Figure 2.5.1-201 Site Region Geologic Map (Sheet 1 of 2)

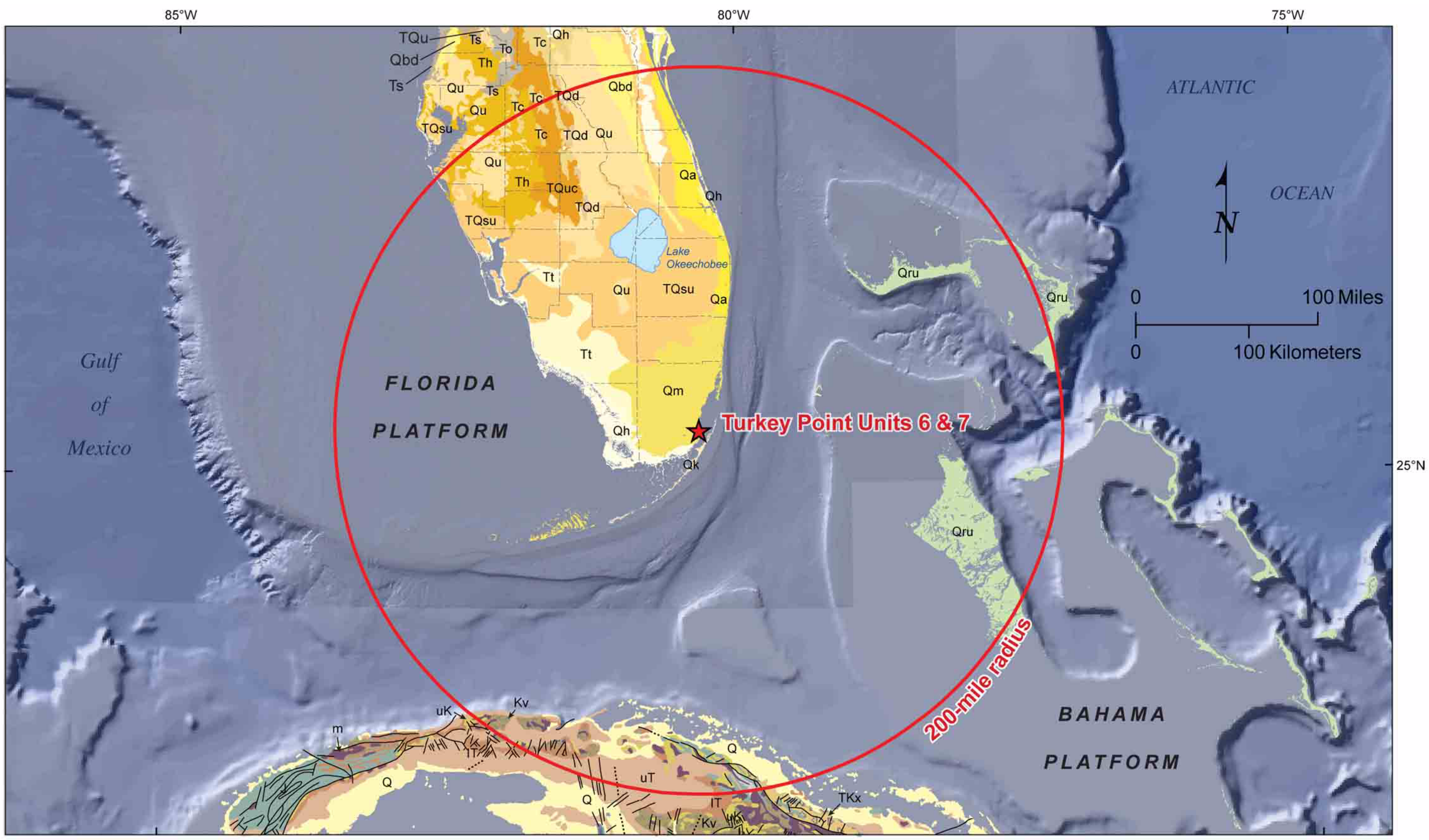


Figure 2.5.1-201 Site Region Geologic Map (Sheet 2 of 2)

Explanation

——······· Fault; dotted where uncertain

Florida Geologic Units

QUATERNARY

Qh	Holocene sediments
Qa	Anastasia Formation
Qk	Key Largo Limestone
Qm	Miami Limestone
Qdb	Beach Ridge and Dune deposits
Qu	Undifferentiated sediments

LATE TERTIARY/ EARLY QUATERNARY

TQsu	Shelly sediments (includes Fort Thompson, Bermont, and Caloostahatchee Formations)
TQuc	Reworked Cypresshead sediments
TQd	Dune deposits
TQu	Undifferentiated sediments

TERTIARY

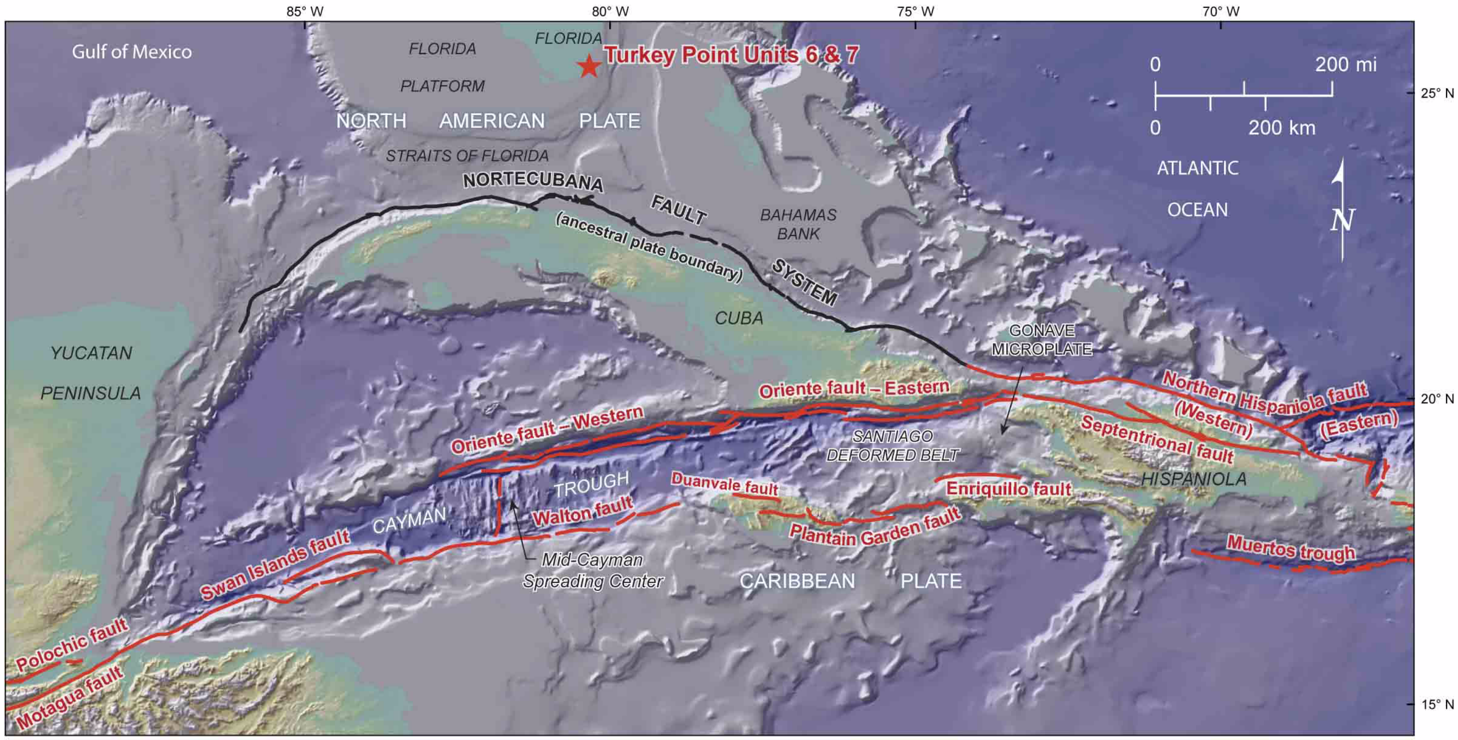
Tc	Cypresshead Formation
Tt	Tamiami Formation
Th	Hawthorn Group, undivided
Ts	Suwannee Limestone
To	Ocala Limestone

Other Geologic Units

Q	Quaternary alluvium
Qru	Quaternary reef deposits, undivided
uT	Post-Eocene marine strata
lT	Eocene and/or Paleocene marine strata
TKx	Tertiary and Cretaceous complex of deformed sedimentary rocks
uK	Upper Cretaceous marine strata
Kv	Cretaceous volcanic rocks
Ki	Cretaceous plutons, mostly intermediate to silicic
J	Jurassic marine and continental strata
Mm	Mesozoic metamorphic rocks
m	Mafic and ultramafic rocks

Note: Geologic information from References 827, 492, and 397

Figure 2.5.1-202 Tectonic Map of the Northern Caribbean-North America Plate Boundary (Sheet 1 of 2)



Source: Reference 492

Figure 2.5.1-202 Tectonic Map of the Northern Caribbean-North America Plate Boundary (Sheet 2 of 2)

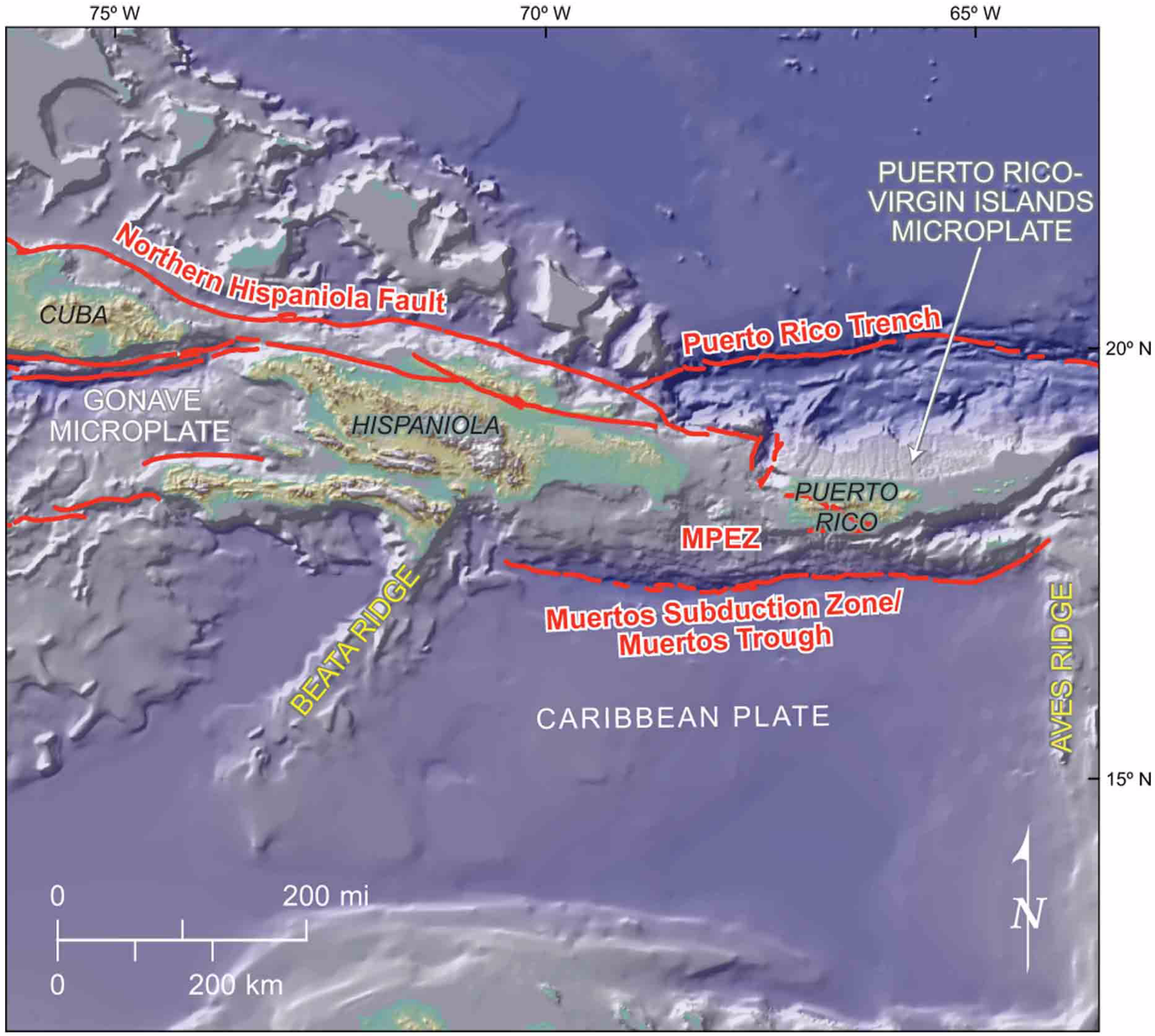
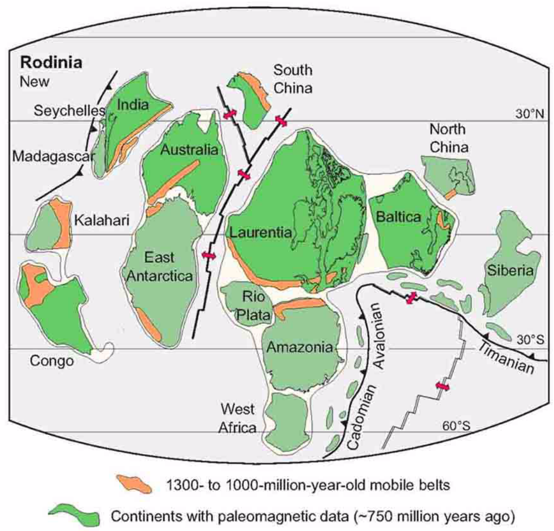
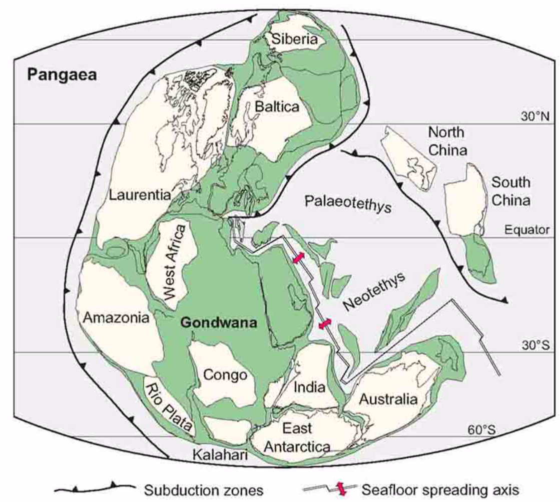


