

2020

## GIS & Middle Earth

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A satellite map of the Middle East region at night, showing city lights and geographical features. The map is set against a dark blue background with a starry sky and a glowing horizon line. The text is overlaid on the left side of the map.

# From Here to There. Using a GIS to Map Middle Earth

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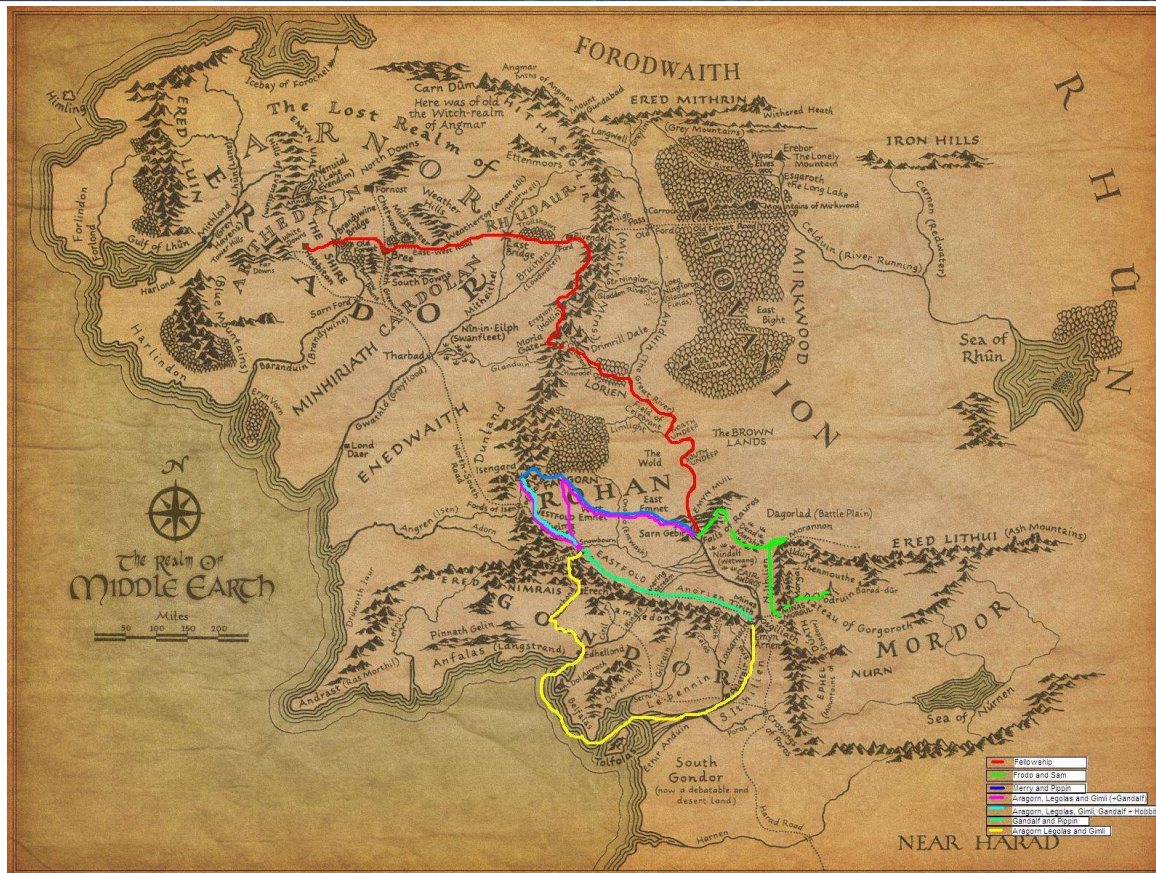
**W&M** | INSTITUTE FOR  
INTEGRATIVE  
CONSERVATION



