NATIONAL REPORT OF TURKEY FOR 2006 EUREF SYMPOSIUM-LATVIA

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OUTLINE

1. Turkish National Fundamental GPS Network (TUTGA)
2. Turkish Permanent GPS Network (TUSAGA)
3. Episodic GPS Observations for Geodynamic Studies
4. Turkish Geoid 2007 (TG-07)
5. Turkish Sea Level Monitoring System (TUDES)

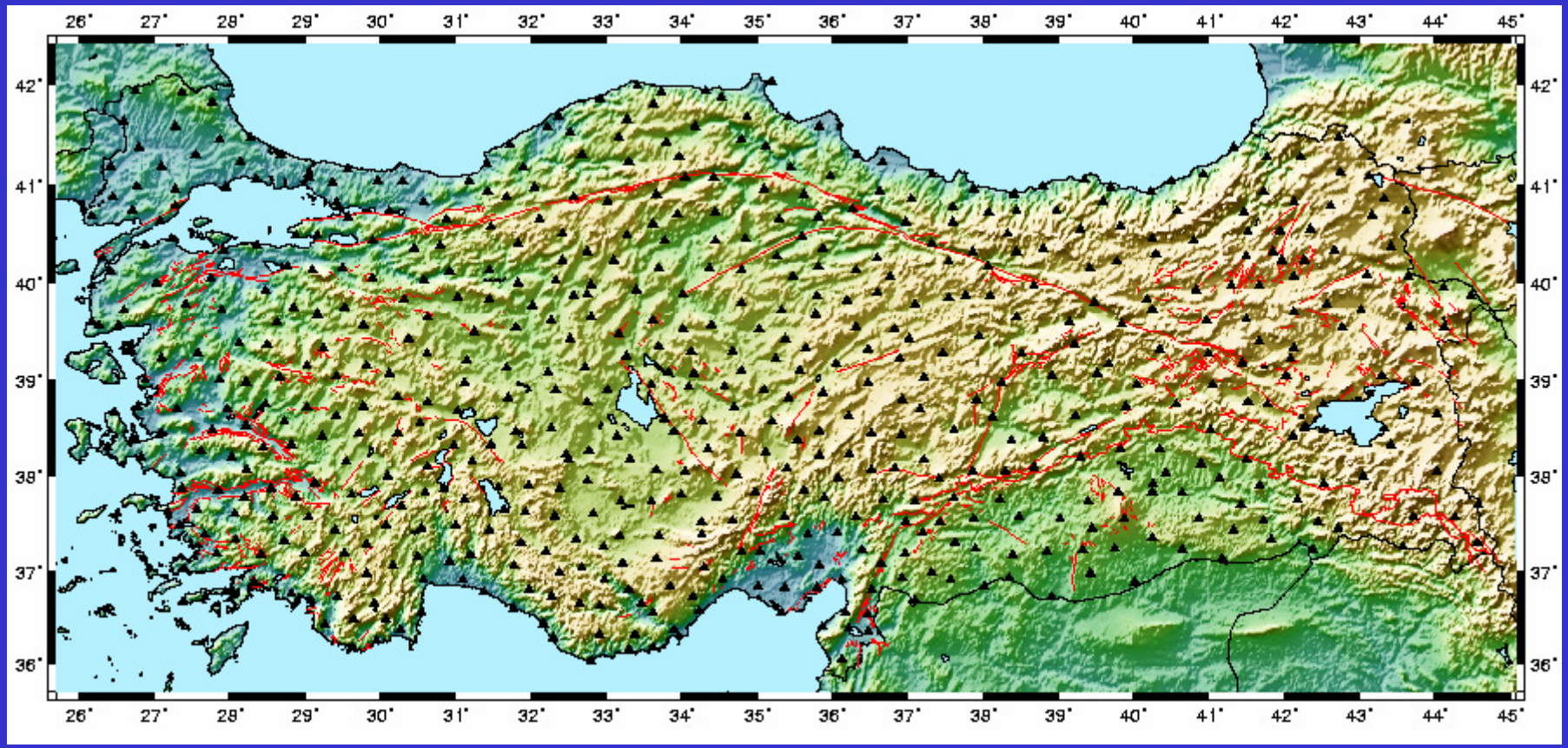
INTRODUCTION

The establishment and monitoring of 4-D Geodetic Datum throughout Turkey is the basic mission of General Command of Mapping under its responsibilities.

