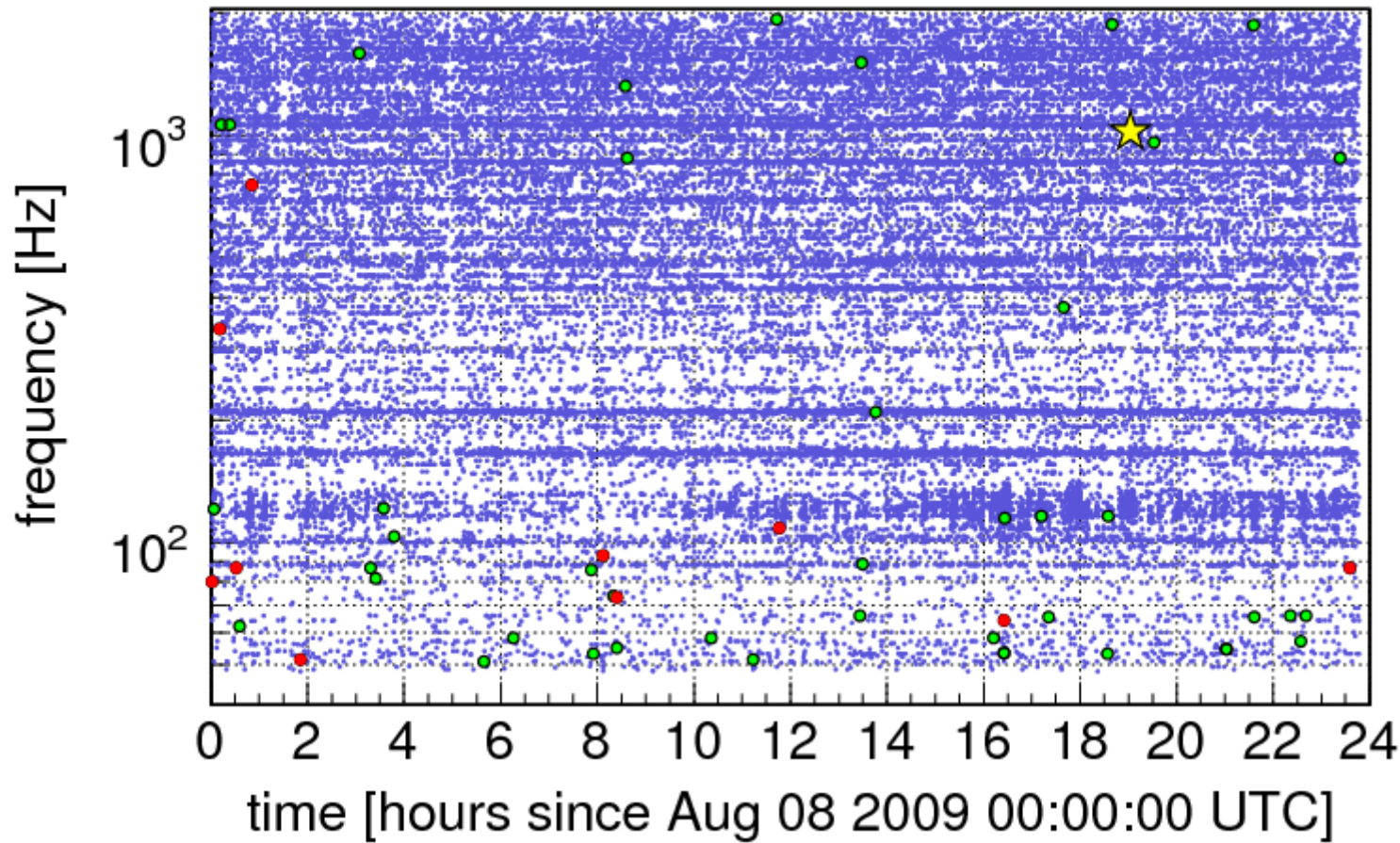# Data Quality Report

VDQ group

**M.A. Bizouard, L. Bosi, E. Cuoco, R. Gouaty,
F. Marion, B. Mours, N. Leroy, F. Robinet, D. Verkindt**

