ID NUMBER	NAME	GEO-DISTRICT	LOCAL TEAM	CONTACT DETAILS	LOCATION	E or W Coordinate (WGS84)	N or S Coordinate (WGS 84)	GEOLOGICAL SETTING	LITHOLOGY	LANDFORMS	OFFICIAL GEOSITE	GEOPARK	PROTECTED AREA	OTHER TYPE UNESCO SITES	SCIENTIFIC VALUE	ECOLOGICAL RELEVANCE	CULTURAL VALUE	AESTHETIC VALUE	SOCIO-ECONOMIC VALUE	SPATIAL ACCESSIBILITY	TEMPORAL ACCESSIBILITY
Progressive numbering	Name	Geographical and geological location	Who is the partner working at the site	E-mail address	State, Region			Geological Domain	Type(s) of rocks featuring the climbing wall	Type(s) of landforms featuring the climbing wall	If the site is an officially recognized geosite, and if yes, in which list with the relative importance	Name and status (aspiring, UNESCO Global Geopark - UGGp)	Name and the type (e.g., National Park, Natural Reserve)	If the site has been awarded of another UNESCO label	Scientific importance of the site	If the geology and geomorphology provide an ecologic support role	If geology and geomorphology have a role in the location of cultural assets, or if there is a cultural asset in the surrounding of the site	If the site has an aesthetic value	If the site has an economic and toruistic relevance, or if it is inserted in a touristic area	Type of access to the site and difficulty of the path	Periods in which the site is accessible
GC-1	Premia Balmafregia	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano- Cusio-Ossola Province, Lepontine Alps	8°20'22.45" E	46°15'50.20* N	European Alps, Pennidic Domain	Micaschist with garnet and quartz lens, local mafic boudins	Vertical cliff modeled by Pleistocene glaciers and by river action. Now inactive gorges.	Geosite in the national and regional lists	None	None	None	It is located within the Baceno tectonic window, where the despest unit of the Alps outcrop. Gliscial and fluvial modelling generate a very representative landscape, featured by several gorges and giant potholes. Several studies have been already performed in the area and geological maps are available.	Not relevant	Not relevant	It is a wide rock cliff with sevral minerals visible on the surface of the wall. The rock cliff is one of the side of a beautiful gorge.	It is located in an important touristic area of the Italian Alps.	By car (not by big bus)	All over the year except rainy days
GC-2	Zornasco	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano- Cusio-Ossola Province, Lepontine Alps	8°29'36.16" E	46°08'02.25* N	European Alps, Upper Pennidic Domain	Orthogneiss with pegmatitic dykes and crenulation cleavage	Vertical cliffs with signs of structural driven erosion	No	Sesia Val Grande UGGp	None	None	Representativeness of structural deformation i.e. crenulation cleavage	Not relevant	Not relevant	Not relevant	Once a year it becomes one of the attractive point during a country fair dedicated to outdoor activities.	By car	Througout the year
GC-3	Ornavasso (Im Schlasti)	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano- Cusio-Ossola Province, Lepontine Alps	8*23'56.44" E	45°58'51.77* N	European Alps, South Alpine basement, Ivrea-Verbano Zone	Mafic granulite with inclined layering and evident plagioclase veins	Fluvial morphology (Stretta di Bara) stricity dependent on the structural and petrographic conditions	No	Sesia Val Grande UGGp	None	None	Rocks of the lower crust outcrop showing very interesting structures and a deep perforation is ongoing (DIVE - Deep drilling of the hre-Verbano Zone). The lithological and structural control on the fluxial morphology is really representative.	Not relevant	The area is characterized by the Cadorna Route realted to the First World War; The climbing crag has a Walser name as the municipality is a Walser tildige. The Walser is one of the most important culture in the Alps.	The panoramic view on the Corni di Nibbio ridge and the Toce Valley	It is located in an important touristic area of the Italian Alps.	By car, Touristic path	Througout the year
GC-4	Mottarone climbing area	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano- Cusio-Ossola Province, Lepontine Alps	8°27'38.40" E	45°53'46.51" N	European Alps, Southern Alps, Permian granitic intrusion	Baveno granite (pink)	Weathering and erosion landforms on granites. Lakes morphology.	No		None	None	Representative landforms related to granite modeling, very well preserved and relevant for educational purposes	Not relevant	Not relevant	Multiscale landforms related to granite modeling, and the panoramic view on the lakes are really impressive.	It is located in an important touristic area of the Italian Alps. Ski resort are located on the top of the Mottarone.	Excursionistic path	From late spring to late autumn. Snow impedes the view
GC-5	Fun d'Scotte	Central-Western Italian Alps (Italy)	University of Turin (Italy)	cristina viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	7*56'15" E	45°52'26" N	European Alps, Middle Pennine Domain, Monte Rosa Unit	Micaschist, Paragneiss	Vertical cliffs showing signs of glacial erosion	No	Sesia Val Grande UGGp	Alta Valsesia Natural Park	None	Not relevant	Not relevant	Walser culture	Not relevant	It is located along the route to approach the Monte Rosa Massif.	Very short path (15 minutes)	Open all year. Best time for rock climbing: May- November
GC-6	Ronco	Central-Western Italian Alps (Italy)	University of Turin (Italy)	cristina.viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	8°5'17" E	45°50'28" N	European Alps, Austroalpine Domani, Sesia Lanzo Zone	Gneiss		Geosite in the Sesia Val Grande UGGp list	Sesia Val Grande UGGp	No	None	Not relevant	Not relevant	Not relevant	Not relevant	Not relevant	Very short path (15 minutes)	Open all year. Best time for rock climbing: May- November
GC-7	Torre delle Giavine	Central-Western Italian Alps (Italy)	University of Turin (Italy)	cristina viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	8°6'12" E	45°49′58" N	European Alps, Austroalpine Domani, Sesia Lanzo Zone	Gneiss	Monolith related to a Deep-seated gravitational slope deformation	No	Sesia Val Grande UGGp	No	None	The monolith is the result of a Deep Seated Gravitational Slope Deformation due to glacier debutressing	Not relevant	Not relevant	Impressive isolated pillar.	Not relevant	40 mins walk from the parking place	Open all year. Best time for rock climbing: May- November
GC-8	Ara	Central-Western Italian Alps (Italy)	University of Turin (Italy)	cristina.viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	8°19'5" E	45°41'58" N	European Alps, South Alpine Domain, Trias Jura sedimentary cover	Limestone	Epigean caves	Geosite in the Sesia Val Grande UGGp list	Sesia Val Grande UGGp	Fenera Natural Park	None	Karst evidences	Not relevant	Not relevant	Not relevant	Not relevant	30 min walk from the parking place	Open all year. Best time for rock climbing: May- November
GC-9	Pietra Romanasca	Central-Western Italian Alps (Italy)	University of Turin (Italy)	cristina viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	8°17'46" E	45°39′53" N	European Alps, Intrusive bodies	Red porfiroid		No	Sesia Val Grande UGGp	None	None	Not relevant	Not relevant	San Lorenzo Castle	Not relevant	Not relevant	20 mins walk from the parking place	Open all year. Best time for rock climbing: May- November
GC-10	Montestrutto	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Ivrea, Pennine Alps	7°50'25.52' E	45°32'17.85* N	European Alps, Austroalpine E Domain, Sesia Lanzo Zone	Eclogitic Micaschist with boudins and garnet	Lithostructural control on weathering and erosion patterns. Glacial striae and flow indicators.	No	None	None	None	It is a very known outcrop of the Eclogitic micaschists complex testifying for subduction during Europe-Africa Collision	Not relevant	The area is characterized by the Francigena Route. In addition the vineyards and olive trees cultivated on the terraces where the climbing walls are located, are really famous.	It is a pleasant landscape with castles and wine terraces.	The cliff is located along the route of the Aosta Valley featured by fortified settlements, and nearby the morainic amphitheatre of Ivrea, an important touristic area.	By car and by bus	Througout the year
GC-11	Sasso del Drago	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Chiavenna Valley, Orobie Alps	9*28'00.68' E	46°19'40.56* N	European Alps, Chiavenna mafic complex and Pennidic Domain, Tambó nappe	Contact between amphibolite and gneiss	Vertical cliff with signs of differential erosion on amphibolites. Glacial erosion on gneiss.	No	None	None	None	It is a relevant outcrop for the Chiavenna Mafic Complex, and the contact with the Tambò nappe is in the middle of the rockwall	Not relevant	Not relevant	Not relevant	It is located along a road connecting Italy to Switzerland, an important touistic-economic route	By car and by bus	Througout the year, without snow
GC-12	Voulismeno Aloni	Cretan Carbonate Platform (Greece)	Psiloritis UGGp (Greece)	fassoulas@nhmc.uoc.gr	Municipality of Malevisi, Heraklion, Crete, Greece	25° 01'05,15° E	35°19'48,5" N	Tripolitsa Nappe	Jurassic-Cretaceous carbonate rocks	than 50 meters at the deepest point formed for the collapse of an ancient	Geosite in the national and Psiloritis UGGp lists	Psiloritis UGGp	Wild Life Reserve	None	It is the most representative karst sinkhole of its characteristics in Crete. It	A large number of birds find refuge at this doline.	It is linked to local myths and traditions related to the formation of the doline, and to a farmer sin and his punishment by a Saint.	It is of great aesthetic value due to its shape and features abut also due to the various colors that the vertical walls have because of the iron and manganese coldes.		By car, as it is nearby to a regional road	Open all year
GC-13	Patsos gorge	Cretan Carbonate Platform (Greece)	Psiloritis UGGp (Greece)	fassoulas@nhmc.uoc.gr	Municipality of Amari, Rethimnon, Crete, Greece	24°34'12,76" E	35°15'28,84" N	Tripolitsa Nappe	Jurassic-Cretaceous carbonate rocks	hypogean cave Vertical cliffs forms at the two sides of Patsos gorge due to karstic erosion	Geosite in the national and Psiloritis UGGp lists	Psiloritis UGGp	Nature 2000 area	None	The site has significant scientific regional value. It is a typical gorge developed within carbonate rocks with steep cliffs and considerable depth, hosting water almost all year arround, something special for Cretan gorges.	The gorge hosts several important and endemic species of Cretan flora.	Inside the gorge exist a small cave that was used in ancient times as temple for Hermes and now as a chapel for Saint Anthony, receiving many pilgrims every year.	It is of great aesthetic value due to the trees and rare vegetation it hosts, the vertical cliffs of limestone and the water presence.	Several hundreds of tourists use it everyyear, whereas it acts as a recreation area, with facilities established by Forest Service.	By foot, entering the trail that crosses the gorge	Almost all year, excpet heavy rainfall
GC-14	.a Pedriza de Manzanares (Central Iberian Range (Spain)	National University of Distance Education (Spain)	manu garo@ccia.uned.es	Sierra de Guadarrama, Madrid, Spain	3°53'18" W	40°44'73"N	Spanish Central Range	Variscen granitoids	Weathering and erosion landforms on granites.Tationi, polygonal cracks, dykes, etc.	No	None	Sierra de Guadarrama National Park	None	Several studies regard the area for the identification of weathering and ension processes and geological processes that originate climbing walk, of the fractures, dykas, memory and weathering processes that condition climbing.	population of vultures	Not relevant	High aesthetic value due to the different shapes of the rocks (such as elephant, seal, helmet, skull, etc). Pink coloured rock due to oxidation of biotite. The whole Pedriza is a labyrism of rocks.	Due to the high landscape value, the area receives thousands of visitors every year: climbers, treikers, naturalists and other tourists.	By car	Climbing is possible all year except on rainy days.
