

Environmental data

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Sources of environmental data – existing sources

Studies of environmental influence on evolutionary processes often require large scale environmental data.

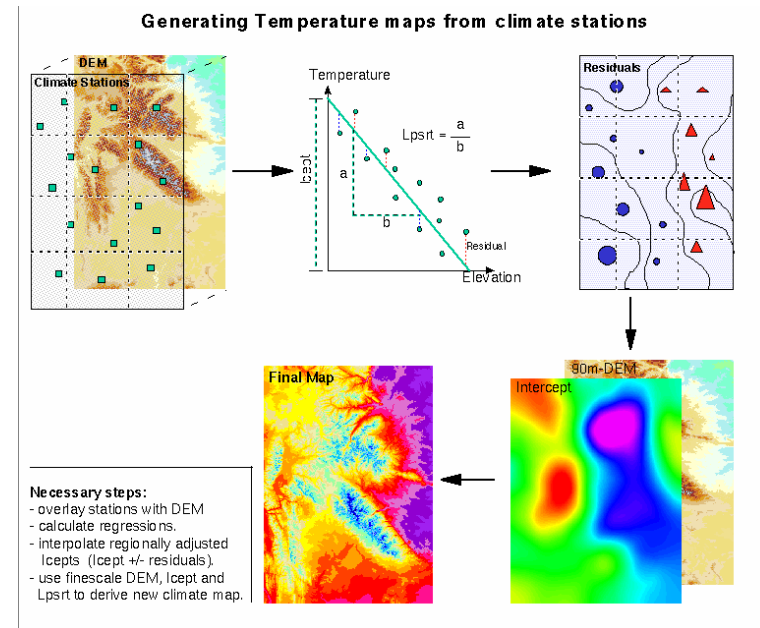
GIS environmental maps are from two sources:

- remote sensing
- spatial interpolation



http://geoinformatik.lehrewelt.de/wp-content/uploads/eos_constellation.jpg

spatial interpolation



<http://www.wsl.ch/staff/niklaus.zimmermann/gifs/fig4.gif>

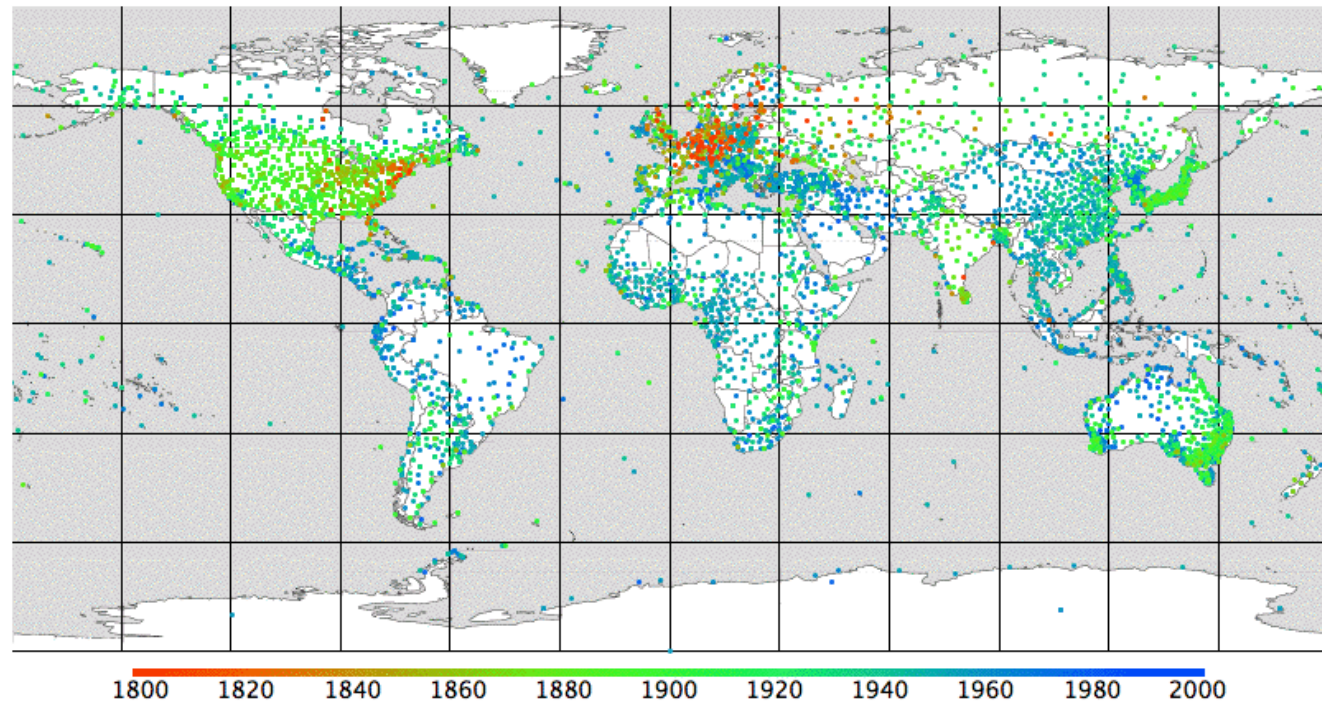
Sources of environmental data – existing sources