Virgo Data can be Very Good

Noise is stationary

Glitch rate is low
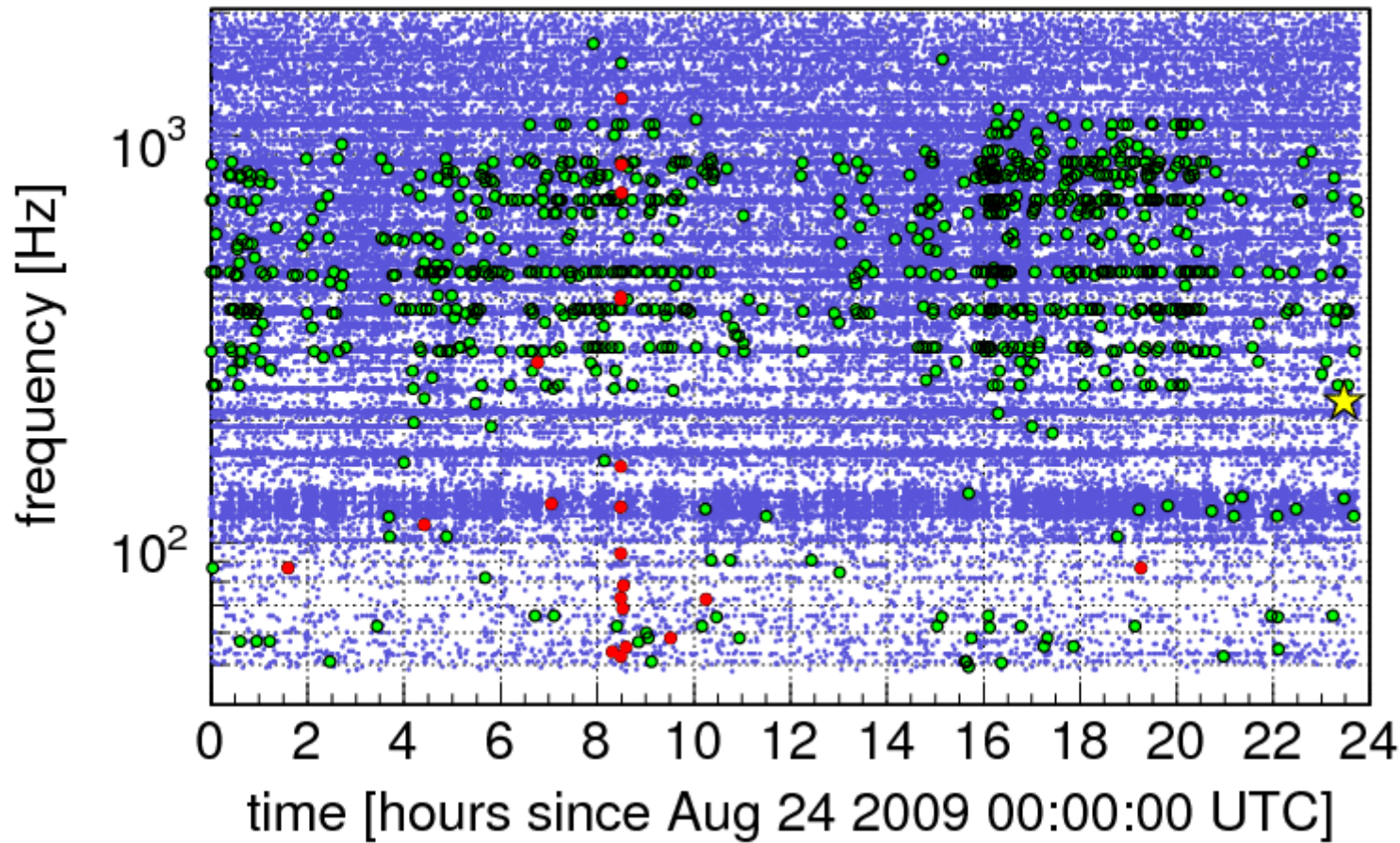
Loud glitches are understood

