PALE Blu: Understanding pathogen, livestock, environment interactions involving bluetongue virus. Project ID: *727393*

Work Package 3 Deliverable Report: August 2017

D3.1 A list of spatial data requirements from WP1, Due PM 3

Introduction and Project Overview

New outbreaks caused by bluetongue viruses (BTVs) have emerged in European livestock every year since 1998. These events that have been linked to climate change, resulted in massive losses due to fatalities, reduced productivity, reproductive failures, restricted animal movements/trade, and surveillance/vaccination costs. PALE-Blu brings together European institutes with expertise in BTV research and diagnosis, with partners in endemic regions (Africa, the Middle East and Turkey) that act as a 'source' for BTV strains that emerge in Europe.

One of the project activities is to identify pathways and mechanisms for BTV spread into and within Europe. These analyses require an assessment of the factors driving these processes – using spatial and spatiotemporal modelling of hosts vectors and disease. These models are dependent on two groups of input data: the training data comprising known distributions hosts, vectors and diseases which calibrate the models, and spatial covariate (or predictor) datasets which are used to actually construct the models.

Within the project, Work Package 3 is a focus of activities to assemble the requisite spatial covariate datasets. The applicable deliverables are *D 3.1 (A list of spatial data requirements from WP1*) and D4.1 (*List of required environmental and landscape factors needed) (with WP3)* both due in project month 3. The scope of D3.1 has been deliberately expanded to include anticipated spatial data needs from the whole project.

These activities are a core element of task 3.1 (Assess the need, acquire, process and standardise spatial data) as follows, which are reported in the following pages.

a) **Identify what spatial data are available**: Inform partners of what data are already available for project use
b) **Establish future spatial data needs**: Ask partners to identify data that will be needed for their analyses
c) **Define future spatial data acquisition strategy**: Outline future data acquisition and update strategies in the light of a) and b) above
d) **Ensuring spatial data access**: Providing partners with the information needed to access the spatial data

Deliverable Activities
Identify what spatial data are available
PALE Blu has been able to take full advantage of the outputs of several preceding FP7 projects – (EDEN, EDENext, IDAMS and VMERGE) which have steadily expanded the range of standardised spatial data available for spatial modelling. This now comprises several hundred datasets amounting to terabytes of data, which have been transferred to a PALE Blu spatial data archive. This archive is accessible through a customised website (http://www.palebludata.com) which provides access to data and a wide range of other information relevant to spatial modelling and Geographic Information Systems (GIS). User access is controlled through a user registration system that provides dataset level permissions. This not only allows

the site to define a range of data accessibility from secure data accessible to specific project partners only to public domain data available to all registered members.

A full list of these data were accordingly sent to leaders of WP1,2,3 &4 in project month one, along with a request to circulate the list to all WP partners, and to return a list of spatial data needs to Partner 6 (ERGO). This document is provided for information in Appendix 1

Establish future spatial data needs:
Partner responses were largely consistent in that
  a) They considered the list of data currently available to be comprehensive and sufficient for their anticipated short term needs, with the proviso that they reserved the option to request additional data during the project if necessary.
  b) They pointed out that most of the data archive was continental or global in extent, and that there may be a future as yet unspecified requirement for more local, high resolution datasets covering the same parameters and covariates
  c) A limited number of specific parameters were identified as possible additions to complement the existing suites – notably GMTED digital elevation, and consensus land use/landcover, wind speed, current climate and vegetation. The European Copernicus satellite imagery products were also suggested for attention if they become readily accessible to the research community.

There are number of parameters that are specified in the project proposal or that partner 6 has identified as potentially valuable additions to the existing archive. These include continental coverage of livestock densities; trade in livestock and livestock products; and animal movements, as well as a wide range of processed Earth Observation satellite imagery from the MODIS platform.

In addition to these, partners also provided suggestions of potentially useful datasets which will be added to the PAlebludata.com links page to make the suggestions available to all project partners. Currently these sources include the following

Dataset	URL	Comments
Human movement and epidemiology	http://www.flowminder.org	info and publications on human mobility
UN DESA, demographic data	https://esa.un.org/unpd/wpp/Download/Standard/Population/	national level human population data. Used extensively to enhance the Worldpop datasets
Eurostat regional commuting data	http://ec.europa.eu/eurostat/estat-navtree-portlet-prod/BulkDownloadListing?file=data/lfst_r_lfe2ecomm.tsv.gz	part of extensive low resolution EU reported statitsics
Global wind atlas	http://globalwindatlas.com/datasets.html	Enquiry sent to access data
Weather station data	Http://wunderground.com, http://www.meteoblue.com, http://en.tutiempo.net, http://www.accuweather.com, http://weatheronloine.co.uk	Good for current and historical data from small numbers of individual stations. Data for larger numbers of station can be purchased

