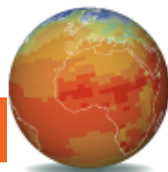


ENSURING PROJECT RESILIENCE IN THE CLIMATEPREDICTION.NET CITIZEN SCIENCE PROJECT

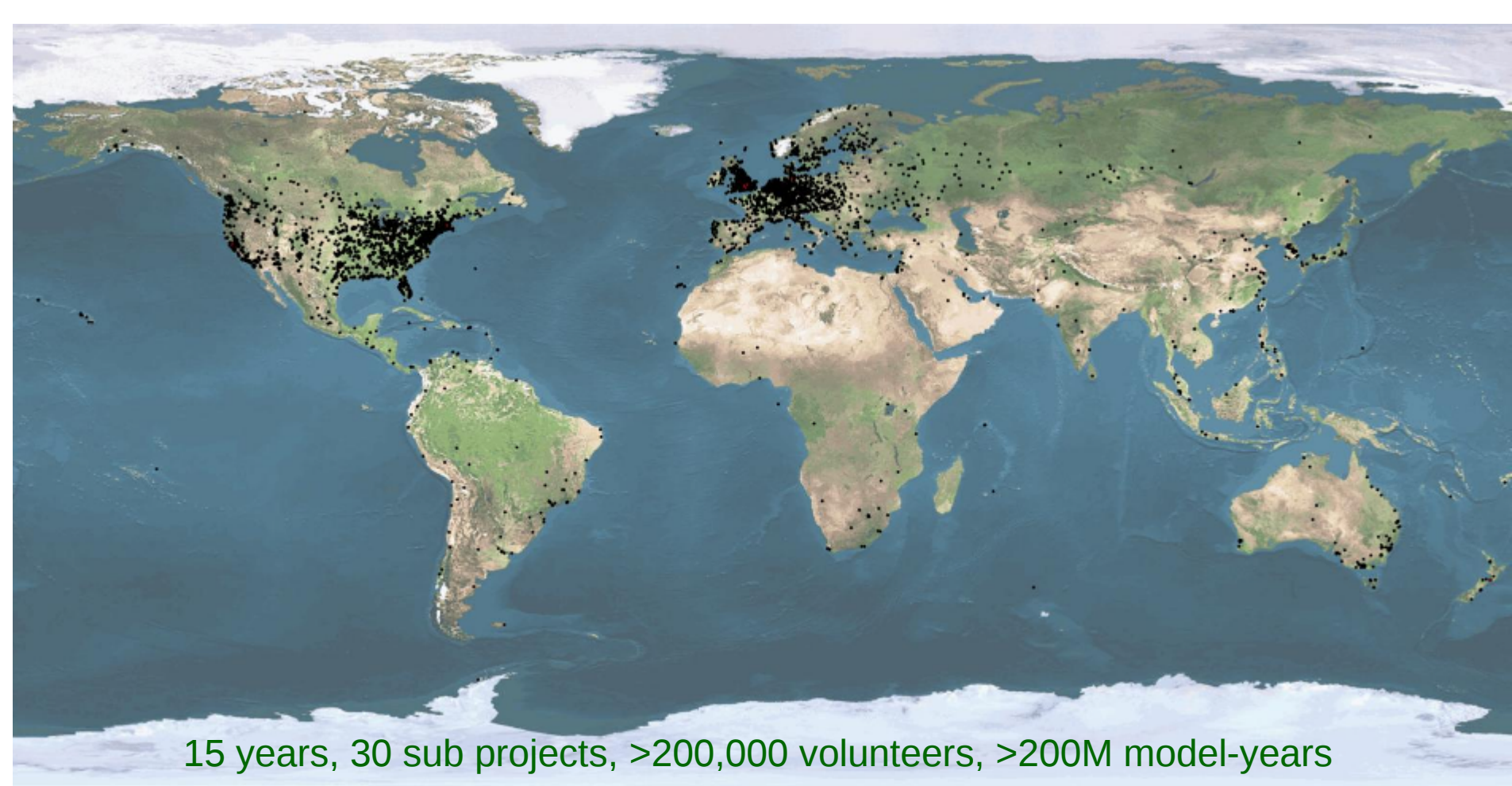
Andy Bowery, Sarah Sparrow,
Mamun Rashid, David Wallom

Environmental *Change* Institute



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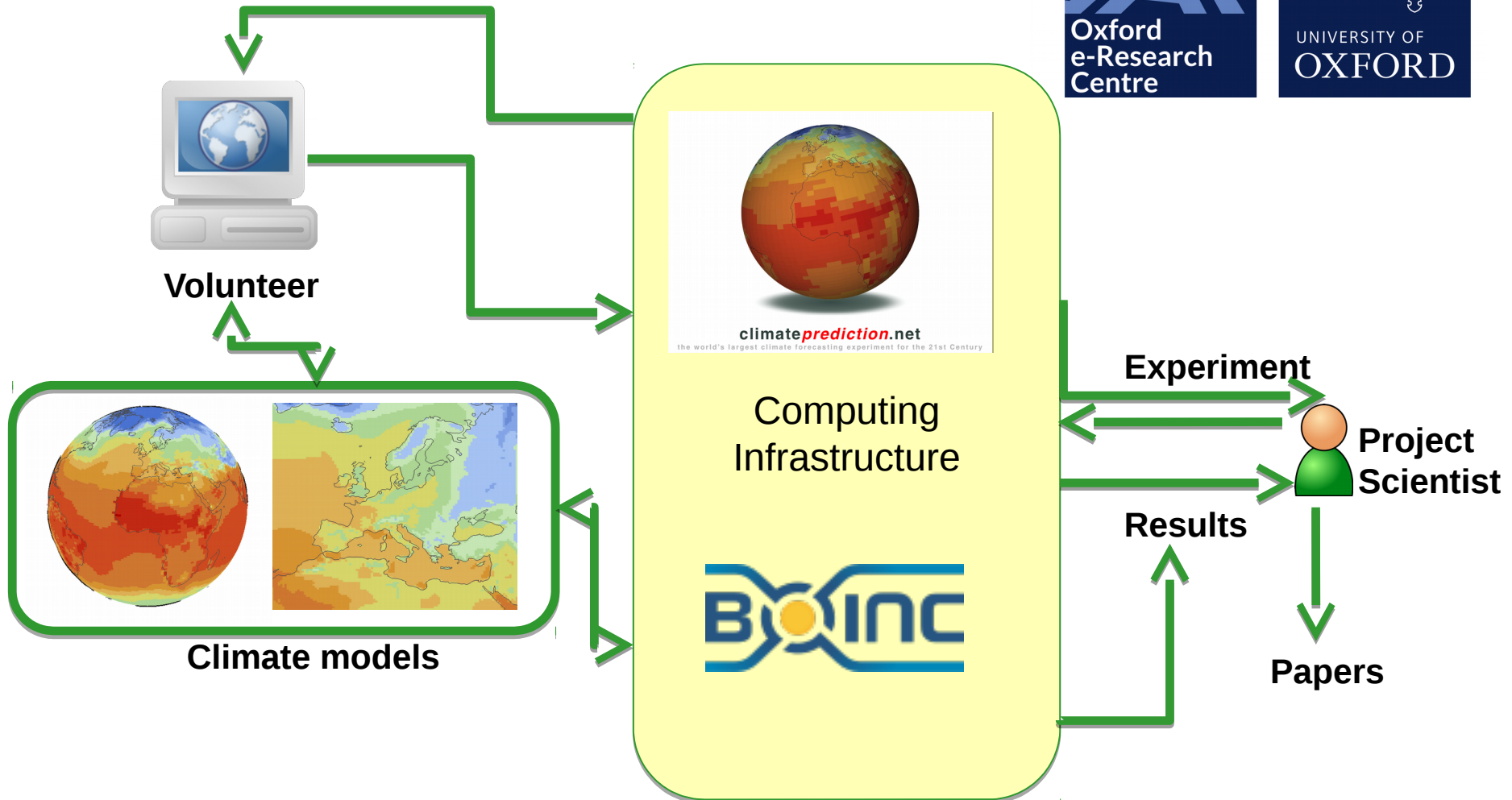
CPDN Network



