

The Campus Ecosystem for Computationally Intensive Research — ManUniCast

ManUniCast

<http://www.manunicast.com>

is a service run by the Centre for Atmospheric Science

<http://www.cas.manchester.ac.uk>

at the University of Manchester.

The service started as a project to build a real-time weather and air-quality forecasting website which could be used as an educational tool by students of The University and the general public.

Forecast Information

Two types of forecasts are made on ManUniCast:

- meteorological, such as temperature, rainfall,

humidity and wind speed and direction;

- air-quality, such as the mixing ratios of sulphur dioxide, nitrogen dioxide and other pollutants, and the mass loadings of particulate matter (e.g., PM10, aerosol particles with diameter up to 10 nanometers).

Daily Forecasts (below)

1. Every day, global meteorological and chemical forecasts are downloaded from the NOAA Global Forecast System and the MOZART-4/MOPITT global chemistry model and used as input (i.e., initial conditions) for the model.
2. Two computational runs are carried out, one using the Weather Research and Forecasting model (WRF) and the other using the WRF coupled with additional routines for modelling

chemical processes in the atmosphere, WRF-Chem.

3. Numerical output from the model is used to make the images and videos used in the forecasts available at the ManUniCast Website (see URL above).

All computational, storage and Web infrastructure requirements are met by the University CIR Ecosystem.

Forecast Maps (right)

The maps on the right show:

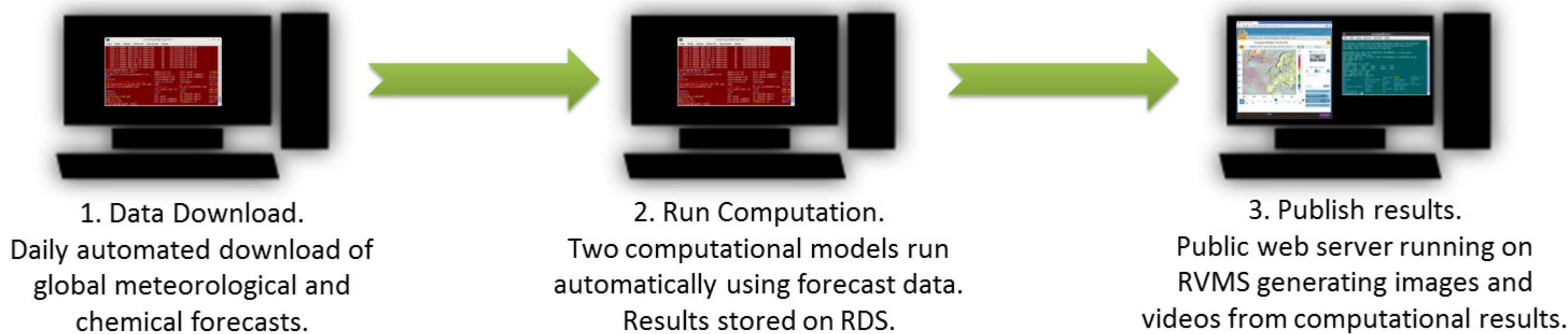
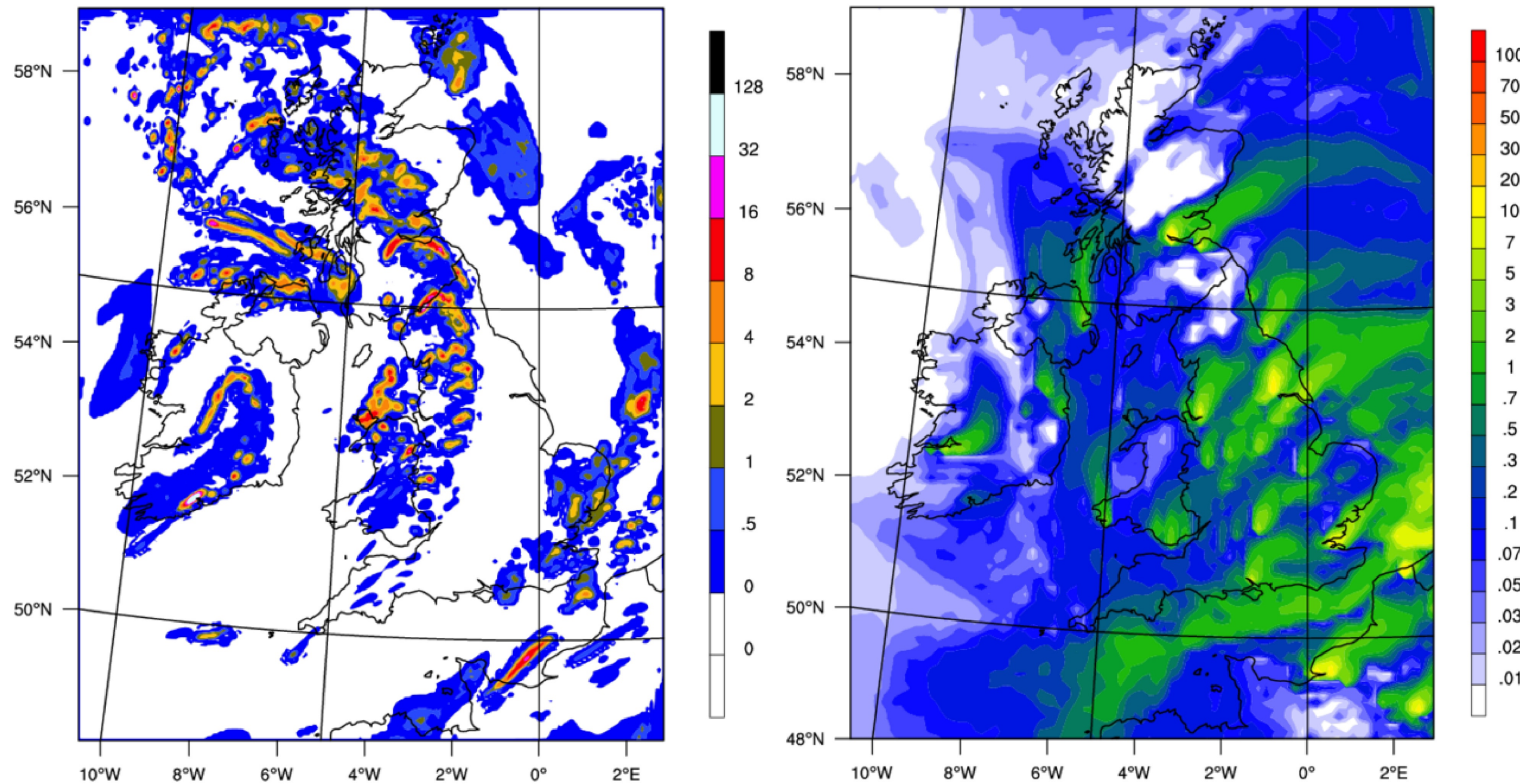
- Sulphur-dioxide mixing ratio.
- Rainfall in mm per hour.

