



US Army Corps of Engineers

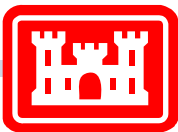
**Engineer Research
and Development Center**

U.S. Army
Topographic Engineering Center (TEC)
Alexandria, VA

**Army Geo-Referenced PDF
(GeoPDF) Project**

June 2006

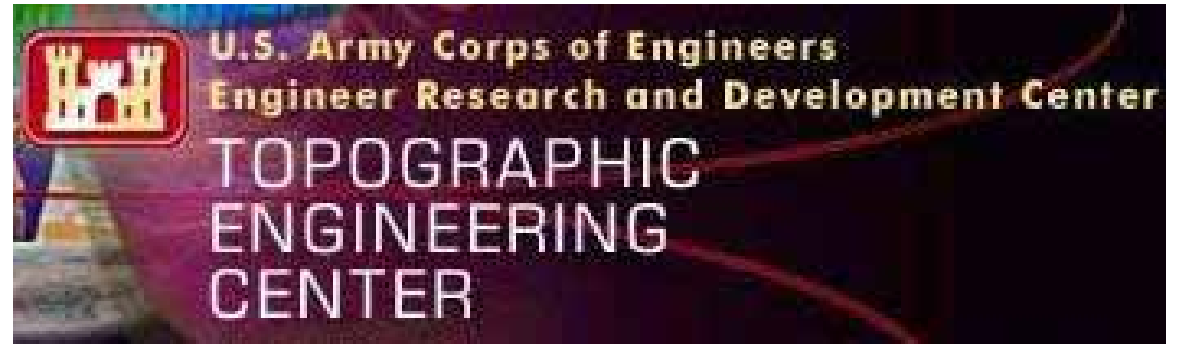
Ray Caputo
Geospatial Information and Imagery Requirements Branch
Operations Division



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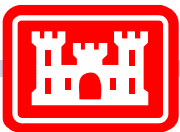
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The Topographic Engineering Center's mission is to provide the warfighter with a superior knowledge of the battlefield and to support the nation's civil and environmental initiatives. This mission is accomplished through research, development, and the application of expertise in the topographic and related sciences.

The Geospatial Information (GI) and Imagery Requirements Branch Serves as the Army technical subject matter experts for geospatial information and imagery applications in liaison role with the National Geospatial-Intelligence Agency (NGA) and maintains liaison with the Army's intelligence community.



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The National Geospatial-Intelligence Agency (NGA)

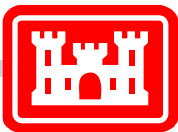


The NGA provides timely, relevant, and accurate geospatial intelligence in support of national security objectives.

i.e. Maps (paper & electronic) and data (raster, vector, text)

NGA began looking for better ways to replicate and distribute their products. At the GITA^{*} Annual Conference 29 (2004) NGA representatives were introduced to the idea of geo-referenced PDF (GeoPDF) by the creators of the file format.

NGA liked the idea and began to look into it further and like it even more (*began the eChart initiative*). They approached TEC and asked if there was interest in helping test this new file format. TEC was impressed with the GeoPDF concept of small file size, geo-referenced data, a software viewer (*Adobe Reader*) that was free and on over 700 million computers worldwide so we agreed.



* Geospatial Information & Technology Association

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NGA e-Chart Program

**A single file to support Demand Based Replication (DBR)
“aka distributed printing.”**

**Support print-on demand field generation of hardcopy (durable,
waterproof, non-fade) from digits.**

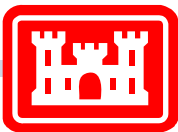
**Provide state-of-the-art technology solutions, maximizing the use of
standards based COTS.**

**No GIS software required to view data, compatible w/multiple free
COTS viewers**

**PDF format provides un-alterable product versions and ISO standard
for print ready material**

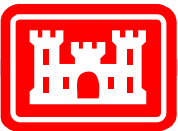
Augments commercial printing compatibility

**eChart supplements NGA printed products, it does not eliminate the
requirement for paper maps.**



GeoPDF Overview

- Provides a Standard format for use and exchange of GIS documents with non-GIS users
- A **stand alone file**; no web or data links; image, text, fonts, graphics, customer data, GIS data and metadata are all contained in one file
- Leverages **free** Adobe Reader
- Users already trained on viewing software
- **Free** MAP2PDF for Reader Plug-in
- Some GIS Functionality
- Significantly smaller data files than traditional GIS formats



“...there are about 1 million users of GIS software. There are about 6 billion people. So there are 5.999 billion other people who don't like using GIS software. We built something for them.”

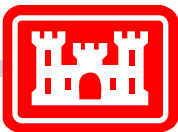
Michael Jones

Google Earth

Chief Technology Office

Geospatial Solutions

May 2006



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GeoPDF Creation

Vector GeoPDF (eCharts)

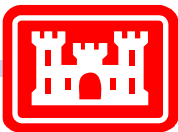
- GIS data is output directly into GeoPDF format
- Vector & Raster data can be combined
- Data can be stored in layers & include hyperlinks
- PDF data is georeferenced

Raster GeoPDF (eCharts)

- Paper maps are scanned or use existing jpg files which are then saved in a PDF format
- PDF data is georeferenced
- GeoTIFF to GeoPDF software

Topographic Line Map (TLM) 1:50,000 scale - 300 dpi

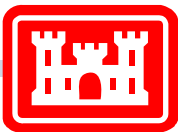
Seoul	312.0	MB	GeoTIFF
	19.7	MB	JPEG
	10.0	MB	MrSid
	8.8	MB	TIFF/ZIP
	5.0	MB	GeoPDF



GeoPDF activities complete

Raster

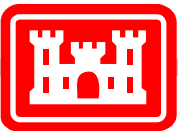
- Created 500+ GeoPDF files of NGA standard products for the Korean Peninsula (scanned paper maps) *TPC, JOG, TLM 100, TLM 50*
- Created nearly 400 GeoPDF files of NGA standard products over Iraq (scanned paper maps and computer to plate jpg files) *ONC, TPC, JOG, TLM100, BG, CG, ICM & ITP*
- Created nearly 400 GeoPDF files of NGA standard products over Afghanistan (scanned paper maps) *ONC, TPC, JOG, TLM 100, CG & ICM plus 100+ NGA has created TLM 50s*
- Created over 200 GeoPDF files of NGA standard products over Pakistan (scanned paper maps) *ONC, TPC, JOG, TLM 100, CG & ICM along with 50+ NGA created TLM 50s*



GeoPDF activities in the works

Raster

- Will create 30+ raster GeoPDF files of NGA standard products over Kuwait
ONC, TPC, JOG, TLM 100, CG & ICM
- Will create over 700 raster GeoPDF files of NGA large scale standard products over Korea
ICM, CG, CM & TLM25
- Will re-create GeoPDF raster files from available NGA computer to plate 300 dpi jpeg files for Korea, Afghanistan and Pakistan and replace paper map scanned images
- NGA is using GeoPDFs in the Geospatial Contingency Packages (GCP) that are being created for the State Department.



GeoPDF activities on going

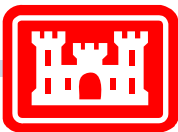
Vector

- Every Global Geospatial Intelligence (GGI) contract NGA signs has a provision it requires that a vector GeoPDF be produced as a map sheets is created. **As the vector GeoPDFs are created they replace the raster GeoPDF**
- Some Army produced mission specific products are saved as GeoPDF **All 83 Army Terrain Teams world wide have Adobe plug-in and ESRI extension**

Other

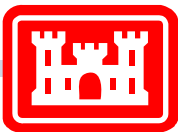
TEC has a GeoTIFF to GeoPDF converter and will convert 60,000 USGS Digital Raster Graphic files from GeoTIFF to GeoPDF and supply them back to USGS for posting on their Geospatial One-Stop.