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Distributed Computing



Very large ensembles of simulations can be generated by using this framework.

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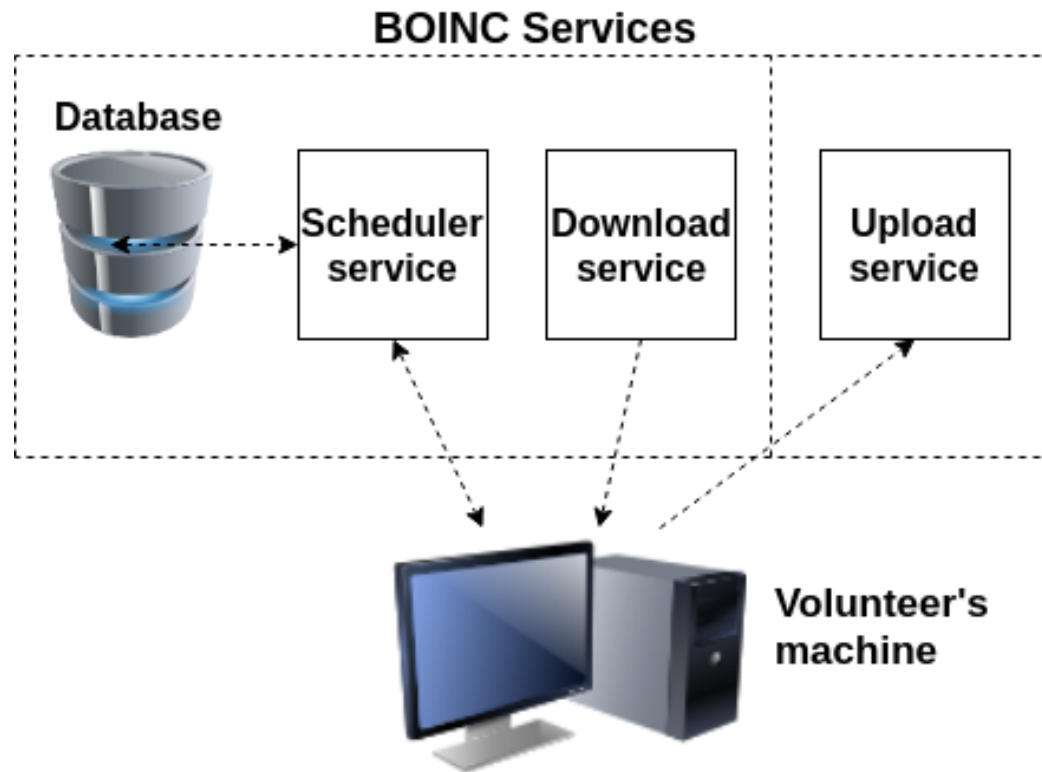
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Berkeley Open Infrastructure for Network Computing (BOINC)

- Distributed computing framework
- Maintained by an open source community
- L-GPL 3.0 licensed
- Allows the use of volunteer computational resources, computational cycles that would have gone to waste
- Used by a variety of academic projects, across a variety of disciplines

Arrangement of BOINC services, can be located on a single server or distributed across a number of servers





Long-term risks:

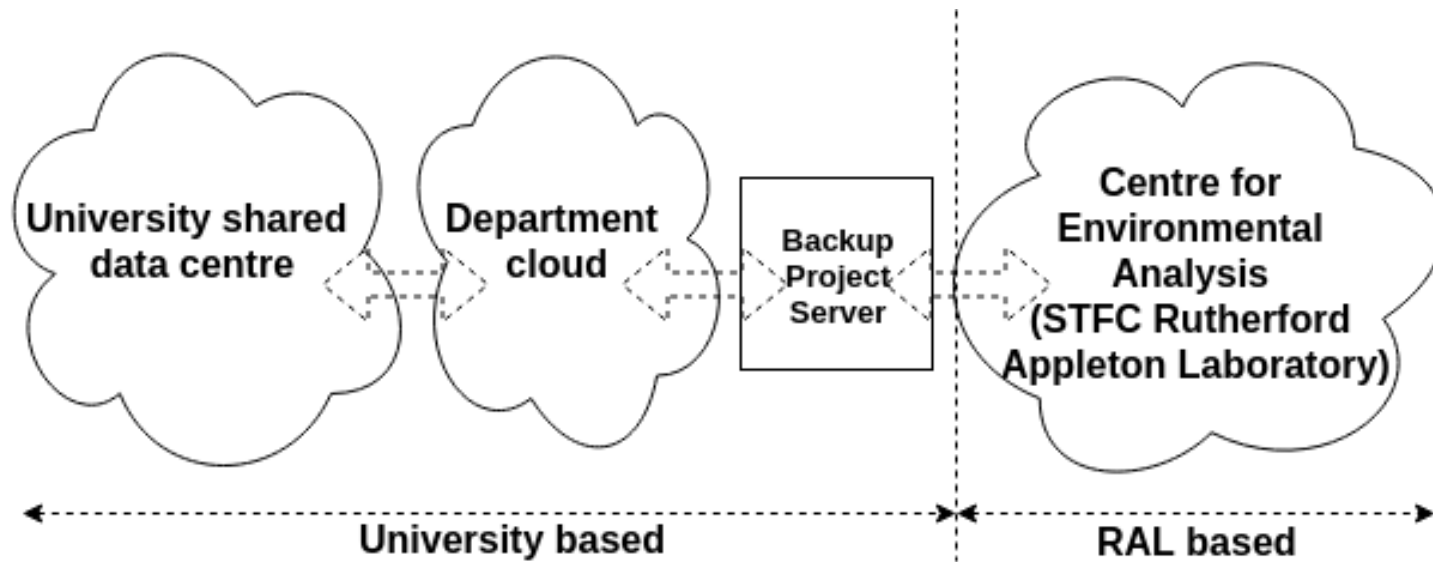
1. Infrastructure disruption risk
2. Retaining and recruiting new volunteers
3. Maintaining the engagement of the scientific community
4. Maintaining long-term consistency and availability of data

