GENERAL DIRECTORATE OF MAPPING

(HARİTA GENEL MÜDÜRLÜĞÜ)

TÜRKİYE

NATIONAL REPORT

(2019-2023)

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31th International Cartographic Conference
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INTRODUCTION

This report contains the cartographic activities between 2019-2023 in General Directorate of Mapping (GDM) (Türkiye).

1. PRODUCTION ACTIVITIES

According to her law of foundation, GDM is responsible for the production of maps needed for defense and development purposes. Therefore, the production of base scale maps at 1:25.000 and other topographic maps at 1:50.000 and 1:100.000 scale which are generalized from base scale maps, 1:250.000 scale Joint Operations Graphics (JOG) series maps and Transit Flying Charts (TFC) series as well as 1:500.000 scale 1404 series maps and Special Air Chart (SAC) series covering Türkiye are under the responsibility of GDM.

Beside these products, GDM is also carrying out the production of small-scale thematic maps, atlases, gazetteer and plastic relief maps. In addition, with the HGM Atlas web map application, user's access to maps in different themes is facilitated.

a. 1:25.000 Scale Topographic Map Production

Base scale of Türkiye's topographic maps is 1:25.000 and the country is covered with about 5532 sheets. The production of all sheets with conventional and digital method is completed. From the end of 1999 to beginning of 2014 all of the sheets are produced digitally. Revision of topographic maps is currently ongoing.

1:25.000 scale digital topographic map production is carried out with Arc/Info (workstation) software until the end of 2015. After this year all production methods and scripts are transferred to ESRI ArcGIS platform. Data is collected in vector format under 9 themes. Each theme has point, line and area feature classes. Totally, topographic map has 28 feature classes with annotation. Themes and layers are shown in Table-1. At the end of the production, two products are obtained, one is vector and the other is a raster product. The vector product is called "1:25.000 scale Cartographic Vector Map" while the raster product is called "1:25.000 scale Cartographic Digital Map". Figure-1 shows 1:25.000 Scale Cartographic Vector Map.

Until the end of 2002 the production was carried out by heads-up digitizing of photogrammetric revision plates. At the beginning of 2003 the system is converted to digital data exchange between Photogrammetry and Cartography departments. Photogrammetry department collect vector data in a database, called Türkiye Topographic Vector Database (TOPOVT). TOPOVT data model convert into cartographic data model for production of Cartographic Vector Map. Within the frame of this development "Feature Describing and Symbology Specification" is prepared and published in 2002, "Data Dictionary" and "Specification for Annotations" is prepared and published in 2003, "Production Specification" is published in 2006. "Feature Describing and Symbology Specification"" was updated in 2015 and it was divided into two parts by the name of "Cartographic Describing" and "Symbology Specification".

After production of 1:25.000 Cartographic Vector Map, 16 sheets, located in the same 1:100.000 area, are combined and quality control process is performed. The combined data is used for 1:50.000 and 1:100.000 Scale Topographic Map Production.

Table-1: Themes and layers of 1:25.000 scale Cartographic Vector Map

No	Themes	Layers
1	Boundaries	Each class have point, line and area feature classes.
2	Elevation	
3	Hydrography	
4	Transportation	
5	Physiography	
6	Utilities	
7	Population	
8	Vegetation	
9	Industry	
10	Annotation	

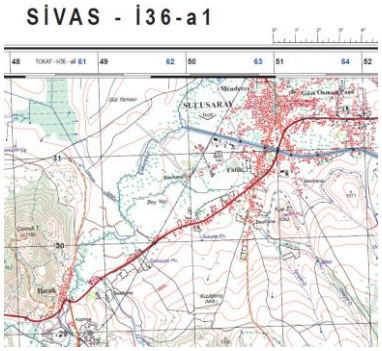


Figure-1: 1:25.000 Scale Cartographic Vector Map

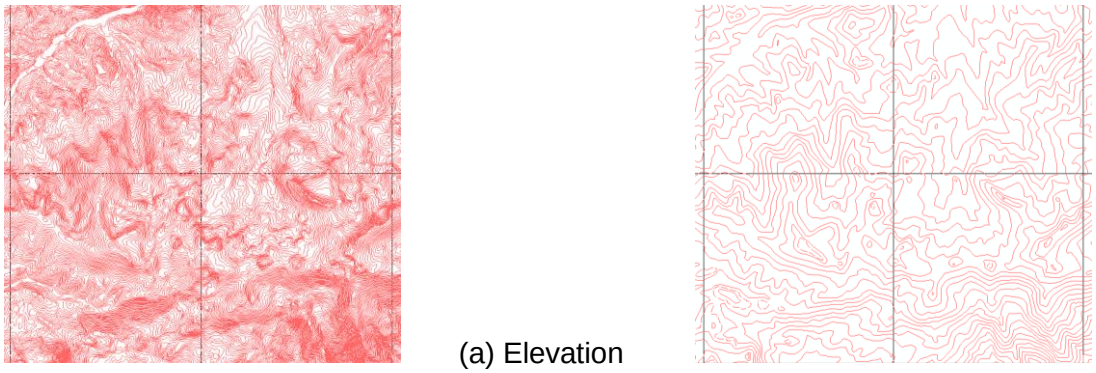
b. 1:50.000 and 1:100.000 Scale Topographic Map Production by Automated Generalization

Traditional cartographic productions at these scales were ceased by the end of year 2000. A new project called “Computer Assisted Generalization Project” was initialized in 2002.