Climatic variables

CRU

Aim to improve scientific understanding in three areas:

- past climate history and its impact on humanity
- course and causes of climate change during the present century
- prospects for the future



Locations of All Stations in Global Historical Climatology Network (GCHN, NOAA) Database, as used by CRU and NCDC. The stations are color-coded to indicate the first year in which they provided twelve months of data. Red stations are the oldest and blue stations are the newest. There are 7280 distinct station locations in all.

<http://www.hashemifamily.com/Kevan/Climate/>

Sources of environmental data – existing sources

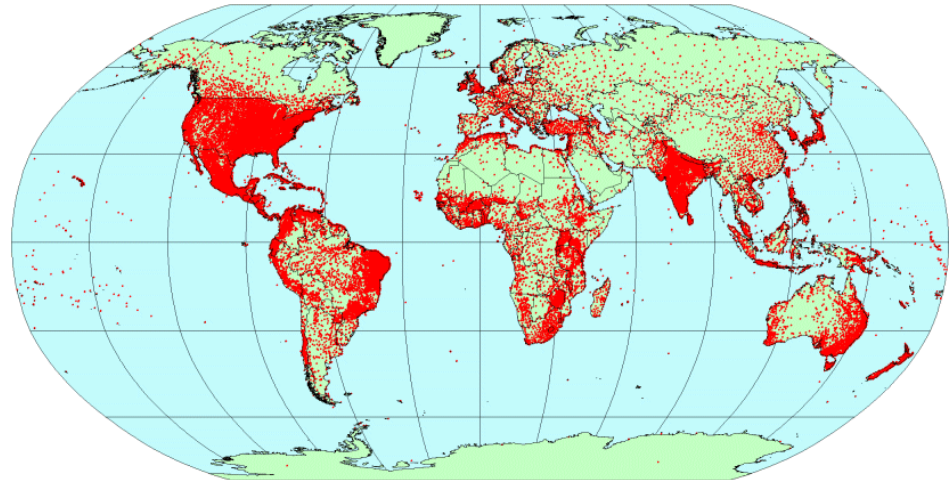
Climatic variables

Worldclim

