REPUBLIC OF TURKEY
GOVERNORSHIP OF SAMSUN
PROVINCIAL DIRECTORATE FOR DISASTER AND EMERGENCY MANAGEMENT
SAMSUN, TURKEY

GIS APPLICATIONS FOR DISASTER MANAGEMENT IN SAMSUN CITY (NORTH TURKEY)

MARCH - 2014

INTRODUCTION

In this study, it has been mentioned GIS applications, one of the job scopes of our management in pilot area, the Ondokuzmayıs district and the Ladik district as secondary area.

EQUIPMENTS

We use some materials during the study;

- Satellite images,
- 1:25000 Scale Geology Map (MTA, General Directorate of Mineral Research and Exploration),
- 1:100000 Scale Geology Map (MTA),
- 1:25000 Scale Digital Landslide Inventory Map (MTA),
- 1:25000 Scale Topography Map (MTA),
- 1:25000 Scale Satellite Images (Samsun AFAD),
- **Orthophotographs** (Samsun AFAD, after 2013),
- Numbering system of local municipalities and villages
- Camera
- Hand GPS

GIS APPLICATIONS IN ONDOKUZMAYIS

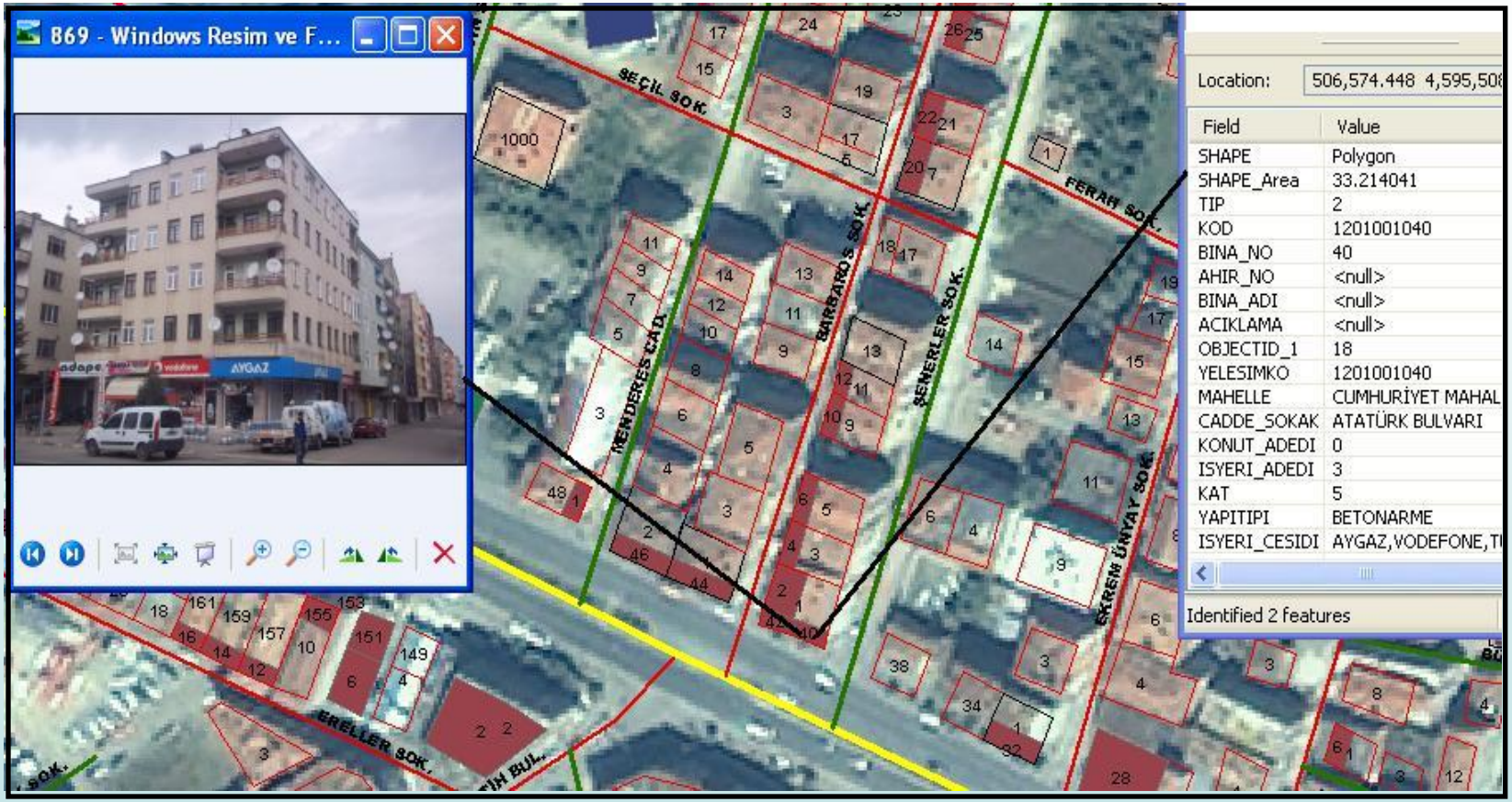
Ondokuzmayıs, located in 33 km east of Samsun, has 363 square kilometers and population of 24338. The criterias, geological structure, climate, **distance, surface area,** and the other criteria have been taken into consideration for the choice of pilot area.

GIS APPLICATIONS IN ONDOKUZMAYIS

All structural information, (house, barn, and office) in order to reveal the structure inventory of urban and rural settlements, have been detected by technical staff in situ **considering the numbering system of local municipalities and villages** from April 2011 to May 2012. Such kind of study has firstly been carried out in Turkey with the steps of pre-disaster, disaster, and post-disaster by our management.

Before the field work, political borders, general geology, main roads, secondary roads, and all rivers have been redrawn as a new map helping with 1:25000 and 1:100000 scale geology maps providing from MTA. Besides, **all structures have been plotted as polygon from the satellite images** (Samsun AFAD), using ArcGIS software.

GIS APPLICATIONS IN ONDOKUZMAYIS



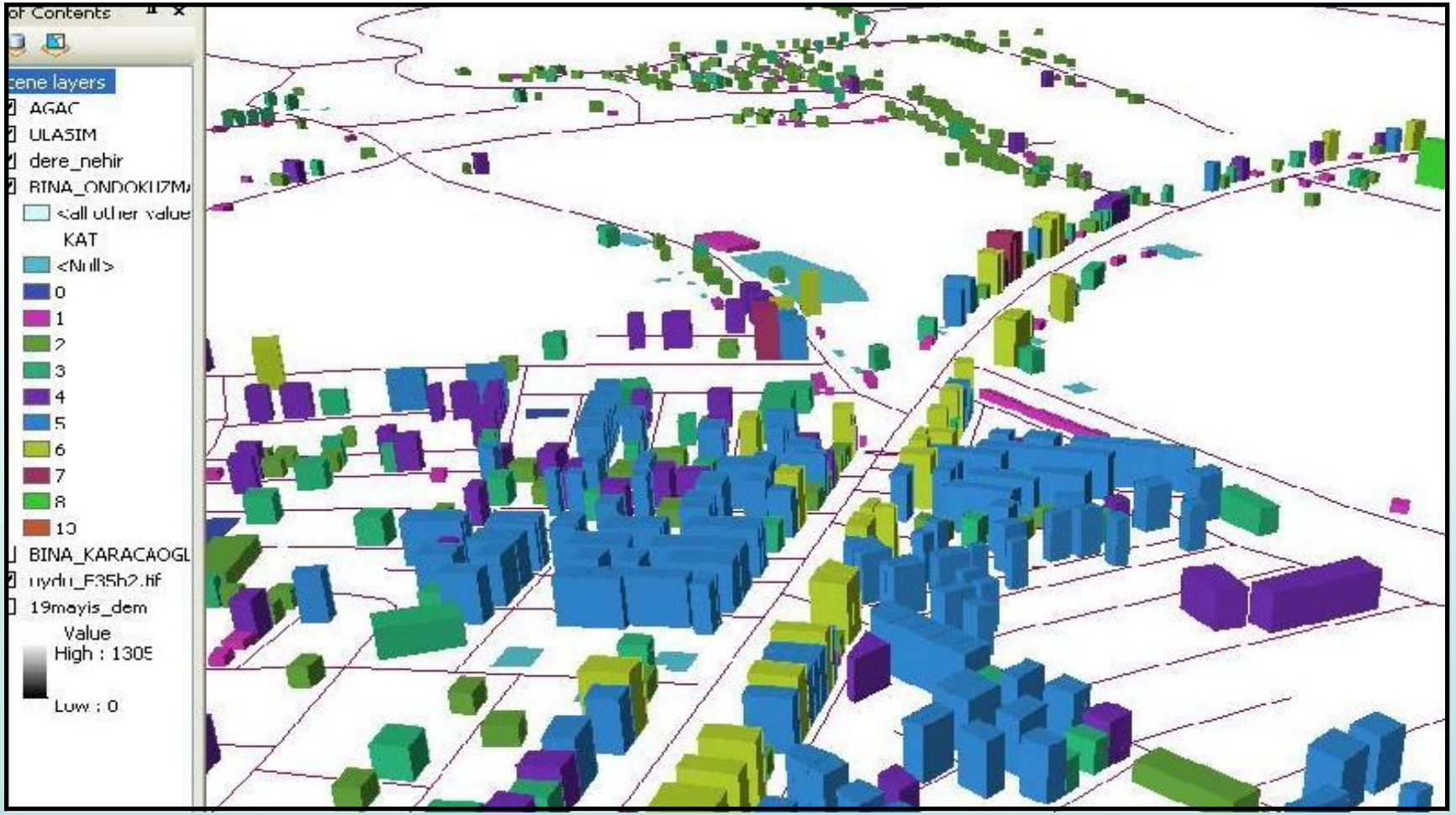
One of the urban settlements in Ondokuzmayıs. (Left) Selected structure photo and (right) attribute table of this structure on the plotted structure map.