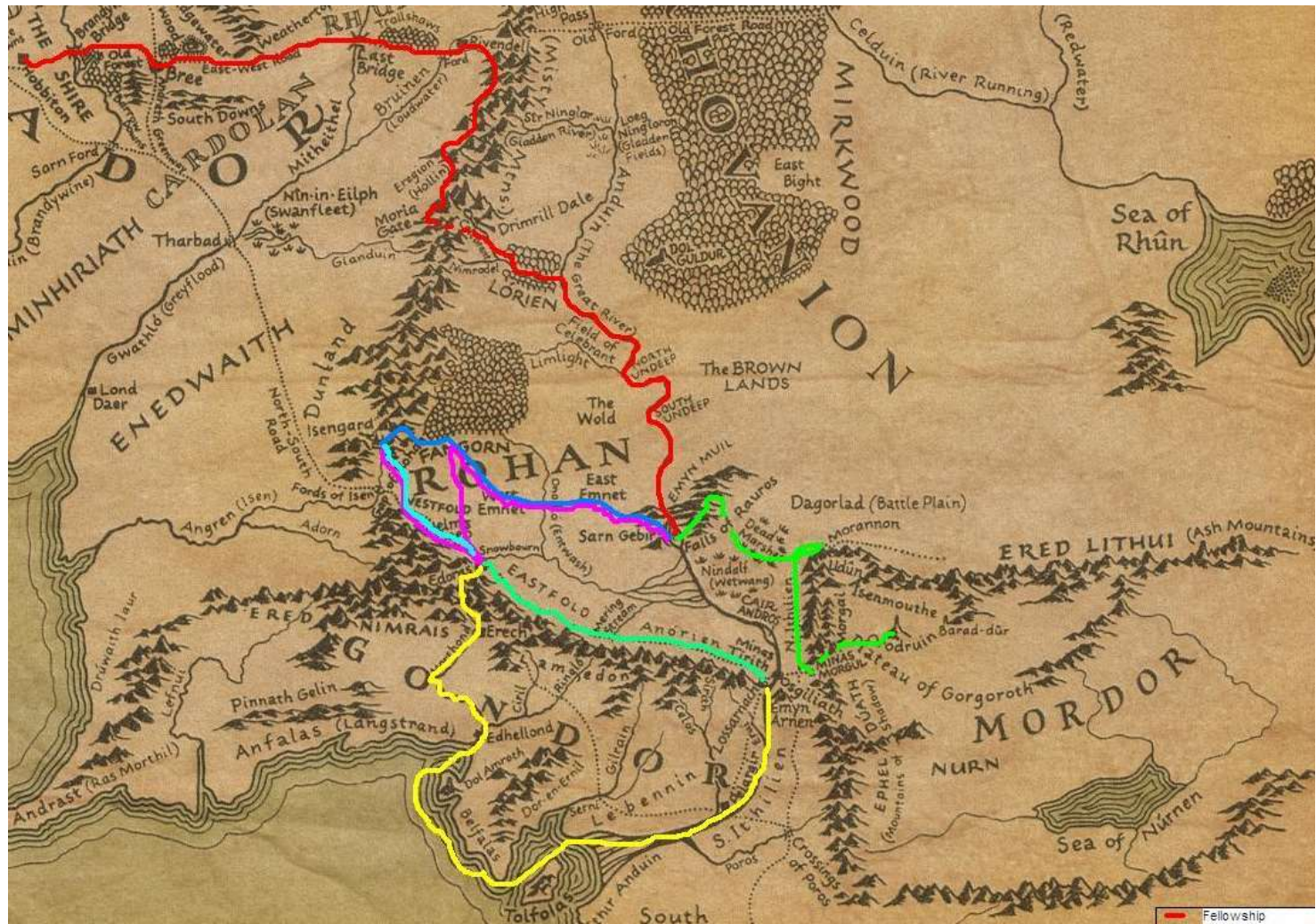




# Where our story begins...









Where our story begins...



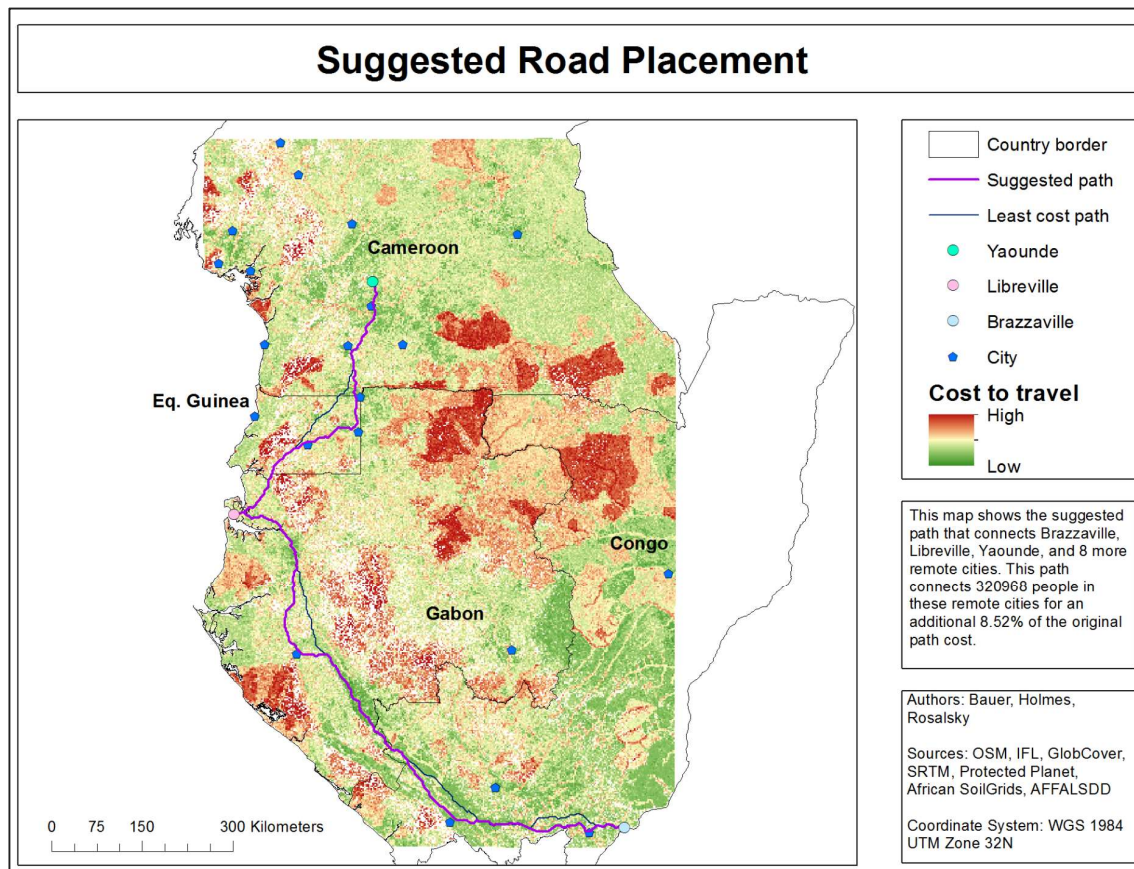
# Where our story begins...