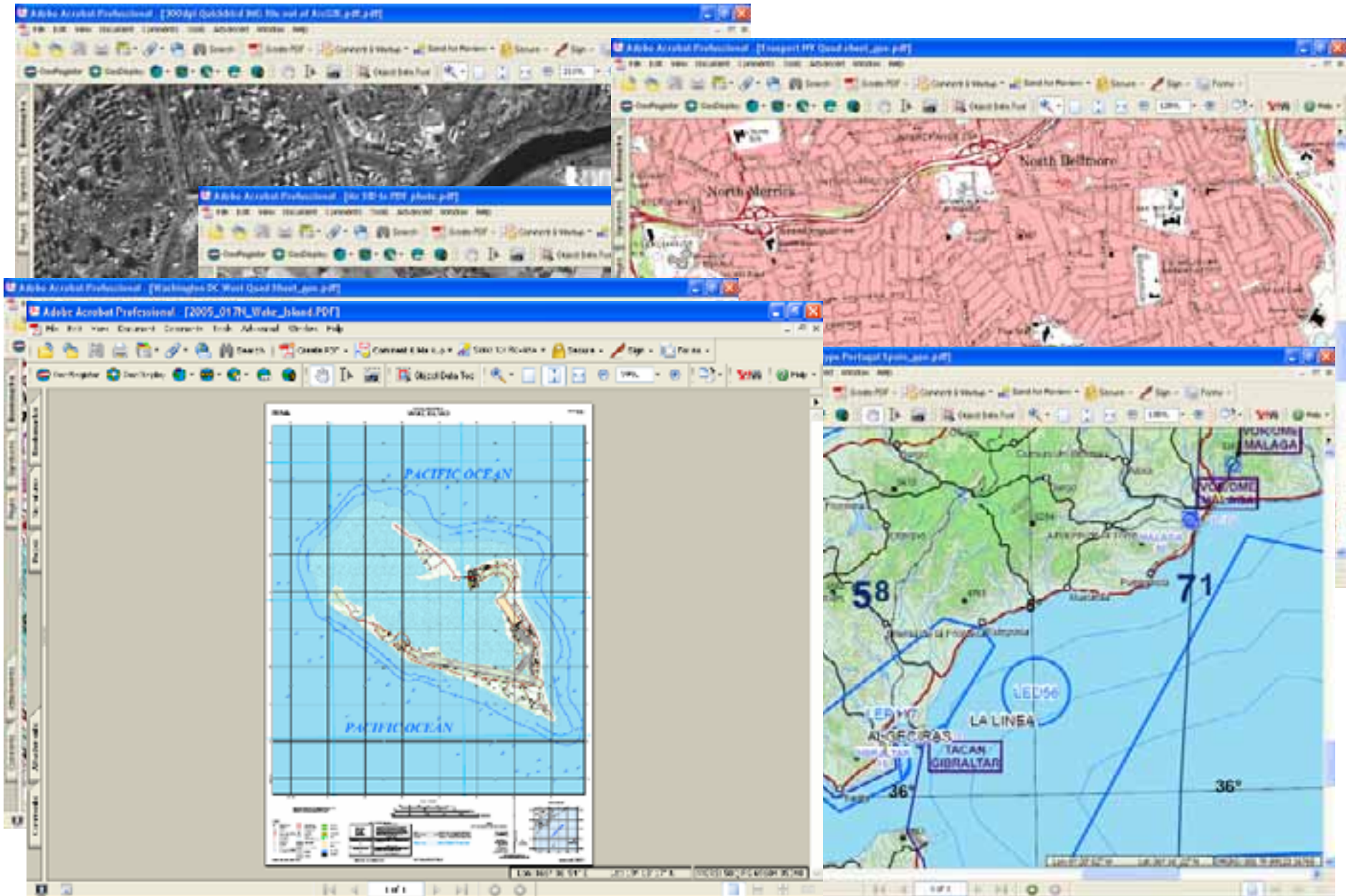
TEC has a ADRG to GeoPDF converter software and will convert its ADRG holding to GeoPDFs.



GeoPDF activities - future

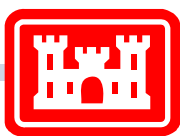
- Other Global War on Terror Country DVDs in the works (45-50 countries)
- NGA Library has begun converting their map holdings (standard and non-standard products) into GeoPDF.
- All Army Terrain Teams will also be supplied with:
 - GeoPDF2GeoTIFF software extension for MAP2PDF
(to get GeoPDF into mainstream GIS software as direct read capabilities are created)
 - De-collar on the fly and mosaic software extension
for MAP2PDF (to create a seamless map background)
 - MAP2PDF suite will also be part of the Army's
Digital Topographic Support System (DTSS) build 10.0
- Convert Urban Tactical Planners to layered GeoPDFs
- 3D GeoPDF for fly-throughs





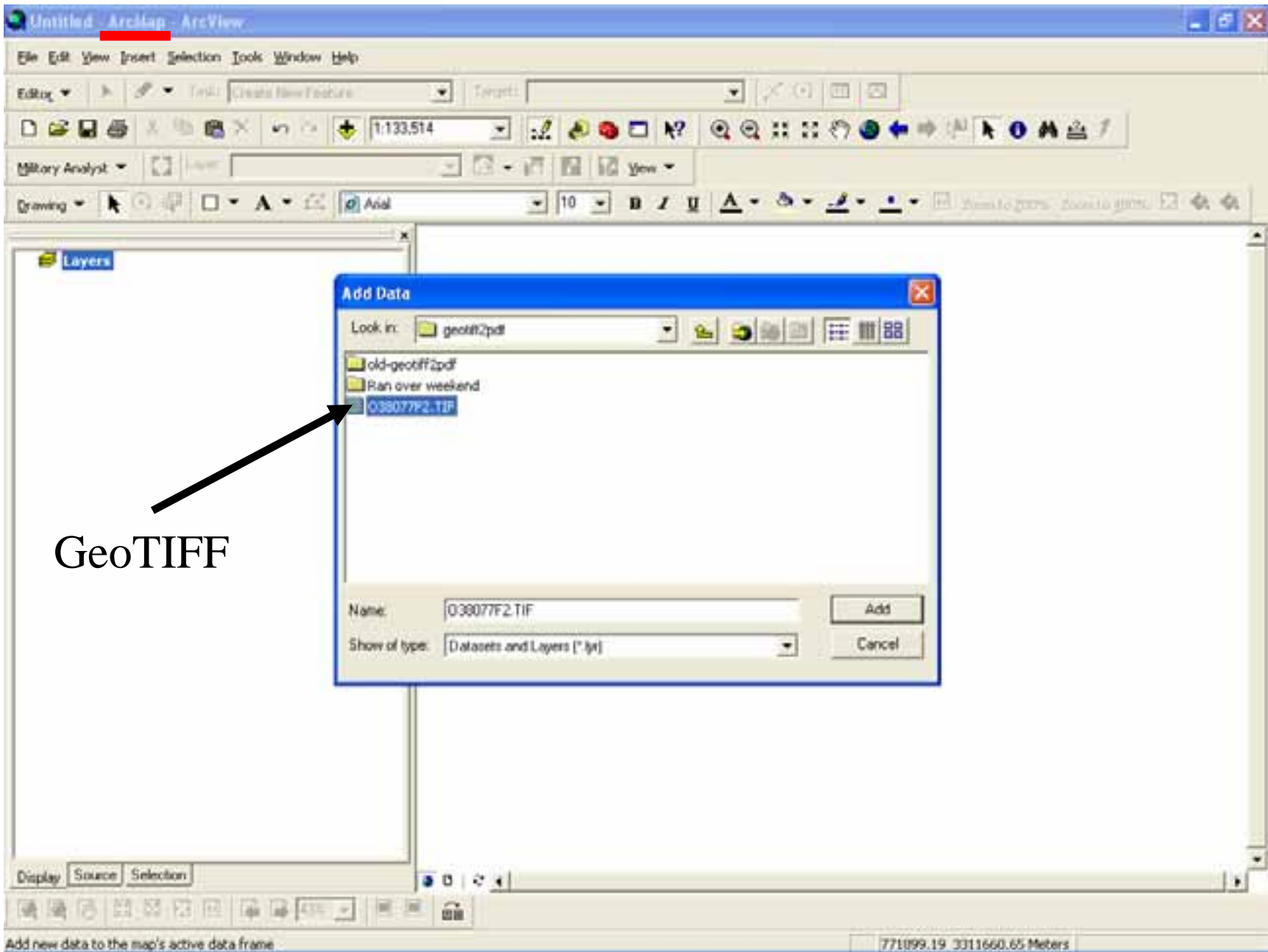
Army data NGA Enterprise Print on Demand (EPoD)