Figure 2.5.1-203 Supercontinents Rodinia and Pangea



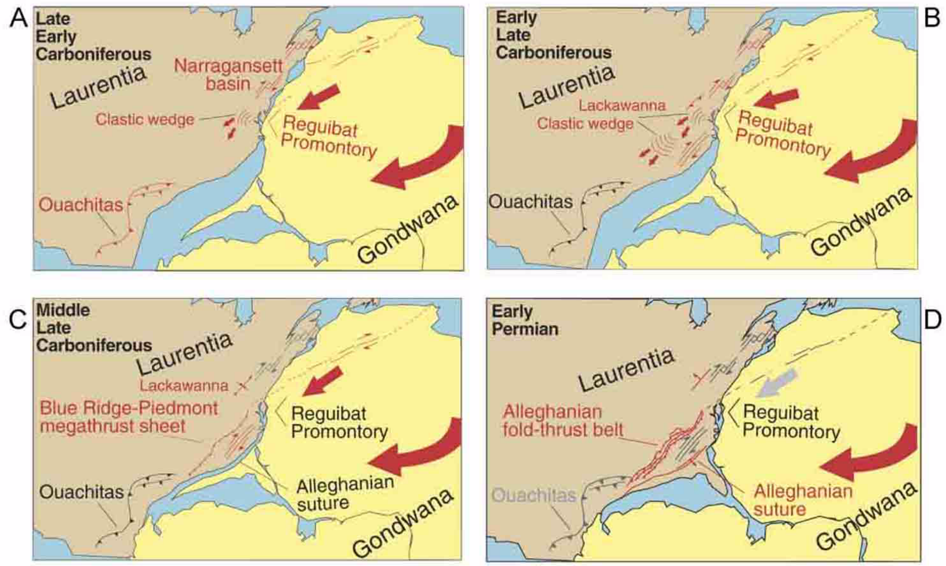
(a) The Rodinia supercontinent in the Mesoproterozoic (revised). The revised or "new" Rodinia reconstruction at 750 Ma. Compared to previous reconstructions, the positions of Australia, East Antarctica, and Congo have been revised. North China is tentatively placed north of Bakltica. Continental fragments and magmatic arcs (Avalonian, Cadomian, and Timanian) along the southwestern margin of Rodinia were welded onto West Africa, Amazonia, Baltica and Siberia in the Late Precambrian.



(b) The Pangea supercontinent in the Late Permian. At the time of its maximum extent, Pangea did not contain North and South China, and new oceanic crust was formed along the eastern margin. Precambrian terranes or continents often discussed in Rodinia reconstructions (but at different locations) are shown in yellow. Gondwana, in the Southern Hemisphere, was formed ~550 million years ago. In the Northern Hemisphere, the earlier terranes of Laurentia, Avalonia, and Baltica combined in the Early Devonian (418 to 400 million years ago) to form Laurussia. Gondwana and Laurus later collided to form Pangea.

Modified from Reference 759

Figure 2.5.1-204 Alleghanian Oblique Rotational Collision between Laurentia and Gondwana



Notes:

Red lines and symbols indicate feature is active in the time interval shown.

(A) Initial contact between Gondwana and Laurentia occurred in late Early Carboniferous (late Mississippian), producing initially sinistral faulting in New England followed immediately by dextral motion and pull-apart basins, then shedding of clastic sediments onto the continent, and Lackawanna-phase deformation.

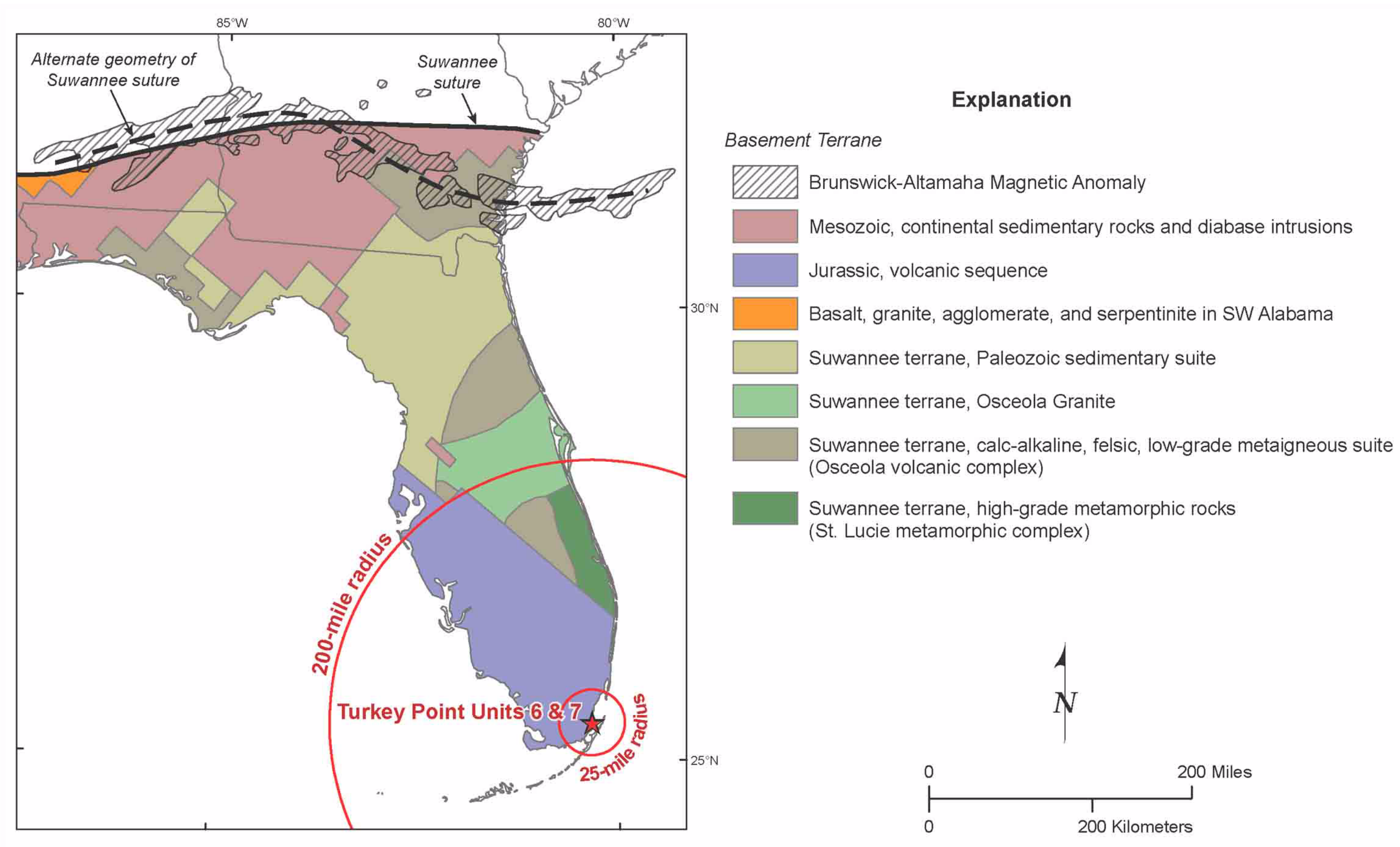
(B) Southward movement and rotation of Gondwana with respect to Laurentia in early Late Carboniferous (early Pennsylvanian) produced dextral motion throughout orogen, waning of Lackawanna phase deformation, and greater dispersal of sediments onto the Laurentian foreland.

(C) Continued clockwise rotation of Gondwana with respect to Laurentia during the Late Carboniferous closed the Theic ocean southward, bringing Gondwana into head-on collision with Laurentia, and producing the first movement on the Blue Ridge-Piedmont mega-thrust sheet.

(D) Early Permian head-on collision of Gondwana with Laurentia produced major transport on Blue Ridge-Piedmont mega-thrust sheet that drove foreland fold-thrust belt deformation (Valley and Ridge and Plateau) ahead of it.

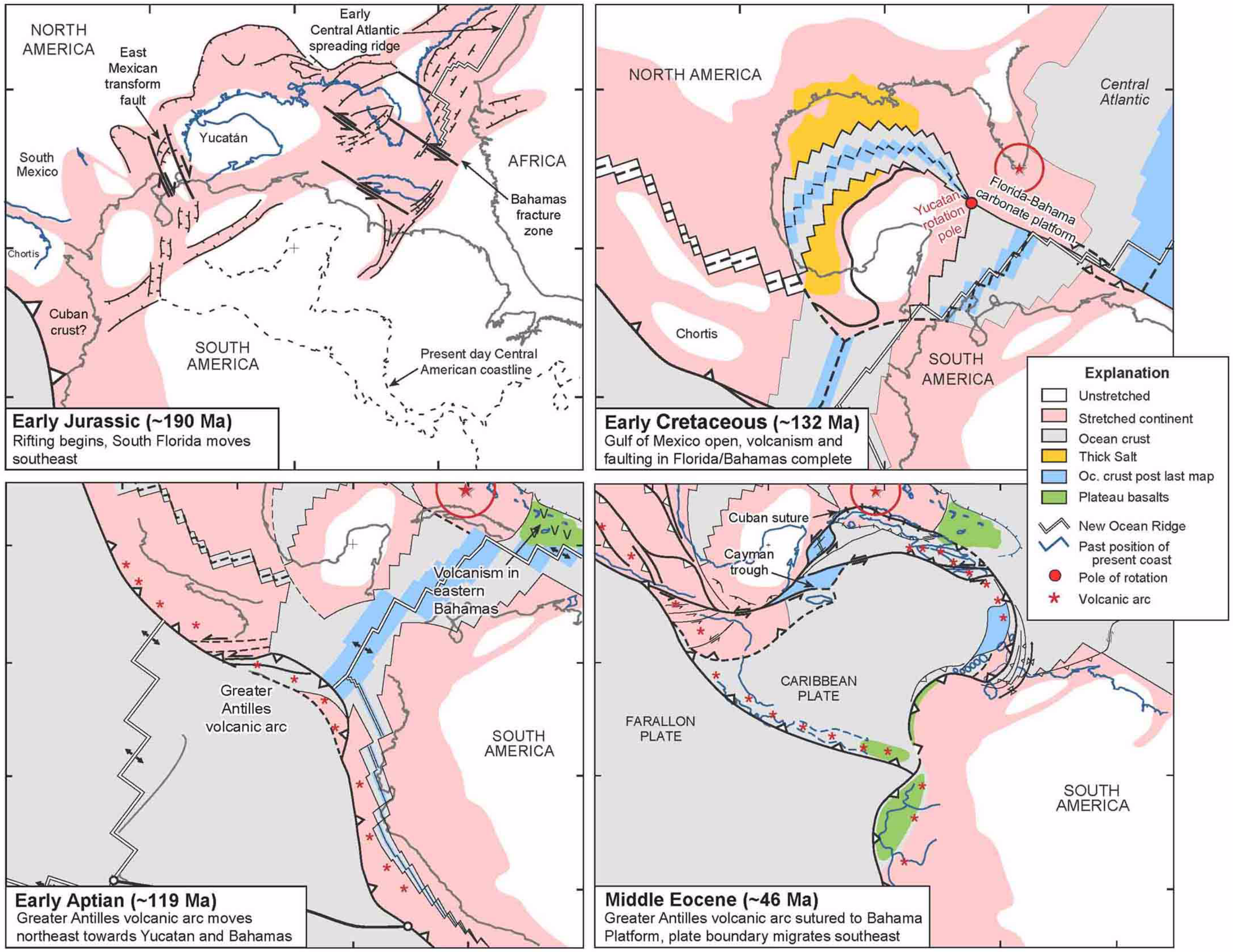
Source: Reference 795

Figure 2.5.1-205 Interpreted Basement Map of Florida



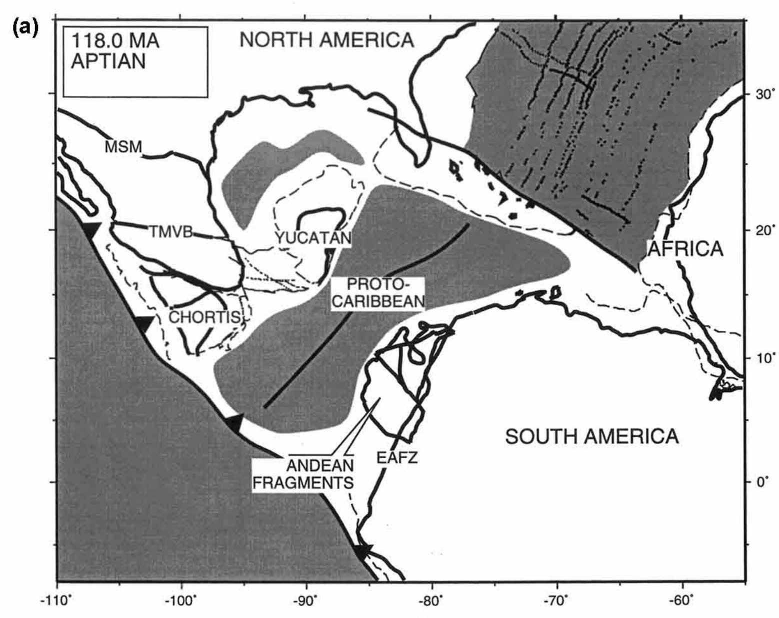
Modified from: References 206, 377, and 338.

