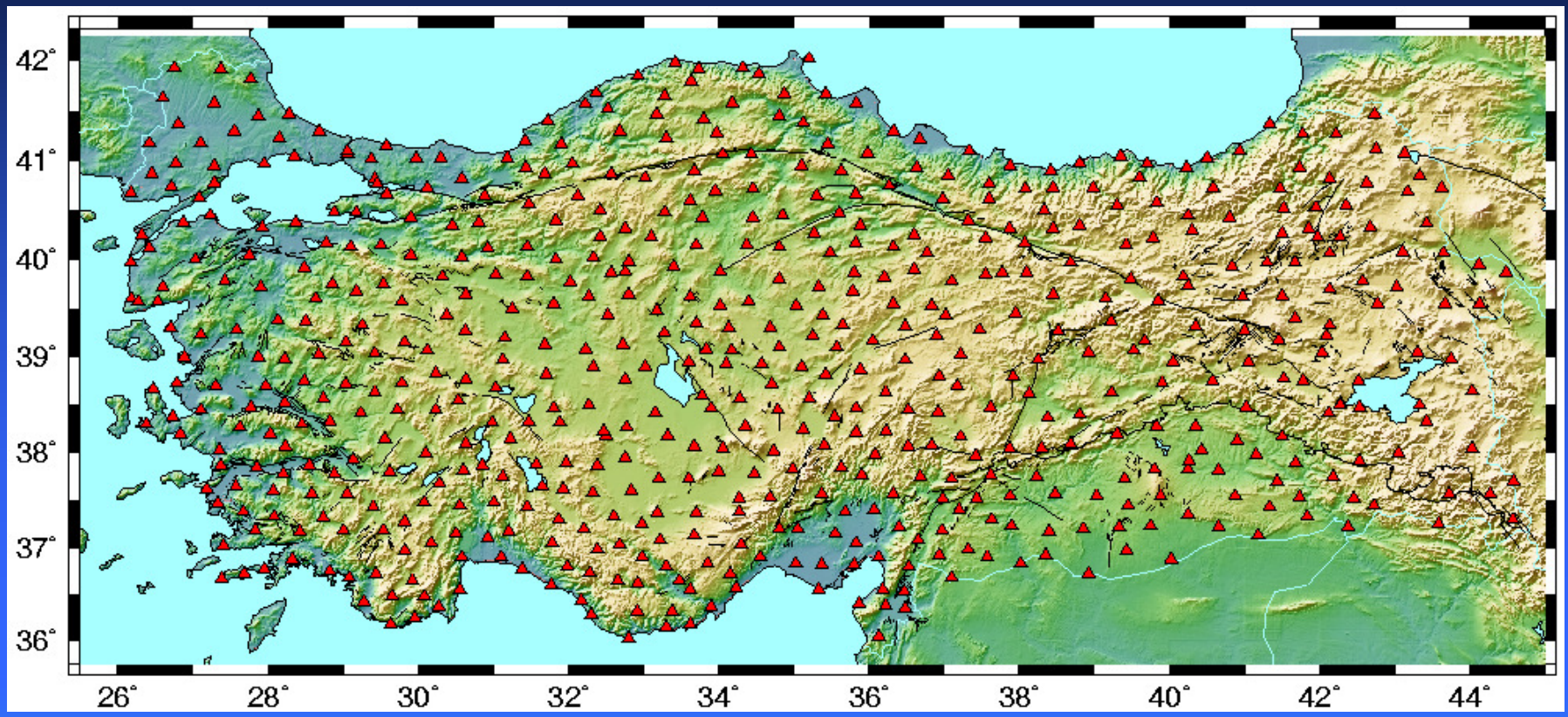
NATIONAL REPORT OF TURKEY- 2011

Türkezer, A., Aktuğ, B., Simav, M., Kurt, M., Parmaksız, E., Lenk, O.

