

Evoluzione geologica del Monte Etna: dalle più antiche manifestazioni vulcaniche ai nostri giorni

Stefano Branca

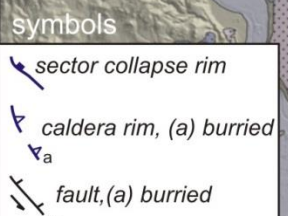
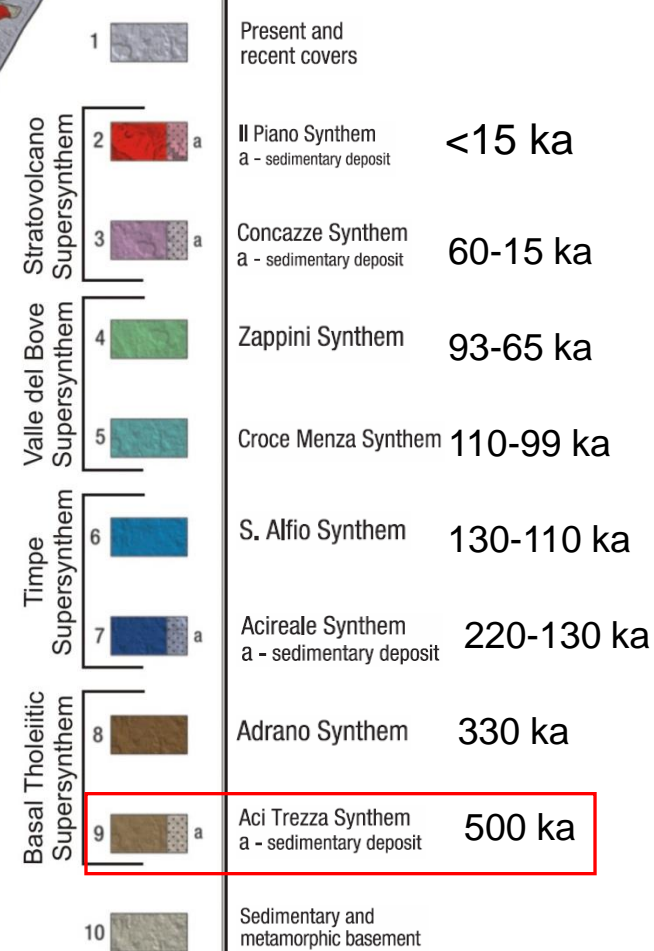
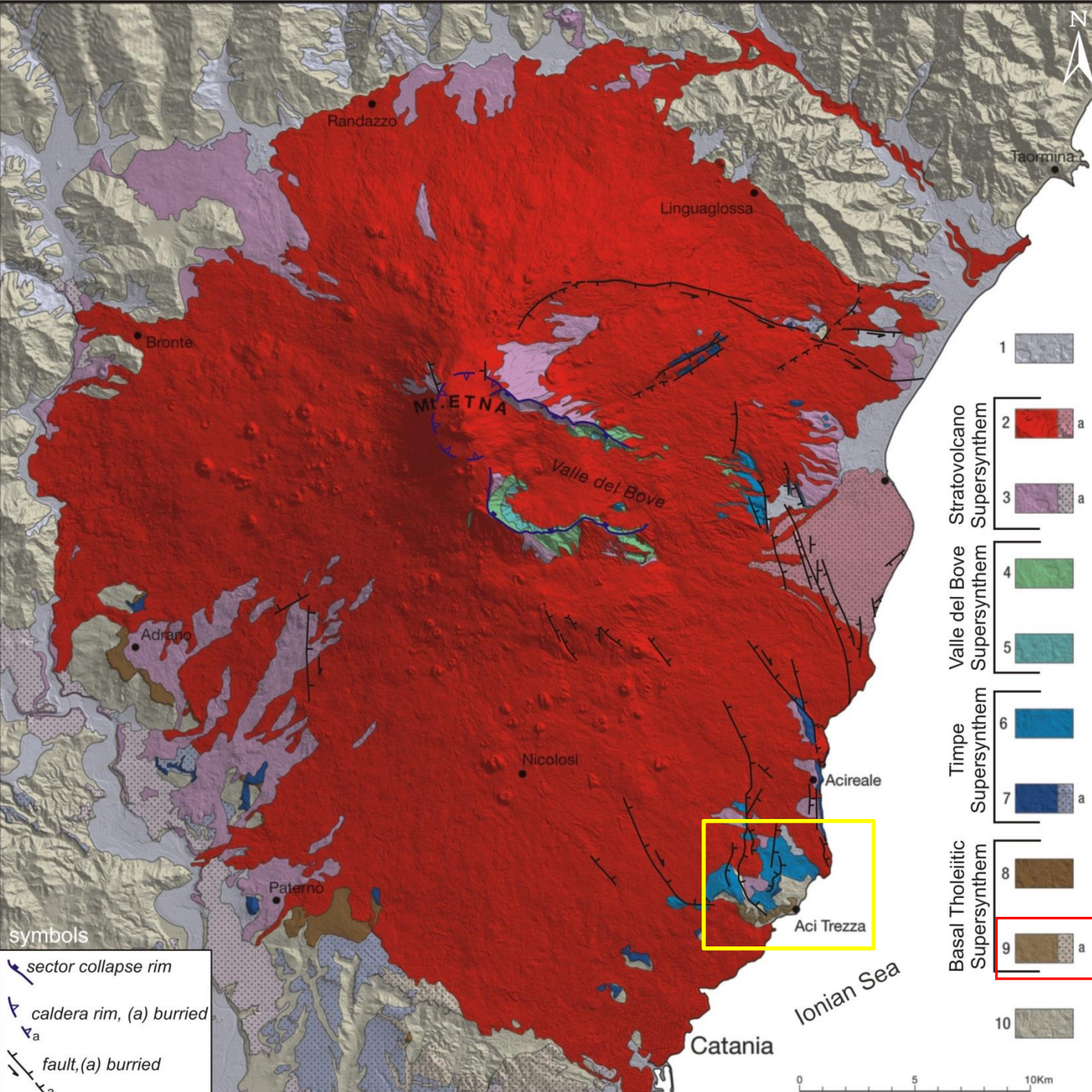


Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Catania-Osservatorio Etneo



Evoluzione Geologica

(Branca et al., 2011)

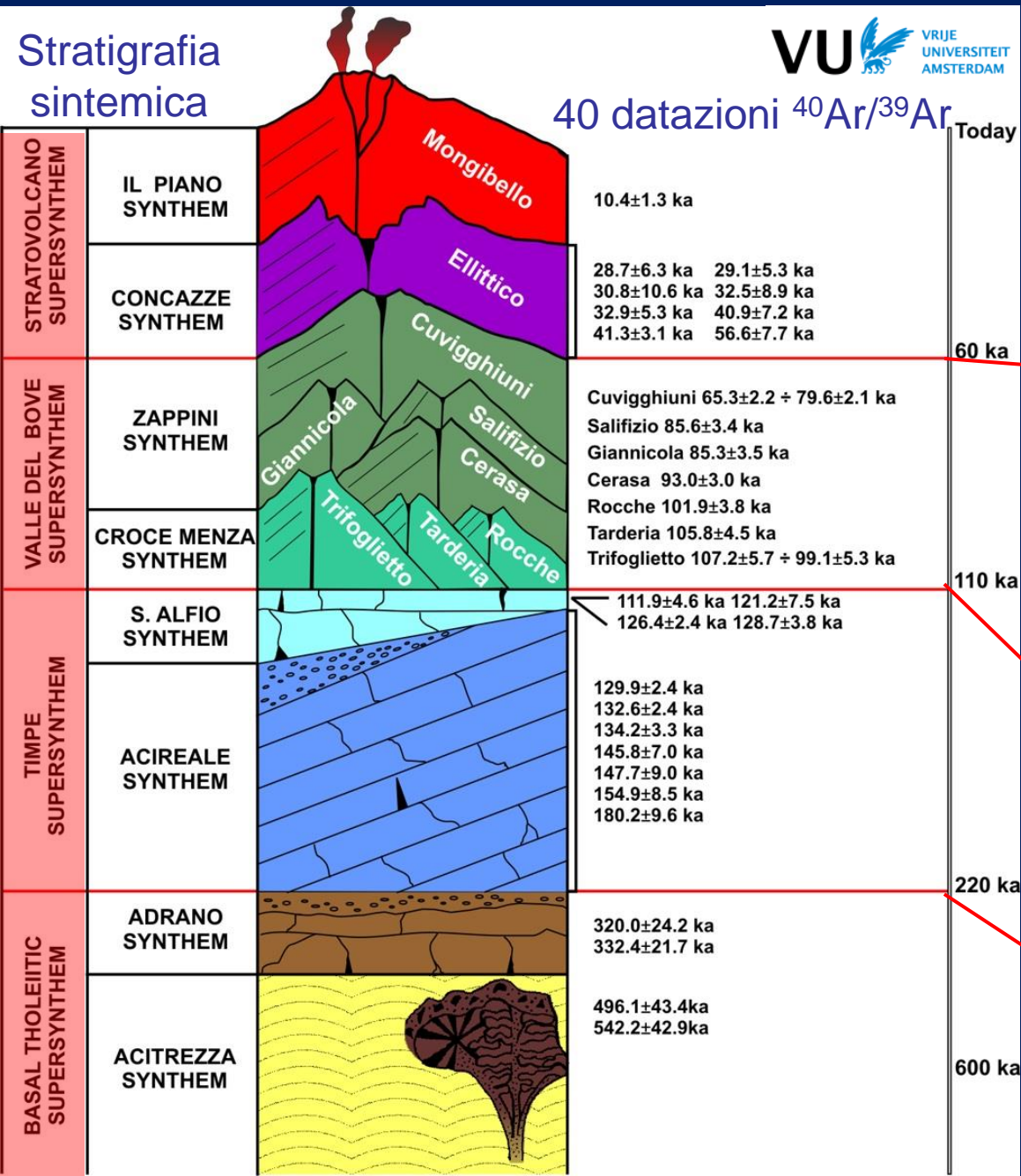


Evoluzione geologica del Monte Etna

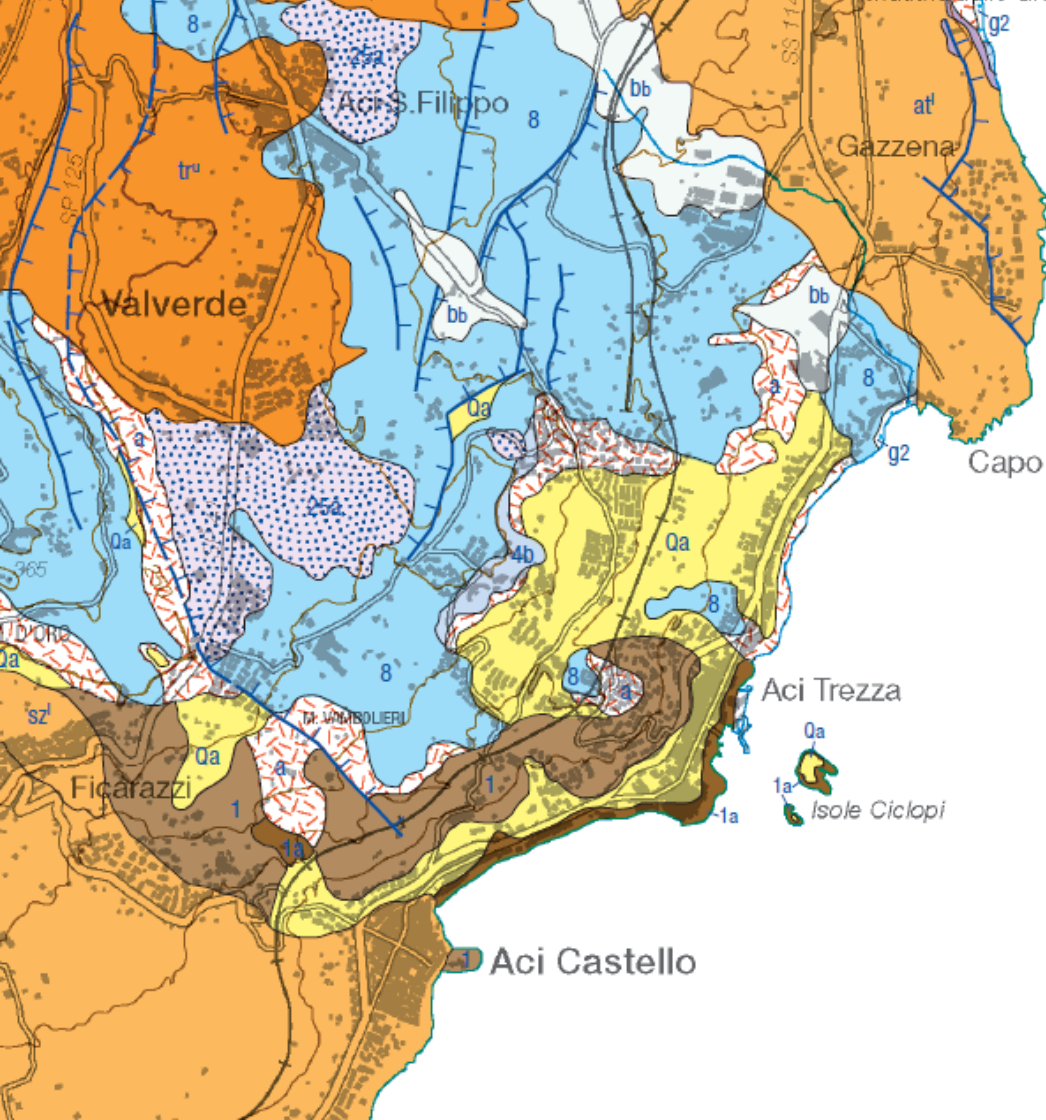
Stratigrafia sintemica



40 datazioni $^{40}\text{Ar}/^{39}\text{Ar}$

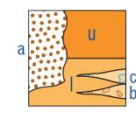


Supersistema	Sintema	Unità litostrofiche	Prodotto vulcanico	Prodotto sedimentario	Intervalli di incertezza stratigrafica / Intervallo di deposizione
Supersistema Stratovulcano	Sintema II Piano	Mongibello	3	formazione Torre del Filosofo 3 - 1971 d.C. - attuale	-
		Concazze	2	2 - 1669 d.C. - 1971 d.C.	
	Sintema Concazze	Ellittico	1	1 - 122 a.C. - 1669 d.C.	
		Cuvigghiuni	u	formazione Pietracannone membro superiore 3,9 ka - 122 a.C. (u) membro inferiore 15 ka - 3,9 ka (f) membro Cubania (a) membro Ilio (b) membro Chiancone (c)	
Supersistema Valle del Bove	Sintema Zappini	Giannicola	a b c	formazione Portella Giumenta membro Osservatorio Etno (a) membro Ragabo (b) membro Ignimbrite di Biancavilla-Montalto (c)	-
		Salifizio	a b	formazione Monte Calvario	
	Sintema Croce Menza	Tarfoglietto	a b	formazione Simeto membro Piano d'Aragona (a) membro Contrada Ragaglia (b)	
		Rocche	a	formazione Piano Provenzana membro Tripodo (b) membro Tagliaborsa (a)	
		Trifoglietto	a b	Formazione Pizzi Deneri membro superiore (b) membro inferiore (a)	
	Sintema S. Alfio	Monte Cerasa	a	Formazione Serra delle Concazze	
		Monte Fior di Cosimo	a	Formazione Canalone della Montagnola	
	Sintema Acireale	Trifoglietto	a	formazione Serra Cuvigghiuni membro Laghetto (a)	
		Rocche	a	formazione Acqua della Rocca	
		Acitrezza	a	formazione Serra del Salifizio	
Supersistema Timpe	Sintema S. Alfio	Trifoglietto	a	formazione Valle degli Zappini	-
		Rocche	a	formazione Serra Giannicola Grande membro Belvedere (a)	
	Sintema Acireale	Trifoglietto	a	formazione Monte Fior di Cosimo	
		Rocche	a b	formazione Monte Scorione	
Sintema Adrano	S. ALFIO SYNTHEM	Valverde	a	formazione Piano del Trifoglietto	-