Geodetic activities at GCM mainly involve;

- the development of existing Turkish National Fundamental GPS Network (TUTGA),
- establishment of new stations and maintenance of Turkish Permanent GPS Network (TUSAGA),
- Turkish Sea Level Monitoring System (TUDES) and
- the achievement of new Turkish Geoid -2007 (TG-07).

1. Turkish National Fundamental GPS Network (TUTGA)



- TUTGA has been established in 2001 and some of the stations have been re-surveyed due to the earthquakes happened in 1999.

- The total number of stations is about 600.

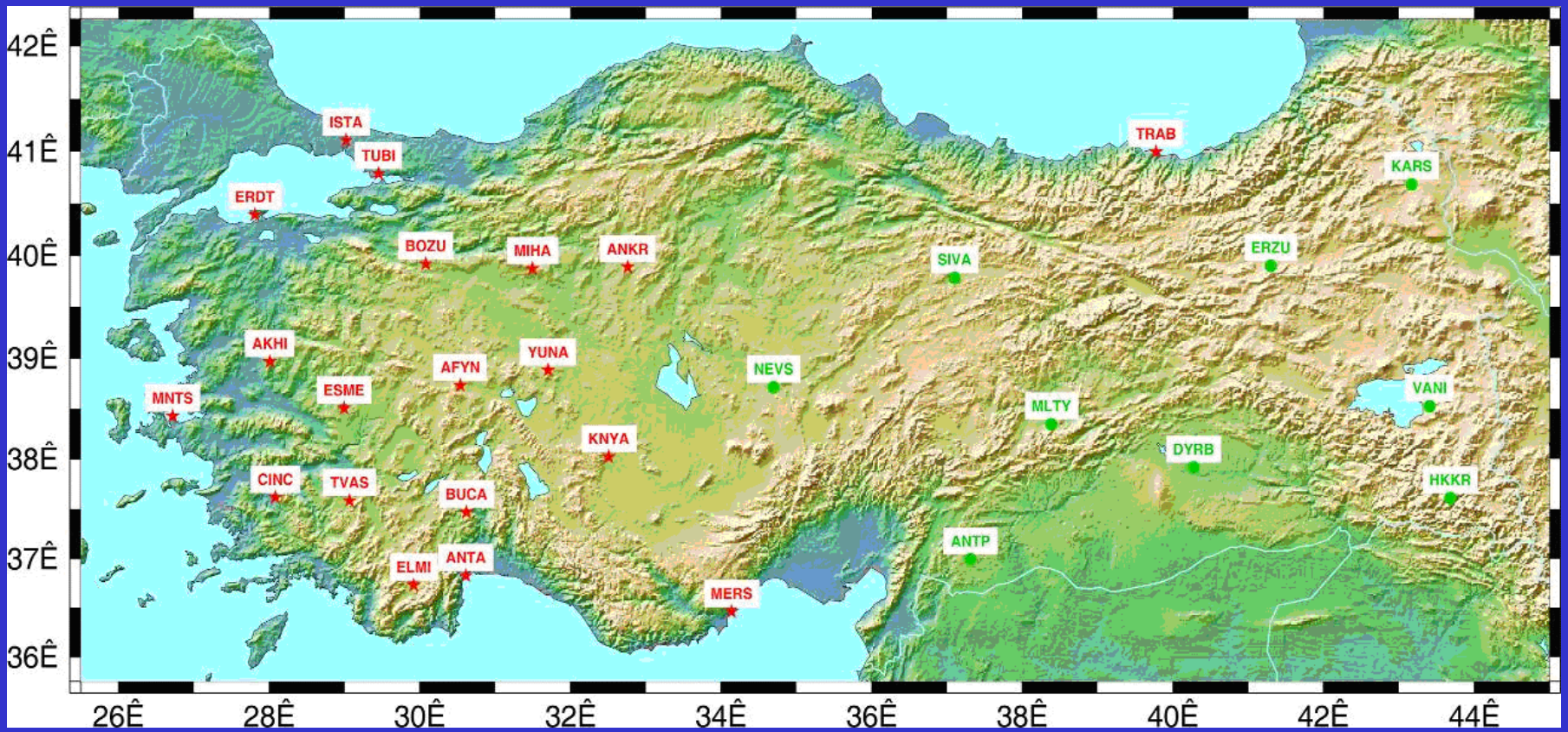
- For each station, 3D coordinates and their associated velocities were computed in ITRF2000.