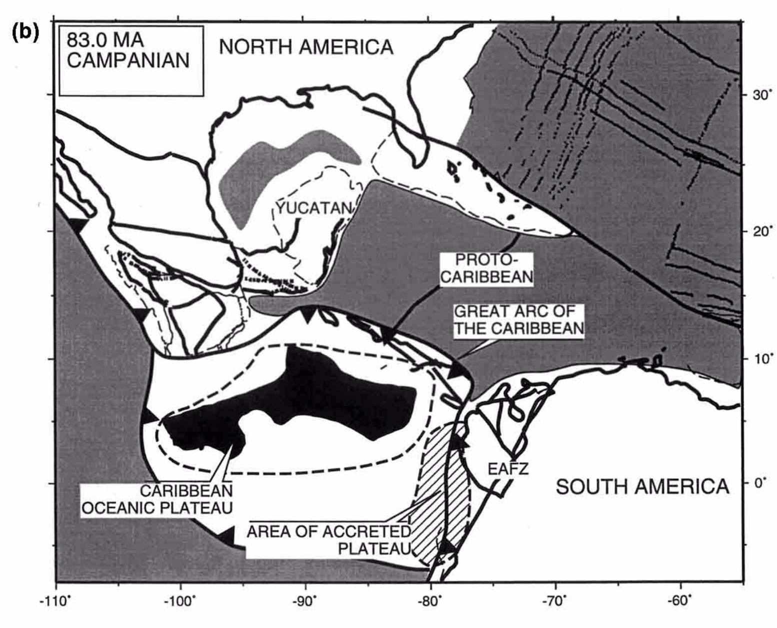
Figure 2.5.1-206 Tectonic Plate Reconstructions of Gulf of Mexico and Caribbean Region



Note: Red circle is the approximate location of the 200-mile radius site region
Modified from Reference 696

Figure 2.5.1-207 Reconstruction of the Caribbean



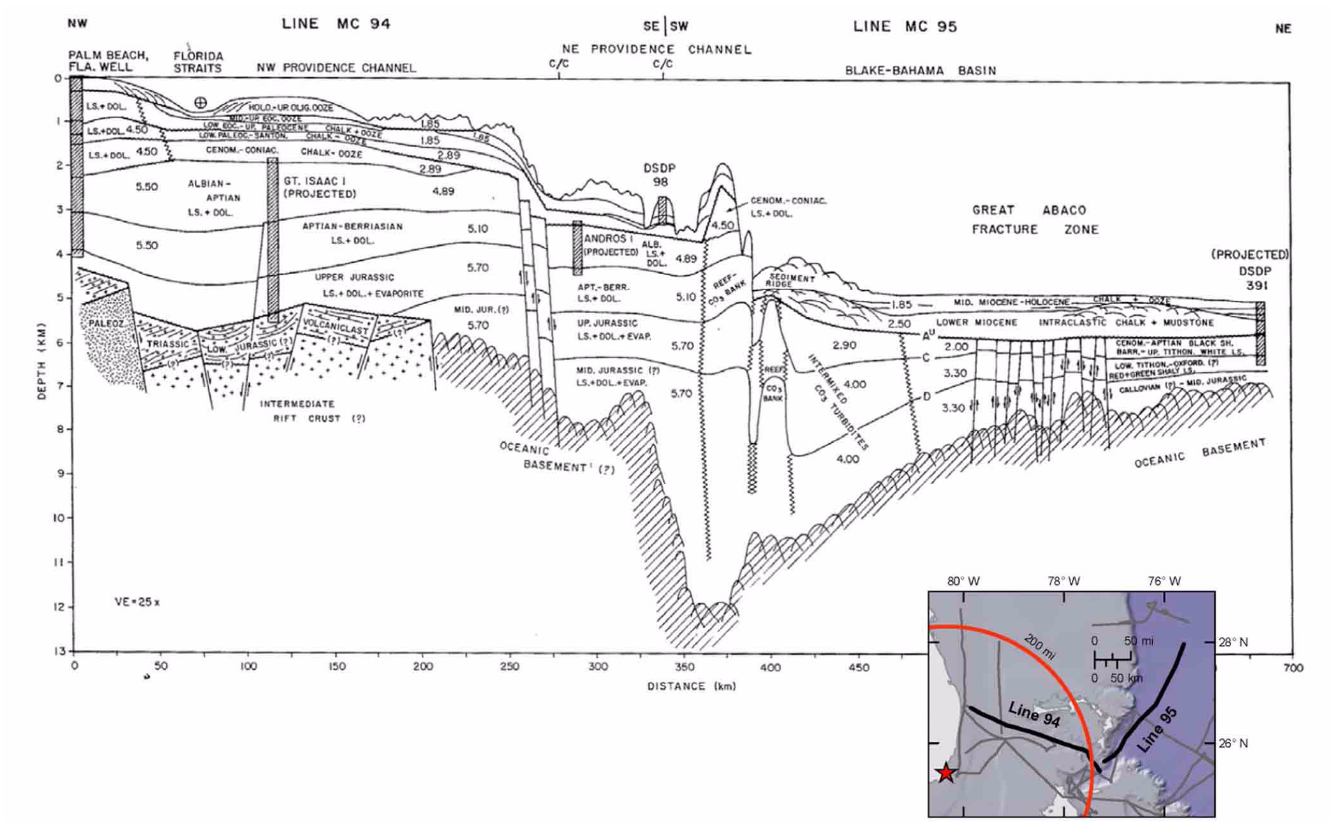


Notes:
(a) Reconstruction of the Caribbean region at 118 Ma
(b) Reconstruction of the Caribbean region at 83 Ma

MSM = Mohave-Sonora megashear, TMVB = Trans-Mexican volcanic belt, EAFZ = eastern Andean fault zone

Modified from Reference 782

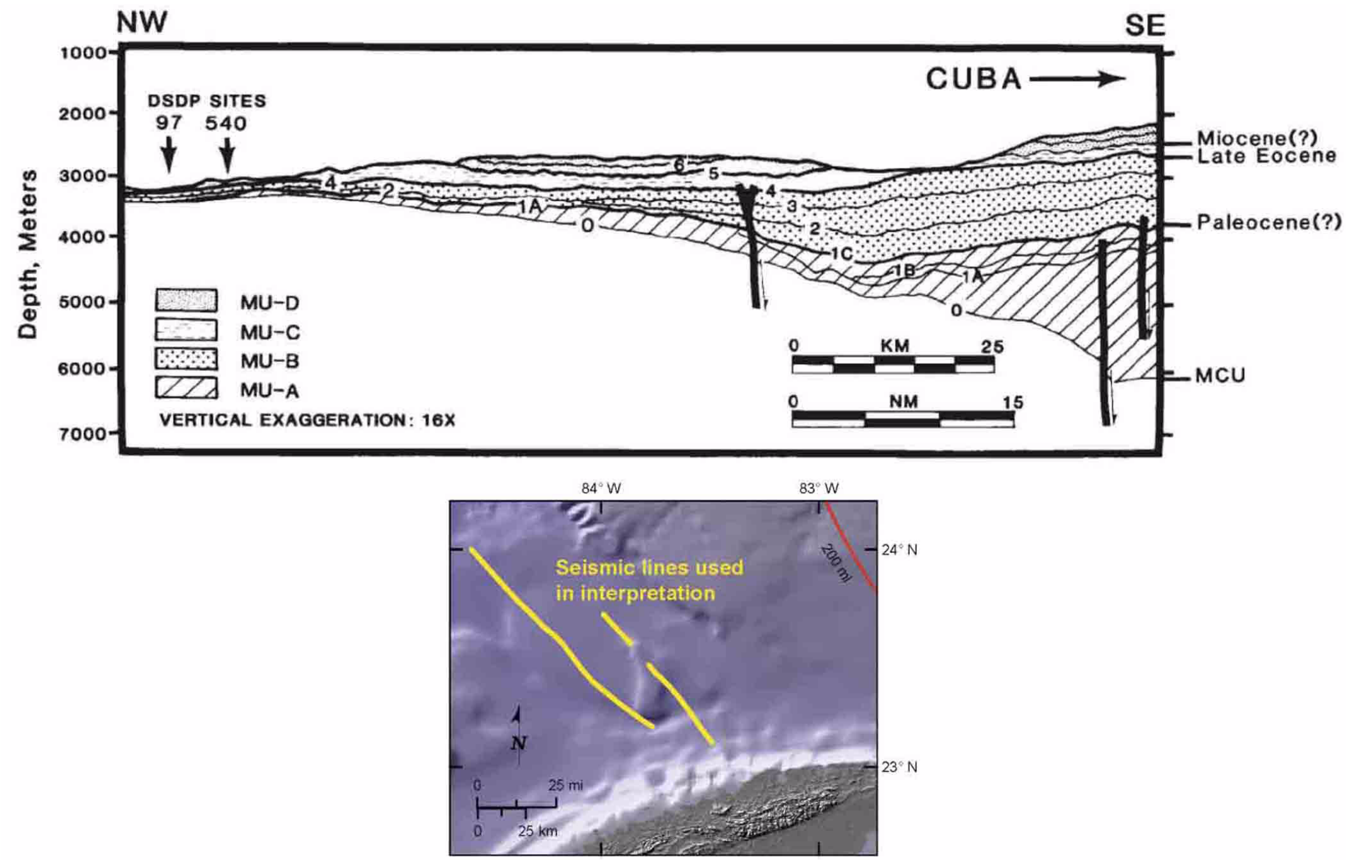
Figure 2.5.1-208 Interpretation of Seismic Line across Bahama Platform and Blake-Bahamas Basin



Note: See Figure 2.5.1-243 for the location and log of the Great Isaac Well 1.

Modified from: Reference 307

Figure 2.5.1-209 Seismic Line Interpretation of Cuba Foreland Basin, offshore west Cuba



Modified from: Reference 482

Figure 2.5.1-210 Physiographic Features of Northern Caribbean-North America Plate Boundary (Sheet 1 of 2)

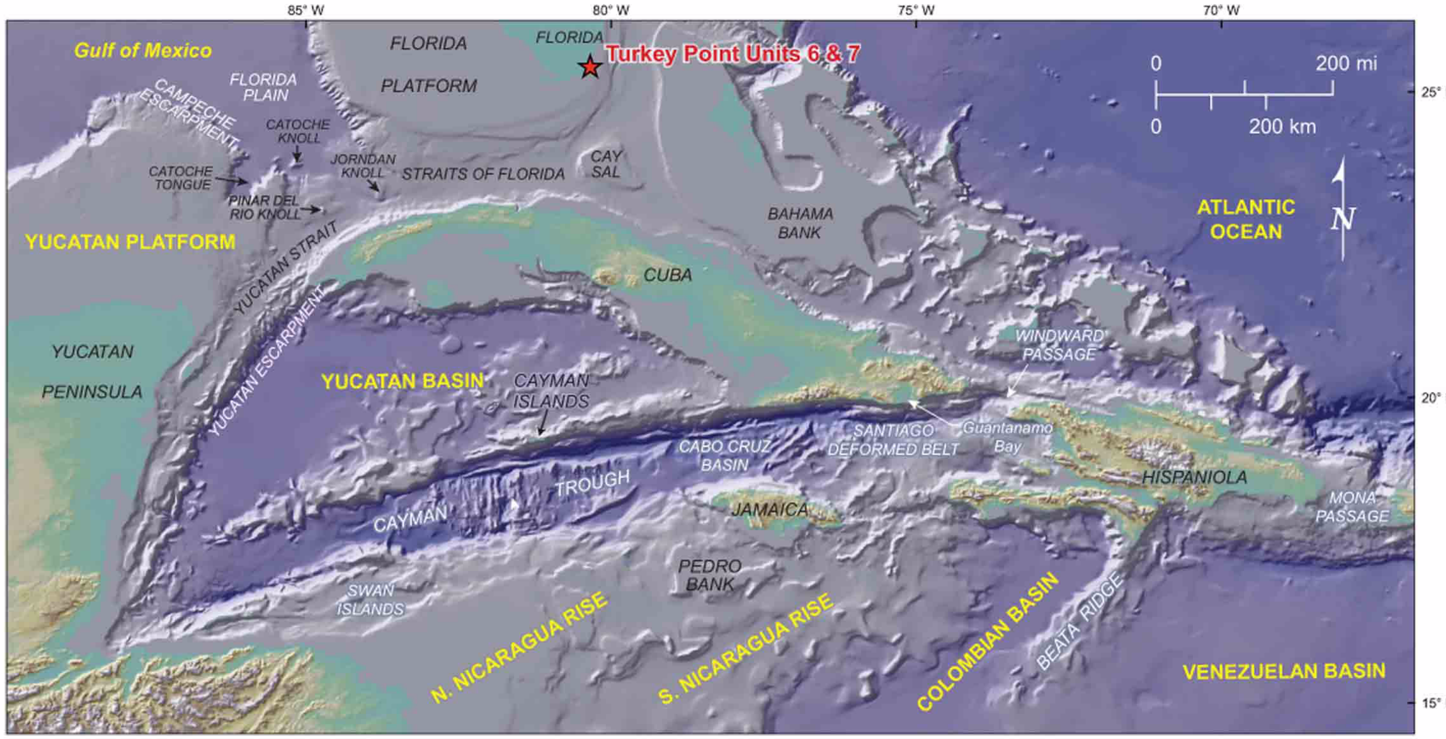


Figure 2.5.1-210 Physiographic Features of Northern Caribbean-North America Plate Boundary (Sheet 2 of 2)