I will focus on: 1. Infrastructure and 2. Volunteers

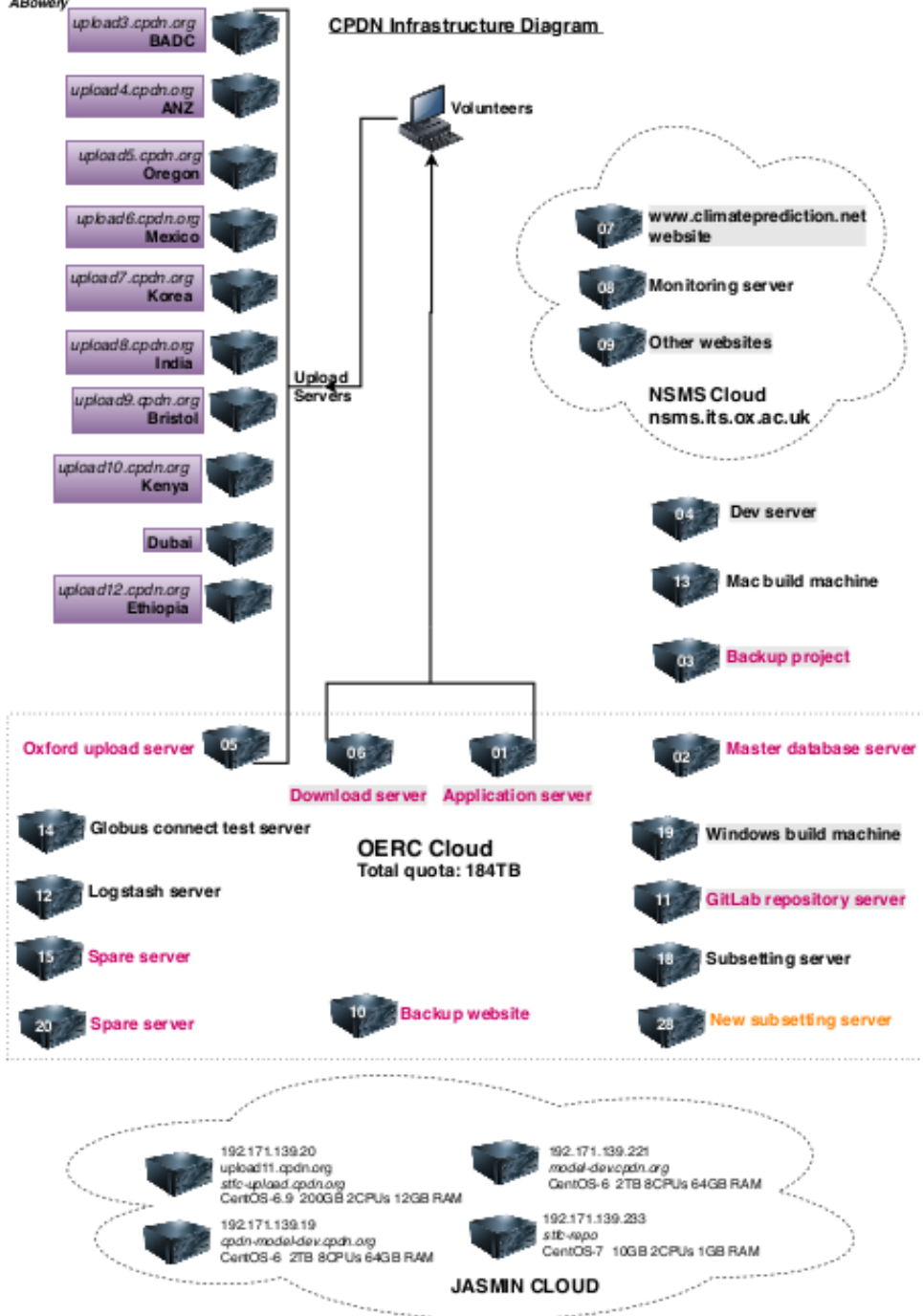
Infrastructure



Current setup:



Migrated from a physical server model to a cloud based model

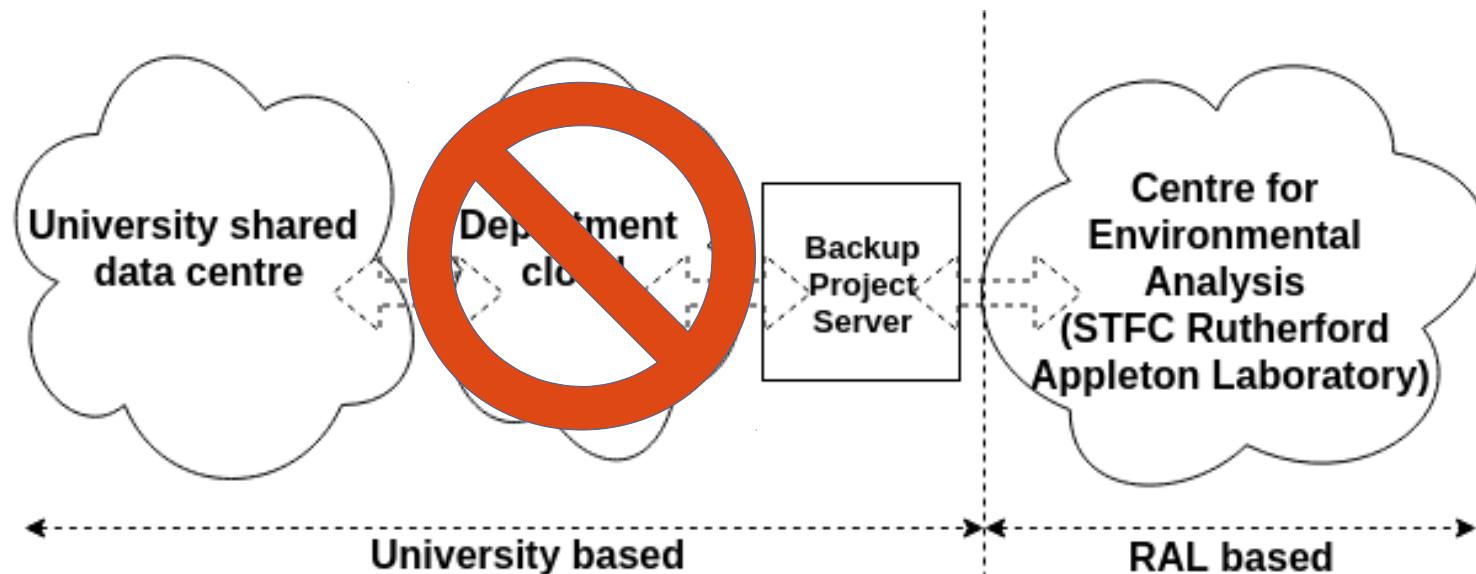
CPDN Infrastructure Diagram

Current infrastructure



- Distributed and replicated BOINC services across 3 clouds and backup project → allows the diversion of disrupted services
- Standard template for all servers, using best practices
- Backup project acts as a whole project mirror
- Replicated databases using master-slave relationship
- Global network of upload servers → allows diversion of disrupted uploads

However in March/April 2018 we had this:



All services were diverted

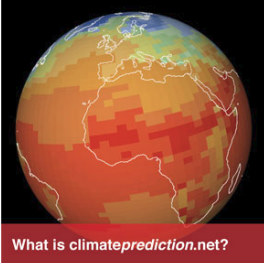
2. Volunteer Engagement



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Climateprediction.net is a volunteer computing, climate modelling project.

We run climate models on people's home computers to help answer questions about how climate change is affecting our world, now and in the future – and help us predict the climate.

Understanding how our climate is changing is vital to make investment in reducing greenhouse gas emissions, as well as coping with inevitable change.

Join now and help us predict the climate.

Project Status

Project Server Status

Translate



Recent CPDN Submissions

Rank: 750 - 1000 / 45000



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climateprediction.net Message boards

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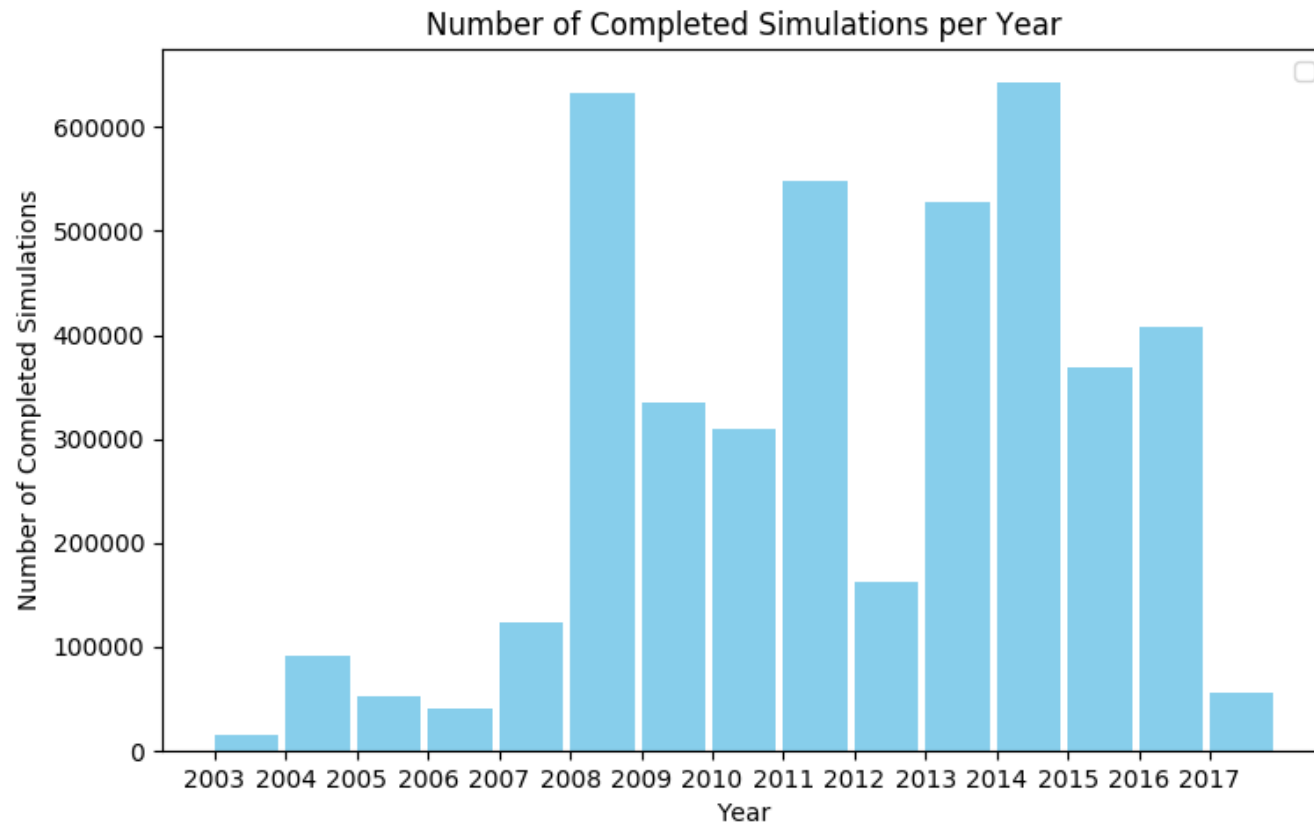
Message boards

Topic	Threads	Posts	Last post
News News from climateprediction.net	1	18	3 days ago
climateprediction.net Science General climateprediction.net/climate change discussion	421	3251	4 days ago
Number crunching Credit, leaderboards, CPU performance	2288	24510	8 hours ago
Cafe CPDN Trade stories with other climateprediction.net Users	374	2935	17 Sep 2018
Platform-specific problems			
Windows Installing and running BOINC on Windows	3122	15783	7 days ago
Unix/Linux Installing and running BOINC on Unix and Linux	588	3417	1 hour ago
Macintosh Installing and running BOINC on Mac OS/X	373	1977	26 days ago
Issues			
Getting started Getting started with BOINC	519	2376	17 Aug 2018
Creating an account Creating an account	403	1978	11 Aug 2018
References References to fine-tune climateprediction.net	338	1476	26 Feb 2018
What would you like to see in BOINC and climateprediction.net?			