Define future spatial data acquisition strategy:
WP1 will therefore focus its initial spatial data acquisition efforts on the datasets identified above. The topography, consensus land use and recent (2015) land cover data have been acquired and standardised, and will be added to the project archive in the near future. Coarse resolution wind data have been identified and the feasibility (and cost) of acquisition and processing higher resolution data are being investigated. Leaf Area Index will be added to imagery archive; the availability of an aridity index (or a proxy such as Embergers Index) will be investigated; and the feasibility of extracting appropriate summary

information from the SARAH solar radiation archive will be assessed. The availability of the Copernicus Earth Observation data is being closely monitored in collaboration with potential suppliers who are in the process of rolling out the new imagery on behalf of the European Space Agency

As well as providing new data as requested, the WP1 spatial data management specialists will devote substantial efforts to upgrading the existing data to the latest versions. A major effort in this context is to convert all the Fourier processed MODIS V5 imagery to the new Version 6 which has better quality control, fewer data gaps, and improved pre-processing algorithms. This involves reprocessing 16 years of data (2000 to 2016) for six parameters with image frequencies of 8 – 16 days – approximately 9 TB. This is a substantial task, anticipated to take several person months, which is currently in progress. Other upgrades will include human and livestock populations and projected climate. As a matter of routine, watching briefs will be maintained for newly produced spatial data that are likely to be relevant to project objectives

Table 1: Ongoing and planned data acquisition and updates

Dataset	Status and Source
GMTED digital elevation	Acquired, and pending addition to archive *https://topotools.cr.usgs.gov/gmted_viewer/*
CCI ESA 300m land cover 2015	Acquired, and pending addition to archive *http://maps.elie.ucl.ac.be/CCI/viewer/download.php*
Consensus Land cover 2005	Acquired, and pending addition to archive *http://www.earthenv.org/*
Windspeed, continental 25km gridded 2010-2015	Acquired, and pending addition to archive *http://agri4cast.jrc.ec.europa.eu/DataPortal/*
Windspeed, continental 5km gridded month 2016	Sourced and costed *http://www.meteoblue.com*
Current synoptic climate – (Worldclim)	Sourced, acquisition pending *http://www.worldclim.com*
Weather station data	Sourced, requirement specifications pending KOM discussions, *http://www.earthenv.org/landcover*
Leaf Area Index	Sourced, pending acquisition and processing *https://modis.gsfc.nasa.gov/data/dataprod/mod15.php*
Solar Radiation	Sourced, pending acquisition and standardisation *https://wui.cmsaf.eu/safira/action/viewDoiDetails?acronym=SARAH_V002*
Aridity indices	Under investigation.
Copernicus Earth observation Imagery	Sourced, acquisition awaiting supply chain finalisation: *http://land.copernicus.vgt.vito.be/geonetwork/srv/eng/main.home?*
Human population	Sourced, pending acquisition *Http://www.worldpop.org*
Animal Movement and Livestock Trade	National trade matrices sourced, pending acquisition *http://ec.europa.eu/food/animals/traces_en* *www.fao.org/faostat/en/#data/TM*
Livestock population upgrades	Training data acquisition in progress *http://www.fao.org/ag/AGAinfo/resources/en/glw/default.html*
Culicoides vector distributions	Preliminary modelling in progress in collaboration with EU projects; *VECTORNET and VMERGE project archives*
Wildlife host distributions	Upgrades of VMERGE project outputs dependent upon acquisition of training data
MODIS Earth Observation Imagery Upgrade	V6 Acquisition complete, Fourier Processing of ERGO archive data in progress
Climate projections	Fourier processing of IDAMS project archive data in in progress

A further group of data requirements centre around wildlife host and midge vector distributions. Collaborations with other projects are in place to ensure that the datasets presently available will be updated as and when new training data are available. Ongoing data acquisition and planned updates are summarised in Table 1.

Ensuring spatial data access
Though this deliverable is formally due before the Project Kick Off Meeting (KOM) in September 2017, it is considered essential that the KOM itself is used as an opportunity to further advocate the availability of spatial data to project partners; to encourage the partners to register on the data site; and to ensure that partners feel able to ask the data specialists in WP3 for assistance in spatial data sourcing, acquisition and processing. Partners will also be given the opportunity to confirm the more technical aspects of their spatial data requirements – extent, spatial and temporal resolution, and delivery format and so on.

