

**ProGeo WG1 Annual Meeting
September 22-28, 2003,
Bucharest, Romania**



Annual report on the protection of geological heritage in Turkey

by

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on the behalf of

JEMIRKO

(A registered association on progeo in Ankara)

Ankara 2003

FOREWORD



On the behalf of members of the Turkish Association for Protection of Geological Heritage –JEMIRKO- and other progeo friends in Turkey the Turkish delegate would like to greet you the assembly and to thank Romanian colleagues for organization.

This report includes short information about Jemirko itself and its activities.

1. The body of JEMIRKO

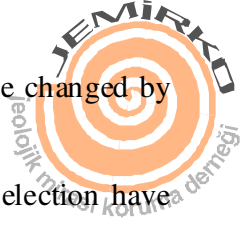
Jemirko is not only a registered progeo group but also a small NGO in our country with total members of 55 earthscientists. The seven of them have joined us this year. As a matter of fact, the executive committee has not any complaint with the shortage of member number, in contrary this is a given policy. To Turkish NGO legislation members should pay their monthly dues properly and should participate in annual general assembly. A formal meeting may be realized by only participation of half of the present members at least. Otherwise NGO police can stop the activity of the association.

The annual membership payment is ca 10 Euro. This due is very small but enough for Jemirko as expenses are generally paid by sponsors.

Jemirko has an executive committee elected and nominated representatives in 22 universities that include geology or earthscience programmes. The present executives re-elected in the general assembly in March 2003 for two years. The representatives are encouraged to form local jemirko/progeo groups from department staffs and students. To news the results are not satisfactory but they show large potential giving hopes.

2. Activities

We differed strongly that the third order cultural NGO activities as it is on progeo (the first and second orders are political and sportive) are basically dependent on silence and



peace in the country and in the world. Jemirko's activity plans have to be changed by because of general election in Turkey in November 2002 and the Iraq war.

After the general election in Nov. 3 2002 the new governments the election have made great changes on structures of official institutions and ministries The biggest one for us is the unifying of former four ministries Culture and Tourism and Environment and Forestry in two ministries respectively. Planning of the change, reorganization of the ministries and nomination of authorized persons have taken time and decreased the importance of real activities. Still there are some legislation gaps and they cause difficulties for effective results.

The current Iraq war has resulted to collapse not only the economy and social life in Turkey but also all kind of third order cultural activities. The reality is worse and fairly different than that of known from away. However we could obtain the positive results as follows:

a) Meetings: Two meetings could be held in Mid December 2002 and mid March 2003 by participation of 39 and 47 geologists respectively. The December meeting was on the definition of the common terms like geosite, cultural and geological heritage, framework list, geopark in the light of current rules and official articles. The March meeting was about the discussion of a proposed framework list. Also, subcommittees for geopark, geo-heritage and geosite and their working procedures have been fixed and results were announced in the website www.jemirko.org.tr.

Some symposia and congress in Turkey declared the geological heritage as sessions, unfortunately there was hardly presentation.

b) Framework list: Jemirko and its members are very pleased that the Turkish progeo framework list has been prepared, however it is not last version. The present list has been completed by great efforts of N.Kazancı, F. Saroğlu and M.C. Göncüoğlu and later accepted in March 2003 meeting by the general assembly of Jemirko (Appendix 1). During the preparation we benefited from works of the other countries. The present list is quite long as the geology and geological evolution of Turkey are very rich and



complicated from Precambrian to Recent. Your comments and critics on this list are welcome.

c) Geosite lists: The former Turkish geosite list has been enlarged by addition up to fifteen new geosites (Appendixes 2 and 3). The number of total geosites in the list is 170 for the time being and we believe that it is less than 01 % of the important geosites in Turkey. On the preparation and improvement of the list the efforts of F. Şaroglu is greatly appreciated.

When comparing it with the framework list, shortage of the geosite list is clear (Appendixes 1 and 2). Probably this is the result of Jemirko's rule. To it, someone should propose a geosite for the list filling an application form (Appendix 4). The geosite subcommittee examines it and then sends to the general assembly for final decision adding its own comments. The aim of this long procedure is to form a large agreement on the importance of the geosite. Such an agreement could provide facilities on protection.

d) Geopark project: In spite of presence many nature protection areas, particular environments for protection, sites for natural heritage, there is not any geopark in Turkey. In addition the most of the registered and famous places are landscapes or geological localities. Jemirko's executive committee has decided to search localities for potential geoparks. Project studies are going on eight areas. They are mostly in central and eastern Anatolia. After completion, results will be sent to the government for registration and for further studies. Jemirko is also pleased that MTA, the Turkish geological survey has started researches in the Mut area as a potential geopark. Jemirko is also in cooperation with MTA on this work.

