# EWS-L Operations Manual (MT)

## Protocol and Procedures

**Applies to**

In-office monitoring personnel (IOMP-MT) of the day/night

**Objective**

To provide clear instructions and to reiterate the procedures during event based monitoring

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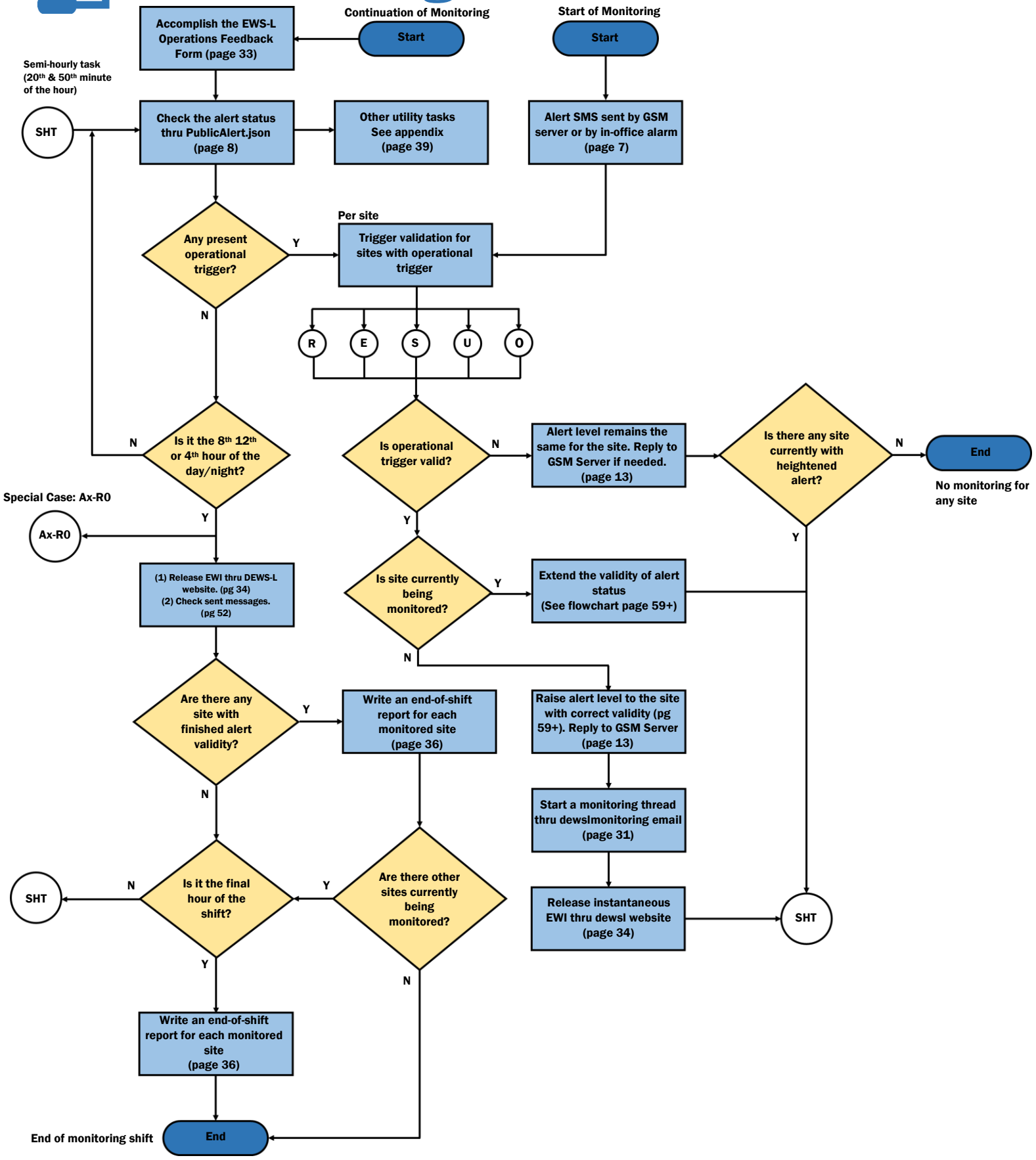
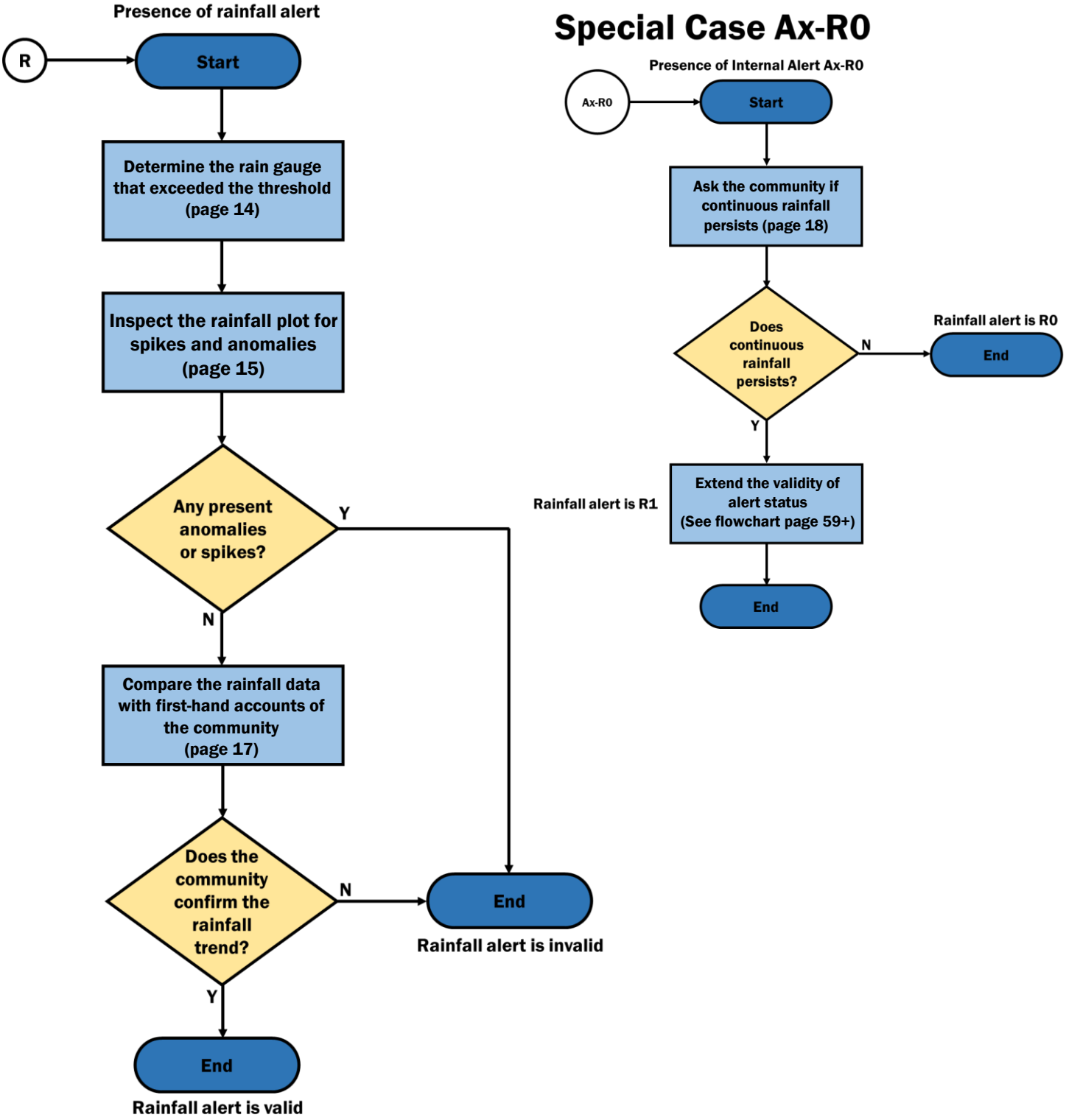
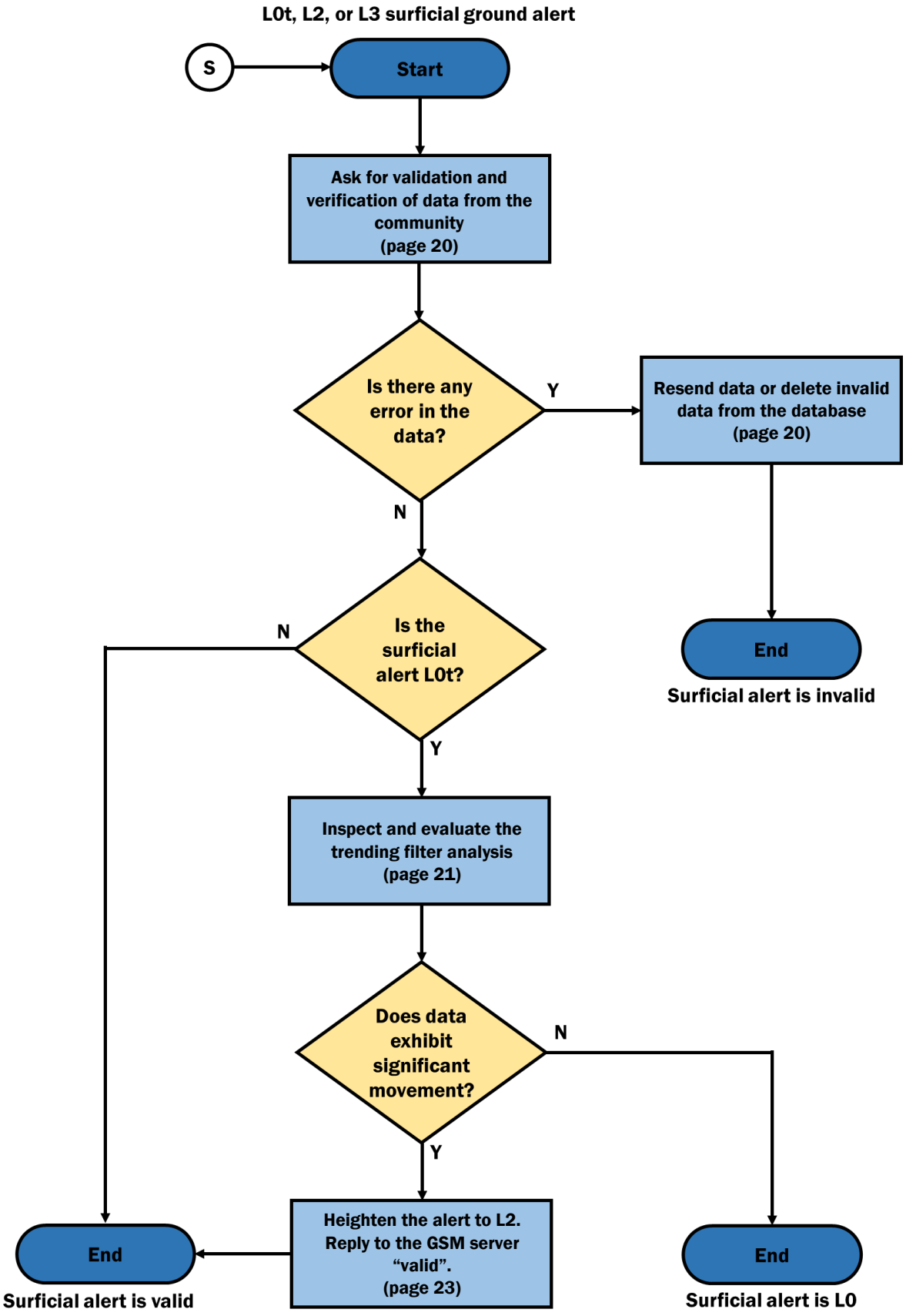
# Monitoring Process Flowchart



