Online Resource 1

Legends of the four abiotic matrices used to assess geodiversity

In the following, the detailed legends of the four abiotic matrices that are used to define geodiversity are reported.

The units of Geological maps No. 465 (Isola di Procida) and No. 446-447 (Napoli) at scale 1:50.000 (ISPRA, 2015) were grouped to derive geolithological classes (Table OR1-1).

The geomorphological matrix was developed from the map published by Ascione et al. (2020). Some modifications have been carried out to highlight specific landforms that may indicate typical microclimatic conditions and processes (Table OR1-2).

The soil types were inherited from Di Gennaro et al. (2002) (Table OR1-3).

Lithological data have been used to assess the permeability of the rock (Table OR1-4), a critical factor affecting the infiltration of water into areas responsible for aquifer recharge.

Label of geological units (CARG, ISPRA)	Geolithological classes	Label of geological units (CARG, ISPRA)	Geolithological classes
h, H_1, antr	Anthropic deposits		
b, a_1, i, a	Alluvial fan, landslide deposits, deposits of mixed origin	ERG, TEA, GCT, MVU, MLV, GPP, GNP, LFA, MOP, TGN_b, ISA, PMX, SGZ, ATN, AER, OAB, LVE, IGL, NCC, CSD, NCO, FLP, TOP, RAC, CIH, ISN, LMI, ATN_b, PTV, PPA_1	Loose pyroclastics
VEF_{2b}, b_2, b_7, b	Eluvial/colluvial deposits	VEF_{11}, VEF_{12}	Sequences of primary and reworked pyroclastic deposits
D, g_2, c	Aeolian deposits and present beaches	PBC, TGC_1, TVD TBF, TMS, TCF, TCM, TNI, TPT, GA	Loose to weakly lithified pyroclastic deposits
e, e_3, d	Lacustrine, marsh and lagoon deposits	TEC, ATN_a, LMP, UNT, OLB, DEI, IMT	Lava flow and domes
RZA, ZZU, e	La Starza and Pozzuoli units (pyroclastic and marine deposits)	TGC_a, TGN_a, TGN, OVO, TTR, TGC, MTF	Tuffaceous deposits (lithified)

Table OR1-1 – Legend of lithological matrix illustrated in Figure 2 (see text)

Label	Geomorphological feature		Label	Geomorphological feature
ANTR	Anthropic filling in coastal area		EFV	External flank of monogenetic volcano
DD	Dismissed dump		IFV	Internal flank of monogenetic volcano
AP	Alluvial plain		IP	Intra-crateric plain
ACP	Alluvial-coastal plain		SR	Scoria rampart
B	Beach		VF/FR	Volcanic slope/ flank remnants
DS	Dune system		ICP	Intra-caldera plain
RMT	Raised marine terrace		HSE	Hill slopes external to caldera
RACP	Raised alluvial coastal plain		HSI	Hill slopes internal to caldera
L	Lake		T	Talus

Table OR1-2 – Legend of geomorphological matrix illustrated in Figure 5a (see text)

Main system	System	Sub - system	Sub-system description	Soil type
F – Volcanic complex	F2	F2.1	Campi Flegrei hills with high to moderate altitude, made up of tuffaceous deposits overlain by pumice and ash deposits	Vitric Andosols, Molli-Vitric Andosols, Molli-Vitric Andosols (Epileptic)
F – Volcanic complex	F2	F2.2	Campi Flegrei hills with low altitude, made up of tuffaceous deposits overlain by pumice and ash deposits	Vitric Andosols, Molli-Vitric Andosols (Endoleptic)
F – Volcanic complex	F2	F2.3	Campi Flegrei hills with low to moderate altitude made up of tuffaceous deposits overlain by pumice and ash deposits	Vitric Andosols, Molli-Vitric Andosols
F – Volcanic complex	F2	F2.4	External Campi Flegrei caldera slopes	Molli-Vitric Andosols
F – Volcanic complex	F4	F4.2	Footslope of Vesuvius	Molli-Vitric Andosols, Molli-Vitric Andosols (Calcaric)
G - Foothills plain	G2	G2.2	Campania plain sector north of Campi Flegrei	Pachi-Vitric Andosols, Molli-Vitric Andosols
G - Foothills plain	G2	G2.3	Campi Flegrei intra-calderic plains	Pachi-Vitric Andosols
G - Foothills plain	G2	G2.4	Vesuvian foothill plain	Vitric Andosols, Molli-Vitric Andosols, Tephri-Thaptovitric Regosols
I – Alluvial plain	I2	I2.4	Alluvial plain of the Regi Lagni channel	Molli-Vitric Andosols (Calcaric, Fluvic), Calcari-Vitric Cambisols
I – Alluvial plain	I4	I4.2	Alluvial Plain of Sebeto River	Pachi-Vitric Andosols (Calcaric, Fluvic), Calcari-Vitric Gleysols, Anthropic Regosols
L – Coastal plain	L1	L1.1	Back-dune depressed areas of the Phlegraean coastal plain	Calcaric Gleysols, Calcari-Gleyic Cambisols, Areni-Calcaric Gleysols, Eutri-Sapric Histosols, Calcaric Arenosols
L – Coastal plain	L3	L3.1	Dune systems and beaches	Calcaric Arenosols, Rubi-Calcaric Arenosols, Areni-Calcaric Gleysols

Table OR1-3 – Legend of soil matrix illustrated in Figure 5b (see text)

Label	Hydrogeological complex	Permeability classes
l	Trachythic lava domes	High
pf pfc	Loose pyroclastic deposits of Campi Flegrei complex. Campi Flegrei primary pyroclastic deposits: volcanic ash embedded to pumice and scoria lapilli layers (pf) sometimes made up only of fine ash (pfc).	Medium (pf), medium to low (pfc)
s	sandy complex of littoral and dunal fine to very fine sands.	Medium to low
pr	Reworked volcanoclastic complex. Loose volcanoclastic deposits with peat layers locally embedded to primary pyroclastic fall deposits.	Low to medium
p	Pyroclastic fall deposit complex. Campi Flegrei and Somma-Vesuvius loose pyroclastic fall deposits made up of lapilli to coarse ash layers locally embedded to thin paleosols.	Low
tf	Tuffaceous complex. Variably lithified ash deposits often engulfing block to coarse lapilli fragments.	Low
at	Clay and peat complex. Alluvial mud deposits of Regi Lagni often embedded to widespread peat layer. Very low to low permeability.	Low to very low

Table OR1-4 - Legend of the permeability matrix illustrated in Figure 5c (see text)

References

Ascione, A., Aucelli, P.P.C., Cinque, A., Di Paola, G., Mattei, G., Ruello, M., Russo Ermolli, E., Santangelo, N., & Valente, E. (2020). Geomorphology of Naples and the Campi Flegrei: human and natural landscapes in a restless land. *Journal of Maps*, 17(4), 18-28, https://doi.org/ 10.1080/17445647.2020.1768448

ISPRA (2015). CARG Project – The Geological map of Italy 1:50,000 scale. Retrieved March 13, 2025, from https://www.isprambiente.gov.it/Media/carg/campania.html (in Italian)

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