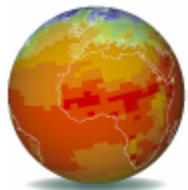


Latest developments in *climateprediction.net*

Andy Bowery

BOINC Workshop Grenoble 2013



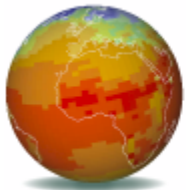
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Overview of talk

- Introduction to *climateprediction.net*
- Remote workunit submission
- Ongoing work
- New website



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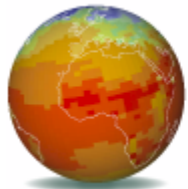
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Introduction to *climateprediction.net*

- *climateprediction.net* has recently passed the 10 year milestone
- *climateprediction.net* is the **world's largest climate modelling facility**, no other climate science group is able to run so many simulations on a study
- For example, in *climateprediction.net* a typical ensemble size for a study is of the range of thousands (for example: 2,000 simulations, 4 x 500 parameter sets)
- This is compared to the UK Met Office QUMP study which is looking at perturbed physics parameters, in this study 128 simulations have been run



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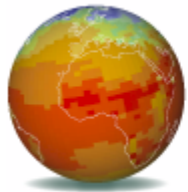
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What do we study in *climateprediction.net*?

- A large amount of research has been done on global mean temperature, but the greatest impacts are likely to be seen at local/regional scales (this is especially with regards to extreme events)
- We also want to investigate how **the risk of extreme weather events** has changed due to human influence -> so-called 'event attribution experiments'
- And **how the climate might change** in the future with higher levels of CO₂, SO₂, Ozone emissions
- **Two types of studies:**
 - **perturbed physics** (to study the uncertainty arising from how we represent physical processes in the model) -> 500 different arrangements of 12 parameters are used
 - **initial conditions perturbations** -> model's initial state of atmosphere is uncertain (aka 'the butterfly effect') -> can sample many possible initial states of the model given the forcings



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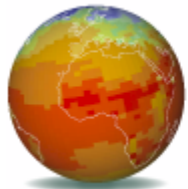
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Why do we use BOINC?

- Most climate science based on **probabilistic results** -> a distribution of scenarios is needed
- > BOINC framework **allows large number of models** (order of thousands) to be run
- > This allows experiments to be designed to be large enough so that missing results do not matter
- > We can get a better handle on uncertainties, especially with extreme events, which may occur for example, 1 in 100 years or 1 in 1000 years



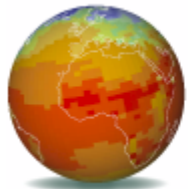
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Current applications in *climateprediction.net*

- We currently have three applications that are being used for studies, all use computational models developed at Hadley Centre in the UK Meteorological Office:
- A **Weather At Home European region** application -> a European regional model nested in a global model -> runtime of 4.5 days (average) -> each workunit produces 13 upload files
- A **Weather At Home Pacific North West region** application -> A North Western US regional model nested in a global model -> runtime of 4.5 days (average) -> each workunit produces 13 upload files
- A **HadCM3** coupled atmosphere-ocean application -> runtime of 1 month (average) -> each workunit produces 4 upload files
- Accessing these large numbers of files is time consuming for remote collaborators



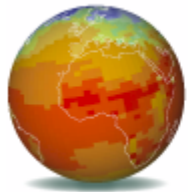
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Workunit Submission

- Collaborators in the *climateprediction.net* project are distributed across a number of countries: New Zealand, Australia, US, and India
- Currently all new workunit submissions go through myself
- In the longer term we want to decentralise the project out to collaborators to remove this dependency and to enable the collaborators better access to their data
- We need a mechanism for collaborators to be able to:
 - test work remotely
 - remotely submit work to the main site
 - receive completed results directly to their home machine organised by study



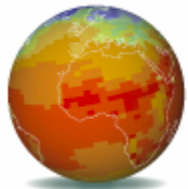
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Remote Workunit Submission

