Data Exchange Status Among GWIC Members

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Inter-project data exchange

- Background
  - » ***Kickoff*** meeting in Rome at GWDAW in Dec 1999 - all GWIC participants represented;
  - » ***Initial*** meeting at Caltech to held [10 Feb 2000]
    - – LIGO-Virgo participation -- discussed sizing of computing resources for network analysis of inspiral coalescence waveforms
  - » ***Second*** meeting at Caltech focused on details of near-term exchanges of environmental data ("PEM Channels") [11 Feb 2001]
    - – GEO, LIGO, Virgo, ANU participation
- PEM channels -- few 10s of kB/s, starting 01 Jun 2001
  - » Sites involved: Hannover [GEO], Cascina [VIRGO], Hanford & Livingston [LIGO]
  - » Seismometers: 1/site, 256 Hz sampling, 1 kB/sec
  - » Magnetometers: 4096 Hz sampling, 8 kB /sec [compressed!]

Motivations

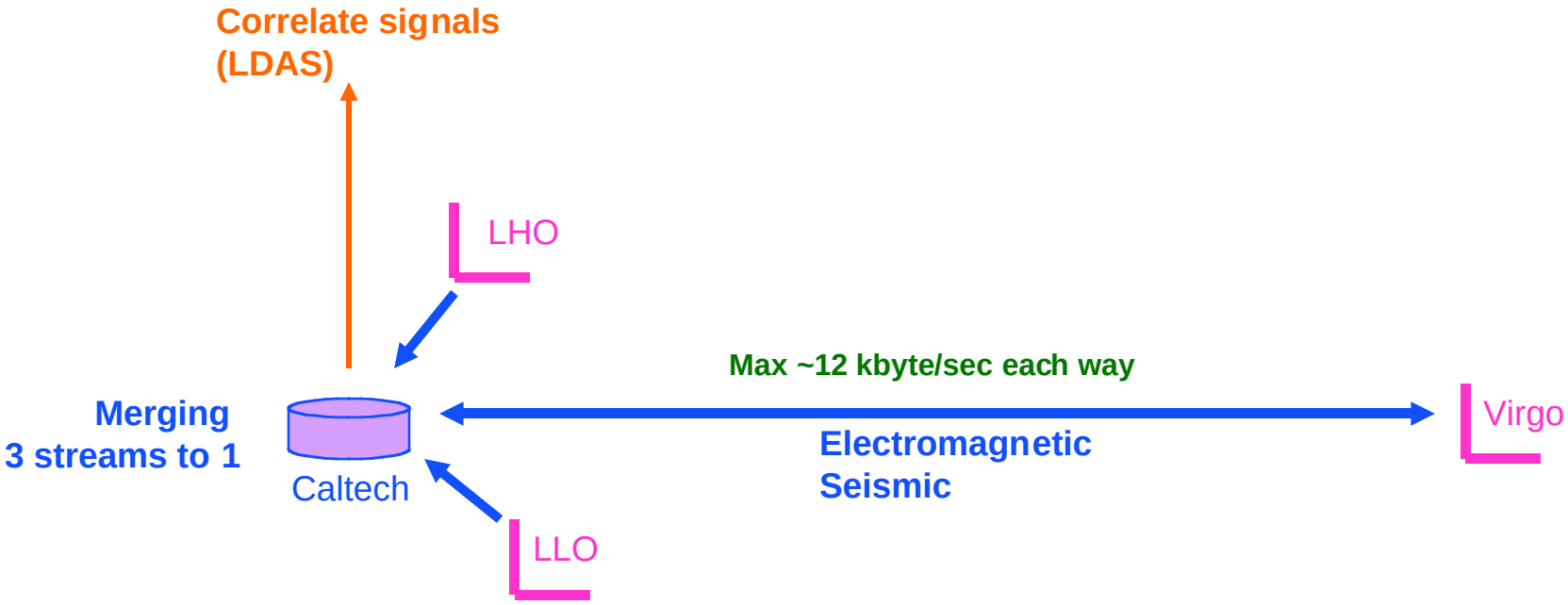
- In the long term, we expect the observatories to do collaborative data analysis at different levels and to cooperate as a network of detectors.
- This goal requires several steps: initial focus on technical aspects of data exchange - formats; preparation; delivery, etc.
- Large volumes of data are already being acquired by LIGO: in particular, environmental monitoring data.
- Learning to exchange and analyze these data will provide the experience needed for the future astrophysics data.