With a question: Did Frodo take the best route from the Shire to Mt. Doom?





# Least Cost Path Analysis





# Where our story begins...

Can we use a least cost path analysis to determine the best route from the Shire to Mt. Doom?

We can, if we had a GIS of Middle Earth



# Start with the maps



- Georeference scanned maps
- Referenced to sit over Europe
- Created a Middle Earth Conformal Conic coordinate system





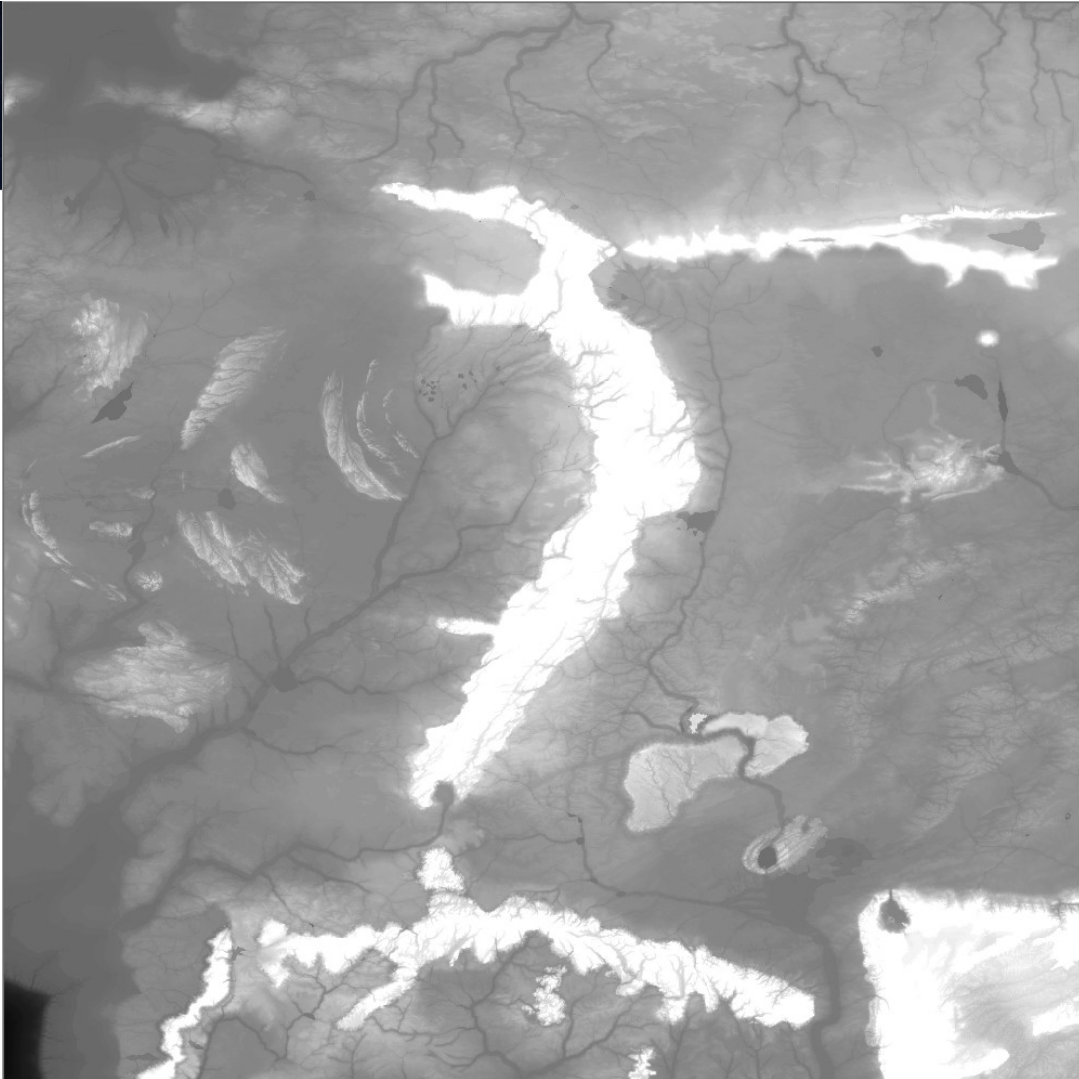






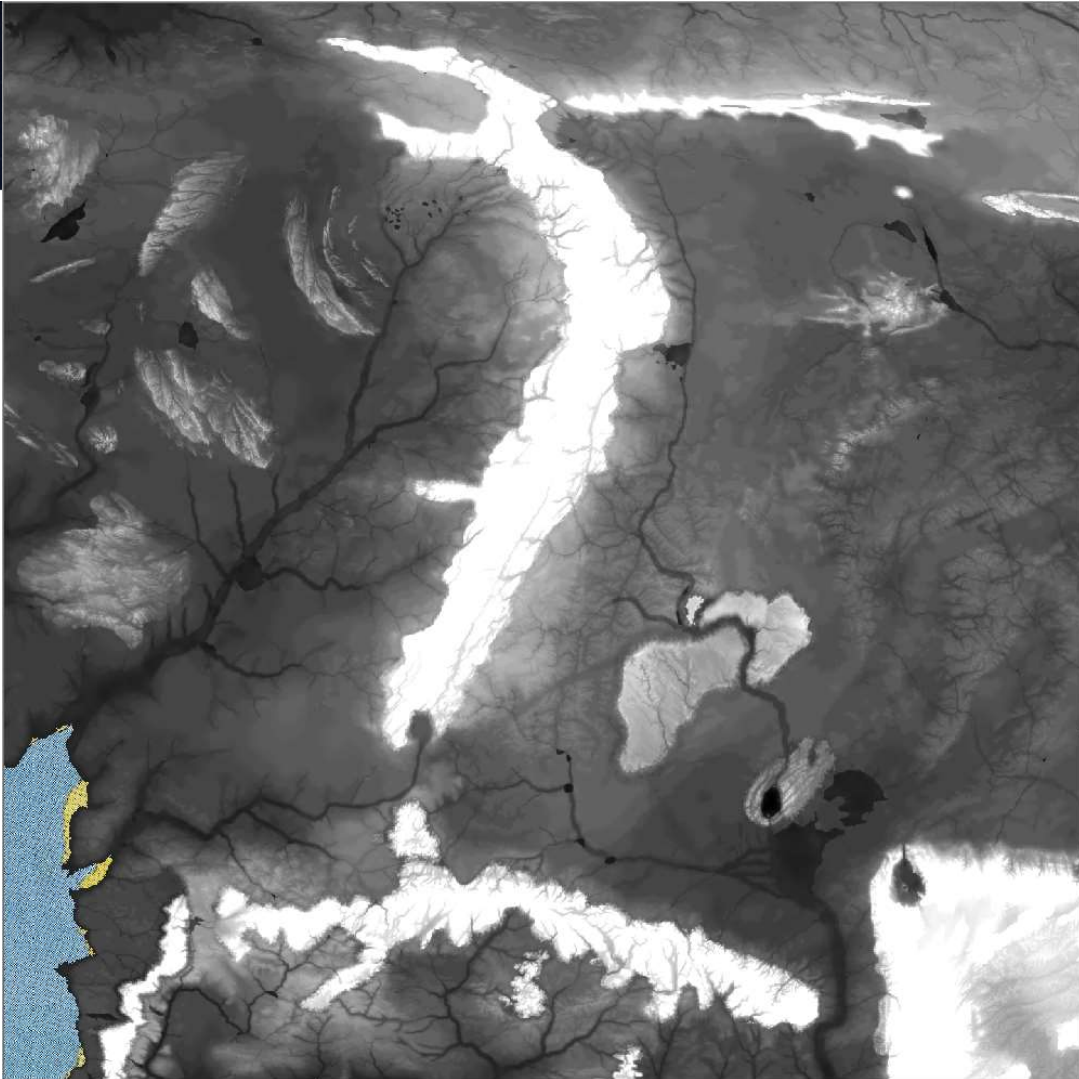