General Command of Mapping
TR06100 Ankara/Turkey
http://www.hgk.msb.gov.tr

CONTENTS

TURKISH NATIONAL FUNDAMENTAL GPS NETWORK (TUTGA)



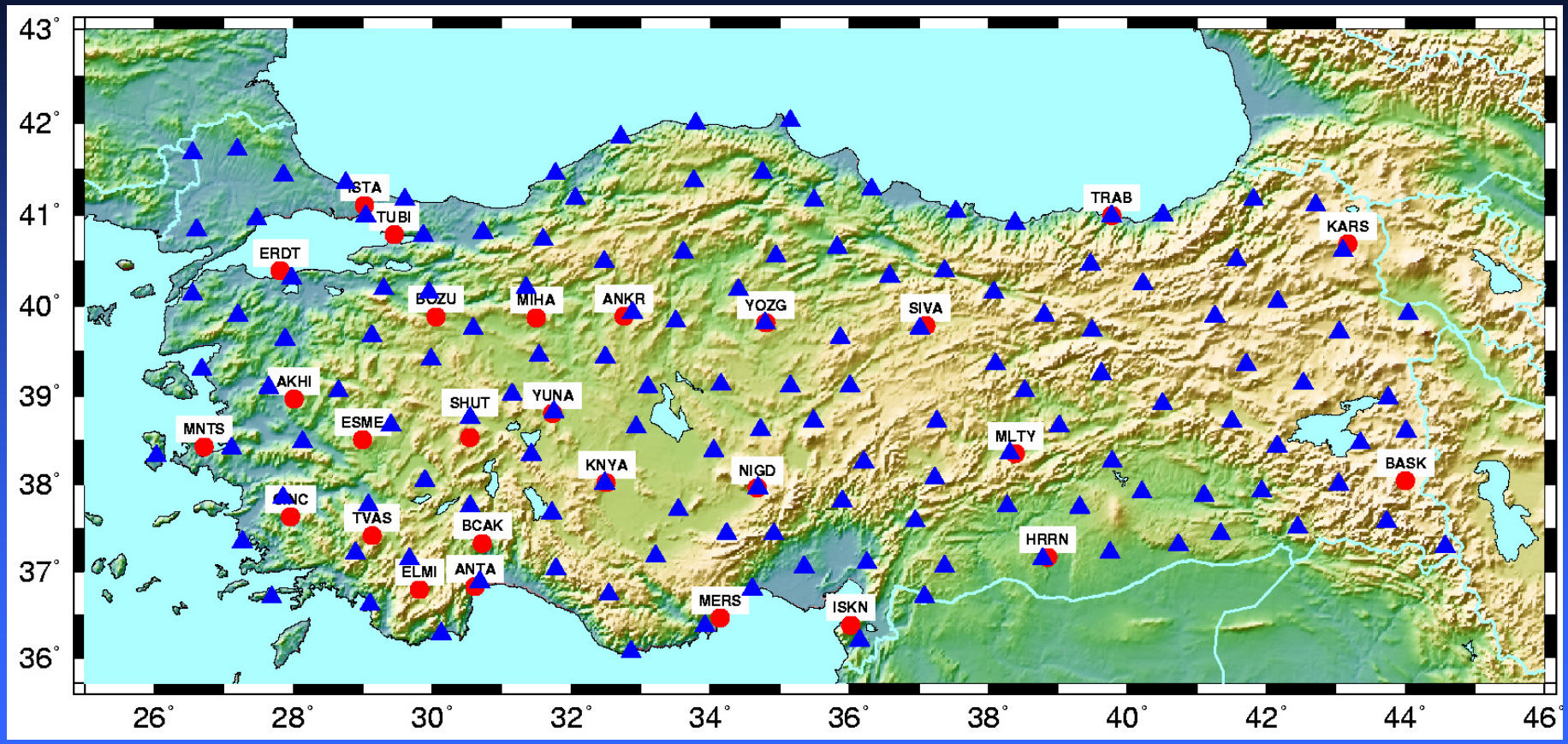
Distribution of TUTGA stations

NATIONAL REPORT OF TURKEY

- Consists of about 700 stations.
- Revision surveys have been done after 1999.
- 3D coordinates and velocities were computed in ITRF2005, transformed into ITRF-96.
- Coordination with TUREF (Turkish National Reference Frame).
- About 1-3 cm positional accuracies, within the range of 0.1-0.01 ppm relative precision.
- Connected to the Turkish Horizontal and Vertical Networks.
- Detailed information is at official web of General Command of Mapping.