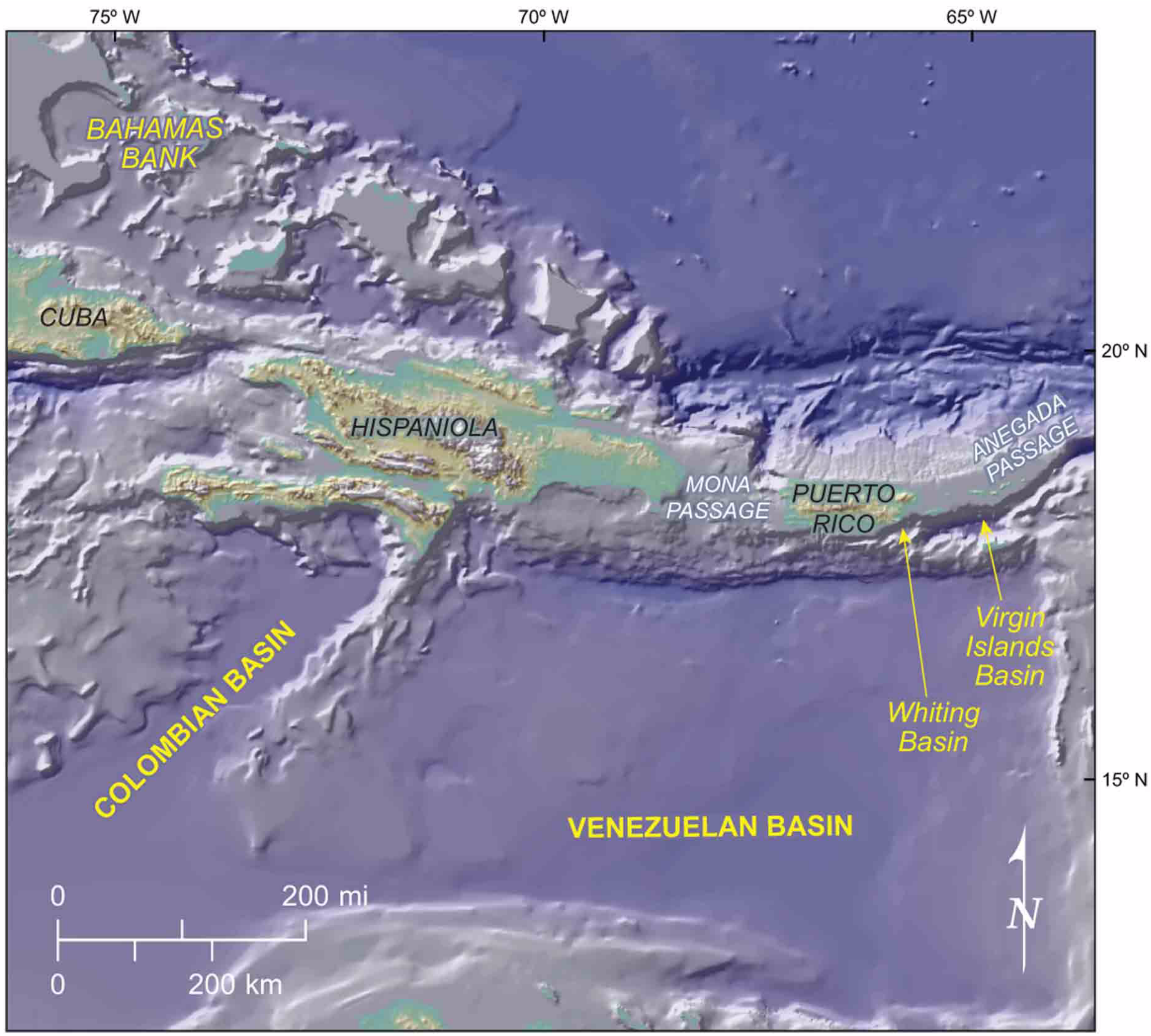
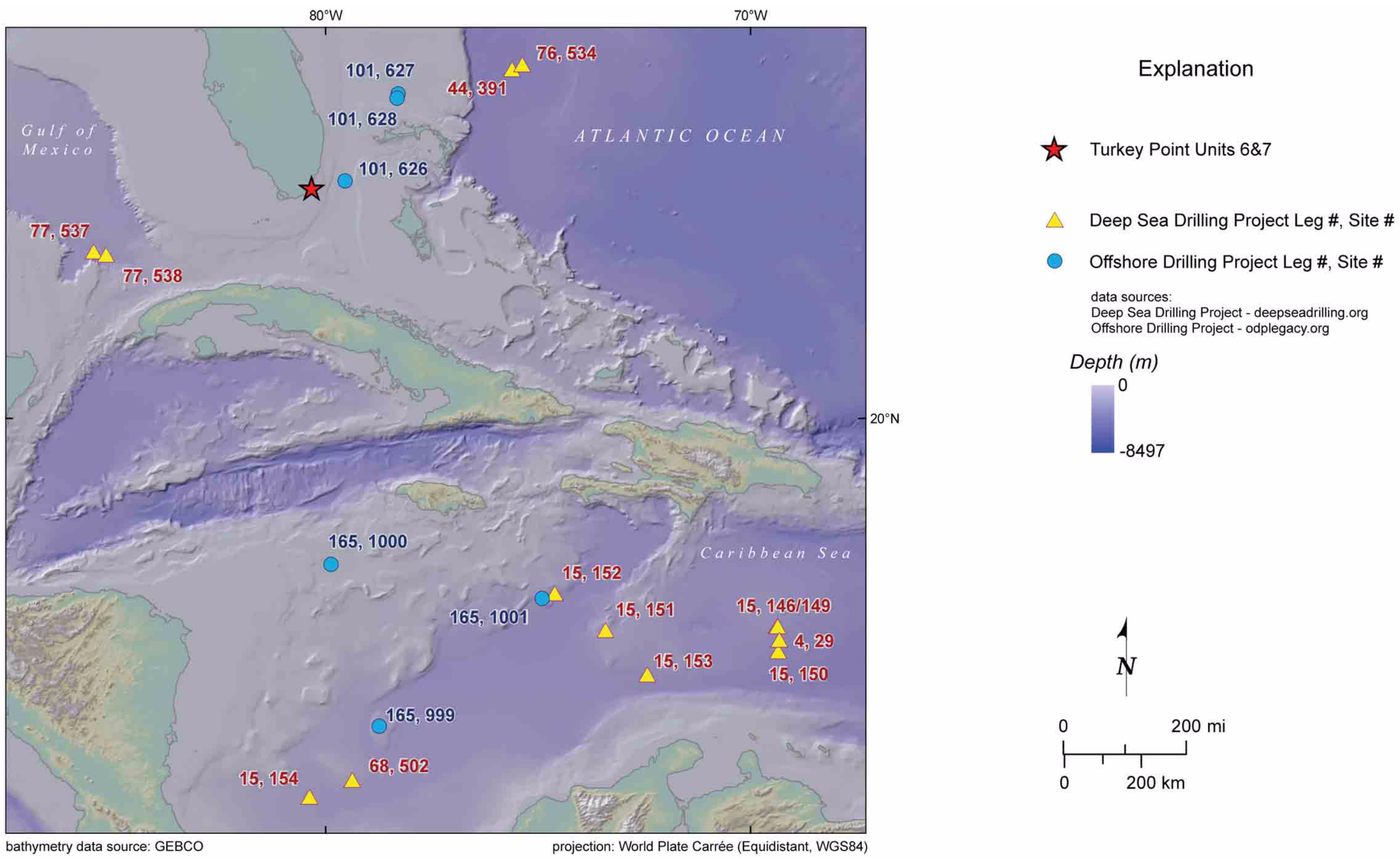
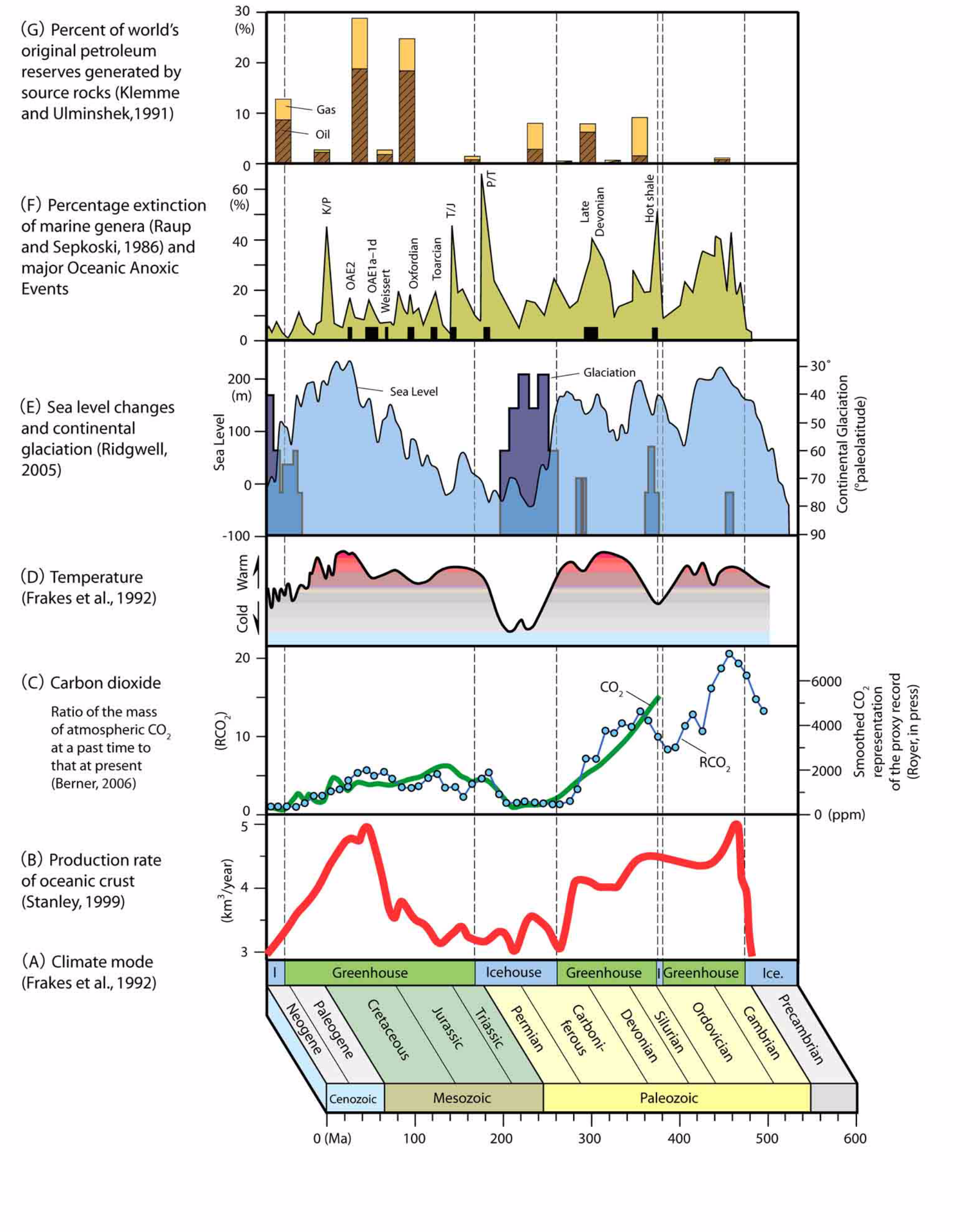


Figure 2.5.1-211 Deep Sea Drilling Locations



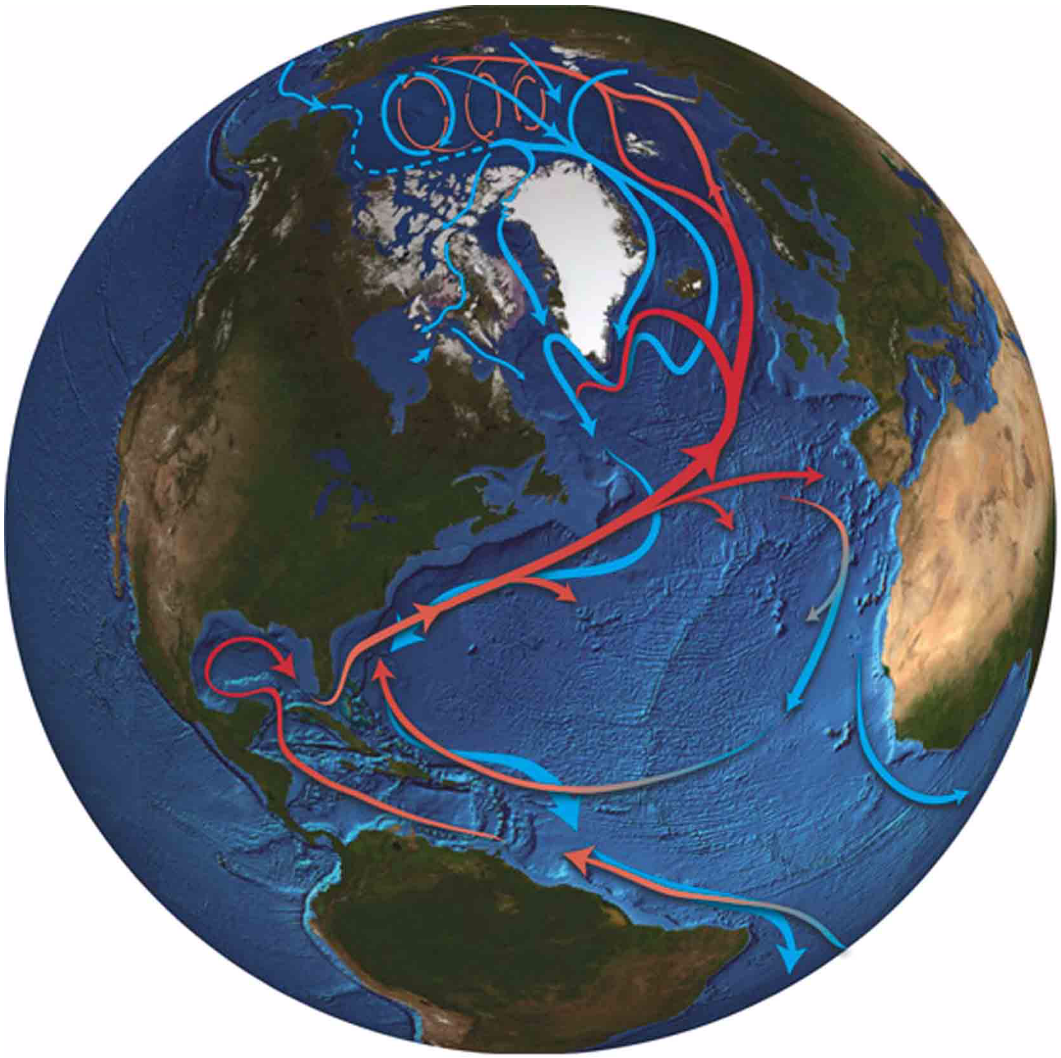
Source of DSDP location coordinates: Reference 802
Source of ODP location coordinates: Reference 803