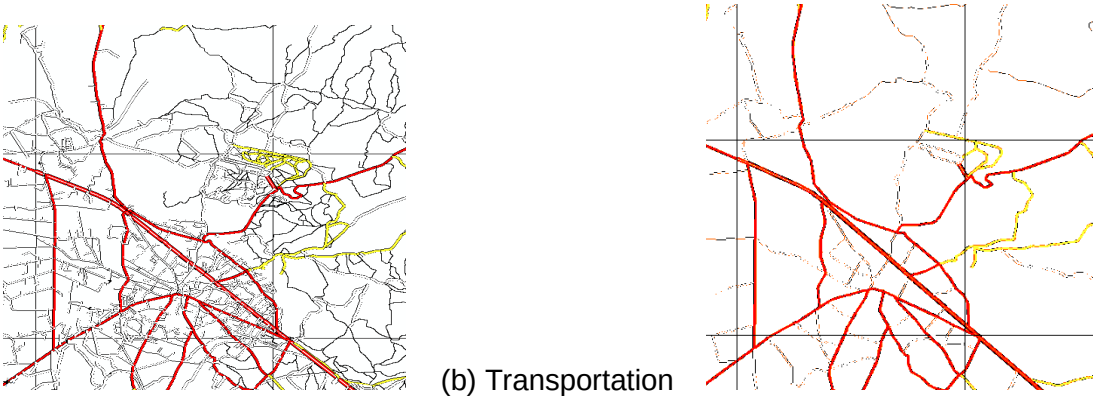
The objective of project was to design 1:100.000 and 1:50.000 scale digital topographic map production system. By the end of 2005, 1:100.000 scale map production system, and by the end of 2006 1:50.000 scale map production system had been realized. According to statistics, 75 % of cartographic processes are carried out automatically and the rest are made interactively. Hence, compared with the conventional production time spent was decreased to 50%.
To accomplish this project, following aims were realized.

- Obtaining, defining and arranging the needed generalization rules,
- Defining and arranging the feature’s importance and priority list,
- Defining the generalization parameters,
- Obtaining the needed generalization algorithms,
- Investigating the present algorithms and their applicability to our needs, and modify and/or improve them or develop a new one, if needed.
- Defining the processes and their orders, and
- Defining the production lines

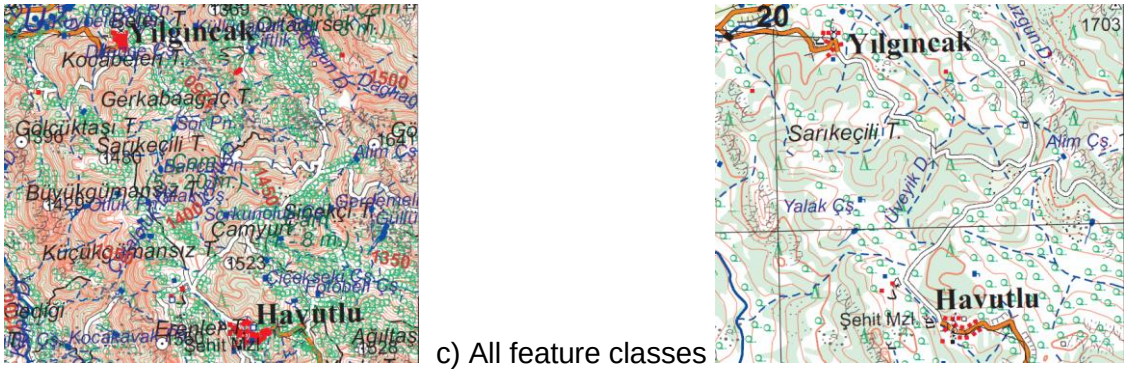
As mentioned above, project group created a semi-automatic production line by developing intelligent and sophisticated generalization tools using ArcGIS and its customization environment (ArcObjects, Visual Basic and C# Programming languages). With this production line which is still improved by the project group, 1453 (100%) 1:50.000 and 391 (100%) 1:100.000 scaled maps were produced by the end of 2019 and their updates are going on. So, first version digital cartographic models of 1:50.000 and 1:100.000 scale maps were completed. Generalization samples of different feature classes in 1:100.000 scale maps are given in Figure-2.