Science issues

- PEM data already contain interesting physics!
- Teleseismic events can correlate on the LIGO-VIRGO distance
  - » Events originating close to the equidistant line can correlate within the narrow (+/- 40 ms) window common with GW detection
- Electromagnetic events propagate over long distances in the ionosphere
  - » In particular the interaction of lightning and the magnetosphere causes VLF EM signals potentially affecting LIGO/VIRGO band as whistlers
- Coincidences in these data can serve in the future as vetoes for the network analysis

Approach

- **Technologies:**
  - » **Realtime data stream reduction to selected channels**
  - » **GridFTP (secure, batch transfer) - begin to grid enable exchanges**
  - » **LDAS (coincidence analysis) on LIGO side**



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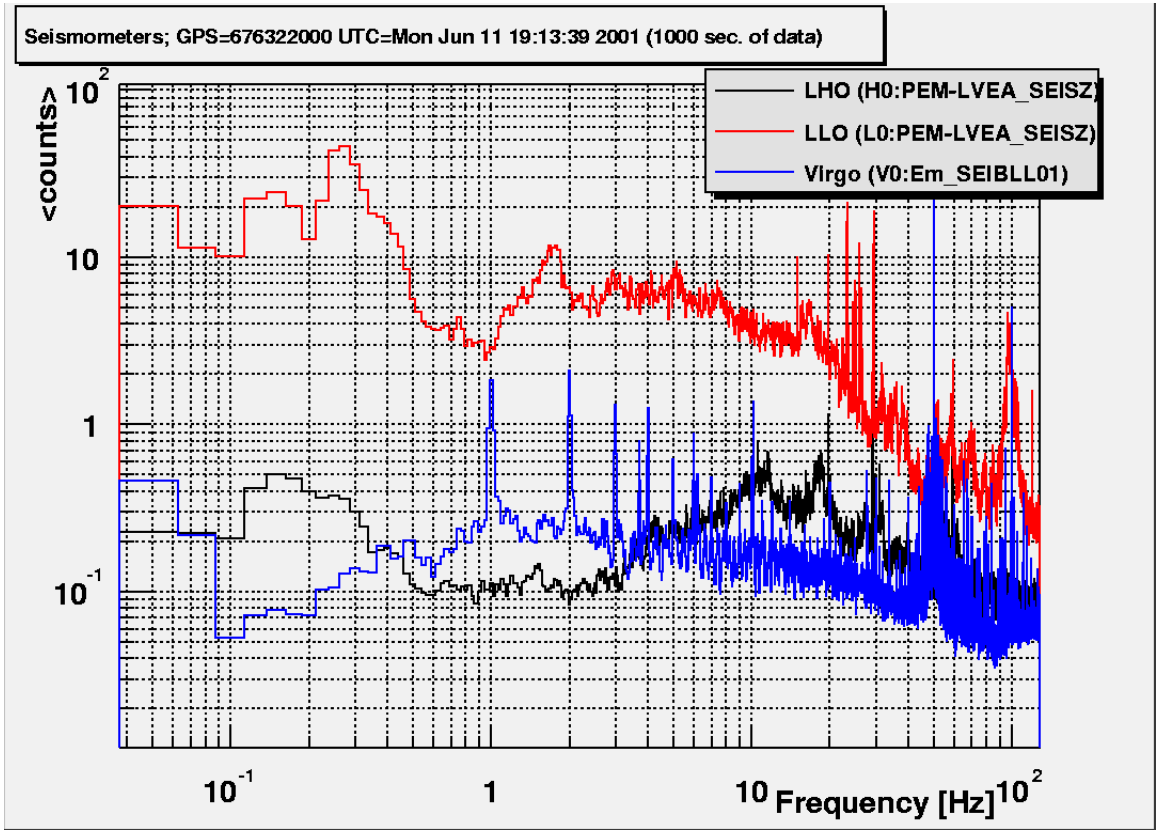
Example of analysis using multiple data sources



- Seismometers
- An example of what we might want to monitor continuously

Benoit Mours (Virgo)

Szabolcs Marka (LIGO)

Status

- Anonymous FTP servers set up at Caltech archive, Virgo archive
- Uniform framed data sets being generated
  - » Use unix utility rsync to mirror data between sites
  - » GridFTP will be set up next
- Data merged into composite frames by each group
- LIGO is archiving these frames in its data center repository

Issues

- GEO is delayed due to data acquisition hardware difficulties
  - » Plans to participate by end of summer
- Data channels need to be characterized, calibrated, etc.
- Need: manpower, manpower, manpower ...