		Moscarello	a	formazione Rocche membro Rocca Capra (b) membro Rocca Palombe (a)	
	Calanna	a	formazione Contrada passo Cannelli		
Sintema Acitrezza	S. ALFIO SYNTHEM	Valverde	a	formazione Timpa membro S. Maria la Scala (a) membro Paternò (b) membro Leucatia (c)	-
		Moscarello	a	formazione Timpa di Don Masi membro S. Caterina (b) membro Farnata S. Venera (a)	
	Calanna	a	formazione San Placido		
Supersistema Tholeiiti basali	Sintema Adrano	Valverde	a	formazione S. Maria di Licodia membro neck Motta S. Anastasia (a)	-
		Moscarello	a	ghiaie di M. Tirti	
	Calanna	a	sabbie di S. Giorgio		
Sintema Acitrezza	S. ALFIO SYNTHEM	Valverde	a	formazione Aci Castello membro Isole Ciclopi (a)	-
		Moscarello	a		



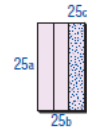
MOUNT ETNA VOLCANIC DISTRICT STRATOVOLCANO SUPERSYNTHEM II Piano Synthem

Pietracannone formation
Upper member 3.9 ka - 122 BC (u)
Lower member 15 ka - 3.9 ka (l)
Cubania member (a)
Milo member (b)
Chiancone member (c)



Concazze Synthem Ellittico Volcano

Portella Giumenta formation. Complex pyroclastic succession subdivided into three members. Radiocarbon ages: 15,420±60 a, 15,050±70 a [Unit D in cf. 5].
Osservatorio Etneo member (25a): proximal pyroclastic fall deposits made of black scoriae spatters that become reddish and partially welded at the top. Spatters form locally massive red and grey beds, including black aphyric portions. At the base, a yellowish pumice bed crops out. The distal deposits are formed by four light grey pumice fall layers interbedded with paleosols. Composition ranges from benmoreite to trachyte [cf. 5, 9]. The maximum thickness is 10 m.



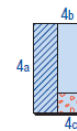
TIMPE SUPERSYNTHEM S. Alfio Synthem

Valverde formation. Lava flow succession interbedded with thin epiclastic deposits and, locally, with a proximal pyroclastic deposit made of ash layers, lapilli and bread-crust bombs with clay xenoliths. Lava composition ranges from hawaiite to mugearite [cf. 11], porphyric texture with phenocrysts of pl, px, ol, variable in quantity and size. The maximum thickness is 70 m. Radiometric ages [cf. 6]: 121.2±15.0 ka, 111.9±9.2.