(a) Elevation



(b) Transportation



c) All feature classes

Figure-2: Samples of Different Feature Classes Before and After Generalization Process

It is aimed to convert generalization tools used in current ArcMap production system to ArcPro until the end of 2023.

c. JOG Series and TFC Series Map Production

JOG series (JOG-Ground and JOG-Air) and TFC series maps are produced from updated 1:100.000 scale digital map data and open sources raster and vector databases. Aeronautical

and other information (AIP, DAFIF, DVOF, etc.) are taken from General Directorate of State Airport Authority and Turkish Air Forces respectively.

Production work-flow from 1:100.000 scale digital map data is given in Figure-3. JOG and TFC series maps (Figure-4, Figure-5, Figure-6) are all produced in the same production line. Map data except from aeronautical information are same for these three maps. Some extra annotation and graphic edits are needed for cartographic design of the final products.

ESRI and Adobe platforms are used for the production. Defense Mapping Tools are used and tools are developed by our staffs for the automation of the production process.

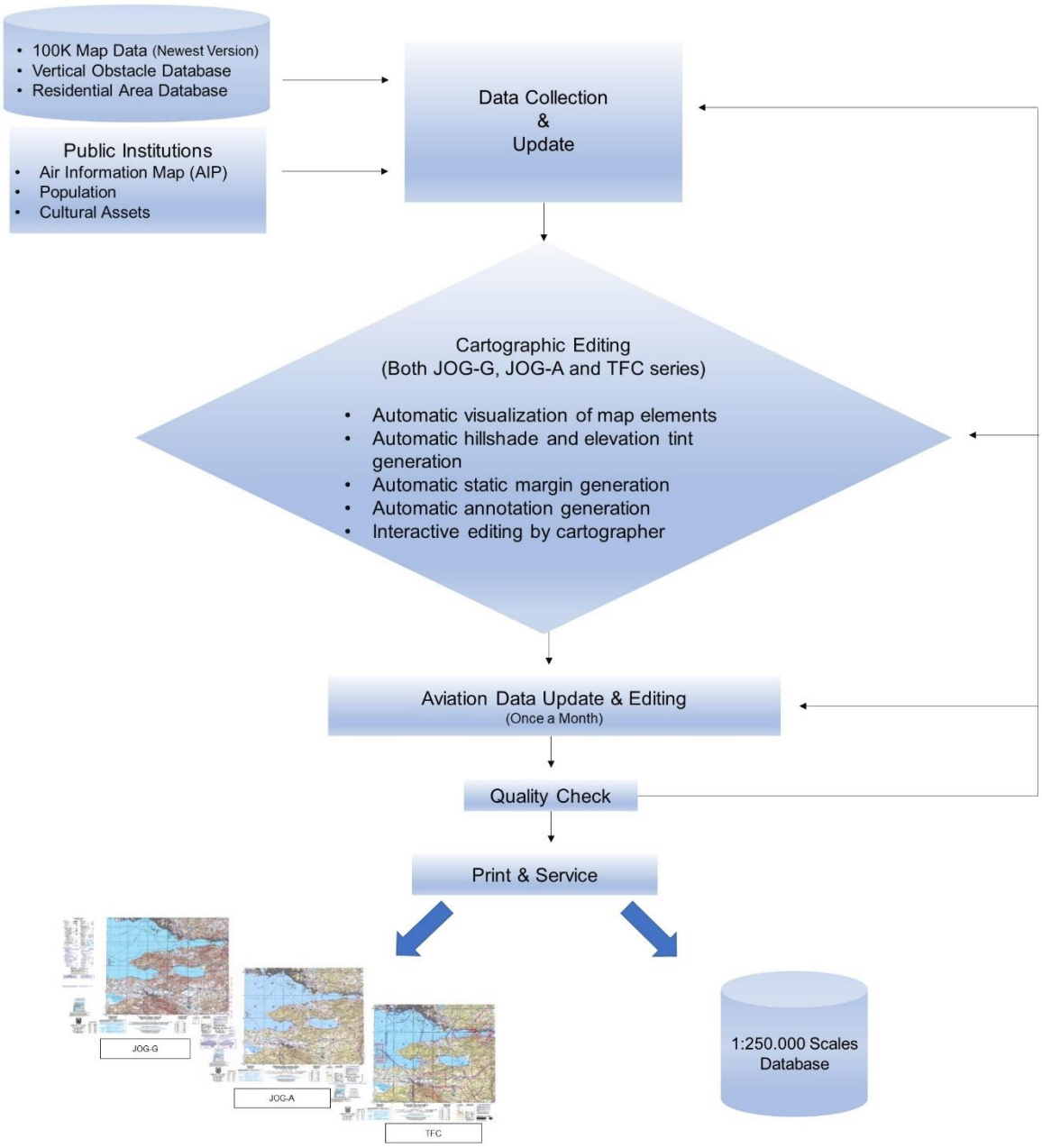


Figure-3: Flow Chart of JOG Series Map Production

