Data quality plans from Virgo

What you should expect to see soon...

F. Robinet on behalf of the VDQ group

VDQ strategy

GW transient searches:

• Provide DQ information with the lowest latency as possible (within the frames)

• Provide reliable and stable offline DQ information (archived in DQSEGDB)

• Provide DQ tools for analysts to understand pipeline-specific background

Detector characterization / commissioning:

• Characterize Adv. Virgo sub-systems as soon as they are online

• Contribute to the commissioning (glitch expertise)

• Detector online monitoring → reactivity

VDQ tools

- A multi-channel trigger generator: Omicron ✓

- A highly selective veto generator: UPV ✓

- A correlator with aux. channels: Excavator ✎

- An online architecture: FdIO ✓

- Online veto segment: SegOnline ✎

- Centralized DQ information: DQSEGDB ✎

- Monitoring tools: MonitoringWeb, DQperf, Safety... ✎

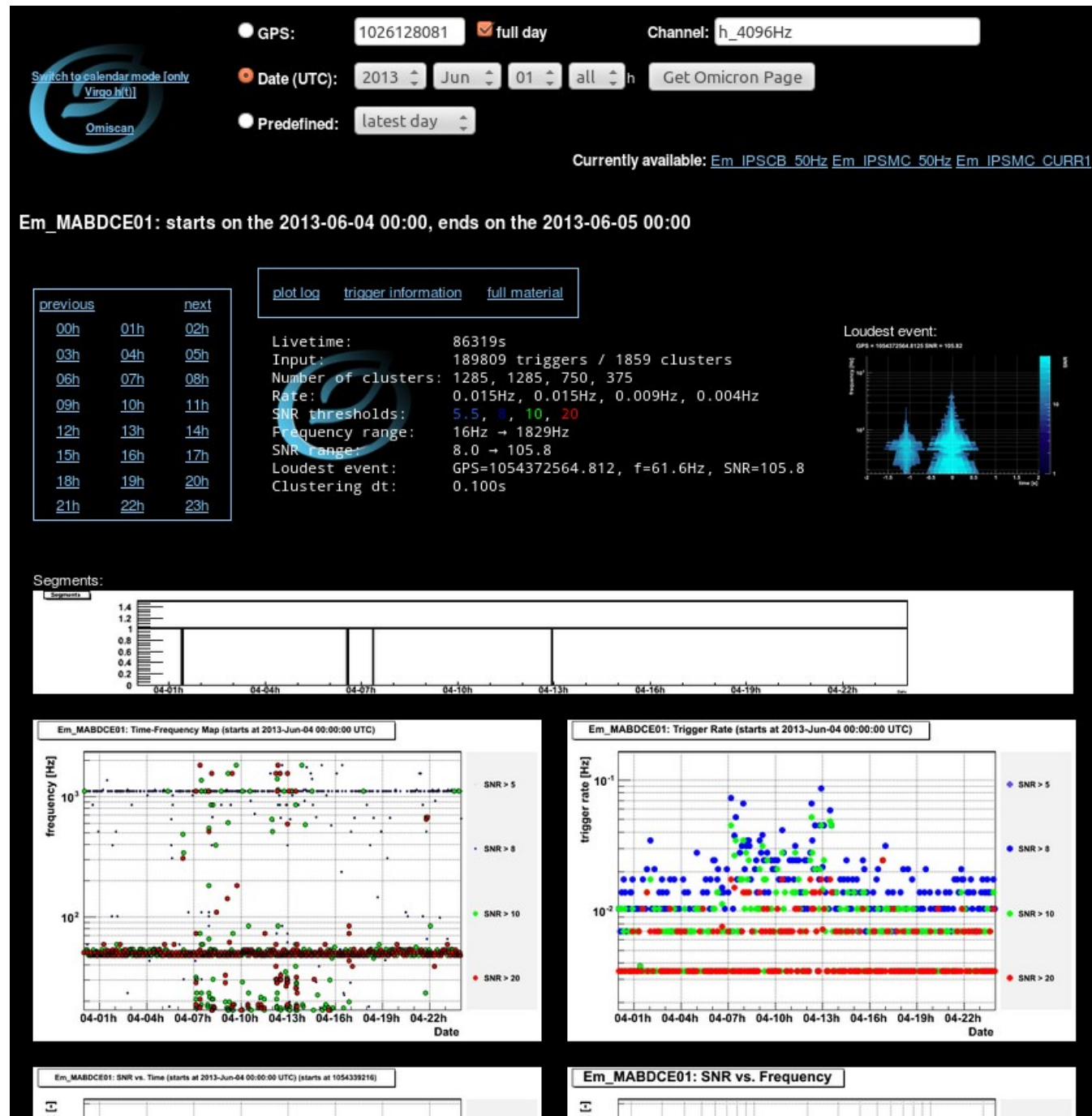- Investigation tools: Ωscan, UPVmatrix, DataDisplay... ✎

VDQ tools: Omicron → trigger production

Omicron = Omega stripped down to what's essential for detchar.

It is fast, reliable and optimized.

The plan is to produce Omicron triggers of ~400 aux. channels. This will be performed online (<20s for fast channels)

Triggers will be included in the online monitoring

VDQ tools: UPV and Excavator → veto generation

The main message:

> *Virgo*   *= prehistoric age of "hand-made" DQ flags*
> *Adv. Virgo*   *= modern age of fully automated veto generation*

"We should no longer be afraid of statistical approaches to generate vetoes. We gained experience and confidence that these methods are safe"

UPV:
The old concept of UPV has much evolved:
- use Omicron triggers as input (Virgo decided to definitely drop KW)
- use the trigger frequency information to tune the veto (this is crucial!)

It has been shown that:
- UPV alone is able to replace ~90% of Virgo DQ flags
- New noise coupling mechanisms have been identified

Excavator:
This new concept is based on a systematic study of correlations between h(t) triggers and the value of an auxiliary channels.

It has been shown that:
- Excavator is able to replace (with better performance) Virgo "non-linear" DQ flags

UPV+Excavator = very high rejection performance

VDQ: Consequences for analyses

The DQ information provided for Adv. Virgo will be massive:
- Several hundreds of vetoes will be available
- Sub-second veto segments will be produced
- We expect an increase of the number of segments/veto of a factor ~10
- A given veto will be declined and several levels of "aggressiveness"

This information must be digested!
Part of this work will be done by the VDQ group: Golden vetoes will be concatenated into one stream (DQ vectors in h(t) frames)

☞ We expect the collaboration of analysis groups. Vetoes are analysis-dependent. A careful selection must be performed by each group
The VDQ group will facilitate this work:
- by sharing the group experience with this kind of work
- by providing tools to select the most useful vetoes for each pipeline (DQperf)