Photos of all structures have been taken for post-disaster studies. After the field work, data collected from the study area, have been added as nongraphic in the pre-plotted structures and attribute tables of all structures has also been created, which consist of type, storey height, year of built, usage, office qualification, and cadastral info data.

GIS APPLICATIONS IN ONDOKUZMAYIS

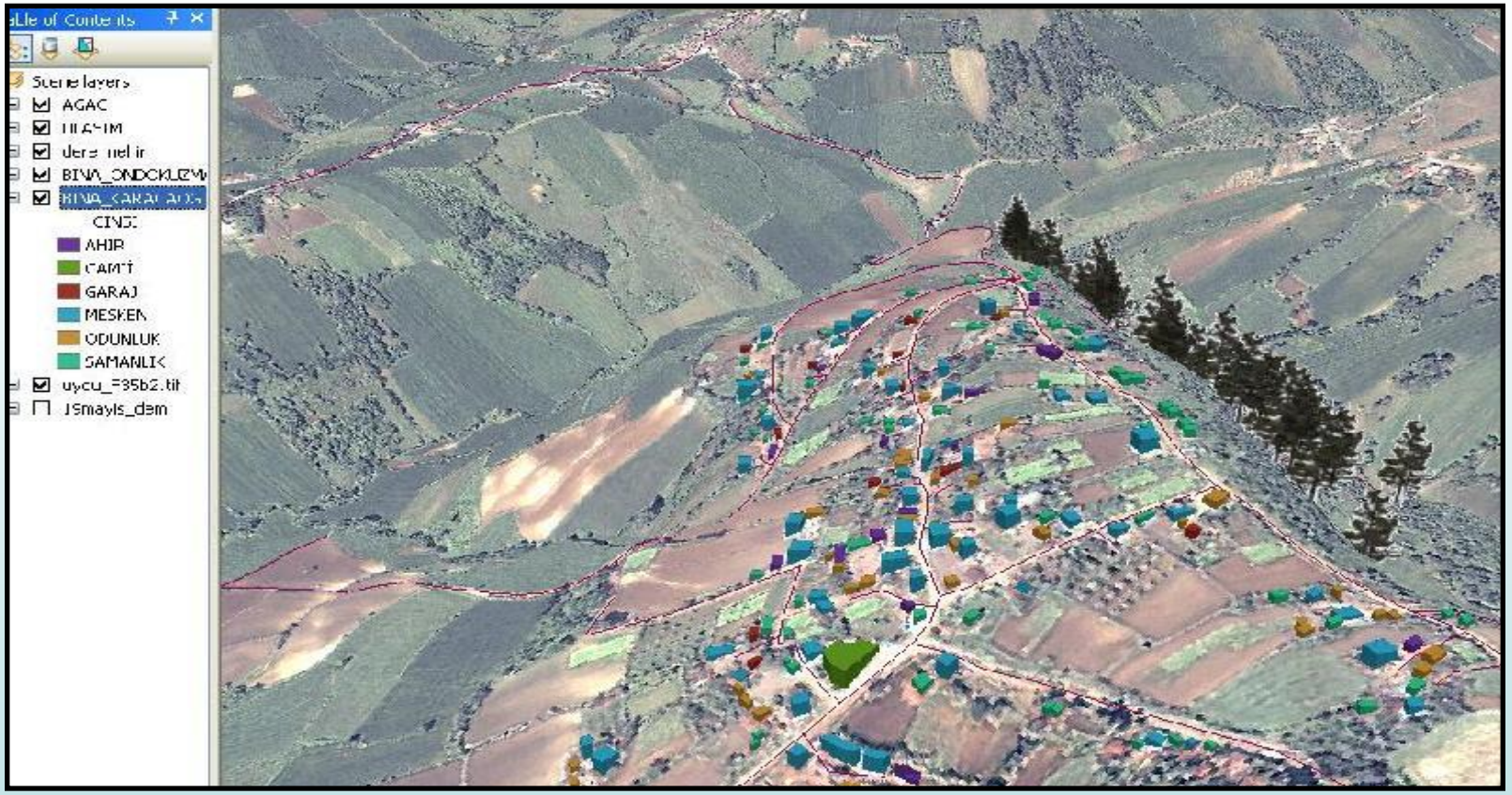
One of the rural settlements in Karacaoğlu Village, Ondokuzmayıs. (Left) Selected structure photo and (right) attribute table of this structure on the plotted structure map.