Figure 2.5.1-212 Climate Change Parameters - Past 600 My



Modified from: Reference 761

Figure 2.5.1-213 Caribbean Currents Driven by the Great Ocean Conveyor Belt



Note: The Antilles Current flows northeast around the Bahama Bank. The Caribbean Current enters the Caribbean through a series of narrow passages and continues into the Gulf of Mexico as the Loop Current, finally exiting through the Florida Straits as the Florida Current. The Florida Current rejoins the Antilles Current and together form the Gulf Stream. The Gulf Stream then moves warm, salty water north along the U.S. East Coast and then toward Europe, before it transitions into the North Atlantic Current and heads north. As this water reaches higher latitudes, it releases heat to the atmosphere, tempering winters in the North Atlantic region and leaving behind saltier, cooler, and denser waters. These transformed waters sink to the depths and form the Deep Western Boundary Current, which flows southward along the East Coast-beneath the northward-flowing Gulf Stream-and into the South Atlantic.

Source: Reference 821

Figure 2.5.1-214 Bathymetry of the Florida Coast

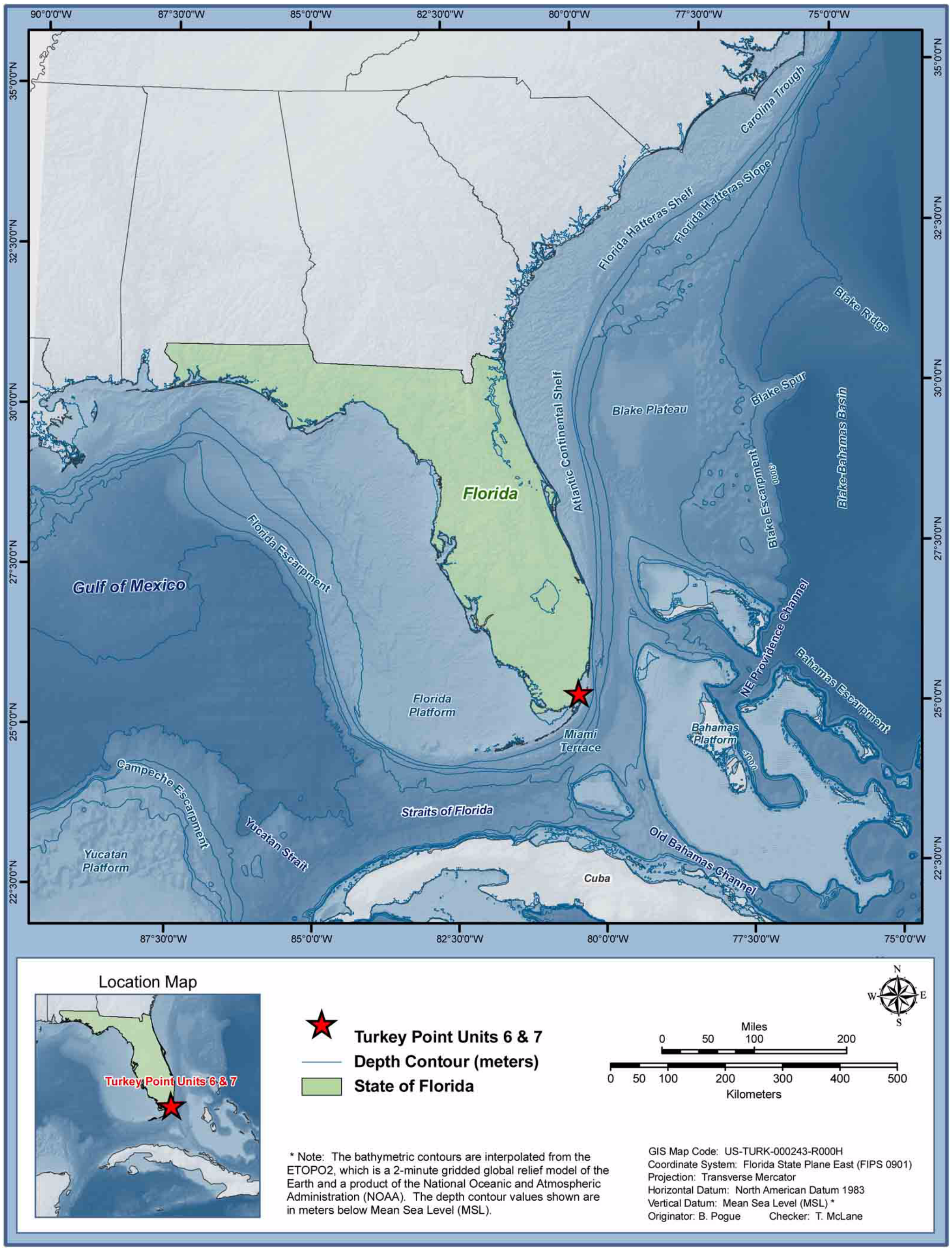
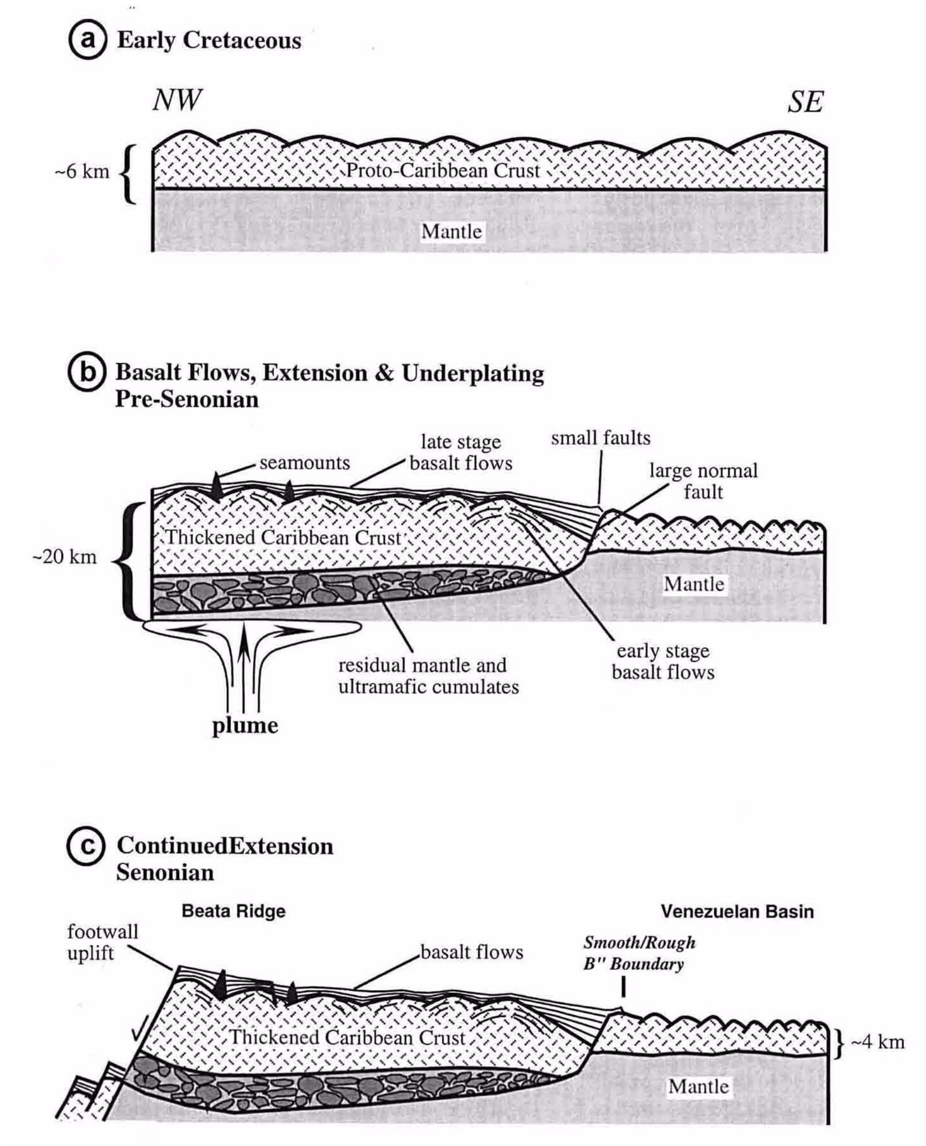


Figure 2.5.1-215 Schematic Illustrating the Geologic Development of the Caribbean Crust



Notes:

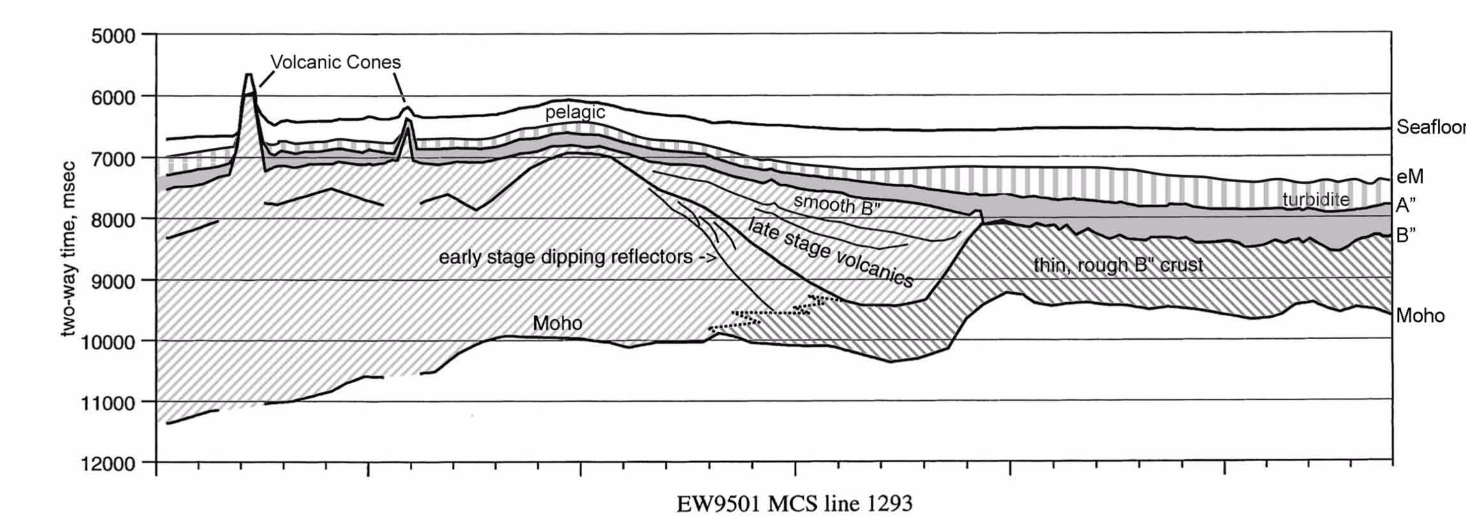
(a) Proto-Caribbean oceanic crust formed by seafloor spreading in Late Jurassic-Early Cretaceous time in the eastern Pacific.

(b) Widespread and rapid eruption of basaltic flows in concert with extension and thinning of the 'old' plate. The plate was thickened by at least two stages of basalt flows. The large divergent volcanic wedge observed along the rough-smooth B'' boundary, is coincident with the abrupt shoaling of Moho, and appear to be bounded by a large northwest-dipping fault system.

(c) Minor extensional deformation across the Venezuelan Basin continued after magmatic thickening of crust as indicated by faulted and rotated basalt flows. The location of major extensional deformation migrated through time from the Venezuelan Basin to the western flank of the Beata Ridge. The extensional unloading of the footwall caused uplift and rotation of the Beata Ridge and collapse of the hanging wall (i.e., Hess Escarpment).