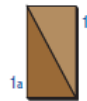
Acireale Synthem

Timpa formation. Succession of thick lava flows (4a), thin lava flows and scoria cone deposits (4b) and volcanoclastic deposits (4c). Lava composition ranges from basalt to mugearite [cf. 9].
S. Maria La Scala member (4a): Thick massive lava flows interbedded with red and yellow epiclastic deposits. Lava exhibits porphyritic texture with phenocrysts of px, ol and pl, variable in quantity and size. Crops out along the coast bordering the Grotta delle Palombe plug, made of columnar lavas, grading upward to a brownish lava breccia. The maximum thickness is 100 m. Radiometric ages [cf. 6]: 154.9±17.0, 147.7±18.0, 145.8±14.0 ka, 132.6±4.8 ka, 129.9±4.8 ka.
Paternò member (4b): Thin lava flows deep-weathered and eroded in isolated outcrops associated with proximal pyroclastic fall deposits formed by scoriaeous lapilli, bombs and lithic fragments mainly of alluvial pebbles. Lava has porphyritic texture with abundant phenocrysts of px and ol and pl. The maximum thickness is 100 m. Radiometric age [cf. 6]: 134.2±6.6 ka

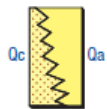


Aci Trezza Synthem

Aci Castello formation. Submarine volcanics tholeiitic and transitional in composition [cf. 11] composed of pillow lavas and hyaloclastic pillow-breccia exposed on the Aci Castello Castle Rock. On the Aci Trezza hill, pillow lavas and pillow breccia made of sharp-edged pillow fragments dispersed in a hyaloclastic matrix crop out. The maximum thickness is 130 m. Radiometric ages [cf. 6]: 542.2±85.8 ka, 496.1±86.8 ka.
Isole Ciclopi member (1a): On the Ciclopi Islands, subvolcanic bodies form a laccolith that shows well-developed columnar jointing; it is intruded into the Argille grigio-azzurre Formation, thermally metamorphosed along the contact aureole. Inland, they form small intrusive bodies having bulb-like shapes and columnar jointing.