# Then create an elevation model

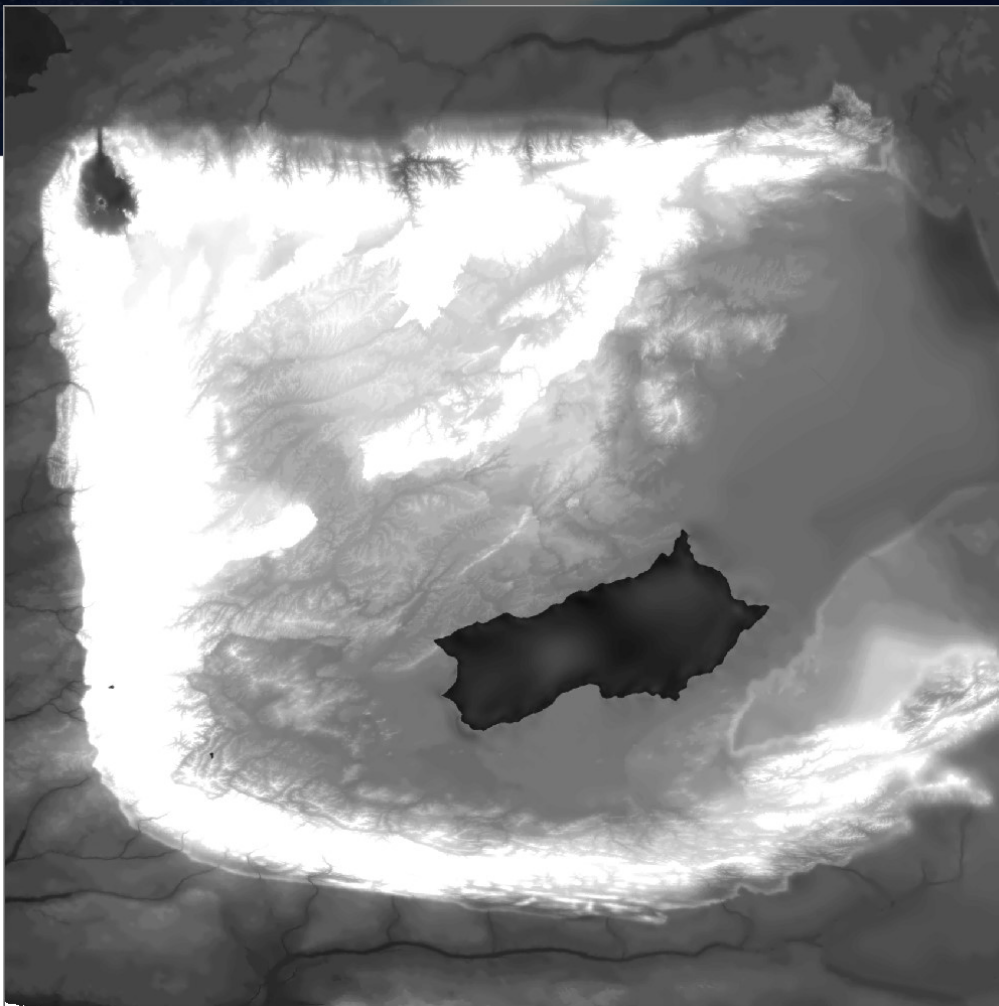
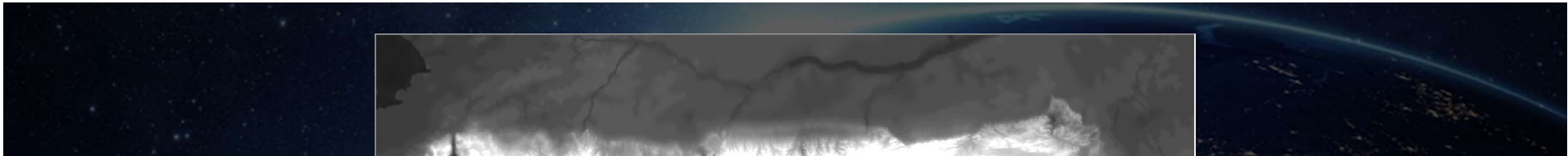
- Found an image that represented elevation
  - Values from 0 – 255 (greyscale)
- Used known elevations to transform greyscale to true elevation
  - Minimum Elevation: Ocean - 0
  - Maximum Elevation: Mount Caradhras - roughly 3657 meters (see Fonstad 86)
  - Other Elevations: Mount Doom - 1371 meters (Fonstad 91), White Mountains - "at least 3000 meters"