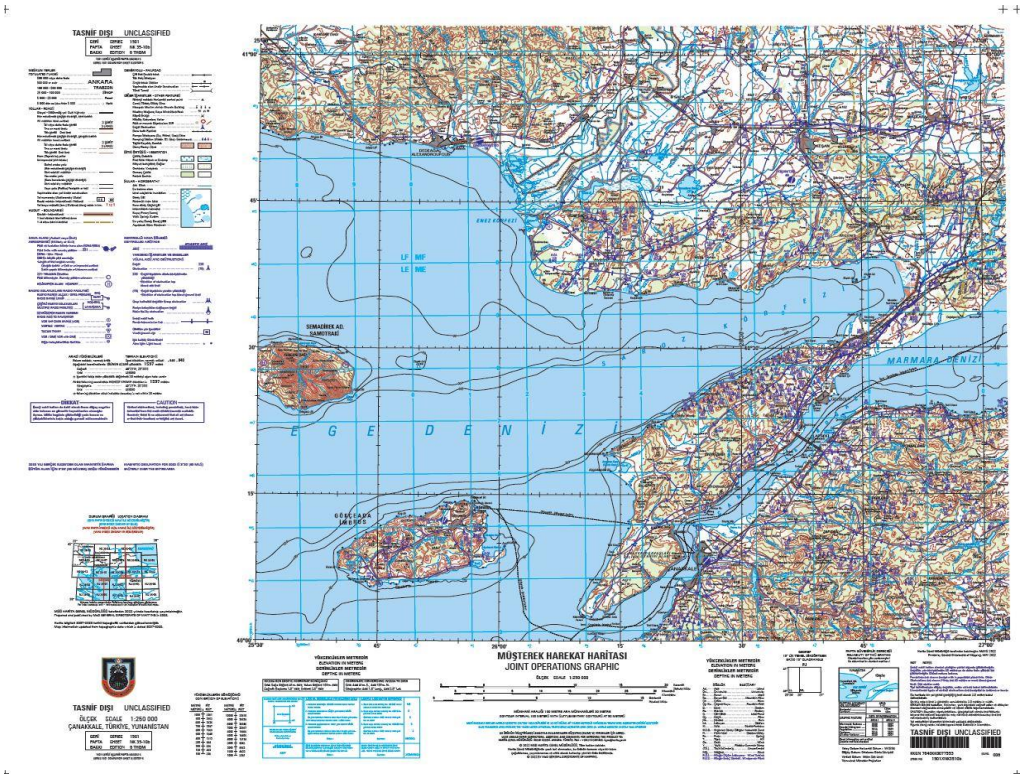


Figure-4: JOG Series 1:250.000 Scale Topographic Maps

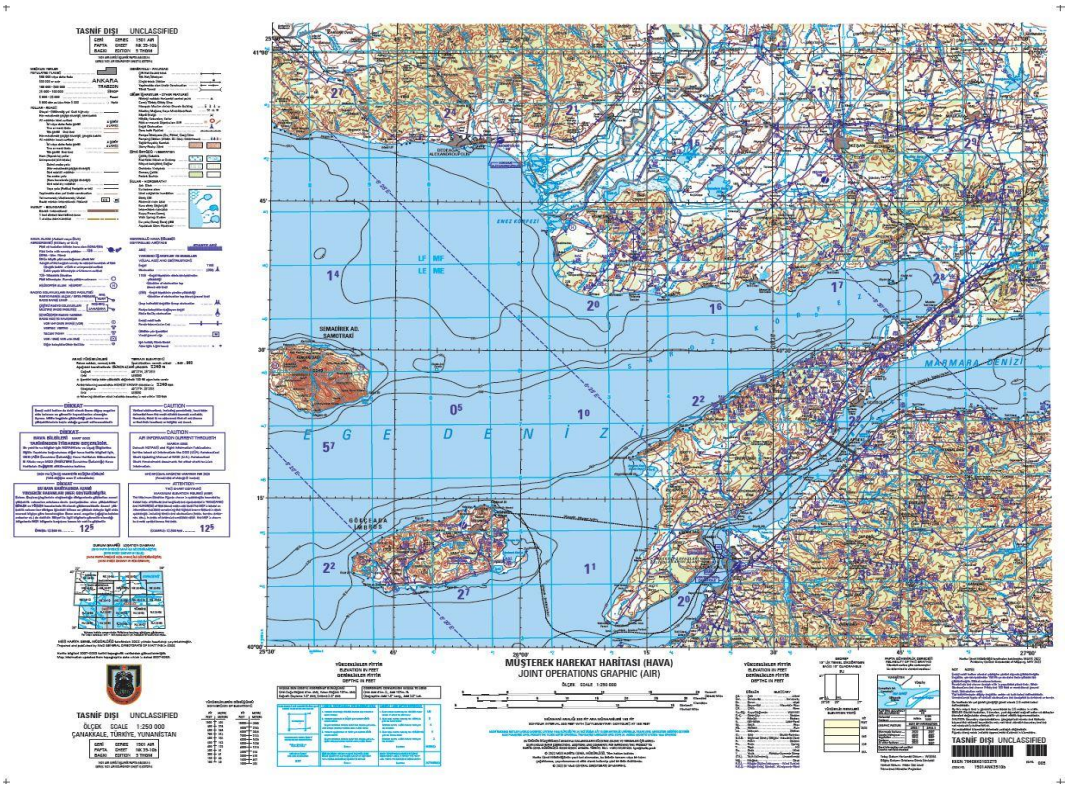


Figure-5: JOG-A Series 1:250.000 Scale Topographic Maps

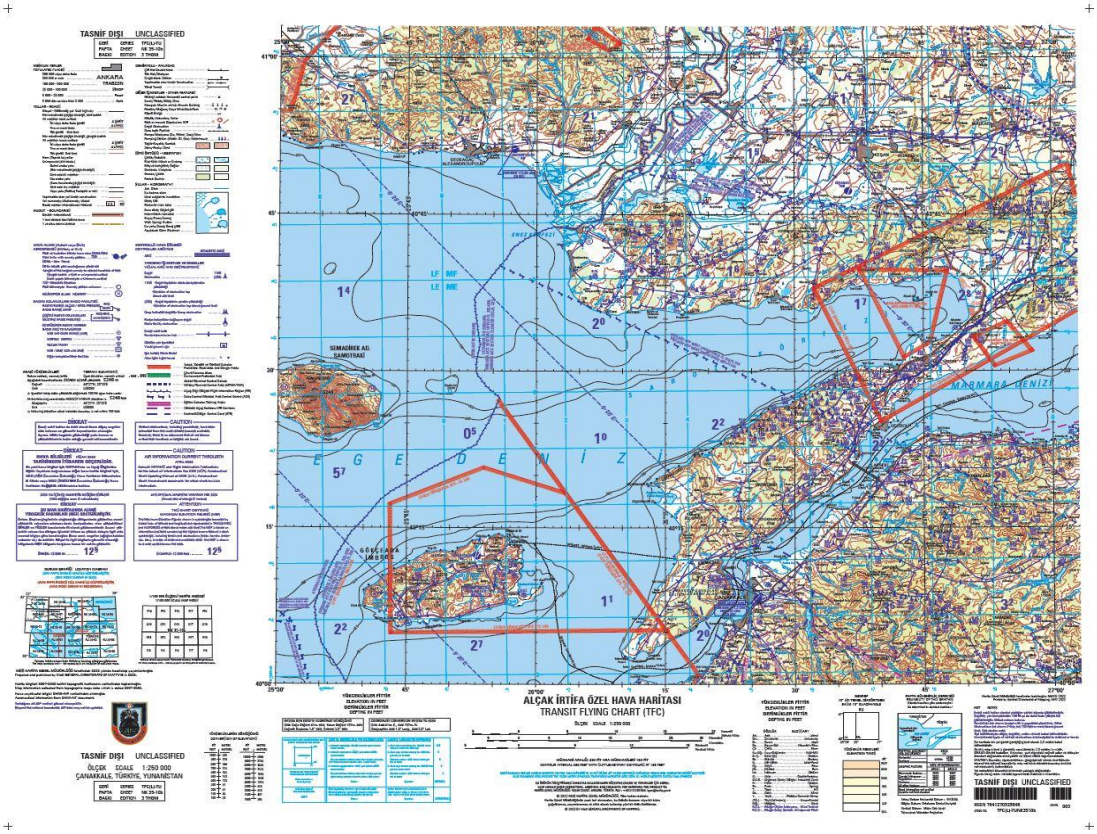


Figure-6: TFC Series 1:250.000 Scale Transit Flying Chart

d. 1:500.000 Scale Topographic Map Production

GDM is able to produce small scale topographic maps and air charts at 1:250.000 and 1:500.000 scales, as well. 1:500.000 scale topographic maps and SAC are produced from 1:250.000 scale maps by generalization. The final product can be seen in Figure 7 and 8.