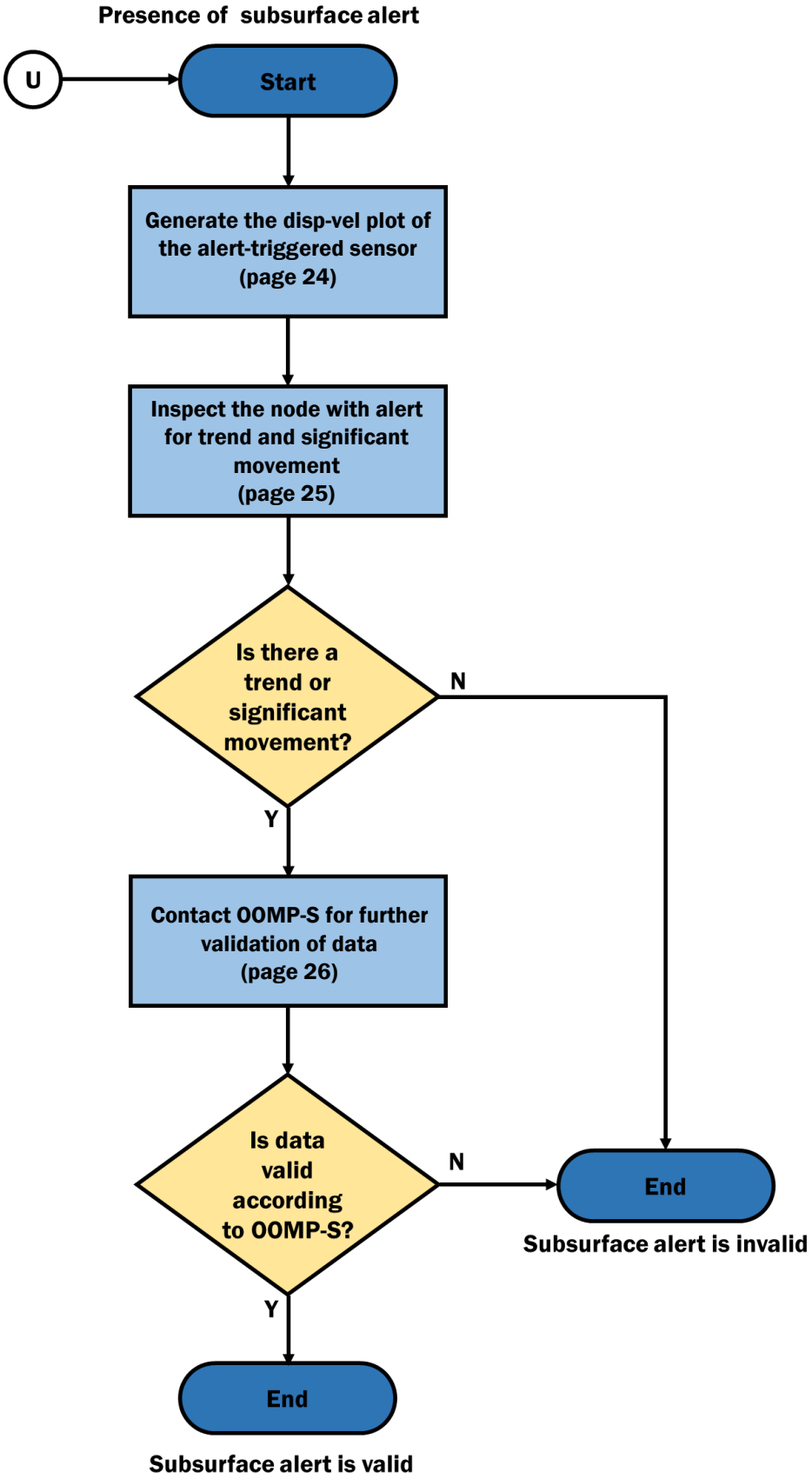
# Rainfall Alert Validation



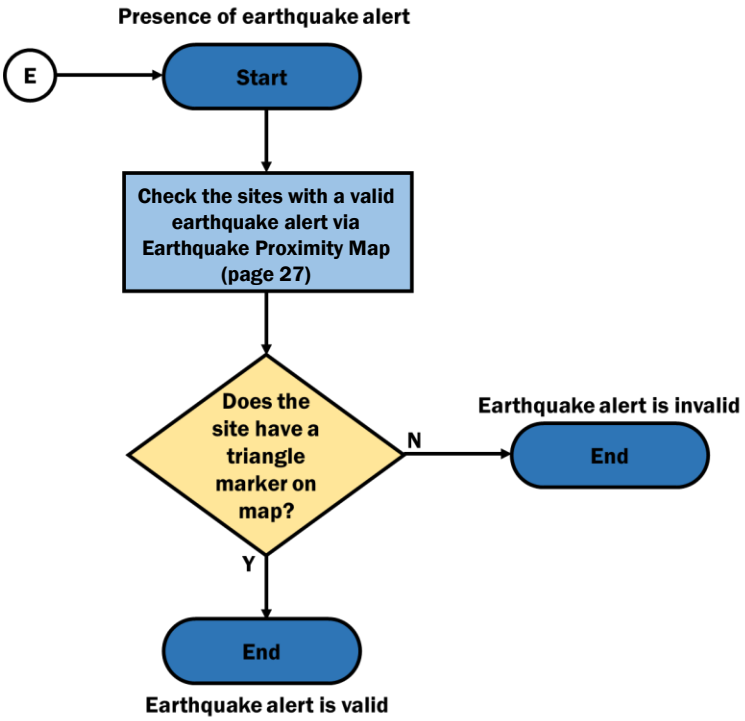
# Surficial Alert Validation



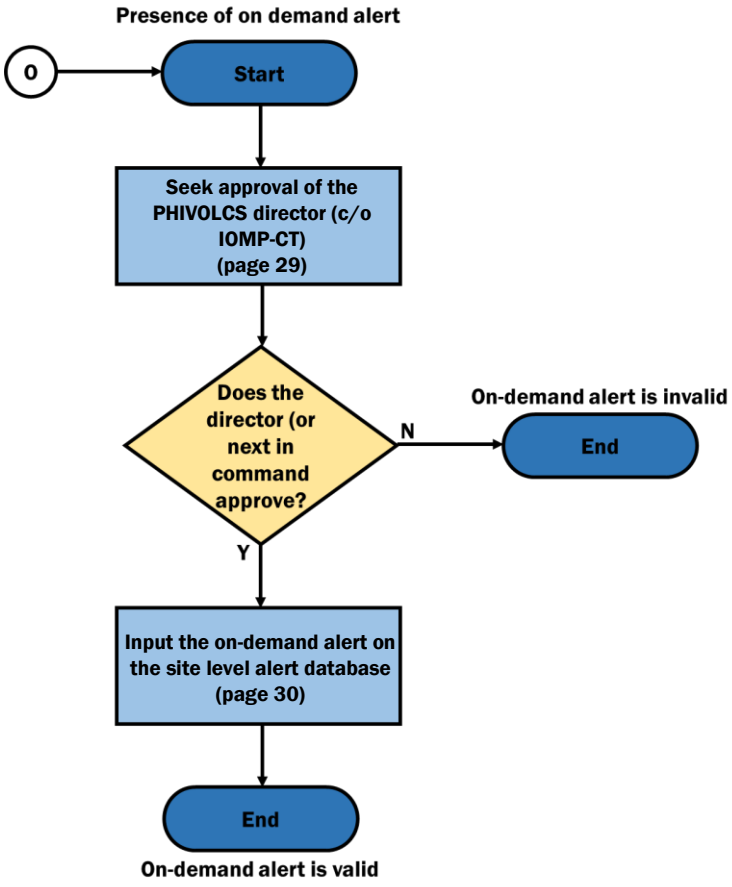
# Subsurface Alert Validation



# Earthquake Alert Validation




# On-demand Alert Validation



# Trigger Validation

## STEP 0: Check the alert status and identify triggers present on each site

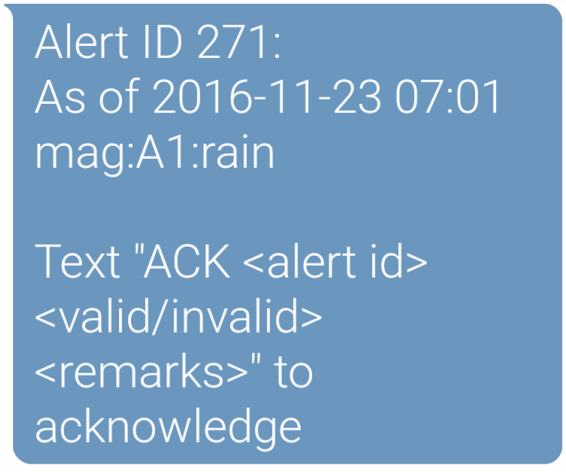
### For sites yet to be monitored:

**The IOMP personnel is notified for new alert triggers thru an alarm sounded in the office accompanied by an alert SMS message.**

**The alert SMS message contains the following information,**

**Alert ID # and Timestamp of the alert SMS,**
**then the alert information with the following format,**
**Site code: Public Alert: Source**
**[Instructions how to acknowledge the alert]**

**Example:**

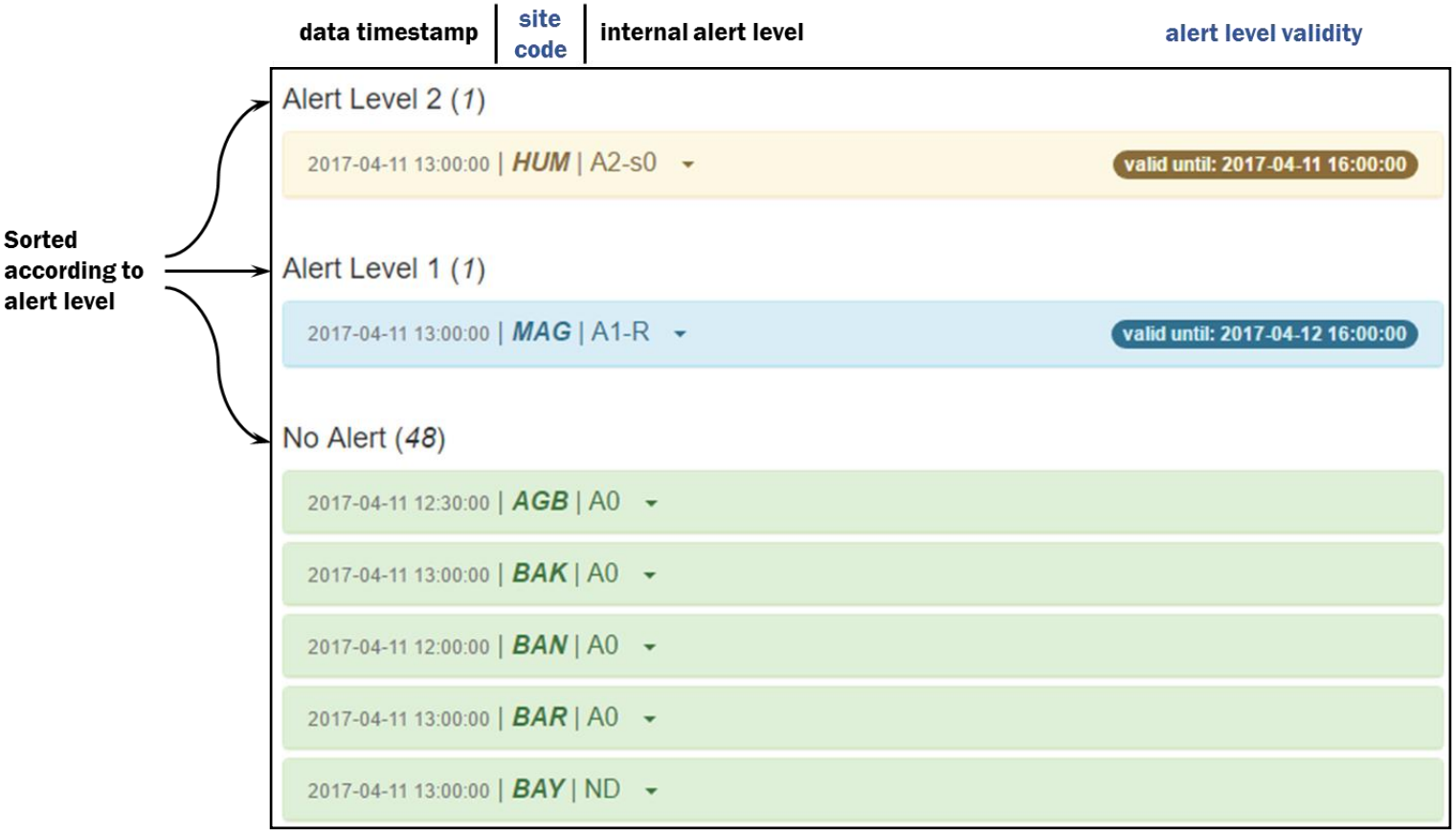



**Tip: Alert information can also be viewed thru PublicAlert.json see next page**

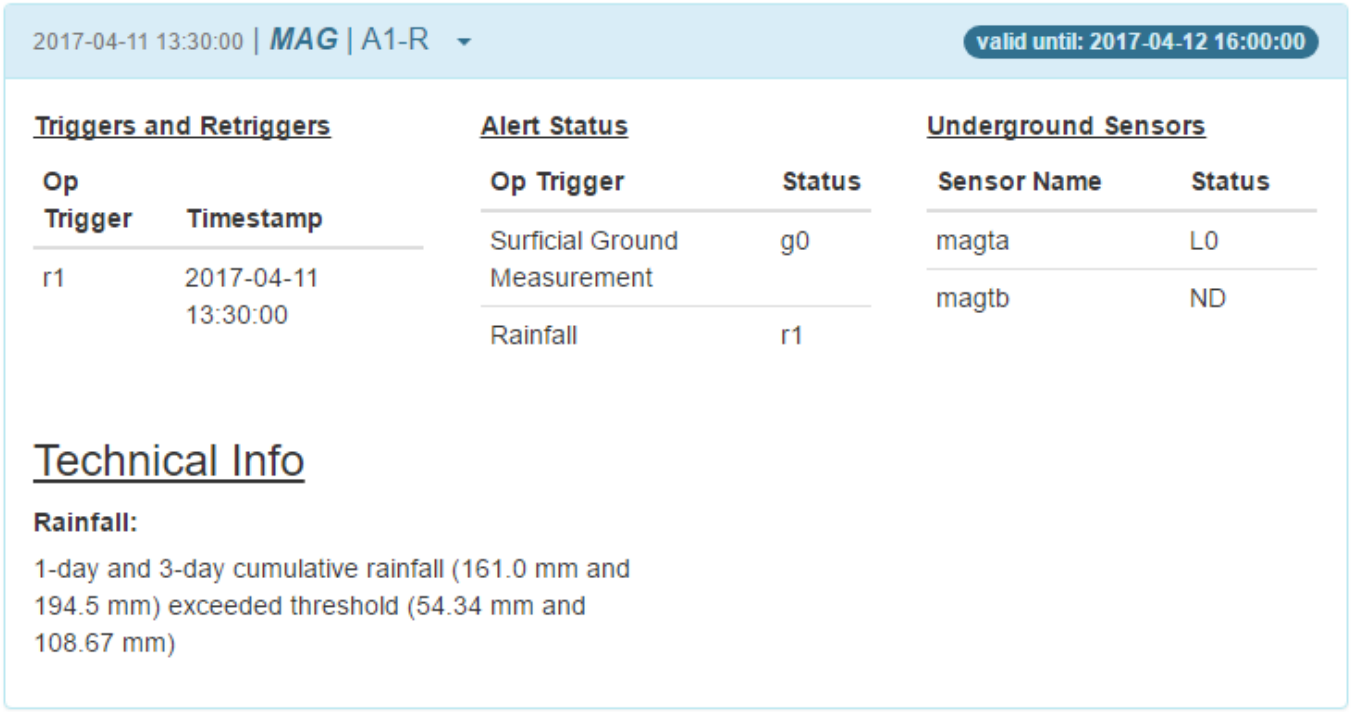
# Checking the alert status thru PublicAlert.json:

**Alert information can be checked regularly using the PublicAlert.json. This is flashed on the monitoring TV and can also be accessed by typing the address *192.168.150.127* thru any web browser while connected to *DYNASLOPE* or *DEWS-L SERVER* network.**

**The following diagram shows the general alert information that can be seen on the PublicAlert.json:**




**Alert information for a specific site can also be obtained by clicking the corresponding tab, see example at the next page.**



2017-04-11 13:30:00 | *MAG* | A1-R

valid until: 2017-04-12 16:00:00

**Triggers and Retriggers**

| Op Trigger | Timestamp |
|---|---|
| r1 | 2017-04-11 13:30:00 |

**Alert Status**

| Op Trigger | Status |
|---|---|
| Surficial Ground Measurement | g0 |
| Rainfall | r1 |

**Underground Sensors**

| Sensor Name | Status |
|---|---|
| magta | L0 |
| magtb | ND |

Technical Info

**Rainfall:**

1-day and 3-day cumulative rainfall (161.0 mm and 194.5 mm) exceeded threshold (54.34 mm and 108.67 mm)

**PublicAlert.json notes:**

***Last retrigger updates every 20th and 50th of the hour.**

***Upper caps L2/L3 indicate subsurface alert, while lower caps l2/l3 indicate surficial ground alert.**

***Sensor names that are absent from the list indicate absence of data for the past 3 hours.**

***More info for internal alerts can be found here: http://tinyurl.com/pl3ry3b**

***An offline text version of PublicAlert.json can also be found at *Desktop/updews-pycodes/Analysis/PublicAlert.txt***

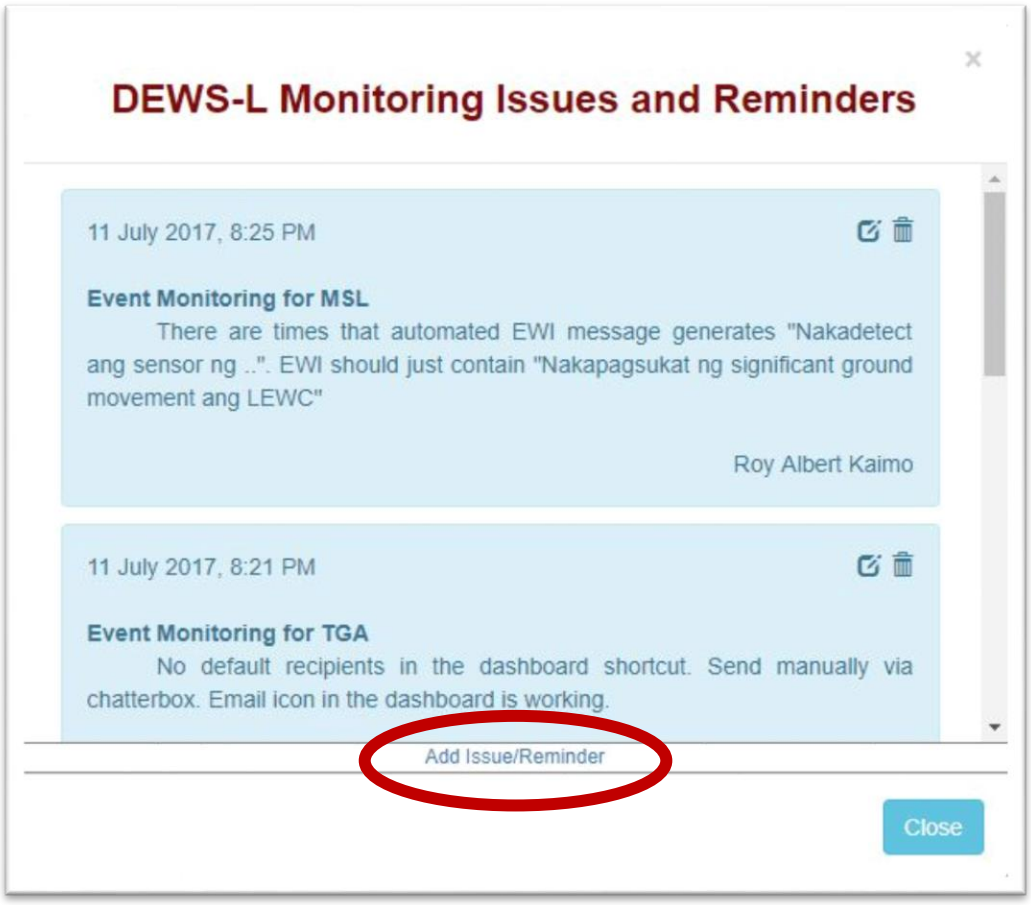
**Recent alerts that have been invalidated thru the GSM Server (see page 13) are also shown at the PublicAlert.json page.**

## Invalidated Alerts

2017-04-10 14:16:00 | ***MAG*** | Invalid A1 from rain data
IOMP: Carlo
Remarks: lewc reported no rain in the morning. Only small amts of rainfall seen in other gauges

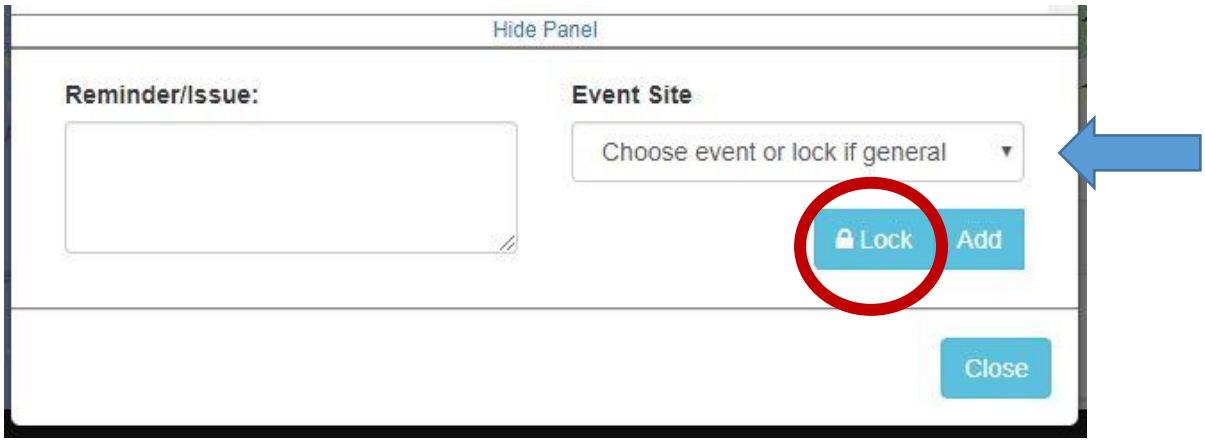
2017-04-09 14:06:00 | ***HUM*** | Invalid A2 from sensor data
IOMP: Kennex
Remarks: this might be due to voltage\/current issues considering the soms values.

**Recent monitoring issues encountered are shown in the home page of the DEWS-L website upon loading. Items in a red box are general reminders while blue boxes are reminders specific to a site for their current monitoring event.**



**To add a new issue or reminder:**

1. **Click on "Add Issue/Reminder" (encircled above).**
2. **Input description of issue/reminder on provided text box.**
3. **If the reminder is for a specific site, choose among currently monitored sites in the drop-down menu (shown by the arrow on the figure below). If it is a general reminder, click on the "Lock" button (encircled) below the drop-down menu.**
4. **Finally, click "Add" to include your issue/reminder to the monitoring issues page.**



# STEP 1: Validate the current operational triggers present for each site.

**Refer to the following pages for the procedure for validating the corresponding type of operational trigger for each site:**

# STEP 2: Process ALL validated/invalidated operational triggers.

## For sites yet to be monitored:

**Reply the findings of the validation to the GSM server using the following format:**

**"ACK [Alert ID #] [valid/invalid/validating] [remarks]"**

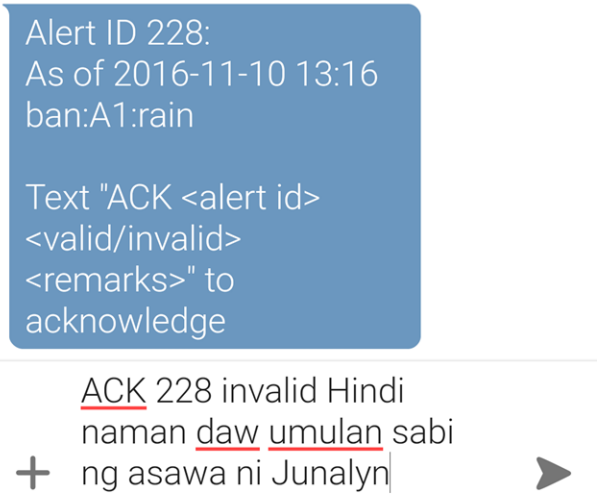
**The GSM server will text blast the information that you sent if it has received your message successfully.**

**Notes:**

***Replying "validating" for the status may be done to stop the alarm but you must reply valid/invalid after the validation of the operational trigger.**

***Invalidated triggers are automatically deleted on the public alert database once your reply message has been sent.**

**Example:**




**→ For valid alerts, initiate monitoring by releasing the result of the trigger validation as an instantaneous public alert report – see page 33 with the corresponding validity (see page 59). Proceed to "Start of Monitoring" see page 31.**

**→ For L0t surficial alerts, replying valid to L0t alert GSM means heightening the alert to L2.**

## For sites currently being monitored:

**Include the result of the trigger validation on the 4-hourly report and extend the validity of the alert accordingly. See page 33.**

# Trigger Validation

# Rainfall

## STEP 1: Determine the rain gauge that exceeded the threshold.

**Open the generated csv file of the summary of rainfall alert evaluation at the time of interest located in the rainfall plots folder:**

*Desktop/MonitoringOutput/RainfallPlots*

**The csv file has the name,**
**SummaryOfRainfallAlertGenerationFor[datetime].csv**

**Example:**

| site | 1D cml | half of 2yr max | 3D cml | 2yr max | DataSource | alert | advisory |
|---|---|---|---|---|---|---|---|
| agb | 0 | 61.23 | 0.00 | 122.47 | Other Rain Gauge: rain_noah_557 | r0 | --- |
| bak | 0 | 115.83 | 1.50 | 231.66 | rain_senslope | r0 | --- |
| ban | 50.25 | 43.84 | 50.50 | 87.68 | Other Rain Gauge: rain_noah_735 | r1 | Start/Continue monitoring |
| bar | 1 | 71.44 | 1.50 | 142.87 | rain_arq | r0 | --- |
| bay | 0 | 94.40 | 0.00 | 188.80 | Other Rain Gauge: rain_noah_1976 | r0 | --- |
| blc | 0 | 58.34 | 0.00 | 116.68 | Other Rain Gauge: penw | r0 | --- |

**Determine the data source of the site with an alert r1.**

**In this example, site BAN exceeded the threshold based on the rainfall data from rain_noah_735 (highlighted in yellow).**

# STEP 2: Inspect the rainfall plot of the site for anomalies.

**Open the generated rainfall plot of the site at the time of interest found in the rainfall plots folder. Each site has the following format for its filename:**