GIS APPLICATIONS IN ONDOKUZMAYIS



3d modelling for storey height in central Ondokuzmayıs

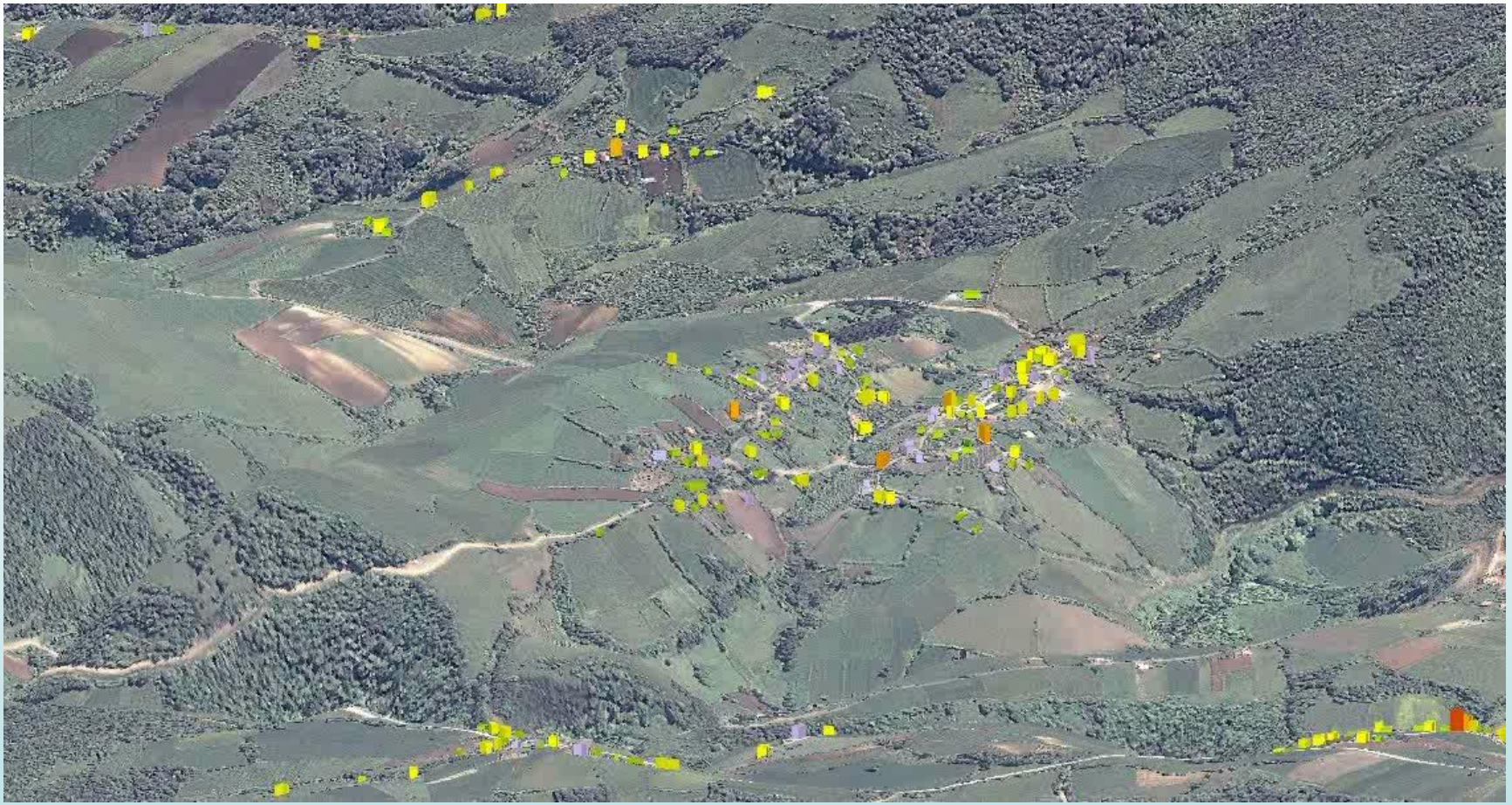
GIS APPLICATIONS IN ONDOKUZMAYIS



3-dimensional modeling for usage classification of the rural settlements in the Karacaoğlu Village, Ondokuzmayıs.

1:25000 scale topography map (MTA) has primarily been digitized for 3-dimensional modeling. The digital elevation model and maps of slope, aspect, and elevation have been created, respectively. 3-dimensional modeling has lastly been generated for usage classification.

GIS APPLICATIONS IN ONDOKUZMAYIS



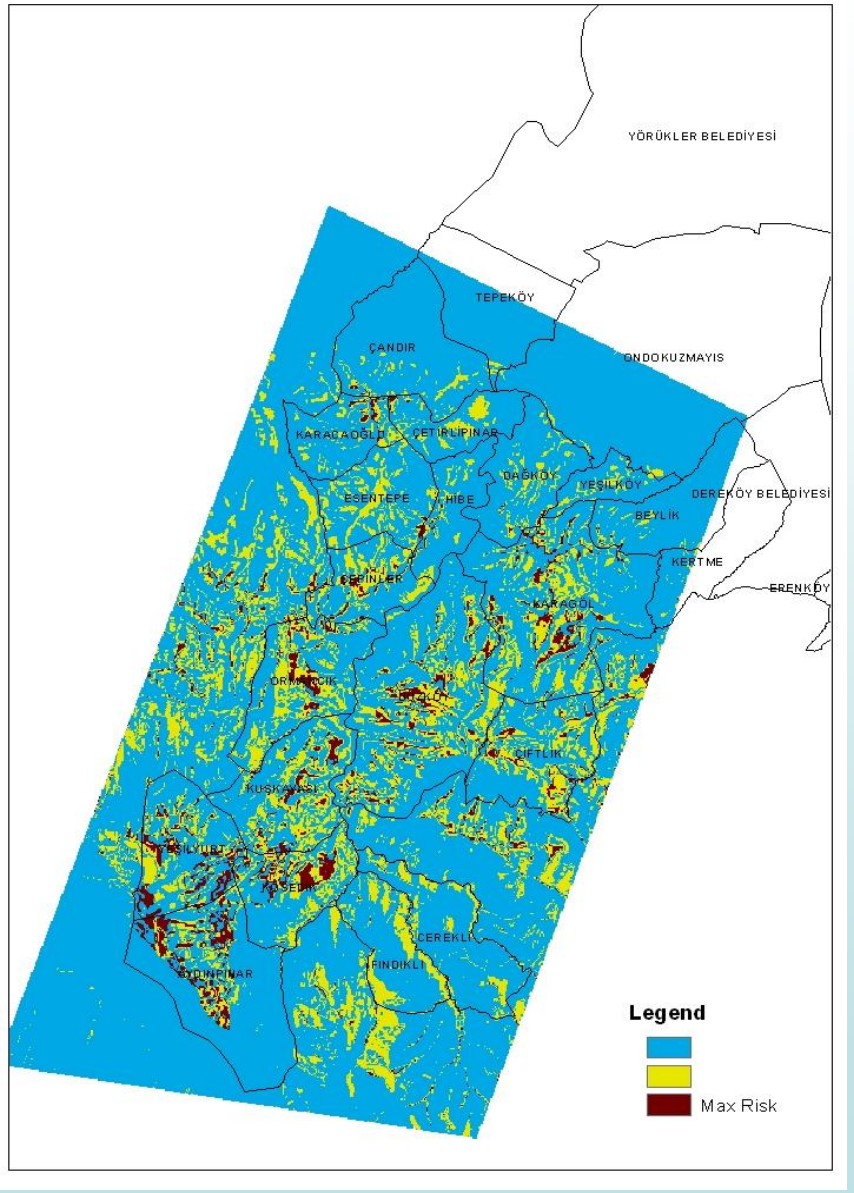
3d modelling from south to north

LANDSLIDE SUSCEPTIBILITY MAPPING

Landslide susceptibility map of Ondokuzmayıs has been generated using **frequency ratio method** (Akgün, 2007; Akgün *et al*., 2008; Akıncı *et al*., 2010; Akıncı *et al*., 2011; Dağ and Bulut, 2012) which is widely used in literature.

Parameters of slope, aspect, elevation, steepness, road network, and river network have been take into account in application.

Generated landslide susceptibility map has been supported by 1:25000 scale digital landslide inventory map (MTA) and **empirical determination of paleo-landslide**.