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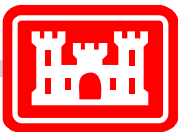


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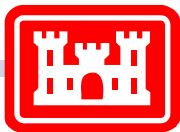
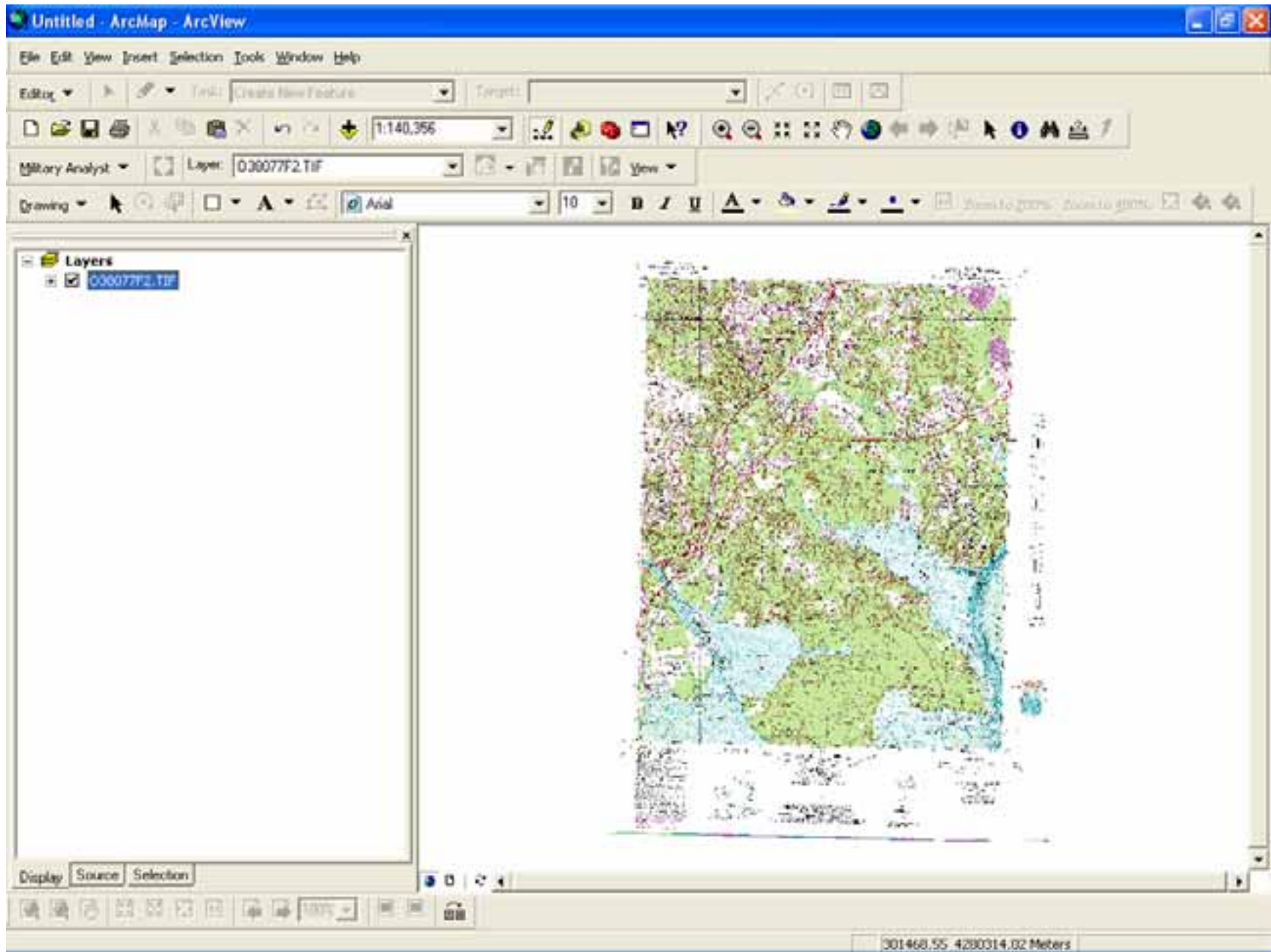
GeoTIFF



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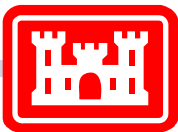
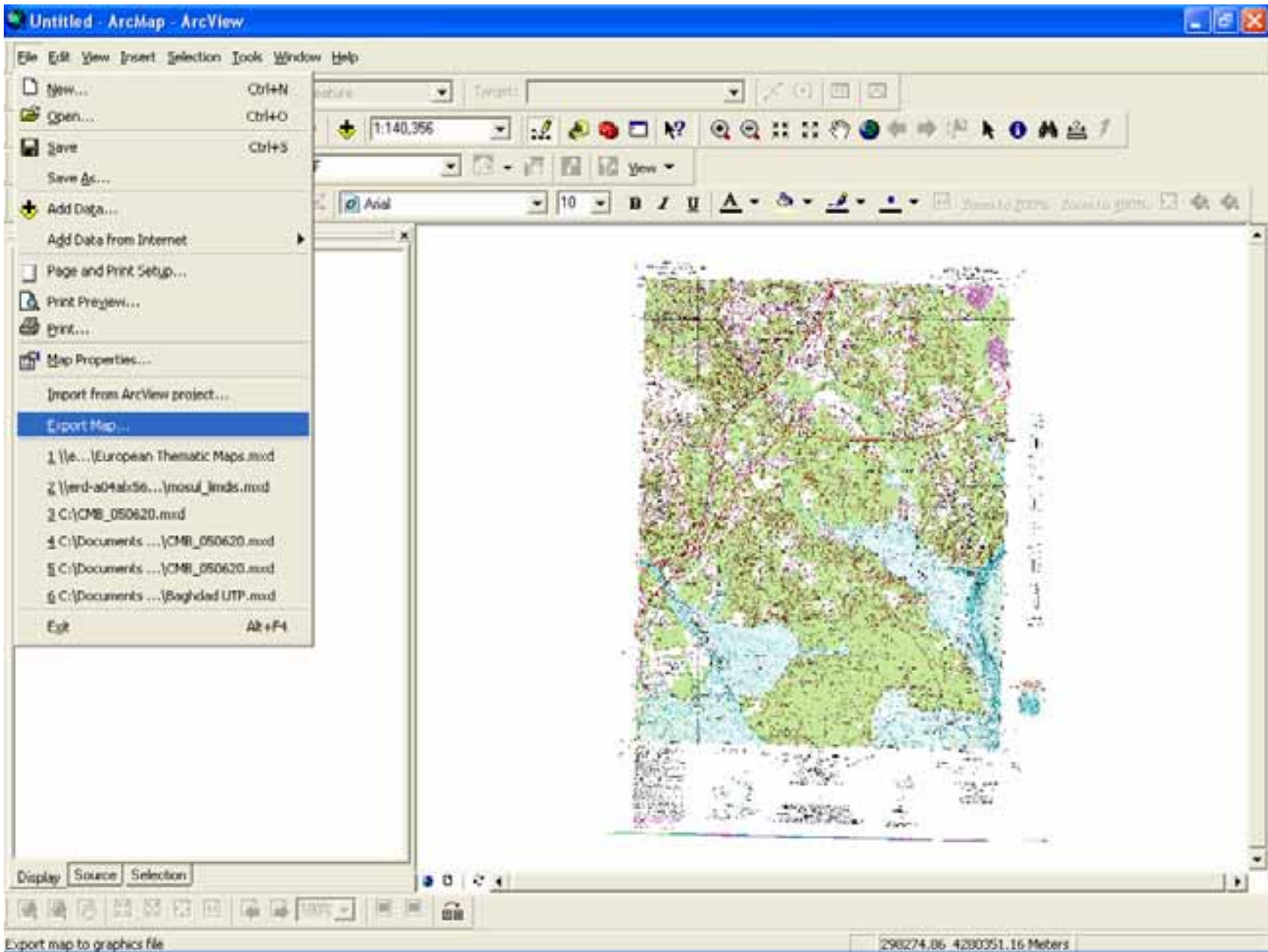