- Solution -> the production of a new portal for remote submission of new workunits. Portal built with the PHP Cake framework and the BOINC api
- A request ID given to each group of workunits submitted
- Request ID is part of the workunit name -> enables the linking of an individual workunit to the originating request and enables the organisation of the returned uploaded files
- Users limited to a maximum number of workunits submitted per request
- Users upload to the portal both the workunit defining XML file and the supporting data files for the workunits -> There is one XML file per request
- Users are organised into research groups
- Queuing mechanism allows multiple users to submit at the same time

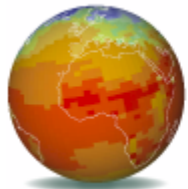
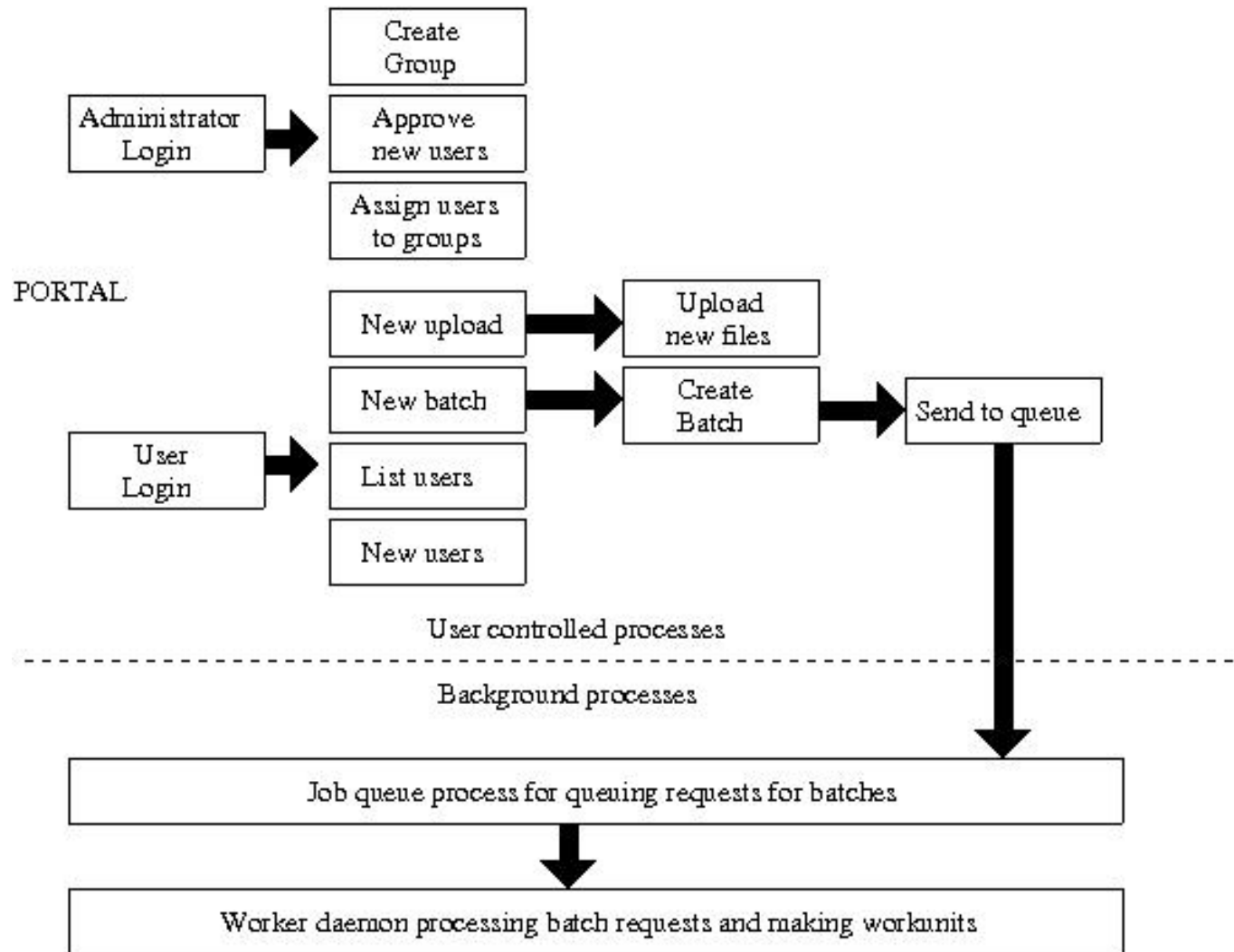