Jemirko project team includes geologists and professional photographers in the leadership of a PhD student, Korhan Erturaç. The obtained material will be use for public education as well.

The target places:



- 1) **The Karapınar composite geopark:** It is in east central Anatolia. It covers many kinds of geological and cultural sites including maars, maar lakes, volcanic cones, stratovolcanoes, sinkholes, dried and living lakes, old lake plains, eolian dunes, modern evaporates and salt formations, ophiolitic and sedimentary sequences from Eocene to Holocene.
- 2) **The Mut composite geopark:** It is in the central Mediterranean region of Turkey. Apart from extraordinary erosive landforms, it includes a very thick, large but undeformed Miocene sequence. It is the largest palaeobay of the Mediterranean.
- 3) **Narman red happiness valley:** It is in eastern Anatolia. The red colour, coarse clastic sequence of Pliocene forms very picturesque landforms.
- 4) **Kula volcanic geopark:** It is in western Anatolia. It is composed of all kind of volcanic formations and landforms included lava tunnel and human footprints. Unfortunately the footprints are decaying and number of them is decreasing rapidly.
- 5) **Cappadocia geopark:** It is in central Anatolia. Erosive landform, many tuff cones, calderas, lava and pyroclastic flows are the basic elements. Colorful lithology and trenched morphology create a wonderful landscape appearance. It has been already in the World Heritage List (WHL).
- 6) **Denizli travertine geopark:** Different types of travertine of late Quaternary can be visited. The area includes remnants of many mammalian species including Hominids. Pamukkale part of it is already in WHL.
- 7) **Nemrut volcano and Lake Van geoparks:** It is in eastern Anatolia and includes many cultural, volcanic, sedimentary and structural sites. North Anatolian Fault begins from here and Lake Van is the largest water body with sodium sulphate.

e) Publications: Our activity is very limited on this topic. We could only contribute to ProGeo Manual of T. Todorov (Ed.) with a short paper (Kazancı et al, Geoconservation in Turkey) and to the joint paper of Drandaki et al (Geosite framework of SE Europe) in the proceedings volume of the last Dublin meeting. However, we have a striking project

which will be ended very soon. We will publish the guide map with a scale of 1/2000000 and explanatory notes of the known geosites (Appendix 3). Some private and official institutions encourage us on this publication.



3. The most active members

It is acknowledged with pleasure that particularly some progeo friends gave extra hands to executive committee for this year's activities. They are Ahmet Doğan, Selim Ozalp, Ozden Ileri (MTA), Ediz Kırman, Koray Sözeri, Sinan Ahıska (Ankara Univ.), Korhan Erturaç (Istanbul Tech. Univ.)

4. Future plans

As mentioned above, geology of Turkey is very rich and consequently potential number of geosites is extra high. Apart from protection, even searching, introduction and registration of the present geosites need large groups and much effort and instead of amateurs or members of an NGO, professionals can manage good results for the purpose. Our plan is to realize a graduate education programme on natural heritage. Students of this programme could work effectively on the topic. The rectorate of Ankara University has promised on it if we can submit an appropriate plan.

The executive committee of JEMIRKO

Prof. Dr. Nizamettin Kazancı

Dr. Fuat Şaroğlu

Assoc. Prof. Dr. Sönmez Sayılı

Dr. Necip Sabri Mülazımoğlu

Dr. Ömer Emre

APPENDIX 1



**TURKISH ASSOCIATION FOR THE PROTECTION OF
GEOLOGICAL HERITAGE
(JEMİRKO)**

FRAMEWORK LIST OF GEOSITES AND GEOLOGICAL HERITAGE IN TURKEY

**2003
Ankara**



STRATIGRAPHIC

Quaternary

Marine coastal deposits (ooids, beachrocks, terraces, sand bars)
Caliches and calcretes for Pleistocene climate

