STRATIGRAPHY OF SOUTH FLANK OF EASTERN UINTA MOUNTAINS AND UINTA BASIN

ERA (ERATHEM)	PERIOD (SYSTEM)	EPOCH (SERIES)	NORTH AMERICAN AGE (STAGE)	ICS AGE (STAGE)	TIME (Millions of Years Ago) (not to scale)	BEDROCK UNIT NAMES and QUATERNARY DEPOSITS	THICKNESS (not to scale) Feet	THICKNESS (not to scale) Meters	DOMINANT ROCK TYPE	NOTES	DEPOSITIONAL ENVIRONMENTS
CENOZOIC	Quaternary	Holocene			0.0117	Alluvium and colluvium	3-100	1-30	Unconsolidated sand, silt, gravel, and boulders; fine- to coarse-grained deposits in stream channels and on several levels of benches; landslides and slumps in unconsolidated and bedrock units susceptible to failure on steep slopes and in some active channels	Alpine glaciers in Uinta Mountains; capture of Green River by the Colorado River system within the last 2 million years	N
		Pleistocene	Rancholabrean	Upper	0.126	Eolian (wind-blown sand) deposits	16-30	5-10			
						Landslide deposits	thin to 160	thin to 50			
			Irvingtonian	Middle	0.781	Glacial till-outwash and older alluvium	3-30	1-10			
	Tertiary (Paleogene)	Oligocene	Arikareean	Chattian	23	Bishop Conglomerate	0-490	0-150	Sandstone and boulder conglomerate with ash beds	Crustal relaxation and collapse of eastern Uinta Mountains; drainage patterns changed about 25 million years ago to the present configuration; unconformity of about 22 million years	
			Whitneyan		28						
			Orellan	Rupelian	34						
		Eocene	Chadronian	Priabonian	36	Duchesne River Formation	1560-4430	475-1350	Sandstone, siltstone, and mudstone with ash beds	Unconformity of <2 million years; Gilbert Peak erosion surface formed after the Laramide uplift ended	
			Duchesnean	Bartonian	38						
			Uintan		41	Uinta Formation	1230-2000	375-610	Upper mudstone; lower sandstone, siltstone	Known for abundant brontothere and turtle fossils	
				Lutetian		Green River Formation	1000-5400	305-1645	Limestone, sandstone, shale, and oil shale with some salt, gypsum, and nahcolite beds	Lake Uinta; known for fossil insects and leaves; contains Mahogany oil shale and other oil shale beds	
			Bridgerian								
			Wasatchian	Ypresian	48	Wasatch Formation	1115-2800	340-855	Interbedded sandstone, siltstone, and conglomerate; intertongues with overlying Green River Formation	Unconformity of about 4 million years; Tertiary-Cretaceous (TK) boundary and the extinction of non-avian dinosaurs	
		Paleocene	Clarkforkian		56						
			Tiffanian	Thanetian	59						
			Torrejonian	Selandian	62						
MESOZOIC	Cretaceous	Upper	Maastrichtian		66	Mesaverde Group: Tuscher Formation, Farrer Formation, Neslen Formation, Sego Sandstone, Buck Tongue, Castlegate Sandstone	515-2500	155-760	Sandstone, siltstone, and carbonaceous mudstone with some coal beds	Laramide uplift of the Uinta Mountains begins	M
					72						
			Campanian							Buck Tongue of Mancos Shale; last marine transgression deposit of the Western Interior Seaway	
					84	Mancos Shale	4600-6200	1402-1890	Mudstone, silty mudstone, and siltstone	Giant marine reptiles swam in the Western Interior Seaway	
			Santonian		86						
			Coniacian		90						
			Turonian		92	Frontier Formation	145-280	44-85	Sandstone, carbonaceous mudstone, coal; large concretions in upper part		
					95	Mowry Shale	30-140	10-40	Siliceous shale	Tununk Shale; unconformity of about 3 million years at base	
			Cenomanian		101					Contains fossil fish scales	
		Lower	Albian		102? 103?	Dakota Formation	80-175	25-55	Sandstone, carbonaceous mudstone, coal		
					113	Cedar Mountain Formation	70-230	20-70	Varicolored mudstone and soil carbonate (calcrete) beds forming nodules	K-1 unconformity of about 1 million years	N
			Aptian		125					Emergence of flowering plants	
			Barremian		129					K-0 unconformity of about 16 million years	
	Jurassic	Upper	Tithonian		145	Morrison Formation	550-700	165-215	Upper varicolored mudstone; lower sandstone, siltstone, thin pebble conglomerate	Contains abundant dinosaur remains	
					152						
			Kimmeridgian		157					J-5(?) unconformity of about 2 million years	
			Oxfordian		159	Stump Formation	130-265	40-80	Mudstone, limestone, glauconitic sandstone	Contains belemnite fossils	T
					163	Entrada Sandstone	100-250	30-75	Fine-grained, cross-bedded sandstone	J-3 unconformity of about 1 million years	N
		Middle	Callovian		164	Carmel Formation	105-400	30-125	Mudstone and siltstone with lower limestone or sandstone		R
					166						
			Bathonian		168						
			Bajocian		170					Contains *Isocrinus* crinoid fossils	T
										J-1 unconformity about 4 million years	
		Lower	Toarcian		174	Nugget Sandstone	655-1030	200-315	Fine-grained sandstone with large-scale trough and planar cross-beds		N
					183						
			Pliensbachian		191						
			Sinemurian		199					Ancient sand dunes	
			Hettangian		201						
	Triassic	Upper	Rhaetian		209	Chinle Formation	210-440	65-135	Mudstone and siltstone with rippled sandstone at top and pebble conglomerate (Gartra Member) at base	Unconformity of unknown duration	
			Norian		227					Gartra Member; contains fossil wood; TR-3 unconformity of about 10 million years at base	
			Carnian		237						
		Lower	Olenekian		247	Moenkopi Formation	525-1115	160-340	Interbedded siltstone, sandstone, mudstone	Contains abundant trace fossils and ripple marks	
			Induan		251	Dinwoody Formation	0-195	0-60	Shale, siltstone, sandstone, some limestone		R
					252					TR-1 unconformity of about 13 million years	
PALEOZOIC	Permian	Guadalupian (Middle)	Guadalupian	Wordian	265	Park City and Phosphoria Formations	65-195	20-60	Limestone and dolomite with interbedded mudstone, siltstone, and sandstone; basal phosphatic shale		T
				Roadian	269					Contains phosphate and marine deposits	
		Cisuralian (Lower)	Leonardian	Kungurian	272						
				Artinskian	284						
			Wolfcampian	Sakmarian	286					Unconformity of about 6 million years	
				Asselian	292	Weber Sandstone	655-1310	200-400	Fine-grained sandstone with thin limestone interbeds in lower part		N
	Pennsylvanian	Upper	Virgilian	Gzhelian	295					Forms cliffs and Steamboat Rock in Dinosaur National Monument	
			Missourian	Kasimovian	299						
		Middle	Desmoinesian	Moscovian	304	Morgan Formation	625-950	190-290	Interbedded shale, siltstone, cherty limestone		R
			Atokan		307						
		Lower	Morrowan	Bashkirian	315	Round Valley Limestone	210-395	65-120	Cherty limestone	Forms ledges, contains jasperized marine fossils	T
	Mississippian	Upper	Chesterian	Serpukhovian	323	Doughnut Shale	280-300	85-95	Carbonaceous shale and thin limestone		R
					331	Humbug Formation	245-295	75-90	Interbedded sandstone, shale, limestone		
		Middle	Meramecian	Visean	347	Madison Limestone	590-985	180-300	Upper (Deseret Limestone equivalent) and lower thick-bedded cherty limestone separated by thin-bedded shaley limestone (Delle Phosphatic Member equivalent); sinkholes and caves (karst) in the upper limestone	Forms cliffs, contains marine fossils; Deseret Limestone equivalent; Delle Phosphatic Member equivalent	T
		Lower	Osagean	Tournaisian							
			Kinderhookian		359						
	Upper Cambrian				485	Lodore Formation	0-590	0-180	Sandstone and pebble sandstone	Unconformity of about 126 million years; marine sand deposited in low areas	
					501					Unconformity of about 140 million years; uplift of ancestral Uinta Mountains and erosion creating a rolling landscape	
NEOPROTEROZOIC	Cryogenian	Middle			642	Uinta Mountain Group: Red Pine Shale	1800-3940	550-1200	Shale and arkosic sandstone		M
						formation of Hades Pass	5900-7220	1800-2200	Quartz sandstone, shale, thin pebble conglomerate and arkosic sandstone		
						formation of Crouse Canyon	4200-8860	1280-2700	Quartz sandstone and some thin beds of shale	Forms the exposed core of the Uinta Mountains; ancient faulted basin repeatedly flooded by marine waters that contained single-celled and early colonial microfossils	
						formation of Outlaw Trail	165-330	50-100	Shale and arkosic sandstone		
						formation of Diamond Breaks	1600-3200	485-975	Quartz sandstone and orthoquartzite		
					770	Jesse Ewing Canyon Formation	740-1640	225-500	Conglomerate and shale	Unconformity of about 800 million years	
PALEOPROTEROZOIC					1600	Red Creek Quartzite	as much as 20,000	as much as 6100	Metaquartzite, mica schist, amphibolite	Metamorphosed rocks	