GC-15	Peñalara	Central Iberian Range (Spain)	National University of Distance Education (Spain)	manu.garo@ccia.uned.es	Sierra de Guadarrama, Madrid, Spain	3°57'79" W	40°50'23*N	Spanish Central Range	Gneisses and other metamorphic rocks	Glacial morphology. Vertical walls, lakes, moraines, scree, peatland, etc.	No	None	Sierra de Guadarrama National Park	None	Many researches concern glacial morphology, different metamorphic rocks and attenation processes in high mountains	High variety of high mountain flora and amphibians.Protected peat bogs. Wild goats, vultures and other birds.	Not relevant	High aesthetic value as a high mountain landscape. Dark-coloured vertical walts due to the presence of lichers. Very well protected green meadows and peatlands. Beautiful lakes.	Every year the area receives thousands of visitors: trekkers, naturalists, rock climbers, ice climbers, mountain skiers and other tourists.	By car and bus (preferred by car)	Open all year. Best time for rock climbing: May- November. For ice climbing: January- February.
GC-16	Kramnica Rock	Pleniny Klippen Belt (Poland)	University of the National Education Commission, Krakow (Poland)	anna.chrobak- zuffova@up.krakow.pl	Krempachy village, Nowy Targ commune, Lesser Poland Voivodeship, Poland	20°07'49,96''E	49°25'43,24"N	Pleniny Klippen Belt	Jurassic white and pink crinoid imestones, red limestones, also with shells	The rock outlier, together with the neighboring Oblazowa rock, forms the gorge of the Białka River	No	None	Białka Gorge Nature Reserve	None	The greatest scientific value is the presence of shell limestone with a large number of invertebrate fauna living in the Jurassic Sex: anmonites, betermittes or brachlopods	As part of the nature reserve, Skalka Kramnica has high ecological values, mainly related to calcareous rock There is rich and	Not relevant	The culmination of Kramnica Rock, despite the presence of a spruce forest, is a good viewpoint. In the foreground I can be seen the the Biaka valley riverbed with its mouth section be the Dunajee. River and the fait bottom of the Nowdarska Basin formed in the Frydman tectoric dtch.	A place visited only by local people, rarely by tourists.	By car	Open all year. Best time for rock climbing: May- November
GC-17	Drevenik travertine hill	Central Carpathians (Slovakia)	University of the National Education Commission, Krakow (Poland)	anna.chrobak- zuffova@up.krakow.pl	Žehra village, Spišská Nová Ves commune, Košicky kraj, Slovakia	20*46'30,26"E	48°59'17,20"N	Central Carpathians Paleogene	Plocene-Pleistocene travertines	A plateau with a dozen travertine outliers on the top.	Geosite in the national list	None	Travertiny pri Spišskom Podhradi Natural Reserve	Spiš Castle	formations in the upper part in the form of columns and spiers. The trunctions that huld this hill are while and explain summary plant debrin	diverse plant life on Drevenik hill. 60 species are included in the list of threatened plants of the Slovak Republic. Contrasting mix	The Spi6 castle - the biggest castle in the middle Europe which has been inscribed on the UNESCO World Heritage List	High aesthetic values due to the variety of reliaf forms that can be observed on the travertine dome. The highest rock outliers of the dome are also very good varitage points for observing the area of Homadika Kotina Basin.	Unlike the adjacent travertine dome on which the Spi8 Castle is located, Drevenik is visited by a smail number of tourists each year.	By car and on foot	Open all year. Best time for rock climbing: May- November
GC-18	Mnich	Tatra Mountains (Poland)	University of the National Education Commission, Krakow (Poland)	anna.chrobak- zuffova@up.krakow.pl	Bukowina Tatrzańska village, Bukowina Tatrzańska commune, Lesser Poland Voivodeship,	20°03'18"E	49°11'33*N	High Tatras	Camboniferous granitoids with pink potassium feldspar crystals	Peak	No	None	Tatra National Park	None	Very large and well-crystallized minerals visible on the wall	(mountain and Only typical mosses and lichens found on granite rocks, such as a Rhizocarpon	The peak is related to the history of Polish mountaineering, it was here that the first climbing routes in the 19th century were marked out.	The summit is a very good viewpoint on the landscape of the Blaka valley, the largest post-glacial valley in the Tatra Mountains with the largest moraine lakes.	it is one of the most frequented places by mountaineers; thousands of people are climbing there every year.	Several hours of trekking to get from the parking lot to the wall	Open all year. Best time for rock climbing: June- November. For ice climbing: December-April.
GC-19 M	iędzy Ściany rock formation	Tatra Mountains (Poland)	University of the National Education Commission, Krakow (Poland)	anna.chrobak- zuffova@up.krakow.pl	Poland Witów village, Kościelisko commune, Lesser Poland Volvodeship, Poland	19*50'58,70"E	49°16'30,03"N	Western Tatras	Organodetritic limestons with numulites; age	Structural narrowing of the river valley	Geosite in the national list	None	Tatra National Park	None	Many shell limestone with a large number of fauna living in the Eocene Sea, especially Numulites	geographicum Unique rock vegetation, e.g. Leontopodium nivale	Not relevant	At the moment, the aesthetic values of this place are low due to the ongoing forestry work	A place known only by local climbers.	By car	Open all year. Best time for rock climbing: May- November.
GC-20	Sab Bani Khamis	Al Hajar Mountains (Oman)	Earth Sciences Consultancy Centre (Oman)	malkindi@gmail.com_	Al Hamra, Jebel Shams, Northern Oman	57°12'30.72"E	23°13'9.78*N	The dome of Western Al Hajar Mountains and Cretaceous Carbonate Platform	Clear and marly Cretaceous carbonates	Vertical cliff with differential erosion	No	None	Jebel Shams	None	The area offers a great exposure of the carbonate platform that produce hydrocarbon from the Arabian Gulf, with their associated faults & fractures	Not relevant	The climbing and trekking routes in Sab Bani Khamis pass through ancient settlements, which have been partly used recently.	The area offers an enchanting view of steep cliff, that are more than 1.2 km deep	The area is heavily visited by tourists, and there are a number of resorts near the climbing and trekking routes.	By car (not by bus)	Open through the year
GC-21	Tail Baila	Deccan Volcanic Province (India)	Savitribai Phule Pune University (India)	andongrey@gmail.com	Tail Baila, Lonavala, Pune, India	73°20'02.94" E	18°33'50.93" N	Deccan Trap Volcanic Province	Basaltic lava flows	Vertical cliff and different lava flows	No	None	None	None	Number of basaltic lava flows, their volcanic features and morphology can be studied, as well as the stratigraphy of Deccan volcanic province	Not relevant	Known for historic forts and caves.	Natural volcanic landscape	.Well known location for climbers and near to tourist attraction of Lonavala	30 mins walk from the parking place nearest village	Throughout the year except heavy monsoon days during June to September
GC-22	The Organ Pipes	Jurassic dolerite (Australia)	University of Tasmania (Australia)	mark.williams@utas.edu.au	Hobart, Tasmania, Australia	147°14'14.3*E	42*53′45.6*S	Jurassic Gondwana rifting and breakup	Dolerite	Columnar jointed Jurassic dolerite cliffs up to 120m high	Geosite in the national list	None	Wellington Park	None	Edge of dolente sill related to horst and graben fault blocks. Sustained frost wedging caused mechanical erosion forming novel isolated fors (Johnstones Knob and Alberts Tomb).	Not relevant	The feature was noted by early French and English explorers, and is strongly linked to the sense of place for Hobart.	An important (high) aesthetic feature of Hobart.	Well known location for climbers and seen from most parts of Hobart.	By car and then on foot. Walking tracks from the bottom of the organ pipes	Open all year. Best time for rock climbing: Nov-
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LEGAL CONSTRAINTS	ASSOCI	SSOCIATED SITES ASSOCIATED GEOTREKKING		OTREKKING	CLIMBING DIFFICULTY	CLIMBING AND EARTH SCIENCE RELATION	POTENTIAL NATURAL HAZARDS	VULNERABILITY FRAGILITY OF THE SITE		PROMOTION OF T	HE CLIMBING SITE	RELEVANT REFERENCES FOR GEOCLIMBING OR GEOSITES PROMOTION		DOMs - Digital Outcrop Models
Any restriction to the use of the site	Other sites of geological interest in the surroundings	Other sites of cultural or naturalistic interest in the surroundings	Geotrekking along which the site is located	Proposed connection with a geotrekking in GEOTREKKING sheet	Degree of difficulty of climbing activity	Relation between geofeatures and climbing activity: influence on difficult degree or geofeatures visible aniong the rock wall.	Any possible natural hazards affecting the site (e.g., rock fail, flood)	Specific knowledge required for climbing on the well or to access the site (We do not mention the need for a Mountain Guide that everywhere should be required for this type of activities)	Potential (natural or anthropic) threats to site conservation	Initiatives angoing to promote the site	Link	Publications regarding the scientific value of the site and the possibility of geoclimbing activity		Link to available DOMs
is located on a private terrain but it is freely accessible	Yes, several related to Alpine mountain range.	Yes, many	GT-1	GT-1	Yes, for every category of climbers: from the beginners to the more expert.	Yes, quartz lenses provide microreliefs for feet and hand, while more erodible micas layers generate holes for both hands and feet. Also vertical fractures and conjugated fractures allow the climber to find adequate holds to progress along the cliff.	Not evident	None	None	None as geoclimbing site, very famous for climbing activity	https://www.visitossola.lt/homepage/viv- lossola/estate/arrampicata-e-bouldering/	- Bollati et al. (2016) - https://vitualexplorer.com.au/system/files/papers/8681/assets/assessment-cilf8-equ/pped-cilmbing.pdf - Bollati et al. (2018) - https://doi.org/10.3301/ROL.2018.19.		https://youtu.be/U_8NYBIBZ5A
is located on a private terrain and low fare has to be paid to access autonomously	Yes, several related to Alpine mountain range.	Yes, many	None	GT-2	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the structural features and mineralogical elements create superficial morphologies that condition climbers' progression.	The climbing wall is monitored and water is drained. A geological report was published on potential risks at the wall.	None	None	None as geoclimbing site, of local importance for climbing activity	https://www.facebook.com/ZurnaskinAut/?iocale=it_IT	Perotil et al. (2020) - https://doi.org/10.3390/hesources9060063		https://youtu.be/p_7xZVGuvtE
None	Yes, several related to Alpine mountain range.	Yes, many	It is located along a hiking trail with cultural value	GT-3	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the layering of minerals with different degree of susceptibility to erosion is characterized by holes useful for both hands and feet. An evident vein is present favouring a different type of climbing	Some portions of the cliff are characterized by fractured rocks that suggest to be careful in such part.	None	None	None as geoclimbing site, very famous for climbing activity	https://www.visitossola.lt/homepage/vivi- lossola/estate/arrampicata-e-bouldering/	- Bolati et al. (2016) - https://witualexplorer.com.au/system/files/papers/8681/assetu/assessment-clifts-equipped-climbing.pdf et al. (2020) - https://doi.org/10.3390/resources0600063 - Perofi	8f	https://youtu.be/AmaN-Hgz8SM
None	Yes, several, and the Lake district is the most important one.	Yes, many	None	GT-4	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the climbing style along the walls is characterized by the use of rounded fractures. The progression is based on grip offered by minerals on the rock wall.	Not evident	None	Human interference is really high in the area due to cave activity and ski resort presence.	None as geoclimbing site, very famous for climbing activity	https://www.visitossola.it/homepage/vivi- lossola/estate/arrampicata-e-bouldering/	Bollati et al. (2016) - https://virtualexplorer.com.au/system/files/papers/868 //assetu/assessment-clifts-equipped-climbing.pdf Perotti et al. (2020) - https://doi.org/10.3380/resources966063	6b	https://youtu-be/2[XL1H38X5M
is inserted a Natural Area with its wn legislation. Between June and optember there is a shuttle to entry the area.	Yes, many	Yes, many	GT-5	GT-5	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the presence of pockets and ledges support the climbing of these vertical and pendant rocks.	Rockfalls along the road to access the site.	None	None	None as geoclimbing site, of local importance for climbing activity	http://www.arrampicareinvalsesia.lt/	Perotti et al. (2020) - https://doi.org/10.3360/resources9060063 Vani et al. (2018)		
None	None	None	None	None	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the rock is an excellent rough and highly worked gneiss, with notches, holes and fissures that help the climbing of these technical walls and overhangs.	Not evident	None	None	None as geoclimbing site, very famous for climbing activity	http://www.arrampicareinvalsesia.tt/	Perotit et al. (2020) - https://doi.org/10.3360/resources9060063		
None	Yes	None	None	None	Multi pitch routes, for expert climbers	Yes, the normal route follows the weakest points of the wall and is a succession of traverses on slabs, blades, cracks. The most famous passage is a blade named "the leef" because of its typical shape.	Not evident	None	None	None as geoclimbing site, very famous for climbing activity	http://www.arrampicareinvalsesia.lt/	Perotit et al. (2020) - https://idoi.org/10.3350/hesources9060063	8d	https://youtu.be/VNBxwiTyTfl.