Phanerozoic

Late Neogene (Pliocene) marine deposits
Neogene evaporite basins
Parathetis successions
Marine and continental Miocene molasse
Complete marine cycles of Neogene
Tertiary mammalian beds
Extensive transgressions in Late Tertiary
Palaeogene basins
Paleogene bioherms
Reference stratigraphic sections of Palaeogene stages

Sedimentary and biological characteristics of time-boundaries
Late Cretaceous-Palaeocene carbonates
Late Cretaceous reefs
Mesozoic carbonate platform
Mesozoic platform deposits of Neothetis
Jurassic-Cretaceous deep marine facies
Ammonitico Rosso facies
Sequence-stratigraphic events of Jurassic
Triassic-Jurassic carbonate successions
Late Triassic rift volcanisms related to the opening of Neothetis Ocean
Rift deposits related to the opening of Neothetis Ocean
Hersinian molasses

Marine and continental deposits of Carboniferous
Lower Palaeozoic succession of northern Gondwana
Cambrian sedimentary sequence

Proterozoic

Precambrian deposits

PALAEOENVIRONMENTAL

Trace fossils
Paleokarsts
Foot prints on volcanites
Mammalia beds with hominoid and handcrafts
Fish and leaf fossils



Neogene paleosols
Neogene siliceous trees
Miocene bivalves

Large Tertiary foraminiferas
Bouma turbidite sequences
Incised valleys

Cretaceous ammonites
Devonian fishes
Euxinic environments of Early Silurian
Ordovician and Silurian Graptolites

VOLCANIC, METAMORPHIC AND SEDIMENTARY PETROLOGY, TEXTURES AND STRUCTURES, EVENTS AND PROVINCES

Collision volcanisms of Quaternary
Extension volcanisms of Plio-Quaternary
Volcanic landforms (Calderas, Maars, Tuff rings)

Bazalt lakes and columnar basalts
Pyroclastic flows and ignimbrites
Neogene rift volcanisms
Stratovolcanoes
Transform-fault volcanisms
Continental arc volcanisms of Cretaceous
Neothetis suture zone and its complex (Ankara-Izmir Suture Zone)
Neothetis island-arc complex
Neothetis oceanic crust series
Sanidinite facies of contact metamorphisms
Eclogite and blue-schist mineral facies of high-pressure metamorphisms
Triassic high-pressure metamorphism of Palaeothetis
Oceanic crust on the Palaeothetis subduction zone
High pressure Alpine metamorphisms
Products of high-grade metamorphism
Core complex in massives
Precambrian ophiolites and island arcs
Nappes and ophiolite complexes

MINERALOGICAL, ECONOMICAL

Neogene evaporitic mineral beds (trona, borax, soeleastine)
Type localities of minerals Konyaite, Bursaite and Pandermite etc
Sepiolite formations in lacustrine basins
Metamorphic and sedimentary bauxites
Thermal spring carbonates



Valuable stones and gemological minerals

STRUCTURAL

Seismically active normal and transform faults

Tectonic clips

Structural landforms

Tectonically active basins (grabens, pull-aparts)

GEOMORPHOLOGICAL FEATURES, EROSIONAL AND DEPOSITIONAL PROCESSES, LANDFORMS AND LANDSCAPES

Recent eolian sand dunes

Evaporite karsts

Modern lakes, wetlands and rivers

Modern marine coastal landforms (spits, bars, beaches, lagoons, deltas)

Karstic landforms (obruks, sinkholes, dolins, polje, caves)

Glacial landforms and deposits

Canyons and valleys

Erosional landscapes

Volcanic landscapes

ASTROBLEMS

CONTINENTAL OR OCEANIC SCALE GEOLOGICAL FEATURES, PLATE RELATIONSHIPS

Foreland thrust belt of Afro-Arabian plate

SUBMARINE

HISTORICAL AND CULTURAL

Antique marble and ore mines

Ankara Melange; the site where the term of melange firstly defined

APPENDIX 2



**TURKISH ASSOCIATION FOR THE PROTECTION OF
GEOLOGICAL HERITAGE
(JEMİRKO)**

TEMPORARY LIST OF GEOSITES AND GEOLOGICAL HERITAGE IN TURKEY

**2003
Ankara**

**(Prepared by Jemirko dependent on individual suggestions of our colleagues. Some
geosites have been voted by different geofriends)**