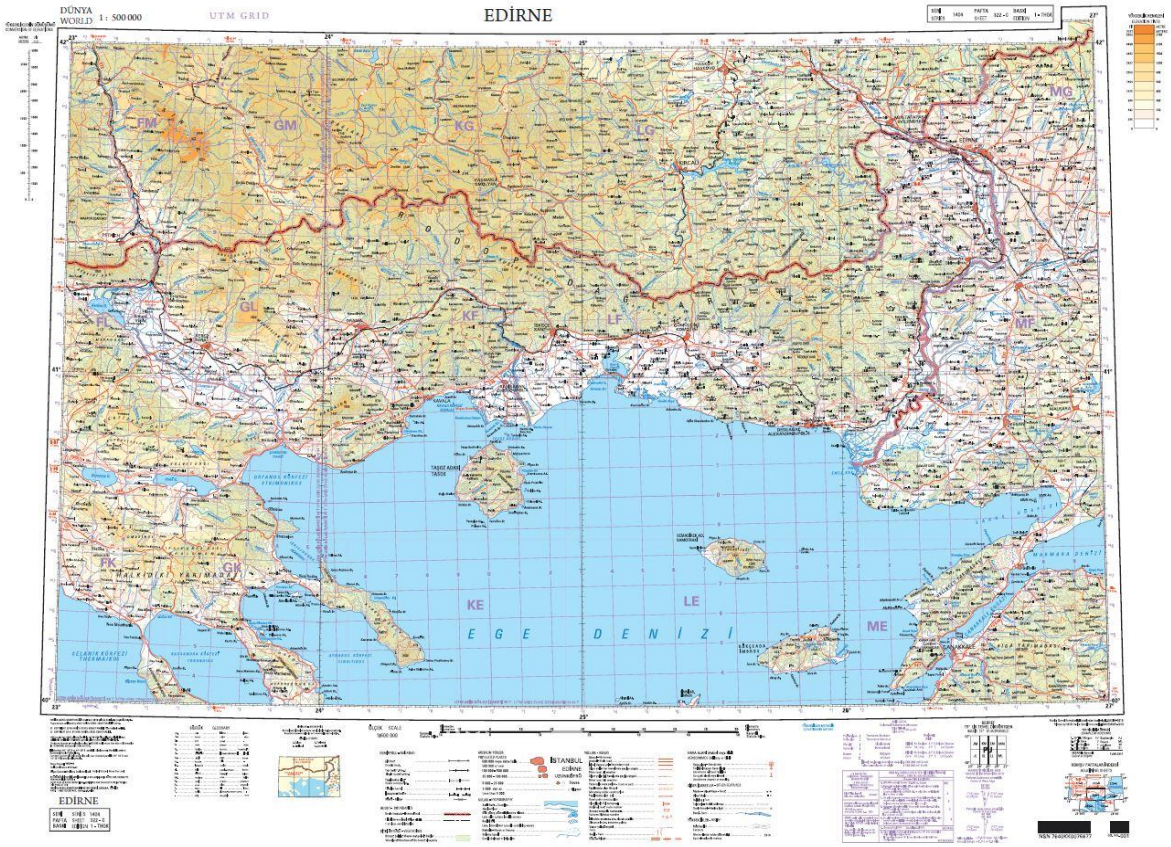


Figure-7: 1404 Series 1:500.000 Scale Topographic Maps

Figure-8: SAC Series 1:500.000 Scale Special Air Charts

e. Thematic Map and Atlas Production

Thematic maps and atlases are produced in various scale with a workflow given in Figure 8. There are three main types of databases that we use. First database is used to produce 5M-30M scale thematic maps. Second database is used to produce 750K-5M scale thematic maps. The last one is used to produce 250K-750K scale thematic maps. Product samples of the thematic maps can be seen through the official web site of GDM (www.harita.gov.tr).

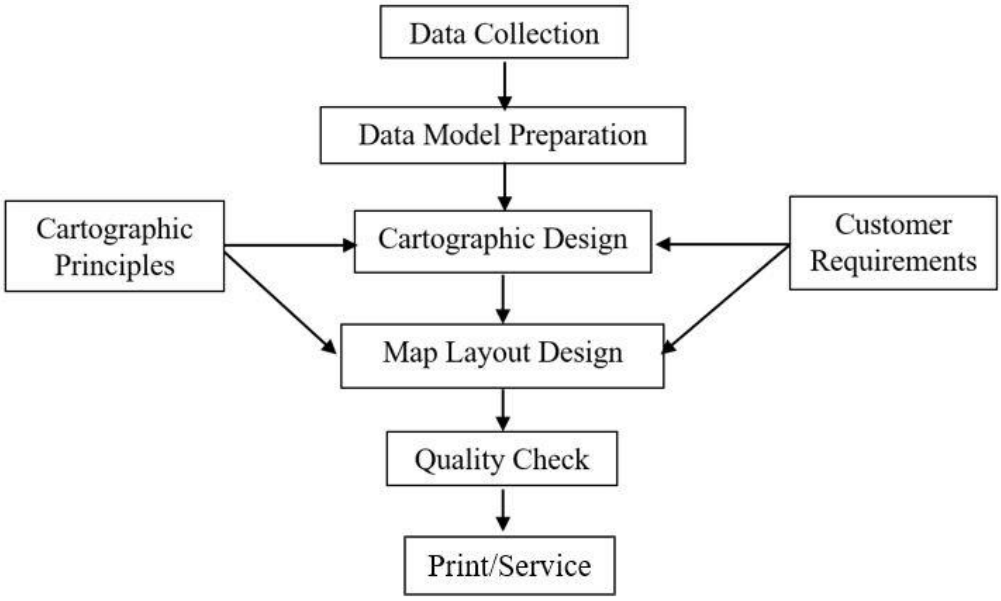


Figure-8: Flow Chart of Thematic Map Production

f. Gazetteer Production

First version of Mid-scale Gazetteer at scale 1:250.000 (Gazetteer-250-v1) containing features rendered on JOG maps at scale 1:250.000 was accomplished in-between 1997-1998 consisting of almost 45.000 names. This Gazetteer-250-v1 is produced according to standards put forward by NATO STANAG 2213.