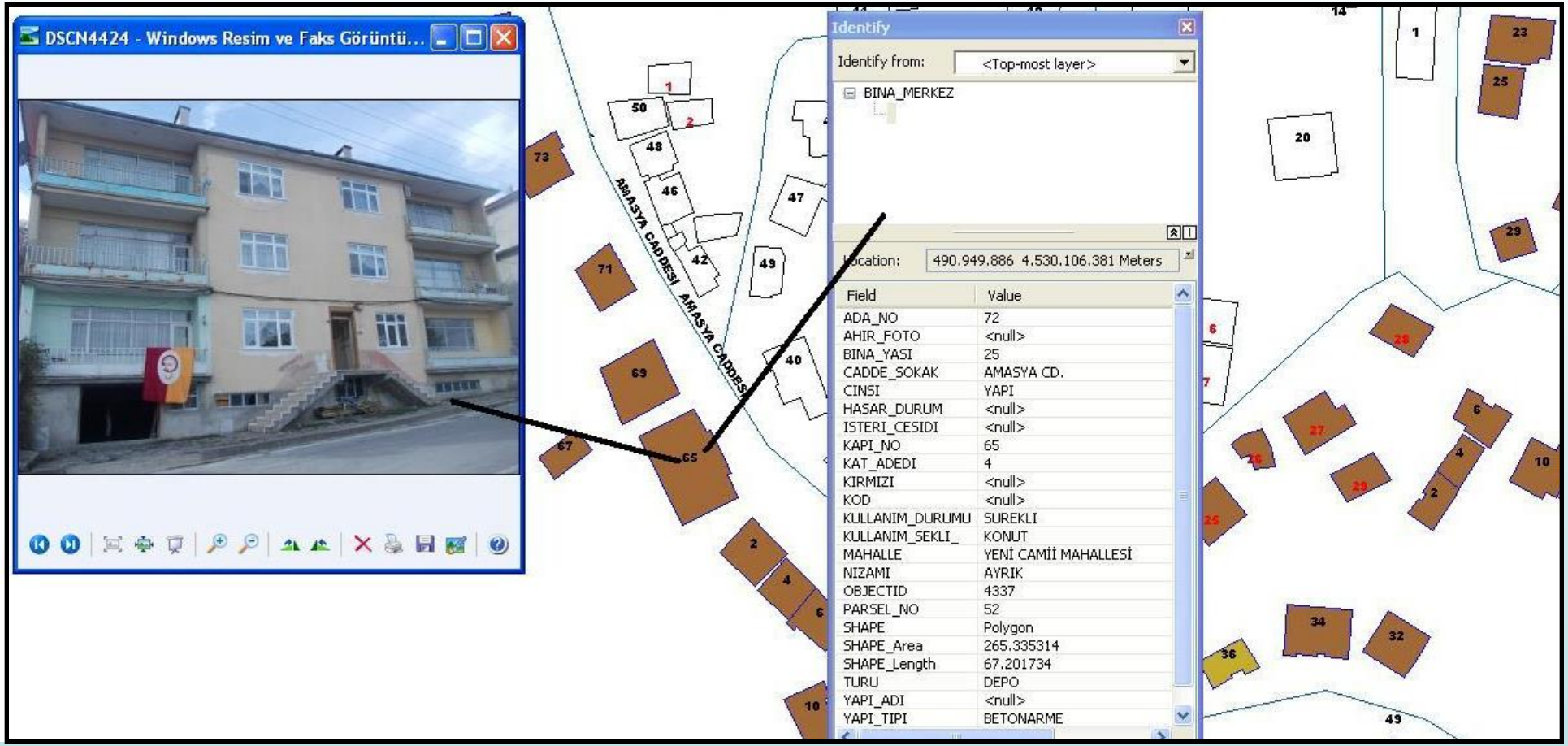


1:25000 scale landslide susceptibility map of Ondokuzmayıs

GIS APPLICATIONS IN LADİK

Ladik, 82 km far away from Samsun city, has 575 square kilometres and population of 17850, where is the second area after Ondokuzmayıs district. Surface area, collective settlements, **North Anatolian Fault**, and the other criterias have been taken into consideration for the choice of the area. 3000 structures have been detected by **only 10 workers** in situ, considering the numbering system of municipality, from 5 to 7 October 2012.

GIS APPLICATIONS IN LADİK

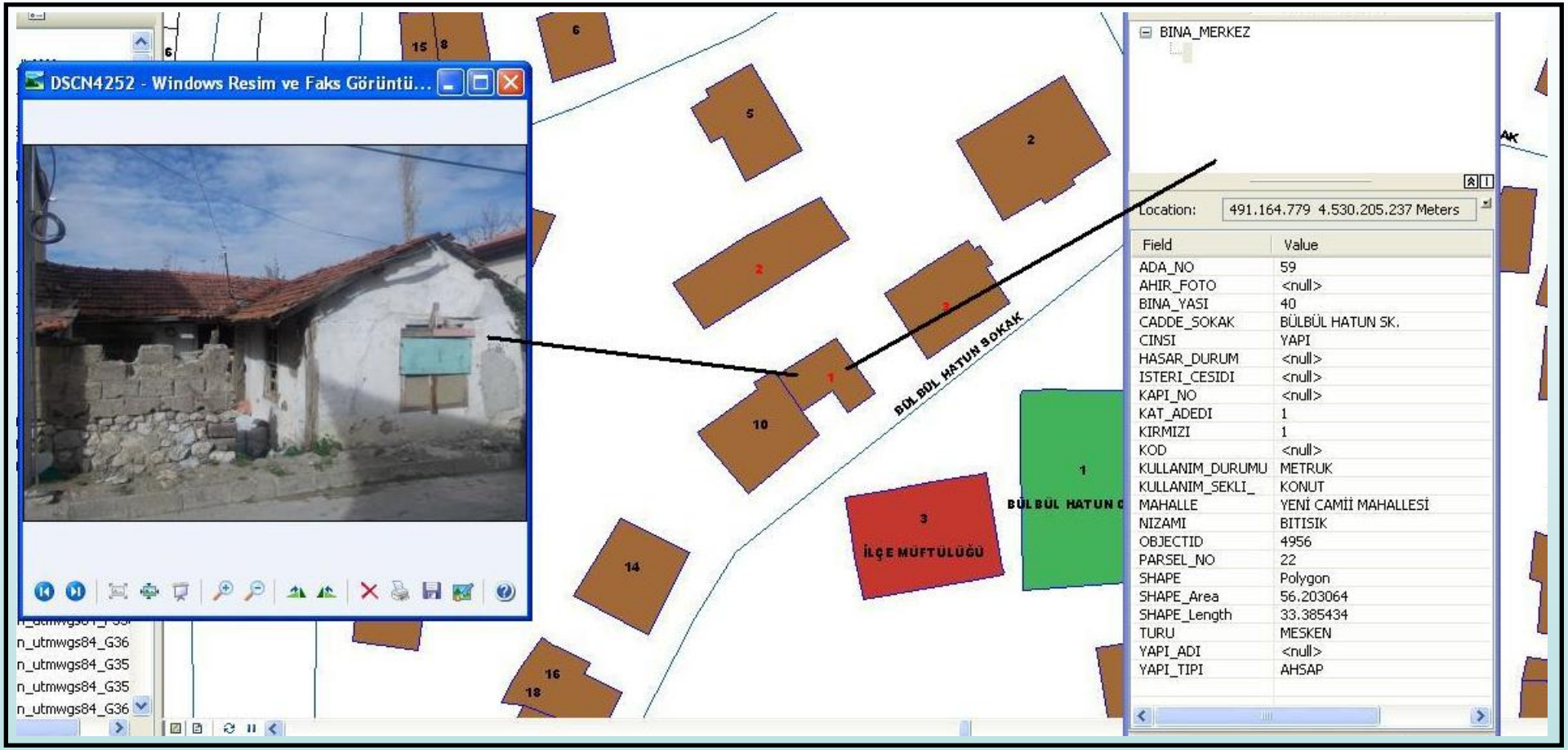


Structure inventory in Yenicami section of Ladik (concrete structure)

GIS APPLICATIONS IN LADİK

Structure inventory in Yenicami section of Ladik (governmental structure)

GIS APPLICATIONS IN LADİK



Structure inventory in Yenicami section of Ladik (abandoned structure)

