



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

The Irish Agriculture and Food Development Authority

Scene processing requirements for regional or country-wide image archives

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Introduction

- Freely available global remote sensing data products have become increasingly available over the past several years.
- These sets are distributed in coordinate projection systems that are well-suited for global applications.
- With local or regional applications, global projections can be less suitable for the end user.

Why am I talking about this today?



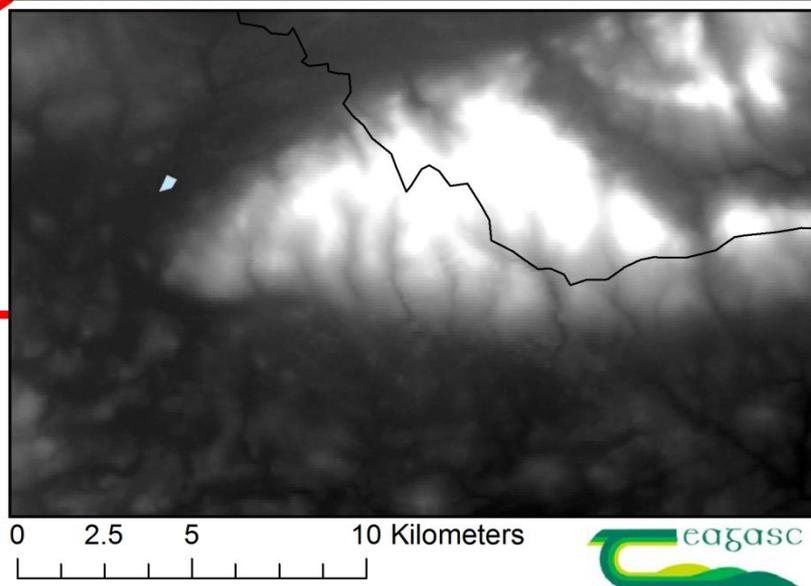
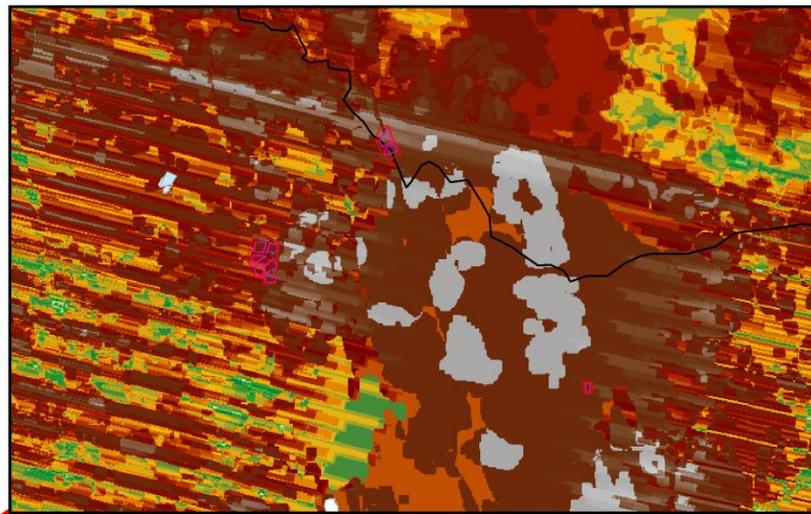
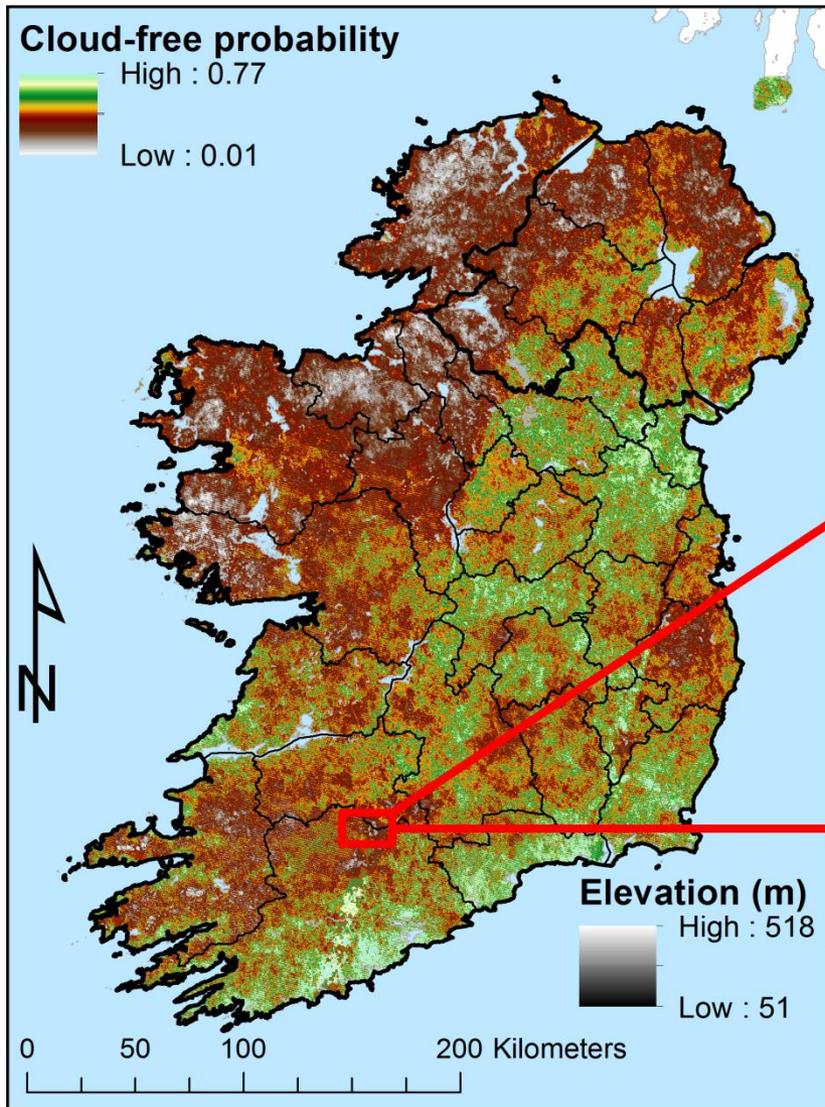
- In August 2013 I moved from USDA/FAS/IPAD to the Teagasc, the Irish Food and Agriculture Authority.
- I used to spy on farmers for the US Government.
- Now I spy on Irish forests for the Irish government.

