

DATUM TRANSFORMATIONS OF THE LOCAL BASEMAPS OF RIZE FOR RABIS (RIZE DISASTER MANAGEMENT SYSTEM) PROJECT

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Abstract

Geographic Information Systems must be built on a uniform reference datum with spatial data infrastructures to analyses without anomalies in regional applications. All spatial data must be defined in one unique datum. But in real world spatial data collected in different datums and transformation can be done to integrate data in a common reference frame.

If spatial data managed in defined geodetic reference frame it can be easily analyze and systems are compatible with other data sets. These sets can be integrated and use for disaster management to reduce hazard impacts. Datum equivalence provides us a strong analysis over emergency management.

A new system will be established using Geographic Information Systems remote sensing and meteorological early warning system in order to minimize the impact loss of life and loss of property against the disasters that will affect Rize city and provincial area. The project, which is first and unique in Turkey, will be executed in two stages and these are;

1. Design of a Disaster Management Information System for Rize province
2. Establishment of a Meteorological early warning System for whole Rize province.

Due to integration of data, all maps are examined in 12 districts of Rize and Global Positioning System observations¹ performed for selected conjugate stations. 98 points observed with GPS and 90 points used for datum transformation in maps with different scales transformed in one standard datum (ITRF96 2005.0) which is defined in Turkey Disaster Management Information System Standards catalogue. After transformation $\pm 3\text{cm}$ accuracy obtained for all spatial references integrated one datum.

Disaster management, loss estimation and planning application of emergency response will be available with the project. Also a decision-support system functioning for governmental and local authorities will be ready for all province area in one information system with high positioning accuracy.

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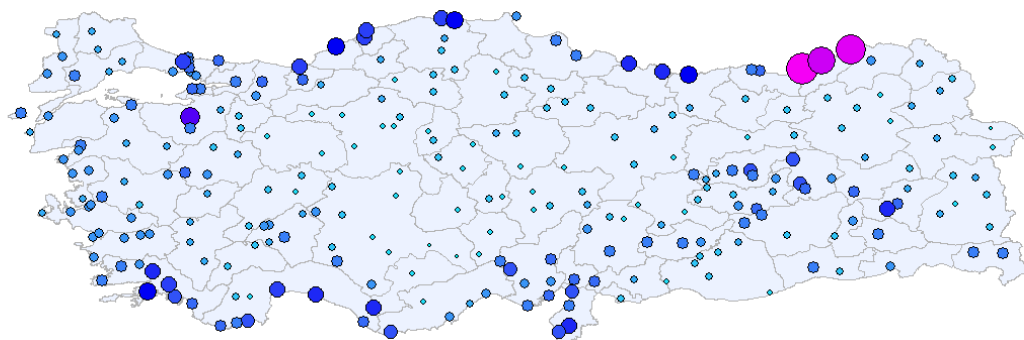
Introduction

Preparedness and mitigation are main elements of Emergency Management (Waugh 2000), after 1999 earthquakes Turkey has a trend over emergency management projects. These projects not only about earthquakes but also include other natural disaster like wildfires, landslides and floods that can be occurred in Turkey as many other natural disasters. Most common problem of projects is different base maps for attribute data for management. The difference causes some difficulties for GIS tool in emergency management planning (ESRI, 2001), such as integrating data over one datum in a system. If spatial data managed in defined geodetic reference frame it can be easily analyze and systems are compatible with other data sets. These sets can be integrated and use for disaster management to reduce hazard impacts. Datum equivalence provides us a strong analysis over emergency management. After 1999 Turkey makes its own Disaster Management Information System Standards catalogue, TABIS (Şahin, et al. 2002). The catalogue defines all GIS standards for Turkey's conditions about data management. In this study local basemaps of Rize province transform to one common system which is defined by TABIS to integrate all data for Design of a Disaster Management Information and System and Establishment of a Meteorological early warning System for whole for Rize province(Unen et al. 2007).

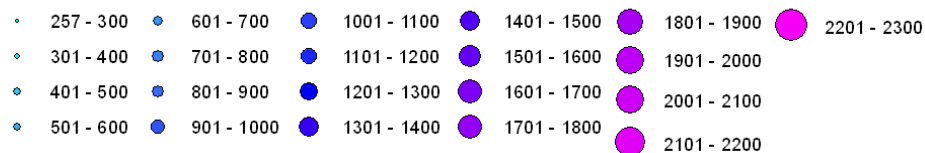
RABIS Project

The project is designed for Rize province, which is at the north east of Turkey on Black Sea shore. The main objective of the project is to establish an integrated information and management system to minimize the effects of disasters in the Rize province of Turkey. 2200 mm annual rainfall with the geographic and geologic conditions causes floods and some secondary disasters like landslides.(Figure.1)

Figure.1 Annual rainfall distribution of Turkey (RABIS Project Term Report 2008)



Annual Rainfall (mm)



Rainfall over hard valleys and rivers with slopes can be turn in to flood rapidly. To detect the risks over Rize, project planned in two stages.

- Design of a Disaster Management Information System for Rize province
- Establishment of a Meteorological early warning System for whole Rize province.