Appendix 1: Data request sent to PALE Blu Partners in Project month 1

PALE-Blu spatial data requirements for modelling activities

PALE-Blue Deliverable D3.1, due in month three, specifies a list of data required by the partners for planned spatial analyses. As a partner responsible for producing the deliverable 3.1 list, and for acquiring additional spatial data if available, we are now starting the process of finding out what data other partners are likely to need.

ERGO has spent many years acquiring and processing a very large archive of standardised data designed for use as covariates for spatial models. These data will be made easily accessible in time for the Kick-off meeting in September to project partners who become registered members of the PALE-Blu data portal website www.palebludata.com. The website will provide an easy and secure platform for browsing, downloading and sharing data with project partners and the wider public. The website uses a simple but secure permissions system which controls access to data controlled by user registrations and strict permissions which can be assigned on a file by file or directory by directory basis, as specified by the data owners. We will therefore also be circulating a questionnaire asking what relevant data you have available that you are prepared to share with other project partners – either directly or securely through www.palebludata.com

This document presents a list of datasets currently available to the project partners, so that partners can then advise us of any other data that may be required. Providing it is available, and can be acquired with the appropriate data use permissions, we will make the additional data requested available through the Palebludata.com website (Deliverable 3.2). This summarised list below is of data that we currently hold on our servers or to which we have relatively quick access and requires minimal processing.   An excel spreadsheet of our complete list of data is also available. Data coverage is either EU and Mediterranean, Eurasia, middle east and Sub-saharan Africa, or Global

We hope that, by the middle of July, partners will be able to send us wish-lists of the spatial data they would like us to acquire. This will give us some time before the kick-off meeting in Glasgow to assess whether these data can be feasibly acquired and processed.

Please feel free to contact us if you have any questions: info@palebludata.com.

Regards and we look forward to hearing from you

Neil and Willy

Neil Alexander and William Wint, Environmental Research Group Oxford (ERGO)

FULL DATA LIST

Data category	Key datasets, Resolution and date	Other data available	Data available shortly
Land cover	• Corine Land Cover 100m/250m/1km 1990, 2000, 2006 – EU only • Globcover 2.3 2009 300m – Global • Consensus Land cover/land use. 1km, 2010	• Multiple forest cover datasets and change in forest cover. Suorces: European Forestry Institute, POSTEL, HarvestChoice, GLCF. 300m upwards • Irrigated areas IWMI • Snow cover MODIS/ISCCP 1km	• Corine Land Cover 2012 100m & 1km • CCI Land cover - 300 m annual global land cover time series from 1992 to 2015(ESA)
Transport networks	• JRC Accessibility Map: Estimated travel time to the nearest city of population 50,000 • Eurostat: Selected transport statistics - passenger and freight volumes	• Roads: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)	
Elevation	• MODIS 1km Digital Elevation Model and Land/Water Mask V5 1km • The Global Land 1km Base Elevation (GLOBE) 1km Digital Elevation Model (DEM) • Slope from GLOBE DEM – 1km • SRTM 100m Digital Elevation VMERGE extent	• Terrain Ruggedness Index (TRI)	
Orthoimagery	• MODIS: Fourier Processed Imagery 2001-15 1km: land surface temperature; Vegetation indices • MODIS v5: Synoptic Months 2001-2012 (smooth-fill) 1km	• MODIS: Fourier Processed Imagery time slice 2001-02, 2014-15 1km • 1km Land Water Mask derived from MODIS • Night time lights datasets (NOAA/NGDC) 1km • Night time lights averaged by admin level 2 areas - indicator of GDP 1km • PROBA-V Level3 Top Of Canopy NDVI Ten-Daily Synthesis at 333M resolution - VMERGE Extent 333m • VMERGE: MODIS Phenology 2006-2012 1km	• MODIS: Fourier Processed Imagery projected to 2020, 2050, 2080 rcp6.5 1km in development • Updated Synoptic Series 2000-2016, version 6 imagery
Human health and safety		• Eurostat Healthcare Indicators (2000-09) at NUTS2 • Projected healthcare spending for the EC (1970-2050) at NUTS0 • UN Maternal mortality ratio by country and Infant mortality rates by country	
Species Distribution	• FAO Livestock Densities: Gridded Livestock of the World (GLW v2) 1km • EDENext Preliminary Livestock Distribution Models 1km • Beta Horse Density Models 1km	• EDENext Vole Species and Biodiversity Input Models 1km • Distribution of Major Crops (SAGE) 10km • HarvestChoice Spatial Production Allocation Model (SPAM) 10km	• FAO Livestock Densities: Gridded Livestock of the World (GLW v3, 2010) 1km and 10km updates