The second version (Gazetteer-250-v2) is created by means of extracting natural features and populated places from Gazetteer-250-v1 and integrated Populated Places Database of Türkiye (PPDB) respectively in July 2006. This gazetteer comprises of approximately 53.000 geographical names. The Gazetteer is released from GDM's web site (www.harita.gov.tr/urunler).

In 2013, geographical names were collected from current 1:25:000 scale maps in order to increase the scope of Mid-scale Gazetteer data content. After this work, which was completed in 2019, geographical names are started to collect from the first edition of 1:25:000 scale maps. Currently, this work is targeted to be complete in 2023. The final product can be seen on HGM Atlas Orthophoto Theme in Figure 9 (https://atlas.harita.gov.tr).

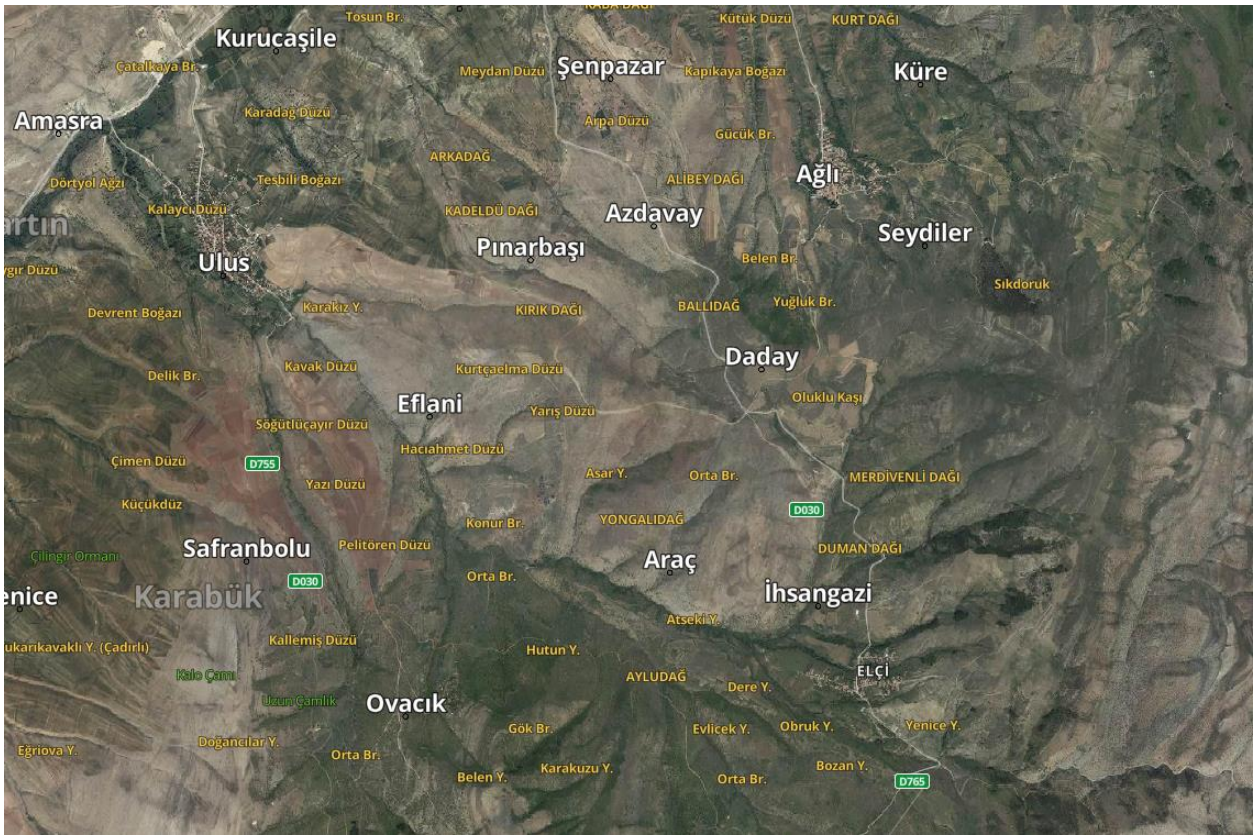


Figure-9 Gazetteer data collected from 1:25.000 scale maps

g. Web Map Application “HGM Atlas”

HGK-Atlas was updated under the name of HGM-Atlas in 2019. Vector tile technology is used in this application. It works with vector data and it has already 20 different zoom levels from world to street. Users can display maps with different themes which are basic, physical, political, orthophoto and dark themes (Figure 10,11). At the same time HGM-Atlas serves all map themes to the other web applications with API services and in this way users can prefer the themes as a base map for their own applications (https://atlas.harita.gov.tr).