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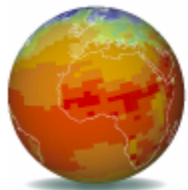
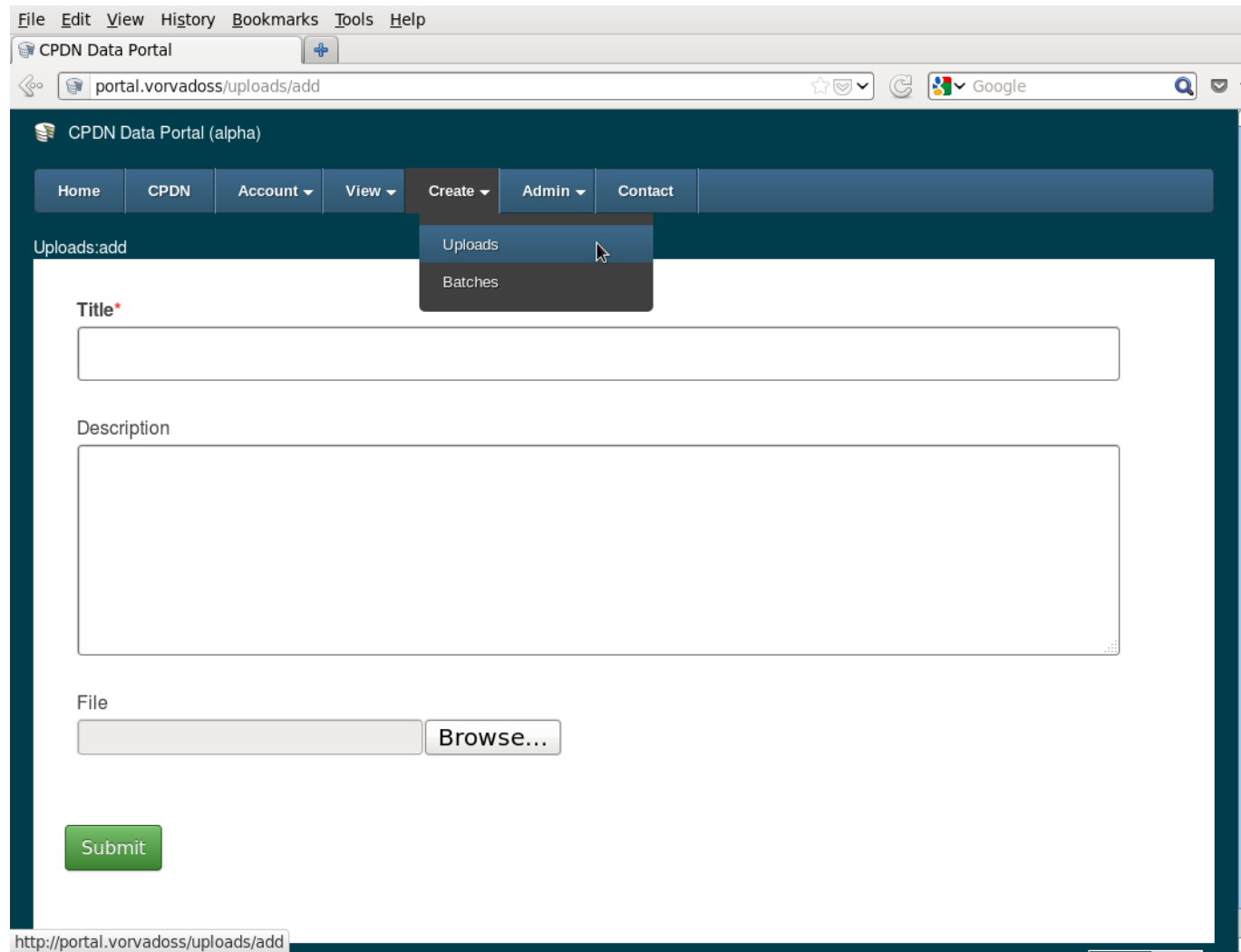
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Portal - Workflow



Portal – Upload submission files



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Portal – Submit group of new WUs

CPDN Data Portal (alpha)

Home CPDN Account View **Create** Admin Contact

Batch:add

Uploads
Batches

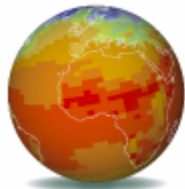
Create a new batch of CP

You will need to choose an XML batch definition file from the list below (when a button to allow you to do so has been provided). This system will then, as if by magic, do all the necessary checks and create the work.