http://www.hgk.msb.gov.tr

TURKISH NATIONAL PERMANENT GPS NETWORK (TUSAGA) AND TURKISH NATIONAL GPS RTK NETWORK (TUSAGA-Active)



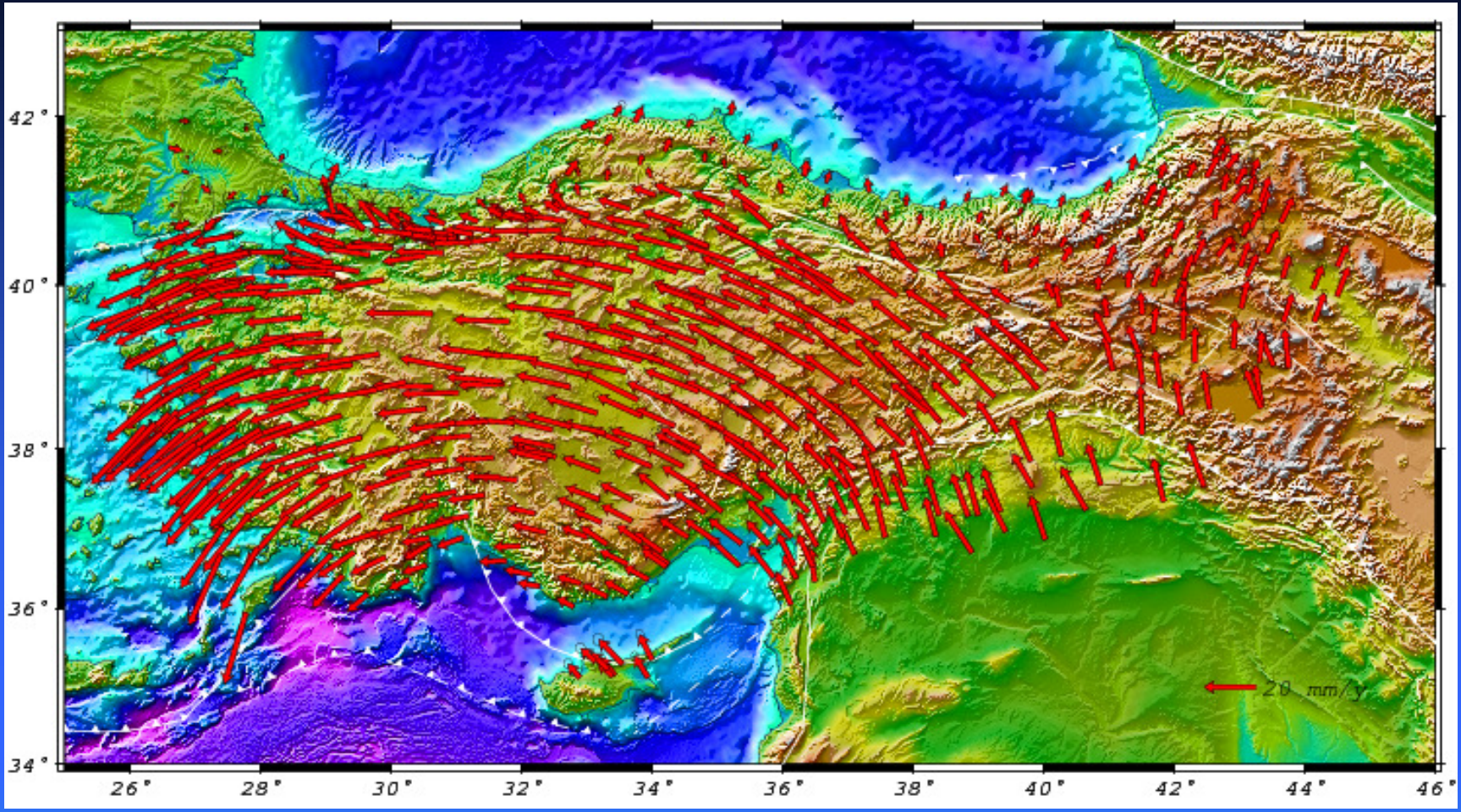
Distribution of TUSAGA (Red Circles-27) and TUSAGA-Active (BlueTriangles-146) stations .