is inserted a Natural Area with its own legislation.	Yes, many	Yes, many	None	None	More suitable for expert climbers	Yes, the limestone cliff is characterized by notches used by the climbers for progressing the routes.	Not evident	None	None	None as geoclimbing site, very famous for climbing activity	http://www.arrampicareinvalsesia.it/	Perciti et al. (2020) - https://doi.org/10.3360/resources9066063		
None	None	Yes	None	None	Yes, for every category of climbers: from the beginners to the more expert.	The porfiroid is extremely rough but not very adherent.	Not evident	None	None	None as geoclimbing site, of local importance for climbing activity	http://www.arrampicareinvalsesia.it/	Peroti et al. (2020) - https://doi.org/10.3360/resources9060063		
None	Yes, the most important is the lvrea Morainic Amphitheatre	Yes, many	None	GT-6	Yes, for every category of climbers: from the beginners to the more expert.	Yes: the mineral and their structures influence stricitly the climbing.	Rock fails in the upper sectors could occur seen the blocks and the fractures, but the wall looks like to be periodically checked.	None	None	None as geoclimbing site, very famous for climbing activity	https://www.montestrutto.it/la-falesia/	- Bollati et al. (2013) - Bollati et al. (2014) - https://doi.org/10.3301/JJG 2013.24		
None	Yes, several related to Alpine mountain range.	Yes, many	None	GT-7	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the layering of minerals with different degree of susceptibility to erosion is characterized by holes useful for both hands and feet. The upper sector charcaterized by gneiss is featured by more difficult degree due to smoother surfaces and vertical walls.	Rock fails in te upper sectors could occur seen the blocks and the fractures but the wall looks like to be periodically checked.	None	None	None as geoclimbing site, very famous for climbing activity	http://www.valchiaverna.com/ft/sport-e-attivita/Arrampicare-h- Valchiaverna.htmlt ~-tend =5%20possibiel%20arrampicare/k20 attal%20primaver%20alf automo.bark-Rogaugnable%20atk 20Gordona%20imboccando%20ia,del%20tekking%20e%20del %20caryoning.			
onstrains on its use are imposed by its location within a Wild Life Reserve.	Yes, a carstic spring, a gorge and a larger plateau	Yes, many	None	None	Mainly for begginers and slightly experienced.	Yes, because the cliffs are formed by karstic erosion and the collapse of a cave.	Only potential hazard maybe due to small rock fails, due to goats activity.	None	None	Yes it is promoted by Psiloritis UGGp both as geosite and also as climbing site.	http://www.climbincrete.com/en/Climbing/Various/Voulismeno_A Ioni	- Fassoulas et al. (2007) - Fassoulas et al. (2012) - https://doi.org/10.1007/s12371-011-0046-9	7f	
onstrains on its use are imposed its location within a Nature 2000 and forest area.	Yes, nappe contact, fold and fossil sites	Yes	Yes	GT-11	Mainly for begginers and slightly experienced.	Yes as cliffs are formed by karstic weathering, where as folds, nappe contact and fossils can be found around.	Only potential hazard maybe due to small rock falls, due to goats activity and also under heavy rain.	It is better not to use trail during rain falls	None	Yes it is promoted by Psiloritis UGGp both as geosite and also as climbing site.	https://www.vrahomania.gr/plakias/)	- Fassoulas et al. (2007)		
t is a National Park with its own legislation. Between June and October there are timetables for entry and exit by car.	Yes, many	Yes, many	None	GT-14	Yes, for every category of climbers: from the beginners to the more expert.	Yea, grip climbing depends on the micro-relief of the rock, which is related to alteration processes. Fractures, dykes and mineralogy also influence the difficulty of climbing routes.	Yes, rock slides.	Typical knowledge that every climber should have before going to the mountains.	Great erosion due to overgrazing by wild goats.	La Peditza is the main climbing school in the Community of Madrid. Many climbing courses are done there.		- de Pedraza et al. (2014) https://idoi.org/10.1007/878-94-017-8528-7_5 Escalante (2017) https://idoi.org/10.1007/s12371-016-0187-y Garcia – Rodriguez (2019)	6e	https://m.3dscannerapp.com/m?id=Nex4sr https://m.3dscannerapp.com/m?id=G2w75hT https://m.3dscannerapp.com/m?id=Z7E03Fn https://m.3dscannerapp.com/m?id=BboTg2u
It is a National Park with its own gislation. Groups with more than 10 people must request a authorization to visit the area.	Yes, many	Yes, many	None	GT-15	Yes, for every category of climbers: from the beginners to the more expert.	Yes, climbing in gneisses depends on mineralogy, phenocrystal size and foliation type. Fractures, dykes and the presence of licities also influence the difficulty of climbing routes.	Yes, snow avalanches in winter and spring.	Typical knowledge that every climber should have before going to the mountains.		Yes, it is promoted like National Park and also as climbing field.			8e	
None	Yes, many	Yes, many	None		Yes, for every category of climbers: from the beginners to the more expert.	Yes, climbing in shell limestone allows you to observe different fossils.	Not evident	None		None		- Birkennajer (1979) - Chrobak & Bejk (2019)		
None	Yes, many	Yes, many	Yes	GT-23	Yes, for every category of climbers: from the beginners to the more expert.	There is a high relation due to the possibility of observing different types of travertines depending on the chemical composition of the water from which the ione travertine precipitated and the possibility of observing the imprimits of various types of plants that courcered in this area at the turn of the Plocene and Plestocene.	Yes, rock falls	None	Currently, they are destroyed by weathering and form various shapes.	None		- Nēmejc (1944) - Nēmčok (1982) - Wróblewski et al. (2010) - Gradinski et al. (2014) https://doi.org/10.1111/sed.12085 - Chrobaik & Bak (2019)		
t is a National Park with its own gislation. All climbing should be reported to the shelter.	Yes, many	Yes, many	Yes	GT-25	Yes, for every category of climbers: from the beginners to the more expert.	Yes, climbing granite massiv allows you to observe different kind of minerals.	Yes, rock falls	Typical knowledge that every climber should have before going to the mountains.		None		- Gawęda (2007) Zasadni & Klapyta (2014) - https://doi.org/10.1080/17445647.2014.885854 -		
None	Yes, many	Yes, many	None		Yes, for every category of climbers: from the beginners to the more expert.	Yes, climbing in shell limestone allows you to observe different fossils.	Yes, rock falls	None		None		- Roniewicz (1969) Tomaszczyk et al. (2009)		
he area if fully accessible, but the nountain summit (Jebel Shams, 6 km away) is not accessible by tourists.	Yes, many	Yes, many	Sab Bani Khamis	GT-27	Yes, for every category of climbers: from the beginners to the more expert.	Yes, the competent steep cliff of the clean carbonate require the use of climbing gear, whereas the many incompetent units form walkable slopes.	Not evident	None		None for geoclimbing, vary famous for climbing activity		- Al Kindi et al. (2022)		
None	Yes	Yes	None		Yes, for every category of climbers: from the beginners to the more expert.	Yes, basalt flow layers, vessicular structure, joints and erosional features help climbers to progress along the cliff.	Infrequent rock fail	Yes		None for geoclimbing, well-known for climbing activities			6a	
None	Yes, many	Yes, many	Yes		More suitable for expert climbers. Some moderate routes for slightly experienced climbers.	Yes, columnar jointing provides many cracks for climbing. Coarse crystate provide textured climbing/slab. Isolated columns due to mechanical erosion provide novel climbing experiences.	Yes, but rare	Yes, most routes are traditional so knowledge of gear placement and anchors is critical.	Aesthetic integrity may be threatened by a proposed development through concealment. Commercial and industrial scale ground disturbance could induce structural damage such as rockfall.	Promoted in climbing guides and online guides.	http://thesarvo.com/confluence/display/thesarvo/The+Organ+Pi pes	- Brasbury, J. (1995) - Williams & McHenry (2021) - https://doi.org/10.1016/j.ijpsop.2021.05.001	6d	https://sketchfab.com/3d-modele/organ-sijoes- 519d2da5e5654c7e89559666b75e8e20c

ID NUMBER	NAME	GEO-DISTRICT	LOCAL TEAM	CONTACT DETAILS	LOCATION	N or S Coordinate (START)	E or W Coordinate (WGS84) (START)	N or S Coordinate (END)	E or W Coordinate (WGS84) (END)	LENGHT OF THE PATH (km)	AHEIGHT (m)	GEOLOGICAL SETTING	LITHOLOGY	LANDFORMS	OFFICIAL GEOSITE	GEOPARK	PROTECTED AREA	OTHER TYPE UNESCO SITES	SCIENTIFIC VALUE	ECOLOGICAL RELEVANCE	CULTURAL VALUE
Progressive numbering	Name	Geographical and geological location	Who is the partner working on the trail	E-mail address	State, Region							Geological Domain	Type(s) of rocks visible along the trail	Type(s) of landforms visible along the trail	If along the trail geosites are visible, and, if yes, in which list with the relative importance	Name and status (aspiring, UNESCO Global Geopark - UGGp)	Name and the type (e.g., National Park, Natural Reserve)	Sites along the trail, or other near-by tes awarded of another UNESCO labe!	Scientific importance of the alte	If the geology and geomorphology provide an ecologic support role	If geology and geomorphology have a role in the location of cultural assets, or if there is a cultural asset also in the surrounding of the trail
GT-1	Uriezzo Glacial Garden	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano-Cusio- Ossola Province, Lepontine Alps	46*16'07.08" N	8"20"26.54" E	46'13'55.72' N	8°19'24.31" E	About 6.2	about 200	European Alps, Pennidic Domain	Micaschist with gamet and quartz lens, local mafic boudins, Granitoides of Verampio Unit	Evident signs of modelling by Pleistocene glaciers and by river action, that took place in alternative stages, gorges and giant potholes sculpted in the two type of rocks are really impressive	y Geosite national and regional list	None	None	None	The brekking is located within the Bacono tectoric window, where the deepest unit of the Apic outcrop. Glacial and fluxial modeling generate a very representative fluxidorup, fluxiated by perveit glogges and glaci profibers. Served studies have been already performed and the server and the server and the server and the diversity between micraschistis and granitoides is also evident.	The gorges host interesting species related to humid and scarce-light environments	None
GT-2	Loana Geotouristic trail	Central-Western Italian Alps (Italy)	Sesia Val Grande UGGp (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano-Cusio- Ossola Province, Lepontine Alps	46'05'23.89" N	8"28'43.03" E	46'05'23.89" N	8'28'43.03' E	A:4 B:12	A: 100 B: 800 m	European Alps, Insubric Line, Southern Alpine Domain and Austroalpine Domain	Orthogneliss, Paragneliss, Marbie, Limestone slightly metamorphosed, Calcschists, Amphibolites, Phylionitic rocks	Glacial, periglacial, water- and gravity-related	No	Sesia Val Grande UGGp	Partially in the Val Grande National park	None	The trail allow to see the effects of the Insubric Line, the major tectoric line of the European Alps, on landscape modeling	Geomorphological processes influence vegetation growth. In the upper portion of the trail several fragile peat bogs related to glacial overdeepenings	Along the trail and the road getting to the access point there are some caves for rocks (carbonates and scapatone) extinaction. Thery were used by Man to built buildings and housewares.
