferred here to keep the terms more general in application, and the textural or compositional contents as estimates.

Colour, chemical composition or genetic terms can be used as additional descriptors to the basic terms as

TABLE 1. *Mudrock terminology*

Mudrock ($>50\%$ siliciclastic, $>50\%$ less than $63\ \mu\text{m}$)			
<i>Basic terms</i>			
<i>Unlithified</i>	<i>Lithified/non-fissile</i>	<i>Lithified/fissile</i>	<i>Approx. proportions/grain-size</i>
Silt	Siltstone	Silt-shale	$>\frac{2}{3}$ silt-sized ($4\text{--}63\ \mu\text{m}$)
Mud	Mudstone	Mud-shale	silt and clay mixture ($<63\ \mu\text{m}$)
Clay	Claystone	Clay-shale	$>\frac{2}{3}$ clay-sized ($<4\ \mu\text{m}$)
<i>Metamorphic terms</i>			
Argillite	slightly metamorphosed/non-fissile		silt and clay mixture
Slate	metamorphosed/fissile		silt and clay mixture
<i>Textural descriptors</i>		<i>Approx. proportions</i>	
Silty		$>10\%$ silt-size	
Muddy		$>10\%$ silt- or clay-size (applied to non-mudrock sediments)	
Clayey		$>10\%$ clay size	
Sandy, pebbly, etc		$>10\%$ sand-size, pebble-size, etc.	
<i>Compositional descriptors</i>		<i>Approx. proportions</i>	
Calcareous		$>10\%$ CaCO_3 (foraminiferal, nannofossil, etc)	
Siliceous		$>10\%$ SiO_2 (diatomaceous, radiolarian, etc)	
Carbonaceous		$>1\%$ Organic carbon	
Pyritiferous		Commonly used for contents greater than about 1–5%	
Ferruginous			
Micaceous			
and others			

appropriate (e.g. black shale, uraniferous mudstone). These, and mineralogical terms such as chlorite-illite mudstone, are mainly applicable only after detailed laboratory investigations. Spears (1980) notes that the percentage of quartz in mudrocks is generally proportional to the grain size or siltiness. In ancient well-lithified rocks it is often simpler to estimate quartz-content than grain-size directly, particularly by laboratory methods, but the same basic terminology should still be applied. Lewan's (1979) attempt to erect a laboratory classification of very fine-grained sediments is also based on textural criteria and compositional modifiers. However, his redefinition of mudstone, shale, claystone and marlstone are not very helpful.

Pelite and lutite (pelitic and lutaceous) are synonymous with mudstone (muddy) and are not recommended. Siltite for siltstone is also a redundant term. Argillaceous sedimentary rock is more conveniently replaced by mudrock, but argillaceous as a strictly compositional term (meaning rich in clay minerals) is still useful in certain cases.

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