Data category	Key datasets, Resolution and date	Other data available	Data available shortly
	• EDENextRed Deer Models 1km • EDENext Roe Deer Models 1km • Current JRC Tree Species Data 1km • JRC Tree Species Suitability & Climate Change 1km • VBORNET/VECTORNET Culicoides vector distirubution Models 1km for Eu and Mediterranean basin	• IUCN Species distribution: EDENext selected species 1:1,000,000 • The EMMA Database: Gridded Mammal Distributions for Europe 50km	•
Current Climate Data	• Worldclim 1km baseline norms 1950-2000 • BIOCLIM: WorldClim Bioclimatic variables 2000 1km • Cmorph Daily Rainfall data Global and West Africa 2010 - Dec 2013 0.25 degree	• CRUCL2 (10') Baseline norms 1961-1990	Worldclim data Likely to be updated 2017/2018
Future Climate Projections	• Ensenmbled and downscaled IPCC5 Europe projections using Worldclim base 1km, 4 RCPS. Temp, precipitation, RH • Futureclim 1km climate projections (2035,55,85) 1km • BIOCLIM: WorldClim Bioclimatic variables (2000, 20 ,50 ,80) 1km	• CLIMOND: Bioclimatic Variables (2030 and 2070) 5km – provides wider no of variables than BIOCLIM at a coarser resolution	
Other Climate Related Datasets	• Relative Humidity 5km & 10km present data monthly and annual min and max values, Global • Relative Humidity 5km & 10km present data summer season min, mean and max summaries, Global • MODIS Land Cover Phenology: Version 5 - 500m • FAO Length of Growing Period 5km • TAMSAT African Rainfall Climatology And Time-series TARCAT V2 •	• MODIS Snow cover: Mean percent of snow cover 2000-2008 by month 0.05 deg • MODIS Snow Cover Mean Monthly Percentage Cover by year 0.05 deg • Days above 105 degrees Fahrenheit (E-OBS data) 1km • MODIS Net Primary Productivity V5 - 1km • VEGETATION Small Water Bodies VITO/JRC - 1km	Summarised Daily wind speed (NOT direction) 25km resolution, from 1974, EU and north Africa, Agri4cast
Utility and governmental services		• Waterbase - UWWTD summarised at NUTS2 • Eurostat: Education, selected statistics • Downscaled Improved Water statistics for Europe at NUTS2 2005, 2030, 2050 • UN UIS: Public expenditure on education, percent of GDP by country for Europe • UN Millenium Development Goals: Proportion of the population using improved sanitation facilities	
Hydrography	• JRC Flood return rate projections 2 year return rates for 2000/25/35/85 – 100m • JRC Flood return rate projections 100 year return rates for 2000/25/35/85 – 100m • VEGETATION Small Water Bodies VITO/JRC - 1km	• Global Lakes and Wetlands Database - Level 3 (WWF) - 30 seconds • Global Lakes and Wetlands Database - Level 3 (WWF) - Seasonal Irregular coverage - 30 seconds • AVHRR Water Layer -1km	

Data category	Key datasets, Resolution and date	Other data available	Data available shortly
	• West Africa Land Surface Water Index MODIS V5 Oct 2010 - Dec 2013 1km • Quantitative ground water maps for Africa – BGS 5km	• Rivers: Vector Map Level 0 (DIGITAL CHART OF THE WORLD) 1:1,000,000	
Soil	• The soil water index data (SWI) Mean synoptic monthly values - 25km • Soils datasets from Oak Ridge National Laboratories - 10km	• POSTEL Soil Moisture 25-04-2004: Soil Moisture (ERS Scatterometer) - 50km	
Bio-geographical regions	• WWF Terrestrial Ecoregions and Biomes 1km • Anthropogenic Biomes 10km • West African Livelihood Zones (FEWS) – 1km	• Olson ecological zones 10k • Köppen-Geiger climate classification: Observed and projected climate shifts 1976-2100 1km	
Population distribution and Demographics	• GPW Populated Places -1km • Human Population Dataset GPW -1km • Eurostat: Population projections by NUTS2 admin areas for 2008, 2010, 2030 • GRUMP Rural Urban Extent and Masks -1km	• Populated places: Vector Map Level 0 (DIGITAL CHART OF THE WORLD) 1:1,000,000 • Night time lights datasets (NOAA/NGDC) 1km • Global Human Footprint Dataset • Night time lights averaged by admin level 2 areas - indicator of GDP • Geographically based Economic data (G-Econ): Purchasing parity GDP 5km • Distance weighted population proximity index v0.3 • UN Maternal mortality ratio by country and Infant mortality rates by country	• WorldPop Africa population and demographics at 100m. Likely updates 2018
Trade and economics	• Global GDP. 2000, 2005. gridded	•	• TRACES, UNFAO, and ETIS summaries