GT-3 TP	ne Cadoma Route to Forte di Bara	Central-Western Italian Alps (Italy)	Sesia Val Grande UGGp (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano-Cusio- Ossola Province, Lepontine Alps	45'59'04.27" N	8"24'00.93" E	45°59′04.27° N	8"24'00.93" N	7.5 for the whole ring including geoclimbing n. 2	about 300	European Alps, South Alpine basement, Ivrea-Verbano Zone	Mafic granulte with inclined layering and evident plagloclase veins	Narrowest section of the Toce Valley (Stretta di Bara). Morphology strictly dependent on the structural and petrographic conditions	No	Sesia Val Grande UGGp	None	None	Rocks of the lower crust outcrop showing very interesting structures. The lithological and structural control on the fluxial morphology is also really representative, and a relevant rockfall is also visible ont he opposite site of the valley.	None	The Cadoma route and relative monuments are related to one of the most important historical event for Europe: the First World War. Their positioning is related to the geomorphological conditions of the area. The village is of Walker zely, one of the most important culture in the Alps.
GT-4 A: Zug	arone trails: ghero Mount B: Climbing area	Central-Western Italian Alps (Italy)	Sesia Val Grande UGGp (Italy)	irene.bollati@unimi.it	Northern Italy, Verbano-Cusio- Ossola Province, Lepontine Alps	A: 45°53'04.82"N B: 45°52'48.84" N	A: 8'27'14.13" E B: 8'27'03.31"E	A: 45'53'44.64" N B: 45'52'16' N	A: 8°27'38.40° E B: 8°26'42'E	A: 3.5 km B: 2 km	A: about 300 m B: about 100 m	European Alps, Southern Alps, Permian granitic intrusion	Baveno granite (pirik)	Typical weathering and erosion landforms on granites. Panoramic view on the lake	No	None	None	None	The area allows to visit very representative landforms related to granite modeling. They are very well preserved and relevant for educational purposes.	None	The value of the rocks as georesources is testified by the high number of caves, some still active, and in some cases open to visitors, other abandoned.
GT-5 Gla	ciological Trail of the Sesia Valley (Monte Rosa)	Central-Western Italian Alps (Italy)	Sesia Val Grande UGGp (Italy)	cristina viani@unito.it	Northern Italy, Sesia Valley, Pennine Alps	45'51'55' N	7'56'11" E	45"53"31" N	7"54'20" N	3.5	Start at 1500 m - End at 2070 m	European Alps, Middle Pennine Domain, Monte Rosa Unit	Micaschist, Paragneiss	Glacial morphologhy (Roche moutonnée, moraines)	Geosite in the national and Sesia Val Grande UGGp lists	Sesia Val Grande UGGp	Alta Valsesia Natural Park	None	Important evidences of past and recent glaciations	Alpine flora and fauna protected by the institution of a Natural Park	Walser culture and architecture
GT-6	Ivrea Morainic Amphitheatre	Central-Western Italian Alps (Italy)	University of Turin (Italy)	franco.gianotti@unito.it	Northern Italy, Sesia Valley, Pennine Alps	45°26'36.69" N	7"51'50.00" E	45'28'56.10" N	7"52'52.05" N	7.1 (8.4 combined with the Lago Nero ring).	167 m (totally, about 200 m)	European Alps, Ivrea Hills emerging from the internal depression of the Ivrea Micrairic Amphiheatre, Southalpine Domain	Gabbo, mytorific gabbo and mafe granities of the tras-lyterano Zone. Various basement (micaschists and parageniss), Early-Permin Intraches various and the second	surfaces, grooves, glacial striae) molded by the Dora	d The whole morainic amphitheater of lvma is a geosite of the Metropolitan City of Turin.	None	T It Nature 2000 area, tyrea Hills are a European Site of Community Importance	hree sites located at a few km from the all has been inscribed on the UNESCO World Heritage List: Ivrea town (industrial city of the 20th century), the pile-dwelling settlement of Lake Viverone, the Castle of Aglé (Residences of the Royal House of Savoy)	The hrea Morainic Amphtheatm, related to the Pteistocere glacial expansions of the Dora Battea Glacier, is one of the best preserved and hage end-moraine systems in European Aps. hrea Hills is the largest (22 km ²) low-elveation area (250-520 m ad) in Italy characterized by diffuse subglacial abrasion morphology.	Lakes and peatlands Protection sites of the amphibian Pelobates fuscus	The Neolithic pie-dwelling settlement of Lake Pistono is one of the oldest archaeological sites in Piedmont. Reconstructed sitted her by the Municipality of Montatio Dona: Exhibition space for the Archeology of Lake Pistone can be visited at the town hait. The 12th centry Montatio Dona castle is performed and a Dolmite diff. Performing the the Who endary. The remains of the Roman aqueduct of Eponedia.
GT-7 C	hiaverma glacial potholes garden, Chiaverna Caurga	Central-Western Italian Alps (Italy)	University of Milan (Italy)	irene.bollati@unimi.it	Northern Italy, Chiavenna Valley, Orobie Alps	46°19'22.67" N	9"24'20.66" E	46° 19'22.67" N	9"24'20.66" E	3.85 km	181 m	European Alps, Chiavenna mafic complex	Serpentinites of the Chiavenna Mafic Complex	Giant glacial potholes	Geosite national and regional lisst	None	Giants' potholes Natural Reserve	None	The glant potholes, carved in the rocks of the Chiaverna mafic complex, testified for the past glacial phases in the region		The Caurga of Chiavenna and the nearbyareas are one fot he most important sites in the Aps for the extraction of soapstone.
GT-8	Floristella mining tour	Sicilian-Maghrebian Chain and Catanissetta Basin (Italy)	University of Catania (Italy)	eugenio.fazio@unict.it martina.forzese@phd.unict.it rosarna.mariscalco@unict.it	Valguarriera Caropepe (EN), Sicily, Italy	37"299.12"N	14"21"11.49"E	37"29'33.25'N	14°20'48.29'E	About 7.58	About 100	Siolly, Caltanissetta Basin, Messinian thrust-top basins	Messinian evaporites, mud volcanoes (Maccalube)	Floristella mining sulfur area where Messinian eveporiter crop out, Tortonian days and Piocene chalks. Along the literary it is possible to see mud volcances and impressive tunnels for old sulfur exploitation.	s Geosite in the regional list	Rocca di Cerere UGGp	Floristella and Grottacalda Regional Mining park	None	The emergence of diffactic layers of evaluatific selentitic gypoun with twin crystab is the clear representation of the so-called "Motture rely". Evaporities deformation and mud volcances are also of great scientific interest.	The most important ecological aspect is represented by the waters that the wito the Rio Floritatila and which are ful of salts coming from the dissolution of the Messinian evaporties. This created the conditions for the stabilization of an extremely interesting euryhaline ecosystem.	From the ethno-anthropological point of view, the area is probably the most complete testimony of the evolution of the methods of cultivation and subsequent processing of the sulfur mineral in Sicily starting from the 18th century, usp to the XXF, Furthermore, the previous interlave agricultural use of the homonymous fiel can still be reconstructed.
GT-9 Fior	n Morgantina to Pietratagliata castle	Sicilian-Maghrebian Chain and Catanissetta Basin (Italy)	University of Catania (Italy)	eugenio, fazio@unict.it. martina.forzese@phd.unict.it. rosarma.maniscalco@unict.it	Aldone (EN), Sicily, Italy	37*25'52" N	14"28'49" E	37"28'30" N	14"28"11" E	About 9	About 100	Sicily, Sicilian-Maghrebian chain	Sandstones (Flysch)	Flat hilly landscape currently used for various agricultural crops as an excellent example to appreciate the intimate connection between the geological nature of the site and the human need to build dominant positions	No	Rocca di Cerere UGGp	Morgantina archeological site	None	Subvertical beds of sandstones allow to see the bottom layer of the sedimentary sequence with a bit of introfossil traces (faunal activities). Tilling of the flyschold sequence is due to deformational phases linked with the Sicilian/Maghrebian chain formation	The most important ecological aspect is represented by the cliff made by subvertical layers of sandstone, which is the ideal staying place for a lot of bird species. Also the small river facilitate the establishment of acquatic faunal.	The cultural feature is twofold since the route connect two human settlements of very different ages, medieval vs greek times. In the Morgantina site beaufif unities of an ancient greek village are welpreserved (agora, theathre, houses)
GT-10 Su Cape	Iphur mine route in the RNO Monte odarso e Valle dell'Imera Meridionale	Sicilian-Maghrebian Chain and Caltanissetta Basin (Italy)	University of Catania (Italy)	eugenio fazio@unict.it martina forzese@phd.unict.it rosanna maniscalco@unict.it	Enna, Sicily, Italy	37°29′40.02″N	14° 8'51.33"E	37*30'38.21"N	14" 8"31.93"E	5.1	170	Sicily, Sicilian-Maghrebian chain and thrust-top basin	Messinian evaporites and Calcarenite sub-vertical beds	Gorge of the Salso river surrounded by the marvellous hills of Mt. Capodarso and Mt. Sabucina with sub-vertica calcarentite cliffs, gentle slopes of maris, and guilles (Calanchi') in clay-rich deposits.	Geosite in the international list	Rocca di Cerere UGGp	Oriented Nature Reserve Monte Capodarso e Valle dell'Imera Meridionale	None	Here, Messinian evaporities crop out, on top of the Tortonian days. They store impressive tunnels and runs of old suffir mines. The succession is capped by Pleistocene offtapping calcareries (clfs, interbedded with marks. They are pivotal in the reconstruction of paleoclimate.	There are more than 500 native species of flora and it is a key area for bird migration. Here, it also lives the rare Aesculapian snake.	The outcropping calcarenites have been extracted for ages to build countiess buildings and helieristic anteflacts, now preserved as archaeological sites.
GT-11	Patsos gorge	Cretan Carbonate Platform (Greece)	Psiloritis UGGp (Greece)	fassoulas@nhmc.uoc.gr	Municipality of Amari, Rethimno, Crete, Greece.	35°15'15.56" N	24"34"13.49"E	35°15'56.90"N	24"34"12.15" E	1.5	Lowest 210, highest 330m	Tripolitsa Nappe	Jurassio-Cretaceous carbonate rocks	Vertical cliffs forms at the two sides of Patsos gorge due to karstic erosion	e Geosite in the regional and Psiloritis UGGp lists	Psilontis UGGp	Nature 2000 area	None	The site has significant scientific regional value. It is a typical gorge developed within carbonate rocks with steep cilfs and considerable depth, hosting water almost all year amound, something special for Cretan gorges.	The gorge hosts several important and endemic species of Cretan flora.	Inside the gorge exist a small cave that was used in ancient times as temple for Hermes and now as a chapel for Saint Anthony, receiving many pilgrims every year.