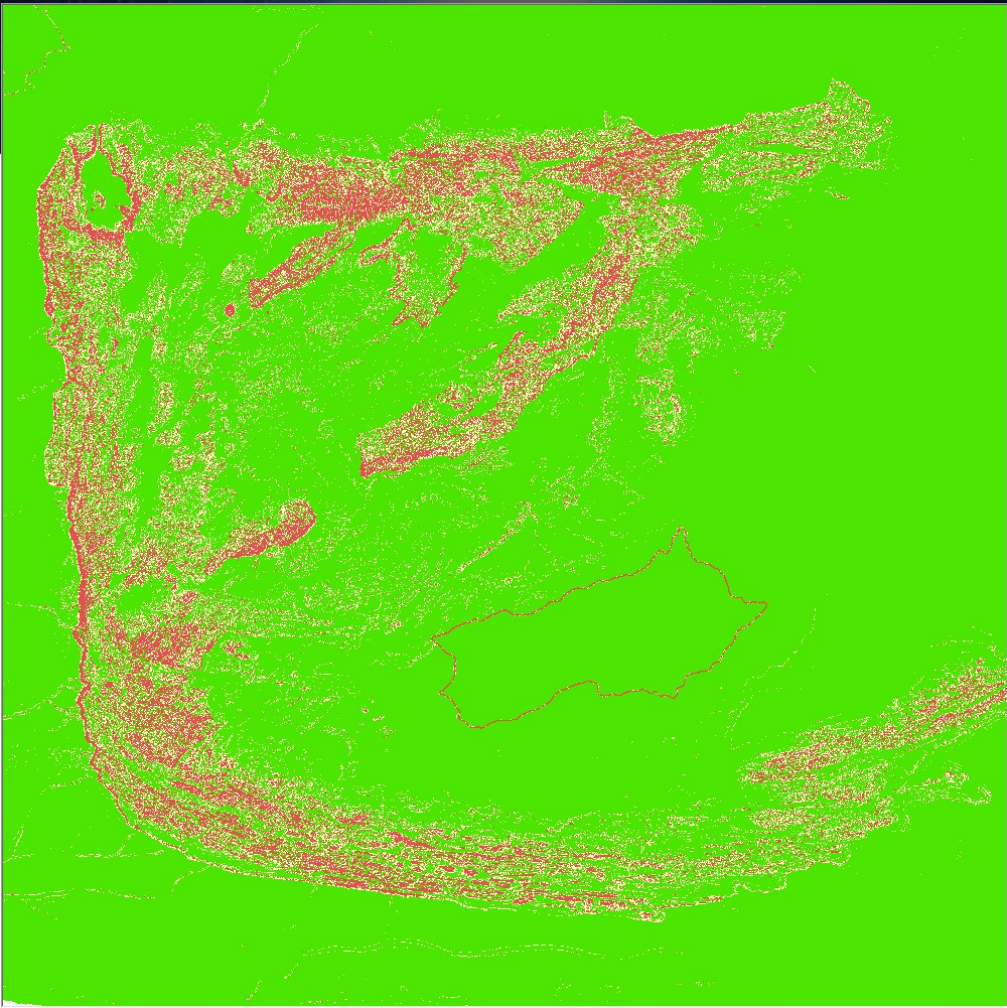
Original elevation image













# Add Features

- Locations of any/all features in Middle Earth
  - Buildings and Towers
  - Roads and rivers
  - Realms and land cover
- Found the Tolkien Gateway
  - [http://tolkiengateway.net/wiki/Main\\_Page](http://tolkiengateway.net/wiki/Main_Page)



NAVIGATION

- Main Page
- Recent changes
- Random page
- Community Portal
- To-do
- Forums
- Help

TOOLBOX

- What links here
- Related changes
- Special pages
- Printable version
- Permanent link

PERSONAL TOOLS

- Log in / create account

## Category:Buildings

Category:Buildings

This category and its subcategories list all **Buildings** within Arda.

