



TEKNIK GEOLOGI



BUKU SAKU

GEOLOGI LAPANGAN



UNIVERSITAS MULAWARMAN



1. PERALATAN KERJA LAPANGAN



Berikan *checklist* sebelum pergi ke lapangan

- | | | | |
|--------------------------|-------------------------|--------------------------|-----------------------|
| <input type="checkbox"/> | Palu geologi | <input type="checkbox"/> | Peta RBI |
| <input type="checkbox"/> | Kompas geologi | <input type="checkbox"/> | Peta Topografi |
| <input type="checkbox"/> | Kaca pembesar (lup) | <input type="checkbox"/> | Peta Geologi Regional |
| <input type="checkbox"/> | Tongkat Jacob/Meteran | <input type="checkbox"/> | GPS |
| <input type="checkbox"/> | Buku Catatan Lapangan | <input type="checkbox"/> | Komparator Butir |
| <input type="checkbox"/> | Pensil dan Alat Tulis | <input type="checkbox"/> | HCI |
| <input type="checkbox"/> | Plastik Sampel | <input type="checkbox"/> | Jas Hujan |
| <input type="checkbox"/> | Spidol <i>marker</i> | | |
| <input type="checkbox"/> | Kabel Ties / Tali Rafia | | |

**silakan tambahkan sendiri untuk melengkapi*





2. SINGKATAN TERMINOLOGI



Geological Abbreviations

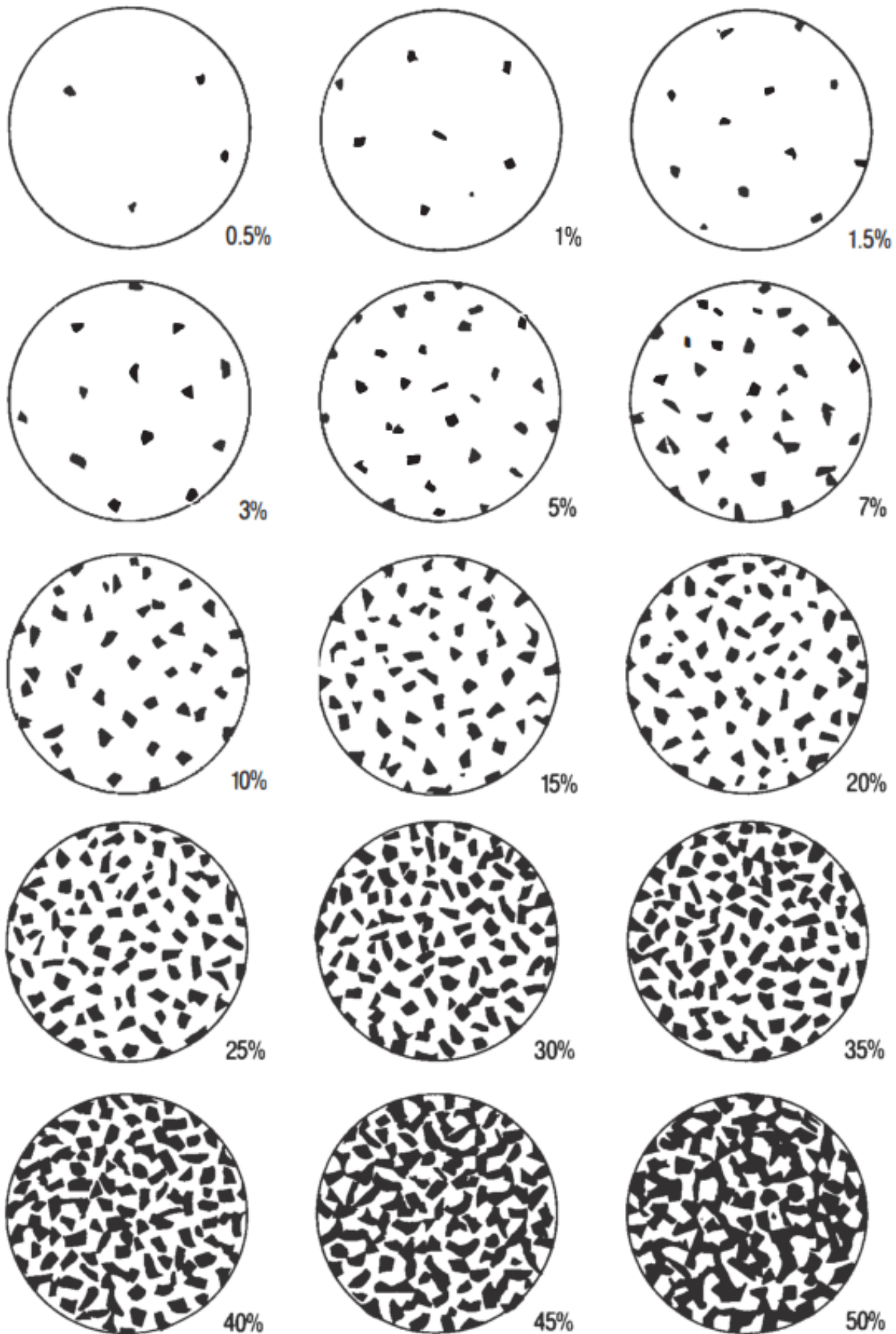
abundant	abnt	clinopyroxene	Cpx
acicular	acic	cobble	Cbl
actinolite	Act	conglomerate	Cgl
aggregate	Aggr	contact	Ctc
albite	Ab	cordierite	Cord
amorphous	amor	corundum	Cor
amount	Amt	cross-bedded	xbdd
amphibole	Amph	cross-bedding	Xbdg
amphibolite	Ampht	cross-laminated	xlam
andalusite	Andal	cross section	X sect
angle	∠	crystal	Xl
angular	ang	crystalline	xln
andesite	And	diameter	Diam
anhedral	anhed	different	diff
anhydrite	Anhy	diopside	Diop
approximate	approx	disseminated	dissem
arenaceous	aren	dolomite	Dol
argillaceous	arg	dolomitic	dol
argillite	Arg	elevation	Elev
arkosic	ark	equivalent	equiv
arsenopyrite	Ars	evaporite	Evap
asphaltic	asph	exposure	Exp
average	Ave	feldspathic	feld
bedded	bdd	foliated	fol
bedding	Bdng	foliation	Fol
bentonite	Bent	foraminifer	Foram
biotite	Bio	formation	Fm
bituminous	bit	fragmental	frag
boulder	Bldr	glauconite	Glauct
brachiopod	Brach	granite	Gr
breccia	Bx	granodiorite	Grd
calcareous	calc	granular	gran
carbonaceous	carb	graptolite	Grap
cavernous	cav	graywacke	Gwke
cement	Cmt	greenstone	Grnst
chalcedony	Chal	gypsiferous	gyp
chalcopyrite	Cp	hematitic	hem
chlorite	Chl	horizontal	horiz
claystone	Clst	hornblende	Hbl
cleavage	Clv	hornfels	Hfls



3. DIAGRAM PRESENTASI



untuk estimasi komposisi berdasarkan volume





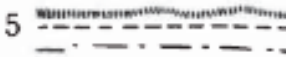




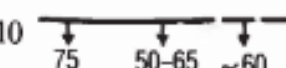

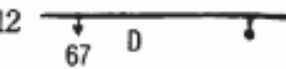
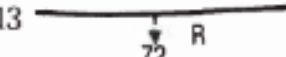





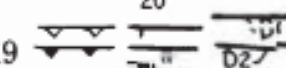
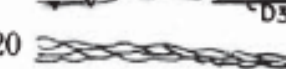