8th of August = the best day so far in terms of data quality
~10 events with SNR>20 over the day
~50 events with SNR>10 over the day

Virgo Data can be Terrible

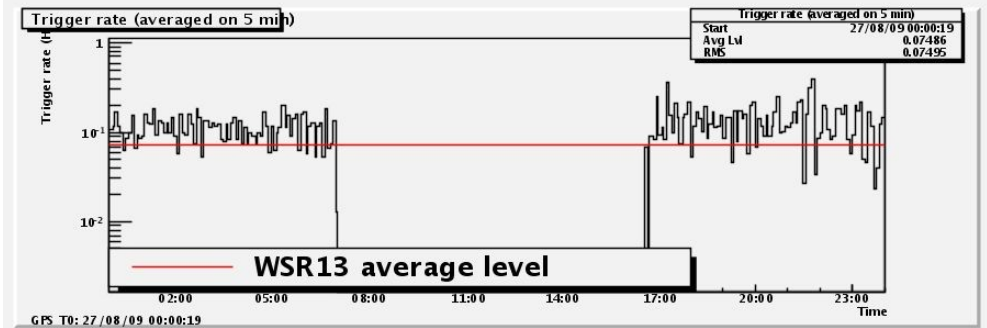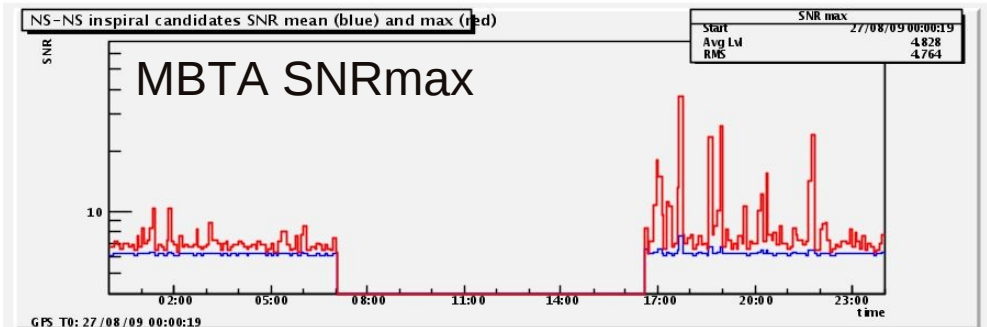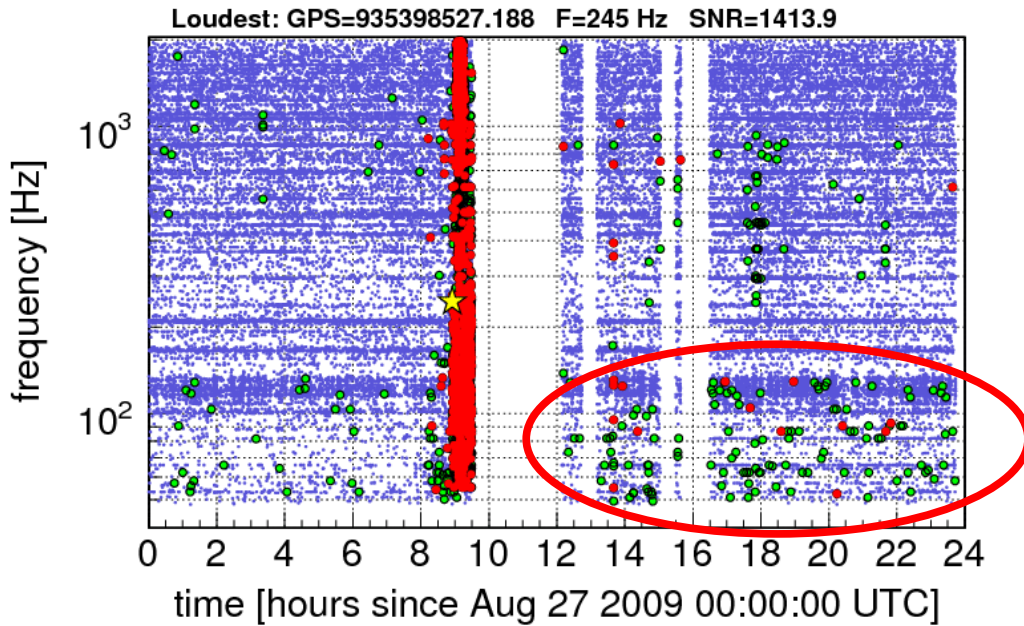**Glitch rate over the top**