### Subcategories

This category has the following 2 subcategories, out of 2 total.

#### I

- [x] Inns (0)

#### T

- [x] Towers (0)

### Pages in category "Buildings"

The following 61 pages are in this category, out of 61 total.

#### B

- Bag End
- Beorn's Hall
- Black Pits
- Brandy Hall
- Brodda's hall

#### C

- Chamber of Mazarbul
- Cottage of Lost Play
- Cracks of Doom

#### D

- Dol Guldur
- Dome of Stars
- Durthang

#### E

- Elvenking's Halls
- Endless Stair
- Ent-houses

#### G cont.

- Great Hall of Thráin
- Great House
- Great Smials
- Grimslade

#### H

- Hall of Fire
- Halls of Mandos
- Halls of Nienna
- Hobbit-holes
- House of Oromë
- House of Ransom
- House of the Hundred Chimneys
- House of the Lord
- House of the *Mírdain*
- House of Tulkas
- Houses of Healing
- Huts of the raft-elves

#### I

- Ilmarin

#### M cont.

- Meduseld

#### O

- Old Grange
- Old Mill

#### R

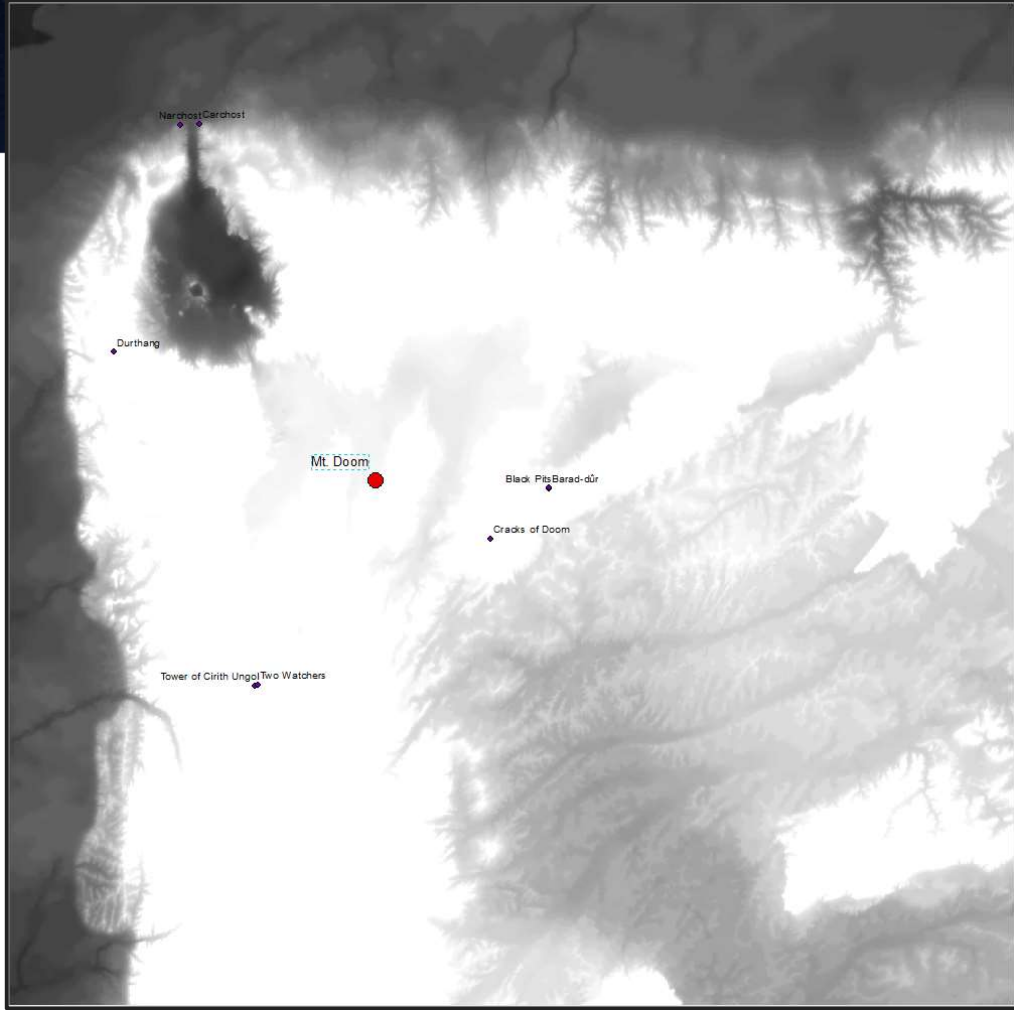
- Rhosgobel

#### S

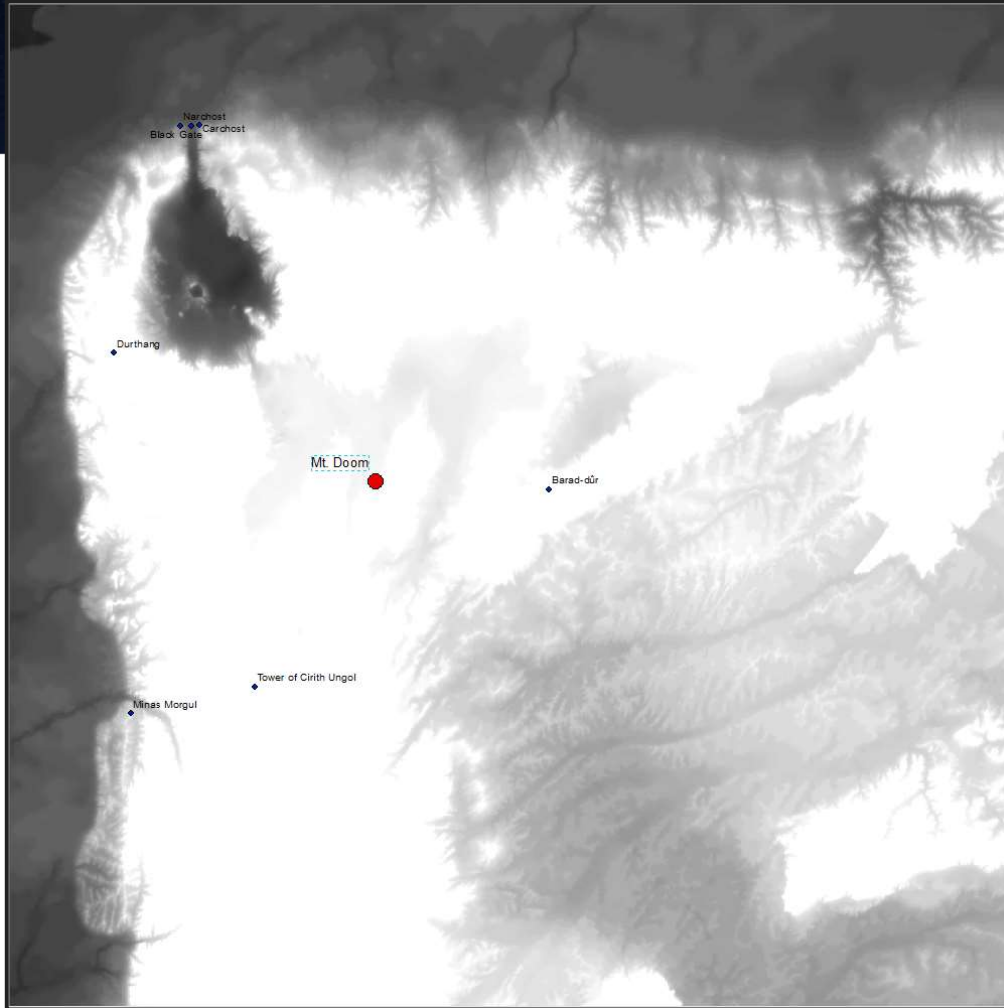
- Second Hall
- Shirriff-house
- Smials

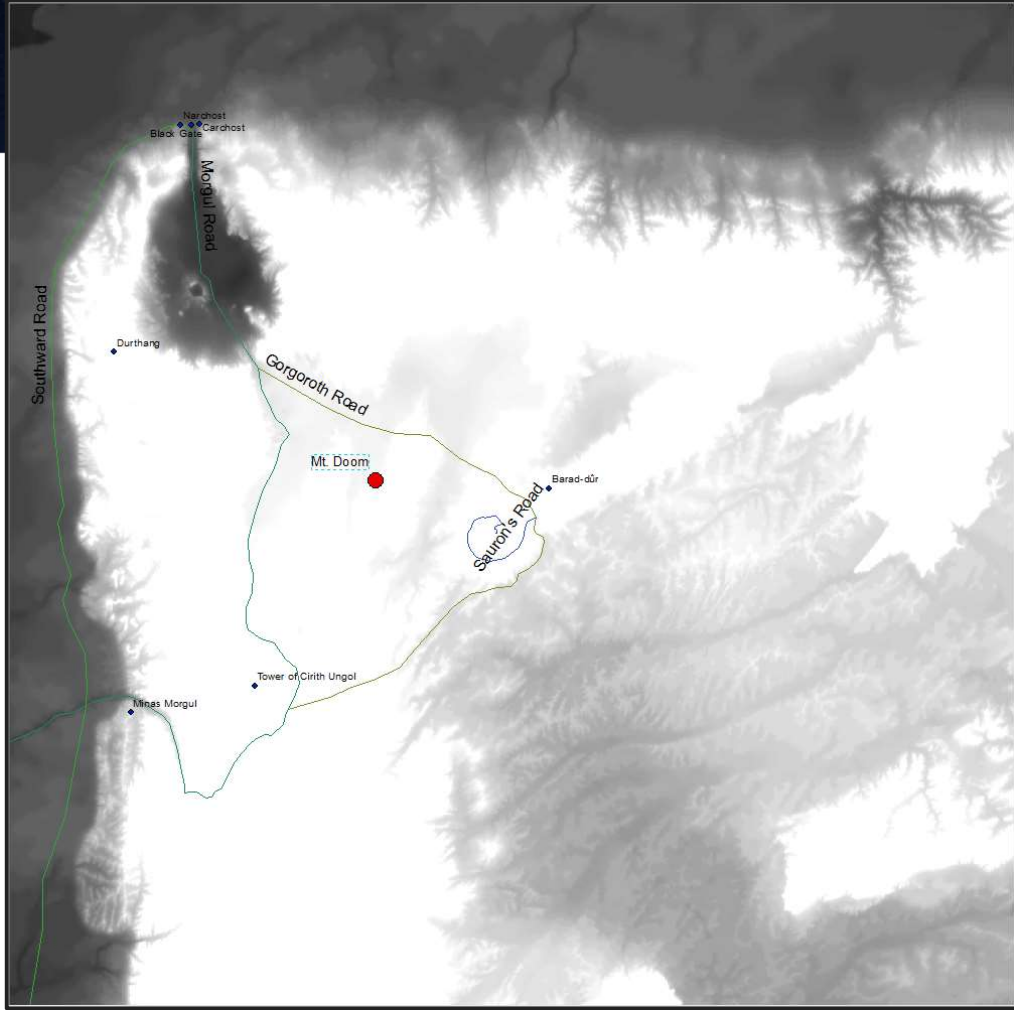
#### T

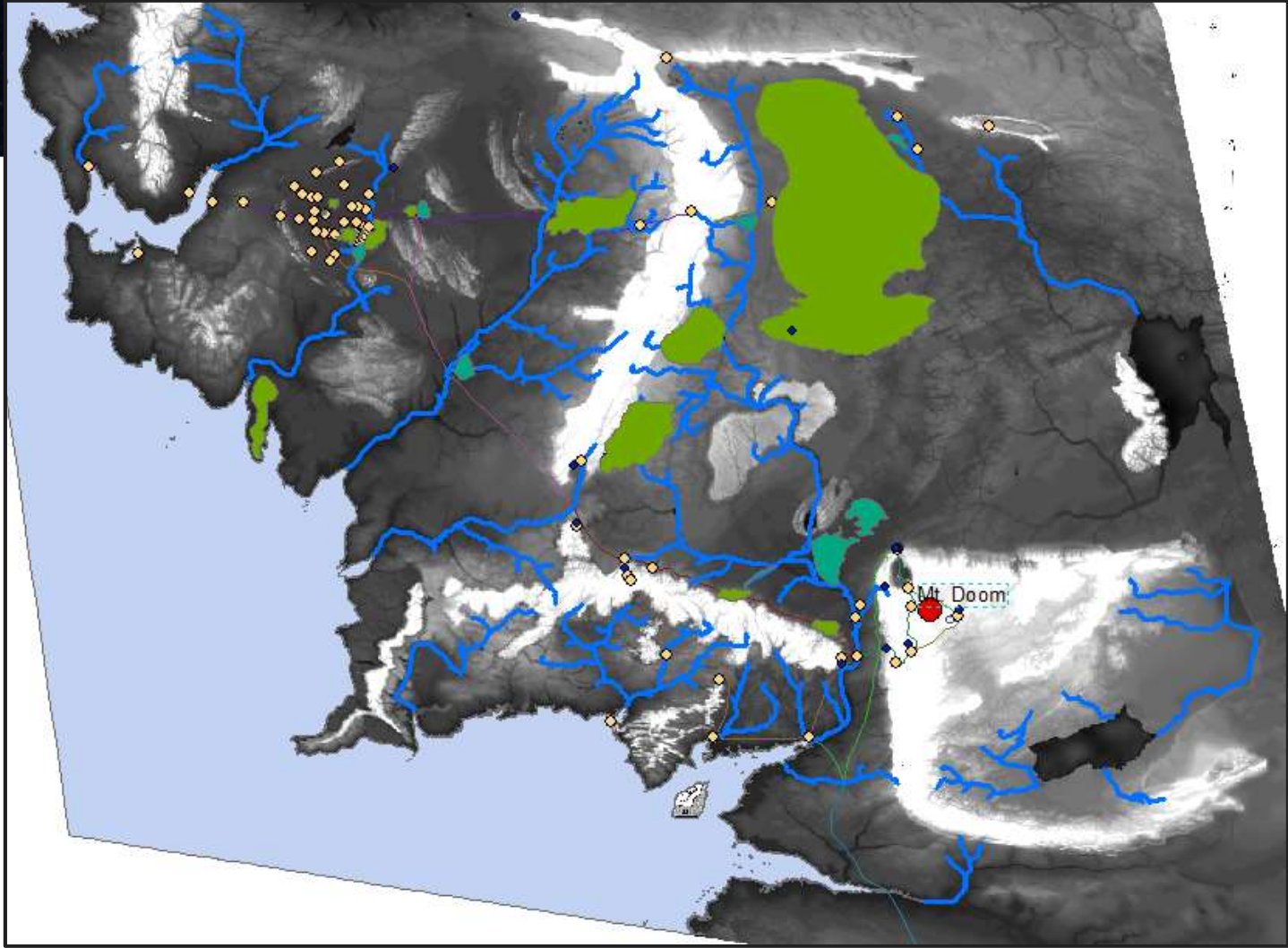
- Telain
- Temple
- Timeless Halls
- Tower Hall
- Town Hole
- Twentv-first Hall













# Next Steps

- Add a landcover layer
- Derive threat layer
- Calculate least cost path from the Shire to Mt. Doom



# GIS & Middle Earth Course

- Student teams developed least cost path models using least cost path analysis in Esri ArcGIS
- Cost layer
  - Threats
  - Cost of travel
- Presented final project as a StoryMap
- See blog post for more details and StoryMaps

<https://www.esri.com/arcgis-blog/products/story-maps/mapping/mapping-a-better-route-from-the-shire-to-mount-doom/>



Thank  
You