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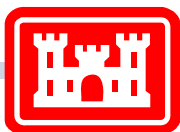
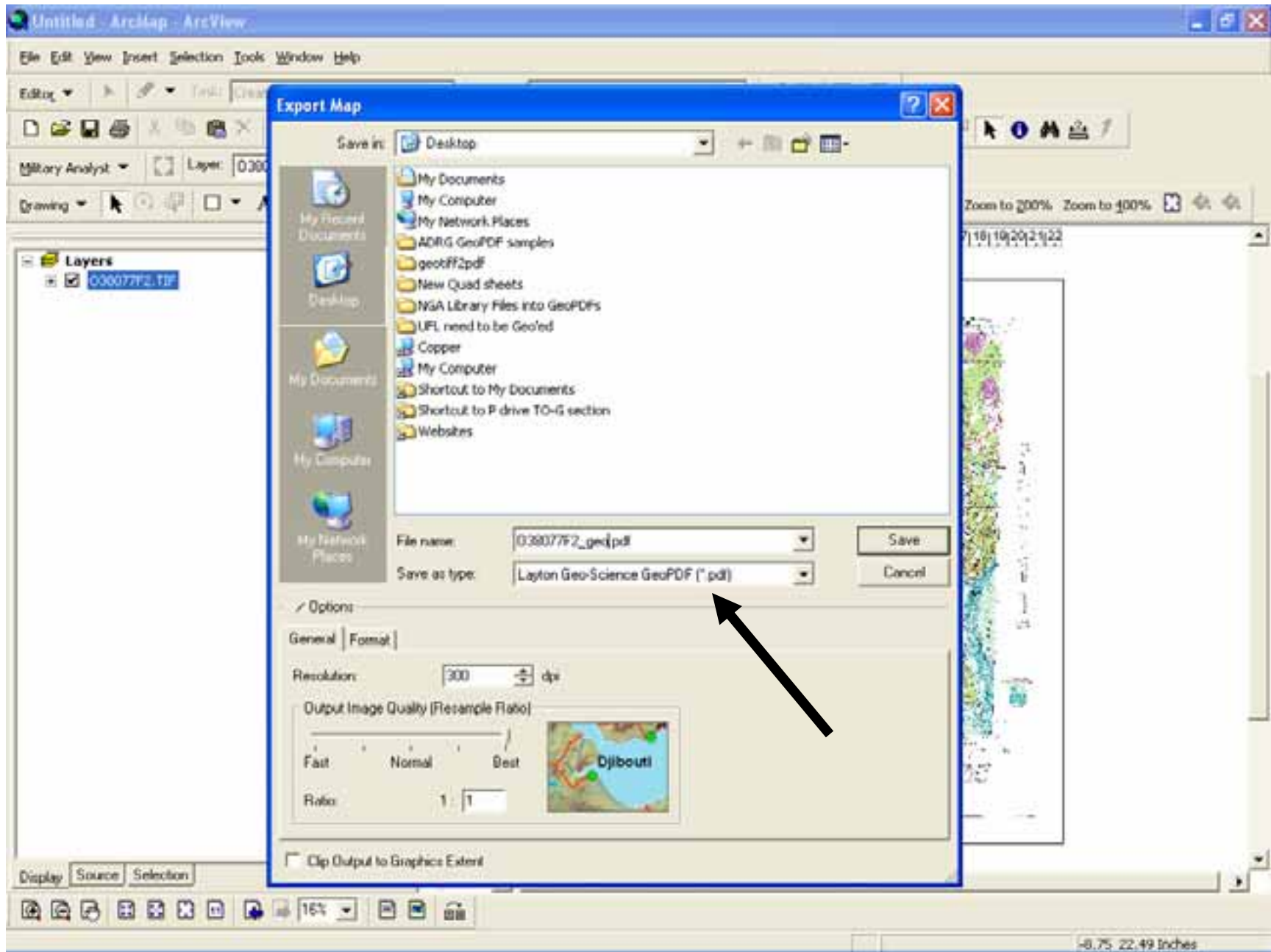