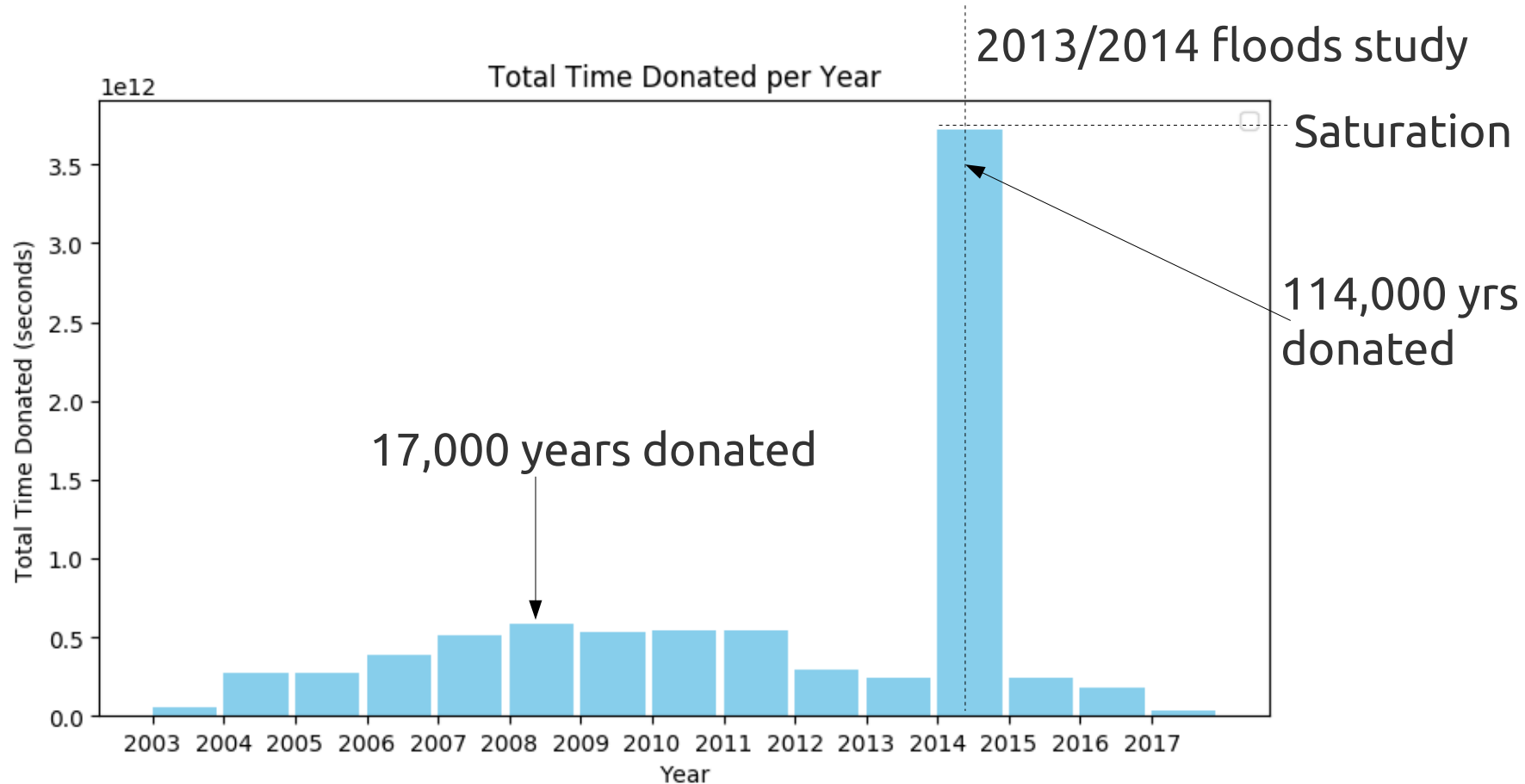
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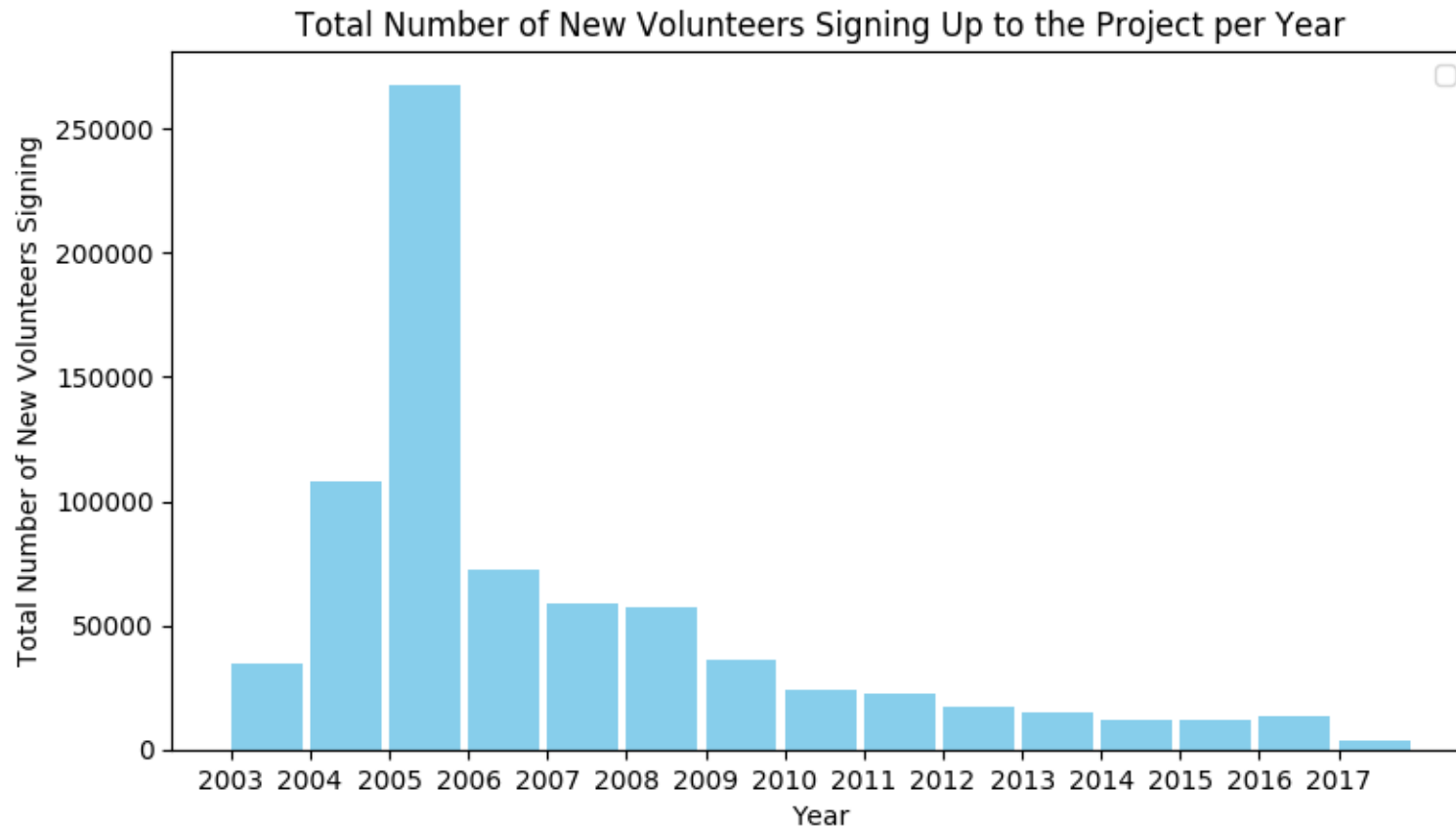
Completed simulations per year since the start of the project:



Computational time donated:



Number of new volunteers signing up:



Volunteer recruitment: how effective is news?