Full Data list

Category	Data Title	Description	Resolution	Source	Future updates
Land Cover	Corine Land Cover Rasters v15 250m		250m	Corine Land Cover (EEA)	Corine 2012 will be added shortly
Land Cover	Corine Land Cover Raster v15 100m - 1990		100m	Corine Land Cover (EEA)	Corine 2012 will be added shortly
Land Cover	Corine Land Cover Raster v15 100m - 2000		100m	Corine Land Cover (EEA)	Corine 2012 will be added shortly
Land Cover	Corine Land Cover Raster v15 100m - 2006		100m	Corine Land Cover (EEA)	Corine 2012 will be added shortly
Land Cover	Corine Land Cover Raster v15 1km - 2006		1km	Corine Land Cover (EEA)	Corine 2012 will be added shortly
Land Cover	ESA GlobCover Version 2.3 2009 300m resolution Land Cover Map		300m	ESA GlobCover	
Land Cover	ESA GlobCover Version 2.3 2009 1km resolution (resampled) Land Cover Map		1km	ESA GlobCover	
Land Cover	Percentage of total forest per land area		0.01 deg	European Forestry Institute	
Land Cover	Percentage of broadleaved forest per land area		0.01 deg	European Forestry Institute	
Land Cover	Percentage of broadleaved forest per forest area		0.01 deg	European Forestry Institute	
Land Cover	Percentage of coniferous forest per land area		0.01 deg	European Forestry Institute	
Land Cover	Percentage of coniferous forest per forest area		0.01 deg	European Forestry Institute	
Land Cover	POSTEL Forest Cover 15-06-2003		1km	POSTEL	
Land Cover	POSTEL Forest Cover 15-04-2002		1km	POSTEL	
Land Cover	Global Land Cover 2000 - derived from SPOT Imagery		1km	The Global Vegetation Monitoring Unit, JRC: http://forobs.jrc.ec.europa.eu/products/glc2000/glc2000.php	
Land Cover	Global Land Cover Forest 2000 - derived from SPOT Imagery		1km	The Global Vegetation Monitoring Unit, JRC: http://forobs.jrc.ec.europa.eu/products/glc2000/glc2000.php	
Land Cover	MODIS 500m tree cover - GLCF		0.5km	GLCF University of Maryland	
Land Cover	Percent tree cover change 1992 - 2001		1km	GLCF University of Maryland	
Land Cover	MODIS Snow cover: Mean percent of snow cover 2000-2008 by month		0.05 deg	http://nsidc.org/data/docs/daac/modis_v5/myd10cm_modis_aqua_snow_monthly_global_0.05deg_cmg.gd.html	
Land Cover	MODIS Snow Cover Mean Monthly Percentage Cover by year		0.05 deg	http://nsidc.org/data/docs/daac/modis_v5/myd10cm_modis_aqua_snow_monthly_global_0.05deg_cmg.gd.html	
Land Cover	IGBP Biome Classification, 1998	Extracted from a classification of Biomes into Standard IGBP Biomes using SPOT VGT 10 series satellite imagery.	1km	Geosuccess, (http://www.geosuccess.net), VITO Belgium	
Land Cover	World Intact Forest Landscapes	It shows the remaining blocks of forest landscapes larger than 500 sq km unfragmented by roads, settlements, waterways, pipelines, power lines etc.	1:1,000,000	www.intactforests.org	
Land Cover	Irregated Areas: Global Map of Generic-IWMI-		1km	http://www.iwmigmia.org/info/main/index.as	