Make sure you have all the necessary files uploaded already and your XML is correct, if you know what's good for you &c.

Available XML files

Id	Title	Description	Filename	Filesize	Filemime	Created	Modified
511cfd9-51d4-4649-823b-4cc28143c37a	XML file	Update to test remote file downloading.	test_input.xml	8269	text/xml	2013-02-14 15:08:41	2013-02-14 15:08:41
51370fa0-ae50-48af-8730-76aa8143c37a	Andy's new XML template	For hadam3p_eu, stash and name list local, all others remote.	test_input_andb_3.xml	2003	text/xml	2013-03-06 09:42:56	2013-03-06 09:42:56
513f37e7-ba3c-4a78-b94e-76b28143c37a	Modified Andy test XML	Three files have been removed in the hope that this will match the templates in the cpdnboinc_alpha \$HOME.	test_input_andb_4.xml	1664	text/xml	2013-03-12 14:12:55	2013-03-12 14:12:55
51a8bdbe-f3ec-4846-922d- http://portal.vorvados.com/batch/add	Andy's workunit	This file sent to me with incorrect data in	test_input_andb_5_updated.xml	1686	text/xml	2013-05-31 15:11:58	2013-06-03 08:19:36



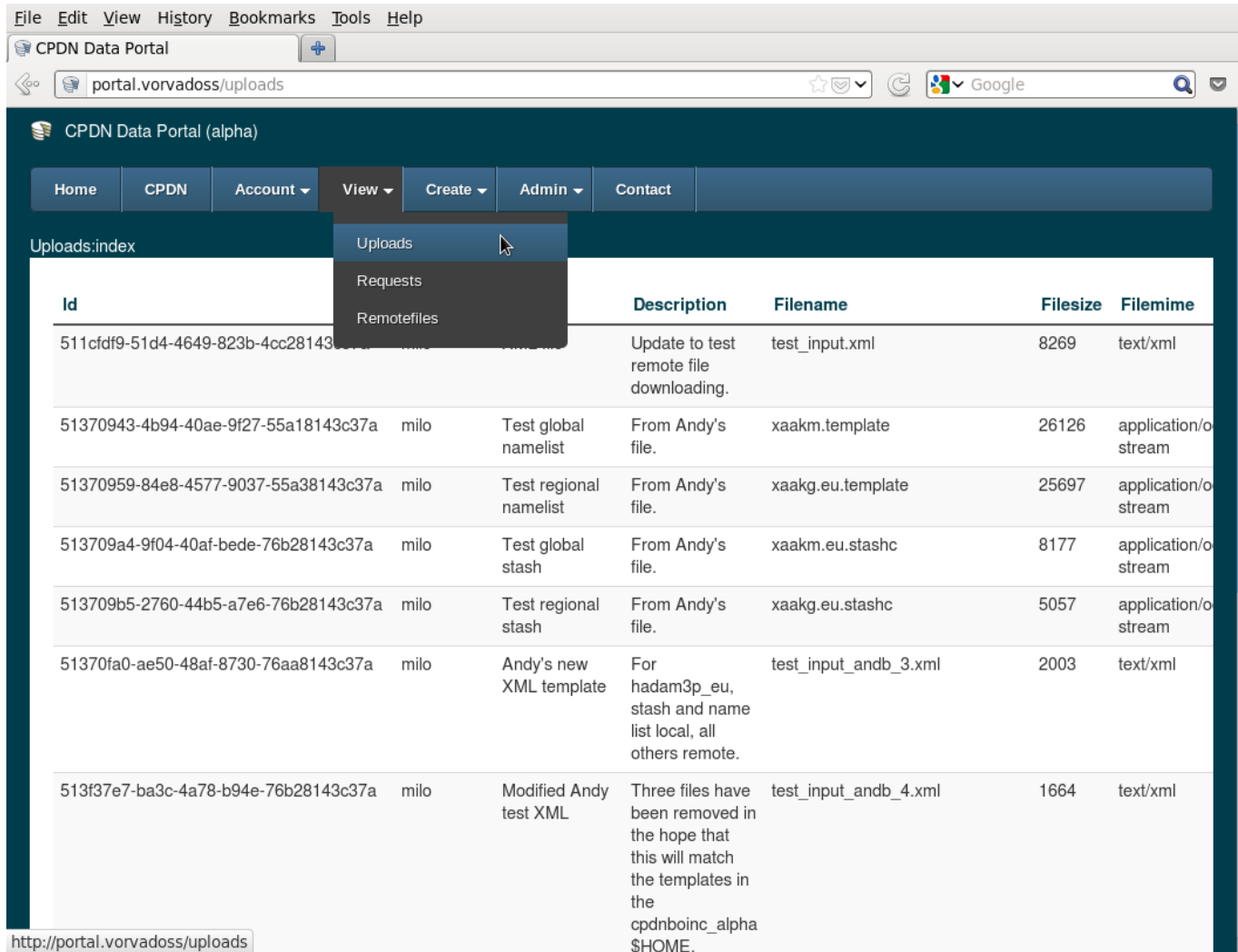
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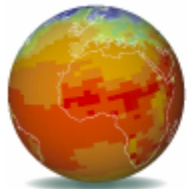
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Portal – List all files uploaded