FOREDEEP QUATERNARY MARINE DEPOSITS

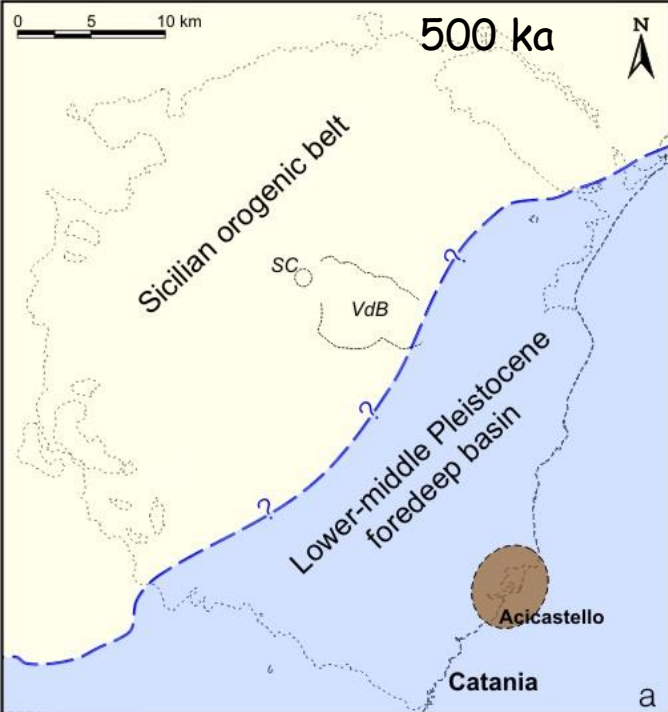


Argille grigio-azzurre Formation. Blue-grey marly clays (Qa). The Foraminifera assemblages are characterized by *Hyalinea baltica*, *Globorotalia inflata* and *Globorotalia truncatulinoides excelsa*. The marly clays grade laterally and upward into bioclastic calcarenites, sands and fossiliferous sandy clays (Qc) with benthonic foraminifera such as *Asterigerinidae*, *Rotaliidae*, *Elphidiidae*. The thickness is 200 m. Age: Lower-Middle Pleistocene.

Carta geologica del vulcano Etna

scala 1:50.000

Branca et al., 2011



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I fase **Basal Tholeiitic** (500 ka)