**rainfall_[timestamp]_[site].png**

**Example:**

**Rainfall plot for Site BAN during November 10, 2016 at 2:00 PM has filename rainfall_2016-11-10_14-00-00_ban.png**

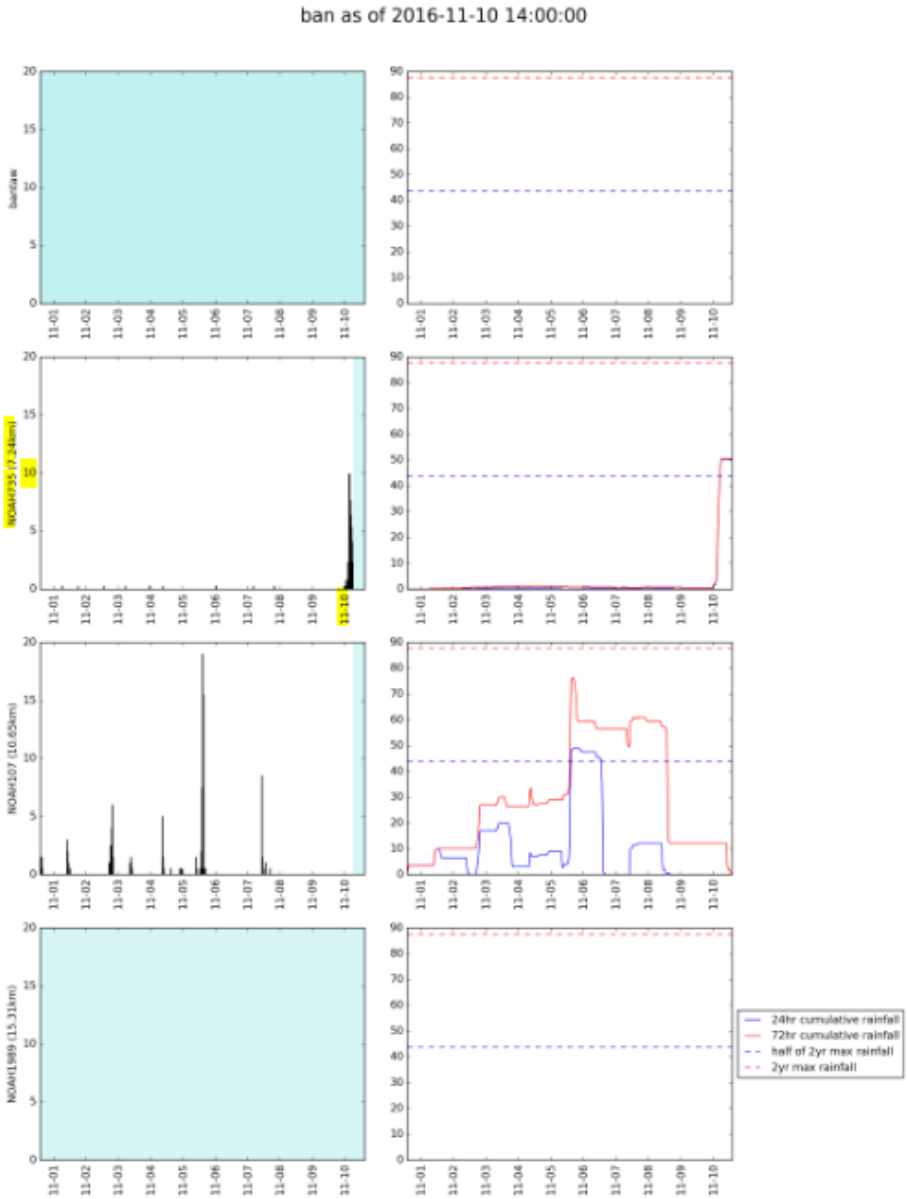
**Look for possible spikes and anomalous data in the rainfall plots. As a rule of thumb, if the 15-minute instantaneous rainfall (denoted by the black bars on the plot) exceeds 50 mm, the data (hence the alert) is invalid.**

**See next page for example.**

**Example:**

**Rainfall plot for Site BAN during November 10, 2016 at 2:00 PM.**

**Rainfall plot show that the 15-minute rainfall does not exceed the 50mm rule of thumb, hence the rainfall data is valid. (highlighted in yellow)**




**Notes:**

**The figures on the left column of the rainfall plot show the amount of the 15-minute instantaneous rainfall (black bar) and the range at which data is absent (light blue highlight).**

**For the figures on the right, when the line exceeds the corresponding dotted line (blue for 24 hr rainfall, red for 72 hr rainfall), the rainfall amount at that time exceeds the current threshold.**

**→ If the rainfall data is valid, proceed to the next step. (See next page)**

**→ If the rainfall data is invalid, proceed to step 2 of trigger validation, see page 13**

# STEP 3: Compare the rainfall data with validation from the community.

Seek the confirmation of the community (stakeholder in decreasing order with respect to the distance to the site) by asking whether a significant rainfall event happened during the observed time of significant increase in rainfall found in the rainfall plot.

Hence, the hierarchy of community validation is from LEWC → BLGU → MLGU → PLGU. Where we take the LEWC info as "on site" validation and others (BLGU, MLGU, and PLGU) as "off site" validation.

For "off site" validations, explicitly ask for on-site data. If no "on site" validation can be retrieved, it is the judgement call of the IOMPs whether to validate or invalidate the alert. If alert is to be raised, include in the EWI the basis for alert (e.g. "as per confirmation provided by B/M/PLGU)

Example:

Community was contacted by the IOMP-CT, AC Junalyn (LEWC) said no rainfall event happened during 12 MN of November 10, 2016. Hence, rainfall data found in the plot is invalid.

→ Proceed to step 2 of "Trigger Validation" after processing the rainfall data. See page 13

# Special Case: Ax-R0

## STEP 1: Ask the community if continuous rainfall persists

For cases where there was a rainfall alert but currently all of the rain gauges provide no or questionable data, to determine the current rainfall alert we ask the rainfall status at the site for the moment from the community.

→ If rainfall has stopped as narrated by the community, lower the operational trigger to r0. Proceed to trigger evaluation if needed. See page 13

→ If continuous rainfall persists as narrated by the community, maintain the operational trigger r1. Extend the validity of the alert then proceed to trigger evaluation step 2. (See page 13) When releasing, write in the technical info the following information:

"No data as of [last valid data timestamp]; however, community confirmed continuous heavy rainfall since [time based on conversation]"

# Special Case: Ax-Rx/rx

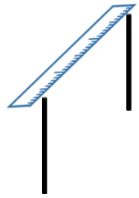
**For event lowering cases where in either the 3-day or 1-day rainfall value is below threshold but above 75% of the threshold, the validity of the alert is extended for another 4 hours. This is done to prevent premature termination of the event since succeeding rainfall may cause retriggers.**

**An internal alert of Ax-Rx denotes prior r1 trigger is present while Ax-rx denotes no prior r1 trigger is present.**

**See Alert Level Flowcharts (pg 59) for more details.**

# Trigger Validation

## Surficial



### STEP 1: Ask for validation and verification of data from the community.

**L0t, L2, and L3 surficial ground trigger indicates that the recent ground measurements have exceeded the velocity threshold. Contact the area coordinator of the site to double check the data sent by the community.**

**→ If the surficial ground data is invalid (due to error in measurement), resend the new ground data with same data timestamp to the GSM Server (c/o IOMP-CT) then invalidate the alert sent by the GSM server (see page 13). Proceed to the next step if an operational trigger persists.**

**→ For other corrections or other concerns, contact your friendly OOMP-MT for further assistance.**

**→ If the surficial ground data is valid, proceed to the next step. See next page.**

**Tip: The ground alert generation code is automatically triggered once the GSM server successfully reads the input data.**

# STEP 2: Inspect the generated trending plot for validation.

→ **If the operational trigger is L2 or L3, you may skip this step and proceed to step 2 of "Trigger Validation" page 13. You may use the result of the following analysis as reference.**

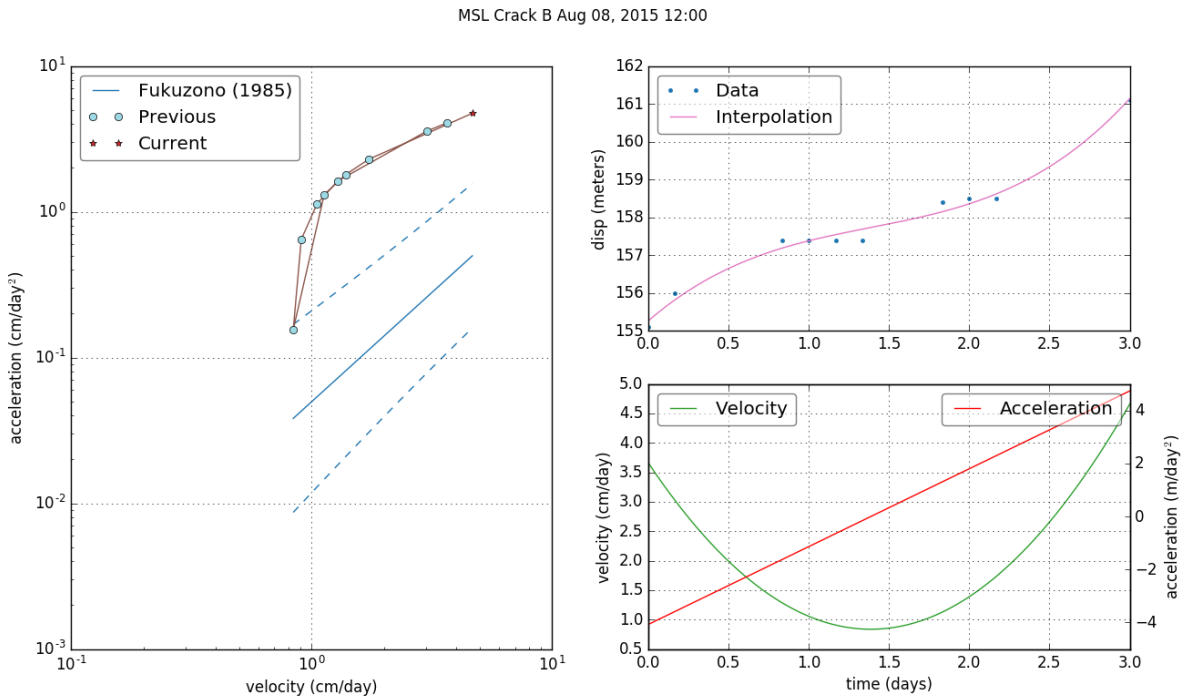
**Open the trending plot for the specific site and marker found at**

***Desktop/MonitoringOutput/GrndMeasPlots/TrendingPlots***

**with filename *"date_time site marker.png"***

**Example:**

**The following is the generated trending plot for MSL Crack B on August 8, 2015 12:00 PM**



**The following are the sections of the trending plot graph along with their descriptions:**

## Displacement vs. Time Graph

**Found in the upper right hand corner, the graph shows the community ground measurement data points (blue dots) with the spline interpolation graph (violet line).**

## Velocity and Acceleration vs. Time Graph

**The graph in the lower right hand corner shows the computed velocity and acceleration derived from the spline interpolation.**

## Velocity vs. Acceleration Graph

**The graph found in the left side shows the computed velocity vs. the acceleration derived from the spline interpolation along with the line regression with 99.99% confidence interval for velocity vs. acceleration slope failure values of various sites (taken from Federico et. al 2011).**

# STEP 3: Evaluate the result of the trending filter analysis.

**At the end of this step you may heighten the operational trigger from L0t → L2 if the evaluation show that the trending filter made an inaccurate result.**

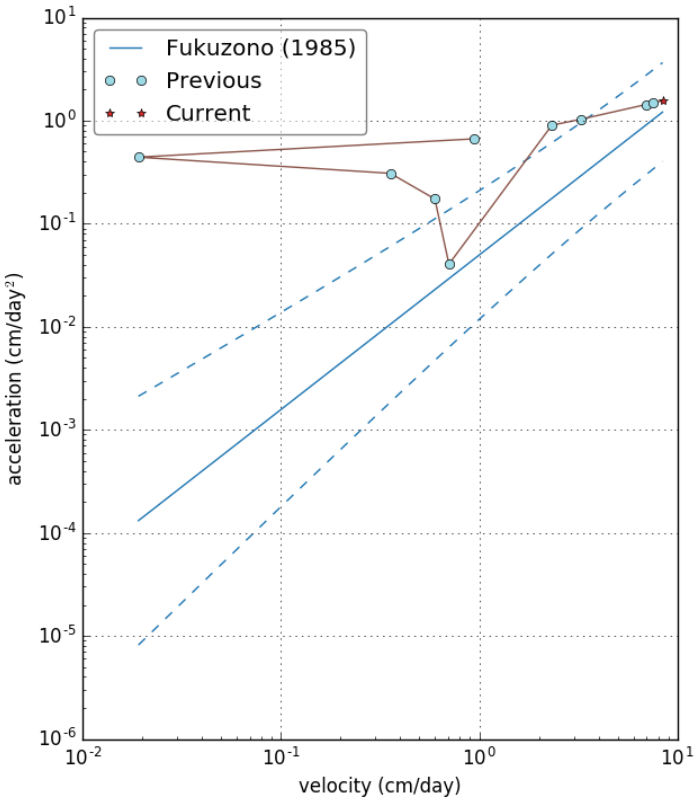
**Use the following criteria (with guide questions) as reference for the evaluation.**

**1. Goodness of the cubic spline interpolation with the trend of the data.**

**Does the cubic spline interpolation capture the apparent trend of the ground measurement data? Are there invalid and artificial spikes and jumps that are present in the interpolation? Does the interpolation follow a smooth curve that behaves and concaves as expected?**

**2. Proximity and trend of the velocity vs. acceleration graph points towards the confidence interval.**

**How close is the current velocity and acceleration value with the confidence interval? Does the velocity vs. acceleration curve show that it trends towards entering the confidence interval (See figure beside)?**




**3. Magnitude of the instantaneous velocity.**

**If the instantaneous velocity of the crack displacement exceeds the L3 threshold significantly (velocity > 43.2 cm/day), you may raise the alert to L3 for L0t generated alerts.**

**Validate or reject the findings of the trending filter / velocity vs. acceleration analysis from the subjective evaluation of the graph based on the above criteria. (See Appendix for more Examples). Reply valid to the GSM server if L0t is to be heightened to L2.**

**→ After the analysis, proceed to step 2 of "Trigger Validation" page 13 to process the validated/invalidated triggers.**

# Trigger Validation

# Subsurface

## STEP 1: Generate the disp-vel plot of the alert-triggered sensor.

**The alert SMS message and the PublicAlert.json shows the sensor and node that triggered the subsurface alert. See step 0 of "Trigger Validation" page 7**

**To generate the disp-vel plot, first run the python code *RealtimePlotter.py* found at *Desktop/updews-pycodes/Analysis* using spyder.**