MODIS image courtesy NASA/GSFC.

Why am I talking about this today?

- I went from looking at:
 - Large areas across the globe to one island on the European continent.
 - Global data sets to local data sets.
 - Areas with low cloud covers to an island with lots of clouds.
 - Data mining from dozens to thousands of scenes.

Cloud-Free Landsat Observation Probability, 2010-2013

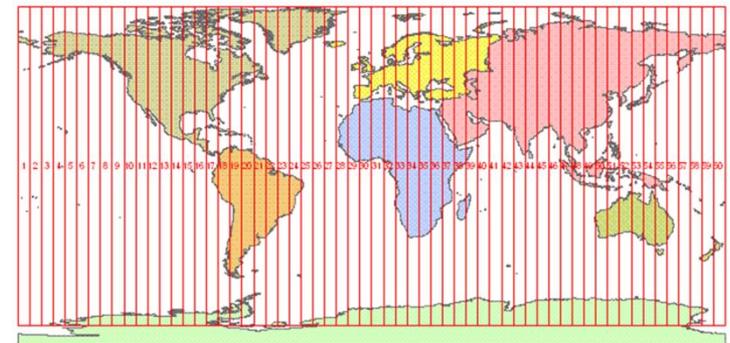
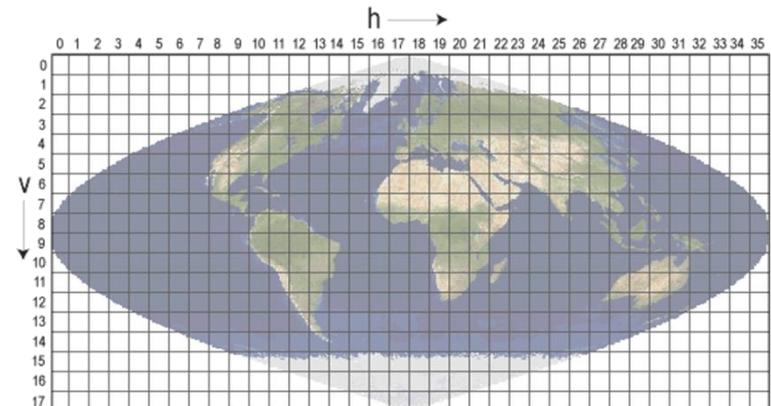


Irish weather: All four seasons in a day!