Branca et al., 2011

Rupe di Acicastello

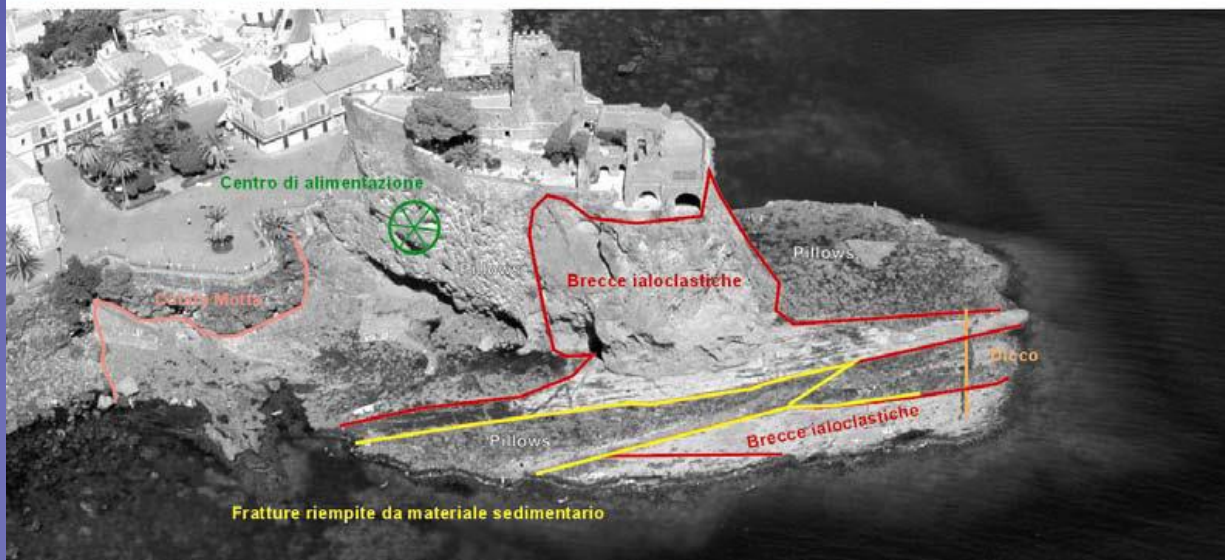
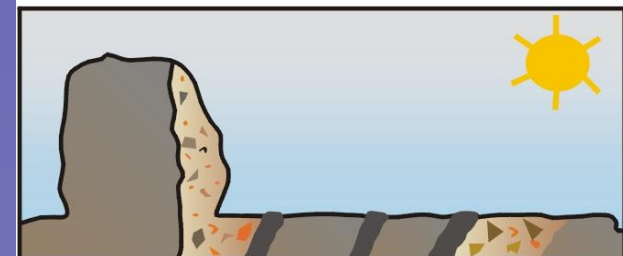
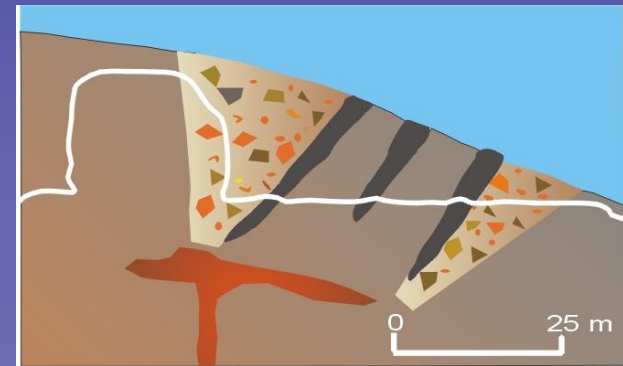
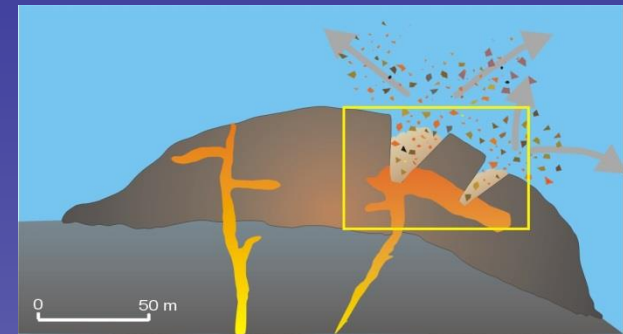
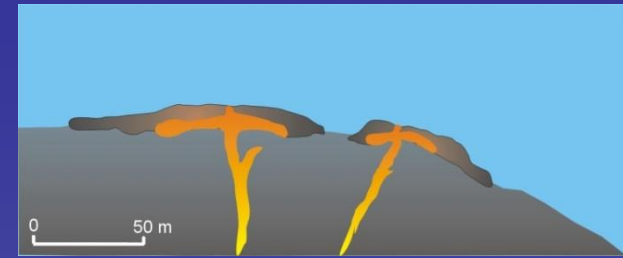
Colata lavica subaerea
Vulcano Mongibello
Età: 4 ka – 15 ka

De Beni, 2002

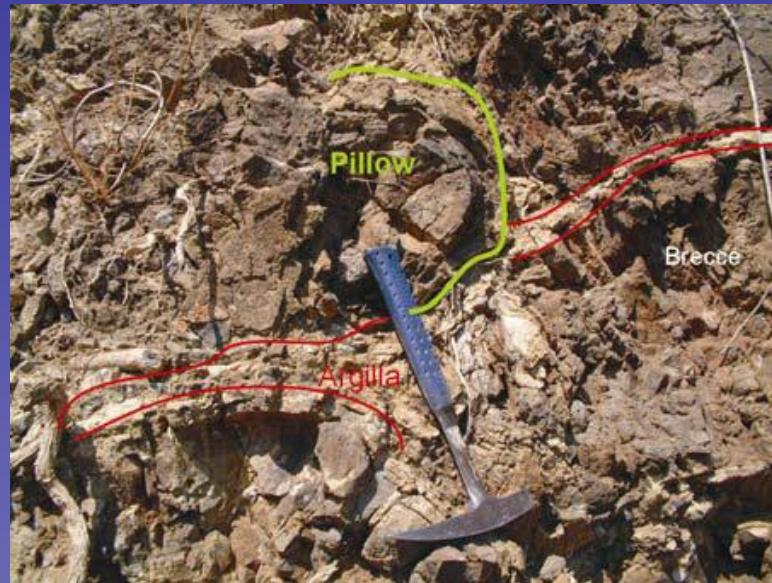
Evoluzione geologica del Monte Etna

I fase **Basal Tholeiitic** (500 ka)