- Positional accuracies of the stations are about 1-3 cm whereas the relative accuracies are within the range of 0.1 - 0.01 ppm.

- Analysis for the redefinition of the network in ITRF2000 is going on with the contribution of new data from 2004, 2005 and 2006.

- Detailed information about TUTGA can be found in www.hgk.mil.tr under the name "TUTGA" in Turkish.

2. Turkish Permanent GPS Network (TUSAGA)



- The number of the sites forming TUSAGA is 19 as of June, 2006.
- The planned stations (9) will be installed in 2006.
- Except these stations, the data from 10 stations around Marmara Sea, established under a scientific project with TUBITAK Marmara Research Center (TÜBİTAK – MAM), is being utilized by scientific community.
- The time-series analyses of TUSAGA stations are performed at General Command of Mapping on monthly basis.

- Besides their usage as master stations for a wide range of surveying activities, TUSAGA stations are going to be utilized as geodetic control and for monitoring the crustal movements in geodynamical activities within their continuous data collection and analyses cycle.

- Particularly for the applications ranging from large-scale mapping, GIS and cadastral surveys, new project under the name **CORS-TR** has been initiated collaboratively with governmental institution and funded by TÜBİTAK.

- The stations will serve as real-time kinematic basis enabling all users to get differentially corrected positional information as well as updated geiod and datum transformation parameters.
- The distribution of planned stations has been given in the following figure.


42°
41°
40°
39°
38°
37°
36°
26°
28°
30
32
34
36
38
40
42
44

3. Episodic GPS Observations for Geodynamic Studies

- Interseismic deformation is monitored by periodic GPS and leveling measurements across Turkey while specific densified networks are established for local and regional secular deformation in certain regions in Marmara Area and in Aegean part of Anatolia.

- Velocity solution of GPS data over the interval 1992-2003 gives the information for tectonic nature of Anatolia and its surrounding.