Commonly-used projections for remote sensing data products

- MODIS Sinusoidal
- Universal Transverse Mercator (UTM)
 - Landsat
 - Sentinel-2



MODIS Sinusoidal

Ireland is here!

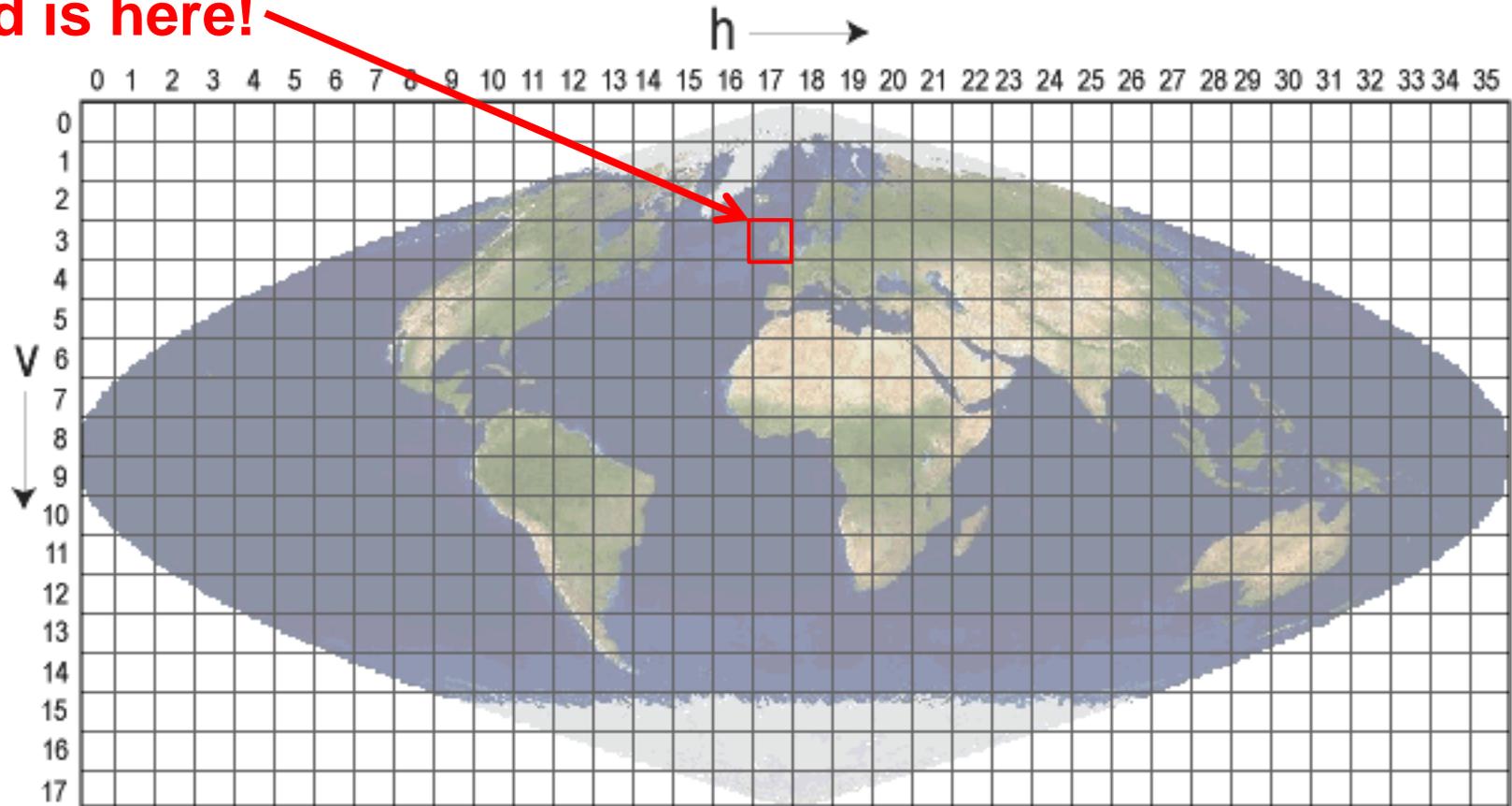
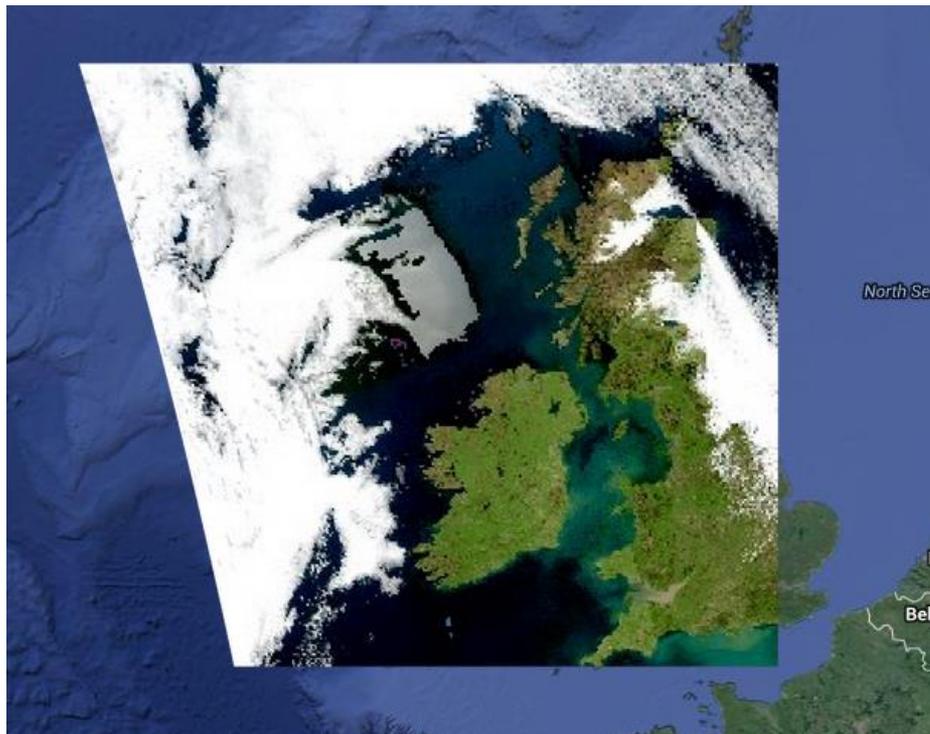