GT-12	Gafaris Gorge	Cretan Carbonate Platform (Greece)	Psiloritis UGGp (Greece)	fassoulas@rhmc.uoc.gr	Municipality of Phaistos, Heraklion, Crete, Greece	35"08'25.6" N	24*54'39.91*E	35°09'54.59'N	24"54'50.03" E	45	Lowest 420m , highest 940m	1 Tripoltsa Nappe	Jurassic-Oretaceous carbonate rocks	Vertical cliffs formed at the two sides of gorge due to karstic erosion, waterfalls, spring, lateral scree deposits, fault scarp	Geosite in the regional and Psiloritis UGGp lists	Psilottis UGGp	Nature 2000 area	None	The site has significant scientific and mostly regional value. It is a hysical wild gonge developed within carbonate nodes with steep ciffs and considerable depth especially at the lower parts. The upper part has water almost all year due to local springs, whereas several important fossi sites of mumulites and gastropds exist.	In the higher part is covered by oak trees whereas all along the trail exist many endemic and rare plants of Crete, as well as wild cat, volume, bearded volume, and other birds of pray can be seen. It is of great ecological value, especial the part of Rouxas forest because it hosts several rare and endemic cretchs, the only endemic these of Crete and many other species of high Importance.	Few local chappels exist along trail, while the Rouvas forest is of great outfural ans local value.
GT-13	Migias Geotrali	Cretan Carbonate Platform (Greece)	Psiloritis UGGp (Greece)	fassoulas@nhmo.uoc.gr	Municipality of Anogia, Rethimno, Crete, Greece	34° 16' 02" N	24" 53' 56" E	34* 15' 51* N	24° 53' 51° E	25	Lowest 1050, Highest 1130m	Tripolitsa and Plattenkalk Nappes	Mattle of Jurassic-Ecoene age, Metaflysh of Olgocene age and Jurassic Limestone	Vertical cliffs in the Migias gorge, gertile mountain slopes and the Stefana plateau	i, Geosite in the regional and Psiloritis UGGp lists	Psilottis UGGp	Nature 2000 area	None	The thail has significant scientific, educational and mostly regional value. It is a geotralialong the northern sizpes of Psilontis mountains which enters in Migia goinge and then occurs the small Solitana dolline. Along the trut the Critetan detachment fault can be observed and rise for longing the the "Patiennakin rock, whereas several leastic structures like simblicies are also present.	In the higher part is covered by oak thesi whereas all along the trail exist. many endemic and rare plants of Crete, as well as normal volture, beasted volture, and other traits of pray can be seen. It is of significant ecological value, especially the Migau gray because the tools several rare and endemic plants of Crete.	The ball new near several Milata, the typical dy-store constructions of the shepherds of Palontis. In addition, the Mitgias goages is related with takes and badditional scorps.
GT-14 La Pe	driza de Manzanares Canto Cochino - Yelmo	Central Iberian Range (Spain)	National University of Distance Education (UNED)	manu.garo@ccia.uned.es	Sierra de Guadarrama, Madrid, Spain	40°44'73"N	3*53*16" W	40°44'73"N	3°53'16' W	6	528	Spanish Central Range	Variscan granitoids	Granitic morphology, large walls and blocks. Tafoni, polygonal cracks, dykes, landsildes, etc.	No	None	National Park Sierra de Guadarrama	None	Sevenal studies regard the area for the identification of weathering and enosion processes and geological processes that originate climbing walls, of the fractures, dykes, mineralogy and weathering processes that condition climbing.	High variety of high mountain flora and amphibians. Protected peat bogs. Wild goats, vultures and other birds.	Manzanares el Real Castle and Nature Interpretation Centre.
GT-15 Maciz	o de Peñalara Puerto de Cotos - Peñalara lake - Zabala refuge	Central Iberian Range (Spain)	National University of Distance Education (UNED)	manu garo@ccia.uned.es	Sierra de Guadarrama, Madrid, Spain	40°49'79'N	3'5743" W	40'4979'N	3°5743' W	5	244	Spanish Central Range	Gneisses and other metamorphic rocks	Glacial morphology. Vertical walts, lakes, moraines, scree, peatland, etc.	No	None	National Park Sierra de Guadarrama	None	Relevant glacial morphology and different metamorphic rocks.	High variety of high mountain flora and amphibians. Protected pealland. Wild goats, vultures and other birds.	High Value for the Real Sitio de San idefonso (La Granja, Segovia), located 20 km north by car.
GT-16 PR	87 MTG - Rota dos Poios Brancos	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucascezar@geoparkestrela.pt	Manteigas, Guarda, Portugal	40°19'36.26" N	7"34"14.01" W	40°19'36.26" N	7"34"14.01" W	7.9	240	Iberian Central System, Central Iberian Range (CIZ), axis of the Variscan orogen	Variscan granites	Several granite weathering landforms, crossing a morain field with boulders dating back to distinct glaciations	e Geosite in the regional list	Estrela UGGp	Serra da Estrela Natural Park	None	The trail has excelent examples of granite weathering landforms. Also, it allows the public to see the extension of the Last loe Age in the Estrela Mountain, with moraines from the Wurm and Riss glaciations	The area encompasses several species of shrubs that are adapted to high altitude conditions and therefore with restricted distribution to mourtain areas, as well as some examplies of high altitude trees. Some endemic species of animals can also be found along this path.	From the viewpoints along the trail, the visitor can observe the agricultural use on the bottom of the glacial valley
GT-17	Fragões das Penhas Douradas	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucascezar@geoparkestrela.pt	Gouvela/Manteigas, Guarda, Portugal	40°24'29.5" N	7*34'04.0" W	40"24"29.5" N	7"34'04.0" W	12.5	380	Iberian Central System, Central Iberian Range (CIZ), axis of the Variscan orogen	Variscan granites	Landscape with several granite weathering landforms with several good examples of tors, castle kopples and bonhardts	h Geosite in the regional list	Estrela UGGp	Serra da Estrela Natural Park	None	The trail goes through some of the best examples of bornhadts, tors and castle kopples in the region. These also mark the edge of the ancient plateaux icefield	The trail crosses large areas of medium altitude shruks, in a transitional stage between altitudinal zones, providing conditions for the establishment of rich biodiversity. Hence, this area is part of one of the most restricted sections in the Natural part due to its important fauna and flora.	The area where it is inserted was one of the health resorts that were established at the end of the 19th century for tuberculosis treatment.
GT-18	PR6 MTG - Rota do Glaciar	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucasoezar@geoparkestrela.pt	Manteigas, Guarda, Portugal	40°19'20.04" N	7*36'44.99" W	40°19'20.04" N	7'36'44.95' W	17.2	50	Iberian Central System, Central Iberian Range (CIZ), axis of the Variscan orogen	Variscan granites	The trail runs through landscapes shaped by glaciers 30 thousand years ago, with glacial valleys, glacial cirgues and several moraines present	Geosite in the national and regional lists	Estrela UGGp	Serra da Estrela Natural Park	None	The trail crosses several glacial erosion and accumulation landforms which can't be seen anywhere else in Pontugal. The Zžezer glacial valley is the most perfect "U" shaped glacial valley in Pontugal, and has long been used has an example in school books.	From its starting point, the trail goes down the mountain, demonstrating the complex biodiversity promoted by the abitudinal gradient, through habitats with endemic and protected species of fauna and flora.	The beginning of the route start on the Tower plateau, wich is the highest point of Portugal continental.
GT-19 GI	RD PR - Passadiços do Mondego	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucascezar@geoparkestrela.pt	: Guarda, Portugal	40°30'39.9" N	7°23'00.9° W	40"31'52.4" N	7*19'48.9' W	11.5	390	berian Central System, Central berian Range (CIZ), axis of the Variscan orogen	Variscan granites and Neoproterozoic metasedimentary formations	The trail runs through the walkways built along the Mondego river. Meandering course running through granites and metassedimentary rocks	Geosite in the regional list	Estrela UGGp	Serra da Estrela Natural Park	None	The geological heritage of this trail allows one to understand the effects of fluvial erosion in the construction of the current landscape	The trail, which goes along the Mondego river, is very rich in riparian habitats, alternating with rupestrian habitats near the narrower gorges.	One of the earliest power stations in Portugal was set in the end of the 19th certury. The trail near the power station, but it is still not open to visitation.
GT-20	Vereda do Aguihão	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucascezan@geoparkestrela.pt	Verdelhos, Covilhã, Castelo Branco, Portugal	40°20'11.0" N	7°29'39.8" W	40"20"11.0" N	7"29'39.8" W	9.3	550	Iberian Central System, Central Iberian Range (CIZ), axis of the Varliscan orogen	Variscan granites and Neoproterozoic metasedimentary formations	The trail runs through both margins of the Beijames stream, crossing granites and metassedimentary rocks	Geosite in the regional list	Estrela UGGp	Serra da Estrela Natural Park	None	Along this trail, its possible to observe the formations where some of the oldest rock in the geopark are present. There are also important periglacial scress.	The influence of human occupation in these area controls the biodiversity, with pine forests planted by the forestry services. In the upmost part of the valley, the less intervened area, we find medium altitude strubs and these and the occurrence of rare and protected species of htms.	The traditional agricultural exploitation of the river banks through is perceivable along the track .
GT-21	PR13 MTG - Rota das Faias	Central Iberian Range (Portugal)	Associação Geopark Estrela (Portugal)	lucascezar@geoparkestrela.pt	Manteigas, Guarda, Portugal	40°25'24.79" N	7"30'58.95" W	40°25'24.79" N	7"30'58.96" W	5.4	290	Iberian Central System, Central Iberian Range (CiZ), axis of the Variscan orogen	Neoproterozoic metasedmentary formations	The trail runs through metassedimentary formations from the Neoproterozoic, also representing a great panorama towards other glacial, periglacial and tectoric phenomena		Estrela UGGp	Serra da Estrela Natural Park	None	Along this trail, it is possible to observe the formations where some of the oldest rocks in the geopark are present. There are also important periglacial screes.	This trail shows the influence of the work of the forestry services throughout the 20th century, with woodlands of beech trees and pine trees	Not relevant
GT-22 PR	5 SEI - Rota da Garganta de Loriga	Central Iberian Range (Portugal)	Estrela UGGp (Portugal)	lucascezar@geoparkestrela.pt	Loriga, Sela, Guarda, Portugal	40°20'23.2" N	7*37'08.1* W	40°19'32.0" N	7'4123.2' W	8.7	120	Iberian Central System, Central Iberian Range (CIZ), axis of the Variscan orogen	Variscan granites	Landscapes shaped by glaciers 30 thousand years ago, with glacial valleys, glacial circues and several moraines	Geosite in the national list	Estrela UGGp	Serra da Estrela Natural Park	None	The trail crosses a diverse set of glacial erosion and accumulation landforms, through the entire extent of Longa Glacial Valley	Located in one of the most important areas for biodiversity in Estrela, there are several examples endemic flora as well as some species that, in Portugal, can only be seen in this area.	It is common to notice the presence of the shepherds with their flocie, the most identitary economic activity for the region.