The screenshot shows a web browser window displaying the CPDN Data Portal. The address bar shows the URL `portal.vorvadoss/uploads`. The page title is "CPDN Data Portal (alpha)". A navigation menu includes "Home", "CPDN", "Account", "View", "Create", "Admin", and "Contact". The "View" menu is open, showing "Uploads", "Requests", and "Remotefiles". The "Uploads" menu item is selected, and a table of uploaded files is displayed.

Id	Description	Filename	Filesize	Filemime
511cfd9-51d4-4649-823b-4cc28143...	Update to test remote file downloading.	test_input.xml	8269	text/xml
51370943-4b94-40ae-9f27-55a18143c37a	Test global namelist From Andy's file.	xaakm.template	26126	application/octet-stream
51370959-84e8-4577-9037-55a38143c37a	Test regional namelist From Andy's file.	xaakg.eu.template	25697	application/octet-stream
513709a4-9f04-40af-bede-76b28143c37a	Test global stash From Andy's file.	xaakm.eu.stashc	8177	application/octet-stream
513709b5-2760-44b5-a7e6-76b28143c37a	Test regional stash From Andy's file.	xaakg.eu.stashc	5057	application/octet-stream
51370fa0-ae50-48af-8730-76aa8143c37a	Andy's new XML template For hadam3p_eu, stash and name list local, all others remote.	test_input_andb_3.xml	2003	text/xml
513f37e7-ba3c-4a78-b94e-76b28143c37a	Modified Andy test XML Three files have been removed in the hope that this will match the templates in the cpdnboinc_alpha \$HOME.	test_input_andb_4.xml	1664	text/xml