Cristofolini & Corsaro, 2000



Corpo subvulcanico



Pillow, età: $542,2 \pm 45,8$ ka

De Beni et al., 2011

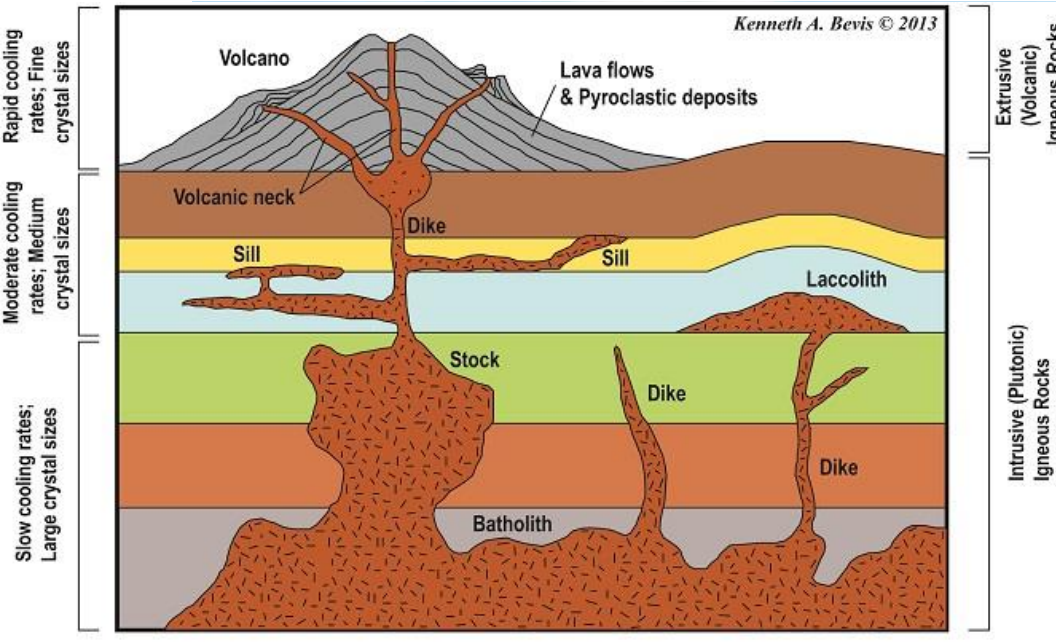


C) pillow immerso in una matrice di argilla termometamorfosata, si trova a tetto del corpo subvulcanico; D) Zeolite.



Corpo sub vulcanico, evidenziato dalla linea gialla, intruso nelle argille azzurre del Pleistocene inferiore-medio presso Aci Trezza (Fotografia E. De Beni).