GT-23	Spičake Travertiny	Central Carpathians Paleogene (Silovakia)	University of the National Education Commission, Knakow (Poland)	anna chrobaik. zutřova@up.krakow.pl	Spišská Nová Ves commune, Košicky kraj, Slovakia	49'00'27,89'' N	20"4327,96" E	48"58"51,42" N	20'47'27,21' E	8.8	140	Central Carpathians Paleogene	Piccere-Peistocere Invertires	Travertine domes of which the lowest one (Siva brada) is still active. There are several springer there, including one minit gapsar. The other domes are searche. On the dome shown are Haday to the Styld Castler and State The largest in Central Europe. At the top of the next Cases – Deventil - there are places suitable for nock cliniting.		None	Travertiny pri Spiåskom Podhradi Natural Reserve	Spill Castle	A rare element of the relief of travertime domes that can be observed due to its size and larg encount time.	WBh the active transition down, the formation of anual and this (in fame) "falces" of white calcurations increases on the water can be observed	The Split castle - Re bigget castle in the middle Europe which has been insorted on the UNISCO World Haritage List and Splitiak Kapitak ony which is also on UNESCO Heritage List
GT-24	Prosiecka a Kvacianska Dolina	Chočske vrchy range (Slovaka)	University of the National Education Commission, Krakow (Poland)	anna.chrobak. zuffova@up.krakow.pl	Liptovský Mikuláž commune, Žilinský kraj, Slovakia	49°09'12,38" N	19"29'56,36" E	49'10'41,73" N	19'32'31,68" E	12.6	160	Križna and Choč nappes of Chočske vrchy range	Triassic, Jurassic and Cirefaceous limestones and dolomites	Two deep karst valeys in the Cho! Mountains featured b karst relief in the valeys: rock gales at the mouth of the valeys, thresholds and eversion boilers, waterfails and slope rock inselbergs.	y Geosite in the national list	None	Prosiecka dolina and Kvačianska dolina Nature Reserve	None	Possibility to observe unique forms of surface and underground karst	Typical rock vegetation characteristic of the Imesione substrate and spruce forest	A monument in the form of a wooden watermill in the Kvačianska Valley
GT-25	Dolina 5 Stawów Polskich	Tatra Mountains (Poland)	University of the National Education Commission, Krakow (Poland)	anna.chrobak- zuffova@up.krakow.pl	Bukowina Tatrzańska commune, Lesser Poland Volvodeship, Poland	49°15'20,50" N	20"06"10,44" E	49°12'05,10° N	20"04"14,00" E	12.6	770	High Tabas	Carboniferous granodiorites and equal-grained tonalities	Deep glacial valleys with glacial lakes, moraines, nunatak suspended valleys, waterfalls on rock thresholds. Two general valleys with landforms resulting from karst	^{i,} Geosite in the national list	None	Tatra National Park	None	The possibility of observing the forms typical of the relief created as a result of the activity of glaciers on the crystalline bedrock	Presence of endemic and relict species of plants and animals, i.e. edelweiss, gentian, Tatta delpihinium, pine tine, marmoti, Tatra charmols, brown bear, golden eagle etc.	The peaks located around the valley: Zamarka Turnia, Mrich, Kazahica Mięguszowiecka, etc. are related to the history of Polish mountaineering In the Rościelska Valley and in Chocholowska Valley, there are many
	olina Kościeliska - Omak - Dolina Chochołowska	Tatra Mourtains (Poland)	University of the National Education Commission, Krakow (Poland)	anna.chrobak. zuffova@up.krakow.pl	Kościelisko commune, Lesser Poland Volvodeship, Poland	49°16'31,13" N	19"52'07,38" E	49°16'57,31" N	19"50'30,31" E	22	640	Western Tatras	Triassic, Jurassic and Cretaceous limestones and dolomites; Paleozoic cristaline rocks: granitoids, gneisses, migmatites, crystalline shales	processes (caves, karst springs, nurseries and karst gullies) and mountain glaciers acitivity (glacial lakes, moraines, U-shaped valleys)	Geosite in the national list	None	Tatra National Park	None	Possibility of observation of forms both resulting from karst and glacial processes, as well as observation of different types of crystalline and carbonate rocks	Presence of endemic and relict species of plants and animals, i.e. edelveelse, gentlan, Tatra delphinium, pine tree, mamnot, Tatra charmols, brown bear, golden eagle etc.	elements referring to the 18th century mining and iron metallurgy that took place here. Additionally, in the Chocholowska Valley, the Pope John Paul II is commemorated
GT-27	Sab Bani Khamis	Al Hajar Mountains (Oman) Deccan Volcanic	Earth Sciences Consultancy Centre (Oman) Savitribai Phule Pune	makindi@gmail.com.	Al Hamra, Jebel Shams, Northern Oman Bhandardara, Maharashtra	23"11"38.09"N	57°12'8.54"E	57°1230.72'E	23°13'9.78"N	8		The dome of Westem Al Hajar Mountains	Cretaceous Carbonate Platform	Vertical cliff with differential erosion A narrow and elongated valley formed due to erosion of	No	None	Jebel Shams	None	The area offers a great exposure of the carbonate platform that produce hydrocarbon from the Arabian Guit, with their associted faults & fractures A unique slot canyon feature formed due to erosion of olivine basalt dyke, dyke	None	The climbing and trekking routes in Sab Bani Khamis pass through ancient settlements, which have been partly used recently.
GT-28	Sandhan Slot Canyon	Deccan Volcanic Province (India) Chapada Diamantina	Savitribai Phule Pune University (India)	andongrey@gmail.com	Bhandardara, Maharashtra State, Western India Chapada Diamantina - Bahia,	19'31'28.81" N	73'41'01.97" E	19/30/22.80" N	73'4'103.87" E	4		Deccan Trap Volcanic Province	Deccan Trap basalitic lava flows and dyles of olivine basalts	dyke	No	None	None Chapada Diamartina	None	features and basatic lava flows can be observed, western ghat escarpment is also seen	None	Historical fort of Ratangad and temple is located nearby
67.29 	Pati's Valley Trail	(Brazil)	(Brasil)	fraga.pereira@ufba.br	Chapada Utamantina - Bana, Brazil	12"45"39.96" S	41°30'48.78" W	12"46'39.19" S	41"27"34.99" W	About 7	1,130	sedimentary rocks of the Chapada Diamantina	Low metamorphosed sandstones and mutistones	Valleys, cave, residual hils	No	Serra do Sincorá Geopark Project	National Park	None	Silicitatic karst processes in an open fold, of kilometric scale	Presence of endemic species of plants	History of traditional communities
GT-30 Go	iden Gate Highlands National Park	Karoo Basin (South Africa)	University of the Witwatersrand (South Africa)	jasper.kright@wlfs.ac.za	Free State, South Africa	28°30'25°S	28'37'03'E	28'30'25''5	28°3703°E	The Golden Gule Highlands National Park is a region, not a site. Eight hiding trails exist. Only one however (Rhebok Hiding Trail) has a map shown online (see https://www.samparks.org/parks/golden_gale/hourism /map.php). This follows a circular route.	from around 1850 m to 2730 m asi	Karoo Basin	Sandatones mainly	Bare sandstone bedrock summits and cliffs, many different stope and fluxial landforms, lots of interesting sandstone weathering forms	No	None	Golden Gate Highlands National Park	None	Sandstone weathering and slope landforms, and relevant Triassic fossil sites	There are endemic Afformorthave paint so in this area, as well as birds and animals. Birds include clape Vulumes, animals include eland, bietook, springbok and jackets	High value for the interconnections between geology and archaeology, through the development (and human ecception of) cave and each shefter sates, let he area there is a lot of archaeological and other heritage absolutions.
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AESTHETIC VALUE	SOCIO-ECONOMIC VALUE	SPATIAL ACCESSIBILITY	TEMPORAL ACCESSIBILITY	LEGAL CONSTRAINTS	ASSOCIATED	D SITES OF	ASSOCIATED GEOCL	MENG	TREKKING DIFFICULTY	POTENTIAL NATURAL	VULNERABILIT	Y 10011E0	FRAGILITY OF THE SITE	PROMOTION OF THE TR		RELEVANT REFERENCES FOR GEOCLIMBING OR GEOSITES PROMOTION	Dam
AESTRETIC VALUE	SUCIO-ECONOMIC VALUE	OPATIAL ACCESSIBILIT	ACCESSIBILITY	LEGAL CONSTRAINTS	INTER	Other sites of	A0000012002002	Proposed	TREMMING DEPICULIT	HAZARDS	Specific knowledge required for hiking	,	PRAGEITOPTRESITE			RELEVANT REFERENCES FOR GEOCLIMBING OR GEOSITES PROMOTION	Figure
If the trail has an aesthetic value	If the trail has an economic and toruistic relevance, or if it is inserted in a touristic area	Type of access to the trail and difficulty of the path	Periods in which the trail is accessible	Any restriction to the use of the trail	Other sites of geological interest in the surroundings	cultural or naturalistic interest in the surroundings	Geoclimbing site(s) that can be visited along which the path	connection with a geoclimbing in GEOCLIMBING sheet	Degree of difficulty of trekking activity	Any possible natural hazards along the trail (e.g., rock fail, flood)	along the trail (We do not mention the need for a Mountain Guide that everywhere should be required for this type of activities)	Are there any unprotected parts of the trail needing specific gears?	Potential (natural or anthropic) threats to trail features	Initiatives origoing to promote the trail	Link	Publications regarding the scientific value of the site and the possibility of geotrekking activity	
The gorges are really impressive as well as the giant's potholes	It is located in an important touristic area of the Italian Alps	By car (by bus only starting form the village) and then on foot on an excursionistic trail.	From Spring till Autumn (not rainy days)	It is located on a private terrain but it is freely accessible	Yes, several	Yes, several	Premia Balmafregia and other potential ones in the Formazza and Antigorio Valleys	GC-1	The first part as far as Balmafnegia climbing wail and Arvera Gorge, is machable also by people with disabilities; other stops can be reached also by children but the path requires for adequate shoes because in some points it could be wet and sliding.	During rainy days it is better not to go along the gorges.	If water is present on the floor of the gorges (often it is), the trekker need the suitable equipment.	None	Some trails of the goinge have been carved by Man, and this is a threat to rock preservation	The trail has been already promoted through themalic maps and publications firedy available at the information centre in Crodo (VE, Italy)		- Castglori G.B (1958) - Bolati et al. (2018) https://doi.org/10.3301.ROL.2018.15	L
Attractive landscapes modelled by glaciers at the water divide between the Loara Valley with the Portaloia Valley, along the Val Grande National Park border. A beautiful view on Monte Rosa Massil is also visible from different geostops.	Very famous among tourists of the Vigezzo Valley	By car and then by touristic path or excursionistic path for experts	From Late Spring to Middle Autumn	None	Yes, several	Yes, several	Zomasco and other potential ones in the Vigezzo Valley	GC-2	There is a touristic path or in alternative an excursionistic path for experts	Gravity-related hazards and snow avalanche hazards during extreme rainfail evens or avalanche season	Along the expert path there are some traits equipped with protection chains tha require expertise	Along the expert path there are some traits equipped with protection chains	Anthropic reflutishment on the Loana valley bottom may threaten the survival of the slope and fluxial landforms and at the head of the valley peat bogs are really fragile t tourist impact.	There is an active promotion activity coordinated by the Ecomuseo in Malesco where there is also a geological room	https://ecomuseomalesco.it/anello- geoturistico-della-valle-loana/	-Boltati et al. (2017) Https://doi.org/10.1007/s11528/017-4427-7 -Boltati et al. (2018c) Https://doi.org/10.1016/jj.co.0indl.2018.05.053 -Boltati et al. (2019) https://doi.org/10.3301/IROL.2019.46 Boltati et al. (2020) https://doi.org/10.3301/IJG.2020.01	
Attractive landscapes seen from the arrival of the trait. Tooc fluxial valley and Mountain ridge bondering the Val Grande National Park on the opposite side of the Valley.	It is a famous toruistic route.	By car and by bus, and then on foot through a excursionistic trail	Open all year round	None	Yes, several	Yes, several	Omavasso and other potential ones in the Lower Ossola Valley	GC-3	The trail is along dirty road and hiking paths	None	None	None	None	It is a very important trail for the historical features, already equipped with panels	Imps //www.comaileonavaso.com /en-as/ivere-8- comune/tinerariomavasso-e-8- linea-cadoma-linerario-la33-21952- 1- br-2031f8afe_22913905f1+2ef34s189		
Multiscale landforms related to granite modeling, and the panoramic view on the lakes are really impressive	Caves and ski resort attracts people.	By car (by bus only from 1 direction), then on foot on an excursionistic trail.	From Late Spring to Middle Autumn. Snow is a obstacle to see landforms	None	Yes, several	Yes, several	Mottarone climbing district	GC-4	The trails are all excursionistic but in some case the ground is granular due to weathering of granites, and some steps on the rocks may occur.	None	Be able to go both on granular and rocky grounds	None	Human interference is really high in the area due to cave activity and ski resort presence.	There are hiking maps with some indications of the most importan points, not specifically on the geological and geomorphological features	tins inversion to a supervise the		