**Provide the essential parameters such as the sensor name and timestamp. See example below for reference,**

**Example:**

**We wish to generate the disp-vel plot for sensor gaasa at the time September 18, 2016 7:30 AM for event based monitoring trigger validation.**

```
plot from start to end of data? (Y/N): n

plot with 3 day monitoring window? (Y/N): y

sensor name: gaasa

test specific time? (Y/N): y

plot end timestamp (format: 2016-12-31 23:30): 2016-09-18 07:30
```

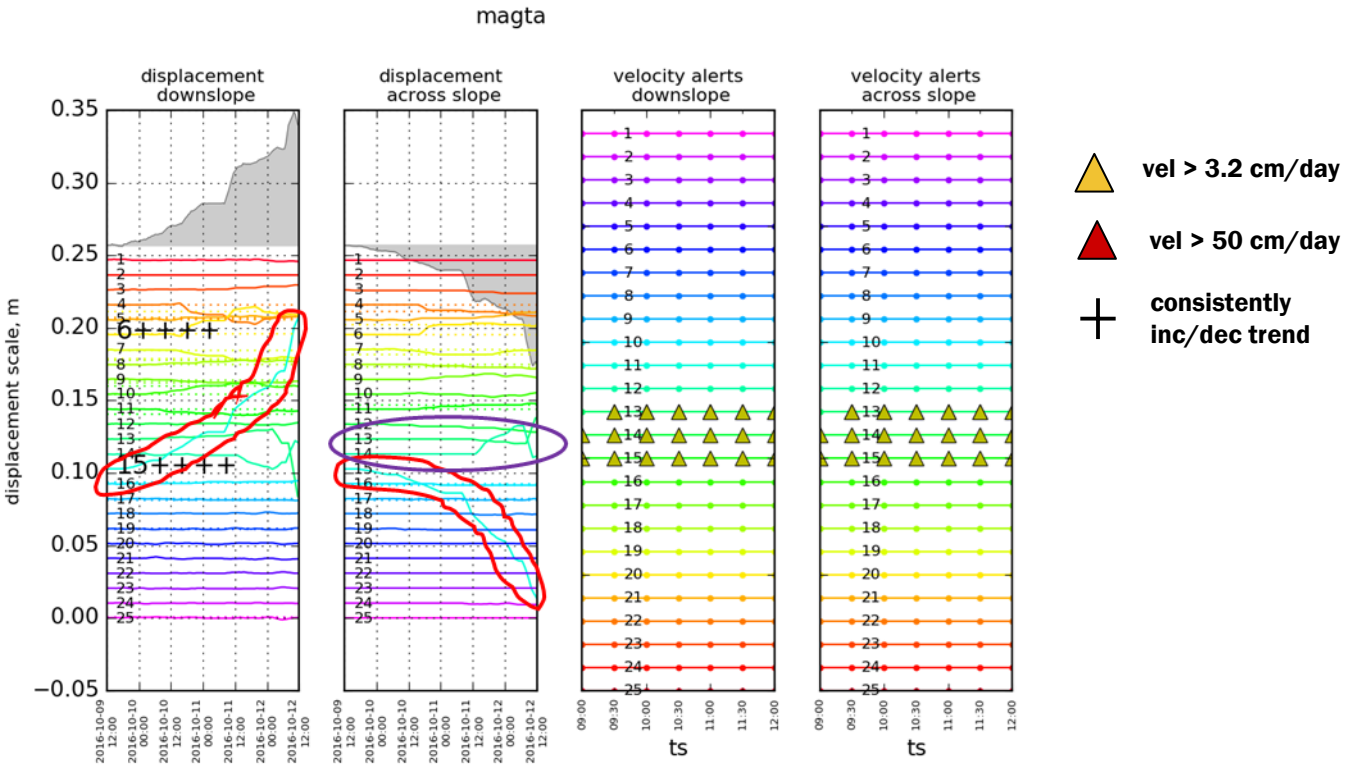
# STEP 2: Inspect the node with alert for trends and significant movements.

**Check if the displacement of the node in question (as indicated by the SMS alert) is significantly higher than apparent noise ranges and is constantly increasing/decreasing.**

**Example:**

**MAGTA's node 14 and node 15 exceeded the threshold as indicated by the SMS Alert during October 12, 2016 12:00 NN. Disp-vel plot shows that node 15 (circled in red) is constantly increasing and is significantly higher than the apparent noise range (circled in violet).**

**→ Since node 15 is included in the alert SMS and the movement seen is constantly increasing and has a magnitude significantly higher than the noise range, the alert is valid.**




**The alert is valid if there is an observed movement within the node that is constantly increasing/decreasing with a displacement magnitude that is significantly higher than the noise ranges.**

→ If the subsurface data is valid, proceed to the next step

→ If the subsurface data is invalid, proceed to step 2 of trigger validation see page 13.

# STEP 3: Contact the OOMP-S for raw data validation.

As a final step, we seek the validation of the out of office monitoring personnel of the senslope team. Contact the assigned OOMP-S via online/text to ask for validation. See "Monitoring Shift Schedule" and "Contacts Database"

The subsurface alert is only valid if and only if it has been validated by both the IOMP-MT and OOMP-S

→ Proceed to step 2 of "Trigger Validation" after processing the subsurface data. See page 13.

# Trigger Validation Earthquake

## STEP 1: Receipt of Alert SMS or report from the community

Whenever a significant earthquake happens with near proximity to one of the DEWS-L site, an alert SMS may automatically be sent by the GSM server to the monitoring personnel or a report from a community member that an earthquake has been felt to their site may be received.

## STEP 2: Verify the finality of the earthquake data

We define data as final if it is posted on the SOEPD website (http://www.phivolcs.dost.gov.ph/html/update_SOEPD/EQLatest.html) 20 minutes after the timestamp of the earthquake.

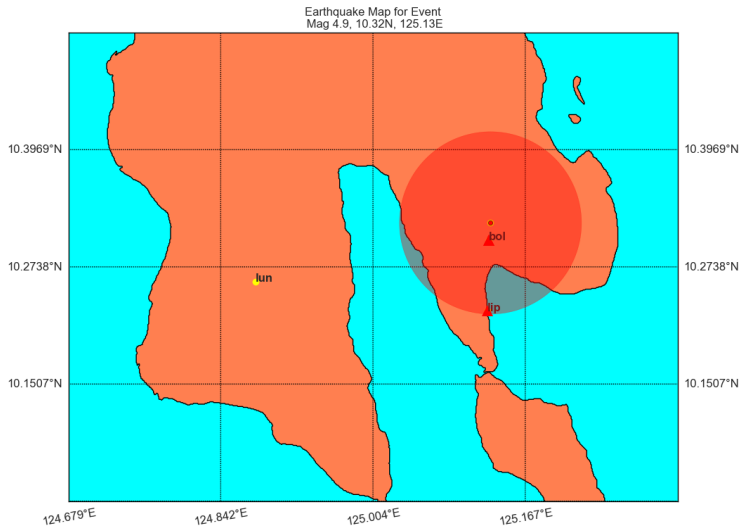
Updates in magnitude and epicenter location may still be done within the first few minutes of the earthquake, especially for larger magnitudes. Visit and refresh the SOEPD EQ Latest website to verify the data.

# STEP 3: Take note of the details of the earthquake

**Once a site has been identified to be affected by a recent earthquake event, the GSM server will send an alert SMS to the IOMP-CT and IOMP-MT and the earthquake alert code will generate an earthquake proximity map found in (Desktop/MonitoringOutput/EQ). The map contains the earthquake's location, extent of critical radius, as well as nearby sites (see below for example). You may also check the earthquake events table (see page 58)**

**Example:**

**EQ Proximity Map**




**If stakeholders ask for updates regarding an earthquake, information may be given (Magnitude, Geographic Coordinates, Relative Location), granted that we provide the source and that the information is subject to change.**

**→ Sites with a triangle marker in the eq map has a valid earthquake alert. Proceed to step 2 of "Trigger Validation". See page 13.**

# Trigger Validation

## On Demand 


## STEP 1: Seek the approval of the PHIVOLCS director (c/o IOMP CT).

**Once the IOMP-CT affirms that it is positive that the community explicitly requests for monitoring, the next step is to ask for the approval of the PHIVOLCS director regarding the request.**

**Use the community phone to contact the PHIVOLCS director thru SMS.**

**→ If the director still does not reply, contact the next person in command (Project Head → Chief SRS).**

**→ Proceed to step to step 2 of "Trigger Validation" for invalidated on-demand alerts (see page 13).**

**→ Proceed to the next step (on the following page) for validated alerts.**

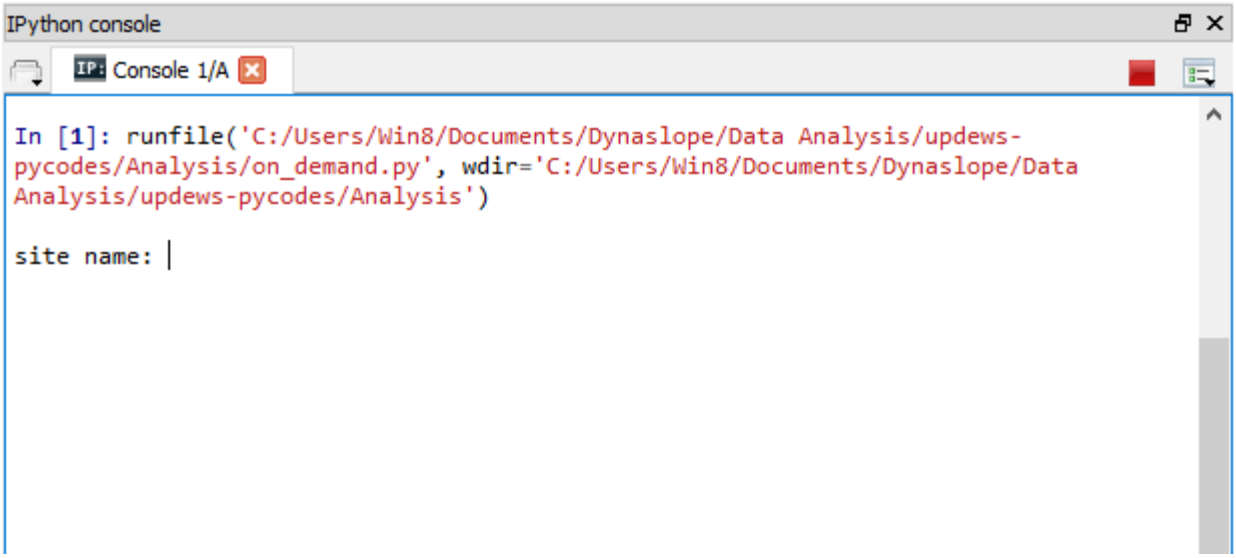
# STEP 2: Input the on-demand alert on the site level alert database.

**Approved on-demand community requested alerts should be registered on the site level alert database, to do this, run the on_demand.py code found at *Desktop/updews-pycodes/Analysis* using Spyder.**

**→ Input the three-letter site code when prompted (as seen on the PublicAlert.json)**

**Example:**

**Sample run of the on_demand.py code**



# Start of Monitoring

**For all validated alerts for newly monitored sites, start an email thread using the dewsl monitoring email* with the following format:**

***DEWS-L Monitoring Email**

**Username:** dewsl.monitoring2@gmail.com

**Password:** deepseated

**Recipients:** phivolcs-dynaslope@googlegroups.com; phivolcs-senslope@googlegroups.com; rusolidum@phivolcs.dost.gov.ph; asdaag@yahoo.com

**Subject:** [Site Code] [Date (in DD MMM YYYY)]

**Body:**

As of [instantaneous EWI release timestamp], [Site Brgy., Municipality, Province] is under [A1/A2/A3] based on [cause] at [data timestamp]

**Notes:**

**The cause of monitoring can be any of the following:**

- **Rainfall data exceeding threshold**
- **Earthquake proximity**
- **Request of community due to [reason of request]**
- **Significant/critical movement from subsurface data**
- **Significant/critical movement from surficial data sent by community**

→ See next page for example

**Example:**

**To:** phivolcs-dynaslope@googlegroups.com; phivolcs-senslope@googlegroups.com; rusolidum@phivolcs.dost.gov.ph; asdaag@yahoo.com

**Subject:** MSL 09 SEP 2016

**Body:**

As of 8:00 AM September 09, 2016, Sitio Lower Mesolong, Brgy. Sto Niño, Talaingod, Davao del Norte is under A2 based on significant movement from surficial data at 7:00 AM September 09, 2016.