Image courtesy NASA/GSFC.

Problems with MODIS Sinusoidal



Screenshot from USGS EarthExplorer

- Sinusoidal doesn't usually "play nice" with local projections.
- Software often misprojects data by several km.
- It wasn't designed for local use, only global.

UTM

Ireland is here!

REDP

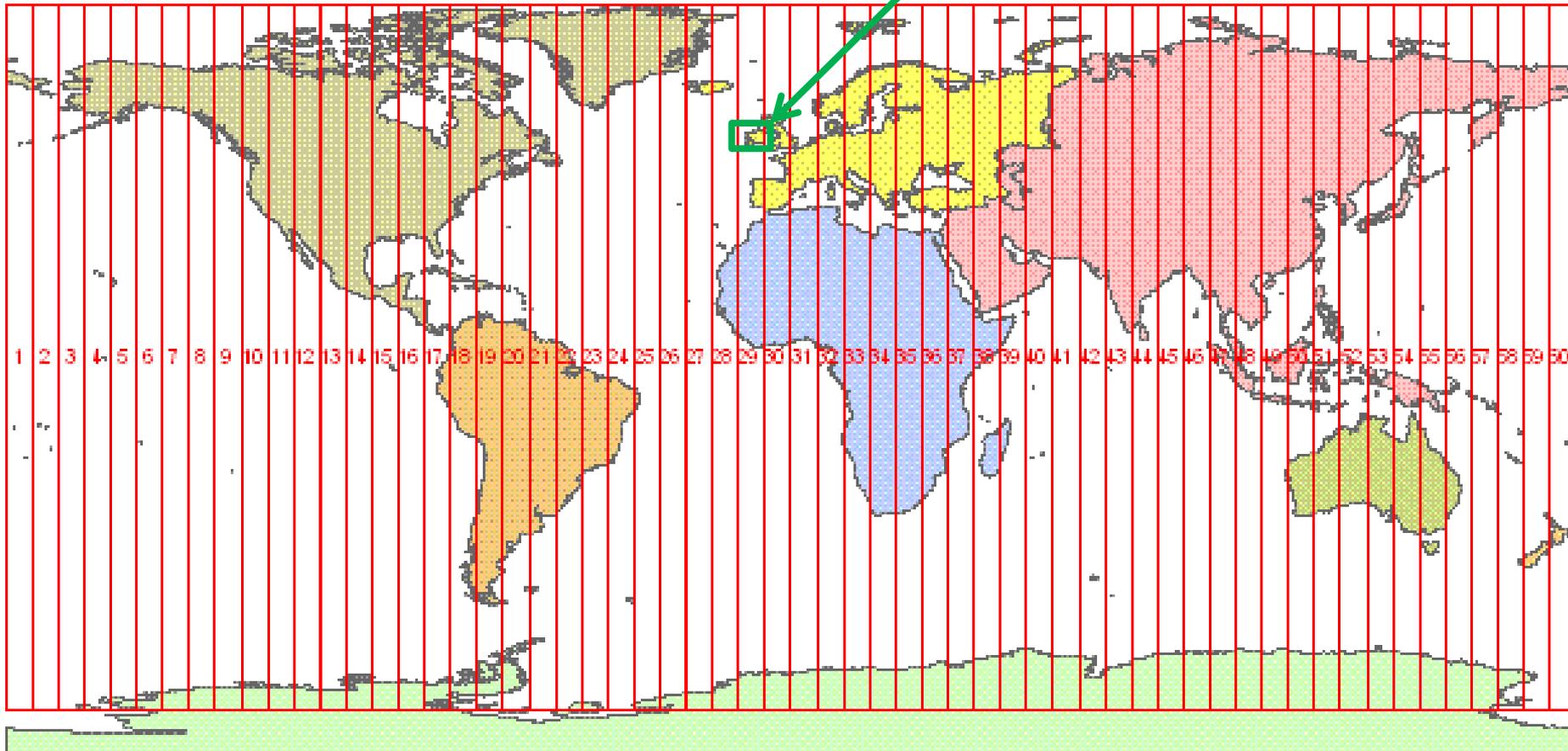
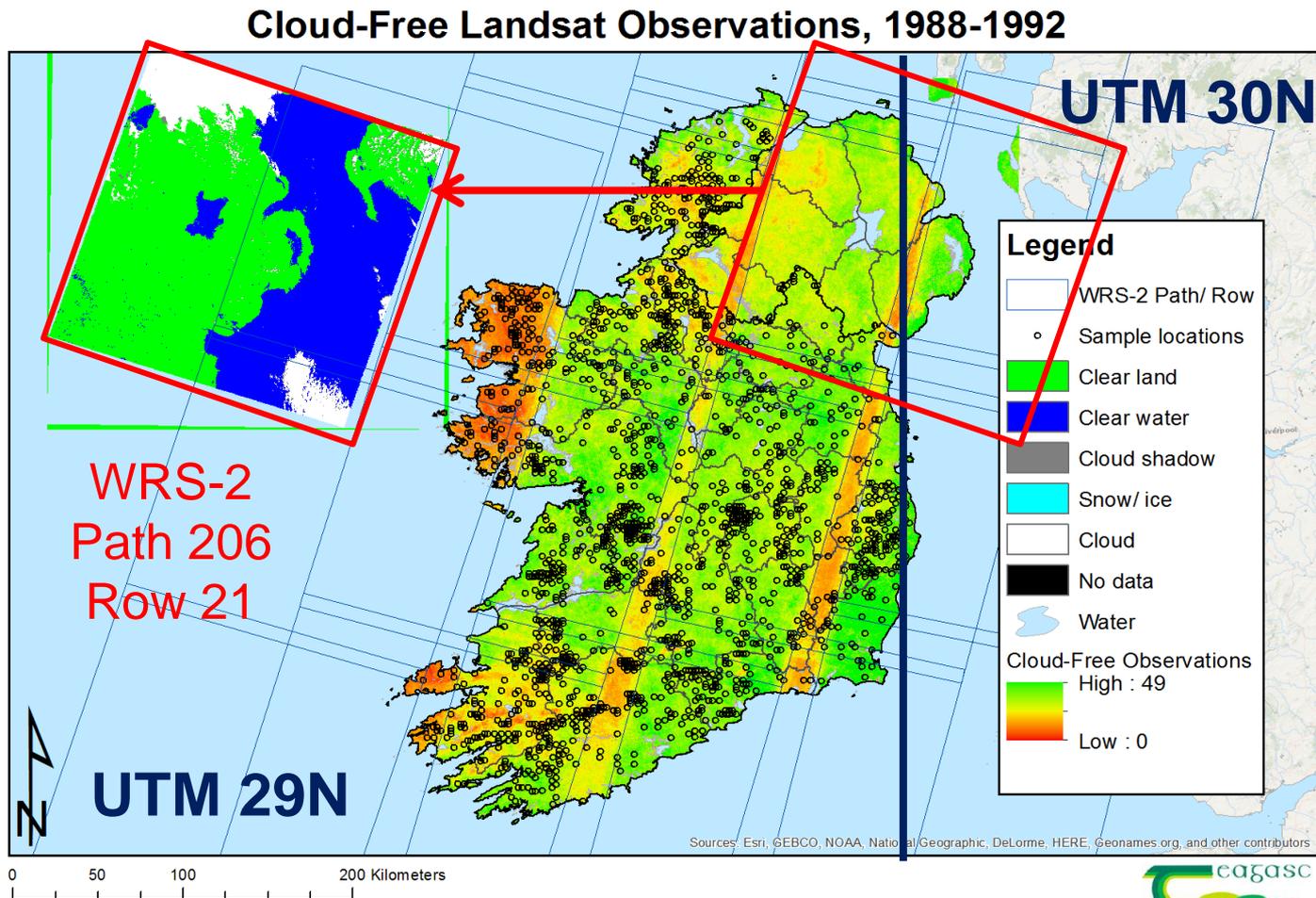