Very loud glitches

The main challenge is to understand the sources of noise in order to :
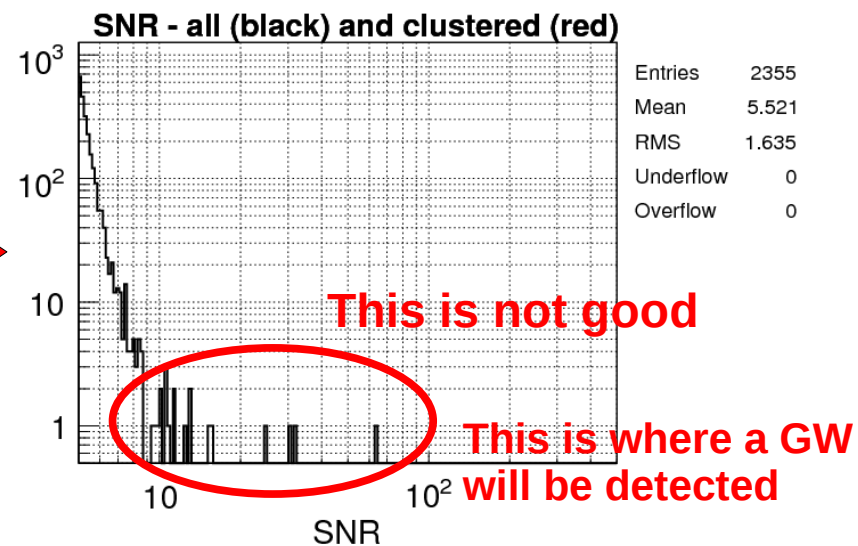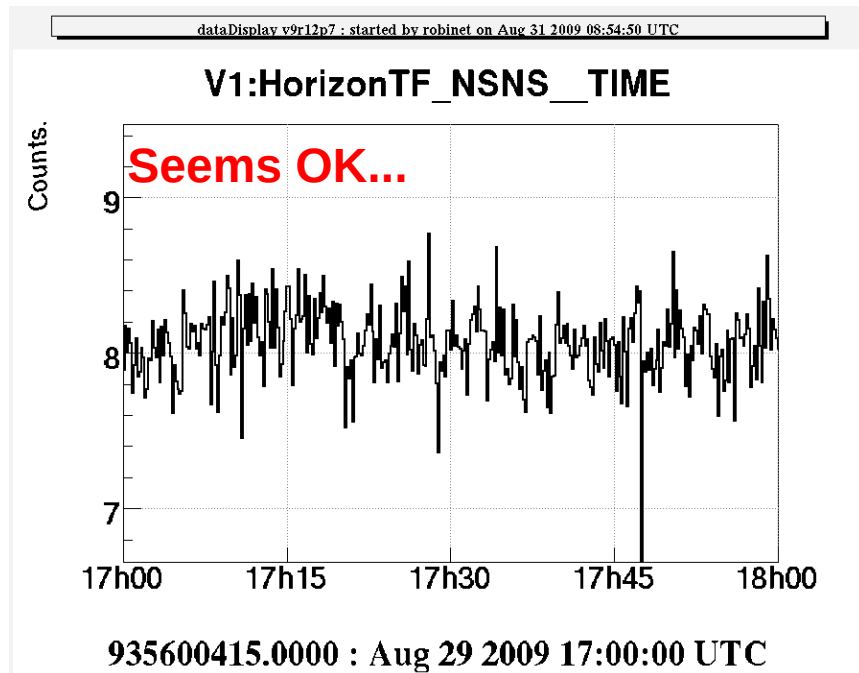- **Correct them**
- **Flag them**

Recent News

27th of August (commissioning) : Trigger rate 0.4Hz ⇒ 0.8Hz
TCS work ?

