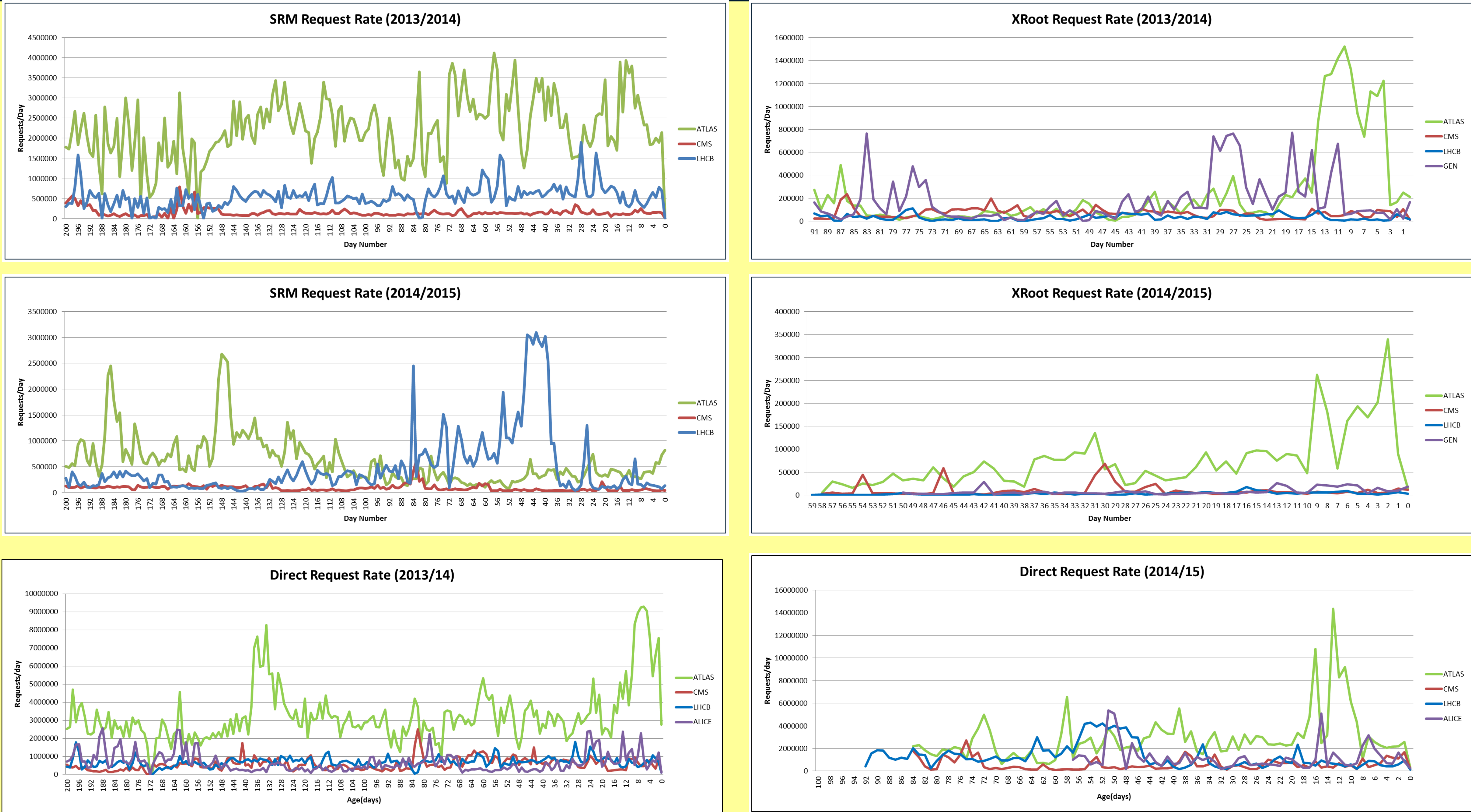# Storage Interface Usage at a Large, Multi-Experiment Tier1