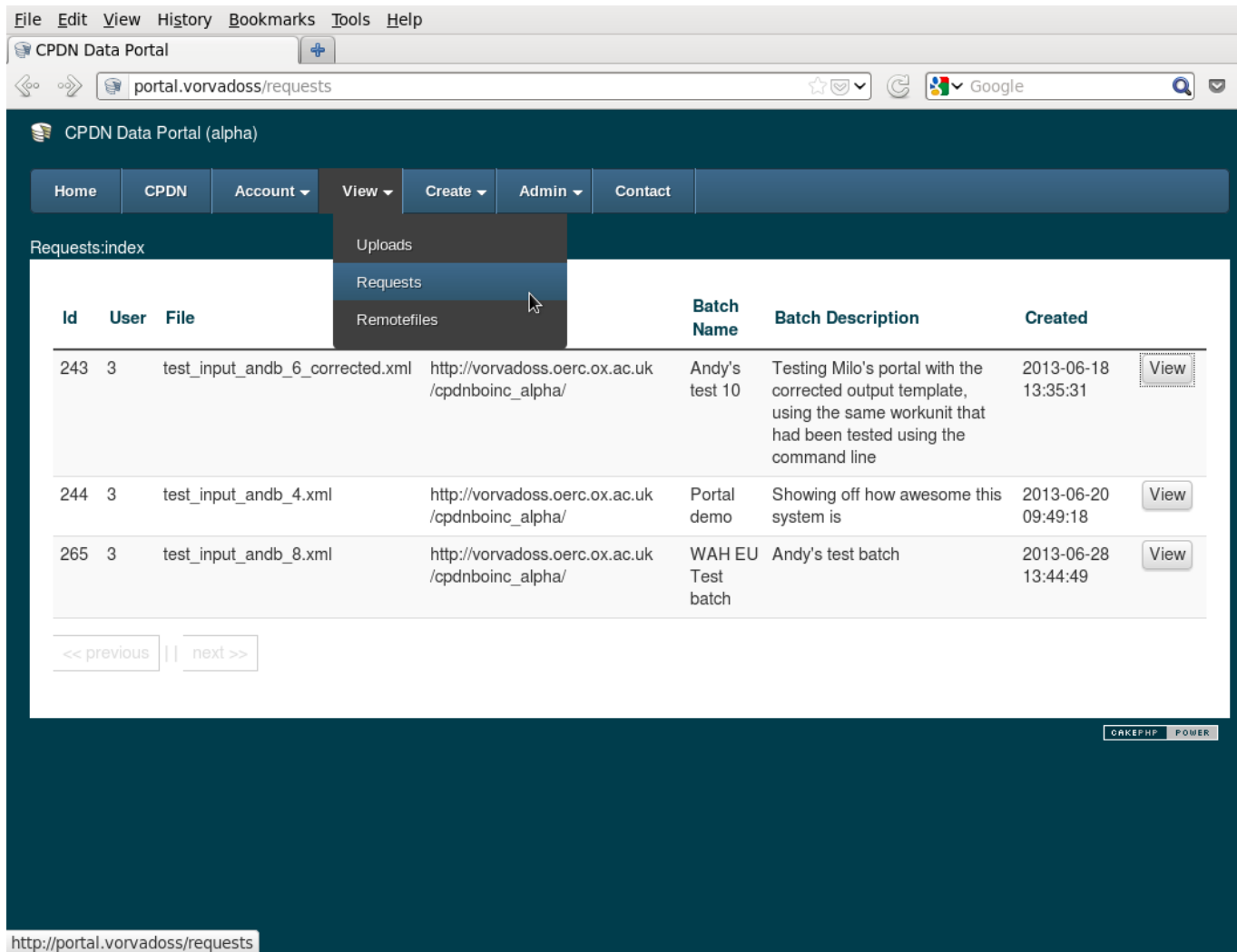


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Portal – View submissions



The screenshot shows a web browser window displaying the CPDN Data Portal. The browser's address bar shows the URL `portal.vorvadoss/requests`. The page title is "CPDN Data Portal (alpha)". A navigation menu includes "Home", "CPDN", "Account", "View", "Create", "Admin", and "Contact". The "View" menu is open, showing options for "Uploads", "Requests", and "Remotefiles". The "Requests" option is selected, leading to a table of submissions.

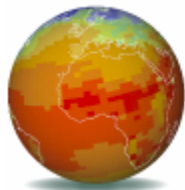
Requests:index

Id	User	File		Batch Name	Batch Description	Created	
243	3	test_input_andb_6_corrected.xml	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/	Andy's test 10	Testing Milo's portal with the corrected output template, using the same workunit that had been tested using the command line	2013-06-18 13:35:31	View
244	3	test_input_andb_4.xml	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/	Portal demo	Showing off how awesome this system is	2013-06-20 09:49:18	View
265	3	test_input_andb_8.xml	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/	WAH EU Test batch	Andy's test batch	2013-06-28 13:44:49	View

