ATLAS Tier-0→Tier-1 Data Transfers

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Nominal Rates

Tier-1	%	RAW	ESD	AOD	Total	Rounded
BNL	24.0	76.8	200.0	20.0	296.8	300
IN2P3	13.5	43.2	54.0	20.0	117.2	120
SARA	13.0	41.6	52.0	20.0	113.6	120
FZK	10.5	33.6	42.0	20.0	95.6	100
ASGC	7.7	24.6	30.8	20.0	75.4	80
RAL	7.5	24.0	30.0	20.0	74.0	80
CNAF	7.5	24.0	30.0	20.0	74.0	80
NDGF	5.5	17.6	22.0	20.0	59.6	60
PIC	5.5	17.6	22.0	20.0	59.6	60
TRIUMF	5.3	17.0	21.2	20.0	58.2	60
Total	100.0	320.0	504.0	200.0	1024.0	1060

Last 7 Days

- Average rate achieved ~300 MB/s (3.5 times less than nominal)
- Maximum rate achieved ~400 MB/s (2.7 times less than nominal average)
- Sites coming and going all the time

Throughput into all T1 sites in the last week
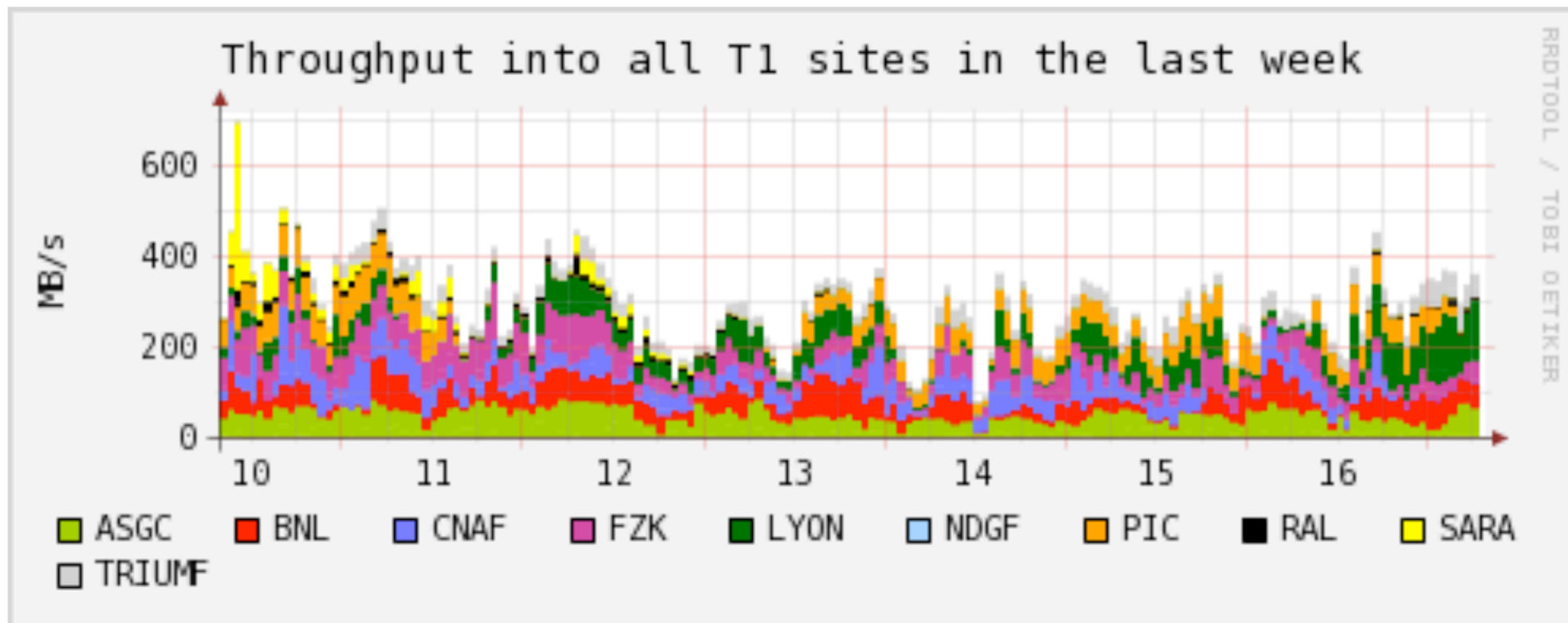
New problems