Shaun de Witt, Matthew Reggler

Science and Technology Facilities Council, Rutherford Appleton Laboratory, Harwell, Didcot, Oxfordshire, UK

SRM Request Rate (2013/2014)

XRoot Request Rate (2013/2014)

SRM Request Rate (2014/2015)

XRoot Request Rate (2014/2015)

Direct Request Rate (2013/14)

Direct Request Rate (2014/15)

Request Rates

What a Difference a Year Makes
Expectation: Lower usage of SRM and more usage of XRootD. Roughly the same amount of requests since both periods are during LHC Shutdown.
Reality:
- SRM Request rates dropped significantly (13% for LHCb to 73% for ATLAS)
- Xroot request rates fell off even more dramatically (70% reduction for ATLAS to 95% reduction for CMS).
- Direct requests stayed stable (mostly internal requests)
- SRM Usage decreased compared to direct access; 46% drop for ATLAS, 11% for CMS, 43% drop for LHCb
- Evidence of performance drop; There are an increasing number of StatusOfXXX request for each PrepareToXXX.

Geographic Distribution

ATLAS CMS LHCb
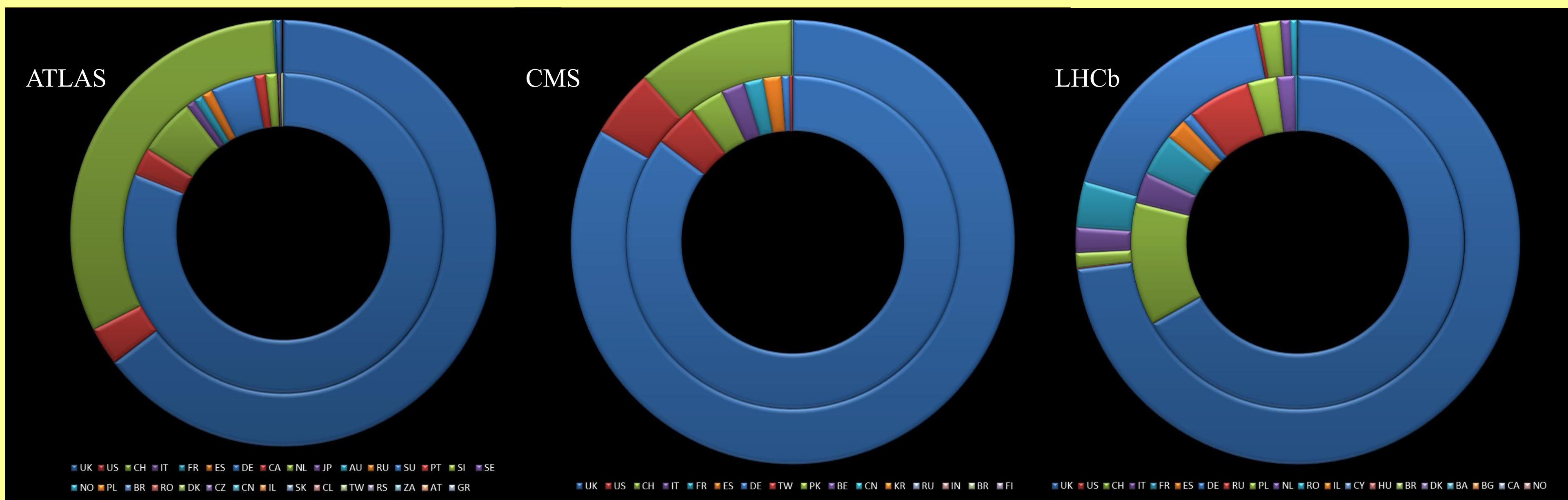
Geographic Distribution of SRM Requests
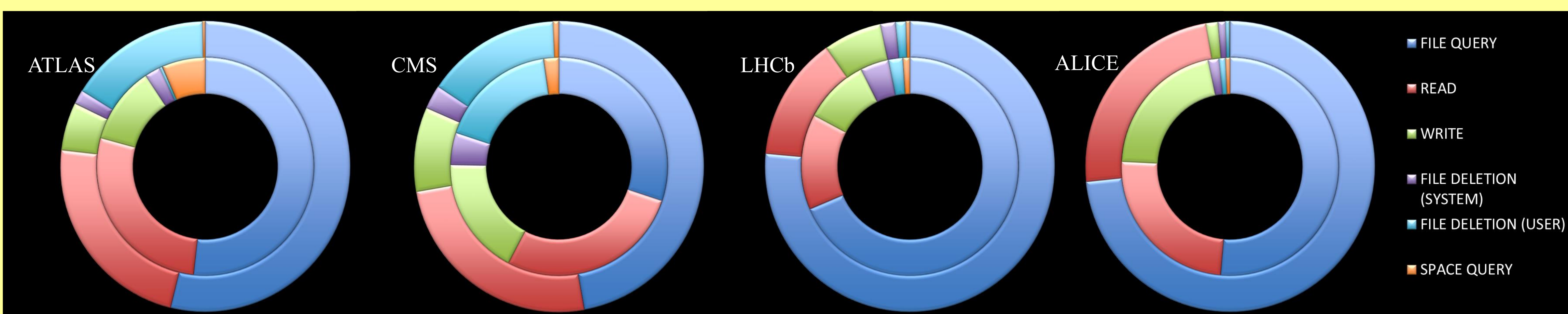**Inner Ring: 2013/14**
Outer Ring: 2014/15
ATLAS and CMS dominated by 3 FTS sites in 2014/15
CMS: **Korea** and **Brazil** still make direct connections to the SRM and are becoming significantly more important.
ATLAS: Many countries still make direct connections at low level, but **Japan** and **Russia** have become more active.
LHCb: Decreased traffic between CERN and RAL, but **Germany** and **Brazil** becoming increasingly important.