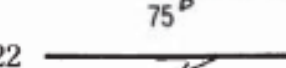
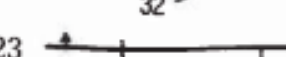





4. SIMBOLISASI PETA GEOLOGI



dan keterangan penggunaannya

- 1  Contact, showing dip where trace is horizontal, and strike and dip where trace is inclined
- 2  Contact, located approximately (give limits)
- 3  Contact, located very approximately, or conjectural
- 4  Contact, concealed beneath mapped units
- 5  Contact, gradational (optional symbols)
- 6  Fault, nonspecific, well located (optional symbols)
- 7  Fault, nonspecific, located approximately
- 8  Fault, nonspecific, assumed (existence uncertain)
- 9  Fault, concealed beneath mapped units
- 10  Fault, high-angle, showing dip (left) and approximate dips
- 11  Fault, low-angle, showing approximate dip and strike and dip
- 12  Fault, high-angle normal (D or ball and bar on downthrown side)
- 13  Fault, reverse (R on upthrown side)
- 14  Fault, high-angle strike-slip (example is left lateral)
- 15  Fault, thrust (T on overthrust side)
- 16  Fault, low-angle normal or detachment (D on downthrown side)
- 17  Fault, low-angle strike-slip (example is right lateral)
- 18  Fault, low-angle, overturned (teeth in direction of dip)
- 19  Optional sets of symbols for different age-groups of faults
- 20  Fault zone or shear zone, width to scale (dip and other accessory symbols may be added)
- 21  Faults with arrows showing plunge of rolls, grooves or slickensides
- 22  Fault showing bearing and plunge of net slip
- 23  Point of inflection (bar) on a high-angle fault
- 24  Points of inflection on a strike-slip fault passing into a thrust



4. SIMBOLISASI PETA GEOLOGI



dan keterangan penggunaannya

25		Fault intruded by a dike
26		Faults associated with veins
27		Anticline, showing trace and plunge of hinge or crest line (specify)
28		Syncline (as above), showing dip of axial surface or trough surface
29		Folds (as above), located approximately
30		Folds, conjectural
31		Folds beneath mapped units
32		Asymmetric folds with steeper limbs dipping north (optional symbols)
33		Anticline (top) and syncline, overturned
34		Antiformal (inverted) syncline
35		Synformal (inverted) anticline
36		Antiform (top) and synform (stratigraphic sequence unknown)
37		Separate dome (left) and basin
38		Culmination (left) and depression
39		Small anticline and syncline, showing shapes in horizontal section
40		Vertically plunging anticline and syncline
41		Monocline, south-facing, showing traces of axial surfaces
42		Steeply plunging monocline or flexure, showing trace in horizontal section and plunge of hinges
43		Plunge of hinge lines of small folds, showing shapes in horizontal section
44		Strike and dip of beds or bedding
45		Strike and dip of overturned beds
46		Strike and dip of beds where stratigraphic tops are known from primary features
47		Strike and dip of vertical beds or bedding (dot is on side known to be stratigraphically the top)
48		Horizontal beds or bedding (as above)



4. SIMBOLISASI PETA GEOLOGI



dan keterangan penggunaannya

49		Approximate (typically estimated) strike and dip of beds
50		Strike of beds exact but dip approximate
51		Trace of single bed, showing dip where trace is horizontal and where it is inclined
52		Strike and dip of foliation (optional symbols)
53		Strike of vertical foliation
54		Horizontal foliation
55		Strike and dip of bedding and parallel foliation
56		Strike and dip of joints (left) and dikes (optional symbols)
57		Vertical joints (left) and dikes
58		Horizontal joints (left) and dikes
59		Strike and dip of veins (optional symbols)
60		Vertical veins
61		Horizontal veins
62		Bearing (trend) and plunge of lineation
63		Vertical and horizontal lineations
64		Bearing and plunge of cleavage-bedding intersection
65		Bearing and plunge of cleavage-cleavage intersections
66		Bearings of pebble, mineral, etc. lineations
67		Bearing of lineations in plane of foliation
68		Horizontal lineation in plane of foliation
69		Vertical lineation in plane of vertical foliation
70		Bearing of current from primary features; from upper left: general; from cross-bedding; from flute casts; from imbrication



4. SIMBOLISASI PETA GEOLOGI



dan keterangan penggunaannya

71		Bearing of wind direction from dune forms (left) and cross-bedding
72		Bearing of ice flow from striations (left) and orientation of striations
73		Bearing of ice flow from drumlins
74		Bearing of ice flow from crag and tail forms
75		Spring
76		Thermal spring
77		Mineral spring
78		Asphaltic deposit
79	BIT	Bituminous deposit
80		Sand, gravel, clay, or placer pit
81		Mine, quarry, or open pit
82		Shafts: vertical, inclined, and abandoned
83		Adit, open (left) and inaccessible
84		Trench (left) and prospect
85		Water wells: flowing, nonflowing, and dry
86		Oil well (left) and gas well
87		Well drilled for oil or gas, dry
88		Wells with shows of oil (left) and gas
89		Oil or gas well, abandoned (left) and shut in
90		Drilling well or well location
91		Glory hole, open pit, or quarry, to scale
92		Dump or fill, to scale



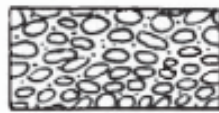
5. LITHOLOGIC PATTERN



untuk pembuatan kolom stratigrafi dan penampang melintang



1. Breccia



2. Clast-supported conglomerate



3. Matrix-supported conglomerate



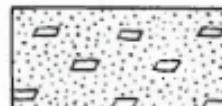
4. Conglomeratic sandstone



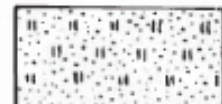
5. Coarse sandstone



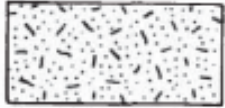
6. Fine sandstone



7. Feldspathic sandstone



8. Tuffaceous sandstone



9. Graywacke



10. Cross-bedded sandstone



11. Bedded sandstone



12. Calcite-cemented sandstone



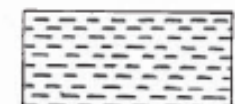
13. Dolomite-cemented sandstone



14. Silty sandstone



15. Siltstone



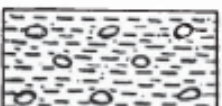
16. Mudstone



17. Shale



18. Coal bed with carbonaceous shale



19. Pebbly mudstone



20. Calcareous shale



21. Limestone



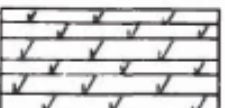
22. Cross-bedded limestone



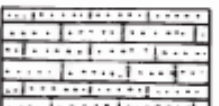
23. Dolomite (dolostone)



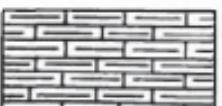
24. Dolomitic limestone



25. Calcitic dolomite



26. Sandy limestone



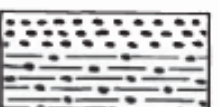
27. Clayey limestone



28. Cherty limestone



29. Bedded chert



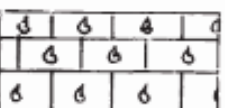
30. Phosphorite, phosphatic shale



31. Chalk



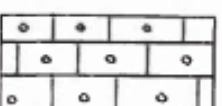
32. Marl



33. Fossiliferous limestone



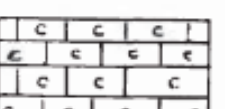
34. Oolitic limestone



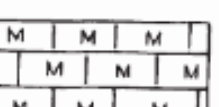
35. Pelletal limestone



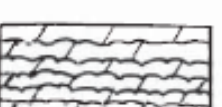
36. Intraclastic limestone



37. Crystalline limestone



38. Micritic limestone



39. Algal dolomite



40. Limestone conglomerate



5. LITHOLOGIC PATTERN



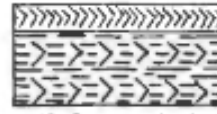
untuk pembuatan kolom stratigrafi dan penampang melintang