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Land Cover	Grass: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,000	Mapability.com	
Land Cover	Crops: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,001	Mapability.com	
Land Cover	Tundra: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,002	Mapability.com	
Land Cover	Swamp: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,003	Mapability.com	
Land Cover	Trees: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,004	Mapability.com	
Land Cover	Combined Snow Cover Layer (MODIS and ISCCP)		1km	NASA MODIS Snow and http://isccp.giss.nasa.gov/products/browsesurf1.html	
Land Cover	Hansen Forest cover change datasets EDENext 1km	Data on request bon case by case basis only	1km	Hansen	
Land Cover	Hansen Forest cover change datasets EDENext 300m		0.3 km	Hansen	
Transport networks	JRC Accessibility Map: Estimated travel time to the nearest city of population 50,000		1km	JRC	
Transport networks	Roads: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,004	Mapability.com	
Transport networks	Eurostat: Selected transport statistics - passenger and freight volumes		NUTS2	Eurostat	
Elevation	MODIS 1km Digital Elevation Model and Land/Water Mask V5		1km	MODIS	
Elevation	The Global Land 1km Base Elevation (GLOBE) Digital Elevation Model (DEM)		1km	http://www.ngdc.noaa.gov/mgg/topo/globe.html	
Elevation	Slope from GLOBE DEM		1km	http://www.ngdc.noaa.gov/mgg/topo/globe.html	
Elevation	Terrain Ruggedness Index (TRI)		5km	http://www.ngdc.noaa.gov/mgg/topo/globe.html	
Elevation	SRTM 100m Digital Elevation VMERGE extent		0.1km	NASA	
Orthoimagery	MODIS v5: Synoptic Months 2001-2012 (smooth-fill)	Synoptic month value for each month and each band: Middle Infra-Red, Day-time Land Surface Temperature, Night-time Land Surface Temperature, Normalised Difference Vegetation Index, Enhanced Vegetation Index	1km	NASA	
Orthoimagery	MODIS v4: Synoptic Months 2001-2005 (Depreciated)		1km	NASA	
Orthoimagery	MODIS: Fourier Processed Imagery 2001-15	Tranformed Fourier Analysis: Middle Infra-Red, Day-time Land Surface Temperature, Night-time Land Surface Temperature, Normalised Difference Vegetation Index, Enhanced Vegetation	1km	NASA	

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Orthoimagery	MODIS: Fourier Processed Imagery time slice 2001-02, 2014-15	Tranformed Fourier Analysis: Middle Infra-Red, Day-time Land Surface Temperature, Night-time Land Surface Temperature, Normalised Difference Vegetation Index, Enhanced Vegetation Index	1km	*NASA*	
Orthoimagery	MODIS: Fourier Processed Imagery 2001-12 (v5 Smooth-fill - Depreciated)	Tranformed Fourier Analysis: Middle Infra-Red, Day-time Land Surface Temperature, Night-time Land Surface Temperature, Normalised Difference Vegetation Index, Enhanced Vegetation Index	1km	*NASA*	
Orthoimagery	1km Land Water Mask derived from MODIS		1km	*NASA*	
Orthoimagery	Night time lights datasets (NOAA/NGDC)		1km	NOAA/NGDC	
Orthoimagery	Night time lights averaged by admin level 2 areas - indicator of GDP		5km	NOAA/NGDC	
Orthoimagery	PROBA-V Level3 Top Of Canopy NDVI Ten-Daily Synthesis at 333M resolution - VMERGE Extent		0.333km	*VITO*	
Orthoimagery	VMERGE: MODIS Phenology 2006-2012 (Only on Request)		1km	*NASA/ERGO*	
Human health and safety	Eurostat Healthcare Indicators (2000-09) at NUTS2		NUT2	Eurostat	
Human health and safety	Projected healthcare spending for the EC (1970-2050) at NUTS0		Country	Eurostat	
Human health and safety	UN Maternal mortality ratio by country and Infant mortality rates by country		Country	UN	
Species Distribution	FAO Livestock Densities: Gridded Livestock of the World (GLW)			FAO	
Species Distribution	EDENext DMT Preliminary Livestock Distribution Models Mean outputs only (Recommended)		1km	ERGO	
Species Distribution	EDENext DMT Preliminary Livestock Distribution Models All Outputs (500MB zipped)		1km	ERGO	
Species Distribution	EDENext DMT Preliminary Goat Distribution Models Mean outputs only (Recommended)		1km	ERGO	
Species Distribution	EDENext DMT Preliminary Goat Distribution Models All Outputs (300MB zipped)		1km	ERGO	
Species Distribution	EDENext Vole Species and Biodiversity Mean Model Maps		1km	ERGO	
Species Distribution	EDENext Vole Species and Biodiversity Input Models (~1GB Download)		1km	ERGO	
Species Distribution	EDENext DMT Red Deer Models		1km	ERGO	
Species Distribution	EDENext DMT Roe Deer Models		1km	ERGO	