Corpo subvulcanico Isola Lachea e faraglioni laccolite



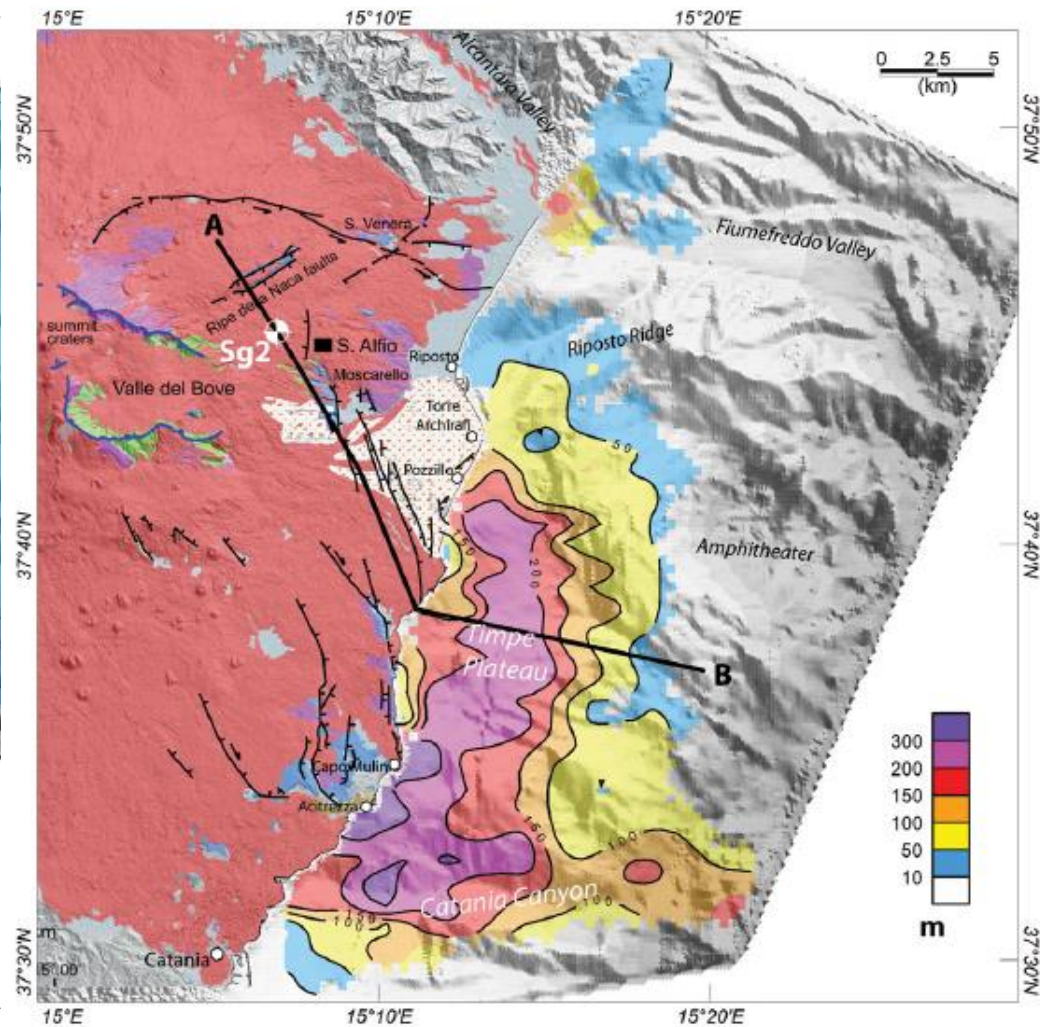
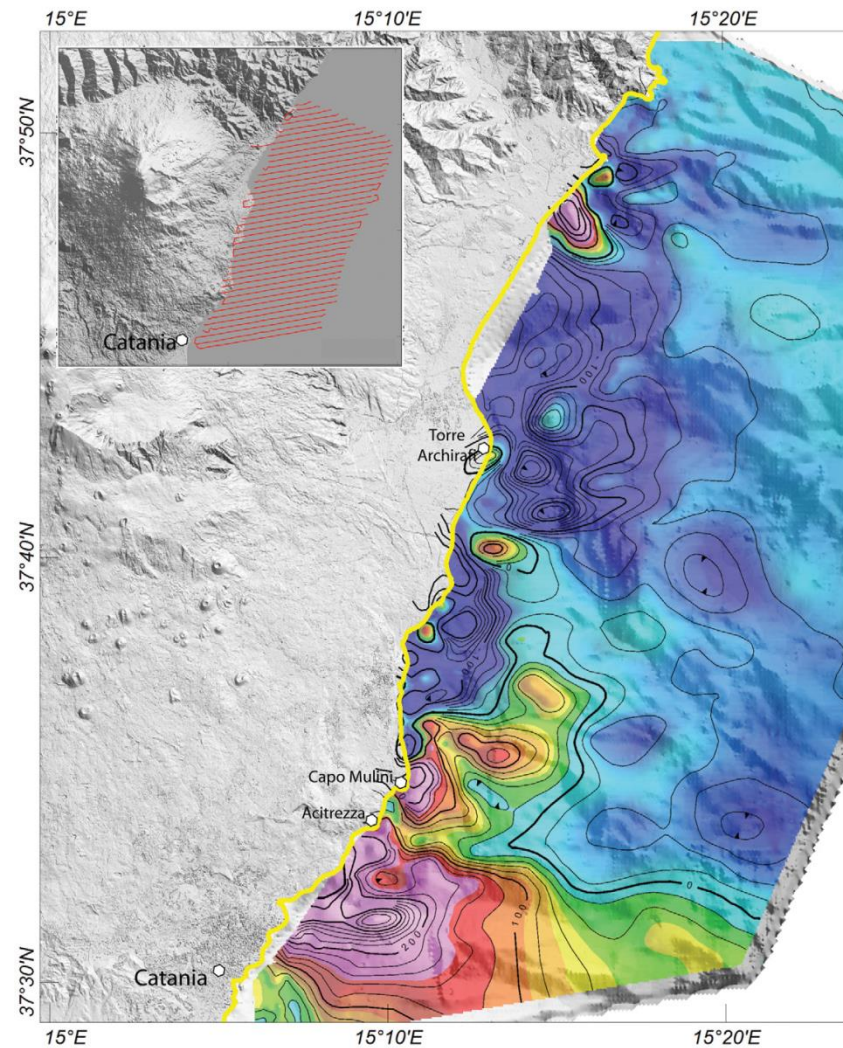
Extrusive (Volcanic) Igneous Rocks

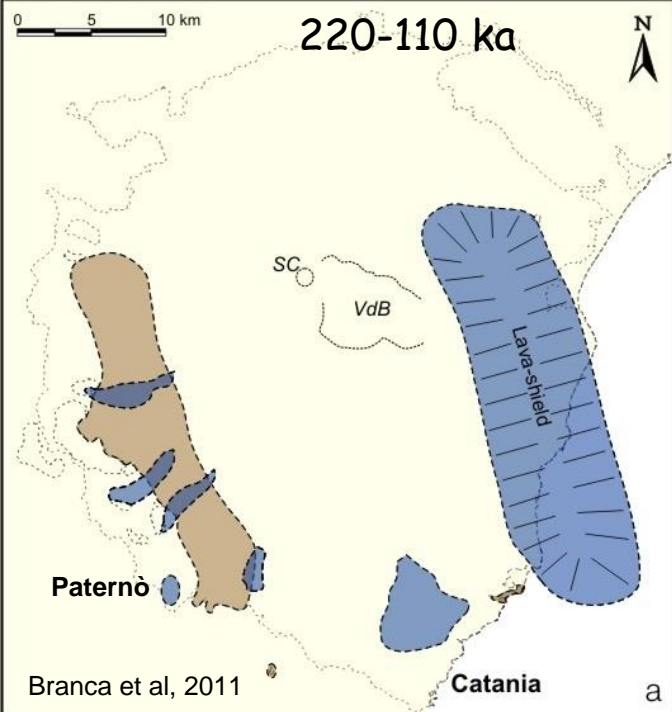


Intrusive (Plutonic) Igneous Rocks



Anomalia magnetica off-shore etneo





Timpe phase (220-110 ka)