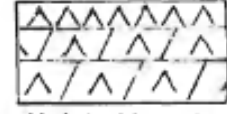
41. Limestone breccia



42. Algal dolomite breccia



43. Gypsum bed, gypsiferous shale



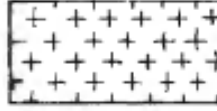
44. Anhydrite, anhydritic dolomite



45. Rock salt, salty mudstone



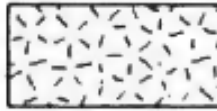
46. Peridotite



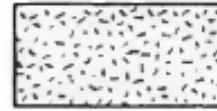
47. Gabbro



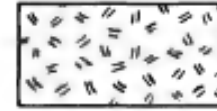
48. Mafic plutonic rock



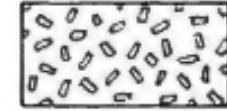
49. Coarse granitic rock



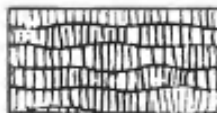
50. Fine granitic rock



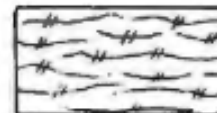
51. Porphyritic plutonic rock



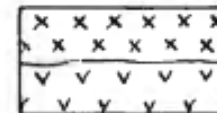
52. Porphyritic plutonic rock



53. Mafic lava



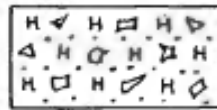
54. Silicic lava



55. Intrusive volcanic rocks



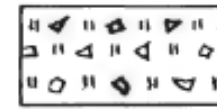
56. Pillow lava



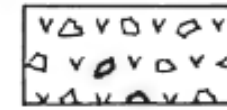
57. Hyaloclastite



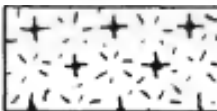
58. Tuff



59. Tuff-breccia



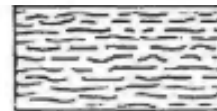
60. Volcanic breccia



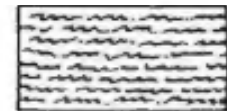
61. Massive serpentinite



62. Foliated serpentinite



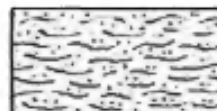
63. Schist



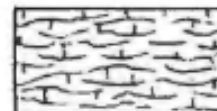
64. Crenulated schist



65. Folded schist



66. Semischistose sandstone



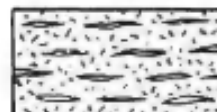
67. Semischistose limestone



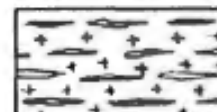
68. Semischistose gabbro



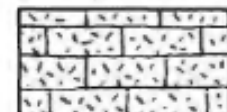
69. Greenstone



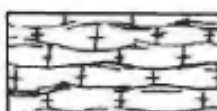
70. Silicic gneiss



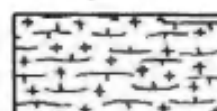
71. Mafic gneiss



72. Marble



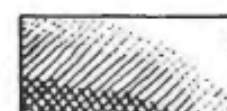
73. Foliated marble



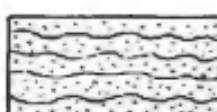
74. Foliated calc-silicate rock



75. Massive skarn



76. Alteration zones



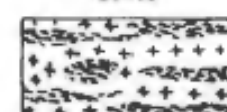
77. Quartzite



78. Quartzite



79. Silicic migmatite



80. Mafic migmatite



6. SIMBOL FOSIL DAN STRUKTUR



untuk pembuatan kolom stratigrafi dan catatan lapangan

	Algae		Tree trunk fallen
	Algal mats		Trilobites
	Ammonites		Vertebrates
	Belemnites		Wood
	Brachiopods		Beds distinct
	Bryozoans		Beds obscure
	Corals, solitary		Unbedded
	Corals, colonial		Graded beds
	Crinoids		Planar cross-bedding
	Echinoderms		Trough cross-bedding
	Echinoids		Ripple structures
	Fish bones		Cut and fill
	Fish scales		Load casts
	Foraminifers, general		Scour casts
	Foraminifers, large		Convolution
	Fossils		Slumped beds
	Fossils abundant		Paleosol
	Fossils sparse		Mud cracks
	Gastropods		Salt molds
	Graptolites		Burrows
	Leaves		Pellets
	Ostracodes		Oolites
	Pelecypods		Pisolites
	Root molds		Intraclasts
	Spicules		Stylolite
	Stromatolites		Concretion
	Tree trunk in place		Calcitic concretion



7. SKALA WAKTU GEOLOGI



PHANEROZOIC CHRONOSTRATIGRAPHIC CHART

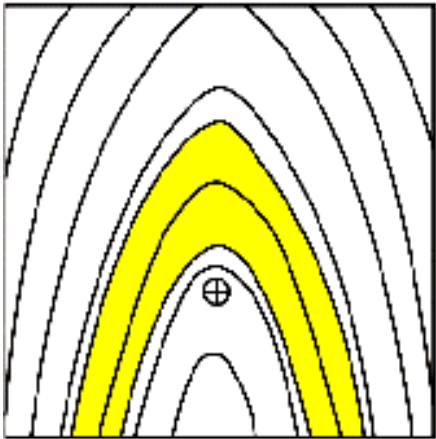
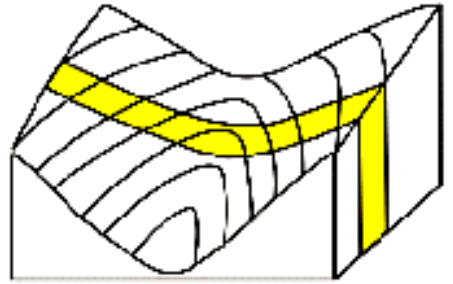
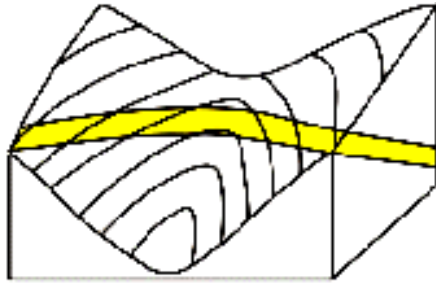
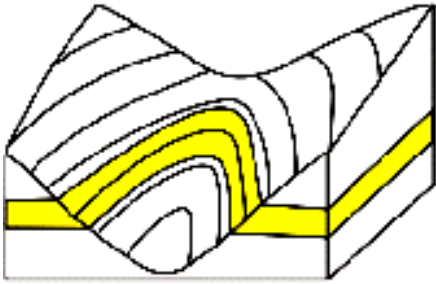
		Eonothem / Eon Erathem / Era System / Period	Series / Epoch	Stage / Age	CSSP	numerical age (Ma)	
Phanerozoic	Cenozoic	Quaternary	Holocene	Meghalayan	present	0.0042	
				Northgrippian	0.0082	0.0117	
				Greenlandian	0.129	0.129	
			Pleistocene	Chibanian	0.774	0.774	
				Calabrian	1.80	1.80	
				Gelasian	2.58	2.58	
			Pliocene	Piacenzian	3.600	3.600	
				Zanclean	5.333	5.333	
			Neogene	Miocene	Messinian	7.246	7.246
					Tortonian	11.63	11.63
					Serravallian	13.82	13.82
					Langhian	15.97	15.97
					Burdigalian	20.44	20.44
					Aquitanian	23.03	23.03
		Paleogene	Oligocene	Chattian	27.82	27.82	
				Rupelian	33.9	33.9	
			Eocene	Priabonian	37.71	37.71	
				Bartonian	41.2	41.2	
		Lutetian		47.8	47.8		
		Paleocene	Eocene	Ypresian	56.0	56.0	
					Thanetian	59.2	59.2
					Selandian	61.6	61.6
					Danian	66.0	66.0
	Mesozoic	Cretaceous	Upper	Maastrichtian	72.1 ± 0.2	72.1 ± 0.2	
					Campanian	83.6 ± 0.2	83.6 ± 0.2
					Santonian	86.3 ± 0.5	86.3 ± 0.5
					Coniacian	89.8 ± 0.3	89.8 ± 0.3
					Turonian	93.9	93.9
				Cenomanian	100.5	100.5	
					Albian	~ 113.0	~ 113.0
Lower				Aptian	~ 125.0	~ 125.0	
				Barremian	~ 129.4	~ 129.4	
				Hauterivian	~ 132.6	~ 132.6	
				Valanginian	~ 139.8	~ 139.8	
				Berriasian	~ 145.0	~ 145.0	