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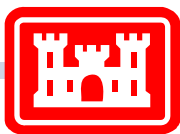
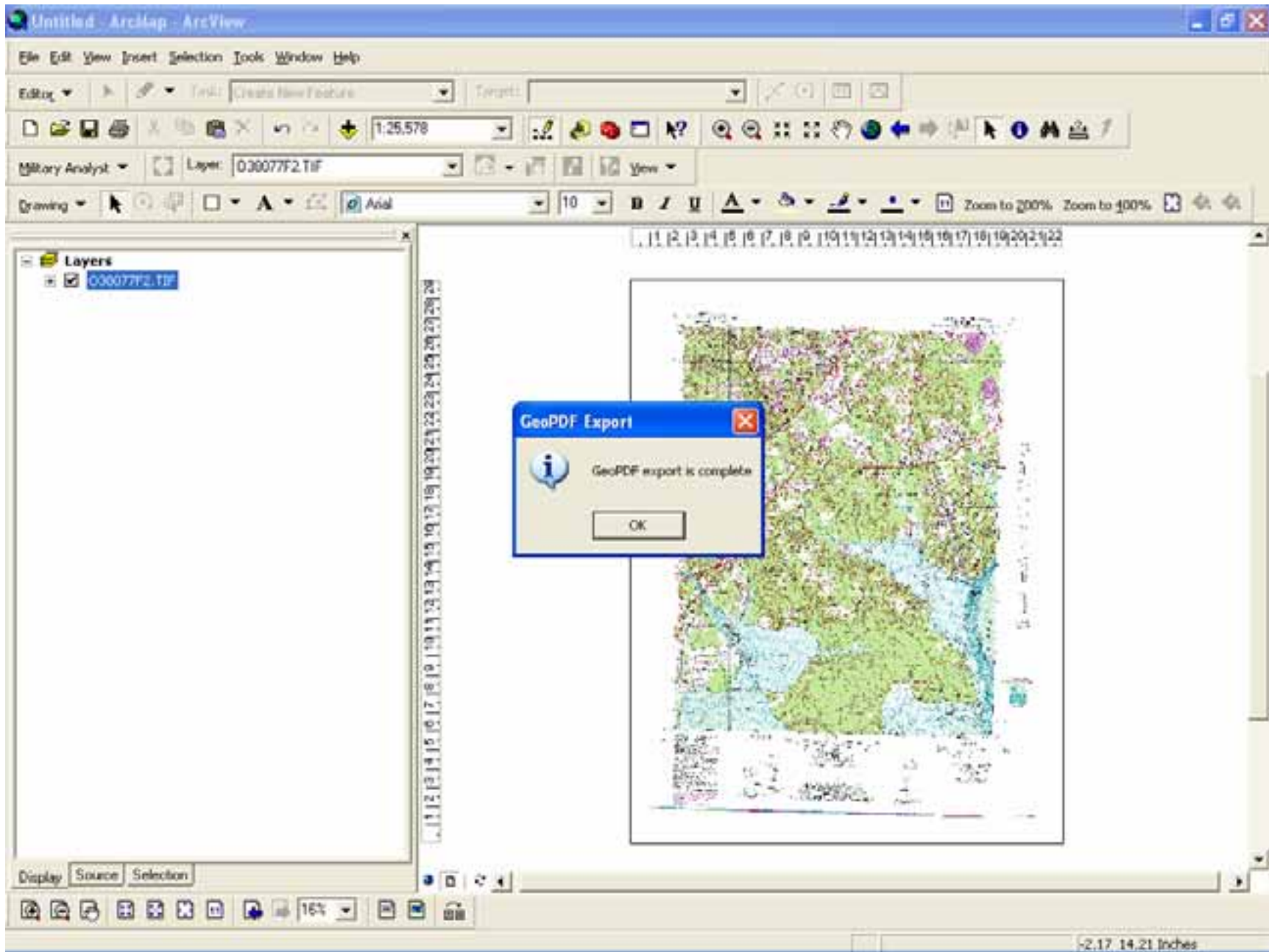




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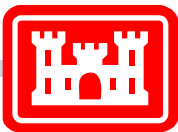
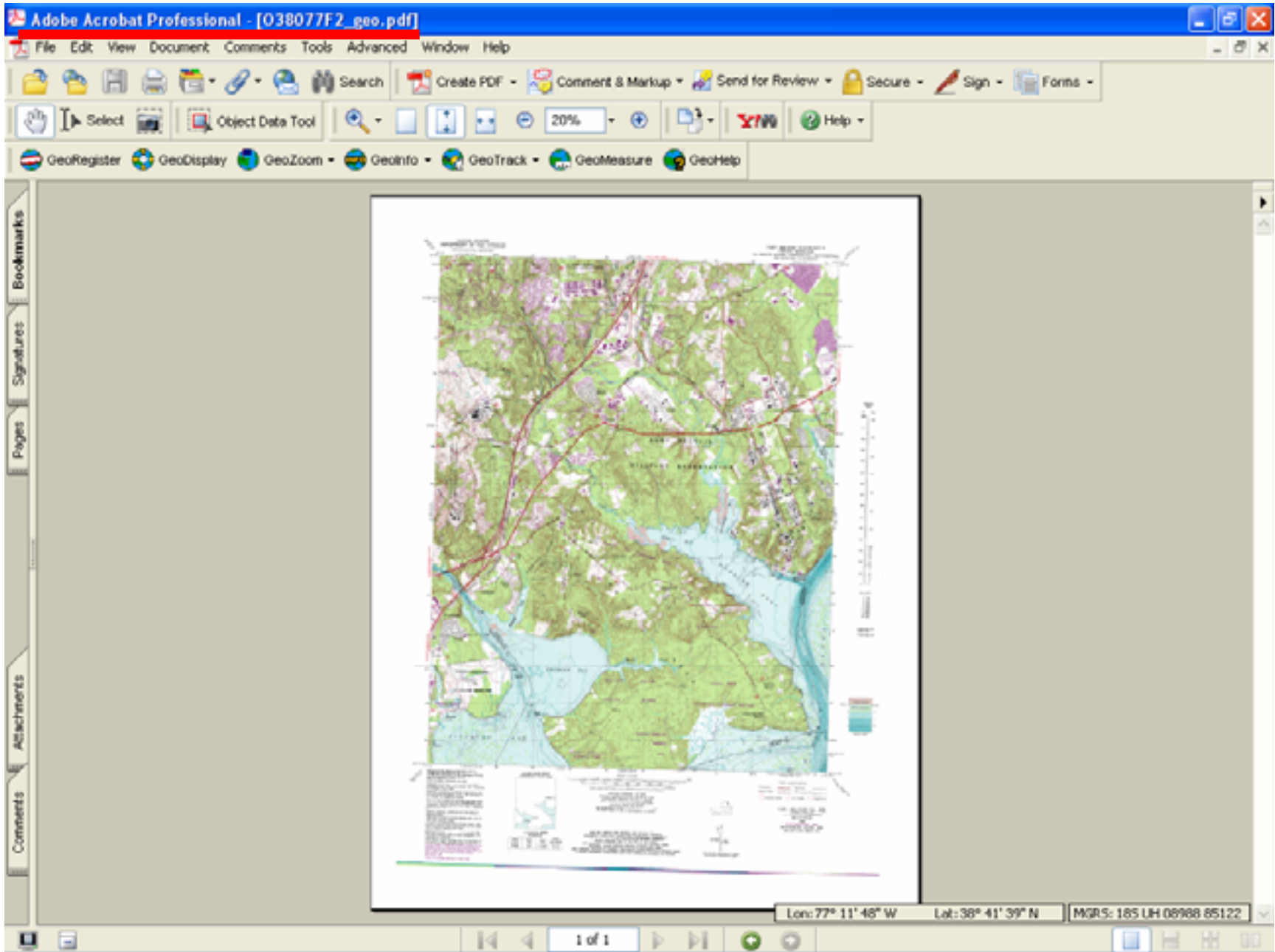