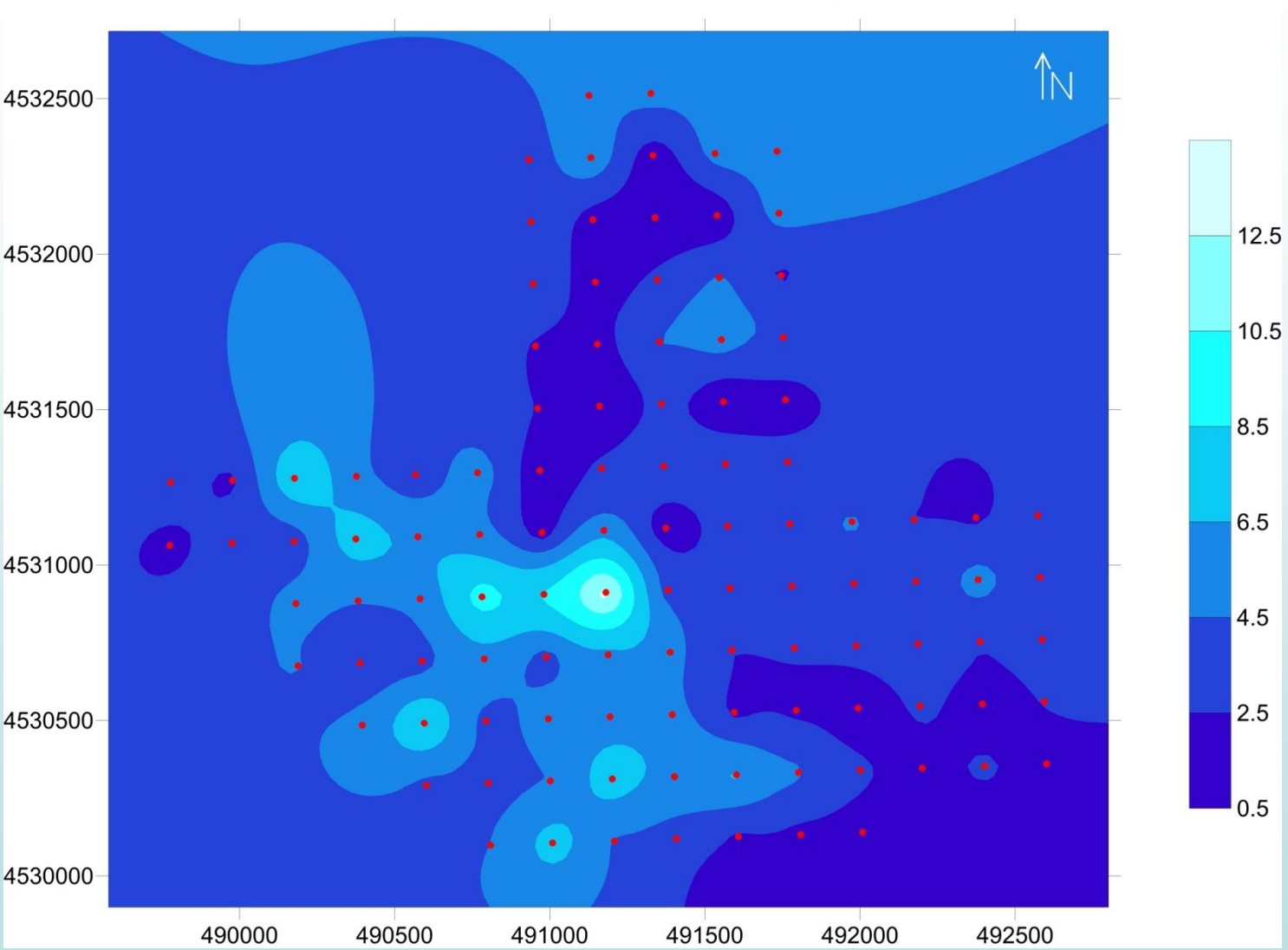
MICROTREMOR MEASUREMENTS IN LADİK

Microtremor studies target the site characteristics. First record was on 6th June, 2012.

MEASUREMENT POINTS

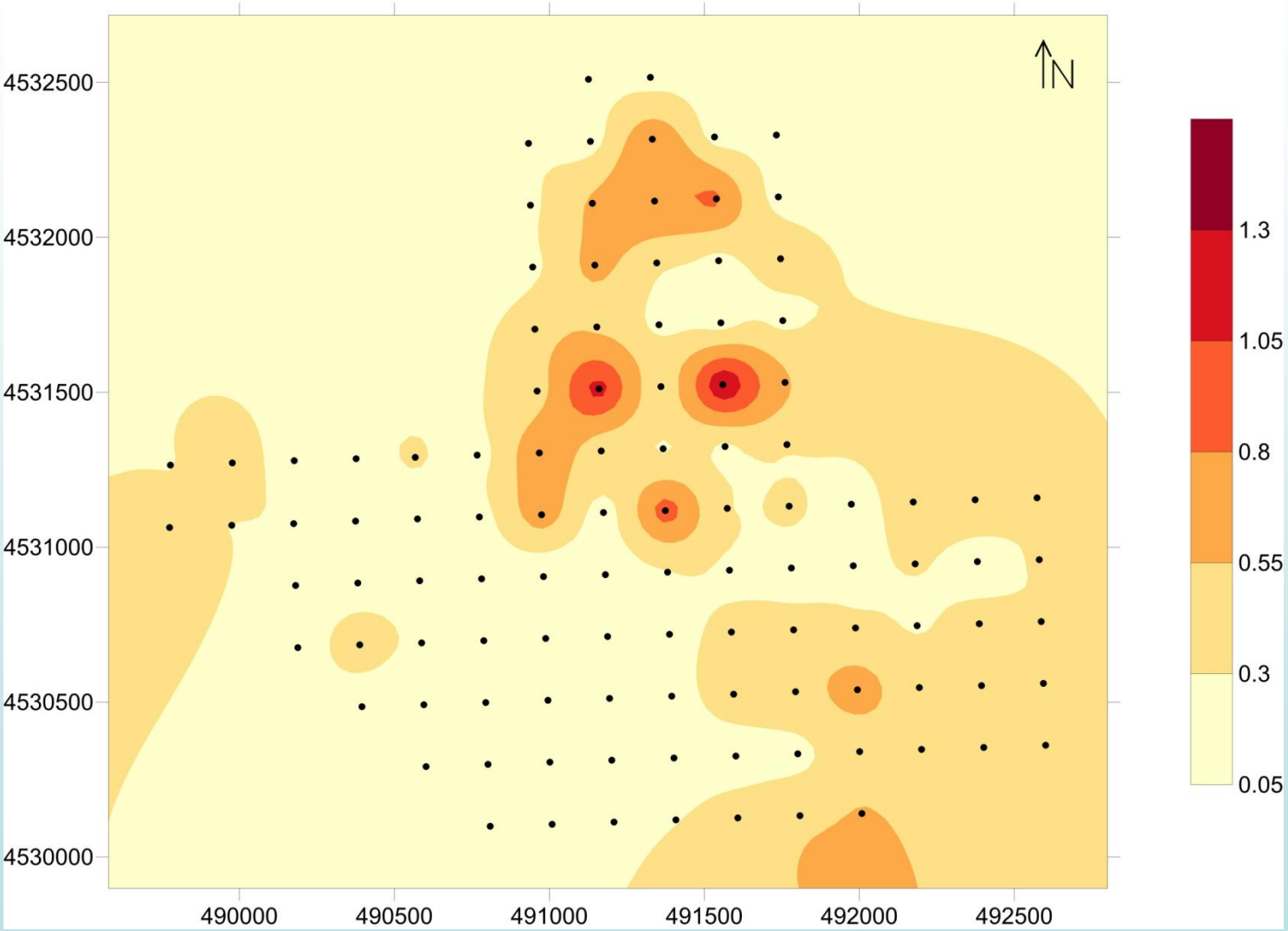
Mesh system in central Ladik. Red spots, totally 118, are 200 metres far away from each other

MAPS



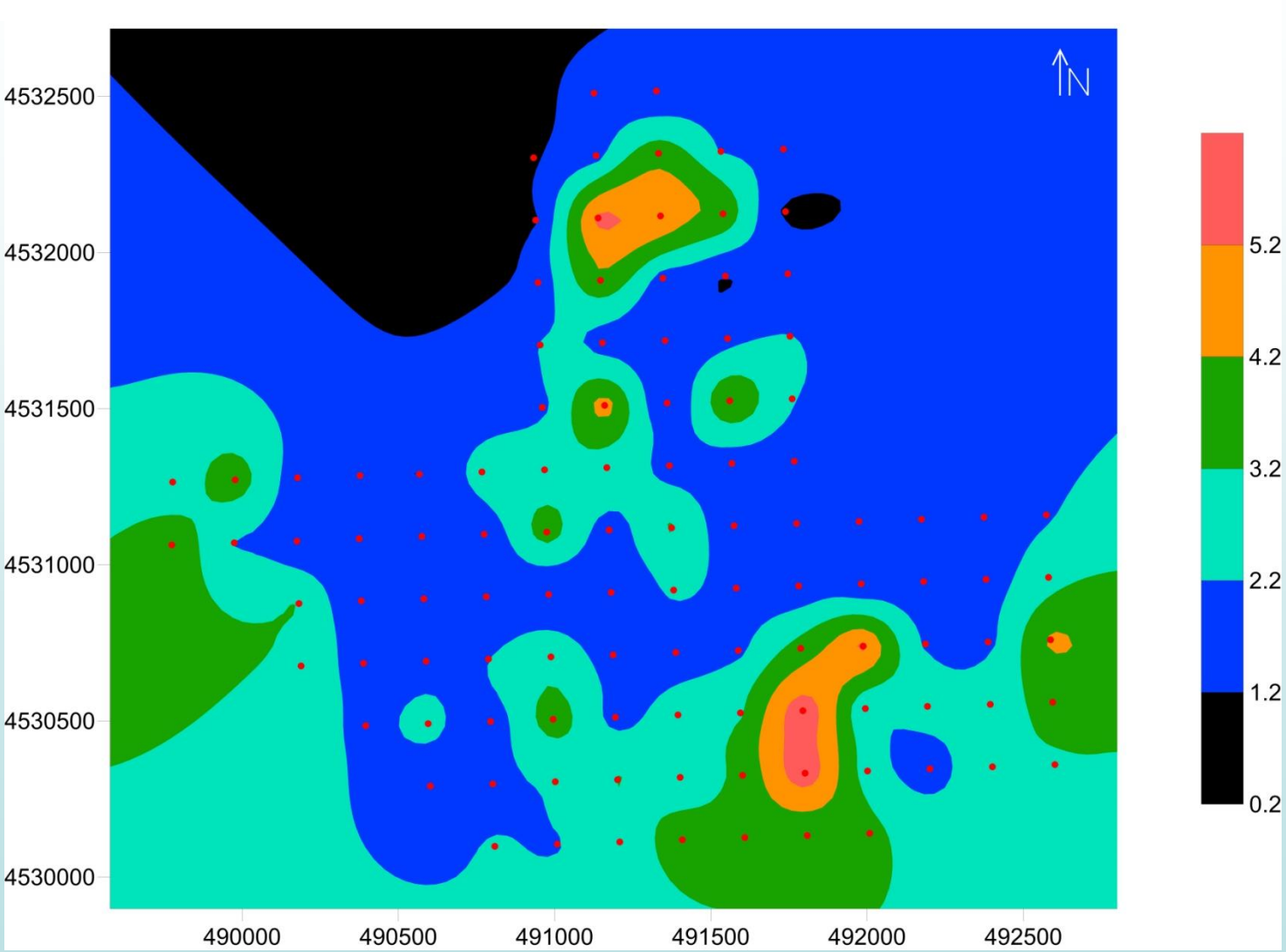
Map of the predominant frequency (Hz)