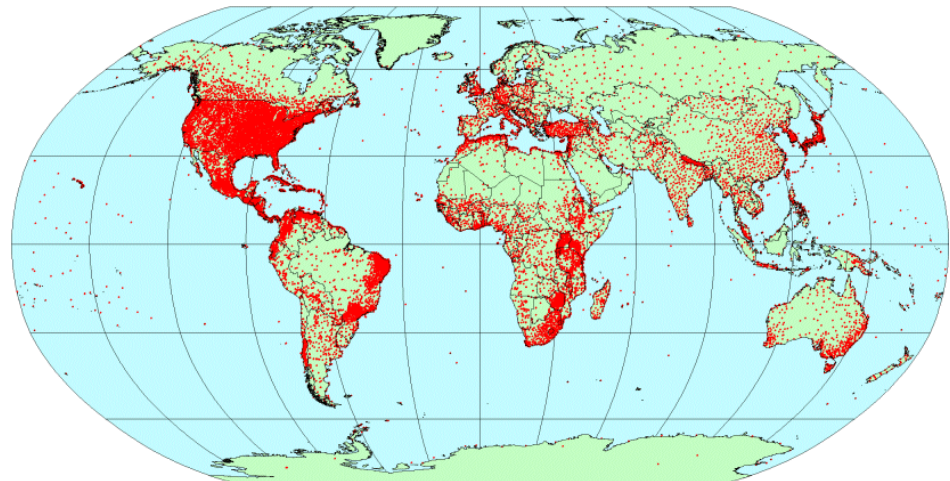
Interpolation of average monthly climate data from weather stations on a 30 arc-second resolution grid ($\approx 1 \text{ km}^2$)

Interpolations using latitude, longitude and elevation.

- monthly total precipitation
- monthly mean T°
- minimum
- maximum T°
- 19 derived bioclimatic variables



Locations of climate stations with precipitation data.



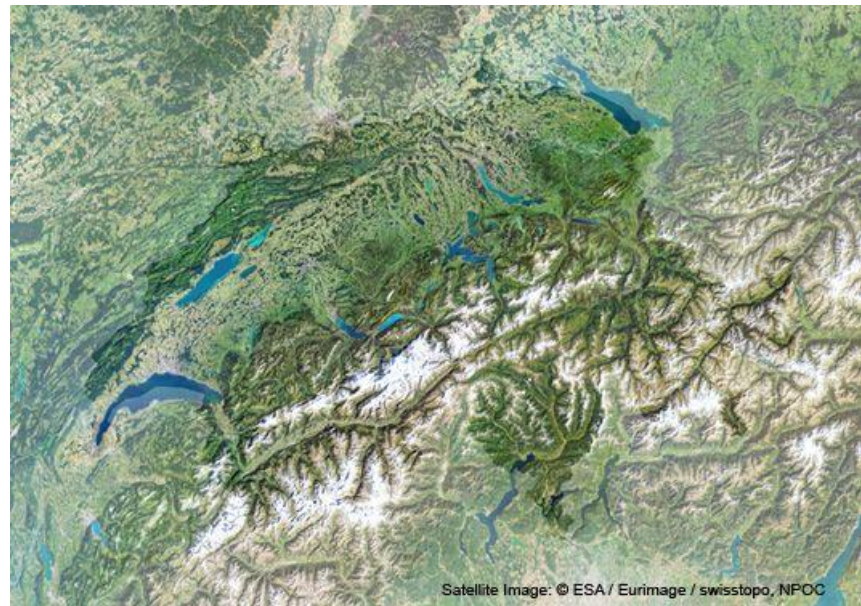
Locations of climate stations with mean temperature data.

Sources of environmental data – existing sources

Satellite imagery, ground cover and soil maps

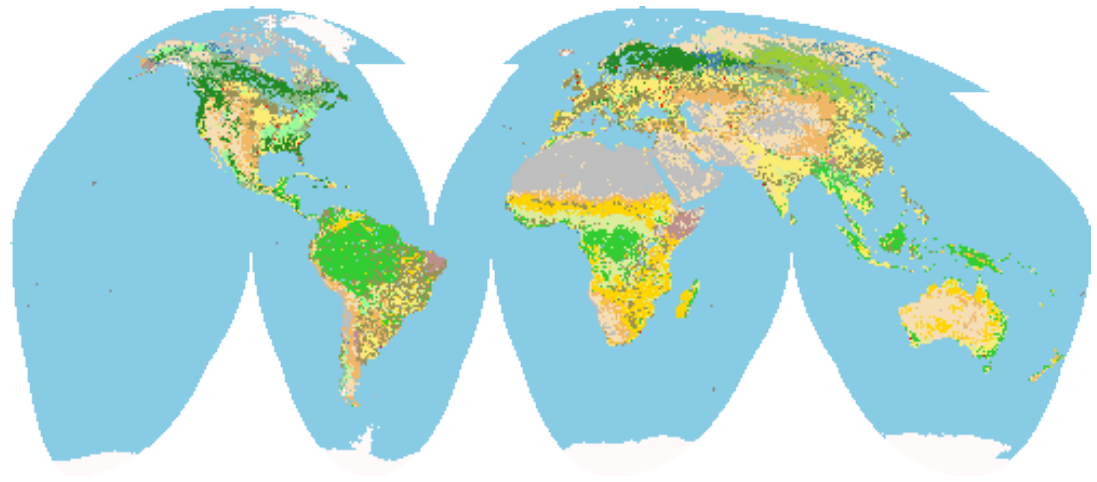
To date, the most complete database can be found on <http://earthexplorer.usgs.gov/> with free access to