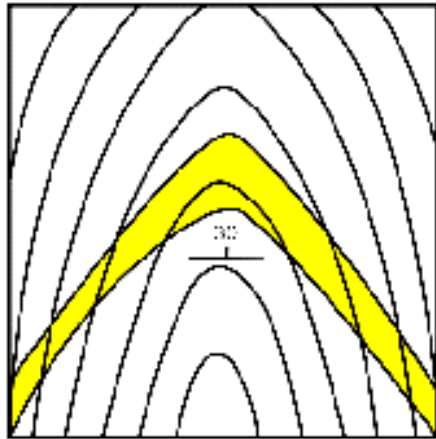
8. KAIDAH HUKUM V



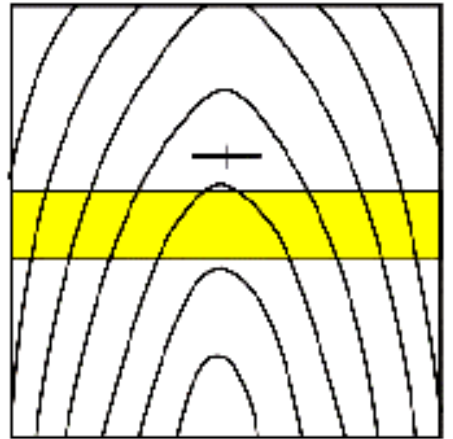
Konsep Dasar



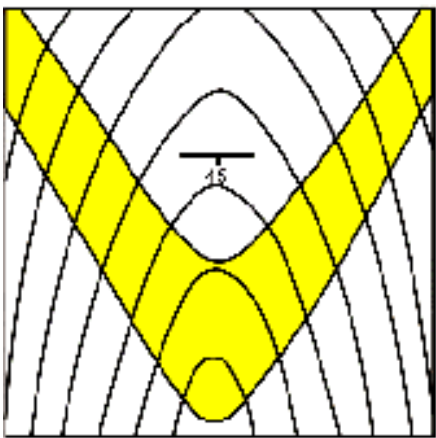
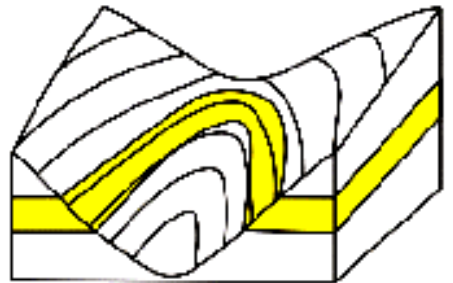
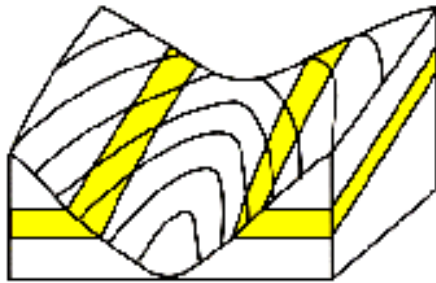
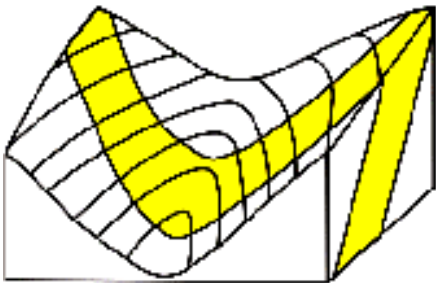
A.



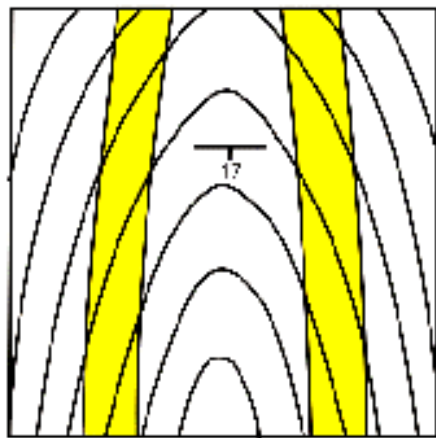
B.



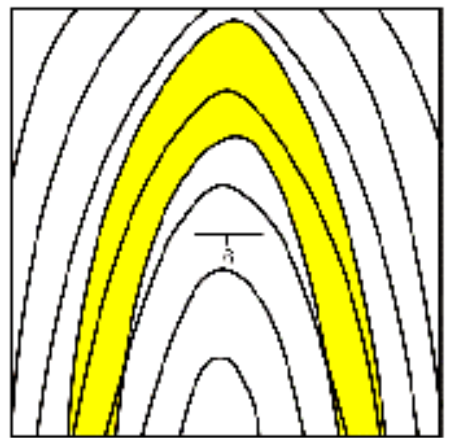
C.



D.



E.



F.



8. KAIDAH HUKUM V



Konsep Dasar

Hukum V adalah hukum yang menjelaskan mengenai hubungan kedudukan perlapisan batuan dengan bentuk topografi berelief. Hal ini akan berpengaruh saat geologis bermaksud mendelineasi *cropline*/pola pelamparan singkapan pada peta geologi. Terdapat beberapa aturan-aturan dalam hukum V yaitu sebagai berikut :