MAPS



Map of the predominant period (s)

MAPS



Map of the ground amplification

GOALS

1- Maps will be transferred on GIS software and will develop scenarios.

2- Participating with expert software developer and academicians, meetings have been organized by us for instant data transfer in disaster area. When the algorithms are complated, area squad will not be opposed to any problem about accurate data transfer. Devices must be industrial.

3- These 2 subjects will be included in special software, named as **ELER** (Earthquake Loss Estimation Routine), developed by Boğaziçi University, İstanbul.

CONCLUSIONS

- It is intended to complete the structure inventory study for 56 villages of Ladik in 2014.

- Completed and planning studies have definitely been maintaning with **our resources**.

REFERENCES

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Akgün, A., Dağ, S. and Bulut, F. (2008). Landslide Susceptibility Mapping for a Landslide-Prone Area (Fındıklı, NE of Turkey) by Likelihood Frequency Ratio and Weighted Linear Combination Models, Environmental Geol., 54 (6), 1127-1143.

Akıncı, H., Doğan, S., Kılıçoğlu C. ve Keçeci, S. B. (2010). Samsun İl Merkezinin Heyelan Duyarlılık Haritasının Üretilmesi, Harita Teknolojileri Elektronik Dergisi, c.2 n.3, 13-27.

Akıncı, H., Doğan, S. ve Kılıçoğlu C. (2011). Frekans Oranı Metodu Kullanılarak Samsun İl Merkezinin Heyelan Duyarlılık Haritasının Üretilmesi, TMMOB Harita ve Kadastro Mühendisleri Odası 13. Türkiye Harita Bilimsel Teknik Kurultayı, 18-22 Nisan 2011, Ankara.

Dağ, S. ve Bulut F. (2012). Coğrafi Bilgi Sistemleri Tabanlı Heyelan Duyarlılık Haritalarının Hazırlanmasına Bir Örnek: Çayeli (Rize, KD Türkiye), Jeoloji Mühendisleri Dergisi, 36-1, 35-62.

General Directorate of Mineral Research and Exploration (MTA), 1:25000 Scale Geology Map, 1:100000 Scale Geology Map, 1:25000 Scale Digital Landslide Inventory Map, 1:25000 Scale Topography Map.

Provincial Directorate for Disaster and Emergency Management (Samsun AFAD), 1:25000 Scale Satellite Images.

REPUBLIC OF TURKEY
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DISASTER MANAGEMENT OF REGIONAL DISASTERS OCCURRED ON 9 JULY 2012 IN SAMSUN CITY, (NORTH TURKEY)

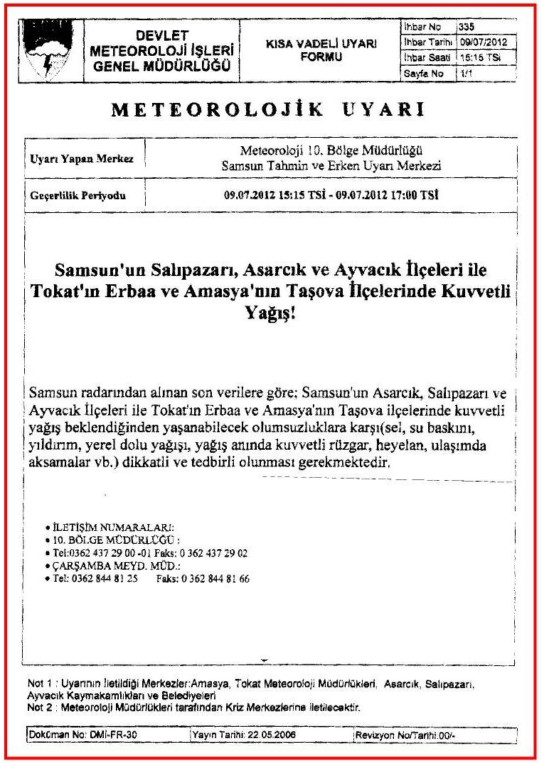
MARCH - 2014

INTRODUCTION

In this study, disaster management of regional disasters caused by heavy rain on July 9th, 2012 in Ayvacık, Çarşamba, Salıpazarı, and Terme districts of Samsun city was reviewed. Operation was carried out by crisis desk established in Governorship of Samsun Crisis Center.

DISASTER MANAGEMENT OF REGIONAL DISASTERS

According to the last forecast by the Regional Meteorological Centre of Samsun, it was warned about heavy rain for the eastern districts of Samsun city on the evening of 9 July, 2012. And the search-rescue squads were ready in various areas. Moreover, in crisis desk, digital map of the region for notices and decisions was opened to use, and a real-time meteorological maps created by satellite images for variation of rain were followed minute-by-minute.



DEVLET METEOROLOJİ İŞLERİ GENEL MÜDÜRLÜĞÜ	KISA VADELİ UYARI FORMU	İhbar No	335
		İhbar Tarihi	09/07/2012
		İhbar Saati	15:15 TSİ
		Sayfa No	1/1

METEOROLOJİK UYARI

Uyarı Yapan Merkez	Meteoroloji 10. Bölge Müdürlüğü Samsun Tahmin ve Erken Uyarı Merkezi
Geçerlilik Periyodu	09.07.2012 15:15 TSİ - 09.07.2012 17:00 TSİ

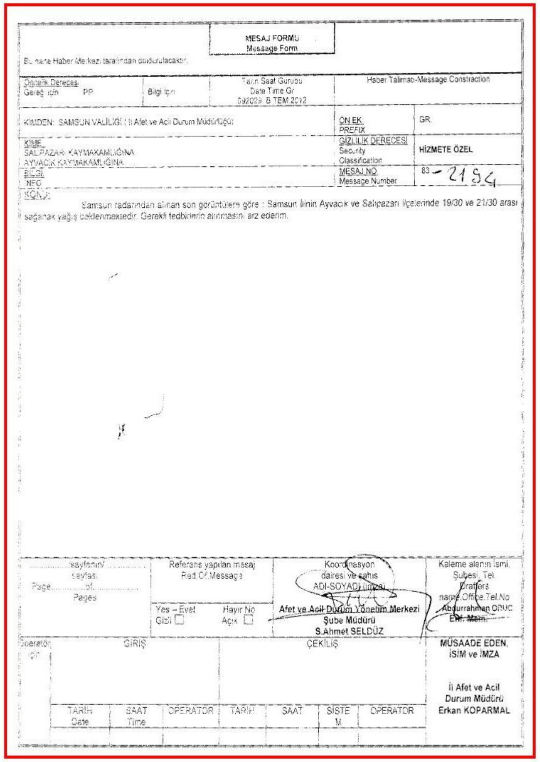
Samsun'un Salıpazarı, Asarcık ve Ayvacık İlçeleri ile Tokat'ın Erbaa ve Amasya'nın Taşova İlçelerinde Kuvvetli Yağış!