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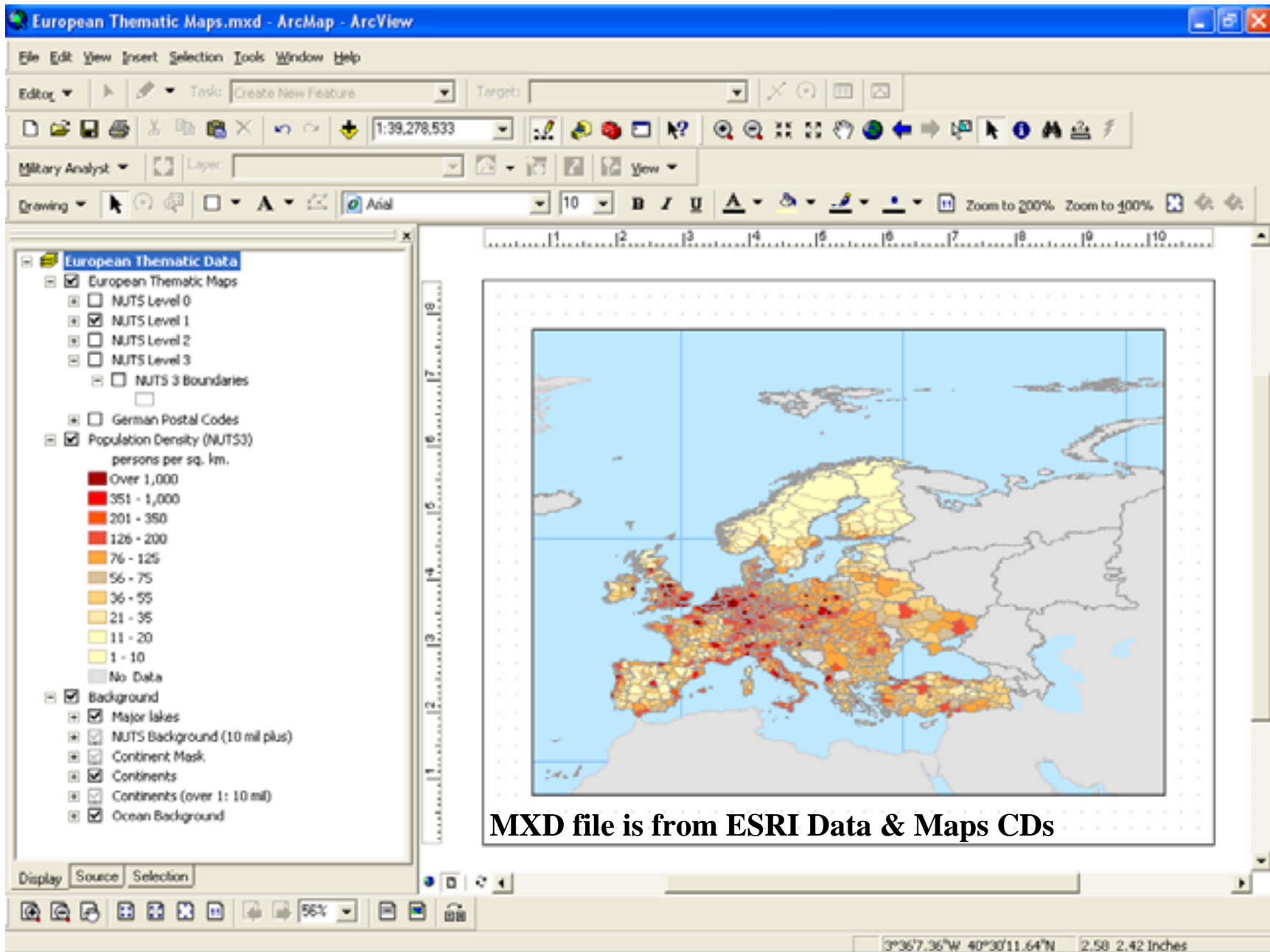




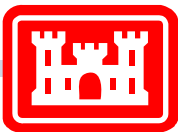
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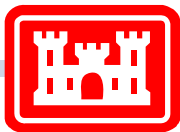
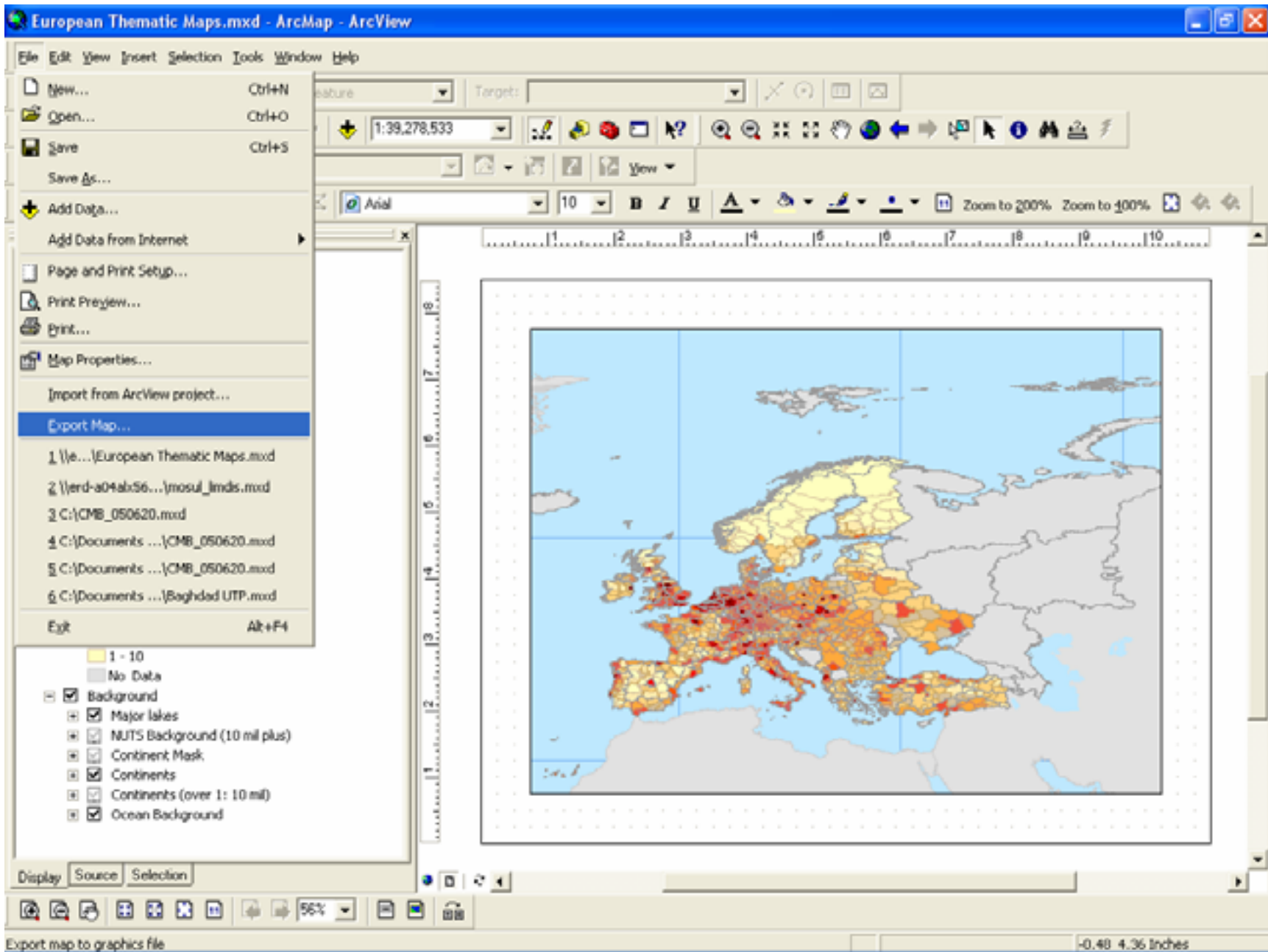
MXD file is from ESRI Data & Maps CDs



