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Abstract ID: 6O4

EUMETGRID – High resolution gridded climate dataset for Europe

Better access to high resolution gridded data at pan-European scale is considered as important in order to improve monitoring European weather and climate and to understand and predict climate variability, extremes and weather related hazards. Such information is urgent for the society to be able to adapt to and to cope with the challenges associated with a changing climate, e.g. showed a user survey carried out within the S-EUROGRID that 99% of the responders would apply a high resolution gridded dataset for Europe if such were available.

EUMETGRID is a new 4 year optional programme under EUMETNET that will run in the period 2010-2013. It aims to meet these demands by establishing high quality gridded data sets and related products and services covering all of Europe. The programme will concentrate on developing and evaluating of methodologies to establish high resolution grids based on observations from synoptic and climatological stations, building a data infrastructure to distribute and exchange gridded data and to develop products and services associated with such data.

The aim of EUMETGRID is to take advantage of all data (primarily in-situ observations) available at a national scale to establish very high resolution (preferably 1x1km^2) gridded datasets. In this respect EUMETGRID will take a distributed data base approach, building a system based on nationally tiled datasets provided *and hosted* by the individual NMSs. This decentralized approach will ensure access to the at any time best available datasets, based on full coverage of observations, best knowledge about local and regional climate conditions. National ownership is crucial for national commitment to the programme.

The long term objective of EUMETGRID programme is to build an operational platform for production and distribution of high resolution gridded climate data. The proposed activities will, as it is based on already existing and planned *national* operations and *national **and** international* infrastructure, establish a crucial input to climate change/variability assessments, decision support and adaptation. EUMETGRID will develop and implement a data infrastructure based on national contributions through distributed databases. This will ensure access to the best available gridded data for any point in Europe.

EUMETNET
The Network of European Meteorological Services

EUMETNET ECSN European Climate Support Network

Royal Netherlands Meteorological Institute
Ministry of Transport, Public Works and Water Management

Norwegian Meteorological Institute
met.no

EUMETGRID – High resolution gridded climate dataset for Europe

Ole Einar Tveito, met.no
Aryan van Engelen, KNMI/ECSN

Outline

- Background
- Objectives & Deliverables
- How to?
- Relations to other activities
- Time Frame

Background

- Access to gridded is regarded as important European wide!
  - understand and predict climate variability, extremes and (weather related) hazards
  - cope with a changing climate
- S-EUROGRID survey: 99% of responders would use a pan-European high spatio-temporal gridded dataset.

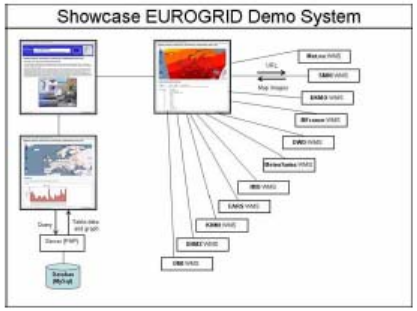
History

- ECSN GIS-project (ZAMG, met.no)
- ECSN European Climate Atlas (MeteoFrance)
- ECA & D
- UNIDART
- HRT/GAR
- COST 719 ”The use of GIS in Meteorological and Climatological Applications”
- NORDKLIM Nordic Maps (2000, 2001), GRID (2004-
- Carphatian Basin Climate Atlas
- MAP
- ENSEMBLES
- etc……..