The Glitchiness as a Data Quality Indicator

From the analysis point of view,
the high-SNR events are just **as important as** the level of the horizon

This has to be taken into account when commissioning the interferometer

Soon, we will provide trend data plots to measure the glitchiness of the data

Tools

- **Omega Pipeline**
  Burst-like events ("low" frequency : 48-2048 Hz)
  Useful to study glitch characteristics (rate, SNR, frequency...)

- **WDF**
  Pipeline running over the full frequency range
  Useful to study high frequency glitches

- **MBTA**
  CBC pipeline
  Complementary to Omega for the glitch study

- **Omega Scans**
  Useful to study correlations dark fringe / aux. channels

- **kleineWelle**
  Useful to spot correlation dark fringe / aux. channels

Data Quality Flags

- **General flags** : HREC_QUALITY, PRE_LOCK_LOSS_10S...

- **Seismic** : based on the Band-RMS of seismic channels in different frequency bands (SE_*)

- **Magnetic** : based on the Band-RMS of magnetic channels in different frequency bands (MAB_*)

- **Acoustic** : based on the Band-RMS of acoustic channels in different frequency bands (AC_*)

- **Specific flags** : based on channels like : Sc_IB_SSFS_Corr or Bs_MOD_6MHz

Florent Robinet

Data Quality Flags

The black surface of the histograms corresponds to not-flagged events (**= not understood**)

This is a log scale so **most of the glitches** are not understood !
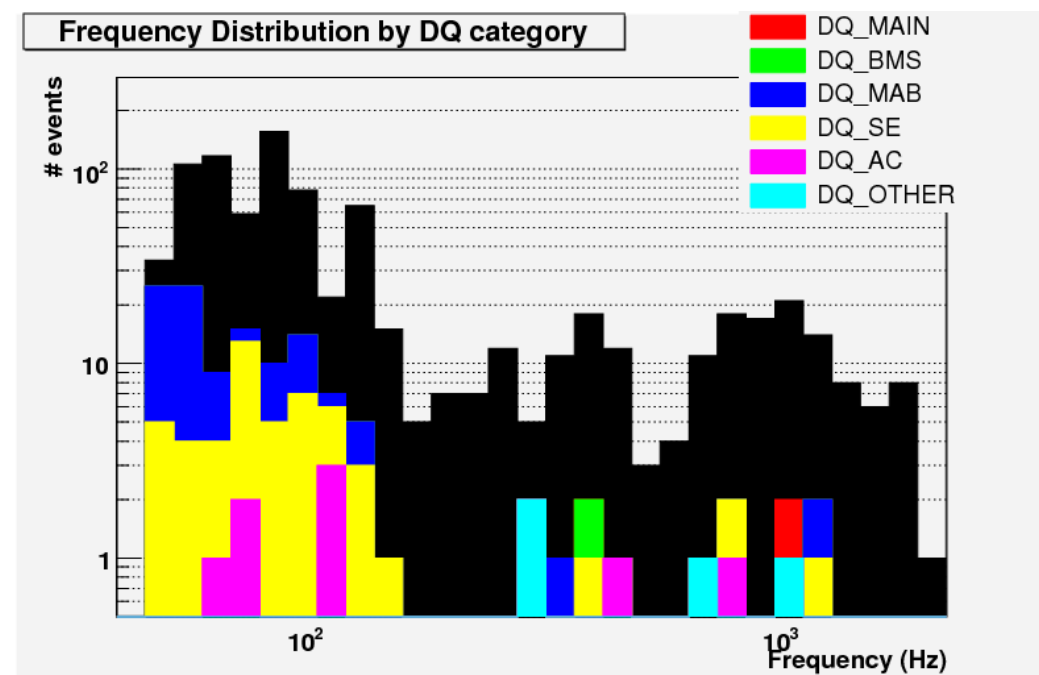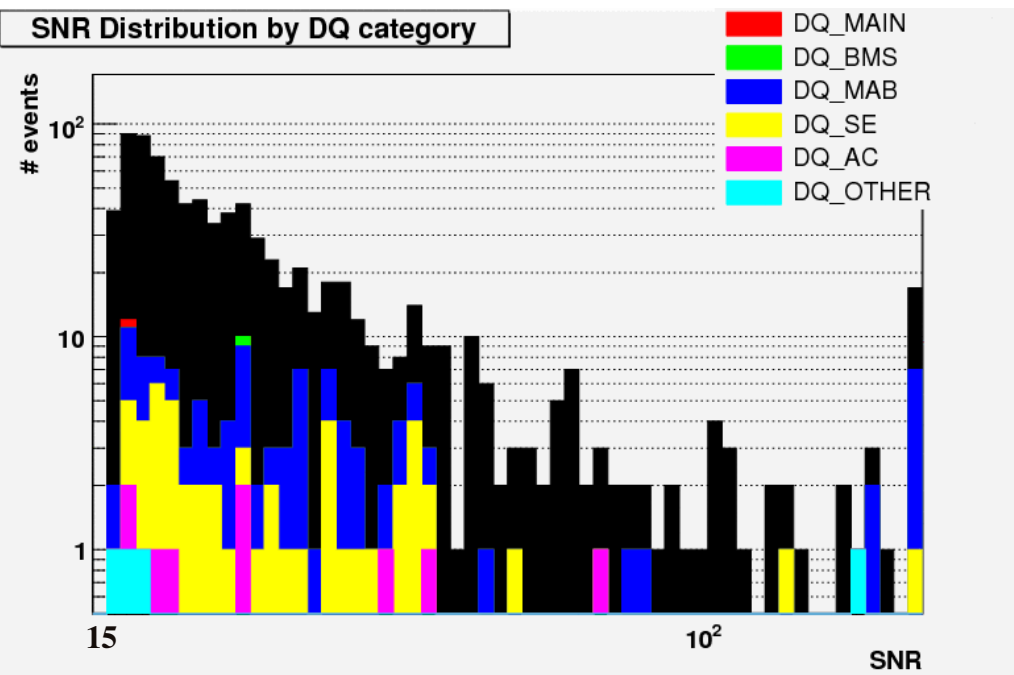
Only loud events (Omega, SNR > 15, August)
Cumulative histograms