Species Distribution	Distribution of Major Crops (SAGE)		10km	SAGE	
Species Distribution	HarvestChoice Spatial Production Allocation Model (SPAM)		10km	Harvest Choice	
Species Distribution	IUCN Species distribution: EDENext selected species		1:1,000,000	IUCN	
Species Distribution	Current JRC Tree Species Data		1km	JRC	
Species Distribution	JRC Tree Species Suitability & Climate Change		1km	JRC	
Species Distribution	The EMMA Database: Gridded Mammal Distributions for Europe		50km	EMMA	
Species Distribution	VBORNET Gap Analysis Vector Habitat Models	Ixodes ricinus, Aedes vexans, Culex modestus, Phlebotomus perniciosus and Phlebotomus tobbi, Anopheleles plumbeus, Phlebotumus ariasi, Phlebotumus papatasi, Dermacentor reticulatus, Hyalomma marginatum	1km	VBORNET/VECTORNET	
Species Distribution	Beta Horse Density Models 1km		1km	ERGO	
Current Climate Data	Worldclim 1km baseline norms 1950-2000	Precipitation, Tmax, Tmin, Tmean	1km	WorldClim	
Current Climate Data	CRUCL2 (10') Baseline norms 1961-1990	Total Frost days, Total Precipitation, Mean Relative humidity, Mean temeperature, Total monthly sunshine hours, Temperature range, Wet days, mean windspeed.	10'	CRU	
Current Climate Data	BIOCLIM: WorldClim Bioclimatic variables 2000		1km	WorldClim	
Current Climate Data	Cmorph Daily Rainfall data West Africa 2010 - Dec 2013		0.25 deg	NOAA	
Future Climate Projections	Futureclim 1km climate projections (2035,55,85)		1km	HarvestChoice	
Future Climate Projections	BIOCLIM: WorldClim Bioclimatic variables (2000, 20 ,50 ,80)		1km	WorldClim	
Future Climate Projections	CLIMOND: Bioclimatic Variables (2030 and 2070)		5km	http://dx.doi.org/10.1111/j.2041-210X.2011.00134.x	
Future Climate Projections	IPCC5 Europe projections using Worldclim base		1km	WorldClim/ERGO	
Other Climate Related Datasets	Relative Humidity 10km present data monthly and annual min, mean and max values, Global		10km	ERGO	
Other Climate Related Datasets	Relative Humidity 10km present data summer season min, mean and max summaries, Global		10km	ERGO	
Other Climate Related Datasets	Relative Humidity 5km present data monthly and annual min and max values, Global		5km	ERGO	
Other Climate Related Datasets	Relative Humidity 5km present data summer season min, mean and max summaries, Global		5km	ERGO	
Other Climate Related Datasets	FAO Length of Growing Period		5km	FAO	
Other Climate Related Datasets	MODIS Snow cover: Mean percent of snow cover 2000-2008 by month		0.05 deg	NASA	
Other Climate Related Datasets	MODIS Snow Cover Mean Monthly		0.05 deg	NASA	

	Percentage Cover by year				
Other Climate Related Datasets	MODIS V4 Land Cover Phenology: Green up dates (superceded)		1km	NASA	
Other Climate Related Datasets	MODIS Land Cover Phenology: Senescence dates (Superceded)		1km	NASA	
Other Climate Related Datasets	Days above 105 degrees Fahrenheit (E-OBS data)	(originally 0.25deg)	1km	E-OBS	
Other Climate Related Datasets	MODIS Land Cover Phenology: Version 5 (Recommended Dataset)		0.5km	NASA	
Other Climate Related Datasets	MODIS Net Primary Productivity V5 - 1km		1km	NASA	
Other Climate Related Datasets	VEGETATION Small Water Bodies VITO/JRC - 1km		1km	VITO/JRC	
Utility and governmental services	Waterbase - UWWTD summarised at NUTS2	Urban Waste Water Treatment Directive	NUTS2	Eurostat	
Utility and governmental services	Eurostat: Education, selected statistics		NUTS2	Eurostat	
Utility and governmental services	Downscaled Improved Water statistics for Europe at NUTS2 2005, 2030, 2050		NUTS2	Eurostat	
Utility and governmental services	UN UIS: Public expenditure on education, percent of GDP by country for Europe		Country	UN	
Utility and governmental services	UN Millenium Development Goals: Proportion of the population using improved sanitation facilities		Country	UN	
Hydrography	Global Lakes and Wetlands Database - Level 3 (WWF)		30 second	WWF	
Hydrography	Global Lakes and Wetlands Database - Level 3 (WWF) - Seasonal Irregular coverage		30 second	WWF	
Hydrography	AVHRR Water Layer		1km	NOAA	
Hydrography	Rivers: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)		1:1,000,000	Mapability.com	
Hydrography	JRC Flood return rate projections 2 year return rates for 2000/25/35/85		0.1km	JRC	
Hydrography	JRC Flood return rate projections 100 year return rates for 2000/25/35/85		0.1km	JRC	
Hydrography	VEGETATION Small Water Bodies VITO/JRC - 1km		1km	VITO/JRC	
Hydrography	West Africa Land Surface Water Index MODIS V5 Oct 2010 - Dec 2013		1km	NASA	
Hydrography	Quantitative ground water maps for Africa - BGS		5km	BGS	
Soil	The soil water index data (SWI) Mean synoptic monthly values		25km	doi:10.1029/2007GL031088	
Soil	POSTEL Soil Moisture 25-04-2004: Soil Moisture (ERS Scatterometer)		0.5deg (50km)	http://postel.mediasfrance.org	
Soil	Soils datasets from Oak Ridge National Laboratories	The dataset contains 7 data surfaces: Soil bulk density (g/cm3). , Soil total	10km	http://www.daac.ornl.gov	