Showcase EUROGRID

EUMETNET
The Network of European Meteorological Services

EUMETNET/ECSN Programme Showcase EUROGRID
Final Report

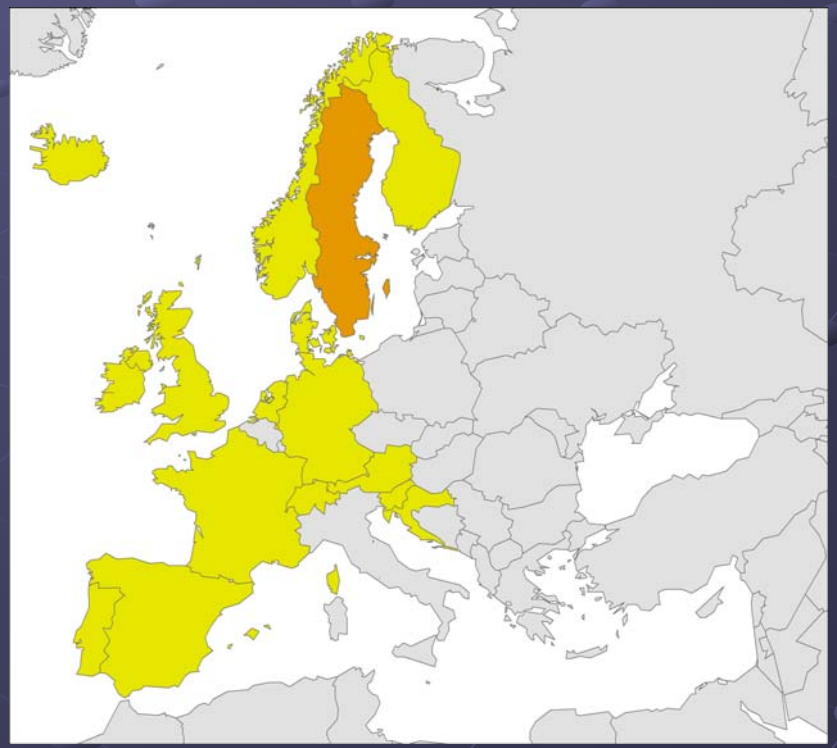


Prepared by Showcase EUROGRID Partners - Programme Manager Christer Persson SMHI

Important! The paper has yet to be submitted to EUMETNET Council and as such, the recommendations have not been considered or approved

February 2009

- 2007-2008
- Responsible member: SMHI
  Christer Persson (PM) & Heiko Klein.



S-EUROGRID conclusions

- There is a need for access to pan-European high-resolution gridded climate information.
- There is a need for downstream services based on pan-European high-resolution gridded climate information.
- The concept of EUROGRID will need to allow for taking into account different data policies.
- There is a need for coordinated and standardized access to distributed data.
- OGC-standards have proven to satisfy many of the requirements. This is evident from the Showcase demo system and experiences from the operational systems like “senorge.no” and “yr.no” hosted by participant met.no.

S-EUROGRID recommendations

A full EUMETGRID will complement the on-going re-analysis and observational interpolation initiatives by:

- Providing access to gridded climate data that already exist.
- Providing a new pure in-situ based pan-European gridded observational climatology based on tiled national datasets. Each country will be responsible for generating their own national grids.
- Cooperate with and take advantage of other initiatives providing gridded data, e.g. the proposed EURO4M FP7 project and/or EURRA and climate-related SAF activities.
- Providing a platform for delivering products based on distributed gridded climate datasets. As illustrated by the Showcase, the integration of information across different environmental themes can lead to a wealth of new products and applications. This cross-theme usage of information will be especially important in the light of SEIS.

Deliverables

Production of national gridded datasets to be tiled to pan European gridded datasets,

- based on high quality high temporal and geographical resolution in situ observations from the national NMHS's
- covering with a time span from ca. -100 years up to present (from climate monitoring to now-casting),

especially suitable for the development of national and European scale products for:

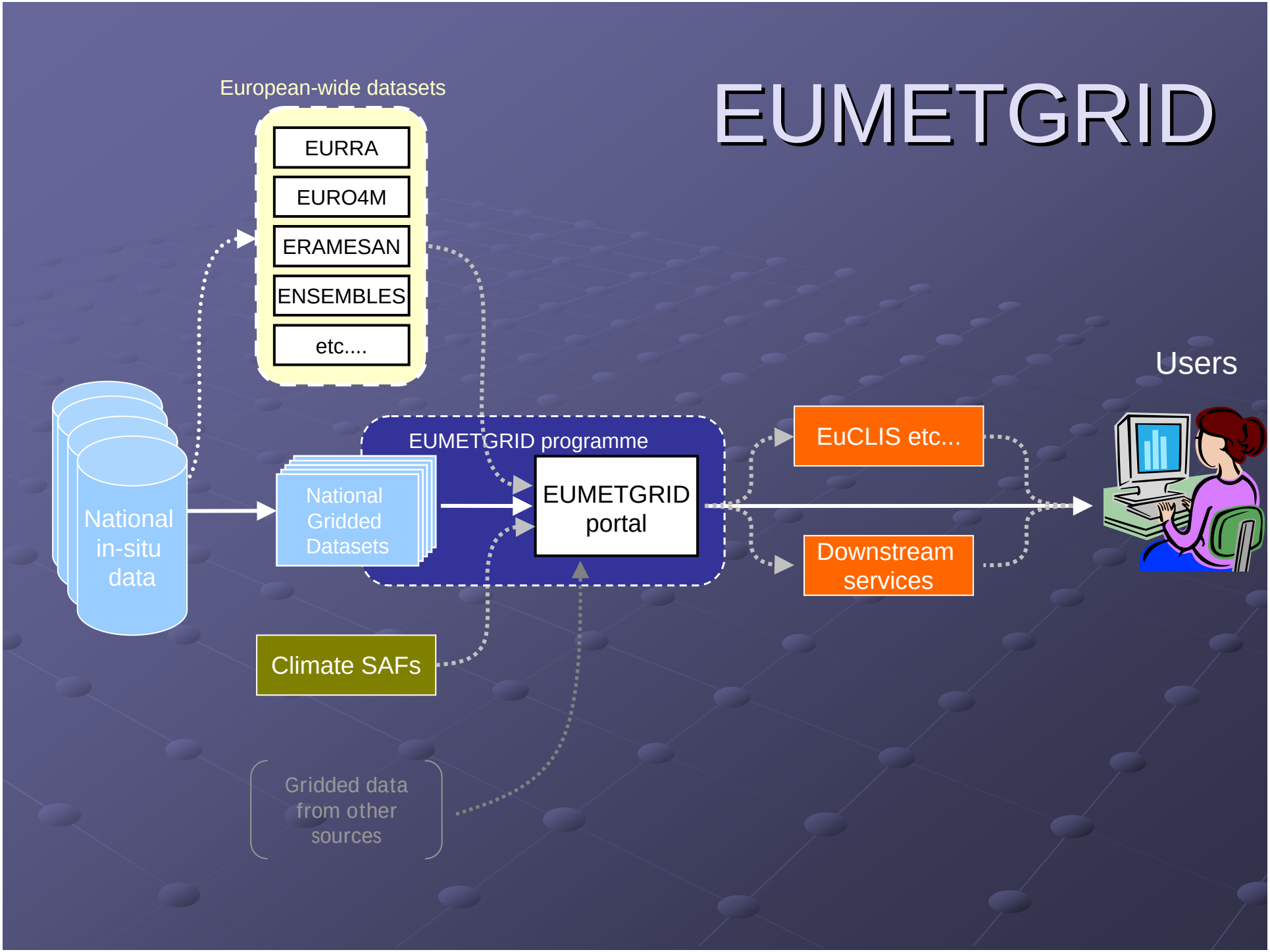
- Assessing climate change of extremes, notably precipitation
- Climate monitoring time series in graphs (in situ) and maps: (sub)regional, Europe
- Detailed near real time monitoring and warning products including e.g. Extreme event monitoring (heavy rainfall and flooding, heat waves and droughts)
- Food and safety (agro-ecology, food production, frost risk, plant diseases)
- Energy, production and consumption

Scope

- *Variables:* EUMETGRID will focus on atmospheric surface climate:
  - **key** parameters:
    - air temperature
    - precipitation
    - air pressure
    - snow cover
  - **additional** parameters:
    - surface radiation budget,
    - wind speed and direction, and water vapour.
  - **Optionally** EUMETGRID will also include upper-air climate data.
- *Area:* EUMETGRID will cover Europe in its entirety.

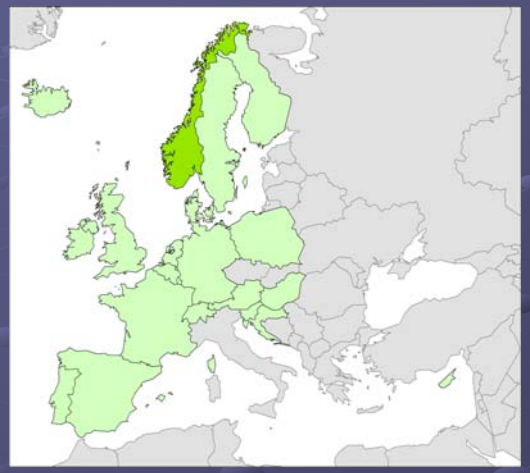
  The extent of the datasets will encompass the EUMETNET area, WMO Region VI, Europe as defined by EEA, the African Mediterranean countries and the countries of the Middle East.
- *Resolution:* EUMETGRID will provide multi-decadal gridded datasets down to 1 km horizontal and 1-day temporal resolution.
- *Period:* EUMETGRID will include the past 50-100 years with a focus on 1971 till present.