ATLAS CMS LHCb ALICE
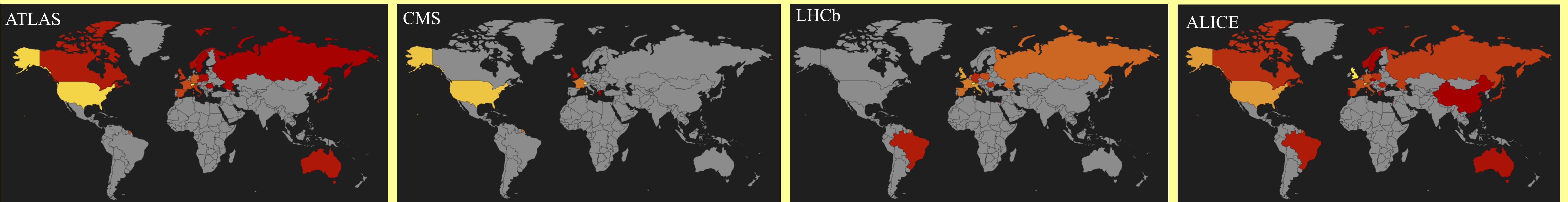
7-Day 'Heat Maps' of Direct Connections to RAL-Tier1.
Alice and ATLAS have the widest distribution of access to RAL Tier 1. No Surprise that UK and Switzerland Dominate.

ATLAS CMS LHCb ALICE

- FILE QUERY
- READ
- WRITE
- FILE DELETION (SYSTEM)
- FILE DELETION (USER)
- SPACE QUERY

Request Type Distribution
Inner Ring: 2013/14
Outer Ring: 2014/15
ATLAS, CMS and **LHCb** show little change in Reads and Writes, but clear evidence of ATLAS data deletion campaigns on 2014/15 data.
ALICE show proportionally less writes in the 2014/15 data (due to no data taking?)

Request Type Distribution