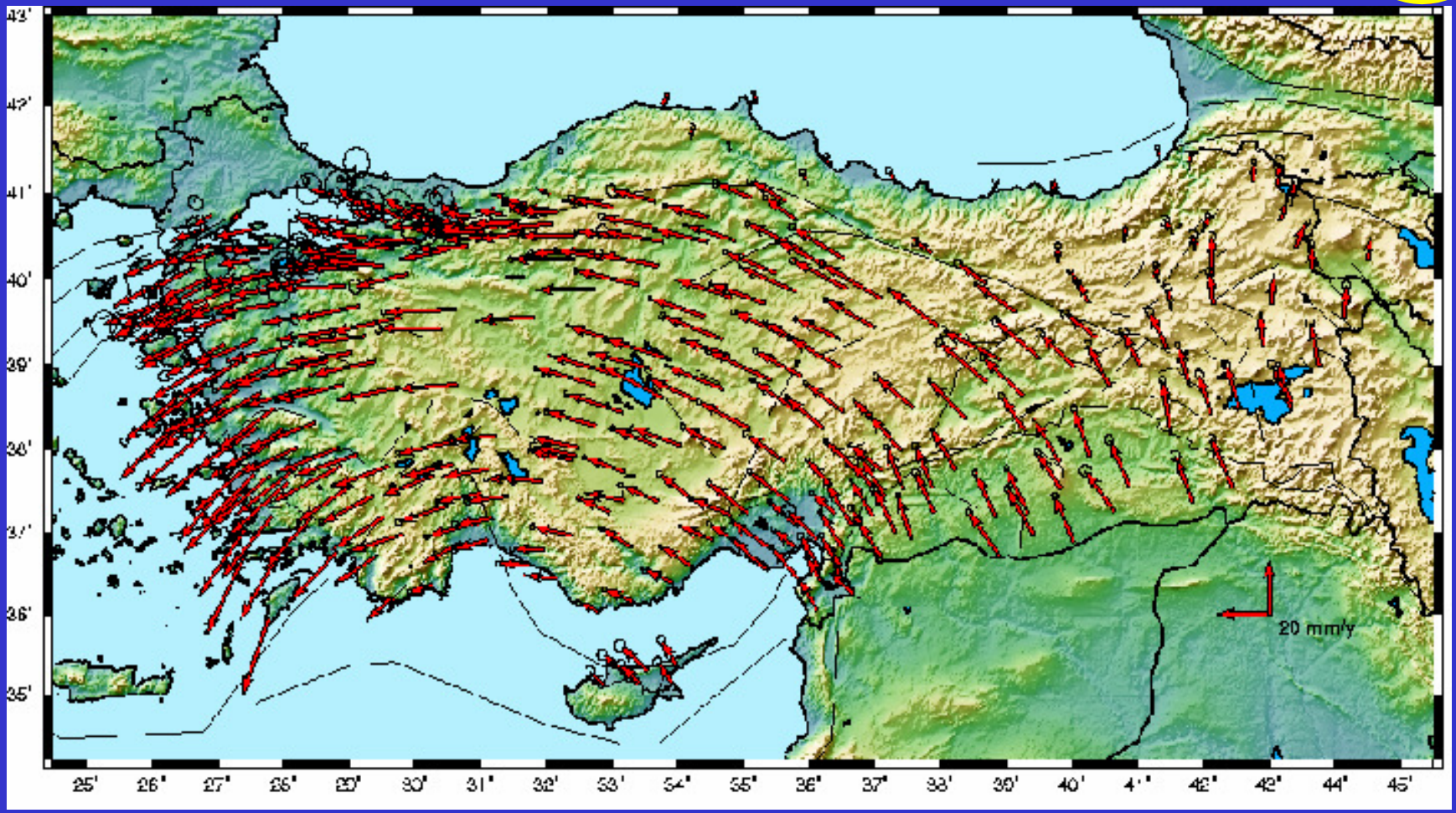


Figure: Horizontal velocity field of Turkey and surrounding regions in a Eurasia-fixed frame

4. Turkish Geoid 2007 (TG-07)

- The high resolution geoid height model for Turkey (TG-07) was recently computed based on spherical FFT approach by using ;

  land (~ 65000 stations) and marine (KMS02) free air gravity anomalies,

  SRTM high resolution (SRTM3) Digital Elevation Model,

  GRACE GGM02S Global Geopotential Model combined with EGM96

- **Ellipsoidal heights of the GPS/leveling points refer to well established Turkish National GPS Network (aligned to ITRF96), while orthometric heights refer to Turkish National Vertical Datum (fixed to mean sea level).**

- **Surface gravity values are in Modified Potsdam Datum, and the free air anomalies were computed in GRS80.**

- **The post-fit residuals of this corrector surface have a standard deviation of 8.8 cm for Turkey.**

- **The geoid heights at 3′x3′ grid points within Turkey were computed to be further interpolated in practical use.**

5. Turkish Sea Level Monitoring System (TUDES)

- General Command of Mapping (GCM) operates Turkish Sea Level Monitoring System (TUDES).

- TUDES consists of eleven digital and automatic tide gauges at Mediterranean coast (Antalya, Erdemli/Mersin and İskenderun), at Agean Sea (Bodrum and Menteş/İzmir), at Sea of Marmara (Erdek and Marmara Ereğlisi) and at Black Sea (Amasra, İğneada, Trabzon and Sinop) and a data center in Ankara.

- **TUDES is planned to be enlarged with new digital and automatic tide gauges.**

- **As an example of self calibrating acoustic sea level sensor and ancillary meteorological sensors at Trabzon-II digital and automatic tide gauge station is shown in Figure.**

- **TUDES is one of the unique tide gauge networks at GLOSS (Global Sea Level Observing System) standards in the Mediterranean and Black Sea.**