EUMETGRID

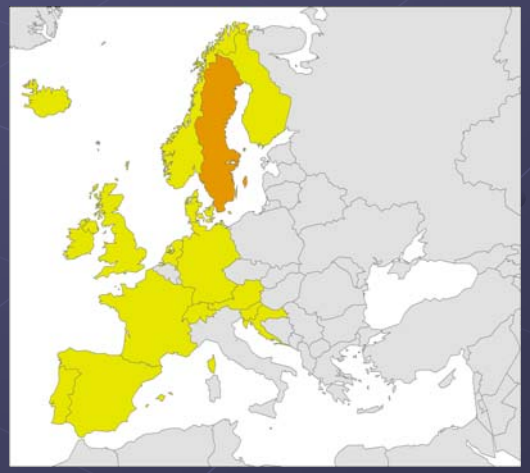

European-wide datasets
EURRA
EURO4M
ERAMESAN
ENSEMBLES
etc....
Users
EUMETGRID programme
National in-situ data
National Gridded Datasets
EUMETGRID portal
EuCLIS etc...
Downstream services
Climate SAFs
Gridded data from other sources

EUMETGRID - approach

- Achievable and affordable also for smaller NMSs
- Keep it simple s....



EUMETGRID



S-EUROGRID

EUMETGRID

- develop and evaluate methodologies to establish high resolution grids based on observations from synoptic and climatological stations,
- build a data infrastructure to distribute and exchange gridded data
- develop products and services associated with such data.
- establish very high spatial (preferably 1x1km2) and temporal (at least daily) resolution gridded datasets using in-situ observations as input. The dataset should take advantage of all information that is available at a national scale.
- distributed data base approach, building a system based on nationally tiled datasets provided and hosted by the individual NMSs. A decentralized approach will ensure access to the at any time best available datasets, based on full coverage of observations, best knowledge about local and regional climate conditions. National ownership is crucial for national commitment to the programme.

Benefits

- More input data
- Clearer ownership
- Best available data
- Local knowledge
- No duplication
- Better national grids
- Added value
- INSPIRE, WMO WIS, SEIS compliancy
- Data policy
- Re-useable technology
- Downstream services

So what should EUMETGRID include?

- Image information (for quick viewing)?
- Possibilities to access the real data?
  - how handle the national tiles in the same request?
  - how to include national policies
- Applications and products
  - different users → different needs!
  - monitoring system. Could EUMETGRID include a frequently updated ”low”-resolutions overview of Europe based on reduces number of stations?
    - climate anomalies…
  - built in analysis? ”On the fly” or predefined analysis products?

Organisation

- A programme management committee consisting of one member from each participating country. In addition will the ECSN PM and EUMETNET Executive Director be members of the committee.
- A core group consisting of the responsible member and the WP-leaders. The main focus for the Core group is to coordinate WP1-3, report to EUMETNET and ECSN, and to have tight contact with other activities, users etc.
- Working groups consisting of national experts within the field. The number of experts within each of these working groups should be limited to max 8-10 persons in order to better focus on programme targets.

Work packages/groups

- WP1: operational gridding systems
  - coordinate the delivery of national, regional and European gridded data sets within the standards provided by WP2.
  - establish a “best practice” for data exchange between neighbouring countries in order to ensure consistency in the national grids along the borders
  - identify which national and European wide datasets that could be made available in EUMETGRID

Work packages/groups

- WP2: gridding methods and data infrastructure
  - review and evaluation of existing gridding methods and for specifications of requirements on observations and explanatory data (incl. experiences from S-EUROGRID, ENSEMBLES, MAP and COST Action 719 + national activities).
  - establish tools for efficient managing and distributing gridded data, according to the standards and specifications defined by INSPIRE, SEIS, WMO, ISO and OGC, and most probably be compliant to WMO WIS
  - specify the protocols for gridded data distribution most suitable for implementation at all partners of the programme.

Work packages/groups

- WP3: applications and products
  - develop standard products and applications based on the gridded data made available in EUMETGRID .
  - establish a web-portal with an easy access to applications and products.
  - Identify and set up demo-projects for the portal based on tight cooperation and contacts with user communities in order to define their needs and requirements.

Work packages/groups

- WP4: management
  - running the programme
  - search for third party funding
  - outreach and dissemination

How ?

- EUMETGRID Annual meeting (annual management committee meetings)
- AdHoc WP-group and core group meetings (1-2 pr. Year/group)
- Workshops and seminars (on selected topics, open to all EUMETGRID participants)
- Set up a wiki web-site with restricted access for discussion, documentation etc.

Next steps

- Get started!!
  - Kick-off meeting, Oslo, 1.5 days, last week of January 2010. To be checked….

➔ Bridging period

Bridging period (=2010 - 2011)

- Initial phase!!

- Getting started!!
  - identify existing
    - datasets
    - solutions for producing and managing such data
  - establish specifications for evaluation and testing methodology
  - establish specifications for the data infrastructure and technical solutions for distributing/accessing data
  - Establish collaboration with other activities, like Euro4M.