Modified from: Reference 253

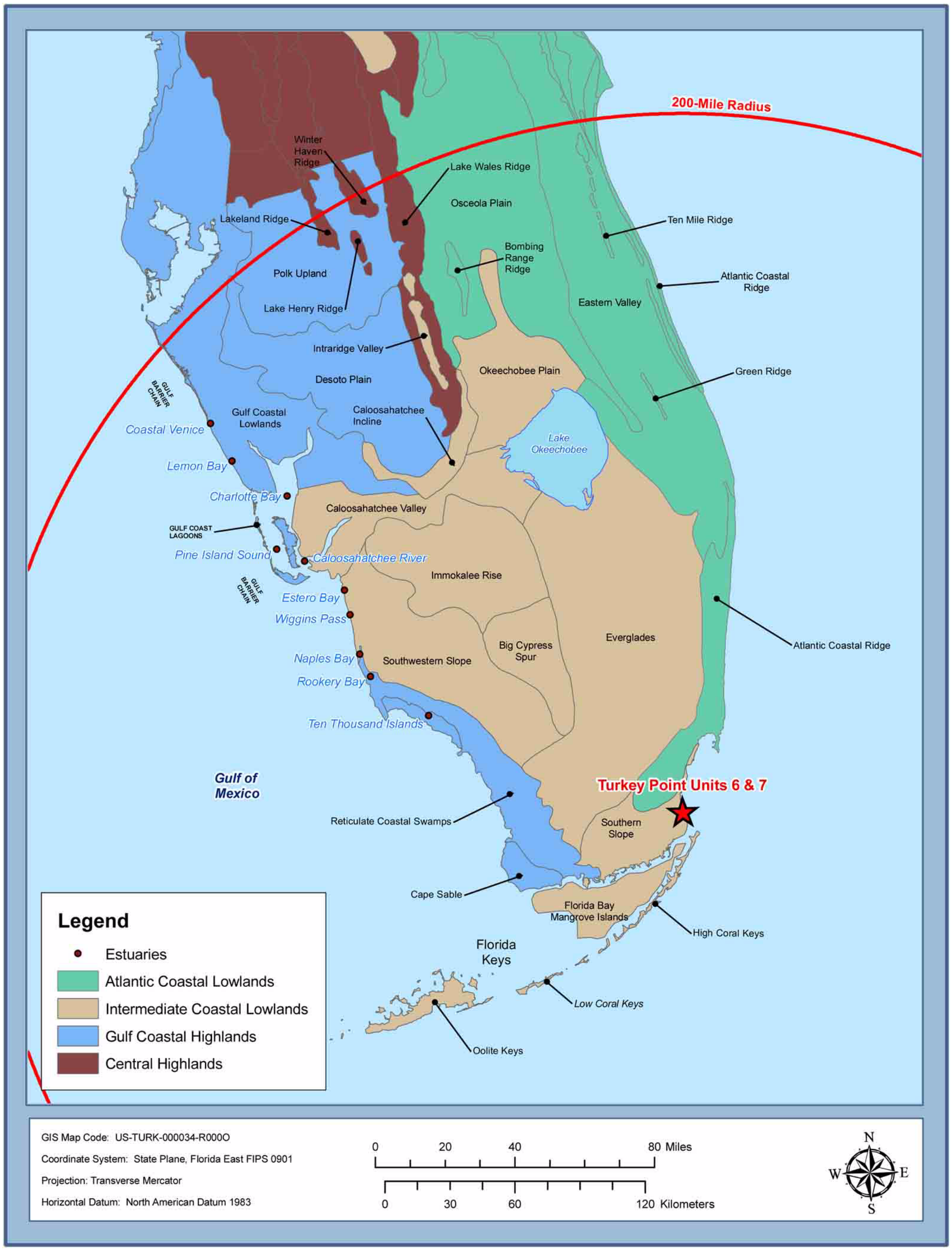
Figure 2.5.1-216 Interpreted Transition from Normal Oceanic Crust to Oceanic Plateau in the Venezuelan Basin



Note: Shows interpretation of major horizons of the Venezuelan Basin in multichannel seismic line 1293 in two-way time (top) and converted thicknesses (bottom) using averaged sonobuoy velocities.