T = Marine transgression
R = Marine regression
N = Non-marine
M = Marine transgression and regression cycles with intervening non-marine deposition

Red line denotes an unconformity (no rock record preserved); two numbers give time gap.

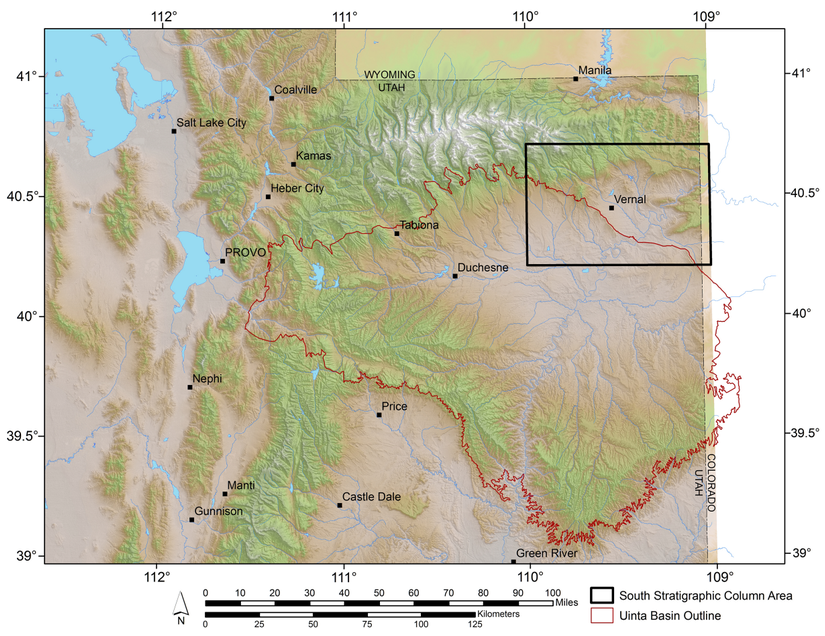

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Plate 1
Utah Geological Survey Open-File Report 651
Stratigraphy of South Flank of Eastern Uinta Mountains and Uinta Basin

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