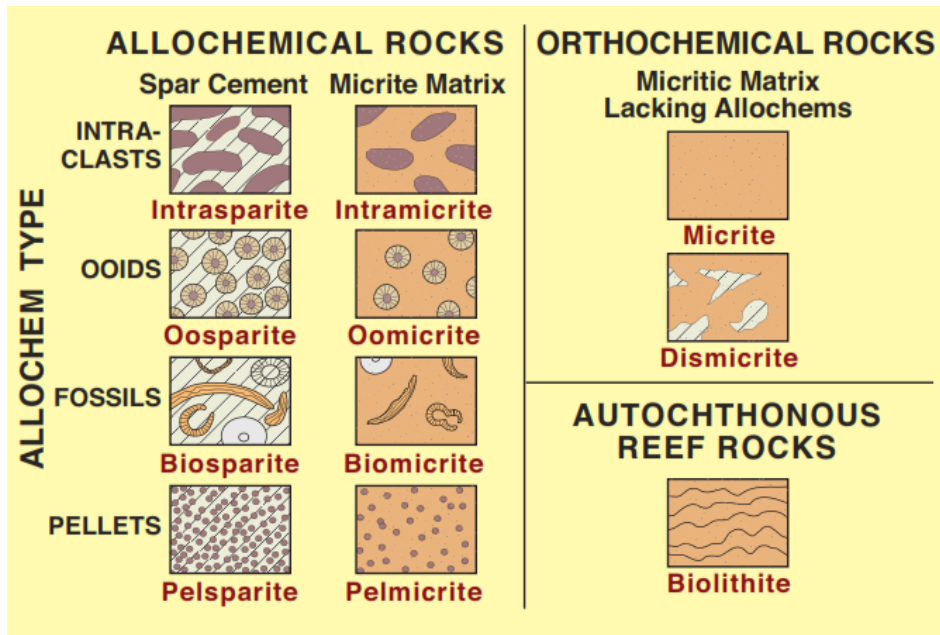
- A.** Perlapisan batuan yang memiliki **dip 0°/horizontal** akan berpengaruh pada penarikan pola singkapan yang mengikuti pola garis kontur.
- B.** Perlapisan batuan yang memiliki kemiringan yang **berlawanan** dengan arah kemiringan lereng maka kenampakan lapisan akan memotong lembah dengan pola singkapan membentuk huruf "V" yang berlawanan dengan arah kemiringan lembah. Pastikan besarnya sudut mengikuti dip yang terukur
- C.** Pada perlapisan batuan yang memiliki **dip 90°/tegak** akan membentuk pola singkapan berupa garis lurus dimana pola singkapan ini tidak dipengaruhi oleh keadaan topografi.
- D.** Pada perlapisan batuan yang miring **searah** dengan arah kemiringan lereng yang memiliki kemiringan lapisan lebih besar daripada kemiringan lereng akan membentuk pola singkapan dengan huruf "V" mengarah sama (searah) dengan arah kemiringan lereng.
- E.** Perlapisan batuan yang memiliki kemiringan yang **searah** dengan kemiringan lereng dimana besar kemiringan lapisan **lebih kecil** dari kemiringan lereng , maka pola singkapannya akan membentuk huruf "V" yang berlawanan dengan arah kemiringan topografi/lembah.
- F.** Lapisan yang memiliki kemiringan **searah** dengan kemiringan lembah/topografi dan besarnya kemiringan lapisan **hampir sama** dengan kemiringan lereng/lembah maka pola singkapan tampak memotong kontur dengan arah yang cukup landai.



9. KLASIFIKASI BATUAN KARBONAT



Folk (1962)



Percent allochems	> 2/3 LIME MUD MATRIX				SUBEQUAL SPAR and LIME MUD	> 2/3 LIME SPAR CEMENT		
	0-1%	1-10%	10-50%	> 50%		SORTING POOR	SORTING GOOD	ROUNDED and ABRADED
Textural name	MICRITE and DIS-MICRITE	FOSSIL-FEROUS MICRITE	SPARSE BIO-MICRITE	PACKED BIO-MICRITE	POORLY-WASHED BIO-SPARITE	UN-SORTED BIO-SPARITE	SORTED BIO-SPARITE	ROUNDED BIO-SPARITE
Typical fabric								
Terri-genous analogs	Claystone		Sandy clay-stone	Clayey or immature sandstone	Sub-mature sand-stone	Mature sand-stone	Super-mature sand-stone	

	Transported Constituents	Authigenic Constituents	
64 mm	Very coarse calcirudite	Extremely coarsely crystalline	4 mm
16 mm	Coarse calcirudite		
4 mm	Medium calcirudite	Very coarsely crystalline	1 mm
1 mm	Fine calcirudite		
0.5 mm	Coarse calcarenite	Coarsely crystalline	0.25 mm
0.25 mm	Medium calcarenite		
0.125 mm	Fine calcarenite	Medium crystalline	0.062 mm
0.062 mm	Very fine calcarenite		
0.031 mm	Coarse calcilutite	Finely crystalline	0.016 mm
0.016 mm	Medium calcilutite		
0.008 mm	Fine calcilutite	Very finely crystalline	0.004 mm
	Very fine calcilutite		
		Aphanocrystalline	



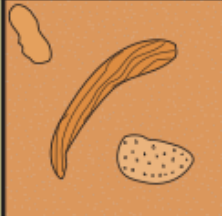

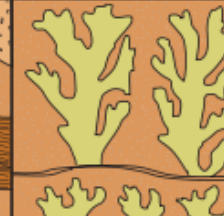
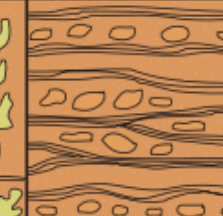

9. KLASIFIKASI BATUAN KARBONAT



Dunham (1962)

DEPOSITIONAL TEXTURE RECOGNIZABLE				DEPOSITIONAL TEXTURE NOT RECOGNIZABLE	
Original Components Not Bound Together During Deposition			Lacks mud and is grain-supported	Original Components Bound Together During Deposition	Crystalline carbonate (Subdivisions based on texture or diagenesis)
Contains mud		Grain-supported			
Mud-supported					
< 10% grains					
Mudstone	Wackestone	Packstone	Grainstone	Boundstone	

Embry & Klovan (1962)

Original Components Not Organically Bound During Deposition		Original Components Organically Bound During Deposition		
> 10% grains >2 mm		Organisms acted as baffles	Organisms encrusted and bound	Organisms built a rigid framework
Matrix-supported	Supported by components larger than 2 mm			
Floatstone	Rudstone	Bafflestone	Bindstone	Framestone
				

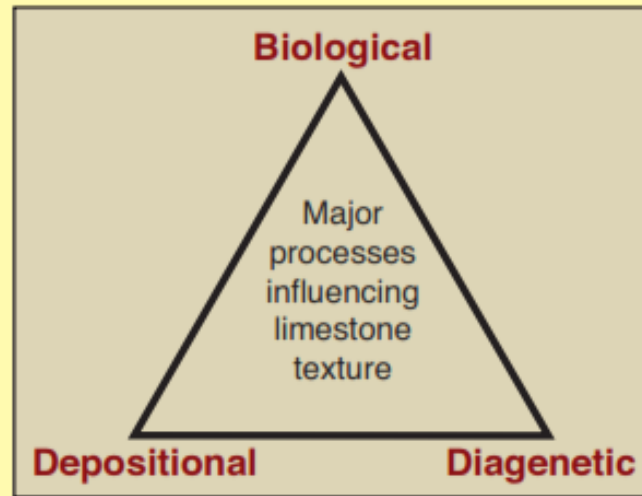


9. KLASIFIKASI BATUAN



Wright (1992)

DEPOSITIONAL				BIOLOGICAL			DIAGENETIC			
Matrix-supported (clay & silt grade)		Grain-supported		In-situ organisms			Non-obliterative			Obliterative
< 10% grains	> 10% grains	with matrix	no matrix	Encrusting binding organisms	Organisms acted to baffle	Rigid organisms dominant	Main component is cement	Many micro-stylolitic grain contacts	Mostly micro-stylolitic grain contacts	Crystals > 10 μm
Calci-mudstone	Wacke-stone	Pack-stone	Grain-stone	Bound-stone	Baffle-stone	Frame-stone	Cement-stone	Condensed grainstone	Fitted grainstone	Spar-stone
	Float-stone		Rud-stone							Crystals < 10 μm
	Grains > 2mm									Microspar-stone