UK 2013/2014 Floods: ClimatePrediction.net study released in Feb 2016

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DAILY NEWS 1 February 2016

South England's 2014 floods made more likely by climate change



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Carbon emissions boosted 2014 January storm risk 'by 43%'

By Matt McGrath
Environment correspondent

1 February 2016

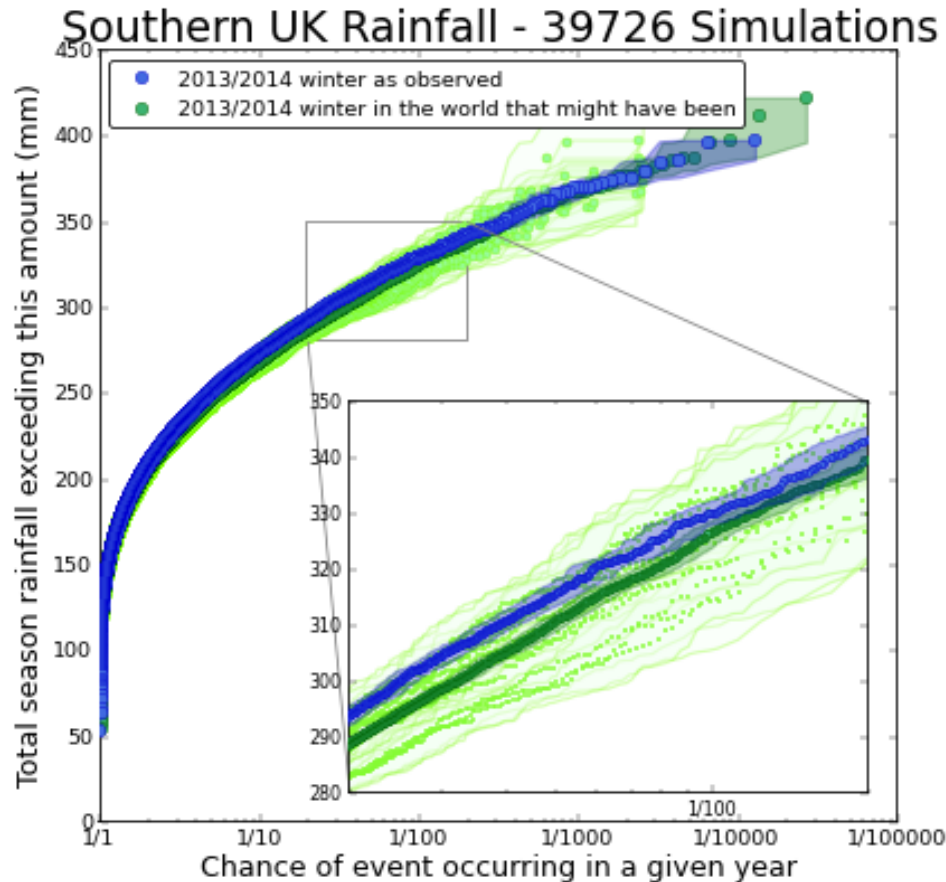
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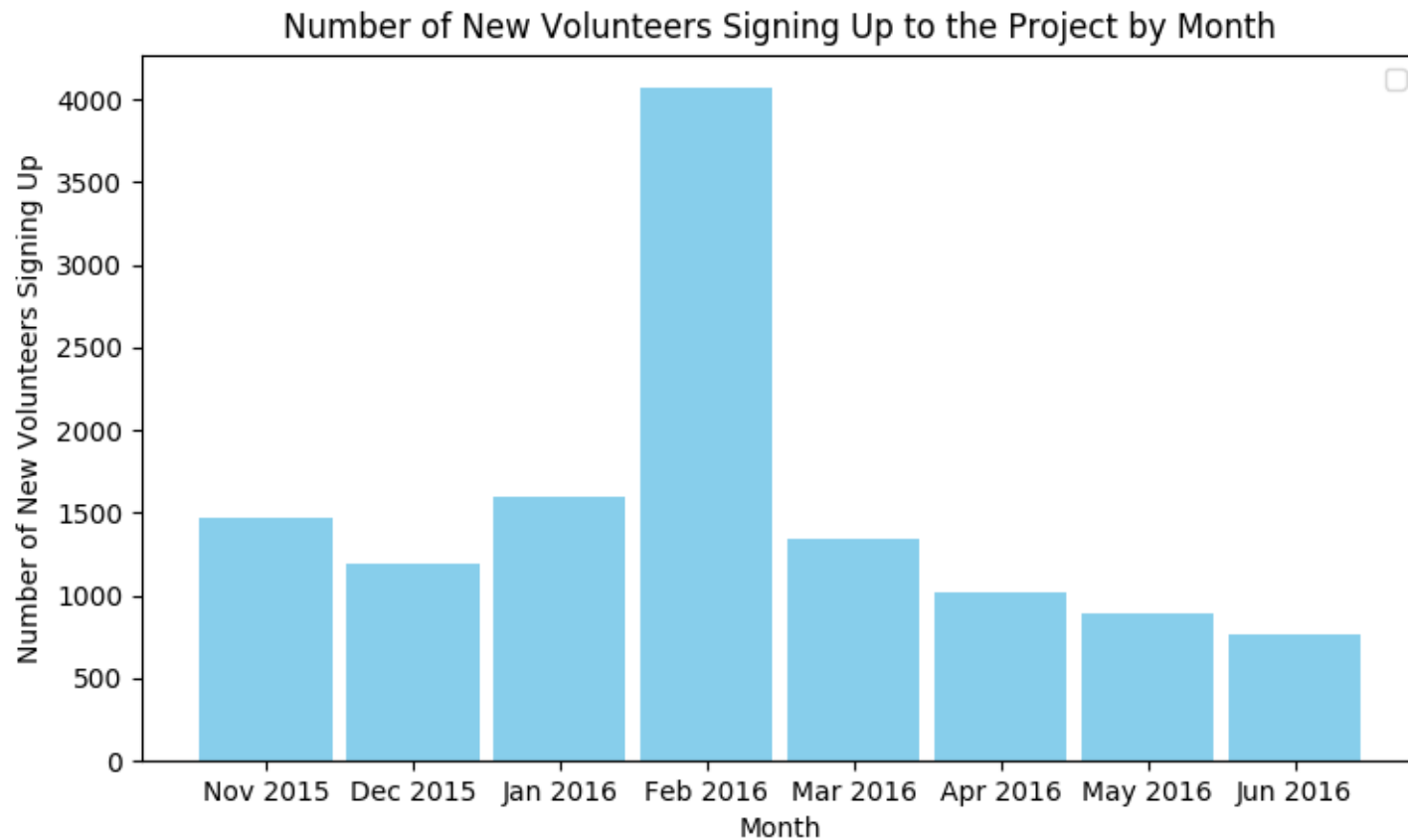
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UK Winter 2014 Floods