→ **Proceed to "On-going Monitoring" for the next steps see page 33.**

# On-going Monitoring

**Refer to this page for the things to do during the monitoring shift.**

**Accomplish the EWS-L Operations Feedback Form for the evaluation of the previous monitoring shift. (https://goo.gl/forms/pqe3IST6v8rgSK6r2)**

**Check the alert status of each site thru PublicAlert.json every 20th and 50th minute of the hour – see page 8.**

**Fill the DEWS-Landslide Early Warning Information Release Form http://www.dewslandslide.com/monitoring/release_form**

**using the recent data (w/in last 30 mins) for each site being monitored then issue the report every 12th, 4th and 8th hour of the day/night (or instantaneously).**

**See http://www.dewslandslide.com/monitoring/faq for more details.**

**Check the sending status of EWI SMS sent by the CT personnel to the community. – see page 52**

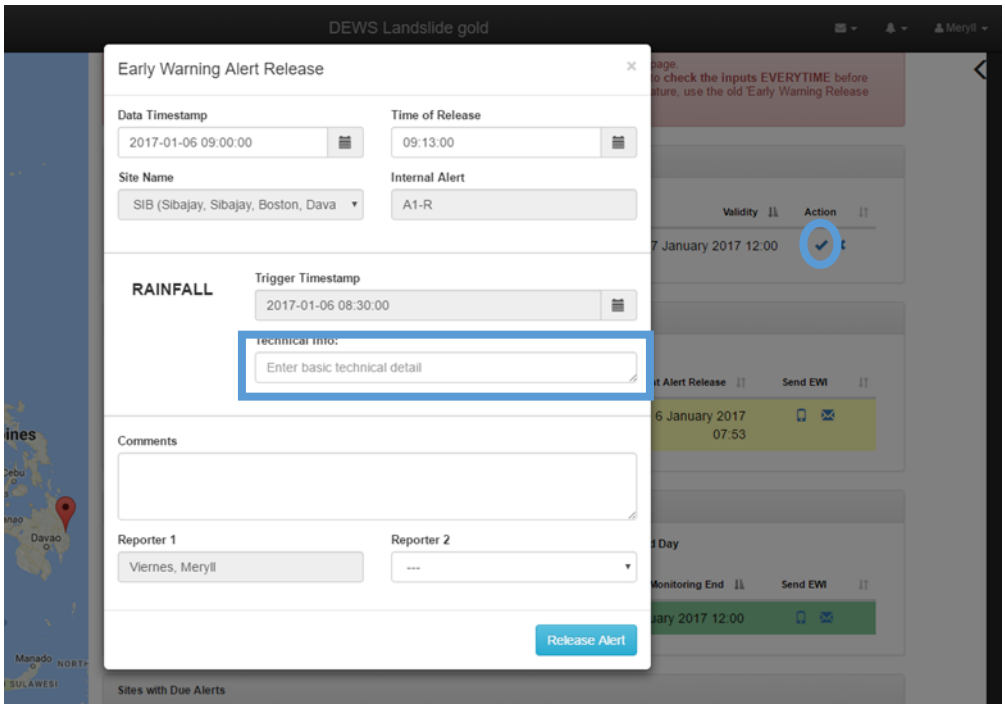
**Check the APPENDIX section as reference for useful commands and actions that you may need to do during your shift – see page 39.**

→ **Proceed to "End of Monitoring" for the final steps of your shift see page 36.**

# Releasing EWI using DEWS-L website

## STEP 1: Check the information in the Latest Candidate Triggers and Releases tab

**The DEWS-L website automatically retrieves alert information from PublicAlert.json, if the information reflected on the "Latest Candidate Triggers and Releases" is correct, click the check mark 5 minutes before the time of release.**



# STEP 2: Fill the required information in the release form.

**If a retrigger is present, fill in the technical info using the following format for each type of trigger:**

## Rainfall

**If 1-day cumulative threshold has been exceeded:**

> **"1-day cumulative rainfall (amount in mm) exceeded the threshold (amount of threshold in mm)."** ***See page 14***

**If 3-day cumulative threshold has been exceeded:**

> **"3-day cumulative rainfall (amount in mm) exceeded the threshold (amount of threshold in mm)."** ***See page 14***

**If both 1-day and 3-day cumulative threshold has been exceeded:**

> **"1-day cumulative rainfall (amount in mm) and 3-day cumulative rainfall (amount in mm) exceeded the threshold (amount of threshold in mm)."** ***See page 14***

## Subsurface

**"[col name] Node/s [node id #] exceeded displacement and/or velocity threshold."** **See page 50**

## Surficial

**"[Marker name]: [displacement with respect to previous measurement in cm] difference in [time difference with the previous measurement in hours]."** **See page 54**

## Earthquake

> **"[distance in km] away from [magnitude] earthquake at [location of epicenter] (inside critical radius of [critical radius in km])"**

## On-Demand

**Monitoring requested due to: "reported [heavy rainfall/reported earthquake/observed changes in slope/formation of new cracks]"**

**Current site info: [current rainfall, subsurface, and surficial conditions of the site]**

# End of Monitoring

## STEP 1: Contact the next monitoring personnel online or via text.

The next monitoring personnel is expected to arrive to the office 1 hour before the end of your shift. Communicate online or via text if the monitoring is expected to continue/end during their shift.

Use the contact database as reference: http://tinyurl.com/zlsnvnb

## STEP 2: File an end of shift report for each monitored site.

The end of shift report should contain vital information that the next monitoring personnel may look at as reference to have an idea of the current situation of each site being monitored. See next page for example.

You may use the End-of-Shift Report Generator feature of the DEWS-L website (http://www.dewslandslide.com/reports/accomplishment/form) to automatically create the report for all sites.

Important additional info should be manually inserted in the "INFO" section.

**END OF SHIFT REPORT (initials of IOMP-MT, initials of IOMP-CT)**

**SHIFT START:**

**Date and time of the start of shift**

**-Brief sentence stating the operational trigger that initiated the monitoring as well as recent retrigger that caused the continuation of the monitoring.**

**SHIFT END:**

**Date and time of the end of shift**

**-Brief sentence stating the operational trigger that caused the extension of the monitoring shift or the conclusion of the event based monitoring.**

**OTHER INFO:**

**Subsurface: Possible moving nodes (per column), trends, approximate magnitude of movement (over 3 days and/or 1 day), and data presence.**

**Surficial: Moving markers, trends, rate of movement, and availability of data.**

**Rainfall: Rainfall source, rainfall trends, approximate rainfall amount received, and threshold exceedance.**

**(No other info necessary for earthquake and on-demand)**

**NARRATIVE:**

**Attach here the IOMP-CT's account of the events encountered and actions during monitoring shift.**

**Send the END OF SHIFT REPORT as a reply to the start of monitoring thread with the same recipients. (See "Start of Monitoring" see page 31).**

**Attach along with the report the latest run of the following:**

**Rainfall plot for the site (found in Desktop/MonitoringOutput/RainfallPlots)**

**Colpos and Disp-Vel Plot (found in Desktop/MonitoringOutput/)**

**Surficial Data Plot (found in Desktop/MonitoringOutput/GndMeasPlots)**

**Earthquake Proximity Map (found in Desktop/MonitoringOutput/EQ)**

**END OF SHIFT REPORT (RS, HG)**

**SHIFT START:**

**October 2, 2016, 07:30 PM**

**- Monitoring continued from A1 initially triggered on 01 October 2016, 18:00:00 due to rainfall exceeding threshold values.**

**SHIFT END:**

**October 3, 2016, 08:30 AM**

**- A0 declared at 8:00AM due to invalid rainfall trigger 01 October 2016 18:00.**

**INFO:**

**-Subsurface data: Nagta: concurrent movements observed in node 10 and node 15, Nagtb: constantly increasing movement observed in node 3 and 13 but below threshold.**

**-Surficial data: No increase/decrease of crack displacement for the whole shift.**

**-Rainfall data: From NAGBTAW, 3-day and 1-day rainfall is below threshold. Rain gauge is reporting single instance, but unusually high values (Sep 30, 6pm; and Oct 1, 5pm) which were contradicted by LLMC reports. Currently no rainfall plot available; troubleshooting plotting module.**

**NARRATIVE:**

**20:44 – PLGU replied to EWI, "Copy po"**

**00:15 – EWI for 12:00 MN sent**

# APPENDIX

# Monitoring Shift Assignment

Every 1:30 PM of the first Monday of the preceding month, the monitoring shift schedule is automatically generated in line with the following considerations:

## Number of shifts

Admin Team – 1 CT shift

Maintenance Team – 1 CT + 1 MT shift

Others – Equal load per month with the excess/remainder shouldered by the following teams (in decreasing priority):

- Monitoring Team
- Community and Tech Transfer Team
- Survey Squad and TEST
- Instru Team
- SWAT & Sir Jun

Note: 1 load = 1 monitoring duty or 7 days of fieldwork per person

Total Load to be distributed = $MS + FW - 12$

$MS$ – Total Monitoring Shifts (# of days $\times$ 4)

$FW$ – Total load from fieldworks

12 monitoring shifts are taken by the admin and maintenance team and hence deducted from the total load.

## Restrictions

- No consecutive shifts.
- No consecutive PM shifts.
- Persons in fieldwork cannot take monitoring shifts starting from the PM shift at the day before their fieldwork until the PM shift at the end of their fieldwork.

# OOMP-MT duties

1. At the onset of any monitoring event, the IOMP-MT is tasked on evaluating the trigger.
2. The OOMP-MT is the person to contact in case of any matters not written in the manual and for any additional assistance.

# Other rules

1. If any monitoring event initiates at a non-work day, the IOMP-MT is required to report to the office and fulfill his/her monitoring duty.
2. If the monitoring event initiates at any time beyond 8pm, it is the IOMP's discretion if he/she would report to the office to fulfill his/her monitoring duty.
3. For the IOMP AM shift if the monitoring event initiates at any time beyond 4PM, it is his/her discretion if he/she would report to the office to fulfill his/her monitoring duty.

# Guidelines and format for filling up monitoring/overtime permits

**1. Accomplish 1 permit form and 1 corresponding accomplishment form per month. One row per overtime/monitoring duty.**

**2. Have your permit requests approved by the Chief SRS (or OIC) within the day of the monitoring duty, at the latest.**

**3. Submit permit and accomplishment forms for the current month to the admin team at 12nn on the 1st day of the next month, at the latest.**

**4. Fill-up forms properly:**

**PERMIT**

**Date: indicate the date/s and default time of your monitoring shift.**

**Work to be done:**

**For event-based monitoring: indicate "Event-based monitoring for site1, site 2, site 3...";**

**For extension of routine monitoring work beyond 8pm or the 10-hour daily cap, indicate "Routine monitoring work for all sites"**

**For any other purpose, indicate the work to be done and the expected output.**

**Remarks:**

**For event-based monitoring: indicate the corresponding reasons why monitoring is requested for the sites:**

**Occurrence of (or continuing) operational triggers (rain, earthquake, on-demand); AND/OR**

**heightened alert (A0+, A1 or A2) is still in effect at the site**

**For extension of routine monitoring work beyond 8pm or the 10-hour daily cap, indicate whether:**

**Monitoring work exceeds the 8pm limit of official workhours, AND/OR**

**Monitoring work exceeds the 10-hour daily work cap**

**For any other purpose, indicate justifications on why the overtime work needs to be rendered.**

**ACCOMPLISHMENT REPORT:**

**Period covered: indicate month**

**Date: indicate the date/s and exact time of your monitoring shift, as reflected in your DTRs, AND as constrained by the workhour policy.**

**Work accomplished:**

**For event-based monitoring: indicate "Event-based monitoring for site1, site 2, site 3..."**

**For extension of routine monitoring work beyond 8pm or the 10-hour daily cap, indicate "Routine monitoring work for all sites"**

**For any other purpose, indicate the work to be done.**

**Remarks:**

**For event-based monitoring: indicate**

**the corresponding alert status of the monitored sites at the end of your shift, AND**

**whether monitoring for the sites will continue to the next shift**

**For extension of routine monitoring work beyond 8pm or the 10-hour daily cap, indicate:**

**Number of sites monitored**

**Number of sites with heightened alerts (A0+, A1, or A2), if there are any.**

**For any other purpose, indicate outputs of the overtime work rendered.**

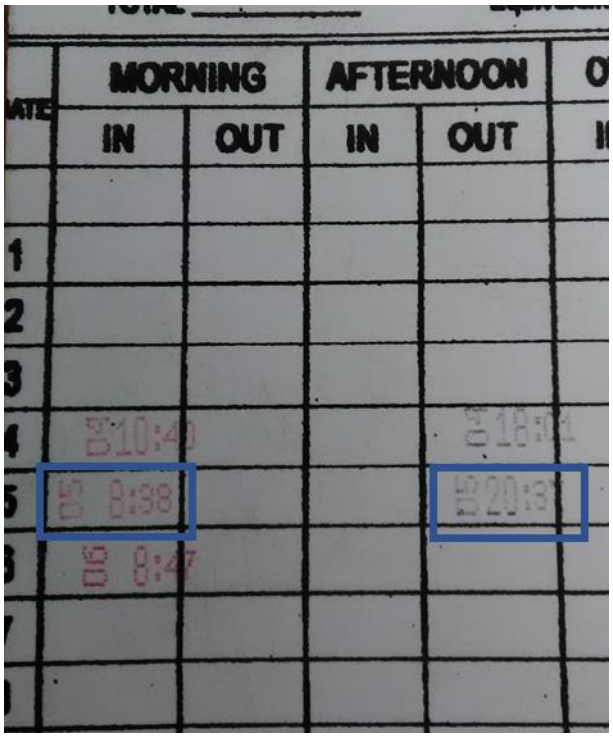
**Example:**

**OVERTIME PERMIT**

| Date | Work to be done | REMARKS | Permitted by: |
|---|---|---|---|
| 07:30-20:30<br>05 Jan 2017 | Event-based monitoring for:<br><br>SIB (Brgy. Sibajay, Boston, Davao Oriental) | • Occurrence of operational trigger/s: alert*<br>• Continuing operational trigger/s: alert*<br>• Heightened alert is still in effect: alert*<br><br>*A1/A2/A3 | Signature of Sir Jun/ Kuya Earl |