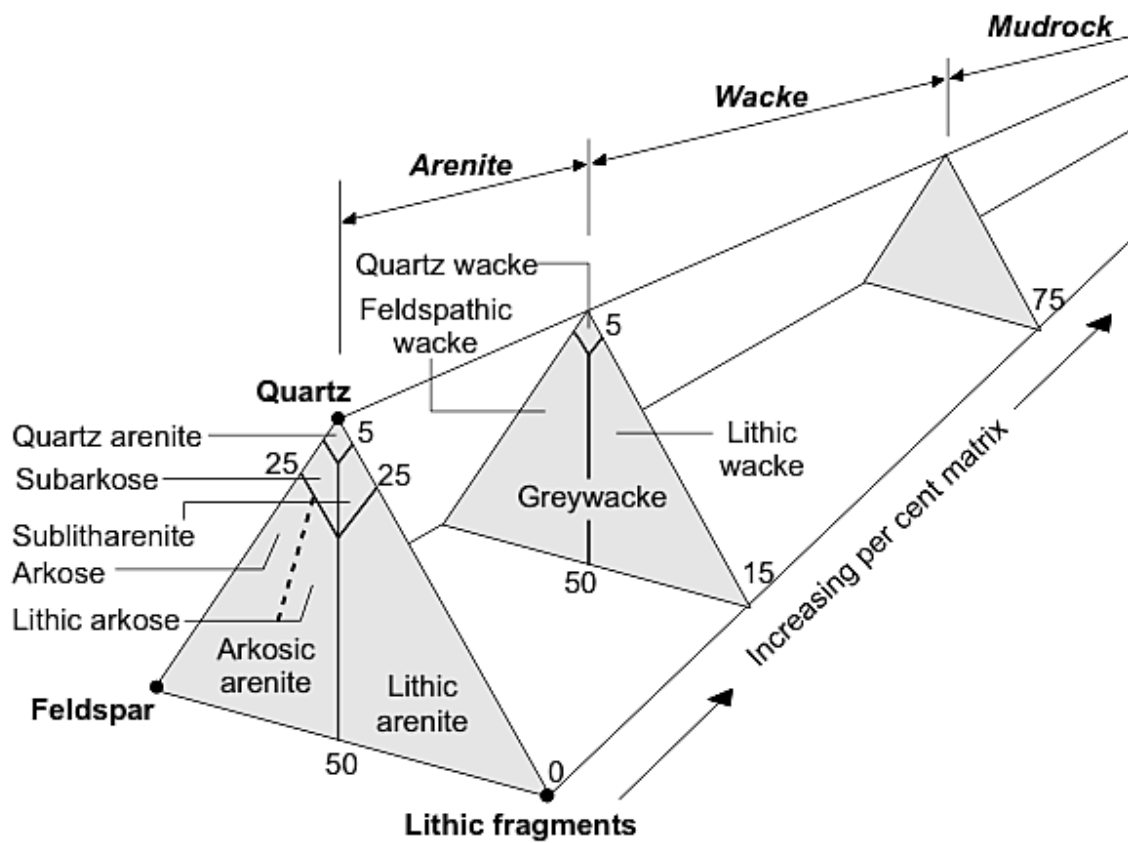




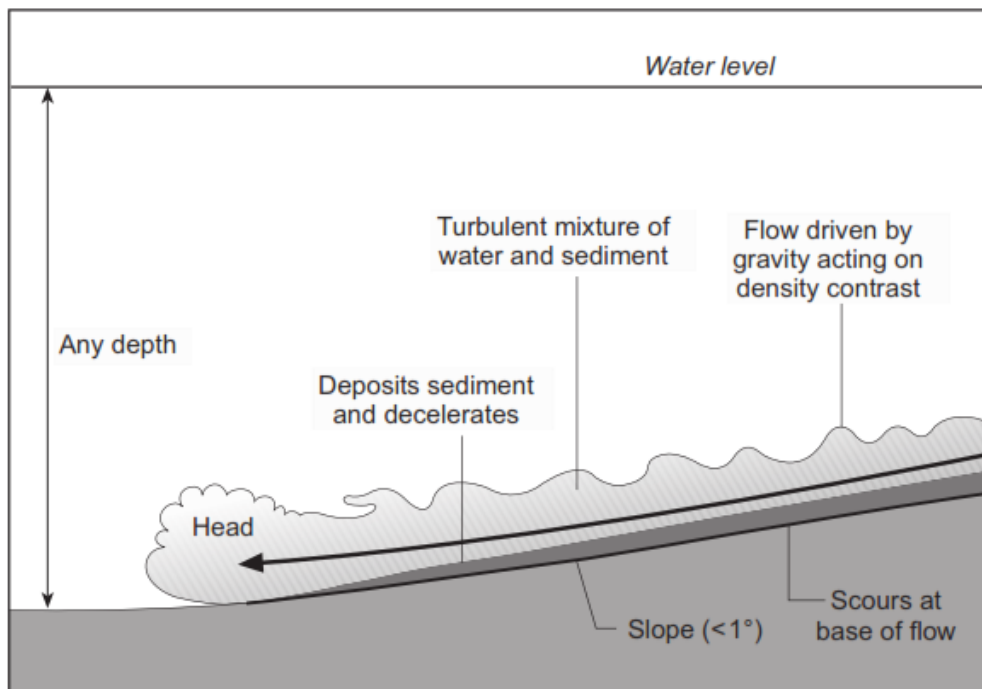
10. KLASIFIKASI BATUAN SILISIKLASTIK



Pettijohn (1975)



Bouma Sequence



Low density turbidite						
Scale	Lithology	Lithology			Structures etc	Notes
		MUD -clay -silt	SAND -vf -m -c -vc	GRAVEL -gran -pebb -cobb -boul		
10s cm						'e' - hemipelagic mud
						'd' - laminated silt
						'c' - cross-laminated, lower flow regime ripples
						'b' - laminated sand, upper flow regime plane beds
						'a' - massive, rapid deposition (upper flow regime)
						Scoured base

High density turbidite						
Scale	Lithology	Lithology			Structures etc	Notes
		MUD -clay -silt	SAND -vf -m -c -vc	GRAVEL -gran -pebb -cobb -boul		
10s cm						water escape structures
						laminated
						structureless
						inverse grading

Fig. 4.29 The 'Bouma sequence' in a turbidite deposit.