STRATIGRAPHY		
■	1	Proterozoic
■	1a	Precambrian deposits
	1a1	Type section of <i>Enirgazi Fm. Of infra-cambrian Oruçlu wilage, eastern Taurus</i>
	1a2	<i>Halevik Dere Glacial deposits of gondwana Hırsısiyen, Gaziantep</i>
■	2	Phanerozoic
	2a	Late Neogene(Pliocene) marine deposits
	2a1	<i>Adana</i>
■	2b	Neogene evaporite basins
	2b1	<i>Sivas</i>
	2b2	<i>Beypazary</i>
	2b3	<i>Çankırı</i>
	2b4	<i>Emet</i>
■	2c	Parathetis successions
	2c1	<i>Şirap</i>
	2d	Marine and continental Miocene molasse
■	2e	Completemarine cycles of Neogene
	2e1	<i>Mut</i>
	2e2	<i>SE Anadolu</i>
	2e3	<i>Adana</i>
■	2f	Tertiary mammalian beds
■	2g	Extensive transgressions in Late Tertiary
	2g1	<i>Mut basin</i>
■	2h	Paleogene basins
	2h1	<i>Safranbolu</i>
	2h2	<i>Haymana-Polatlı</i>
■	2ı	Plaeogene bioherms
	2ı1	<i>Malabodazy</i>
	2ı2	<i>Kalecik, Ankara</i>
	2ı2	<i>Çaldağ</i>
■	2j	Reference stratigrafic section of Paleogene stapes
	2j1	<i>Rupeliyen, Sattiyen(Oligosen) referans kesiti, Develli köyü B.Akçadağ, B.Malatya</i>
	2j2	<i>Rupeliyen (Erken Oligosen) referans kesiti Pahu, Sarıbuğday köyü</i>
	2j3	<i>Priaboniyen'in referans kesiti, Kovancılar 2 km. Dodosu</i>
	2j4	<i>Tanesiyen referans kesiti, Polatlı, Karahamzalı köyü, Kırkkavaktepe</i>
	2j5	<i>Daniyen-Selandiyen'in referans kesiti, Haymana, Çaldağ, Ahyrlı köyü</i>
■	2k	Sedimentary and biological characteristics of time-boundaries
■	2l	Late Cretaceous-Paleocene carbonates
	2l1	<i>Bilecik Kireçtaşı</i>
	2l2	<i>Akveren, Amasra-Cide</i>
	2l3	<i>Haymana</i>
■	2m	Late Cretaceous reefs
■	2n	Mesozoic carbonat platform
	2n1	<i>Toroslar</i>
	2n2	<i>KB Karadeniz</i>
■	2o	Mesozoic platform deposits of Neothetis
■	2p	Jurassic-Cretaceous deep marine facies
■	2r	Ammonitico Rosso facies
	2r1	<i>Bahum, Ankara</i>
■	2s	Sequence-stratigraphic events of Jurassic
	2s1	<i>Toroslar</i>
■	2p	Late Triassic rift volcanisms related to the opening of Neothetis Ocean
■	2t	Rift deposits related to the opening of Neothetis Ocean
■	2v	Hersinian molases
	2v1	<i>Çakraz</i>
■	2y	Marine and Continental deposits of Carboniferous
	2y1	<i>Taurus</i>
	2y2	<i>Zonguldak</i>
■	2z	Lower Palaeozoic succession of northern Gondwana
	2z1	<i>Karadere</i>
■	2x	Cambrian sedimentary sequence
	2x1	<i>Dedirmenli</i>
	2x2	<i>Tufanbeyli</i>
	2x3	<i>Derik, Hazro</i>
■	3	QUATERNARY
■	3a	Marine coastal deposits (ooids, beachrocks, terraces, sand bars)
	3a1	<i>Beachrocks between Yskenderun and Antalya</i>
	3a2	<i>Gelibolu marine coastal sepuence</i>
	3a3	<i>Marine terraces at southern Marmara region</i>
●		PALAEOENVIRONMENTAL
●	1	Trace fosils
	1a	<i>Karlar, Haymana</i>
●	2	Paleokarsts
	2a	<i>Konya</i>
	2b	<i>Bandıрма</i>
	2c	<i>Soma</i>
●	3	Foot prints on volcanites
	3a	<i>Kula</i>