- LANDSAT images
- OrbView-3 (USGS) 1m b&w, 4m multispectral
- Global Land Cover Characterization (GLCC)
- Corona declassified images from 1960-70 (US military satellites)
- eMODIS (EROS Moderate Resolution Imaging Spectroradiometer)
- ...



Landsat Image

<http://www.swisstopo.admin.ch/internet/swisstopo/fr/home/products/images/ortho/landsat.html>



Global Land Cover Characterization

Sources of environmental data – existing sources

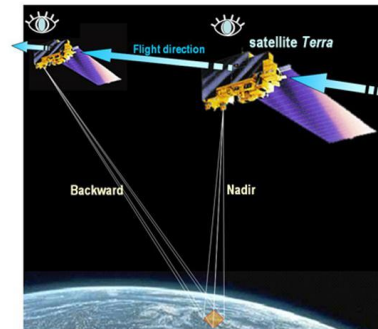
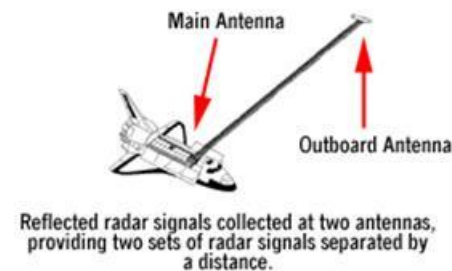
DEM derived variables

In mountainous areas, patterns of environmental conditions are driven by relief.

Exploiting correlation between difficult-to-observe causal variables and easily observed non-causal variables.

Soon: Tandem-X (10m resolution)

Models for the earth	SRTM3	ASTER GDEM
Acquisition date	11 days in 2000	2000-2011
Spatial resolution	3 arcsec ($\approx 90\text{m}$)	1 arcsec ($\approx 30\text{m}$)
DEM accuracy (stdev.)	$\pm 16\text{m}$	$\pm 12.6\text{m}$ (v.2)
Coverage	$60^\circ\text{N} - 56^\circ\text{S}$	$83^\circ\text{N} - 83^\circ\text{S}$
Acquisition method	Radar interferometry	Extraction of corresponding points between images by pattern matching
Comment	Topographically steep areas causing radar shadow	Available for steep mountainous regions Missing data for regions under constant cloud cover



How to get SRTM and ASTER datasets?

USGS
science for a changing world

EarthExplorer

USGS Home
Contact USGS
Search USGS

Page Expires In 1:59:55

Home 1 New System Message Login Register Feedback Help

Search Criteria Data Sets Additional Criteria Results

2. Select Your Data Set(s)

Check the boxes for the data set(s) you want to search. When done selecting data set(s), click the *Additional Criteria* or *Results* buttons below. Click the plus sign next to the category name to show a list of data sets.