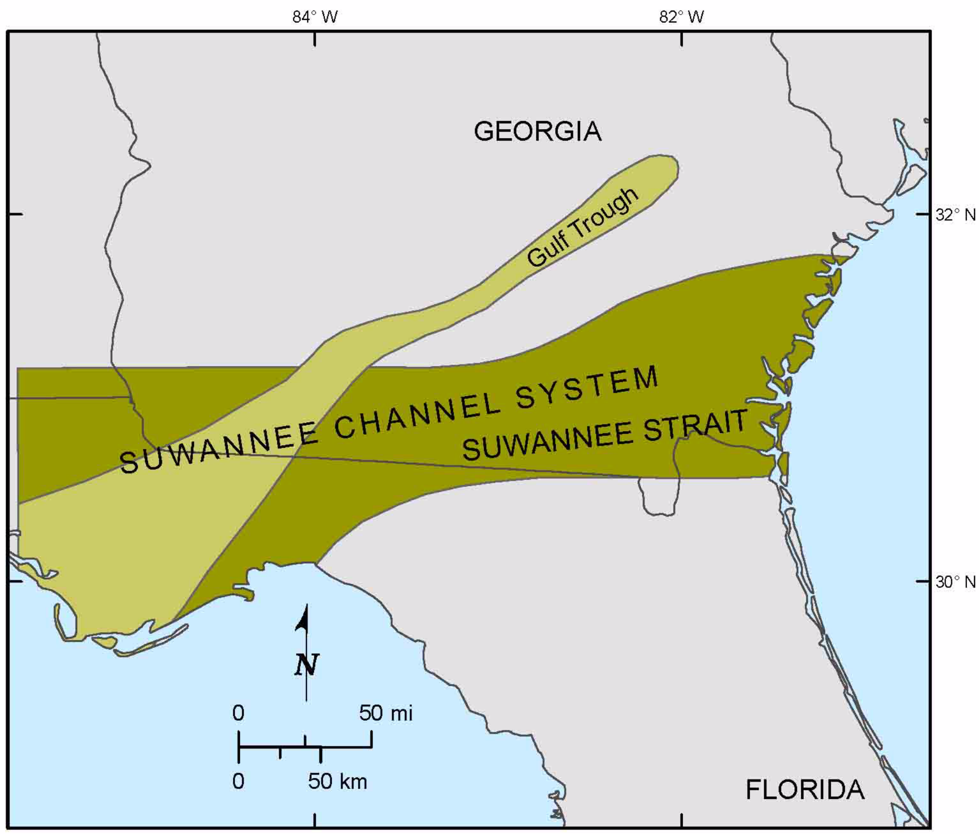
Modified from: Reference 255

Figure 2.5.1-217 Physiography of Florida



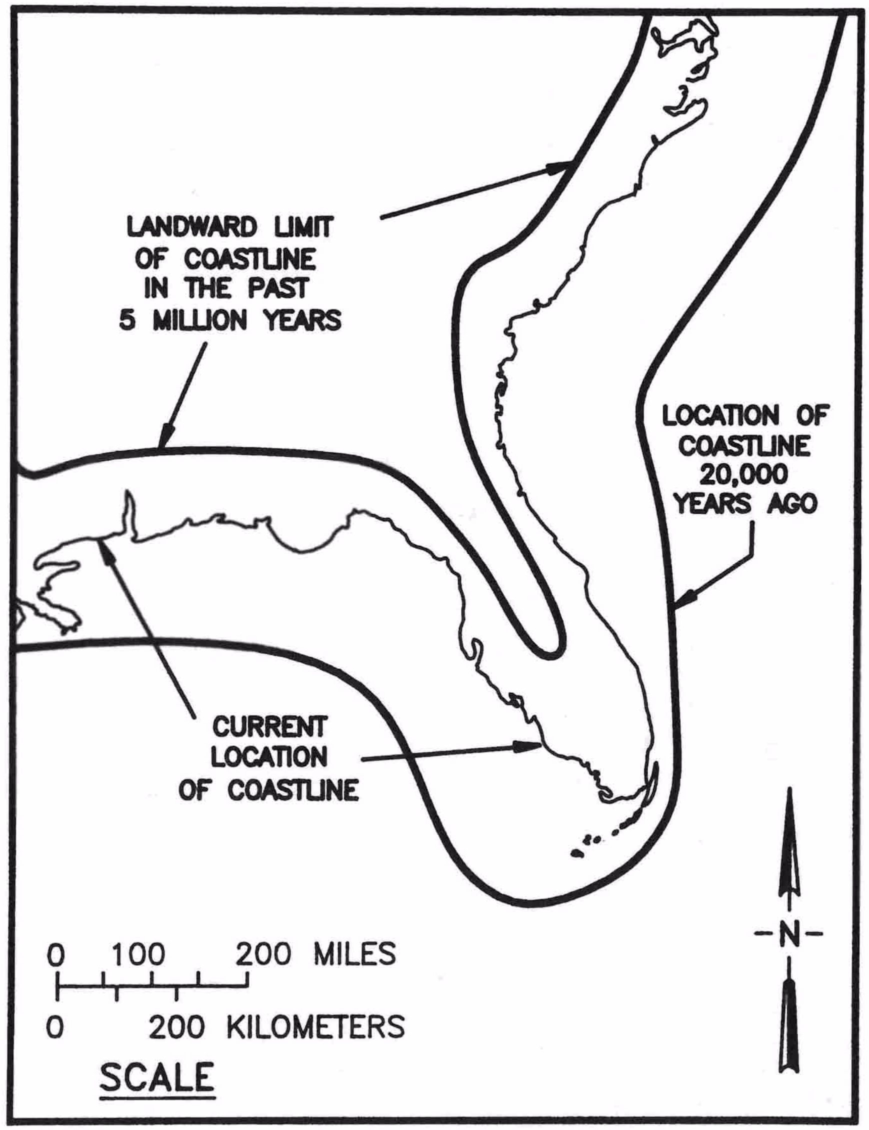
Modified from References 265 and 266

Figure 2.5.1-218 Suwannee Channel System



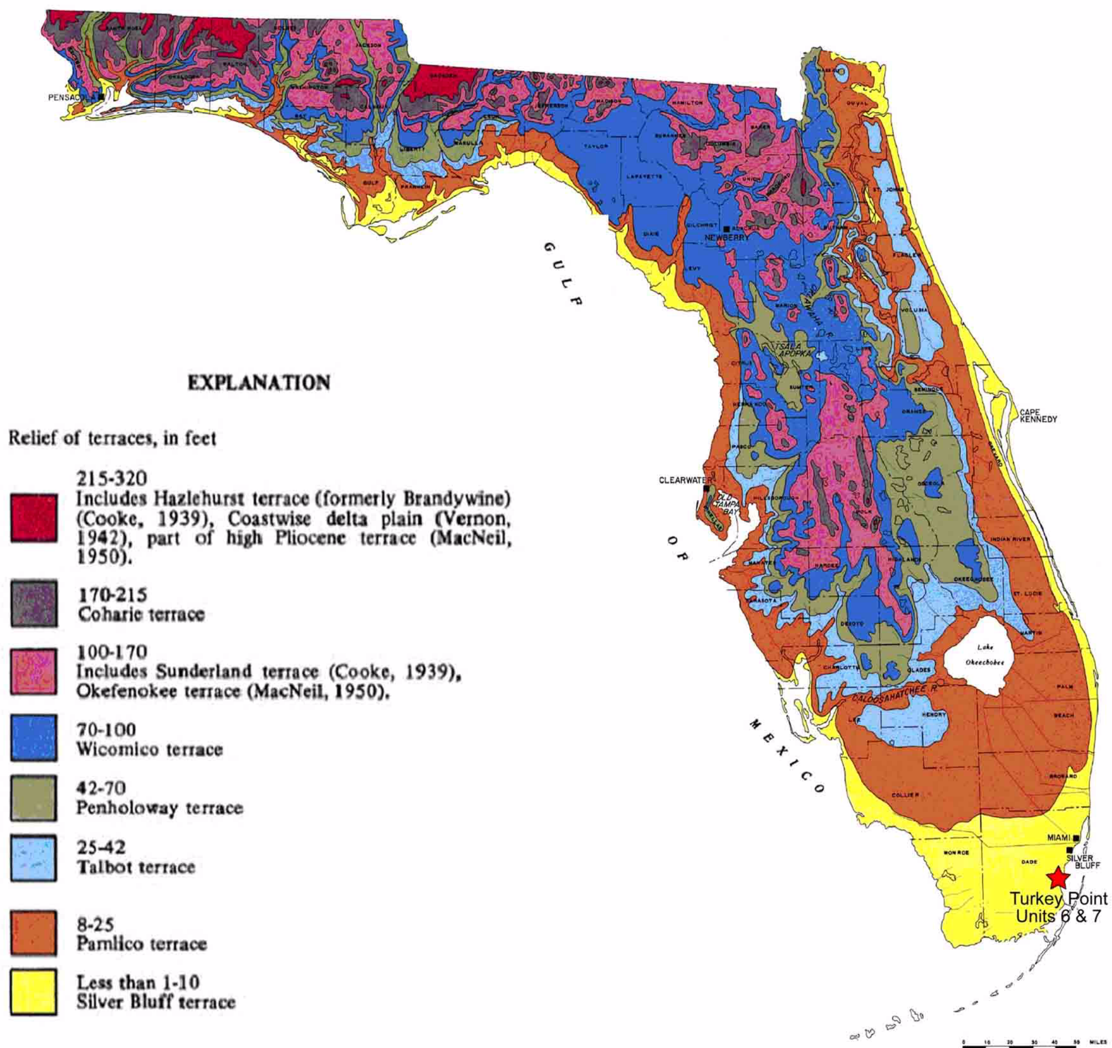
Modified from: Reference 388

Figure 2.5.1-219 Ancient Florida Coastlines



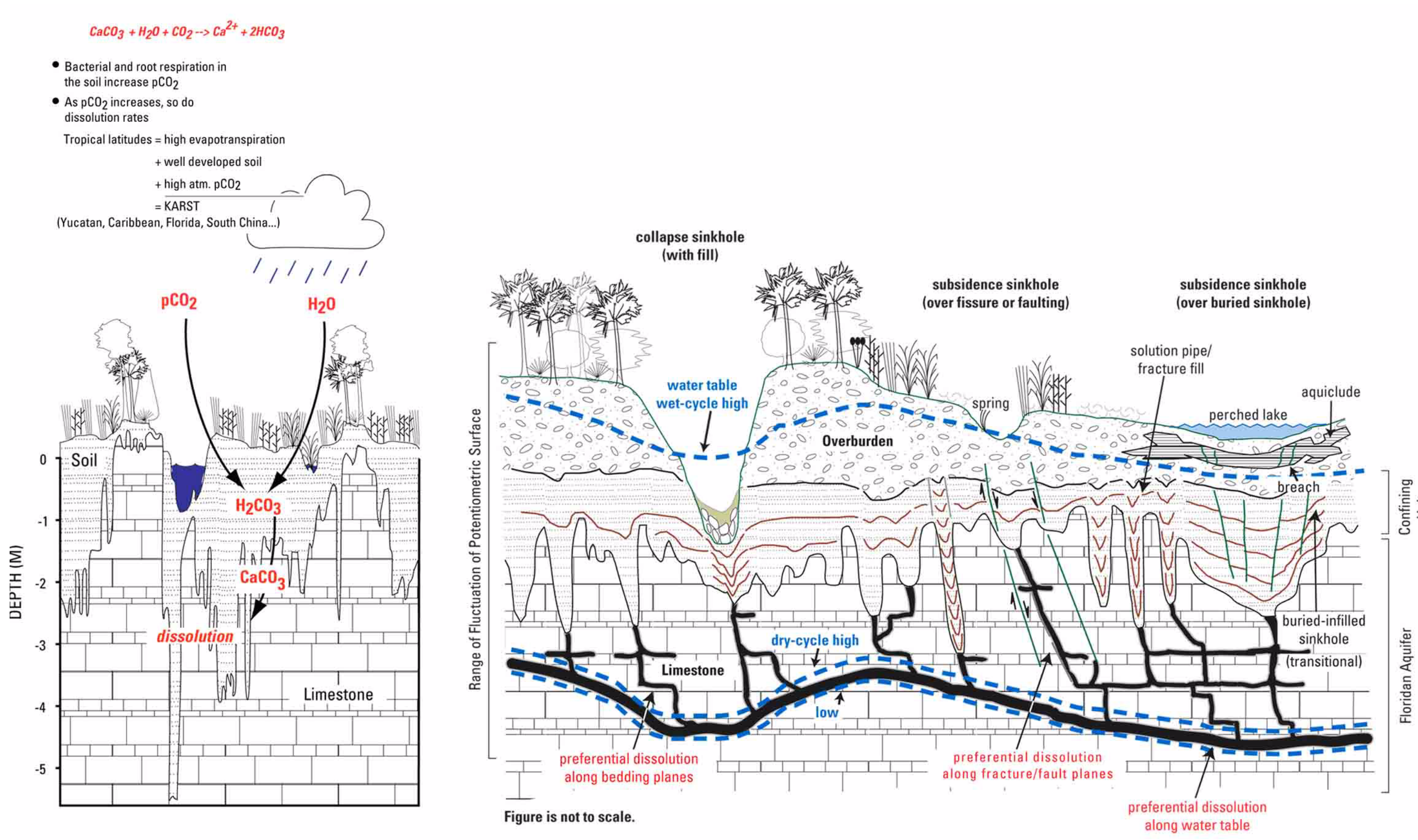
Source: Reference 266

Figure 2.5.1-220 Terraces and Shorelines of Florida



Modified from: Reference 261

Figure 2.5.1-221 Karstification Process

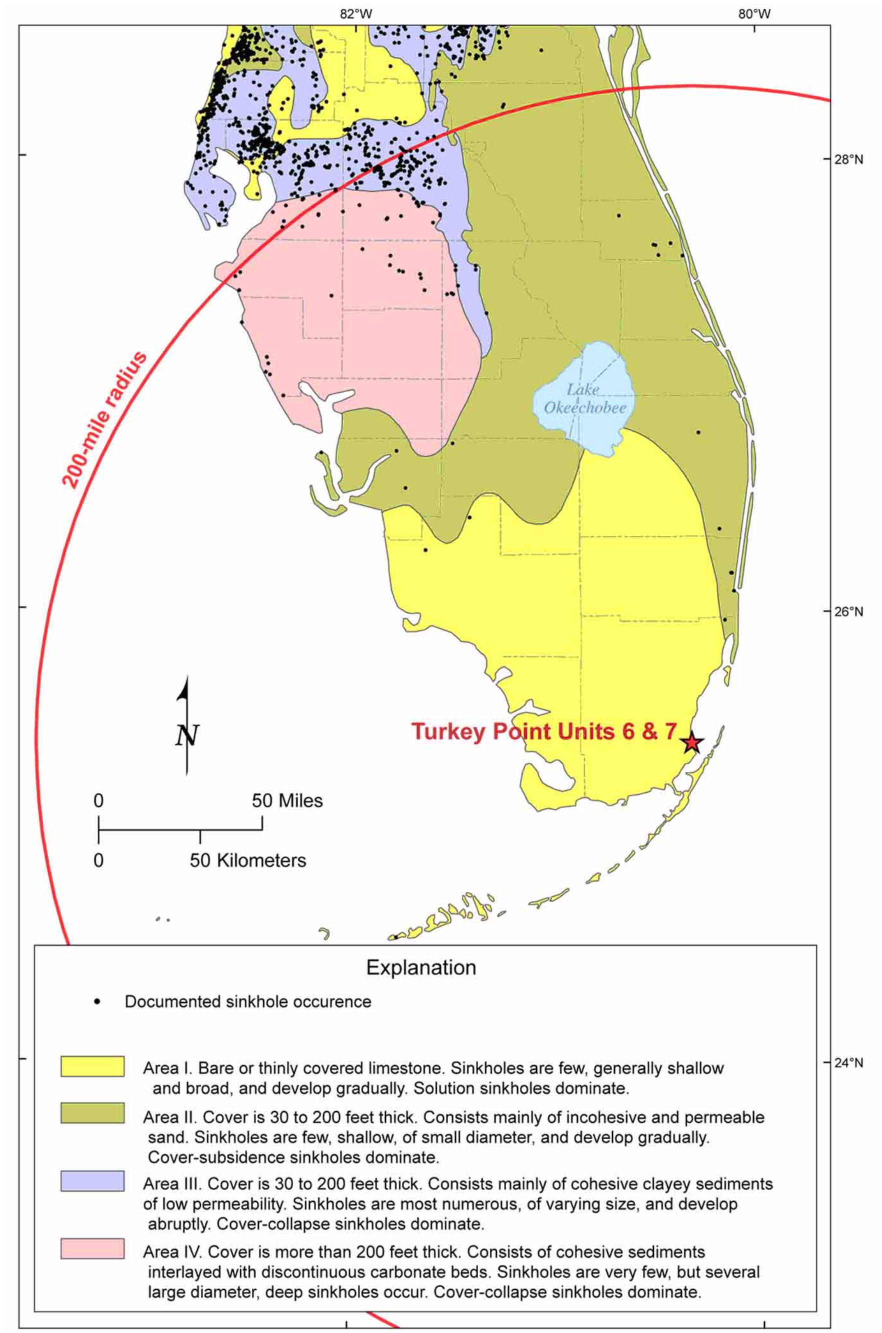


(a) Carbonate dissolution process and karst formation

(b) Solution and collapse features of karst and karren topography

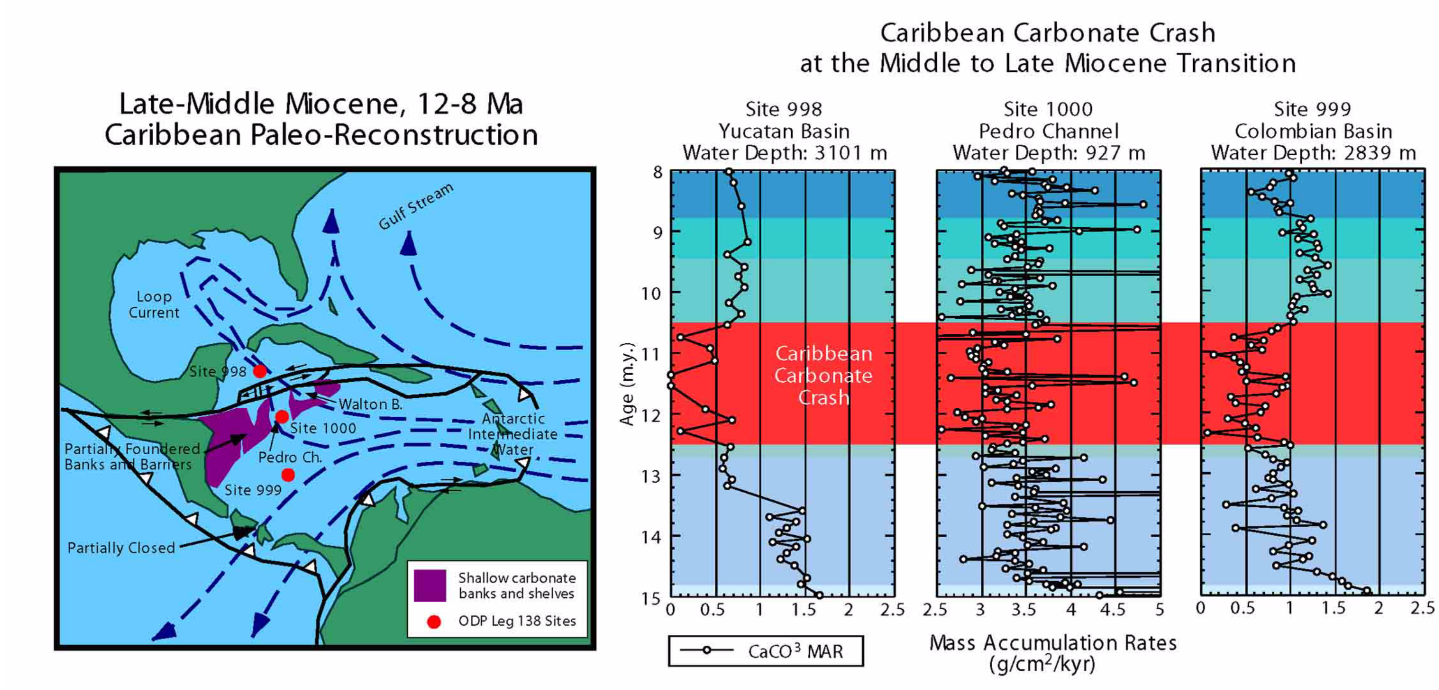
Modified from: Reference 760

Figure 2.5.1-222 Sinkhole Type, Development, and Distribution



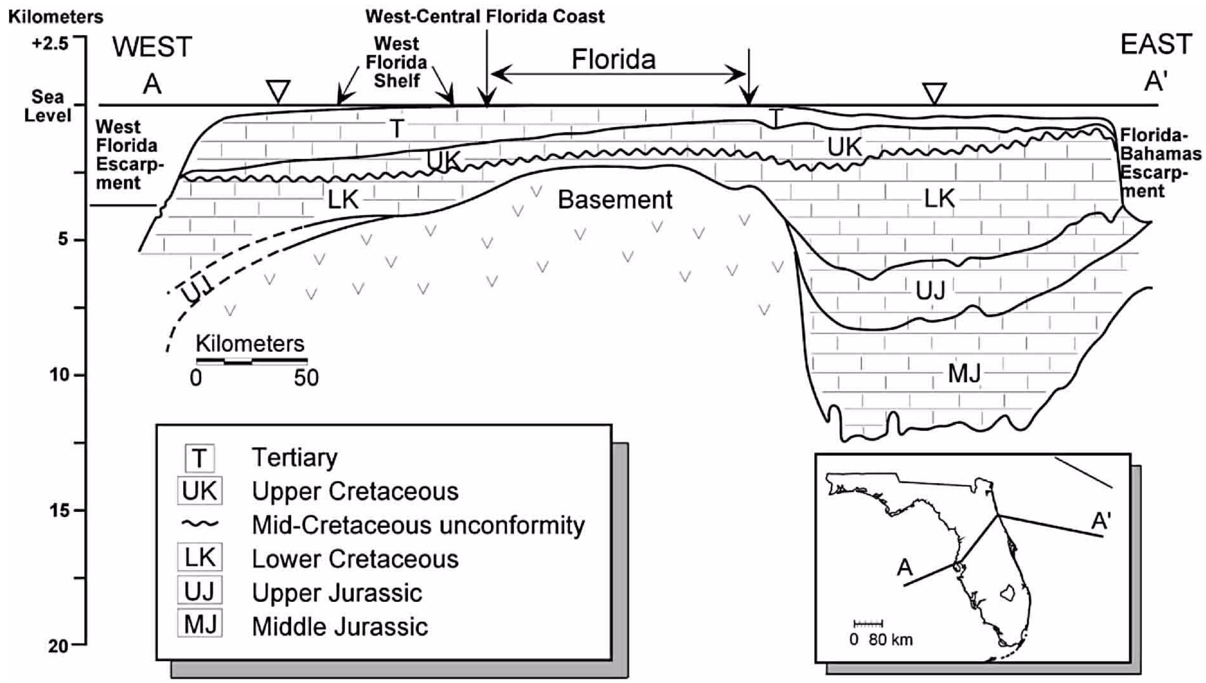
Data source: Reference 264

Figure 2.5.1-223 The Caribbean Carbonate Crash and Initiation of the Modern Global Thermohaline Ocean Circulation