VOLCANIC, METAMORPHIC AND SEDIMENTARY PETROLOGY, TEXTURES AND STRUCTURES EVENTS AND PROVINCES

●	4	Mammalia beds with hominoid and handrats	▲		
●	4a	<i>Pajalar mammalia beds with hominoid, Mustafakemalpaşa, Bursa</i>	▲	1	Collision volcanisms of Quaternary
●	4b	<i>Dursunlu mammalia beds with handrats, Akşehir</i>	▲	1a	<i>Ararat Mountain</i>
●	4c	<i>Çobanpinarı mammalia beds at Kızılcadamam town</i>	▲	1b	<i>Tendirek Mountain</i>
●	4d	<i>Çalta mammalia beds Ayaz, Ankara</i>	▲	1c	<i>Siphan Mountain</i>
●	4e	<i>Akkaltepe mammalia beds at Kestin, Kırıkkale</i>	▲	1d	<i>Nemrut Mountain</i>
●	4f	<i>Sinop tepe and Kayıncak tepe mammalia beds Kayah, Ankara</i>	▲	1e	<i>Karacadağ Mountain</i>
●	4g	<i>Enirkiye mammalia beds Seydişehir, Konya</i>	▲	2	Extension volcanisms of Plio-Quaternary
●	4h	<i>Çandır mammalia beds Hırsız deresi, Kocatek</i>	▲	2a	<i>Kula Volcanoe Park western Anatolia</i>
●	4i	<i>Esendere Karaburun mammalia beds İzmir</i>	▲	3	Volcanic landforms (Calderas, Maars, Tuffings)
●	5	Fish and leave fossils	▲	3a1	<i>Nemrut Caldera Bitlis</i>
●	5a	<i>Güvem-Bepkonaklar-Keseköy</i>	▲	3a2	<i>Yincekaya Caldera Tavan, Bitlis</i>
●	5b	<i>Melekani yaylası, Solhan</i>	▲	3b1	<i>Aygör maar and lake Siphan Mountain apron</i>
●	5c	<i>Tekman</i>	▲	3b2	<i>Acygöl and Kaletepe maars Cappadocia</i>
●	6	Neogene paleosols	▲	3b3	<i>Çora maar Yıcesu, Kayseri</i>
●	6a	<i>Çifteler</i>	▲	3b4	<i>Kurtören maar Karapınar, Aksaray</i>
●	7	Neogene siliceous trees	▲	3b5	<i>Meke maar Karaman</i>
●	7a	<i>Yapraklı köyü, Çerkeş</i>	▲	3b6	<i>Nargözü maar nargözü, Aksaray</i>
●	7b	<i>Yvrindi, Balykesir</i>	▲	3b7	<i>Obrik maar Aksaray</i>
●	7c	<i>Murat Mountain</i>	▲	3b8	<i>Gölcük maar Isparta</i>
●	7d	<i>Ayaz, Ankara</i>	▲	4a	<i>Gelibolu colomnar bazalt</i>
●	8	Miocene bivalvia	▲	4b	<i>Güzcelhisar colomnar bazalt</i>
●	9	Large Tertiary foraminiferas	▲	4c	<i>Kızılcadamam colomnar bazalt</i>
●	10	Bouna turbidite sequences	▲	5	Pyroclastic flows, lavas and ignimbrites
●	11	Incised valleys	▲	5a	<i>Spişdağ pillow lavas, Manisa</i>
●	11a	<i>South of Karaman</i>	▲	5b	<i>Bolkardağlıy pillow lavas of Paleocene-Eocene</i>
●	12	Cretaceous ammonites	▲	5c	<i>Kantalyı Nemrutalıy lava flow, Tavan(1441 MS)</i>
●	12a	<i>Giant ammonites Köşrelilik köyü, Ankara</i>	▲	5d	<i>Kızıltepe volcanic cone, Kızıltutlar köyü</i>
●	12b	<i>Giant ammonites Çaycuma, Zonguldak</i>	▲	6a	<i>Eldivan Ophiolite Complex, Çankırı</i>
●	12c	<i>Yığırtı-Makaracılar, Amasra</i>	▲	7a	<i>Banded Monzonites, Çiftelhan-Niğde</i>
●	12d	<i>Pirtili ammonites Himmetpaşa, Cide</i>	▲	8a	<i>Tafonies of Menderes Massif, East of Bafca</i>
●	13	Devonian fishes	▲	9	Neogene rift volcanisms
●	13a	<i>Devonian fishes within red sandstones, Antalya</i>	▲	10	Stratovolcanos
●	14	Euxinic environments of Early Silurian	▲	10a	<i>Siphan Stratovolcano</i>
●	15	Ordovician and Silurian Graptolites	▲	10b	<i>Erciyes Stratovolcano</i>
●	15a	<i>Early Silurian Graptolites at Değirmentaş section, Saryz, Kayseri</i>	▲	11	<i>Transform-fault volcanism</i>
●	15b	<i>Graptolites of Karadere ordovician</i>	▲	11a	<i>North Anatolian Fault Zone(NAFZ)-Erzincan basin volcanism</i>
●	15c	<i>Değirmentaş-Helevikkere succession of Cambrian-Ordovician with graptolites Saryz</i>	▲	11b	<i>NAFZ-Niksar basin Transform-fault volcanism</i>
			▲	11c	<i>East Anatolian Fault Zone(EAFZ)-Yıldırımlı Transform-fault volcanism</i>
			▲	12	Continental arc volcanisms of Cretaceous
			▲	12a	<i>Kurucakile</i>
			▲	13	Neothetis suture zone and its complex
			▲	13a	<i>Ankara-Yzmir Suture zone</i>
			▲	13b	<i>Bozüyük</i>