Figure-10: Digital Atlas View with Basic Theme

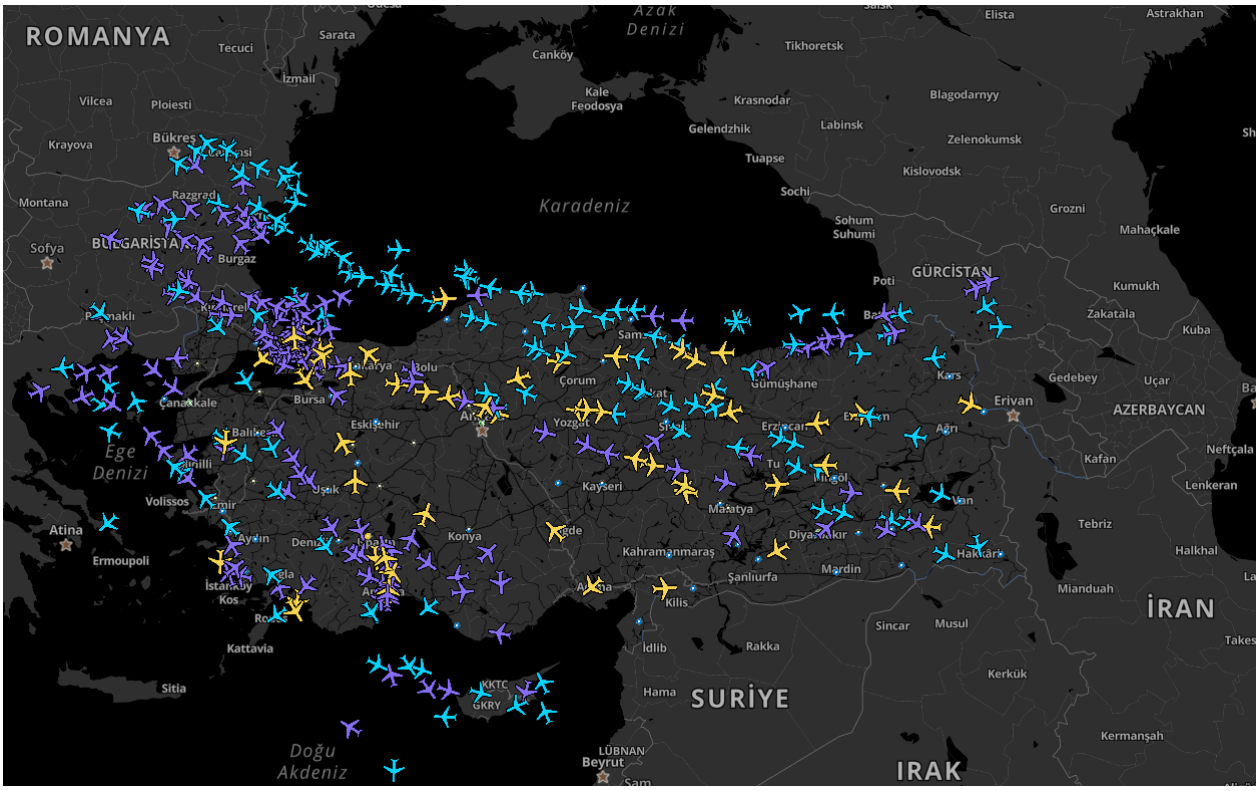


Figure-11: Sample View from the Web Application Using HGM Atlas API Services (ucusizle.dhmi.gov.tr).

2. RELATIONSHIP WITH OTHER ORGANIZATIONS

To contribute to the national/international cooperation and collaboration, to catch up with the latest technological developments and benefit from international expertise and provide the staff with fast and updated information, GDM having been National Mapping Agency (NMA) for Türkiye is eager to work closely with national/international organizations and national mapping agencies.

Geographic activities in NATO have been carried out in accordance with the decisions taken by "NATO Geospatial Board (NGB)" and "NATO Joint Geospatial Standardization Working Group (NJGSWG)". GDM participates in the relevant meetings regularly.

Apart from its active participation in geographic events in NATO, GDM is a member of Turkish Board of Experts on Geographical Names. This board is subordinated to the Ministry of Interior General Directorate of Provinces. The board is working on standardization of geographical names and also is responsible to represent Türkiye in UN Geographic Names Conference and United Nations Group of Experts on Geographical Names (UNGEGN).

Besides International Cartographic Association (ICA) and the UNGEGN mentioned above, GDM is also a member of EuroGeographics.