Interaction with Commissioners

Involvement of commissioners is VERY helpful.
Ex :

List of interesting events by Frederique Marion

Just a few hours later...

Gabriele Vajente identifies the faulty channel

The source of the glitches
is identified
**Now we have a DQ flag
for these events**

Glitch Web Page

In the VDQ group, we have set-up **Glitch Shifts**. Reports can be found there :
http://wwwcascina.virgo.infn.it/DataAnalysis/VDBdoc/dqonline_shiftlist.html

Loudest glitches are looked "in the eyes".
Most of the investigations are done with the Omega-Scans.
It is often not sufficient and about 70-80 % of the glitches are not understood !

Nothing in the Scans !

VSR2 Glitch Top 5

GPS	Ω-scan
935646565.691	SCAN
935599650.639	SCAN
935586158.295	SCAN
935579849.027	SCAN
935563670.688	SCAN

VSR2 Glitch Reports

M. Bizouard : 26aug - 01seg

- 26th of August :
Trigger rate increases at the end of the day. 2-3 times higher than at the beginning.
Excess of events with high SNR at low ferquency + ~ 1000 Hz. **8** glitches with snr>20 (injections excluded)
All events (7) suppressed by a DQ have been checked and validated.

TOP 5 of the most problematic glitches
Please have a look

Loudest glitches day by day

Conclusions

- Through the online pipelines, we witnessed periods of time when the interferometer worked in (almost) ideal conditions… Unfortunately, it never lasts.

- The detection of GW will only be possible when high-SNR glitches are understood.

- The VDQ group aims at understanding the sources of glitch to be able to flag noisy periods of time.

- For the moment the efficiency of this task is ~20-30%.

- This efficiency could be much improved with the help of the commissioners. They have the best understanding of the interferometer.

- Please have a look at the loudest glitches (dedicated web page). Your input in the glitch hunt can be very helpful.