Time-series analysis on a daily basis.

- Going to be utilized as geodetic control and for monitoring crustal movements.
- A RTK Network of 146 sites, financed by Turkish National Scientific and Technological Council, responsibility of Istanbul Culture University, supervision of General Command of Mapping (GCM) and General Directorate of Registration and Cadastre.
- Fully operational.
- Particularly for the applications ranging from large-scale mapping, GIS and cadastral surveys.
- Serve on real-time kinematic basis.

EPISODIC GPS OBSERVATIONS FOR GEODYNAMICS STUDIES

Velocity solution of GPS data over the interval 1992-2009

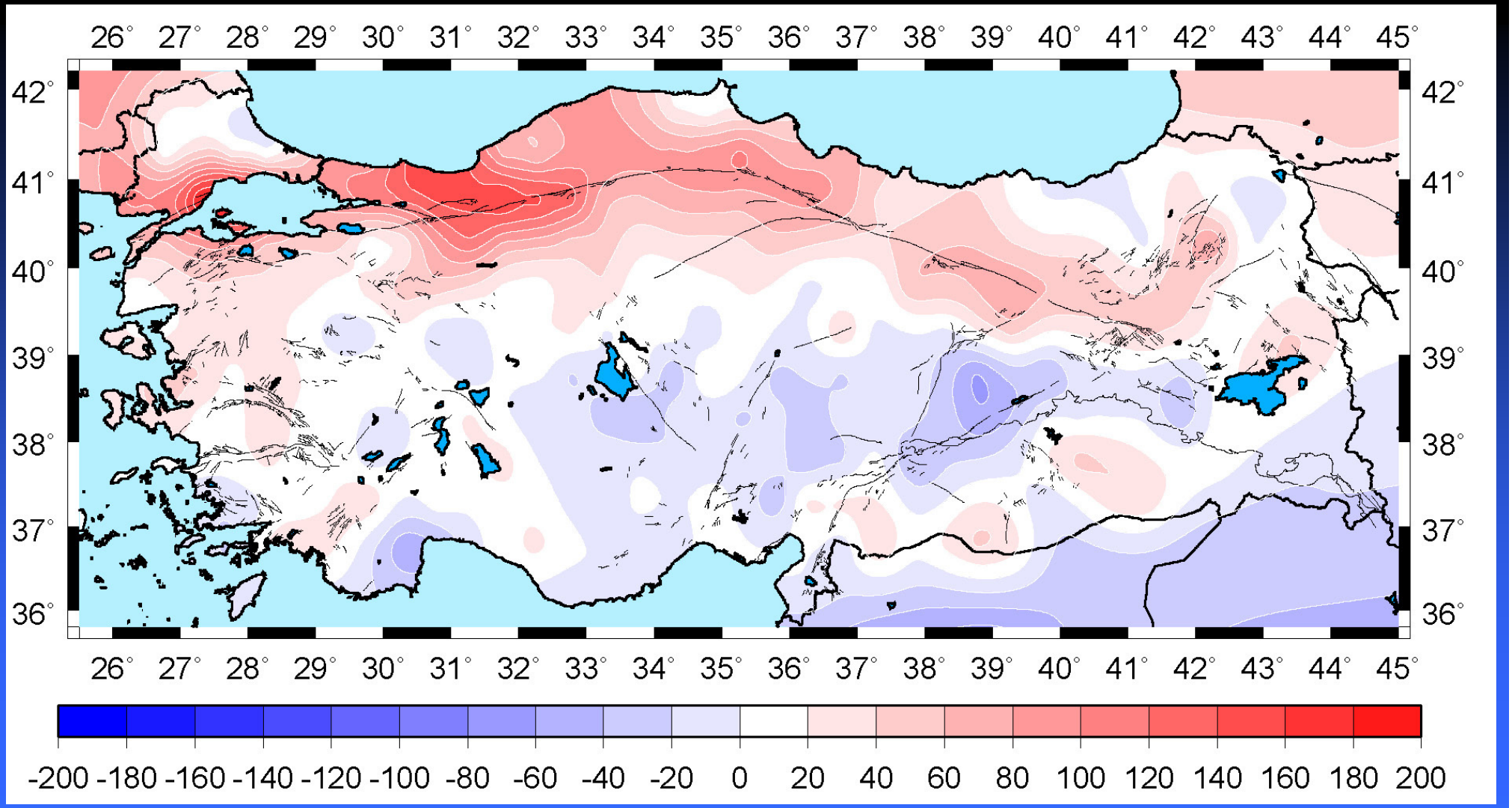


Horizontal velocity field of Turkey and surrounding regions
in a Eurasia-fixed frame

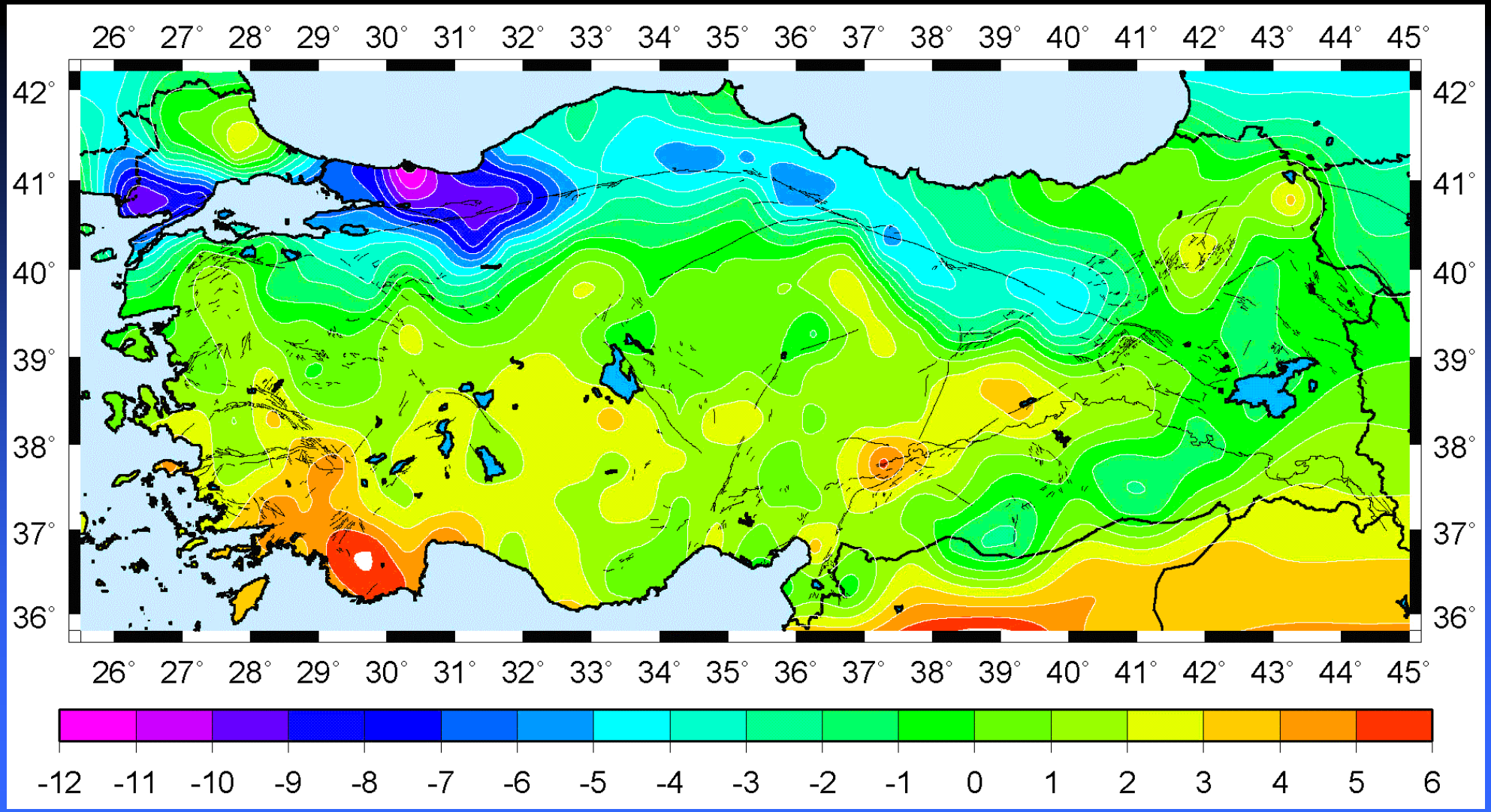
Strain analyses utilizing secular movements shed light on rigid block rotations, local compression and faulting areas that well conform to the geological and geophysical evidence of Anatolia.