- Seek third party funding (FP7, others….)

Bridging period (=2010)

- Set up a primary list of products and applications (based on user requirements)
- Define key climate elements to be included in the first phase (based on availability and user needs).
- DELIVERABLE: A demonstrator (based on the S-EUROGRID demo-portal).

Relations to other activities

- EURO4M
  - FP7 project
  - 9 partners
  - parallel objectives to EUMETGRID → mutual benefits and synergies
  - include re-analysis and remote sensing
- ECA & D
  - Host station data
  - Depository for the ENSEMBLES gridded dataset
  - Will be linked with EUMETGRID as one of the data providers
- EURRA
  - European regional reanalysis.
  - ECMWF and EEA.
  - Plans only? Not very much has happened since 2005….

INSPIRE, SEIS, WMO WIS, GMES, ...

EUMETGRID will:

- be compliant to these guidelines and initiatives.
- follow ISO/WMO/OGC-standards

- be an important contribution to GMES and thus the European contribution to GEOSS and as data portal for environmental assessments inline with the INSPIRE Directive and SEIS.

Oslo - declaration

- In the spirit of the INSPIRE directive, the EUMETNET members should expand the set of graphical products accessible free of charge to the public for general purposes, through the viewing services of their respective web sites, whilst continuing to license as appropriate the underlying digital data and products.

- In the context of GMES, meteorological data and products required by the operators of the GMES Core Services to deliver new, non meteorological public good services, could be licensed to them at no information cost to fulfil their production duties, subject to commitment from EU and national authorities to fund these Core Services on a sustainable basis.

Third party funding

- EU FP7
- ERA NET
- EEA and others….

- FP7 theme 6 Environment/Climate Change, application deadline: **5.January 2010!!!!!**

Next steps

- EUMETNET Council: appoint CM. (Approved yesterday).
- A detailed work plan should be established
- Set up the core group
- Kick-off meeting: January/February? In Oslo?
- Organize the ”gridding” session at next EMS/ECAC, make it more ”visible”… (now such contributions are spread…).

www.eumetgrid.eu

ole.einar.tveito@met.no

Benefits

- **More input data**

  The individual national gridded datasets can use the full climate and precipitation networks within each country. If a single European-wide grid were produced then the data would need to be collected together and it is certain that the total number of stations would be less because of the different data policies in each country.

- **Clearer ownership**

  Each country would retain ownership of, and responsibility for, its own national gridded datasets. A single European-wide grid would have uncertain ownership.

- **Best available data**

  Many countries generate several versions of each grid e.g. first in near-real time then after quality control of the data. A tiled approach has the flexibility to cope with different updating schedules in each country. By automatically incorporating the latest version of each of the national grids, the EUROGRID system would create a composite grid that was always composed from the best available data.

- **Local knowledge**

  The experts in each NMHS are the people with the most experience of producing gridded climate data for their country. A tiled approach makes best use of this expertise.

Benefits

- **No duplication**

  Even if a single European-wide grid were produced it is likely that individual countries would continue to produce their own national grids (because they could incorporate more data). This could lead to confusion amongst users by giving them two versions to choose from. Creating a European composite from the national grids avoids this potential duplication.

- **Better national grids**

  The quality of individual national grids should benefit from the exchange of scientific knowledge, tools and techniques and from the proposed exchange of data in border areas. This will enable the NMHSs to provide national gridded data in a harmonized way and to improve the national datasets in the border regions. The tiled approach ensures reasonable consistency between the national gridded climate dataset.

- **Added value**

  In some countries there are parts of the climate data archive that are little used other than to create 30-year normals. By encouraging all project participants to generate grids of monthly and daily data this will add value to an under-used resource.

Benefits

- **INSPIRE, SEIS and WMO WIS compliancy**

  A future EUROGRID system will need to be compliant to international guidelines concerning spatial data infrastructure. By incorporating the national grids in the EUROGRID portal this will help individual NMHSs achieve compliancy for their gridded climate data.

- **Data policy**

  The tiled approach provides a solution where a single European-wide grid probably would not be realized due to the (different) data policies.

- **Re-useable technology**

  WMS technology has uses outside of climatology e.g. distribution of forecast data. Investing in this technology for the EUROGRID project has potential benefits for other services. The use of open standards opens the possibilities to combine/harmonize climatological and real-time/forecast meteorological data.

- **Downstream services**

  The proposed approach facilitates the development of commercial downstream services from national gridded climate data and for the NMHSs to get a feeling what kind of downstream services are necessary for the users. This can explore new technical opportunities for new added-value services and applications.