		nitrogen density (g/m2) , Soil field capacity (mm), Soil wilting point (mm), Soil profile available water capacity (mm), and Soil thermal capacity (J/m3/K).				
Bio-geographical regions	Olson ecological zones 10k			10km	Global Ecosystems Database, Version 2.0	
Bio-geographical regions	WWF Terrestrial Ecoregions and Biomes 1km GeoTIFF			1km	WWF	
Bio-geographical regions	Anthropogenic Biomes 10km GeoTiff			10km	http://www.ecotope.org/people/ellis/papers/ ellis_2008.pdf	
Bio-geographical regions	Köppen-Geiger climate classification: Observed and projected climate shifts 1976-2100			1km	http://koeppen-geiger.vu-wien.ac.at/shifts.htm	
Bio-geographical regions	West African Livelihood Zones (FEWS)			1km	FEWS	
Population distribution and Demographics	Populated places: Vector Map Level 0 (DIGITAL CHART OF THE WORLD)			1:1,000,000	Mapability.com	
Population distribution and Demographics	Eurostat: Population projections by NUTS2 admin areas for 2008, 2010, 2030			NUTS2	Eurostat	
Population distribution and Demographics	Night time lights datasets (NOAA/NGDC)			1km	NOAA/NGDC	
Population distribution and Demographics	Global Human Footprint Dataset			1km	http://www.ciesin.columbia.edu/wild_areas/	Updated to version 2
Population distribution and Demographics	EDENext GPW Populated Places			1km	SEDAC	
Population distribution and Demographics	EDENext Human Population Dataset GPW			1km	SEDAC	
Population distribution and Demographics	Night time lights averaged by admin level 2 areas - indicator of GDP			NUTS2	NOAA/NGDC	
Population distribution and Demographics	Geographically based Economic data (G-Econ): Purchasing parity GDP			5km	EDENext/ERGO	
Population distribution and Demographics	Distance weighted population proximity index v0.3			1km	ERGO	
Population distribution and Demographics	UN Maternal mortality ratio by country and Infant mortality rates by country			Country	UN	
Population distribution and Demographics	EDENext GRUMP Rural Urban Extent and Masks			1km	SEDAC	
Data only available on request	HarvestChoice Spatial Production Allocation Model (SPAM)			10km	HarvestChoice	
Data only available on request	Days above 105 degrees Fahrenheit (E-OBS data)				E-Obs	
Data only available on request	JRC Tree Species Suitability & Climate Change				JRC	
Data only available on request	The EMMA Database: Gridded Mammal Distributions for Europe				EMMA	
Data only available on request	VBORNET Gap Analysis Vector Habitat Models				VBORNET/VECTORNET	
Data only available on request	Relative Humidity 5km present data monthly and annual min and max values, Global				ERGO	

Data only available on request	Relative Humidity 5km present data summer season min, mean and max summaries, Global			ERGO	
Data only available on request	TAMSAT African Rainfall Climatology And Time-series TARCAT V2 - VMERGE Extent			TAMSAT	
Other Websites & data					
Agri4casts	http://agri4cast.jrc.ec.europa.eu/DataPortal/				
KNML Climate explorer	https://climexp.knmi.nl/start.cgi?id=someone@somewhere				
LDAS	https://ldas.gsfc.nasa.gov/gldas/GLDASpublications.php#_Rodell,_M.,_P._R.%20Houser,%20U.%20Jambor	*Atmospheric Composition , Water and Energy Cycle , and Climate Variability* Data	5KM		
Future data	**CCI Land cover - 300 m annual global land cover time series from 1992 to 2015**		300m/1km	ESA	
Future data	**The new water/no water mask at 150 m**		150m	ESA	
Future data	Corine Land Cover 2012 100m & 1km		100m/1km	EEA	
Future data	WorldPop population and demographics data at 100m		100m/1km	WorldPop	
Future data	MODIS: Fourier Processed Imagery projected to 2020, 205, 208 rcp6.5 1km in development		1km	NASA /ERGO	