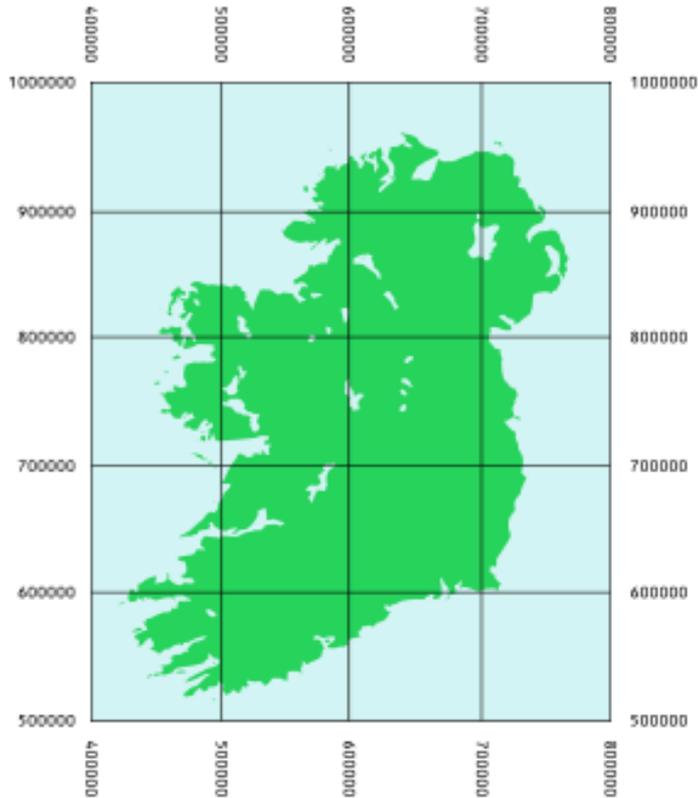
Image courtesy ESRI.