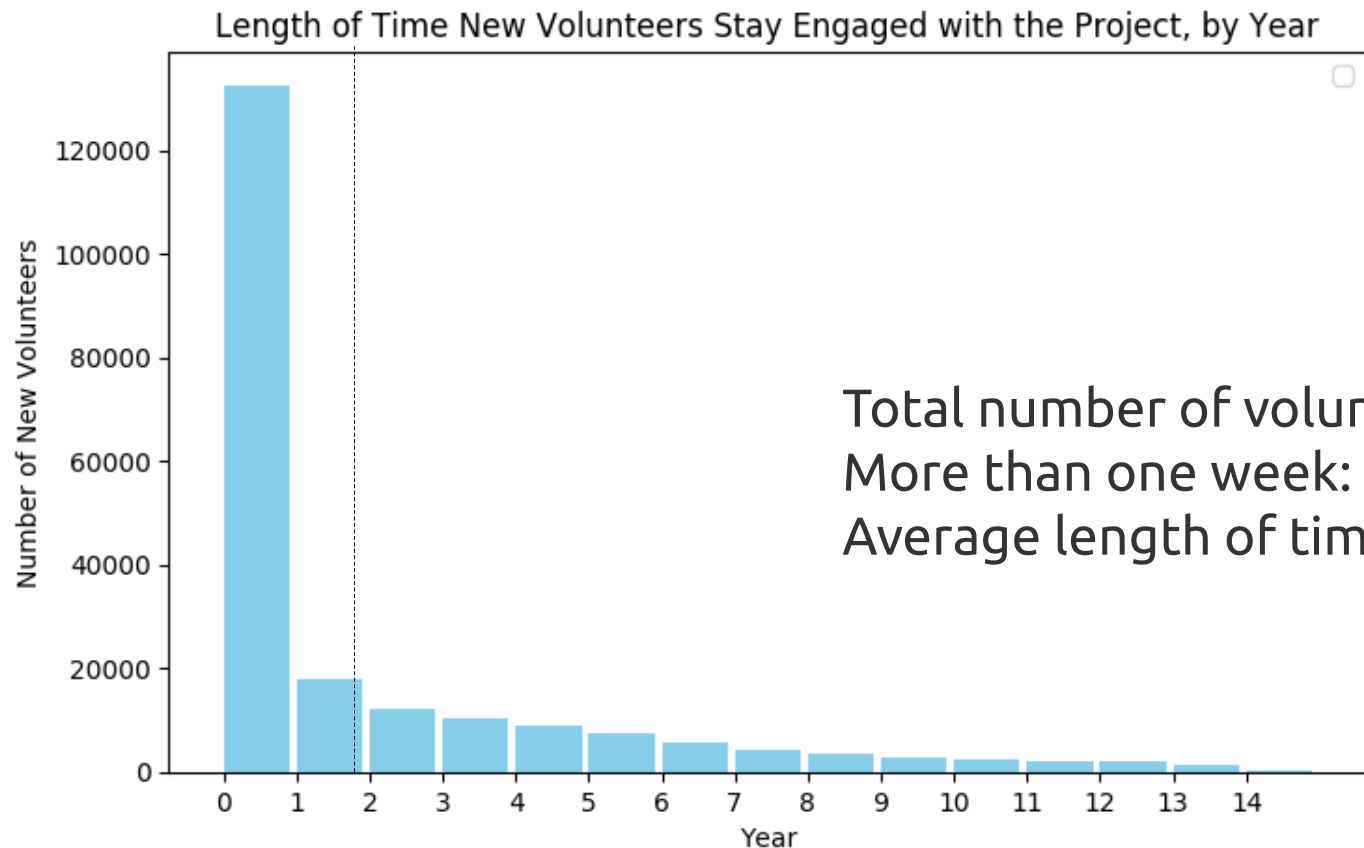


- 2014 flooding has been described as 1 in 100 year event in terms of rainfall volume
- Return time plot shows 1 in 80 year event in terms of risk
- Risk of very wet winter has increased by 25%

New volunteers joining the project around February 2016:

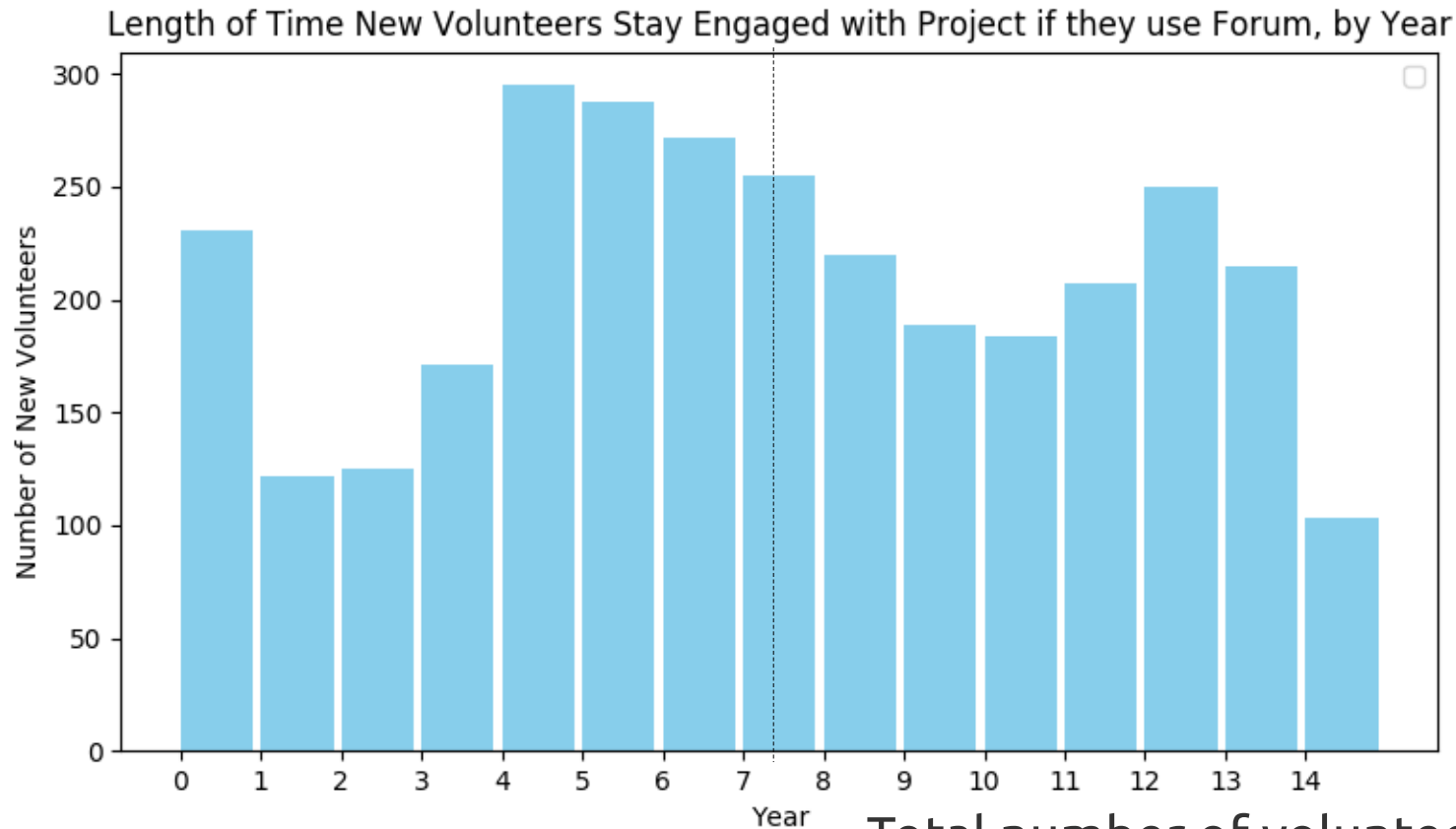


How long did new volunteers stay engaged with the project?



Total number of volunteers: 214,400
More than one week: 142,200
Average length of time: 1 yr 11.5 mths

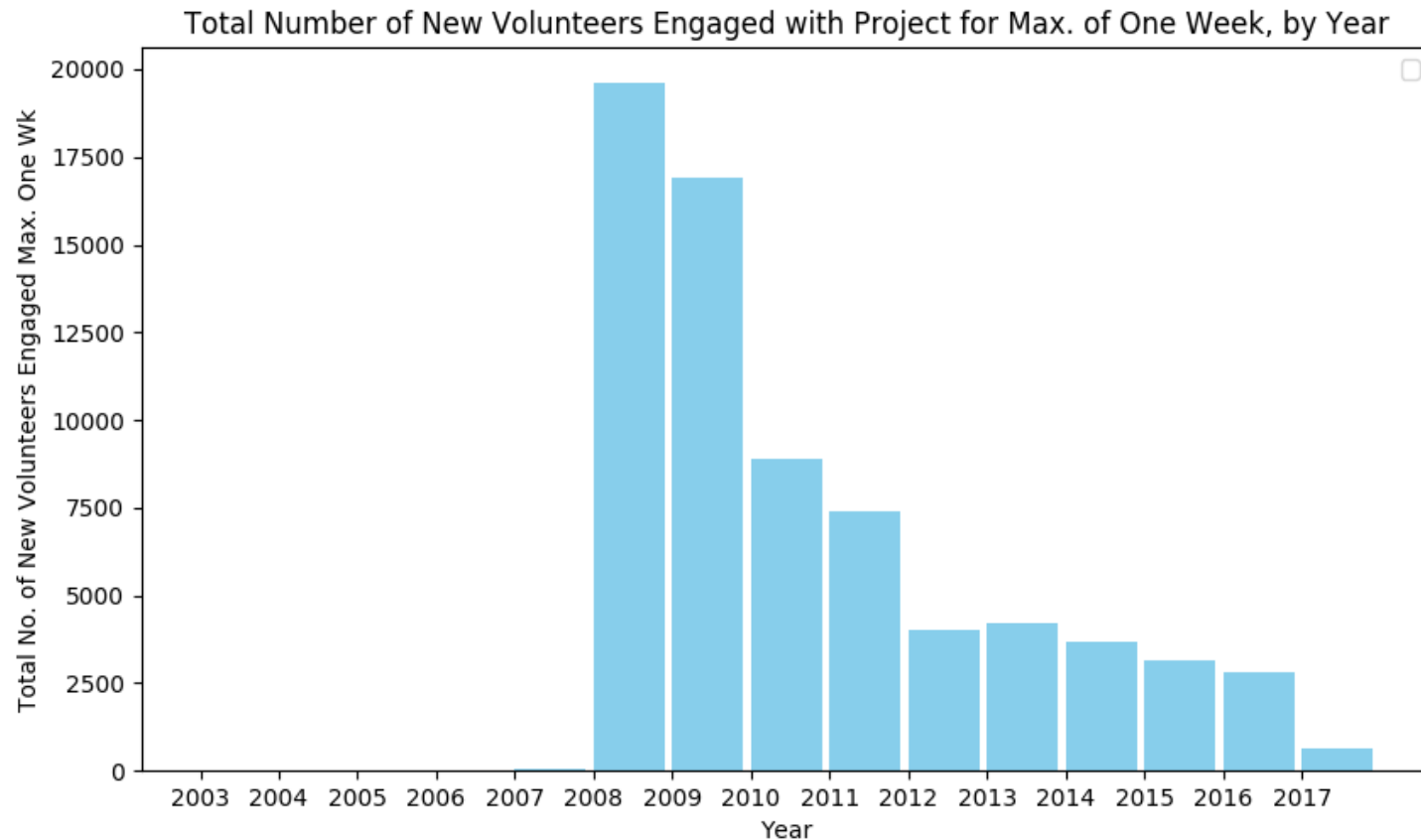
How long did new volunteers stay engaged with the project if they engaged with the forum?



Total number of volunteers: 3,127

Average length of time: 7 yrs, 5 mths

How has the number of people who have stayed engaged for one week changed with time?



Conclusions



- Infrastructure risk: distributed and replicated BOINC services
- Volunteer recruitment: news campaigns around scientific publications are effective
- Volunteer retention: volunteers engaging with forums -> volunteers stay engaged longer with the project
- Provides resource that is continually improving as volunteers upgrade machines
- Future work: will link volunteers contributions with publications
- CPDN has enjoyed a consistent level of support from the volunteer community, which has resulted in the provision of a long term, unique resource to climate science, and resulting contribution of scientific output to climate science