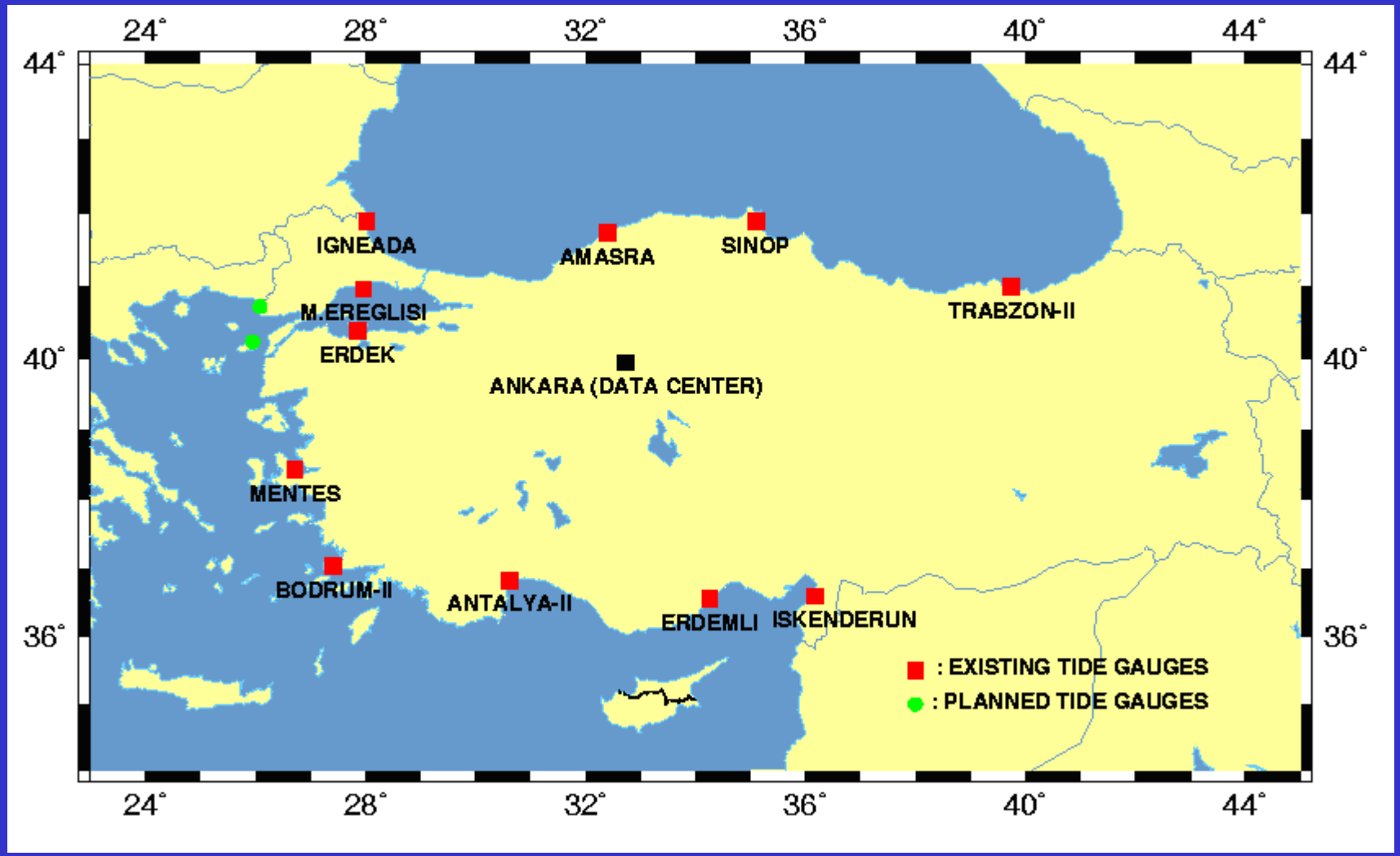
- **The data collected from digital and automatic tide gauge are used for the determination of;**

  vertical datum of Turkish Vertical Control Network,

  long term sea level changes,

  vertical land movements along Turkish coasts and

  for engineering purposes such as harbor design and tidal information generation.


24°
28°
32°
36°
40°
44°
44°
40°
36°
IGNEADA
AMASRA
SINOP
M.EREGLISI
TRABZON-II
ERDEK
ANKARA (DATA CENTER)
MENTES
BODRUM-II
ANTALYA-II
ERDEMLI
ISKENDERUN
: EXISTING TIDE GAUGES
: PLANNED TIDE GAUGES

- **GCM participated in the European Sea Level Service (ESEAS), initiated by the European Sea Level Observing System (EOSS) (COST Action 40) in 2001 which is a sub-program of European Commission, European Cooperation in the Field of Scientific and Technical Research with the Antalya digital and automatic tide gauge and was selected as one of the analysis centers having the responsibility of analyzing the sea level data in Eastern Mediterranean Sea and Black Sea and of analysis GPS data of ESEAS CGPS stations.**

THANK YOU !