## ACCOMPLISHMENT REPORT

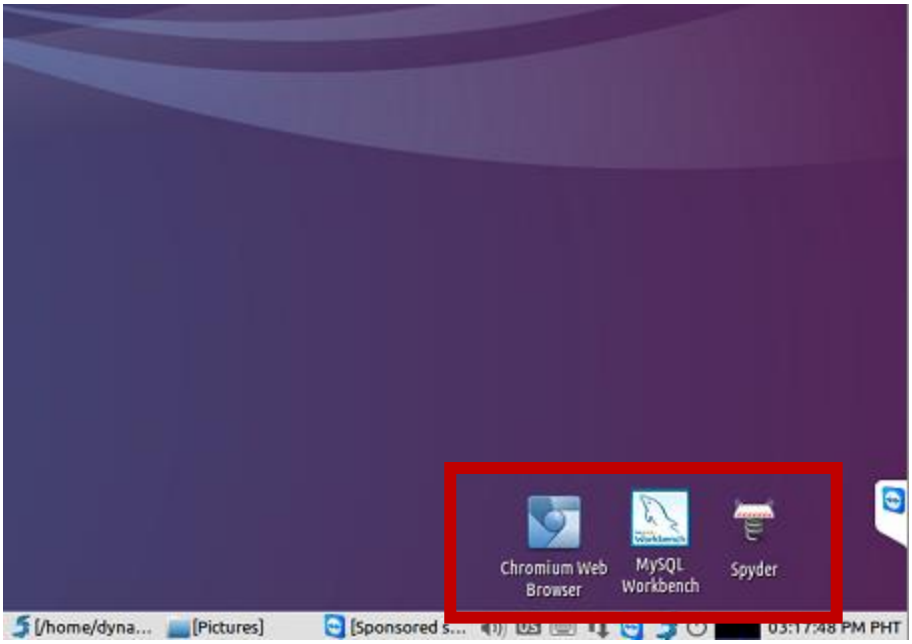
| Date | Work Accomplished | REMARKS |
|---|---|---|
| 08:38-20:37<br>05 Jan 2017 | Event-based monitoring for:<br><br>SIB (Brgy. Sibajay, Boston, Davao Oriental) | A0/A1/A2/A3- will/(not) continue to next shift |



# How to launch Spyder, MySQL, and Chrome on the Monitoring PC

## Step 1: Find the program icons on the Monitoring PC desktop

**The shortcut of Spyder, MySQL, and Chrome can be found on the lower right side of the Monitoring PC desktop.**




## Step 2: Double click the program you wish to use.

# How to open the Dynaslope Server Database/Raspberry Pi Server using MySQL Workbench

## Step 1: Launch the MySQL Workbench.

- see page 46

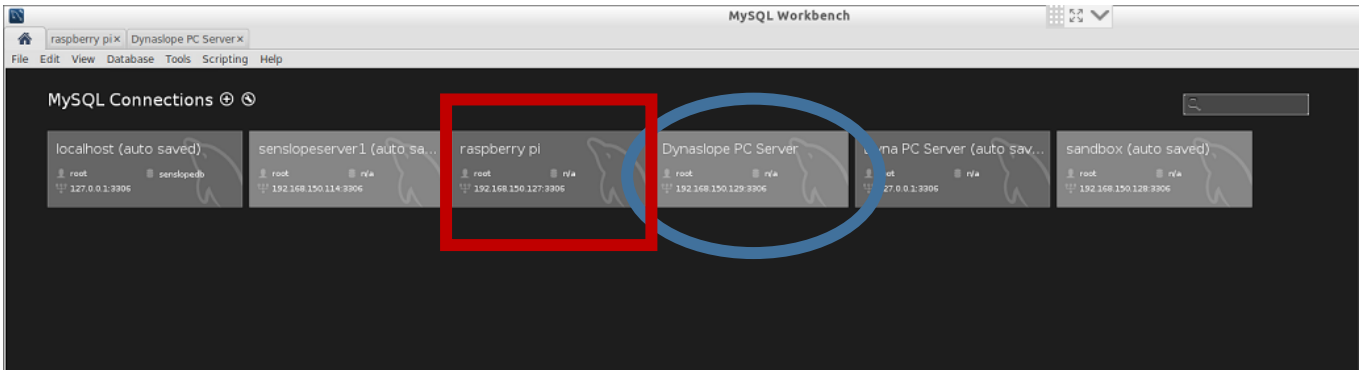
## Step 2: Open the Dynaslope PC Server connection.

**From the MySQL connections, choose**

**Dynaslope PC Server (192.168.150.129:3306) (red boxed)**

**or Raspberry Pi (192.168.150.127:3306) (circled in blue)**

**If asked for a password, key in "senslope" then press enter.**



# How to check all the latest processed alerts for a site after a specified time

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

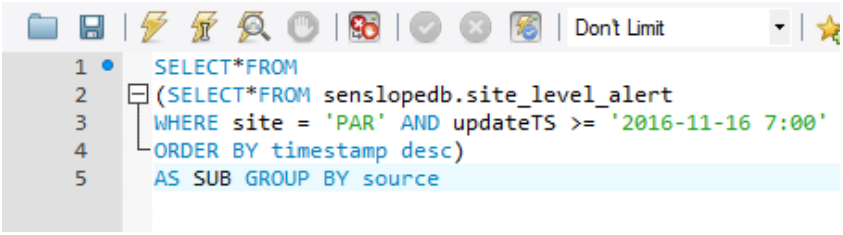
```
SELECT * FROM
(SELECT * FROM senslopedb.site_level_alert
WHERE site = '[site]' and updateTS >= '[timestamp]'
ORDER BY timestamp desc)
AS SUB GROUP BY source
```

**Press CTRL+SHIFT+ENTER to execute the command**

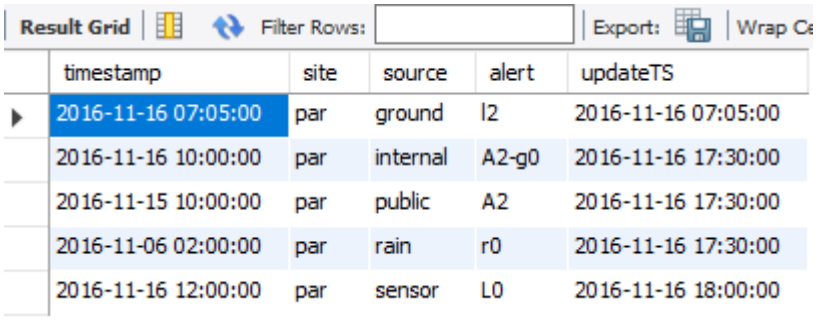
**Example:**

**Check all processed alerts for site PAR after November 16, 2016 7:00 AM**

**Input:**




**Output:**




| timestamp | site | source | alert | updateTS |
|---|---|---|---|---|
| 2016-11-16 07:05:00 | par | ground | l2 | 2016-11-16 07:05:00 |
| 2016-11-16 10:00:00 | par | internal | A2-g0 | 2016-11-16 17:30:00 |
| 2016-11-15 10:00:00 | par | public | A2 | 2016-11-16 17:30:00 |
| 2016-11-06 02:00:00 | par | rain | r0 | 2016-11-16 17:30:00 |
| 2016-11-16 12:00:00 | par | sensor | L0 | 2016-11-16 18:00:00 |

# How to check all the latest processed alerts for a specific source after a specified time

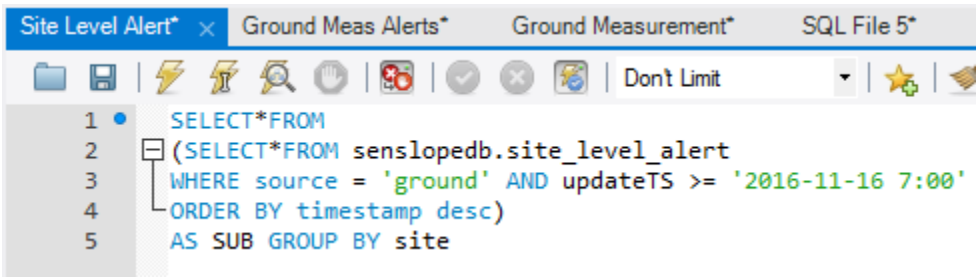
**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

```
SELECT * FROM
(SELECT * FROM senslopedb.site_level_alert
WHERE source= '[source]' and updateTS >= '[timestamp]'
ORDER BY timestamp desc)
AS SUB GROUP BY site
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**
**Check all processed ground alerts after November 16, 2016 7:00 AM**

**Input:**




**Output:**

| timestamp | site | source | alert | updateTS |
|---|---|---|---|---|
| 2016-11-16 11:30:00 | bat | ground | l0 | 2016-11-16 11:30:00 |
| 2016-11-16 09:35:00 | blc | ground | l0 | 2016-11-16 09:35:00 |
| 2016-11-16 11:15:00 | ime | ground | l0 | 2016-11-16 11:15:00 |
| 2016-11-16 07:30:00 | ina | ground | l0 | 2016-11-16 07:30:00 |
| 2016-11-16 10:30:00 | lab | ground | l0 | 2016-11-16 10:30:00 |
| 2016-11-16 10:30:00 | mar | ground | l0 | 2016-11-16 10:30:00 |
| 2016-11-16 07:05:00 | par | ground | l2 | 2016-11-16 07:05:00 |

***Note:**

**'source' can be any of the following:**

**'public', 'internal', 'rain', 'eq', 'ground', 'sensor', 'on demand'.**

# How to check which node has an alert for a specific sensor after a specified time

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

```
SELECT * FROM senslopedb.node_level_alert
WHERE site= '[sensor name]' and timestamp >= '[timestamp]'
ORDER BY timestamp desc
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**Check which nodes of sensor MAGTA had an alert after October 14, 2016 12:00 AM.**

**Input:**

```
SELECT * FROM senslopedb.node_level_alert
WHERE site = 'magta' and timestamp >= '2016-10-14 00:00'
ORDER by timestamp desc
```

**Output:**

| timestamp | site | id | disp_alert | vel_alert | col_alert |
|---|---|---|---|---|---|
| 2016-10-14 03:30:00 | magta | 8 | 0 | 1 | L2 |
| 2016-10-14 03:00:00 | magta | 8 | 0 | 1 | L2 |
| 2016-10-14 02:00:00 | magta | 9 | 0 | 1 | L2 |
| 2016-10-14 01:00:00 | magta | 14 | 0 | 1 | L2 |
| 2016-10-14 01:00:00 | magta | 13 | 1 | 1 | L2 |
| 2016-10-14 01:00:00 | magta | 9 | 0 | 1 | L2 |
| 2016-10-14 00:30:00 | magta | 14 | 0 | 1 | L2 |

***Note:**

**On the column disp_alert and vel_alert**

**1 indicates a positive alert**

**0 indicates a negative alert**

# How to check the column level alert for the sensors of a specific site after a specified time

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

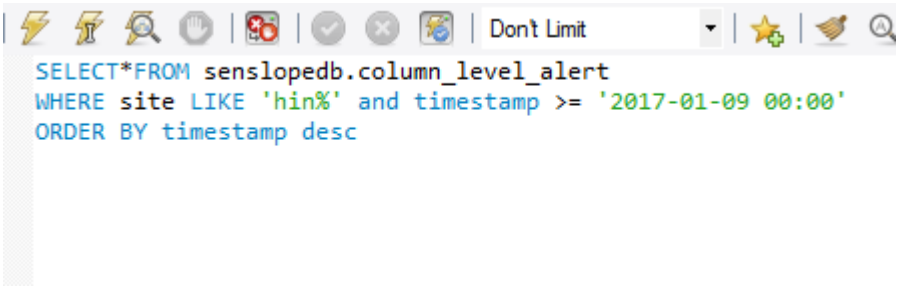
```
SELECT * FROM senslopedb.column_level_alert
WHERE site LIKE '[site code]%' and timestamp >= '[timestamp]'
ORDER BY timestamp desc
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**Check the column level alert of the sensors of site HIN as of 2017 January 9 12:00 AM.**

**Input:**




**Output:**

| alert | site | source | timestamp | updateTS |
|---|---|---|---|---|
| L0 | hinsb | sensor | 2017-01-10 18:30:00 | 2017-01-10 19:00:00 |
| ND | hinsb | sensor | 2017-01-10 15:30:00 | 2017-01-10 16:00:00 |
| L0 | hinsa | sensor | 2017-01-10 12:00:00 | 2017-01-10 12:30:00 |
| L0 | hinsa | sensor | 2017-01-10 09:00:00 | 2017-01-10 09:00:00 |
| L0 | hinsa | sensor | 2017-01-09 18:00:00 | 2017-01-09 18:00:00 |
| L0 | hinsa | sensor | 2017-01-09 15:00:00 | 2017-01-09 15:00:00 |
| L0 | hinsb | sensor | 2017-01-09 15:00:00 | 2017-01-10 15:00:00 |
| L0 | hinsa | sensor | 2017-01-09 13:00:00 | 2017-01-09 13:00:00 |

# How to check if EWI has been sent by the GSM server

**On the MySQL Workbench (Raspberry Pi Server) query tab, key in**

```
SELECT * FROM senslopedb.smsoutbox
WHERE sms_msg LIKE '%-[IOMP-CT NAME]%'
ORDER BY timestamp_written DESC
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**Check if the EWI written and sent by Leo thru chatter box has been sent by the GSM server**