- Many more smaller datasets onto DQ2 (testing different luminosity blocks)
    - Leading to more FTS jobs (an FTS job is a (sub)set of an ATLAS dataset)
- Usage of FTS server @ CERN by other experiments created additional problems
    - Many FTS contacts failed
        - Submitting new FTS jobs, polling FTS jobs, etc
        - Due to increase on the load of central servers
        - (FTS developers informed and notification service - as opposed to polling - requested)
    - DQ2 had to become considerably more robust handling these failures
        - Some particularly nasty (memleaks, sockets left hanging, etc)
- Experimenting with 'atldata' (CERN disk-only area - our Analysis Facility) caused several new problems
    - Disk-servers full/disabled can render CASTOR to a halt
        - Difficult to monitor 'available' disk space
            - Using 'atldata' has proven to be an invaluable experience!
    - This has affected Tier-0 export multiple times

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Side Effects

- We keep all FTS channels saturated all the time (see next slide)
  - Submit FTS jobs until a few FTS jobs stay pending
- Unclear where differences on behaviour per VO come from (different storage diskservers?)
  - See the FZK example with CMS yesterday afternoon:

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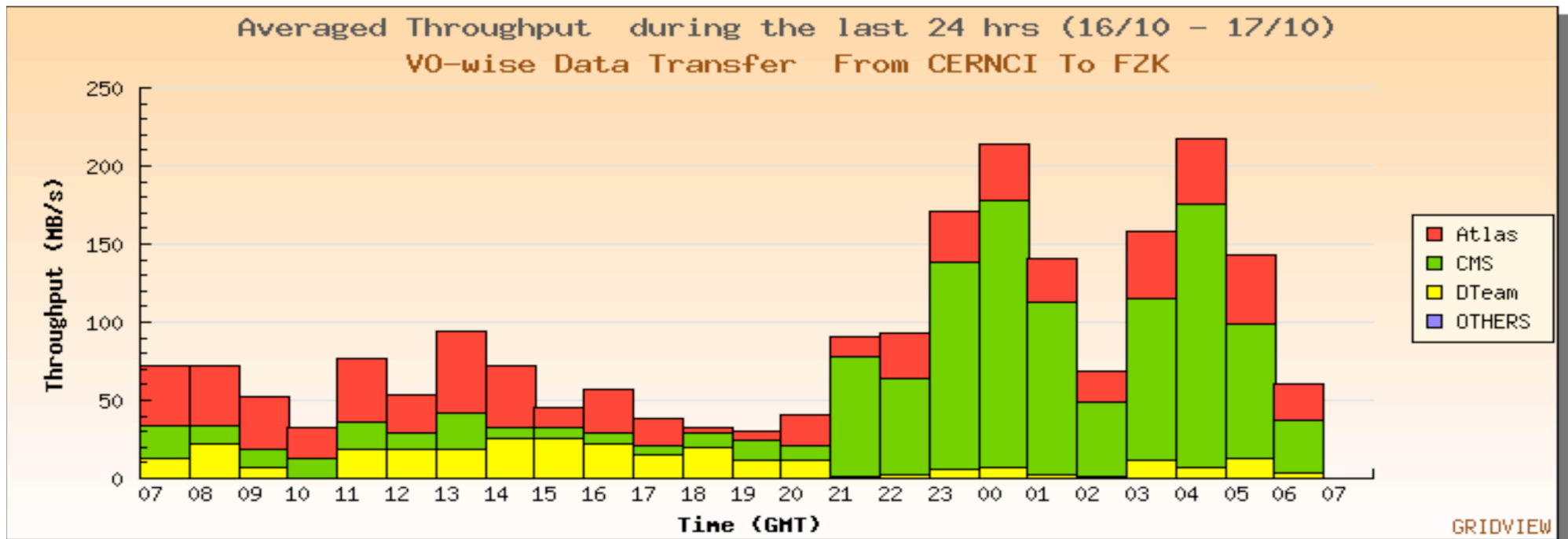
Nr Jobs pending on FTS (means many other jobs are active; all channels full)
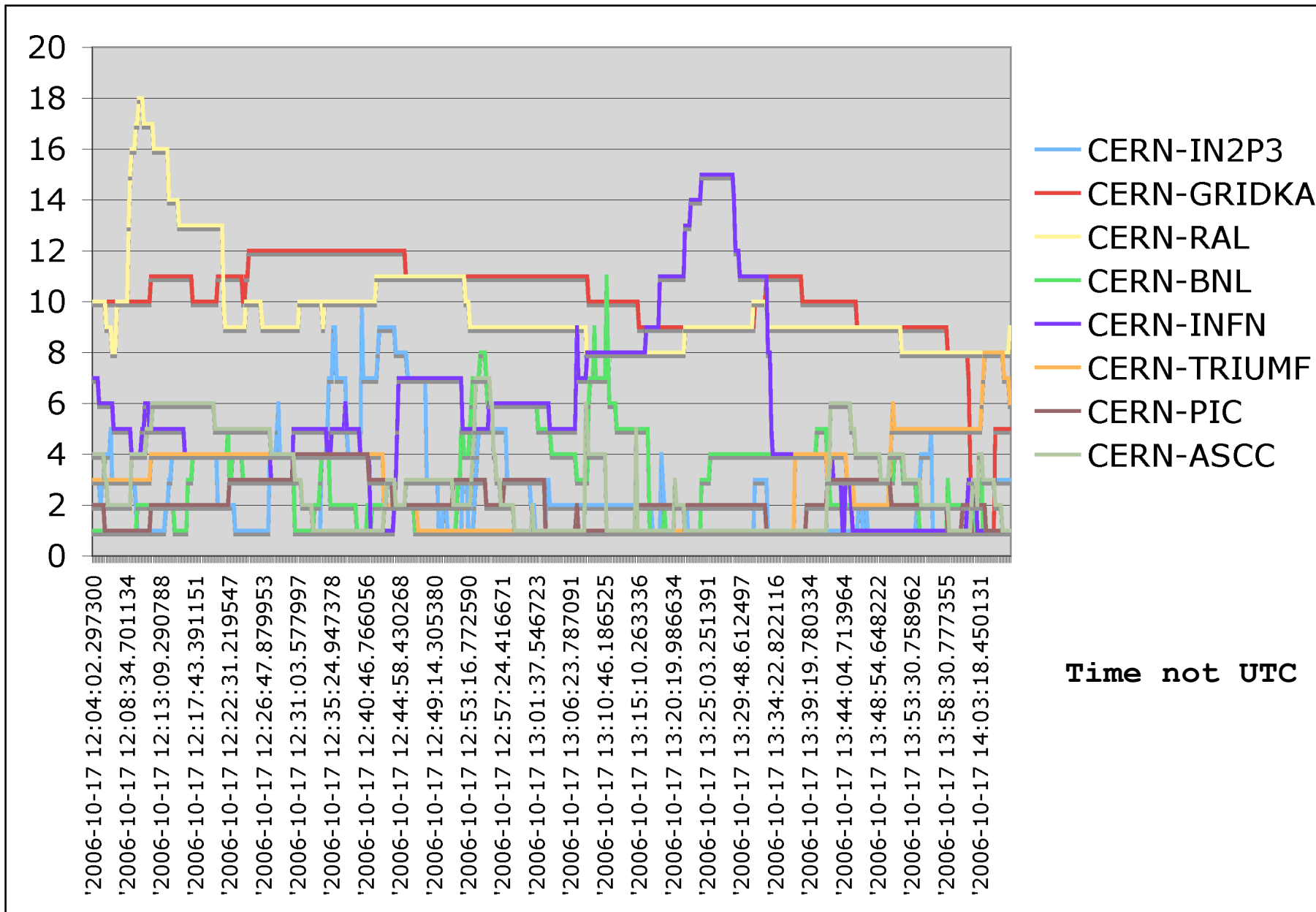
Time not UTC

Throughput in the same period

- (as seen by DQ2)

Time in UTC