↓	4	Tectonically active basins (grabens, pull-aparts)		7b	<i>Köprülüçay canyon, Isparta-Anıtlıya</i>
	4a	<i>Lake Hazar pull-apart basin, EAFZ</i>		7c	<i>Tapkale (Kızıllar) canyon, Yç Anadolu</i>
	4b	<i>Erzincan basin, NAFZ</i>		7d	<i>Horoz valley, Pozantı</i>
	4c	<i>Alaşehir basin, Gediz graben</i>			
		GEOMORPHOLOGICAL FEATURES, EROSIONAL AND DEPOSITIONAL PROCESSES, LANDFORMS AND LANDSCAPES			
	1	Recent Eolian sand dunes		8	Erosional landscapes
	1a	<i>Karapınar sand dunes, Konya</i>		8a	<i>Cappadocia landforms, Nevşehir</i>
	1b	<i>Eğir valley sand dunes, Antalya</i>		8b	<i>Red happiness valley, Narman-Erzurum</i>
				8c	<i>Cingeyli-Ambar red sandstones</i>
				8d	<i>Camels of Nemrut, Bitlis</i>
				8e	<i>Aras valley, Horasan</i>
	2	Evaporite karst		9	Volcanic landscapes
	2a	<i>Gypsum karst, Ulup, Yınanlı-Sivas</i>		9a	<i>Cappadocia landscapes, Nevşehir</i>
				9b	<i>Hasandağ volcanos, Aksaray</i>
	3	Modern lakes, wetlands and rivers		10a	<i>Pamukkale travertines, Pamukkale-denizli</i>
	3a	<i>Lake Akvatan, Adana</i>		11a	<i>Olimpos fire, Antalya</i>
	3b	<i>Lake Van</i>		12	Landslides
	3c	<i>Acıgöl, Denizli</i>		12a	<i>Noah's boat or Telçeker landslide, Doğubeyazıt</i>
	3d	<i>Lake Salda</i>		13	Landscape of eastern Black Sea region
	3e	<i>Lake Beyşehir</i>		14	Karapınar geopark
	3f	<i>Tuzgölü (salt lake)</i>			
	3g	<i>Lake Köyceğiz</i>			
	3h	<i>Lake Bafa, Aydın</i>			
	3i	<i>Present and ancient mouth bars of rivers Ceyhan and Seyhan</i>			
	4	Modern marine coastal landforms (spits, beaches, lagoons, deltas)	▲▲		ASTROBLEMS
	4a	<i>Kızılirmaci spit, Orhaniye-Marmaris-Muğla</i>	▲▲ 1		CONTINENTAL OR OCEANIC SCALE GEOLOGICAL FEATURES, RELATIONSHIPS OF TECTONIC PLATES AND TERRAINS
	4b	<i>Dalyan channel and Yztuzi beches, Muğla</i>	1a		Foreland trust belt of Afro-Arabian plate
					<i>Bitlis massif and overtrust, Siirt</i>
	5	Karstic landforms (obruks, sinkholes, dolins, polje, caves)	▲▲ 2		Kocaeli peninsula
	5a	<i>Sinkholes (Obuoks), Karapınar-Konya</i>	▲▲ 3		Günceel levha sınıyırı, Anadolu bloku, Pontitler (Avrasya) kıtası, NAFZ
	5b	<i>Cennet Cehennem dolins</i>			SUBMARINE
	5c	<i>Ayvazini cave, Nilifer-Bursa</i>			HISTORIC FOR DEVELOPMENT OF GEOLOGICAL SCIENCE
	5d	<i>Ulupınar cave, Kepsit-Balıkesir</i>	★		<i>Ooids of Kleopatira, Marmaris-Muğla</i>
	5e	<i>Narlıkaya (Dilek) cave, Yçel</i>	★ a		<i>Antique marble mines et Belevi, Kuşini-Selçuk</i>
	5f	<i>Altınbeşik cave, Ybradı-Anıtlıya</i>	★ b1		<i>Marmara Island</i>
	5g	<i>Yerköprü cave, Hadim-Konya</i>	★ b2		<i>Antique ore mines (Pb-Zn), Çamardı-Niöde</i>
	5h	<i>Balıyca cave, Pazarcık-Tokat</i>	★ c1		<i>Granit columns, Kestemol-Çanakkale</i>
	5i	<i>Gündere cave, Aydıncık-Yçel</i>	★ d		<i>Antik obsidiyen yatakları</i>
	5j	<i>Söğütü cave, Söğütli-Adapazarı</i>	★ e		<i>Solhan obsidiyen yatakları</i>
	5k	<i>Kaklık cave, Denizli</i>	e1		<i>Sarıkamyş obsidiyen yatakları</i>
	5l	<i>Dim cave, Alanya</i>	e2		<i>Nenezi Dağı volkanitleri</i>
	5m	<i>Cave with ice, Adıy</i>	e3		<i>Göllü Dağı volkanik kompleksi</i>
	5n	<i>Çankırı tuz madarası</i>	e4		<i>Antik maden ocakları</i>
	5o	<i>Tuzluca tuz madarası</i>	f		<i>Antik maden ocakları, Bolkaradağı</i>
			★ fl		<i>Antik maden ocakları, Balıkesir</i>
	6	Glacial landforms and deposits			
	6a	<i>Cirques at Bolkaradağı</i>			
	6b	<i>Cirques at Aladağ</i>			
	6c	<i>Glacial valley and deposits, Mut-Adıy</i>			
	7	Canyons and valleys			
	7a	<i>Red happiness valley, Narman-Erzurum</i>			