☐ Use Data Set Prefilter [\(What's This?\)](#)

Data Set Search:

- ☐ Aerial Imagery
- ☐ AVHRR
- ☐ Cal/Val Reference Sites
- ☐ Commercial
- ☐ Declassified Data
- ☒ **Digital Elevation**
 - ☒ ASTER GLOBAL DEM
 - ☒ GMTED2010
 - ☒ GTOPO30
 - ☒ GTOPO30 HYDRO 1K
 - ☒ IFSAR Alaska
 - ☒ SRTM
 - ☒ SRTM Void Filled
 - ☒ SRTM Water Body Data
- ☐ Digital Line Graphs
- ☐ Digital Maps
- ☐ EO-1
- ☐ GEOGLAM
- ☐ Global Fiducials
- ☐ Global Forest Observations Initiative

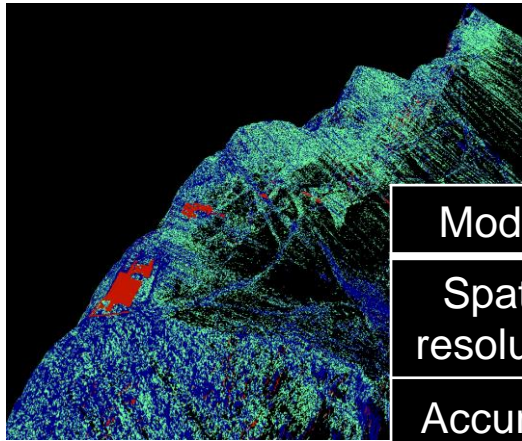
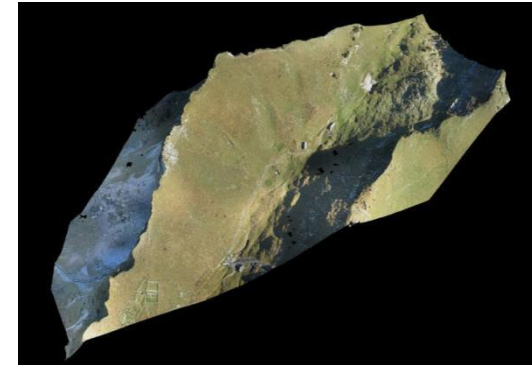
Search Criteria Summary (Show) Clear Criteria

(46° 38' 06" N, 003° 01' 20" E) Options Overlays Plan Satellite

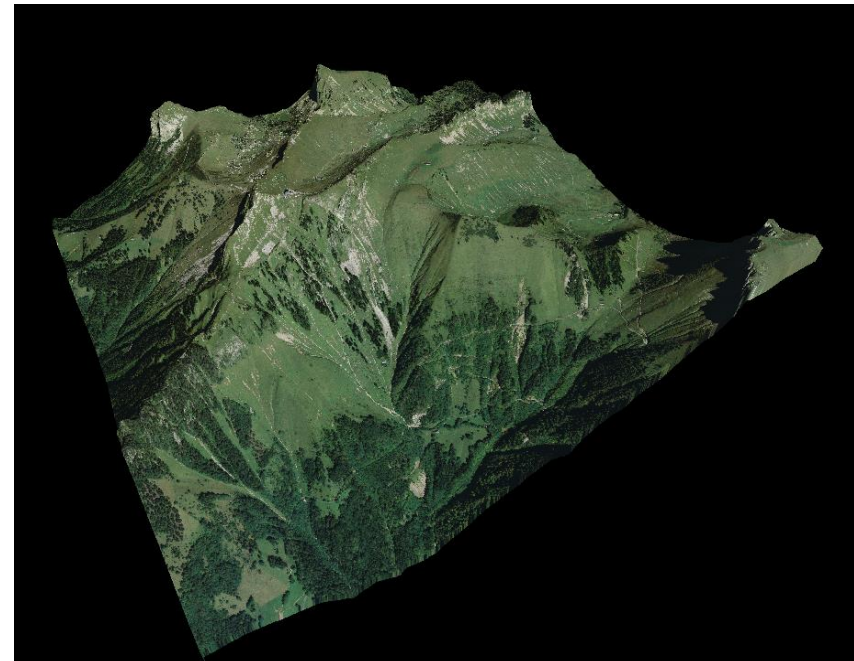
Sources of environmental data – fieldwork sources

DEMs

LIDAR and stereophotogrammetry sources



Models	LIDAR
Spatial resolution	<0.25m
Accuracy	<0.1m
Comment	equipped on an helicopter



Exercise

- Import environmental variables