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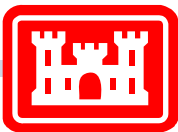
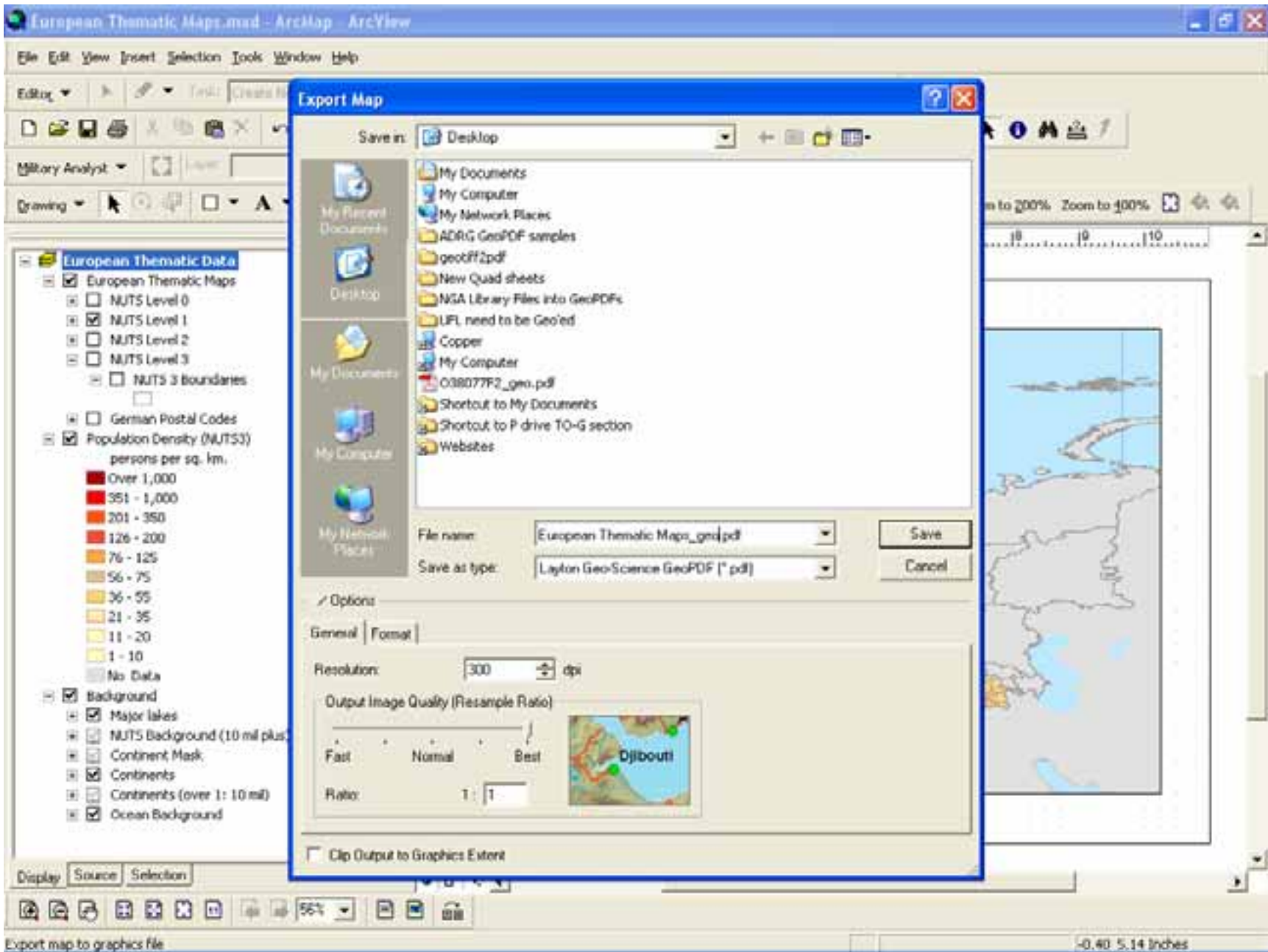




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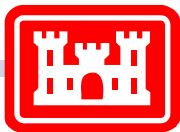
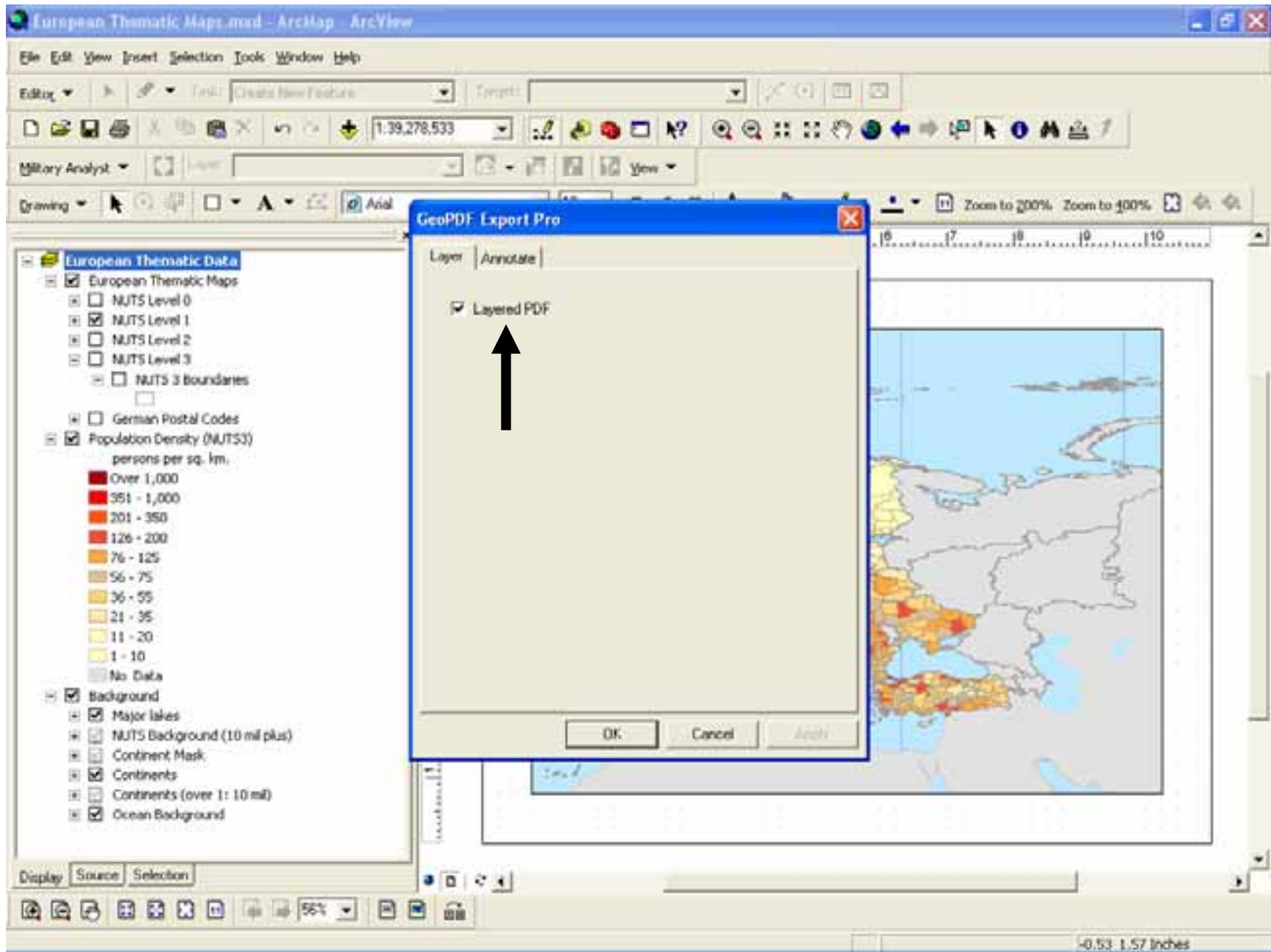