NATURAL PARK

- 1 *Yozgat Çamlığı, Yozgat*
- 2 *Karatepe-Aslantaş AMP, Adana*
- 3 *Kızılcahamam-Soğuksu, Ankara*
- 4 *Bandırma Kuş Cenneti, Balıkesir*
- 5 *Uludağ, Bursa*
- 6 *Yedigöller, Bolu*
- 7 *Dilek Yarımadası, Aydın*
- 8 *Spil Dağı, Manisa*
- 9 *Kızıldağ, Isparta*
- 10 *Termessos AMP, Antalya*
- 11 *Kovado Gölü, Isparta*
- 12 *Munzur Vadisi, Tunceli*
- 13 *Beydağları Sahili, Antalya*
- 14 *Köprülü Kanyon AMP, Antalya*
- 15 *Ilgaz Dağı, Kastamonu*
- 16 *Göreme (Kapadokya) TMP, Nevşehir*
- 17 *Maçka-Altındere Vadisi, Trabzon*
- 18 *Boğazköy-Alacahöyük AMP, Çorum*
- 19 *Nemrut Dağı, Adıyaman*
- 20 *Beyşehir Gölü, Konya*
- 21 *Kazdağı, Balıkesir*
- 22 *Kaçkar Dağları, Rize*
- 23 *Hatila Vadisi, Artvin*
- 24 *Karagöl-Sahara, Artvin*
- 25 *Altınbeşik Mağarası, Akseki, Antalya*
- 26 *Honza Dağı, Denizli*
- 27 *Aladağlar, Niğde-Adana*
- 28 *Marmaris, Muğla*
- 29 *Saklıkent, Fethiye, Muğla*