Bouma Sequence

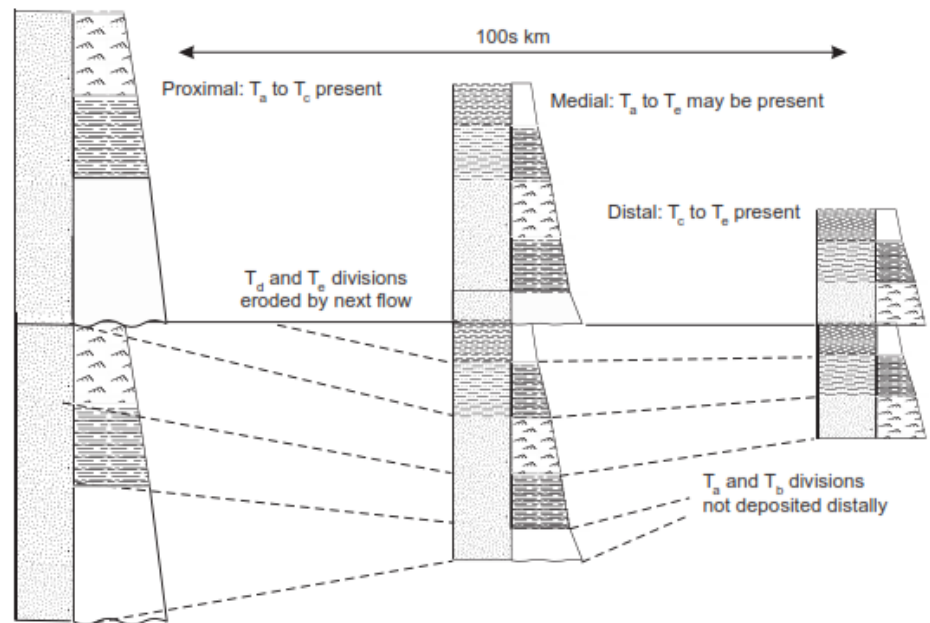


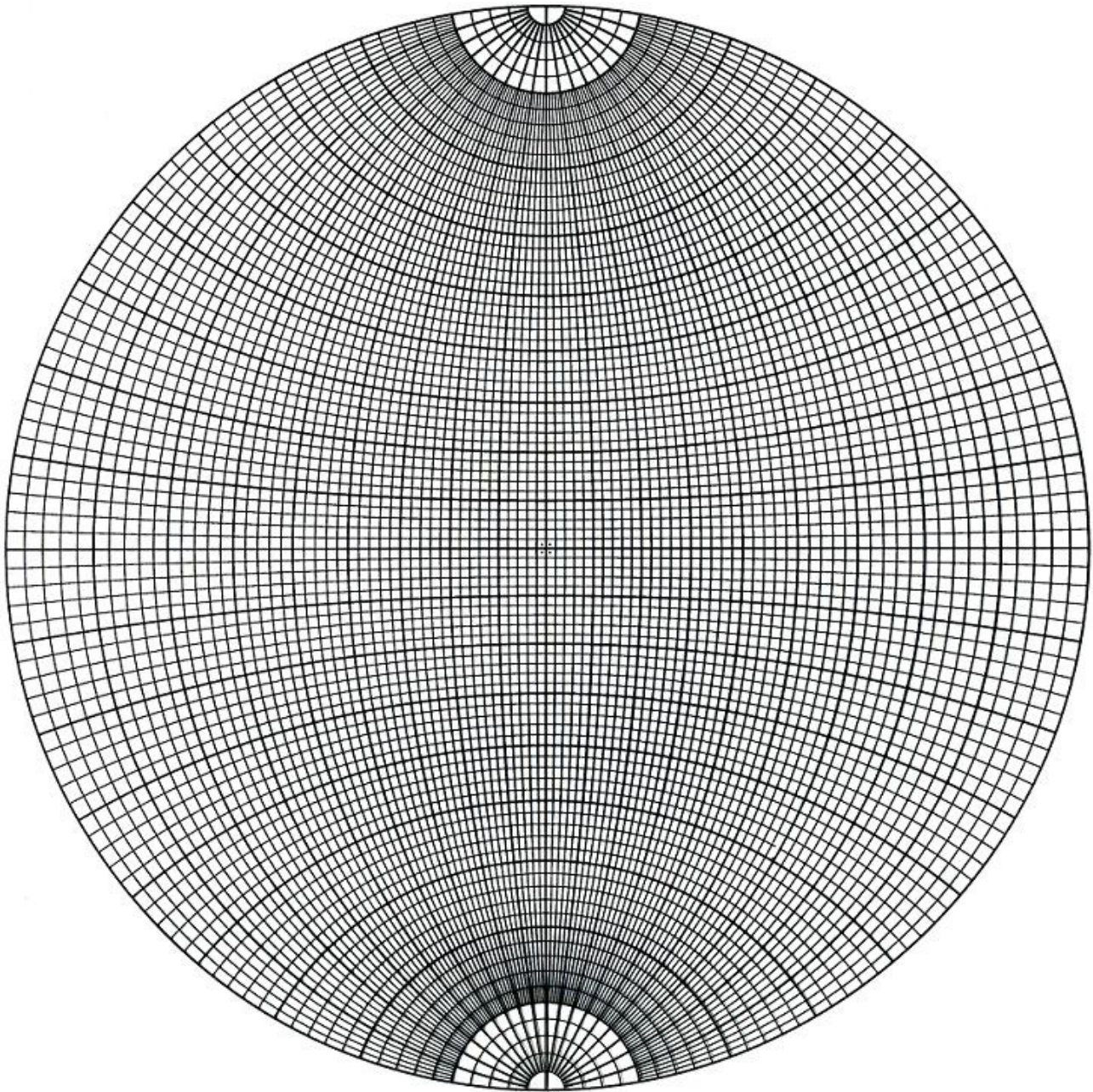
Fig. 4.30 Proximal to distal changes in the deposits formed by turbidity currents. The lower, coarser parts of the Bouma sequence are only deposited in the more proximal regions where the flow also has a greater tendency to scour into the underlying beds.