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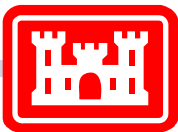
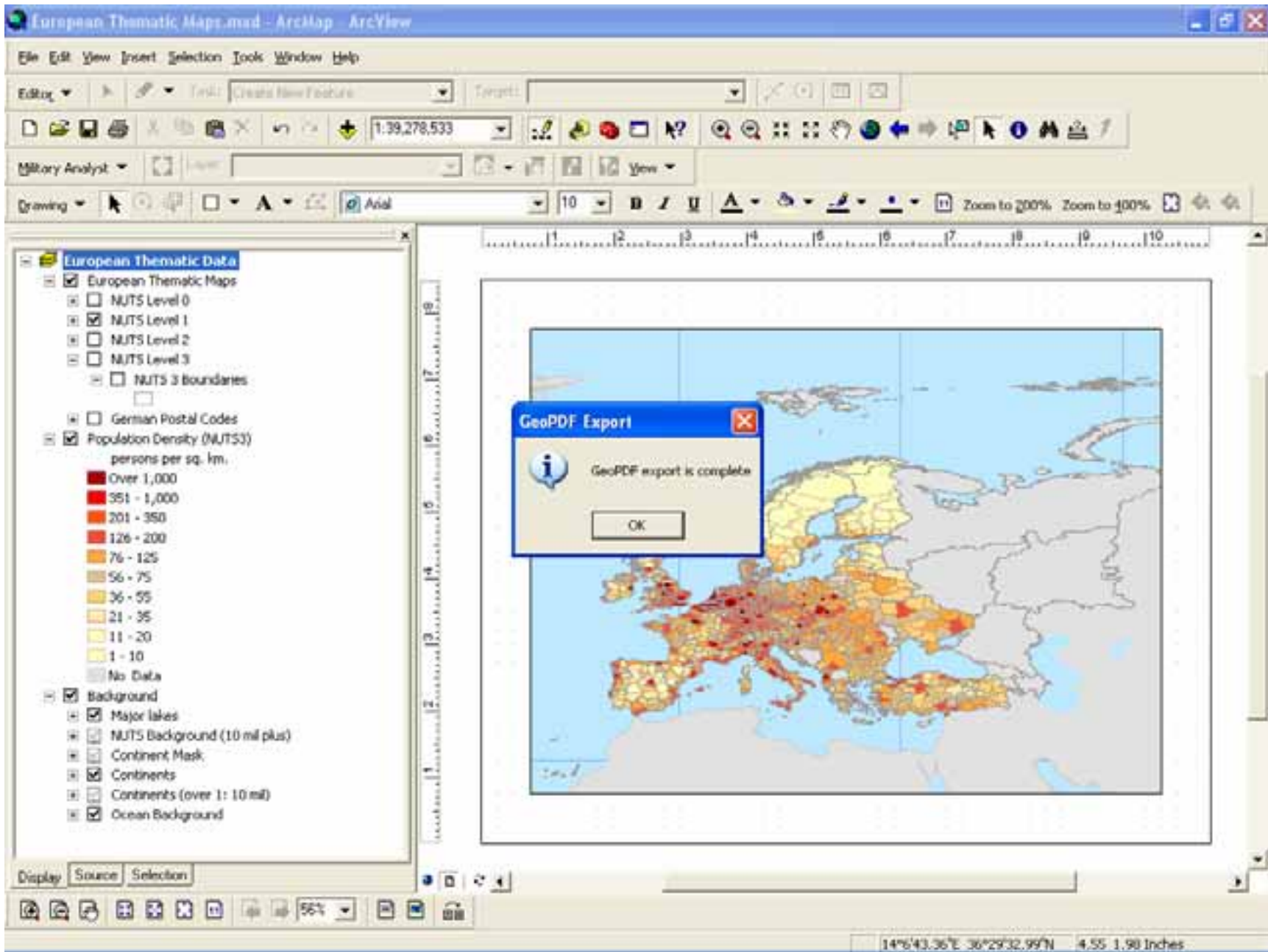




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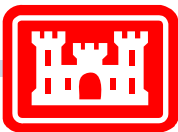
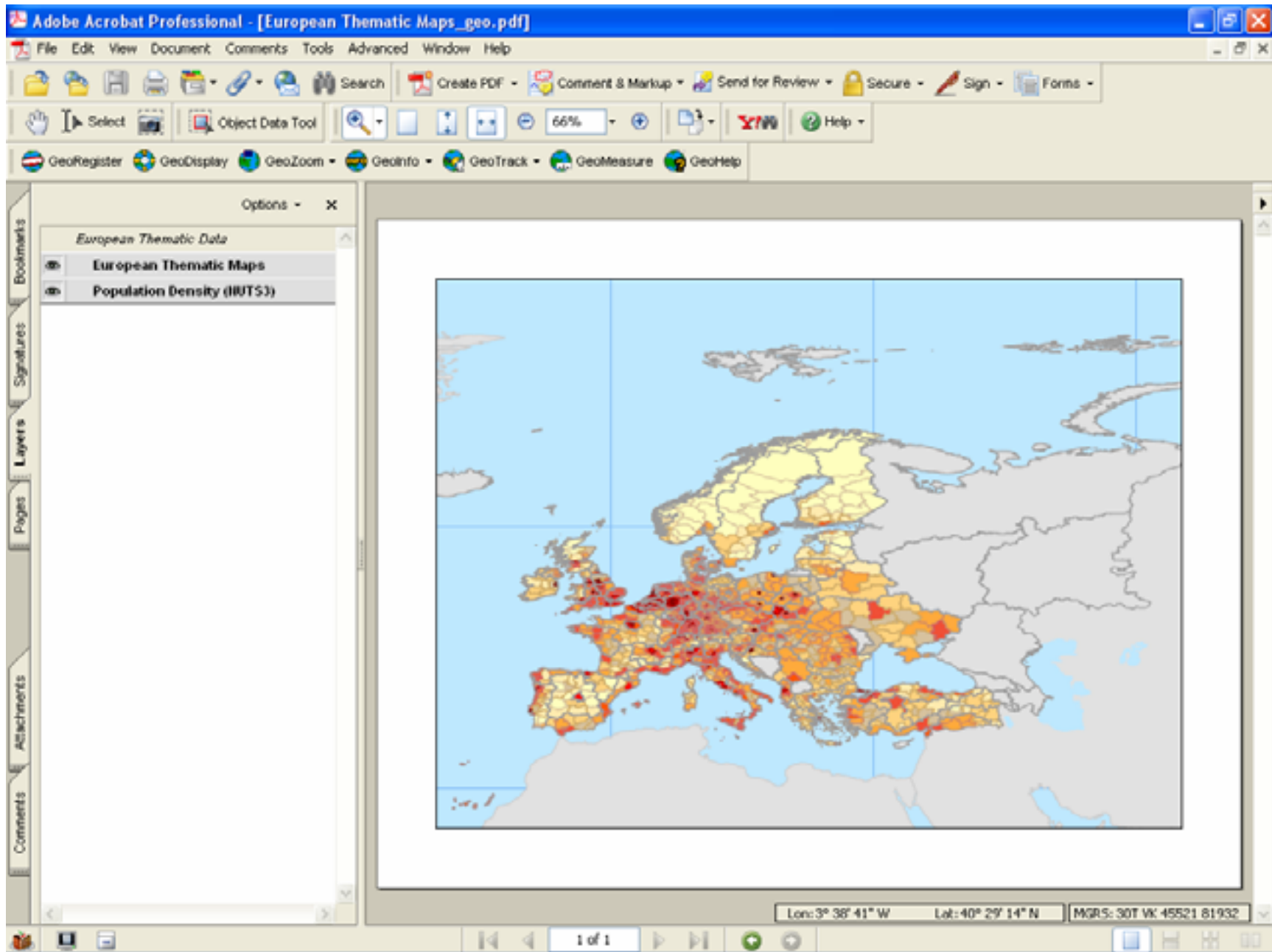




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Thank you

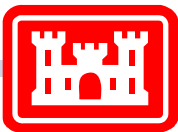
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