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# Dentro e fuori la Montagna

Giornate di incontri, divulgazione ed escursioni su  
*Geologia - Carsismo & Paleontologia*

## Inside and outside the Mountain

Information and excursions days on  
*Geology - Karst & Palaeontology*

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**PROGRAM & ABSTRACTS**



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## THE LATE MIOCENE DIATREMES OF NORTHERN HYBLEAN MTS. (SE SICILY): THE GEOSITE OF COSTA GIARDINI (SORTINO - SYRACUSE)

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The geosite “Diatrema di Costa Giardini” lies to the east of Sortino (Siracusa), in the northern Hyblean Mts. This is a multiple geosite, of areal type, which is at the institution stage by the Assessorato Regionale del Territorio e dell’Ambiente of the Regione Siciliana (L.R. 11.04.2012 n. 25 e dal D.A. attuativo n.87 del 11/06/2012).

The Late Miocene diatremes are located only in the northern region of the Hyblean Plateau, between the Siracusa-Sortino-Mt. Lauro alignment south and the Catania Plain north. Diatremes are cone-shaped pipe with a sub-circular edge, set in the Miocene limestones of the Monti Climiti Fm. (Calcari di Siracusa Mb.). Early external morphology of the Hyblean diatremes is often obliterated by recent volcanic and sedimentary products; the edges can be cross-cut by faults, or covered by volcanoclastic deposits that expand over the edges of the diatreme, shrouding the neighbouring eruptive centres.

The volcanoclastic deposits of the Carlentini Fm. consist of three lithofacies, exhibiting latero-vertical heteropy: tuff-breccia deposits occur inside or near the pipes, cross-bedded thin levels are set on the edges or near the conduits, and parallel/undulated-bedded levels are the most distal facies. On the basis of the distribution of these lithofacies, Carbone & Lentini (1981) and Carbone et al. (1986) recognized about 20 eruptive centres, whose diameters range from 200 m to 1 km (Cuppodia Mts. diatreme, east of Pedagaggi).

The Costa Giardini diatreme represents one of the best examples for its preservation state and fruition. This diatreme shows a funnel-shaped morphology, semi-circularly edged, opened south, with a diameter of about 700 m. The edges are formed by the Calcari di Siracusa Mb., overlaid with volcanoclastic levels, instead the crater is filled with volcano-sedimentary material consisting of tuff-breccia deposits, lava and calcareous blocks (of decametric dimensions) collapsed from the walls of the crater. The walls show an undulated surface, slightly sloping down to the eruptive centre.

The tuff-breccia deposits and the cross-bedded facies of the Costa Giardini diatreme, and more diffusely the Valle Guffari center (Buccheri), are characterized by the presence of deep-seated xenoliths (Scribano, 198 , 1988), which are ovoidal fragments of 2-30 cm in diameter, and are sometimes coated with the host lava. Hyblean xenoliths consist of dominant peridotites and pyroxenites and rare gabbroic rocks (Sapienza &



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Scribano, 2000), in addition to sedimentary and volcanic lithologies belonging to the Meso-Cenozoic succession (Bianchi et al., 1987). These xenoliths have a role of primary relevance in the study of the lithosphere beneath south-eastern Sicily, which lies upon an ancient serpentinized oceanic basement (Scribano et al., 2006a,b; Manuella, 2013, 2014, 2015), being a remnant of the Paleo-Mesozoic Ionian-Tethys Ocean that form the present Ionian-Hyblean-Pelagian domain.

Although diatremes do not represent a peculiarity in time and the country (see Eocene diatremes in the southern Trento region; Castellarin, 1966; Castellarin & Piccoli, 1966), Hyblean diatremes are unique in the regional country, and their scientific interest for the Italian and international community is unquestionable due to the aforementioned deep-seated xenoliths.

The Costa Giardini geosite is near to the archeologic area of the Necropolis of Pantalica. The degradation risk of the area is only natural. The geosite does not need interventions for the safety, up to date, except the proposed valorization of the area.

- BIANCHI F., CARBONE S., GRASSO M., INVERNIZZI G., LENTINI F., LONGARETTI G., MERLINI S. & MOSTARDINI F. (1987) - *Sicilia orientale: Profilo geologico Nebrodi-Iblei*. Memorie della Società Geologica Italiana, 38: 429-458.
- CARBONE S., GRASSO M. & LENTINI F. (1986) - *Carta geologica del settore nord-orientale ibleo (Sicilia SE)*, scala 1:50.000. S.EL.CA., Firenze.
- CARBONE S. & LENTINI F. (1981a) - *Caratteri deposizionali delle vulcaniti del Miocene superiore negli Iblei (Sicilia Sud-Orientale)*. Geologica Romana, 20: 79-101.
- CASTELLARIN A. (1966) - *I tufi eocenici a struttura caotica dei dintorni di Rovereto (Trentino Meridionale). Il problema delle tufiti*. Giornale di Geologia, 32 (2): 417-440.
- CASTELLARIN A. & PICCOLI G. (1966) - *I vulcani eocenici dei dintorni di Rovereto*. Giornale di Geologia, 33 (2): 292-365.
- MANUELLA F.C., BRANCATO A., CARBONE S. & GRESTA S. (2013) - *A crustal-upper mantle model for southeastern Sicily (Italy) from the integration of petrologic and geophysical data*. Journal of Geodynamics, 66: 92-102.
- MANUELLA F.C., BRANCATO A., CARBONE S. & GRESTA S. (2014) - *Reply to "Comments on the paper "A crustal-upper mantle model for southeastern Sicily (Italy) from the integration of petrologic and geophysical data" by Manuella et al. (2013)*. Journal of Geodynamics, 73: 81-82.
- MANUELLA F.C., SCRIBANO V., CARBONE S. & BRANCATO A. (2015) - *The Hyblean xenolith suite (Sicily): an unexpected legacy of the Ionian-Tethys realm*. International Journal of Earth Sciences (Geol. Rundsch.), DOI: 10.1007/s00531-015-1151-9.
- SAPIENZA G. & SCRIBANO V. (2000) - *Distribution and representative whole-rock chemistry of deep-seated xenoliths from the Iblean Plateau, southeastern Sicily, Italy*. Periodico di Mineralogia, 69: 185-204.



- SCRIBANO V. (1987) - *The ultramafic and mafic nodule suite in a tuff-breccia pipe from Cozzo Molino (Hyblean Plateau -SE Sicily)*. Rendiconti della Società Italiana di Mineralogia e Petrologia, **42**: 203-217.
- SCRIBANO V. (1988) - *Petrological notes on lower-crustal nodules from Hyblean Plateau (Sicily)*. Periodico di Mineralogia, **57**: 41-52.
- SCRIBANO V., IOPPOLO S. & CENSI P. (2006b) - *Chlorite/smectite-alkali feldspar metasomatic xenoliths from Hyblean Miocenic diatremes (Sicily, Italy): evidence for early interaction between hydrothermal brines and ultramafic/mafic rocks at crustal levels*. Ofioliti, **31**: 161-171.
- SCRIBANO V., SAPIENZA G., BRAGA R. & MORTEN L. (2006a) - *Gabbroic xenoliths in tuff-breccia pipes from the Hyblean Plateau: insights into the nature and composition of the lower crust underneath South-Eastern Sicily, Italy*. Mineralogy and Petrology, **86**: 63-88.