11. ANALISIS STEREO NET



WULFF NET

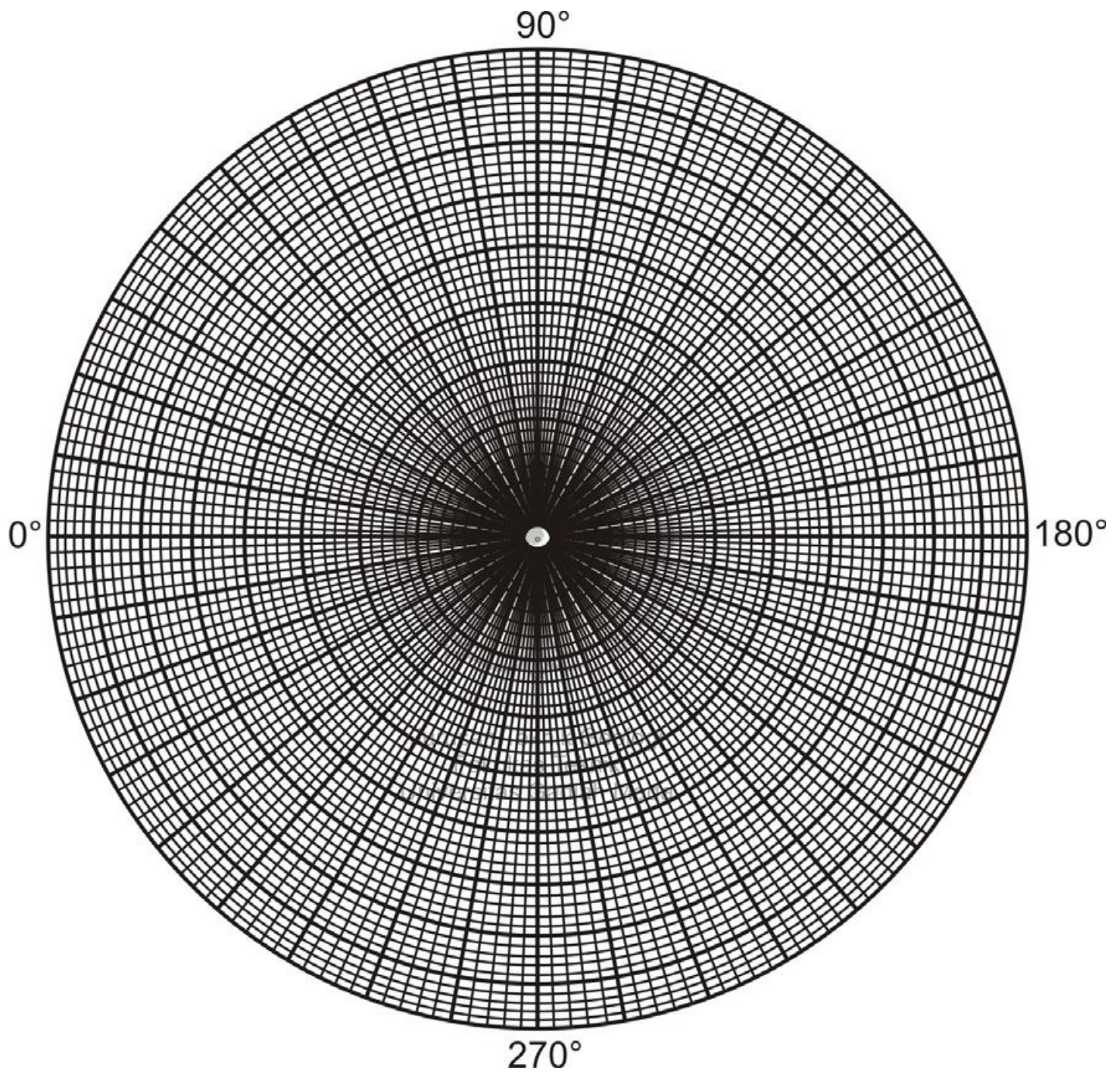




11. ANALISIS STEREO NET



POLAR NET

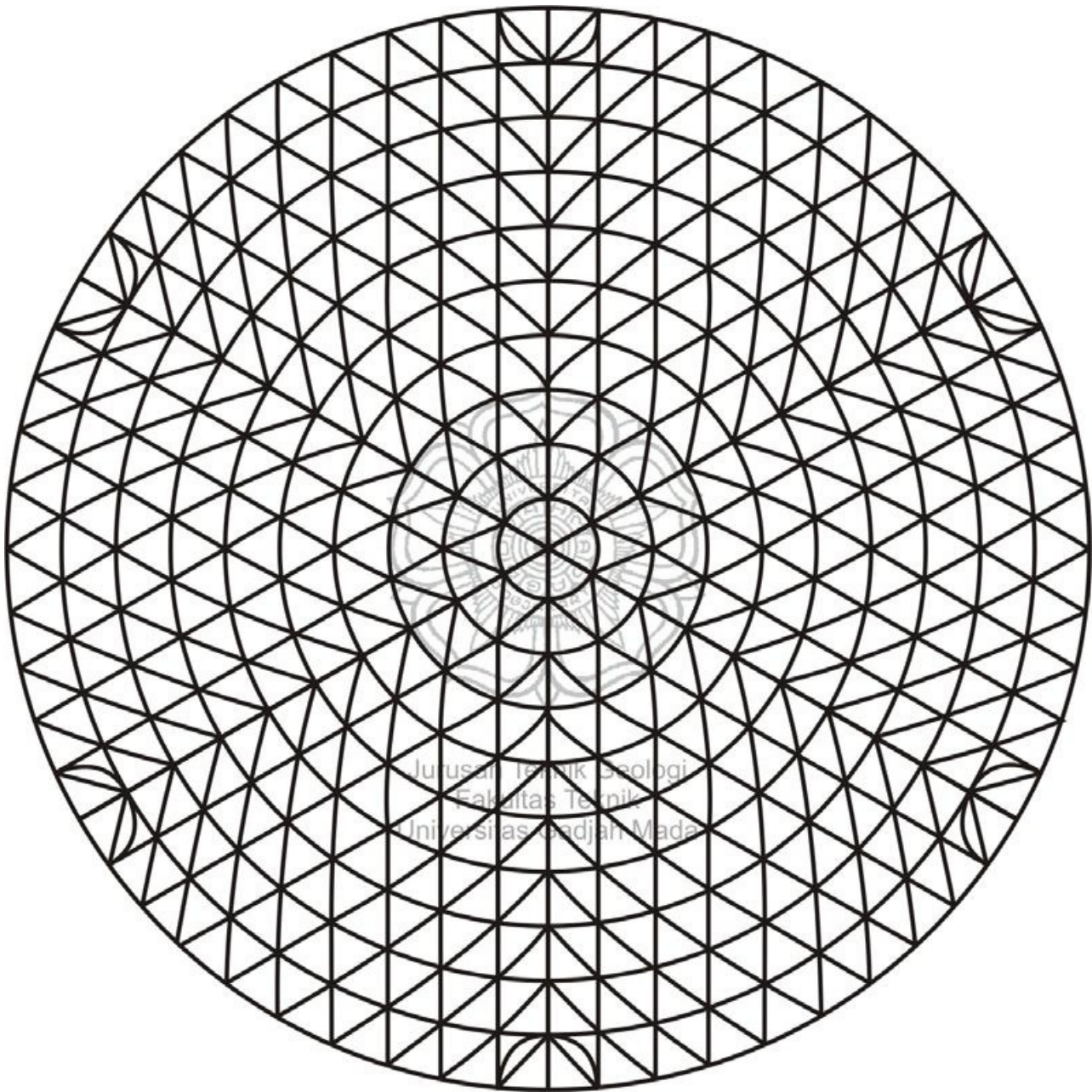




11. ANALISIS STEREONET



KALSBECK NET





**KEMENTERIAN RISET DAN TEKNOLOGI PENDIDIKAN TINGGI
UNIVERSITAS MULAWARMAN
FAKULTAS TEKNIK
PROGRAM STUDI TEKNIK GEOLOGI**



KOLOM STRATIGRAFI TERUKUR

SKALA 1 : 50

SKETSA JALUR PENGUKURAN

INFORMASI PENGUKURAN	
Tanggal pengukuran	
Koordinat GPS	
Formasi	
Jalur / Area	
Ketebalan terukur	
Cuaca	
Diturunkan oleh	
Diperiksa oleh	

LEGENDA FASIES		
<p>LITOLOGI</p> <ul style="list-style-type: none"> Batugamping Batulempung Batunapal Batupasir Conglomerate 	<p>STRUKTUR SEDIMEN</p> <ul style="list-style-type: none"> Laminasi paralel Trough Cross Bedding Planar Cross Bedding Fosil Jejak / Bioturbasi Kedudukan bidang perlapisan 	<p>KANDUNGAN FOSIL</p> <ul style="list-style-type: none"> Load cast Scouring Imbrikasi Blank zone Fragmen Oncoid Discocyclina Nummulites Planocamerinoides Abeolina Echinoids

UMUR GEOLOGI	SATUAN BATUAN	KETEBALAN	UKURAN BUTIR								NOMOR SAMPEL	NOMOR FOTO	STRUKTUR SEDIMEN/ FOSIL	DESKRIPSI LITOFASIES	FOTO SINGKAPAN	ASOSIASI FASIES	PALEO-ENVIRONMENT
			MS	WS	PS	GS	PSRS	BS	Clay	SAND							

13	12	11	10	9	8	7	6	5	4	3	2	1							
----	----	----	----	---	---	---	---	---	---	---	---	---	--	--	--	--	--	--	--

KETERANGAN PENGAMBILAN SAMPEL
● DR.SWG1.01 : Sampel paleontologi disayat
● DR.SWG1.02 : Sampel paleontologi disayat
● DR.SWG1.02 : Sampel tidak disayat