Due to high seismic activity, co-seismic and post-seismic deformation is also monitored by independent GPS campaigns.

TUTGA as well as other existing stations comprises a set of precise coordinates along with their velocities and possible co-seismic corrections for the earthquake-prone areas.

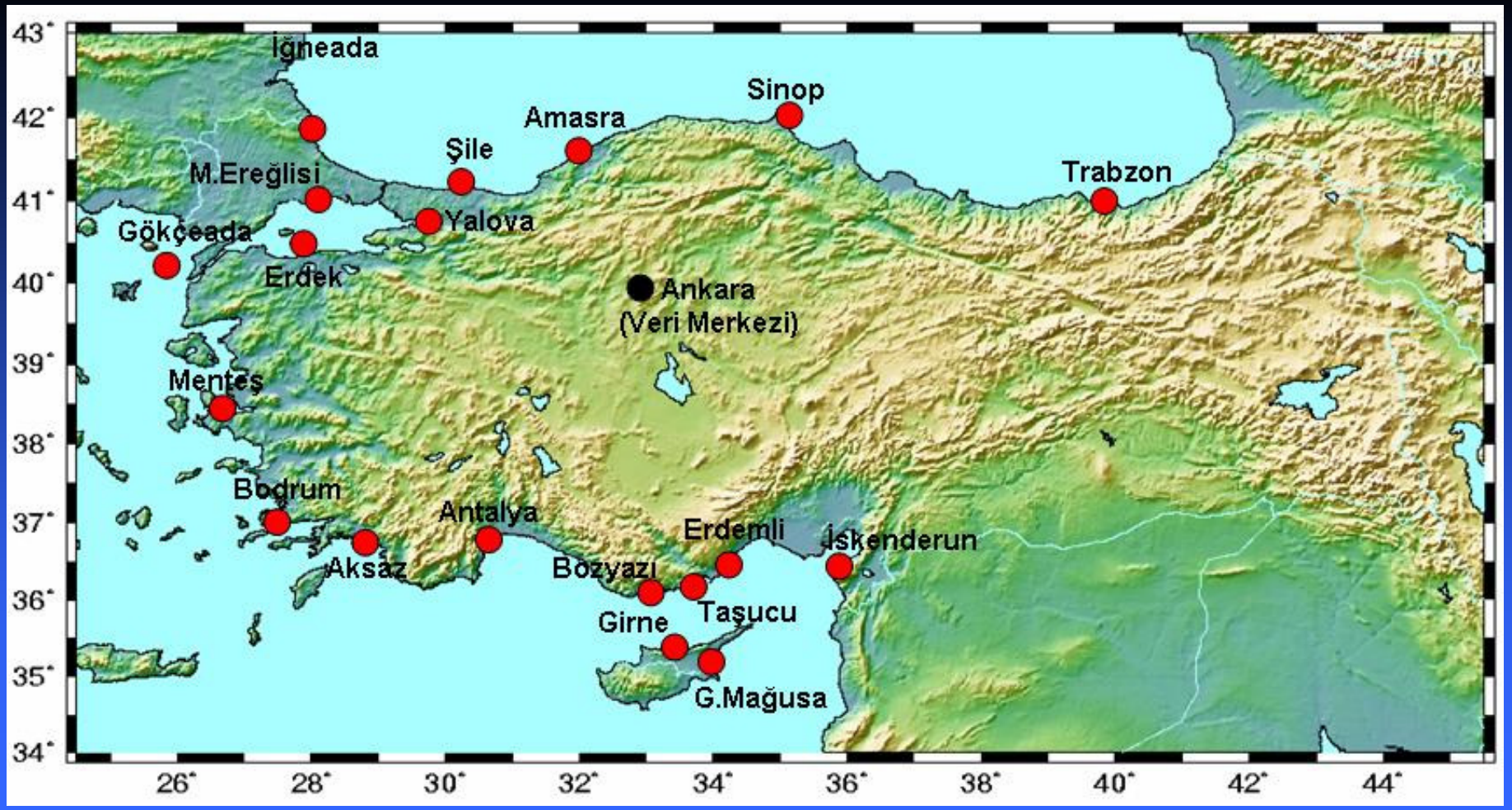


Shear strains in nanostrain yr^{-1}



Rigid-body rotations in ^{0}Myr-1

TURKISH SEA LEVEL MONITORING SYSTEM (TUDES)