<< previous || next >>

CRKPH.P POWER

<http://portal.vorvadoss/requests>



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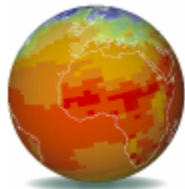
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Portal – View all uploaded files

The screenshot shows a web browser window displaying the CPDN Data Portal. The address bar shows the URL `portal.vorvadoss/remotefiles`. The page title is "CPDN Data Portal (alpha)". A navigation menu includes "Home", "CPDN", "Account", "View", "Create", "Admin", and "Contact". The "View" menu is open, showing options for "Uploads", "Requests", and "Remotefiles". The main content area displays a table of uploaded files with columns for "Id", "Username", "Fileuri", "Filesize", "Md5", and "Date". Each row includes a "View" button. The table contains 10 entries, all uploaded by "milo" on 2013-05-17.

Id	Username	Fileuri	Filesize	Md5	Date	
9	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/xaclfa.start.0000.gz	26657809	6c754ee3406c6cf6614bd6897ab4c494	2013-05-17 11:21:05	View
10	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/dchapa.start.EU.b.new.0000.gz	6450624	605fb32cdfd0af5263dddb8110c5aa6c	2013-05-17 11:21:05	View
11	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/ic19610304_14_N96.gz	1313976	3cfd8bc7f05b25e09eeaa50886e1d0bb	2013-05-17 11:21:05	View
12	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/HadISST_SST_N96_SST_95_1_01f.gz	3405175	27a0c14645cec72c9f2097e37856b892	2013-05-17 11:21:05	View
13	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/HadISST_SI_N96_SI_95_1_01f.gz	834721	3ac400f3da512ef93051bfaca2a7f233	2013-05-17 11:21:05	View
14	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/so2dms_N96_1999_12_2002_02.gz	3174862	1f4515a67ee4125342f0b32da62bfe0c	2013-05-17 11:21:05	View
15	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/oxi.addfa.gz	82651774	2675710126e914da296a3e770f18ec76	2013-05-17 11:21:06	View
16	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/o3_A2_1959_2010_N96_f.anc.gz	6347202	9ad966059be399e49743077e7556528a	2013-05-17 11:21:06	View
17	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/xaclfa.start.0000.gz	26657809	6c754ee3406c6cf6614bd6897ab4c494	2013-05-17 11:29:52	View
18	milo	http://vorvadoss.oerc.ox.ac.uk/cpdnboinc_alpha/download/dchapa.start.EU.b.new.0000.gz	6450624	605fb32cdfd0af5263dddb8110c5aa6c	2013-05-17 11:29:52	View



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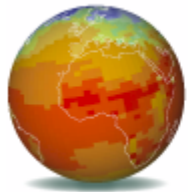
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Future plans with the workunit submission portal

- Include the ability to automatically report back on progress of workunits to the submitter
- Include the ability to actively manage workunits
- Require all groups of workunits submitted to the main site to be linked to successful test groups



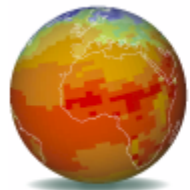
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Ongoing and future work in CPDN

- We are currently working on **upgrading** the version of BOINC used by the project **to version 7**
- We have a number of upcoming new applications:
 - ***Weather At Home South Asia region*** application -> to study the climate over the Indian subcontinent in detail -> the development of this application is in progress
 - ***Weather At Home Africa region*** application -> to study the climate over Africa in detail looking at changes in the likelihood of extreme weather events in Africa -> development of the application is in progress
 - Changed backend servers -> now running 50% on VMs