Impressive view under the Sesia Valley side of the Monte Rosa	It is located in an important touristic area of the Italian Alps, two mountain huts are present along the path	By shuttle (June-September) or by car (in the other months)	June-September	Constraints imposed by the Natural Park regulations	Yes, several	Yes, several	Furld Scotle and other potential ones in the Sesia Valley	GC-5	Excursionistic	Rockfalls and snow avalanches	It requires to know how to proceed in mountainous territories.	None	Highly frequented path by excursionists.	Inserted in the Guide to Italian Glaciological Trails and on the local tourism agency website	en-uslaree-protette/timerari- outdoorisentiero-glaciologico-34-1- abcaDafde5a0ff3cc95405feceb6077 b	- Vlari et al. (2017) - Perotii et al. (2020) - https://doi.org/10.3390/resources9060063	
Attractive landscapes due to the presence of many lakes, landforms related to subglacial erosion and great views on the surrounding morainic amphibiatre with the Alps in the background	Thousands of tourists every year, hrea Hills are crossed by a dense network of narrow streets and partis. They can be visited starting on foot from numerous inhabited centers (krea, Cassinette, Chiaverano, Mortalo Dora and Boopfranco d'hrea) and so local people use them as a recreation area.	By car (by bus from lyrea town)	Througout the year. The best time is in spring and autumn.	Constraints imposed by the natural area. The path also covers private land, but paths and disr roads can be traveled freely (see map).	Yes, several	Yes, several	Yes, the Montestrutio climbing site is 5 km away from the start of the trail in Montato. The two locations are also connected by the Via Francigena route.	GC-10	Easy trekking, suitable for all ages, but with adequate shoes (rock surfaces are sliding when wet). Caution is needed on the paved roads (short stretch near Lake Sirio) for car traffic and along the entire path for cyclists.	None, if you rest Some exposer small rocky cliffs are present near the path. On rainy days the rocks between Monte di Maggio and Lake Pistono can be very silppery. Caution!	Basic inoveledge is required for the few sections on a steep path. Most of the trail is on small reads without natural hazards.	Basically none. Nordic walking poles can be useful on the few steep sections of the trail	Terre Balletine is a very sensitive environment.	Very popular trail. The trail "In search of the Lake Conigilo" and the pile-dwelling settlement interable to the Neothic can be accomparied by Volunteer Tourist Guides. Some hiking maps are available.		- De Renzo G. (2004) - Canavese et al. (2016) - Heps://doi.org/10.17148/gp.j.lasn.2210.3382.2018.01.004	
View on the Chiavenna Valley and impressive glacial landforms	It is located at the confluence between 2 roads connecting Italy to Switzerland, that are important touistic-economic routes.	By car, or on foot from Chiavenna city on a touristic trail.	From Late Spring to Middle Autumn. Snow is a obstacle to see landforms	None	Yes, several	Yes, several	Sasso del Drago and other potential ones nearby Chiavenna City	GC-11	The trails is suitable also for children	None	None	None	None	It is a very famous trail promoted in several ways	http://www.valchiavenna.com/enicut ure/Paradiso-Botanical— Archaeological-Park.html		
Not only the grandeur of the mining landscape but also the presence o the so-called "oye" of the maccalute, point of emergence of mud, gas and fluids.	Heart of the Rocca di Cerere geopark, the site of Fioritsela is located in the certer of the main road towards the UNESCO site of the Vila Romana del Casale, one of the most visited sites in Italy.	By car, with public services between Enna and Valguamera, with the e-bikes of the Cafeci agricultural workshop.	Open all year round	Access is free but regulated by the park regulations that protect the geology and mineral evidence.	Yes, several	Yes, several	None		Experted hikers	Only to the eye of the Maccalube where there is a minimal risk of paroxysmal events. Obviously, I is forbidden to enter the mining turnels without the park's permission.	t None	None			www.roccadicerere.eu		
The landscape is dominated by a morphological contrast between flattened surfaces and rocky crests of sandstones.	The initial and final stop of the path can be correlated with other commercial activities existing in a circle of 10 km (Sicily outlet brands commercial centre)	By car, with public services between Enna and Valguamera, with the e-bikes of the Cafeci agricultural workshop.	Open all year round	Access is free but regulated by the park regulations that protect the geology and mineral evidence.	Yes, several	Yes, several	None		Experted hikers	Ruins of Pietra tagliata Castle are partially at risk of rock falls	None	None		Yes, a promotional video (drone flights) about historical sicilian castles, natural landscape			
The landscape is dominated by two marvellous mountains of sub- vertical calcarenite beds, interbedded with marts, which are cut by the magesty of the Satso river	Heart of the Rocca di Cerere geopark, the site of Floristella is located in the center of the main road towards the UNESCO site of the Villa Romana del Casale, one of the most visited sites in Italy.	By car and bus (no public transportation system). From Enna or Caltanissetta by bike. The path is also suitable by mountain bikes.	Open all year round	Access is free but regulated by the park regulations that protect the geology and mineral evidence.	Yes, several	Yes, several	None		All category of people, except people with disabilities.	The calcarenite beds are at risk of rock fails while the interbedded marts can create located landslides	Better avoid trekking after abundant rainy days, because of the muddy nature of the path and the proximity with the Salso river.	None			https://riservaimera.it/approfondime r&/tinerari/	- Club Alpino Italiano (2022)	
It is of great aesthetic value due to the trees and rae vegetation it hosts, the vertical diffs of limestone and the water presence.	Several hundreds of tourists use it everyyear, whereas it acts as a recreation area, with facilities established by Forest Service.	By car and then by foot	Almost all over the year, excpet heavy rainfall in winter time	Constrains on its used are imposed by its location within a Nature 2000 and forest area.	Yes, nappe contact, small caves, spring, fold and fossil sites	Yes	Yes	GC-13	Most people with proper shoes, helmet and some basic knowledge on trekking can walk the trail. The route is easy, some parts need to use fixed rope or stains. It is better to return the same way up as it is easier and shorter.	Only potential hazard maybe due to small rock falls, due to goals activity and also under heavy rail	In winnler time trekkers need to get into the poole and water, and in some a parts to use fixed-rope and stairs	The trekkers should alwayes stay on the trail, and avoid side trails that might impose several risks to them	Sometimes after heavy rain rock fails and small slides happen. Rock fails may be initiated by goat activity too.	Yes it is promoted by Psilontis UGGp both as geosite and also as climbing site.	tilps://www.psiloritisgeopark.grienig eolamari-citits/	- Fassoulas ef al. (2007)	
The Rouvas forest, the wild nature of the goige the steep clifs and the rare plants give a high aesthetic value	It is a trail that received hundreds of tourists every year. It starts from a very touristic recreation site that of Zaros lake and leads to one of the rare cak forests of Crete.	By normal car at its begging and only by 4WD car at its end at Rouvas forest. The best is to return back the same way.	Not in winter time because heavy rain and also snow close several parts of the trail	Constrains on its used are imposed by its location within a Nature 2000 and forest area.	Yes, fault scarps, waterfalls, fossil sites, cliffs, springs and small caves	Yes	Not now, but has great potential		Most people with proper shoes, and some basic knowledge on trekking can waik the trail. It needs some physical ability because of the 500m athtude difference.	Only potential hazard maybe due to small rock falls, especially due to heavy rain.	In winter time it might be too cold, proper clothes and shoes are needed	The trekkers should alwayes stay on the trail, and avoid is side trails that might impose several risks to them	In some parts of the gorge with steep clifs rock falls happen after heavy rain or goat activity	Yes it is promoted by Psilontis UGGp both as geosite and also as trekking route.	titos //www.psilorilisgeopark.grienig gofrom-mountain-to-the-plain/	- Fassoulas et al. (2007) - Fassoulas et al. (2012) - https://doi.org/10.1007/s12371-011-0046-9	
The Miglas gorge with its steep ciffs, as well as the Stefana doline in writer time are of high-asethetic values. In addition at the end of the trail a splendid view all over the northern coast of the island of Crele is offered.	The trail is used mainly for educational purposes, however, many loariets that are visiting the nearby village of Anogia are also using it	By nomal car through the road leading to Nida plateau and then by foot.	Not in winter time because heavy rain and also snow close several parts of the trail	Constrains on its used are imposed by its location within a Nature 2000 and forest area.	Gorge, detachment fault, , folds,doline, sinkholes,	Yes	None		Most people with proper shoes, and some basic knowledge on trekking can walk the trail.	None	In winter time it might be too cold, proper clothes and shoes are needed	The trekkers should alwayes stay on the trail, and avoid side trails that might impose several risks to them	None	Yes it is promoted by Psilottis UGGp both as geosite and also as trekking route. It is mainly used for educational purposes and a special educational app titled e-Geodiscover has been developed by Geopark.	titos Jwww.osloritisgeocark.orima gesiedionitiserFiles/files/Psiloritis_ Trat_Mygia.odf	- Fassoulas et al. (2007) - Fassoulas et al. (2012) - Higu: Ildoi.org/10.1007/s.12371-011-0046-0	
High aesthetic value due to the different shapes of the rocks. The whole Pedriza is a labyrinth of rocks.	The area receives thousands of visitors every year: climbers, trekkers, naturalists and other tourists.	By car	All over the year. Best without rain.	It is a National Park with its own legislation. Between June and October there are timetables for entering and exiting by car.	Yes, severals	Yes, severals	Yes	GC-14	The trekking is easy. Suitable for all ages from approx. 9 years above.	On rainy days the rock can be very slippery. Caution!	If water is present on the floor, the trekker need the suitable shoes	None	Great erosion due to overgrazing by wild goats.	A part of the trail is explained in some divulgative document of the Interpretation Center La Pedriza (NPSG)	https://www.parquenacionalsiemagua damama.es/en/visit/contact-vc	- de Pedraza et al. (2014) https://doi.org/10.1007/978-94-017-9628-7_5 - Garcia-Rodriguez, M. (2015b)- https://doi.org/10.22201/logeo.20072902e.2015.3.597	
High aesthetic value as a high mountain landscape. Vertical walls, green meadows, peatiand and bautiful lakes.	Thousands of visitors every year: trekkers, naturalists, rock climbers, ice climbers, mountain skiers and other tourists.	By car and bus (preferred by car)	The best time is between May and October. Snow may cause difficulties for trekking.	It is a National Park with its own legislation. Between June and October there are timetables for entering and exiting by car.	Yes, severais	Yes, severals	Yes	GC-15	The trekking is easy. Suitable for all ages from approx. 9 years above.	None	In autumn and spring the weather can change quickly. Bring warm clothes.	None		A similar trail is explained in the National Park's own documents.		- Garcia-Rodriguez et al. (2016) - https://doi.org/10.1144/SP416.11 - de Pedraza et al. (2019) - https://doi.org/10.1016/j.geomorph.2019.05.024	
The intrinsic characteristics of granite confers to the landscape unique peculiarities, as if there had passed the human hand carving the stones that stand out proud into the sky.	The trail is close to Penhas da Saúde, one the most touristic high attitude villages of the territory	By car and bus (no public transportation system)	Open all year round	It is a National Park with its own legislation. Groups with more than 10 people must request a authorization to visit the area.	Yes, several	Yes, several	None		All category of people, except people with disabilities.	loy sections.	During intense foggy days, it is better not to do the hiking.	None	Tramping may increase erosion by the trail and affect habitats and endemic species, under unconscious trekking behaviour.	Promotion through thematics maps and Geopark's activities.	tilps ilmanteigastrihosverdes comie	- Ferreira, N. & Vieira, G. (1999) - Vieira et al. (2021) - https://doi.org/10.1016/j.gaomorph.2021.107781	