Locations of the existing TUDES tide gauges

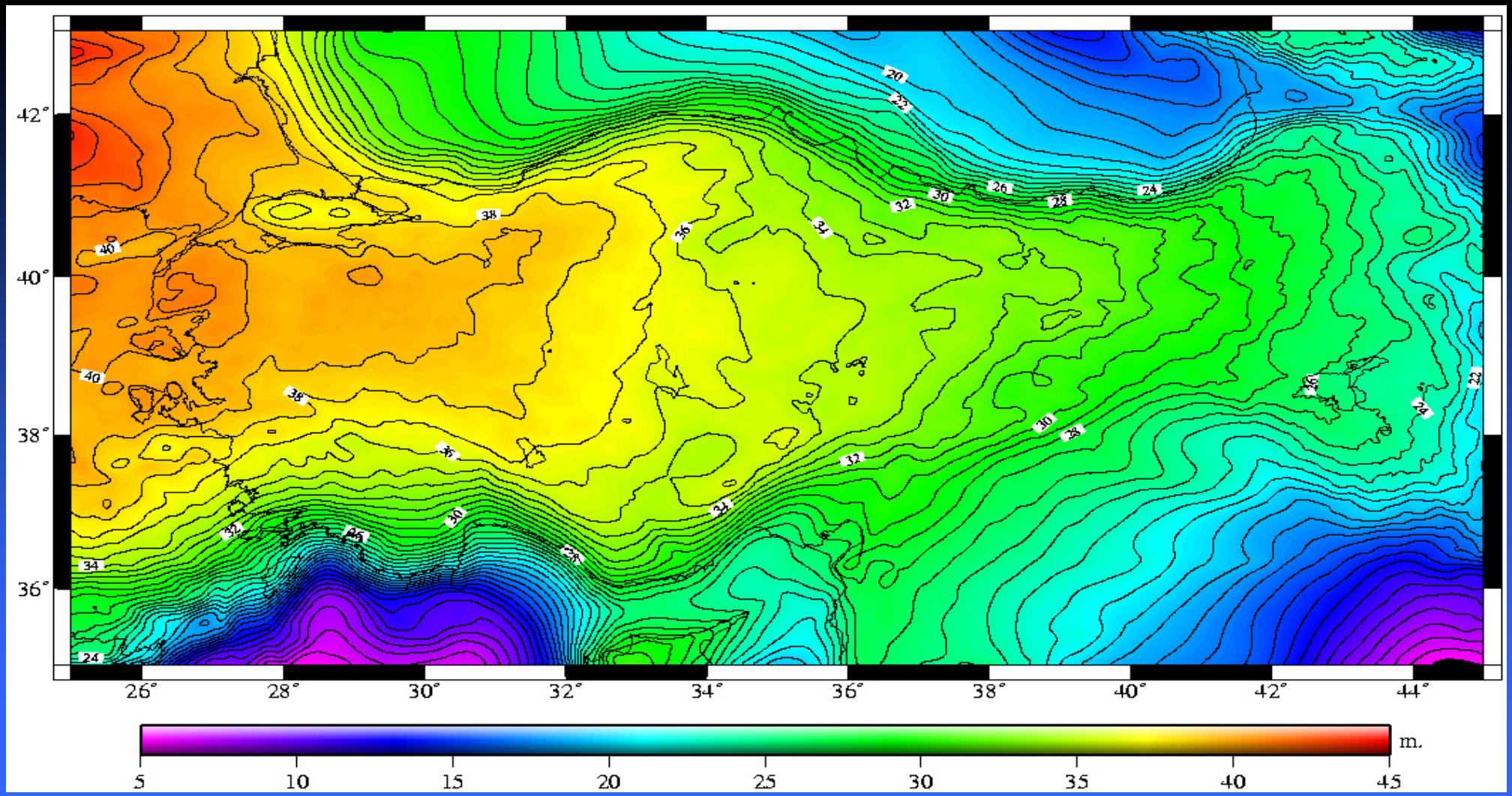
- Consists of 19 digital and automatic tide gauges and a data center in Ankara.
- Used for the determination of vertical datum of Turkish Vertical Control Network, long term sea level changes, vertical land movements and for engineering purposes.
- GCM is a member of European Sea Level Service (ESEAS) and GCM acted as an ESEAS CGPS. Close collaboration with national universities for “Intergovernmental Coordination Group for the Tsunami Early Warning and Mitigation System in the North Eastern Atlantic, the Mediterranean and Connected Seas (ICG/NEAMTWS) Project“.

- Satellite altimetry and GRACE data were used to understand the sea level variations together with the tide gauge data.

- The high resolution geoid height model for Turkey (TG-09) has been recently computed based on spherical FFT approach by using land and marine (KMS02) free air gravity anomalies, Digital Elevation Model (DEM) and GRACE GGM02S, Global Geopotential Model combined with EGM08.

GRAVIMETRİC STUDIES IN TURKEY

- The Fundamental Gravity Network of Turkey – 1999 (TFGN-99) was established between 1993-1999.
- GCM is a member of IAG Evaluation Group for Earth Gravitational Model-2008 (EGM08) and compare EGM08 model by using regional gravity, geoid height and GPS/leveling data in Turkey.
- The EGM08-derived quantities were compared with the GPS/leveling quasi-geoid heights, an existing GPS/leveling fitted regional quasi-geoid model (TG09)), and the surface gravity anomalies in Turkey.



Turkish Hybrid Geoid (THG-09)

RMS ± 9 cm.

HEIGHT MODERNIZATION STUDIES IN TURKEY

- Studies of Turkish National Vertical Control Network (TUDKA) were were started in 1935. Between 1985 and 1992 new measurements were performed and adjustments studies were completed and it is named TUDKA-92. In 1999, network was adjusted after including additional leveling measurements.
- GCM has started a project for height modernization in Turkey.

CURRENT STATUS OF LEVELLING NETWORK

Continuous Damage in Vertical Network,
Current way of height determination not sustainable

THREE WAYS TO GO;

- Re-measure the leveling network completely.
- Improve the geoid and re-measure some part of levelling network.
- Improve the geoid and select as reference surface for the height system.

THANK YOU!