Samsun radarından alınan son verilere göre; Samsun'un Asarcık, Salıpazarı ve Ayvacık İlçeleri ile Tokat'ın Erbaa ve Amasya'nın Taşova ilçelerinde kuvvetli yağış beklendiğinden yaşanabilecek olumsuzluklara karşı(sel, su baskını, yıldırım, yerel dolu yağışı, yağış anında kuvvetli rüzgar, heyelan, ulaşımda aksamalar vb.) dikkatli ve tedbirli olunması gerekmektedir.

- İLETİŞİM NUMARALARI:
- 10. BÖLGE MÜDÜRLÜĞÜ :
- Tel:0362 437 29 00 -01 Faks: 0 362 437 29 02
- ÇARŞAMBA MEYD. MÜD.:
- Tel: 0362 844 81 25 Faks: 0 362 844 81 66

Not 1 : Uyarının İletildiği Merkezler:Amasya, Tokat Meteoroloji Müdürlükleri, Asarcık, Salıpazarı, Ayvacık Kaymakamlıkları ve Belediyeleri
Not 2 : Meteoroloji Müdürlükleri tarafından Kriz Merkezlerine iletilecektir.

Doküman No: DMİ-FR-30	Yayın Tarihi: 22.05.2006	Revizyon No/Tarihi:00/-



MESAJ FORMU
Message Form

Bu hane Haber Merkezi tarafından doldurulacaktır.

Öncelik Derecesi Gereği için PP	Bilgi İçin	Tarih Saat Gurubu Date Time Gr 092029 B TEM 2012	Haber Talimatı-Message Constraction

KİMDEN: SAMSUN VALİLİĞİ (İl Afet ve Acil Durum Müdürlüğü)	ÖN EK PREFIX	GR.
KİME SALIPAZARI KAYMAKAMLIĞINA AYVACIK KAYMAKAMLIĞINA	GİZLİLİK DERECESİ Security Classification	HİZMETE ÖZEL
BİLGİ INFO	MESAJ NO Message Number	83 - 2194

KONU:
Samsun radarından alınan son görüntülere göre : Samsun İlinin Ayvacık ve Salıpazarı ilçelerinde 19/30 ve 21/30 arası sağanak yağış beklenmektedir. Gerekli tedbirlerin alınmasını arz ederim.

........sayfanın/........ sayfası Page........of........ Pages	Referans yapılan mesaj Red.Of.Message / Yes – Evet Gizli ☐ Hayır No Açık ☐	Koordinasyon dairesi ve şahıs ADI-SOYADI (imza) Afet ve Acil Durum Yönetim Merkezi Şube Müdürü S.Ahmet SELDÜZ	Kaleme alanın İsmi, Şubesi, Tel Drafters name.Office.Tel.No Abdurrahman ORUC Enf. Mem.

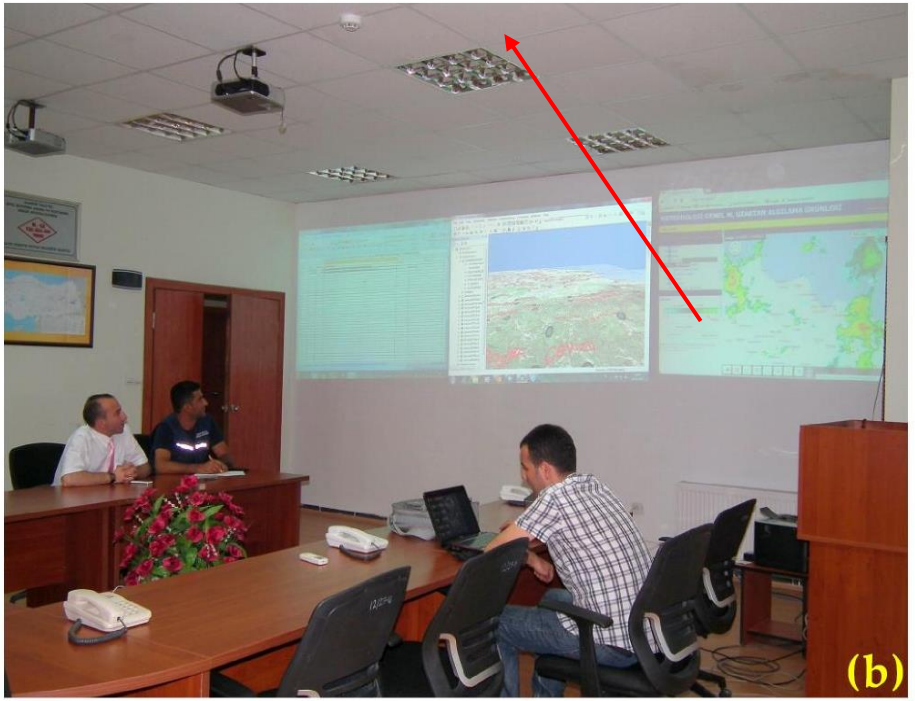
Operatör için	GİRİŞ			ÇEKİLİŞ				MÜSAADE EDEN, İSİM ve İMZA İl Afet ve Acil Durum Müdürü Erkan KOPARMAL
	TARİH Date	SAAT Time	OPERATÖR	TARİH	SAAT	SİSTEM	OPERATÖR	

On 9th July 2012, important warning taken from Regional Meteorological Centre of Samsun (left). We have immediately been warned our district governors and mayors (right).

DISASTER MANAGEMENT OF REGIONAL DISASTERS

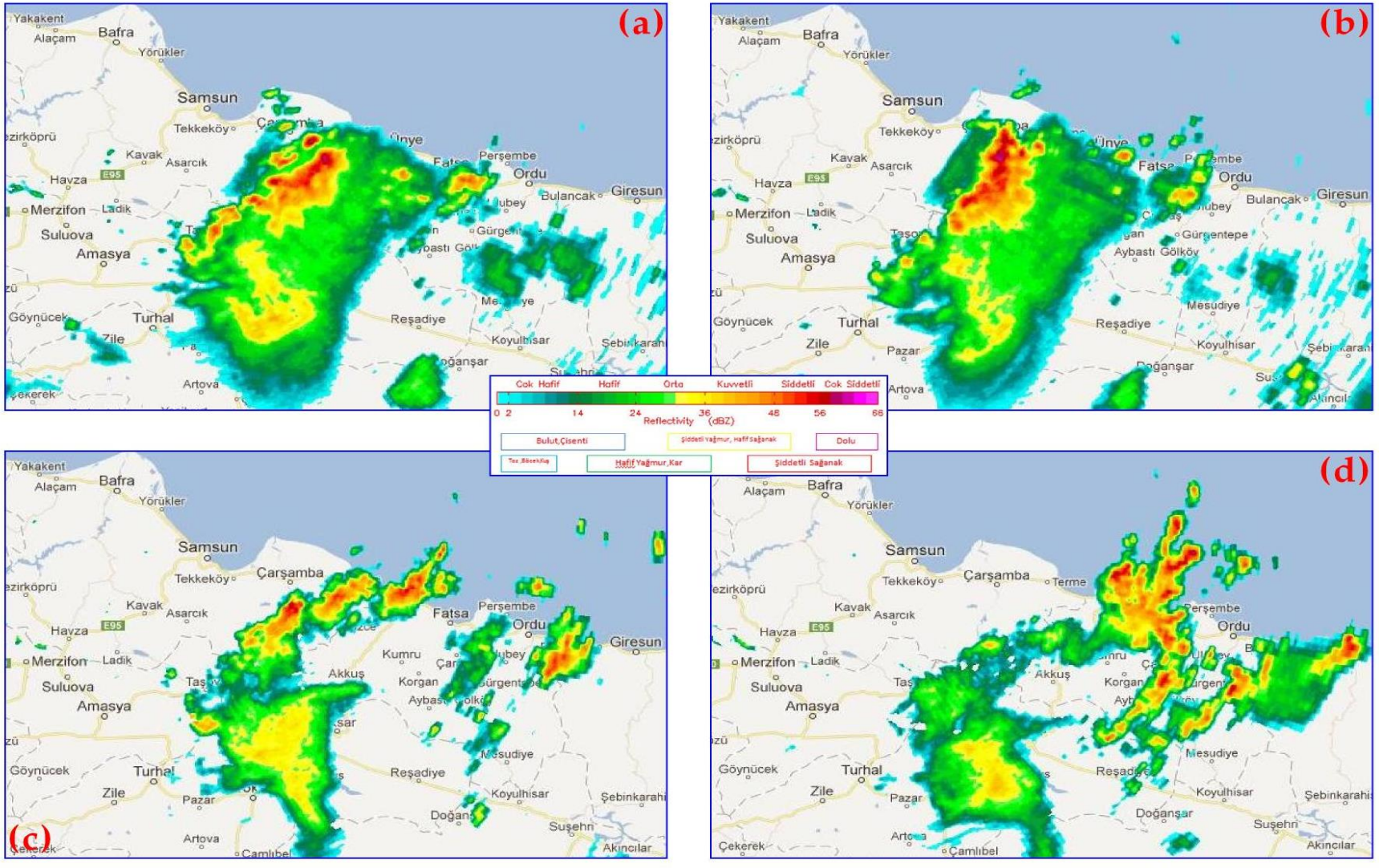
With a total number of 70 workers, 12 vehicles (cars and trucks), and 2 rescue boats, alarmed AFAD (Disaster and Emergency) teams in the cities such as Samsun, Sivas, Yozgat, Ankara, as well as UMKE (National Medical Rescue Team) in Samsun were sent to the region because of 16 notices that come to Information Center from the districts of Ayvacık, Çarşamba, Salıpazarı, and Terme. These notices included subject of flood, overflow, floodbound, and landslide. Additionally, 2 rescue helicopters, provided by the Coast Guard Command, were flown to the region.