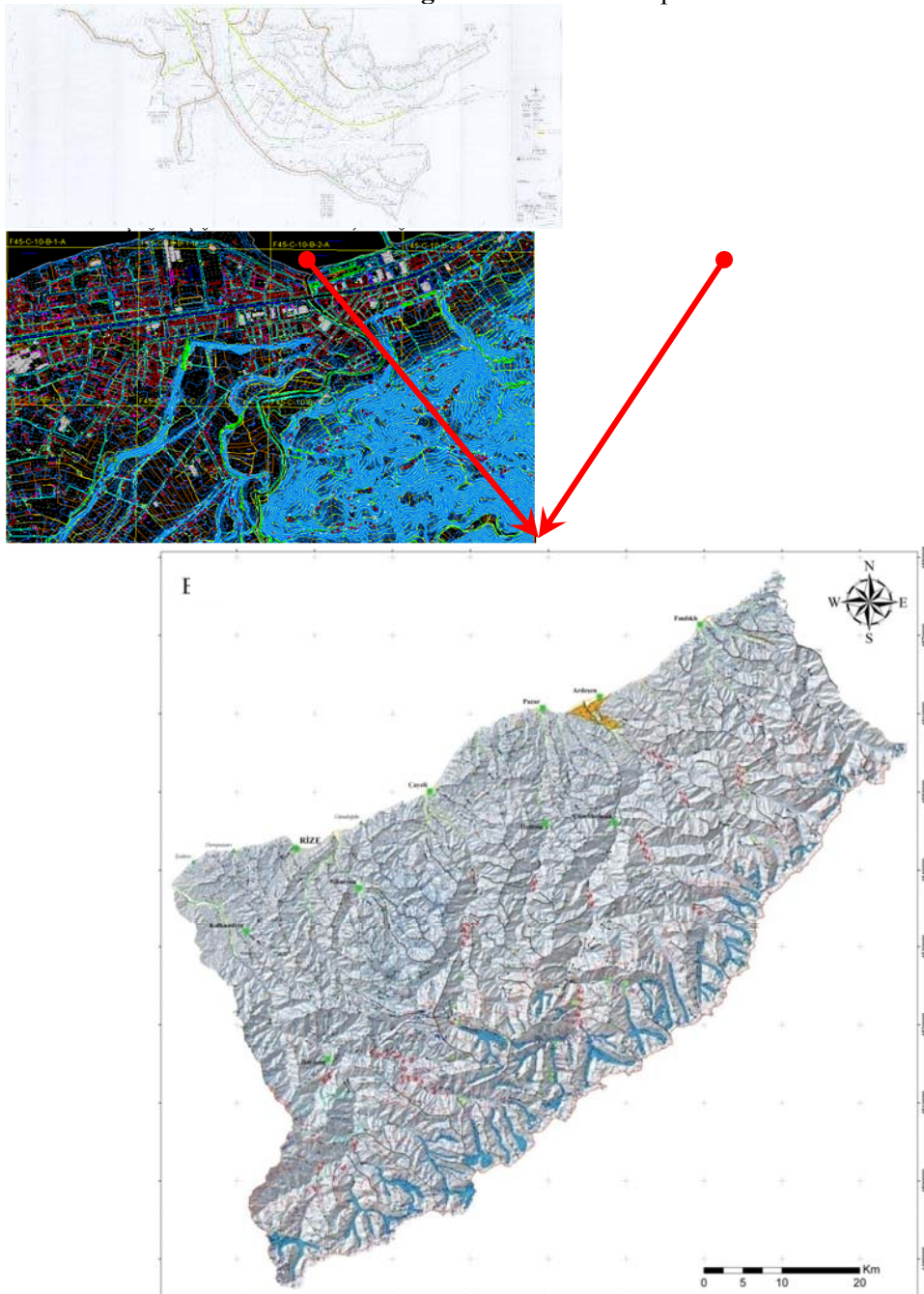
Three main data type needed to integrate over one geodetic datum in these two stages; geological, meteorological and remote sensing. Geology maps, digital elevation models geomorphological maps, vegetation type, soil type, rainfall data, flow data over rivers, and remote sensing images in different resolutions are some main examples of data types. In

addition to these data, the locations of landslides, occurrence time of landslide and floods will be investigated and recorded into the database. The ground stations observing rain, temperature and humidity of soil will be located as representing the zone of height beginning from sea-level in every 500 meters (Unen, et al. 2007) The remote sensing group will use QUICKBIRD satellite images to determine buildings and streets of Rize city center and province in detail. SPOT 5XS/PAN satellite image is used to locate forests, agricultural regions, lakes, rivers, main highways.

Transformation of Maps

All these data integrate in one Geographical Information System for an accurate analyze of risks over Rize province. Due to this integration necessity datum transformation for local basemaps came up.(Figure.2)

Figure.2 Local basemaps



Conclusion

As a conclusion all local base maps can be computed to ITRF96 2005.0 epoch due to the TABIS catalogue so all data can be manage in one system with enough accuracy in position. Transformation parameters which are obtained by using Helmert transformation provides us ± 3 cm and better coordinate accuracy ($M_0=\pm 3$) after transformation. By using these parameters all data which is provided by local authorities can be integrated to system or data form system can be convert to local system. These parameter are also can be used by other persons or corporations via web interface which is design for local authorities. Final product is transformation parameters for Rize province and transformed map and images for infrastructure of emergency management system.

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