Problems with UTM

- Mis-projections along zone boundaries possible.
- Areal distortions in higher latitudes.
- Problem not unique to Ireland.



Irish Transverse Mercator Projection (ITM) REDP



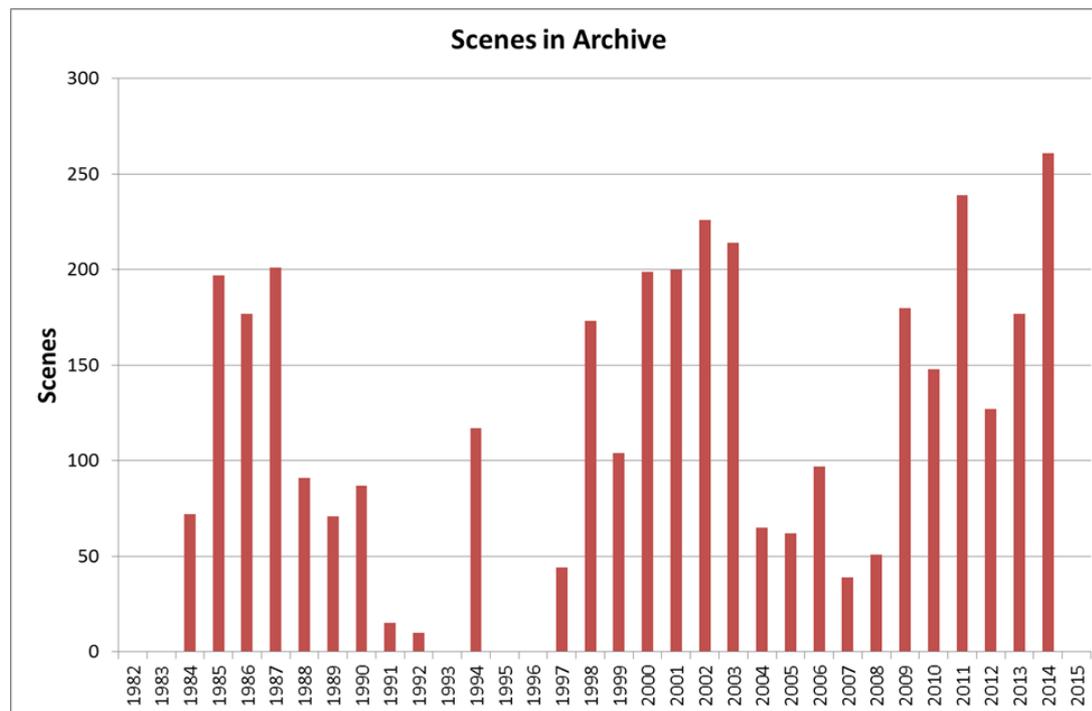
- Optimized for the island of Ireland.
- Used by the ordnance surveys of both the Republic of Ireland and Northern Ireland.
- In my workflow, both MODIS and Landsat get warped to this projection.

My current workflow

- Download scenes from online archive (USGS/EROS or ESA):
 - Usually LEDAPS surface reflectance or MOD/MYD 09 and 13 data products.
- Convert from MODIS Sinusoidal or UTM to ITM.
 - Landsat: make sure the reprojection is appropriately located.
 - MODIS: Clip data to Ireland.
 - If it were the UK, I'd have to mosaic three tiles, and then clip.

What is wrong with this?

- My archive: with ~3800 Landsat scenes and ~700 MODIS tiles, it uses up valuable:
 - Disk space
 - Processing time
- Warping adds noise to the data.



The proposed solution- a regional archive

- Satellite data will be processed from raw/ level 0 directly to a local projection.
 - This minimizes noise.
- More accurate orthorectifications possible by allowing for richer sets of ground control points.
- Improved calibration to surface reflectance by using more accurate local parameters and models.

Regional archives

- Will allow more efficient data distribution to local end users.
- Should be modeled after EarthExplorer/
GLOVIS.
- Can include vector data sets- in essence, a one stop geospatial data shop.
- Can use free open-source tools- many of the processing algorithms are freely available on the internet.

Questions?