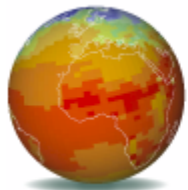
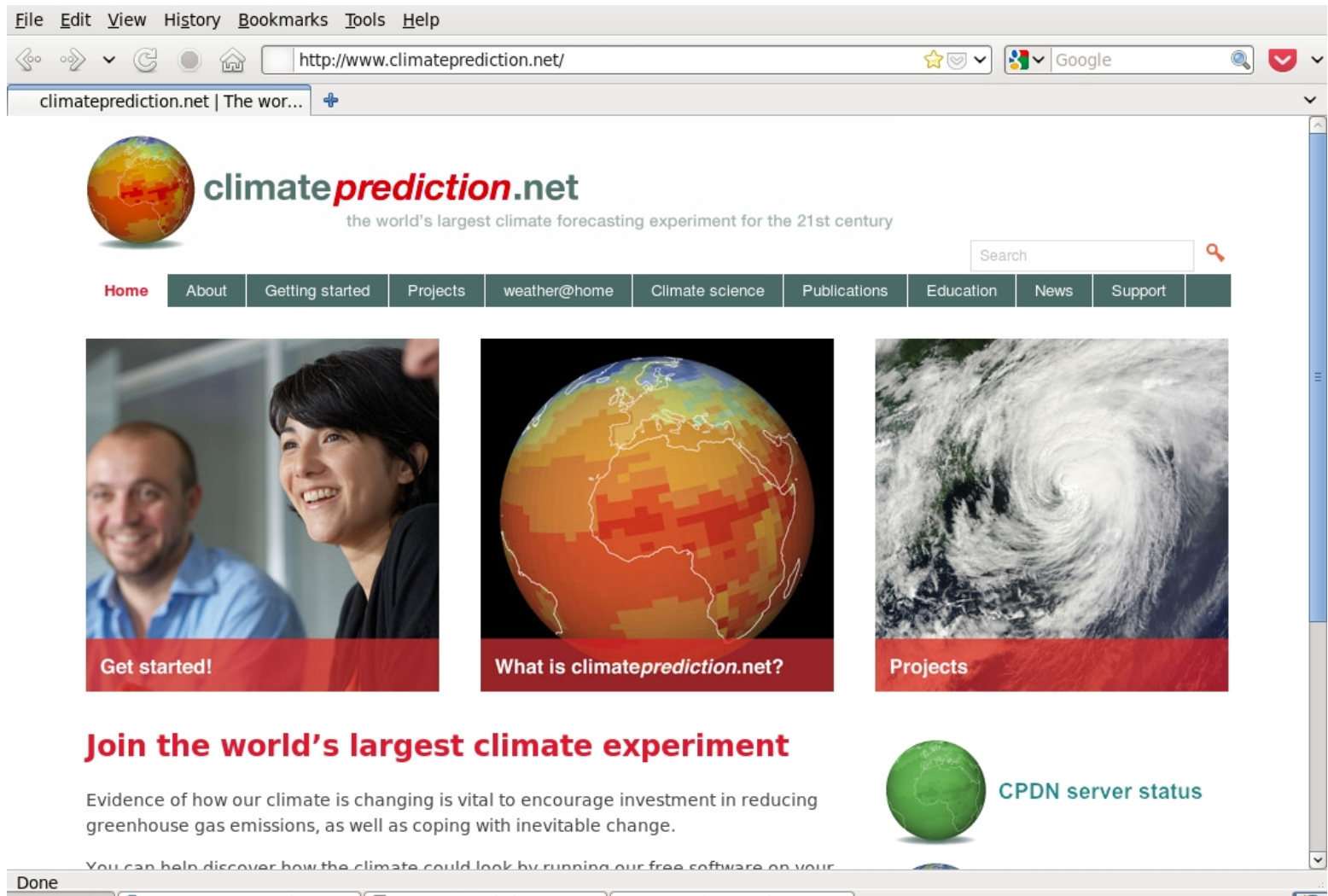


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New *climateprediction.net* website



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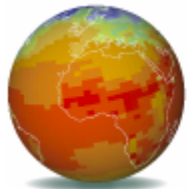
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BOINC wish list

Wish list:

- Functionality to enable moderators of the forum to be identified as a distinct team, perhaps by a special user flag, this would enable them to communicate privately between each other, **whilst still being able to be members of other teams**



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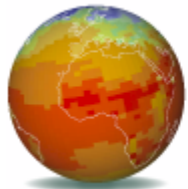
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Thanks!

And lastly...

The work of *climateprediction.net* is not possible without the participation of volunteers, thank you to all our volunteers!



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