More Information

Please contact Prof. David Schultz, or Prof. Gordon McFiggans of the School of Earth, Atmospheric and Environmental Sciences.

Credits

ManUniCast was created by the Centre for Atmospheric Sciences and the eLearning Team at the University of Manchester. Thanks to the hard work of David Schultz, Stuart Anderson, Jonathan Fairman, Doug Lowe, Gordon McFiggans, Ryo Seo-Zindy, and Elsa Lee. Also, thanks for the support of Dean Tony Brown, Alison Hamilton, Simon Hood, and Chris Paul. ManUniCast was funded by grants from the Geography, Earth, and Environmental Sciences Subject Centre of the UK Higher Education Academy and the eLearning Team.



Proxy
RQ
RDS

RQ
RDS

RVMS
RDS

What is the CIR Ecosystem?

Ecosystem Overview

The Computationally-Intensive Research Ecosystem is a response to feedback asking for an *integrated* system of infrastructure designed to address all aspects of research groups' computational work and requirements. It comprises:

- traditional batch computational facilities, including the Computational Shared Facility (CSF);
- a facility for interactive computation, e.g., for development work (iCSF);
- high-capacity, resilient storage (RDS);
- a dedicated, secure, fast network linking all

computational facilities and storage (RDN);

- a virtual machine service for research groups (RVMS);
- a cluster for sharing emerging technology hardware (Zrek);
- a virtual desktop service and SSH gateway.

The UoM CIR Ecosystem: A Flexible Resource

The University of Manchester CIR Ecosystem is a flexible, agile resource for local researchers. It is complementary to — different from — regional and national services.

IT Services Research Infrastructure Team

For more information about the University of Manchester CIR Ecosystem, please contact the IT Services Research Infrastructure Team

its-ri-team@manchester.ac.uk

Alternatively, please visit our Web site

<http://ri.itservices.manchester.ac.uk>

ManUniCast and the UoM CIR Ecosystem

Ecosystem Components used by ManUniCast

Redqueen

Redqueen is a high performance computing (HPC) cluster located at the University of Manchester, managed by the Research Infrastructure Team, within IT Services.

Like the Computational Shared Facility, Redqueen is built on a shared model of contributions of funds from academic research groups. Within the CSF, most compute nodes are shared amongst all contributors. However, within Redqueen, individual nodes are owned by the contributing groups and may therefore be used and configured almost entirely as the owners wish.

Redqueen is used by the ManUniCast service: the nodes owned by the Centre for Atmospheric Science are reserved every day to ensure that forecasts are completed on time.

Research Data Storage (RDS)

IT Services provides centrally-hosted and administered data storage for research staff and students — the Research Data Storage service. Some storage is available to each academic-led research project at no charge. Further storage will be charged for. (This storage is commonly referred to as Isilon.)

This service is used to provide common storage across facilities within the Ecosystem, such as Redqueen and the RVMS (see below). Storage shares are also accessible to desktop and laptop machines on the University campus.

The RDS provides storage common to Redqueen and the ManUniCast Web server (which is located in the RVMS — see below).

To find out more about the RDS, please visit

<http://www.rds.manchester.ac.uk>

Research Data Network (RDN)

Many users of CIR infrastructure have large quantities of data which must be moved from experimental instruments to the RDS and/or from the RDS to a computational facility. This requirement is satisfied by the RDN which connects all nodes on all facilities within the Ecosystem to the RDS over a fast, dedicated and secure network.

The RDN connects Redqueen and the RDS.

Web Proxy

Most computational and storage components of the Ecosystem are accessible from on University campus, only, for security reasons. To enable downloads from off-campus, a Web proxy is provided.

ManUniCast cron jobs automatically download datasets onto Redqueen (on storage mounted from the RDS) via the proxy.

Research Virtual Machine Service (RVMS)

The RVMS provides virtual machines to research groups on which PIs and their team may have OS administrator/root privileges. This service is located on the same resilient, professionally-managed infrastructure as other IT Services VMs. The primary use of this service is expected to be for public-facing Web servers which access data located on the RDS service.

The ManUniCast Web server is located within the RVMS.