for meteorological satellite images wms.mgm.gov.tr/web/giris.htm



(a) Notices, car transfers, and actual progress follow by Information Center. (b) Notices, came from Information Center, 2d and 3d digital maps of probable heavy rain region, and meteorological satellite images follow by Disaster Management Center.

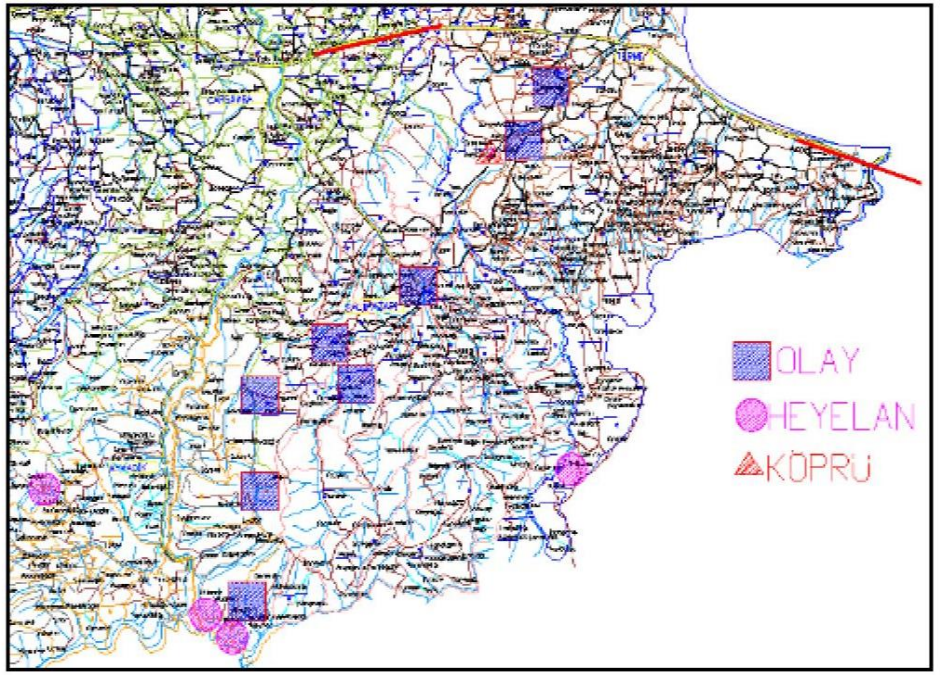
DISASTER MANAGEMENT OF REGIONAL DISASTERS

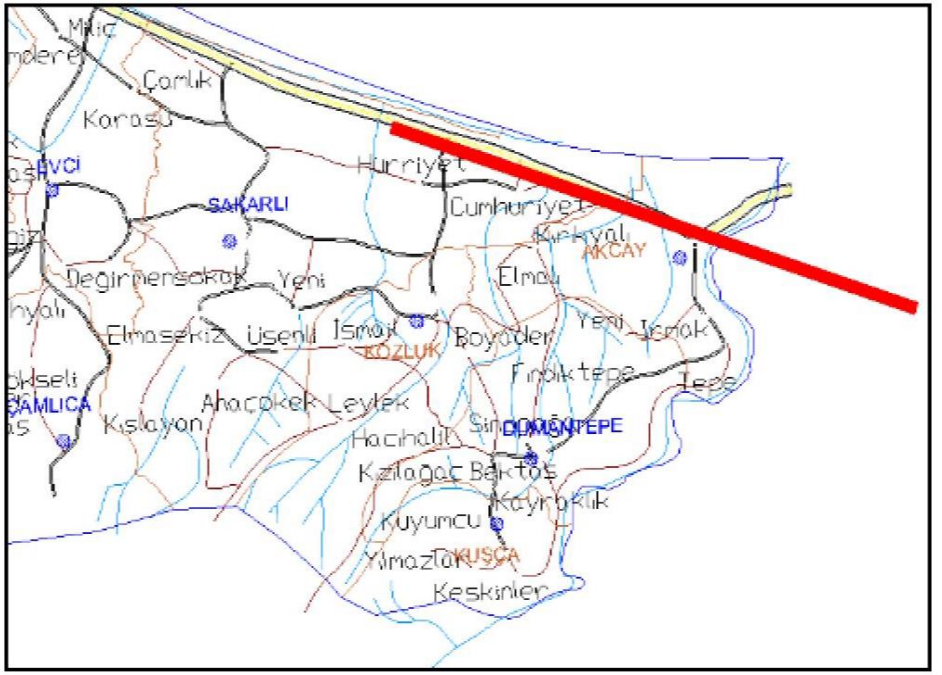


Real-time meteorological satellite images have been represented the times of (a) 19:30, (b) 20:30, (c) 21:30, and (d) 22:30, respectively.

DISASTER MANAGEMENT OF REGIONAL DISASTERS

In Disaster Management Center, we followed the 3d models of Salıpazarı-Terme region and warned some villages headmen, who live in the villages parallel to steep valleys. Terme River, which enlarged by tributary river from southern Salıpazarı district, caused flood in the city center and heavy traffic on the bridges. Sivaslılar and Çangallar villages have temporary been discharged and transferred to safety zones by local government for overflow risk in Terme district.





Events, occured in 4 districts, on the 2d map. Additionally, in order to ensure traffic security, Samsun-Ordu highway (eastern) was closed up for a period of 30 minutes.

DISASTER MANAGEMENT OF REGIONAL DISASTERS

1 corpse and 2 injuries were pulled from the landslide wreck in Çamalan Village, Ayvacık district.

DISASTER MANAGEMENT OF REGIONAL DISASTERS

Demolished wooden structure because of the landslide in Kestanepınar Village, Çarşamba district.

CONCLUSIONS

- Heavy rain having started at 7:30 P.M. was decreasingly ended at 10:30 P.M. 1 corpse and 2 injuries were pulled from the landslide wreck in Ayvacık district. Besides, 95 people were transferred to safety zones in four districts.

- On 9 July 2012, disaster management of flood and landslide resulted from heavy rain in districts of Ayvacık, Çarşamba, Salıpazarı, and Terme was successfully ended by devoted efforts of the crisis desk. The whole operation and the followed procedures was a **correct and reliable** sample of coordination, which is worth taking into account for the future disasters.

THANK YOU