Presence of large scale granite morphology like majestic granite outcrops.	Its located near Vale do Rossim, a very touristic area, especially during the summer, due to the dam	By car and bus (no public transportation system)	Open all year round	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for regular low-impact trekking activities.	Yes, several	Yes, several	None		All category of people, except people with disabilities.	None	During intense foggy days, it is better not to do the hiking.	None	Tramping may increase erosion by the trail and affect habitats and endemic species, under unconscious trekking behaviour.	Promotion through thematics maps and Geopark's activities.		- Ferreira, N. & Vieira, G. (1999)	
The valley is one of the best examples of landscape modelation by the glaciers, with its "U" form, in its magnific dimensions.	The trail starts at the highest point in Portugal, and the most visited spot in the Estenia UGGp territory. It ends in the Village of Marteigas, one of the main villages in the territory with several touristic resources	By car and bus (no public transportation system)	All year (adverse conditions at the Winter).	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for regular low-impact trekking activities.	Yes, several	Yes, several	None		People with some experience on trekking activity.	Storms and bitzzard on the highest part of the route, specially in the winter.	In the highest part of the route, during the whiter, is possible have snow, ice and storms. During intense foggy days, it is better not to do the highest part of the hiking.	During the winter, is needed adequated gear to the snow in the highest part of the route.	Wildfres have affected the stability of the slopes, with several landsides occuring. If there this occurs again in the future, the ensistent processes will be accentuated. On the higher sections of the path, transpir may increase ension by the bail and affect habitats and	Promotion through thematics maps and Geopark's activities.	https://manteigastrithosverdes.com/e	- Ferreira, N. & Vieira, G. (1999)	
The trail runs through the boardwalks bulk along the Mondego river, with some hanging bridges.	Since its opening, it has been one of the most visited sites in the territory, boosting new enterprises and jobs.	By car and bus	Open all year round	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for regular low-impact trekking activities.	Yes, several	Yes, several	None		All category of people, except people with waiking disabilities.	Wildfires on dry season	None	None	Wildfires can destroy the wakways. With the burning of the vegetation, there will be significant erosional processes in the steep slopes of the valley	Promotion led by Guarda municipality: website, local and national news, international promotion. Estrela UGGp1's activities and a specific calendar of events only for this equipment.	https://www.passadicosdomondego.j	- Ferreira, N. & Vieira, G. (1999)	
Bucolic landscape, some sections of the route, goes on the screes.	Not relevant	By car and bus to Verdelhos village (then by foot through a dirt path, 3 km from the village).	All over the year (adverse conditions at the Winter).	The walkways are closely managed by the municipality and a private partner who limit access according to the equipment's carrying capacity. Possible constraints may also be imposed by the Natural Park	Yes, several	Yes, several	None		People with some experience on trekking activity.	Rock fail on the gravel pits. Wildfires on dry season	During the winter, some sections can be slippery due to the ice and it is not possible to cross the river because of the rising flow.	None	Wildfires have affected the stability of the slopes, with several landslides occuring. If there this occurs again in the future, the ensional processes will be accentuated	Local promotion		- Femeira, N. & Vieira, G. (1999)	
This route dives inside a dense Beech forest, remarkable for its colours in the Autumn.	Located near the village of Manteigas, one of the main villages in the geopark with several touristic resources	By car and bus (no public transportation system)	Open all year round	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for regular low-impact trekking activities.	Yes, several	Yes, several	None		All category of people, except people with disabilities.	Tree fail; wildfires on dry seasor	n None	None	Wildfires can affect the area, burn all the vegetation, and increase the instability of the slopes, which are already unsteable due to the screes Wildfires can burn all of the vegetation and	Promotion through thematics maps and Geopark's activities.	tilps ilmarteigastrihosverdes.com/e	- Fennia, N. & Vieira, G. (1999)	
Sequence of 4 overdeepnings well-developed, in staircase shape.	It ends in the village of Loriga, which is a large village with important buristic resources	By car and bus (no public transportation system)	All over the year (adverse conditions at the Winter).	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for regular tow-impact trekking activities.	Yes, several	Yes, several	None		People with some experience on trekking activity.	Floods at the highest sections of the route.	In the highest part of the route, during the writer, is possible have snow, ice and storms. During intense foggy days, it is better not to do the highest part of the hiking.	During the winter, is needed adequated gear for the snow and water on the field, in the highest part of the route.	Wilderies can burn ai or the vegetation and contribute to an incress in alonge instability and occurrence of landsidies; On the higher sectors of the path, transpiller increase encoded by the thal and afflect habitats and endemic species, under unconscious trekking	Promotion through thematics maps and Geopark's activities.		- Ferreira, N. & Vieira, G. (1999)	
High assibility value is due to the possibility of observing the formation of unique traventine domes. The highest domes are also a very good viewpoints over the structuring Homitable Bash and the sumounding modeline larges	³ The travertine dome with the Spi8 castle is the most frequently visited - over 100,000 tourists a year, the remaining domes are visited less frequently	By car	Open all year round	Possible constraints may be imposed by the Natural Park regulations. However, there is currently no constraints for ngular low-impact trekking activities.	Yes, several	Yes, several	Yes	GC-17	No difficulties	None	None	None		None		- Nonge (1944) - Nondewski et al (2016) - Gradmaki et al (2014) Https: Station org 11.1111/sec. 12086 - Chrobaki & Bak (2019)	
The high aesthetic value results from the possibility of observing deep karst valleys with numerous landforms asstructural sills, waterfalls, gorges, etc.	Thousands of tourists every year; the trail is very well marked	By car	Open from June to October	None	Yes, several	Yes, several	None		Easy trekking, suitable for all ages from 6 years above	watch out for slippery rocks on rainy days	In winter, it is worth having crampons	None		It is promoted as an educational trail		- Gros (1973) - Gross (1993) - Lacka (2009) Bąk (2019) - Chrobak (L.
High aesthetic value is due to the possibility of observing a typical glacial landscape with a large number of glacial lakes, moraines, suspended valleys and nunstracks	About half a million tourists a year, the most popular place in the Polish Tatras, full tourist development with mountain huts	By car and by bus (prefered by bus due to the limited number of parking spaces and traffic jams)	Open from June to November	School groups must be under the care of a Tatra mountain guide	Yes, several	Yes, several	Yes	GC-18	Medium treiking, suitable for all ages from 10 years above	watch out for slippery rocks on rainy days; possible avalanches	In winter it is worth having crampons and ice ax	None		very popular trail, no additional promotion required		- Kotartski(1971) - Gaseçda A. (2007) - Zasadni & Kilapita (2014) - https://doi.org/10.1080/17445647.2014.885854	
High aesthetic value results from the possibility of observing both kars and post-glacial forms, as well as elements related to the former iron mining	t 300 thousand tourists a year; full tourist development with mountain huts	By car and bus	Open all year round	School groups must be under the care of a Tatra mountain guide	Yes, several	Yes, several	No		Easy trekking, suitable for all ages from 6 years above, lower part of Chocholowska Valley is accessible for people with disabilities	watch out for slippery rocks on rainy days	In winter, it is recommended to wear crampors or non-slip overlays on boots	None		very popular trail, no additional promotion required		- Kotański (1971) - Rączkowska (2019) - Ciurej et al. (2019)	
The area offers an enchanting view of steep cliff, that are more than 1.2 km deep.	The area is heavily visited by tourists, and there are a number of resorts near the dimbing and trekking routes.	By car (not by bus)	Open all year round	The area if fully accessible, but the mountain summit (Jebel Shams, 6 km away) is not accessible to tourists.	Yes, several.	Yes, several.	Sab Bari Khamis	GC-20	The trekking route is generally easy, and suitable for all ages from approx. 8 years above, however a few locations need cation as they are exposed to small cliffs	During rainy days it is better not to go along the route.	Avoid trekking on the route during rain days.	/ None		The trail is known in Oman, and frequently visited by people.		-Al Kindi et al. (2022)	
Attractive landscape of Western Ghat escarpment, highest peak of Deccan is nearby	Located in well-known tourist area of Bhandardara	By car	Open throughout the year except heavy rainy days during June to September months	None	Yes	Yes, several	None		The last part of the trek is rocky and somewhat difficult	Silppery rocks	None	None		Well-Incom trail, additional promotion is required for its geoscientific aspects			
Impressive landforms and large scale geomorphological process	One of the highlights trails of the region, attracting people from all over the world	y car until the starting point of the trail. The rest of it just walking, or mules	All over the year, but better between May and August	None	Yes, severals	Yes, severals	Possible, but not yet used for this activity		Most people with proper shoes, physical ability and some basic knowledge on trekking	summer storms	Due to the rules of the National Park, must be accompanied by official guides	None		One the most visited trails in Chapada Diamantina	http://www.infochapada.com.br/portf olio-item/pativalley-mini/	- Cezar R.V. (2011)	
High authetic value, the mountains are great	Tourism is one of the main economic activities in this area	By car, there is no public transport	Open all year round	This is a protected area and also covers private land, pathetrails are available (see map)	northern sector of the Drakensberg mountain range, so further south there are many scenic areas with well developed tourist facilities, with walking, trekking, horse riding and	and heritage sites. For archaeology, there are rock shelters with lots of rock art (these are	None		There is more potential here for a drivingshop-and-see toil rather than a walking hat because much of the land is privately owned and access is sometimes difficult	Some rocidals and road floods in some places; in the mountains themselves rocidal is the mina hazard; but there are also snakes; skep cliffs and overhangs, and unstable slopes	None	None		None really that are specifically related to geohestage, but there is a to of potential here. The national agency for analysis SAMParks, has come information analysis of the second second second second second paties communication, diving/stopping notes, and information boards	https://www.sanparks.org/parks/gold en_gate/	- Toffer et al. (2012) - Https://doi.org/10.1003/ep.2011.10.008 - Mel & Hile (2012) - Https://doi.org/10.1003/ep.2021.10.008 - Mel & Hile (2014) - Https://doi.org/10.1003/ep.2022 - Tarai et al. 2012 - Tarai et al. 2014 - Tarai et al. 2014) - Https: - //doi.org/10.1003/ep.2487	

ITION	Figure in the manuscript	3D models or Virtual tours
ing activity		Link to available 3D models or Virtual tours
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st al. (2019) -		
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82.2018.01.004		
	74	Yes, Mt. Capodarso and Sabucina
12) -		
12) -		https://tours.nhmc.uoc.gr/geoparks/mygia-new/map/.
	6f	
-	8e	
	6c	https://sketchfab.com/3d-models/lagca-seca-estrela- aspiring-geopark- 21ad10ff6b32478db48d842249dc91be
		https://sketchfab.com/3d-models/perhas-douradas- estrela-unesco-geopark- 8d4941cc79004c9785abo45d4d94761d
		https://skitch/fab.com/34-models/skito-branco-estrela- unesco-global-geopari- https://skitch/fab.com/35-models/covao-boi-estrela- unesco-global-geopari- 63a011bf72062497986ccf2ba4b282a67
		https://sketchfab.com/3d-models/loriga-salgadeiras- estrela-unesco-global-geopark- d7cf1428bb64661bc9a3de08326a0d3
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