APPENDIX 3

GEOSITE MAP OF TURKEY

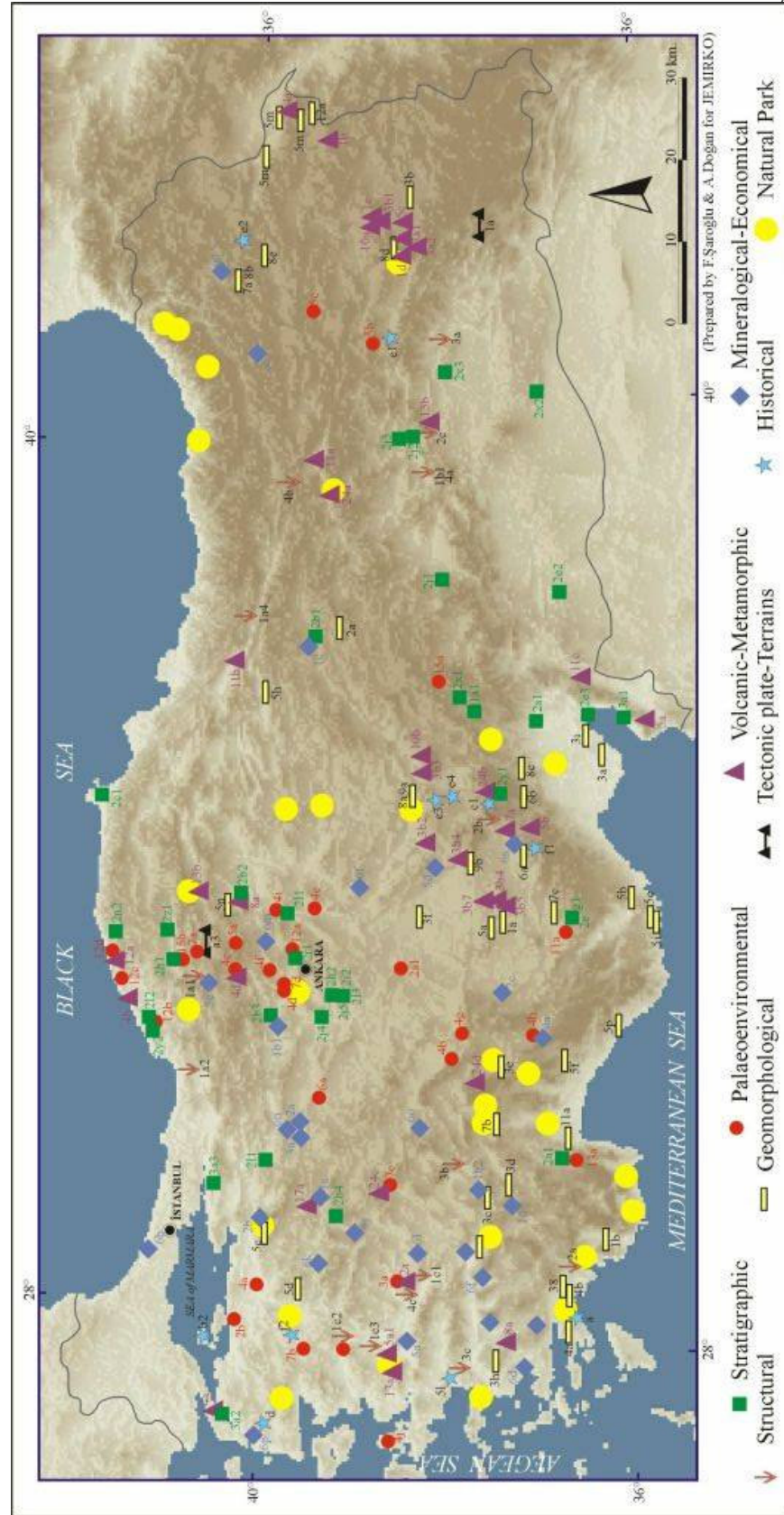


Figure 1. Geosites defined by JEMIRKO to the framework of ProGEO