Modified from: Reference 879

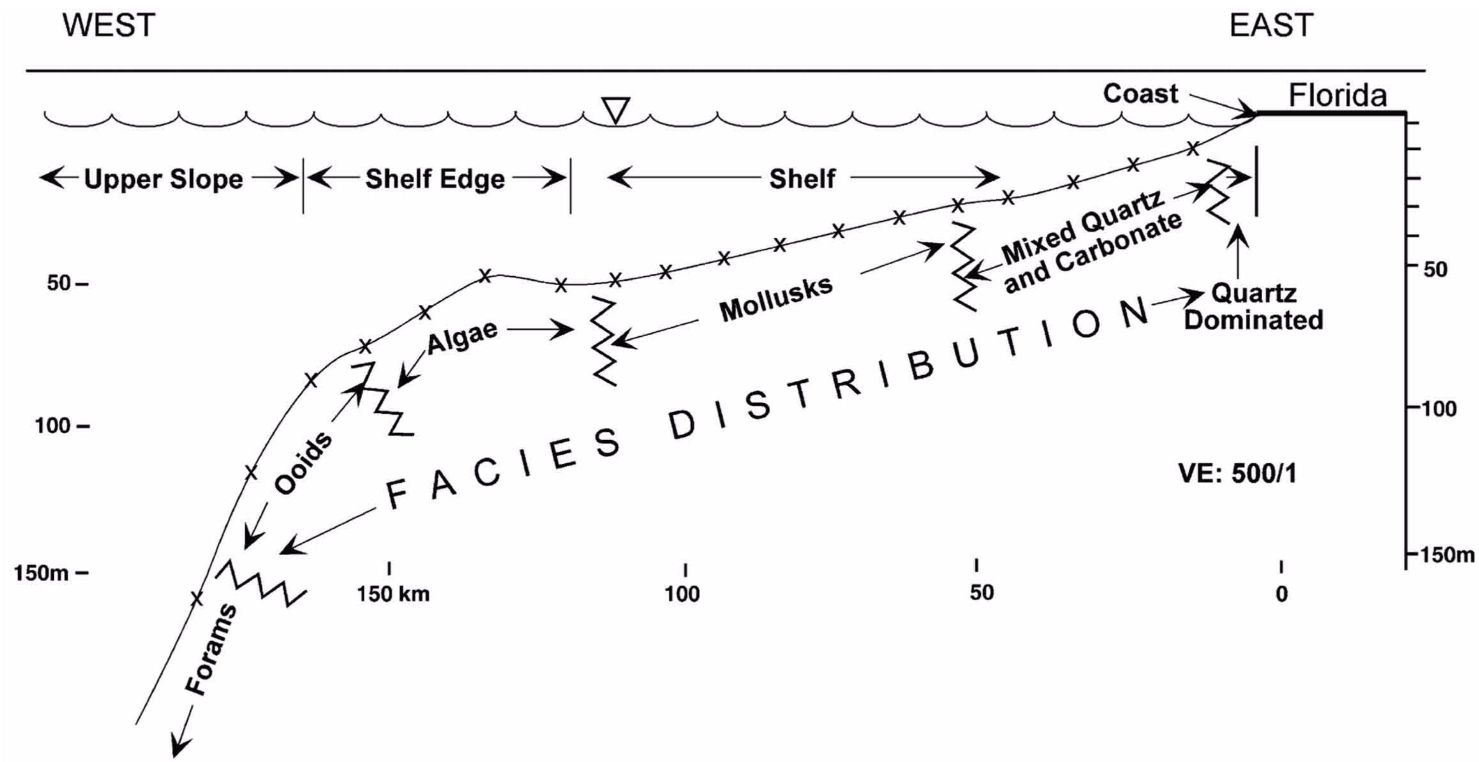
Figure 2.5.1-224 Cross Section of the Florida/Bahama Platform Showing Range of Thickness of Carbonate Rocks Covering Basement Rocks



Note: Peninsular Arch forms the backbone of peninsular Florida. About 4 kilometers (2.5 miles) of shallow water carbonates underlie portions of the site area. This figure shows that the west Florida shelf is a low-gradient carbonate ramp.

Source: Reference 764

Figure 2.5.1-225 Facies Distribution across the West-Central Florida Inner Shelf

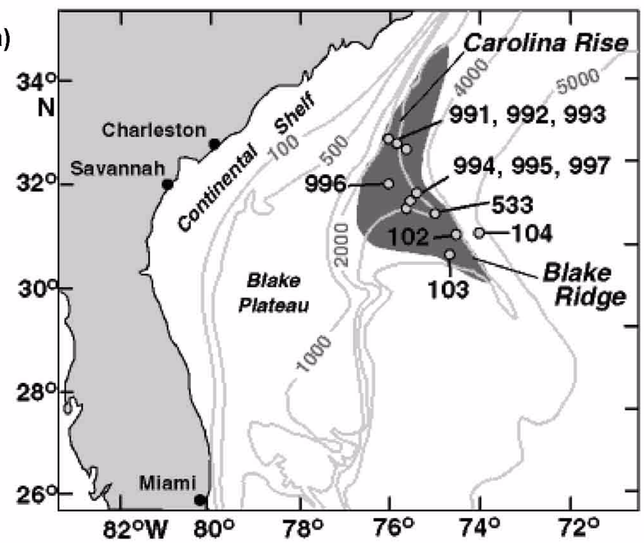


Note: Deposits along the coast are predominantly comprise quartz-rich sediments but contain a skeletal carbonate component. Just offshore, the skeletal components increase so that the inner shelf lies within the mixed quartz and carbonate zone. Further to the west out onto the shelf and upper slope, the carbonate content increases and belts of different carbonate constituents, including mollusks, algae, ooids and foraminifera, appear with broad transitions between the belts.

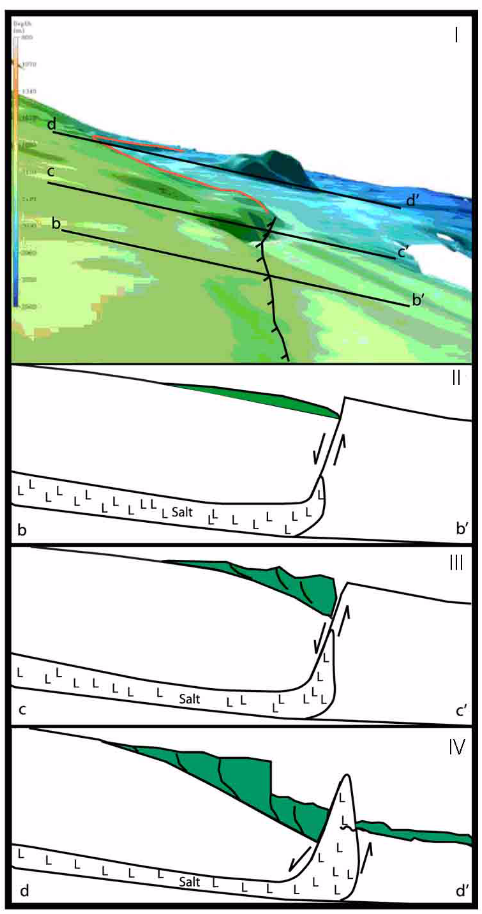
Source: Reference 764

Figure 2.5.1-226 Cape Fear Landslide and the Blake Ridge Salt Diapir Structure and Gas Hydrate Deposit

(a)



(b)



(I) Three-dimensional view of the Cape Fear Slide from the south,assuming a vantage point near the Blake Ridge Diapir and looking along the strike of the normal fault (black line with tick marks). The solid black lines show the locations of interpreted cross sections bb', cc' , and dd' (Figures II, III, and IV, respectively). Although Figures II through IV correspond to different parts of the fault, they also serve as a proxy for the impact of salt migration along the normal fault over time: The northernmost profile (dd') captures the most advanced stage of salt intrusion, and the southernmost profile captures the least (bb').
(II) Cross section coincident with Cape Fear Slide line 59, where the normal fault is observed. This likely represents the configuration of slumps (green), salt (hatched), and the normal fault at the Cape Fear Slide before sliding initiated.
(III) As normal faulting progressed, salt began to evacuate the subsurface, resulting in slope steepening along the down-dropped portion of the fault and some sliding.
(IV) Continued salt extrusion resulted in even further steepening, perpetuating mass wasting at the site and eventually leading to breaching of the salt structure.

Notes:
(a) Source: Reference 302
(b) Modified from: Reference 323

Figure 2.5.1-227 Physiography of Cuba

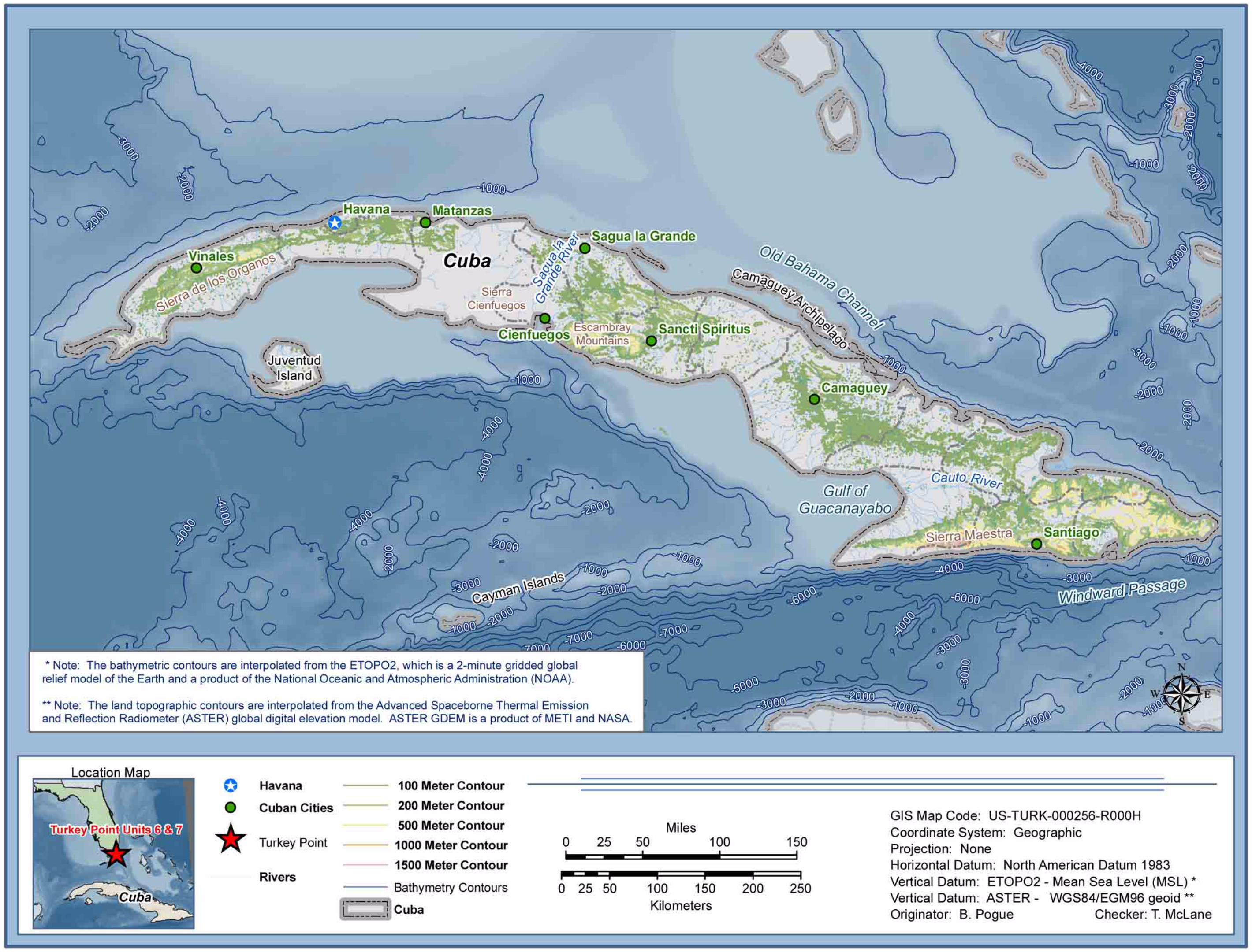


Figure 2.5.1-228 Paleozoic to Mesozoic Stratigraphy of Florida

ERA	SYSTEM	SERIES	STRATIGRAPHIC UNIT		LITHOLOGY	APPROXIMATE THICKNESS (ft)
MESOZOIC	CRETACEOUS	UPPER	Pine Key Formation		chalk, ls, dol	3000
		LOWER	Naples Bay Group	Corkscrew Swamp Fm	ls with anhyd & dol	450
				Rookery Bay Fm		500
				Panther Camp Fm		350
			Big Cypress Group	Dollar Bay Fm	ls w. dol & anhyd	450-620
				Gordon Pass Fm	anhyd w. ls & dol	475
				Marco Junction Fm	ls w. dol & anhyd	350
			Ocean Reef Group	Rattlesnake Hammock Fm	anhyd w. ls & dol	600
				Lake Trafford Fm	ls with anhyd, dol	150
				Sunniland Fm	ls with dol & anhyd	200-300
			Glades Group	Punta Gorda Anhydrite	salt with anhyd & dol	800
				Lehigh Acres Formation	anhyd, ls, dol	210
					ls, dol, brown dol zone	300
					sh	200
			Pumpkin Bay Formation		anhyd with ls	1200
			Bone Island Formation		ls with anhyd & dol	1300-2000
	JURASSIC	UPPER	Wood River Formation		dol, anhyd, salt, ss	1700-2100
		MIDDLE	basement volcanic province		felsic rocks: rhyolite porphyry	
		LOWER			mafic volcanics: basalt & diabase	
PALEOZOIC			Suwannee Terrane	Paleozoic sedimentary Suite	quartzitic sandstone & black shale	
				St. Lucie Metamorphic Complex	pan-African metamorphics	
				Osceola Granite	granite	
				Osceola volcanic complex	felsic meta-igneous	
TOTAL THICKNESS						12,750-14,300

Abbreviations:
ls = limestone
dol = dolomite
ss = sandstone
anhyd = anhydrite
sh = shale
Fm = formation

Sources: References 352, 339, 338, 354, 366, 467, and 470