**Input:**

```
SELECT * FROM senslopedb.smsoutbox
WHERE sms_msg LIKE '%-Leo%'
ORDER BY timestamp_written DESC
```

**Output:**

| sms_id | timestamp_written | timestamp_sent | recepients | sms_msg | send_status | gsm_id |
|---|---|---|---|---|---|---|
| 59625 | 2016-10-30 07:04:52 | 2016-10-30 07:06:06 | 09335648715 | Magandang Umaga po. A1 ang alert level sa G... | SENT-WSS | SMART |
| 59626 | 2016-10-30 07:04:52 | 2016-10-30 07:06:06 | 09102576007 | Magandang Umaga po. A1 ang alert level sa G... | SENT-WSS | SMART |
| 59627 | 2016-10-30 07:04:52 | 2016-10-30 07:06:06 | 09182840910 | Magandang Umaga po. A1 ang alert level sa G... | SENT-WSS | SMART |
| 59628 | 2016-10-30 07:04:52 | 2016-10-30 07:06:35 | 09285077118 | Magandang Umaga po. A1 ang alert level sa G... | SENT-WSS | SMART |

***Notes:**

**Column send_status tells if the message has been SENT or UNSENT.**

**Check if the information in sms_msg is precisely the message written in the chatter box**

**Raise any concern regarding the chatter box to the SWAT team and/or the database to EAVM,**

**Ex. If a message is unsent 10 minutes after the timestamp_written time.**

# How to check the displacement and alert status of each marker of a specific site

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

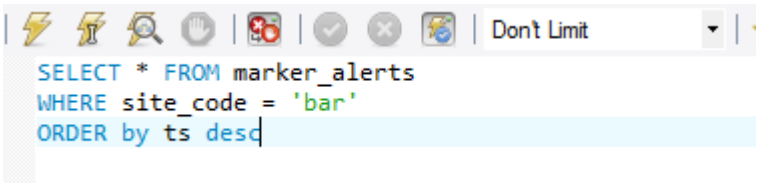
```
SELECT * FROM senslopedb.marker_alerts
WHERE site_code = '[site]'
ORDER BY ts desc
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**Check the latest alert status and displacements of the marker of site BAR.**

**Input:**




**Output:**

Result Grid | Filter Rows: | Edit: | Export/Import:

| ma_id | ts | site_code | marker_name | displacement | time_delta | alert |
|---|---|---|---|---|---|---|
| 5171 | 2017-07-18 07:50:00 | bar | E | 0.5 | 96.3333 | l0 |
| 5170 | 2017-07-18 07:50:00 | bar | D | 0.1 | 96.3333 | l0 |
| 5169 | 2017-07-18 07:50:00 | bar | C | 0.9 | 96.3333 | l0 |
| 5168 | 2017-07-18 07:50:00 | bar | B | 0.2 | 96.3333 | l0 |
| 5167 | 2017-07-18 07:50:00 | bar | A | 0.1 | 96.3333 | l0 |

**Displacement is expressed in cm. Time delta is the number of hours between the recent and previous data. While the alert is the alert level of the marker for the timestamp ts.**

# How to view all surficial ground data for a specific site

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

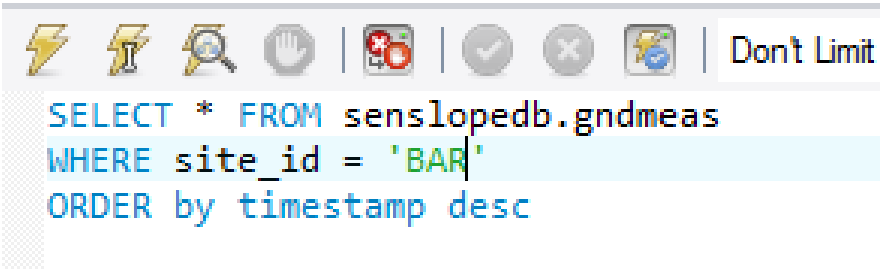
```
SELECT * FROM senslopedb.gndmeas
WHERE site_id = '[site]'
ORDER BY timestamp desc
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**View all surficial data for site BAR.**

**Input:**




**Output:**

Result Grid | Filter Rows: | Edit: | Export/Import: | Wrap Cell Content:

| timestamp | meas_type | site_id | crack_id | observer_name | meas | weather | reliab |
|---|---|---|---|---|---|---|---|
| 2017-01-06 07:45:00 | EVENT | BAR | E | ARTURODARAMAN ROSEMARIESANTIAGO RIN... | 146.30 | MAARAW | Y |
| 2017-01-06 07:45:00 | EVENT | BAR | D | ARTURODARAMAN ROSEMARIESANTIAGO RIN... | 184.00 | MAARAW | Y |
| 2017-01-06 07:45:00 | EVENT | BAR | C | ARTURODARAMAN ROSEMARIESANTIAGO RIN... | 91.30 | MAARAW | Y |
| 2017-01-06 07:45:00 | EVENT | BAR | B | ARTURODARAMAN ROSEMARIESANTIAGO RIN... | 85.20 | MAARAW | Y |
| 2017-01-06 07:45:00 | EVENT | BAR | A | ARTURODARAMAN ROSEMARIESANTIAGO RIN... | 76.30 | MAARAW | Y |
| 2017-01-03 07:30:00 | EVENT | BAR | E | ARTURODARAMAN RINIEBRANQUELA ROSEMA... | 146.40 | MAARAW | Y |
| 2017-01-03 07:30:00 | EVENT | BAR | D | ARTURODARAMAN RINIEBRANQUELA ROSEMA... | 184.10 | MAARAW | Y |
| 2017-01-03 07:30:00 | EVENT | BAR | C | ARTURODARAMAN RINIEBRANQUELA ROSEMA... | 91.30 | MAARAW | Y |

# How to view the latest surficial ground data for a specific site for each marker prior to a specified time

**On the MySQL Workbench (Dynaslope PC Server) query tab, key in**

```
SELECT * FROM
(SELECT * FROM senslopedb.gndmeas
WHERE site_id = '[site]' AND timestamp >= '2016-04-01'
AND timestamp <= '[timestamp]'
ORDER BY timestamp desc)
AS SUB GROUP BY crack_id
```

**Press CTRL+SHIFT+ENTER to execute the command**

**Example:**

**View the latest surficial ground data for site BAK prior to February 22, 2017 8:00 AM release.**

**Input:**

```
SELECT * FROM (
SELECT * FROM senslopedb.gndmeas
WHERE site_id = 'bak' AND timestamp >= '2016-04-01'
AND timestamp <= '2017-02-22 08:00'
ORDER BY timestamp DESC
) AS sub GROUP BY crack_id
```

**Output:**

| timestamp | meas_type | site_id | crack_id | observer_name | meas | weath |
|---|---|---|---|---|---|---|
| 2017-02-22 06:50:00 | ROUTINE | BAK | A | TITOTIBOLDEC | 137.50 | MAARA |
| 2017-02-22 06:50:00 | ROUTINE | BAK | B | TITOTIBOLDEC | 127.50 | MAARA |
| 2017-02-22 06:50:00 | ROUTINE | BAK | C | TITOTIBOLDEC | 20.00 | MAARA |
| 2017-02-22 06:50:00 | ROUTINE | BAK | D | TITOTIBOLDEC | 109.50 | MAARA |
| 2016-05-27 12:00:00 | | Bak | Marker 4 | | 110.00 | |

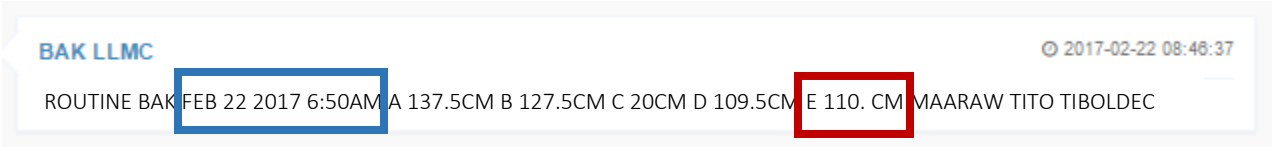
***Note:**

**crack_id will appear once with latest timestamp**

# How to check if surficial data sent by the community has been stored in the database correctly

**Step 1: Take note of the timestamp of the surficial data sent by the community in the chatter box.**

**Ex. Surficial data sent by site BAK last February 22, 2017 6:50 AM as seen in the chatterbox**




**Step 2: Check the latest surficial data stored in the database for the site prior to the obtained timestamp. See page 55.**

**Ex. Latest surficial data stored in the database for site BAK prior to February 22, 2017 6:50 AM as seen in the MySQL database.**

| timestamp | meas_type | site_id | crack_id | observer_name | meas | weath |
|---|---|---|---|---|---|---|
| 2017-02-22 06:50:00 | ROUTINE | BAK | A | TITOTIBOLDEC | 137.50 | MAAR |
| 2017-02-22 06:50:00 | ROUTINE | BAK | B | TITOTIBOLDEC | 127.50 | MAAR |
| 2017-02-22 06:50:00 | ROUTINE | BAK | C | TITOTIBOLDEC | 20.00 | MAAR |
| 2017-02-22 06:50:00 | ROUTINE | BAK | D | TITOTIBOLDEC | 109.50 | MAAR |
| 2016-05-27 12:00:00 | | Bak | Marker 4 | | 110.00 | |

**Step 3: Check if the surficial data in the database reflects the correct timestamp, number of markers, measurement and marker name.**

**Ex. Comparing the latest surficial data stored in the database for site BAK prior to February 22, 2017 6:50 AM as seen in the MySQL database with the surficial data sent by the community as seen in the chatterbox reveals that marker E was not stored correctly. See above two examples.**

**Step 4: If there are any disparity between the surficial data stored in the database and sent by the community, resend the surficial data with proper format, then repeat step 2 to verify that the surficial data has been stored correctly.**

# How to view the rainfall data of other rain gauges

**There are cases where we want to obtain the rainfall data of other rain gauges if we suspect the main rain gauge to have invalid values. To do this, first we open the python code RealTimeRainfall.py from the folder:**

***Desktop/updews-pycodes/Analysis/***

**After running the program using spyder, supply the required information:**

**[timestamp]**

**[site]**

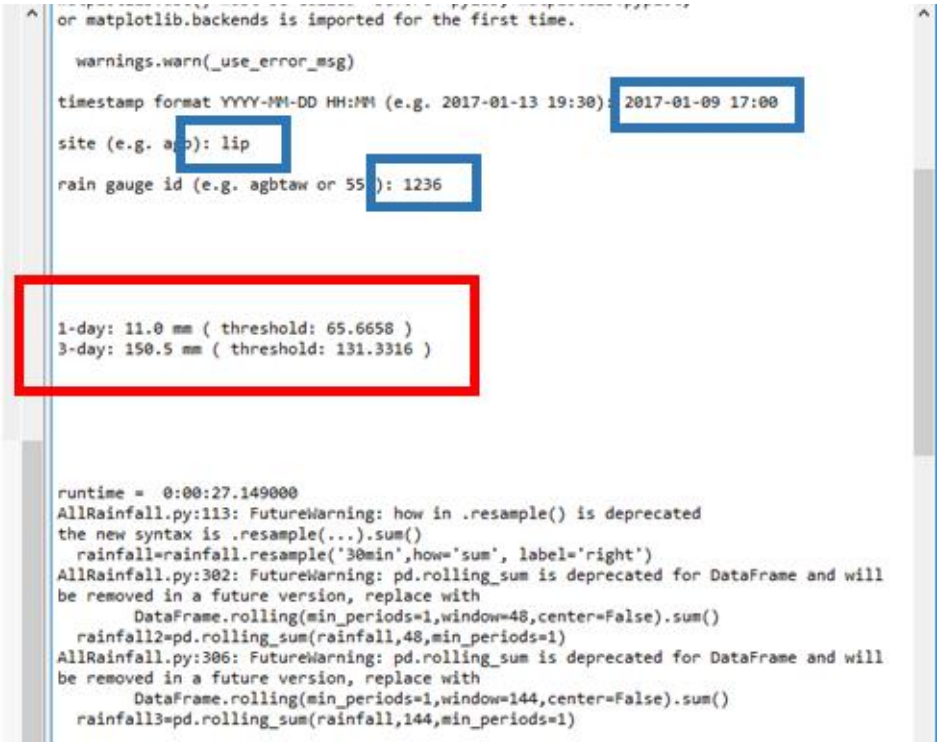
**[rain gauge of interest]**

**Output:**

**1-day rainfall value (threshold)**

**3-day rainfall values (threshold)**

**Example:**



# How to check if an earthquake event has been processed

On the MySQL Workbench (Dynaslope PC Server) query tab, key in

```
SELECT * FROM earthquake
ORDER BY e_id desc
LIMIT 50
```

Press CTRL+SHIFT+ENTER to execute the command

Sample Output:

| # | e_id | timestamp | mag | depth | lat | longi | dist | heading | municipality | province | issuer | critdist | processed |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 5079 | 2017-07-27 13:11:00 | 2.80 | 32.00 | 9.42 | 125.78 | 17 | S16E | CLAVER | SURIGAO DEL NORTE | HD | NULL | 1 |
| 2 | 5078 | 2017-07-27 13:02:00 | 3.70 | 23.00 | 5.10 | 120.65 | 92 | N89E | BONGAO | NULL | HD | NULL | 1 |
| 3 | 5077 | 2017-07-27 11:07:00 | 2.40 | 12.00 | 12.40 | 123.65 | 4 | N33E | MASBATE | MASBATE | HD | NULL | 1 |
| 4 | 5076 | 2017-07-27 11:02:00 | 2.20 | 37.00 | 13.74 | 120.92 | 3 | S52W | MABINI | BATANGAS | HD | NULL | 1 |
| 5 | 5075 | 2017-07-27 10:59:00 | 2.60 | 22.00 | 7.17 | 126.16 | 25 | N14W | MATI | DAVAO ORIENTAL | HD | NULL | 1 |

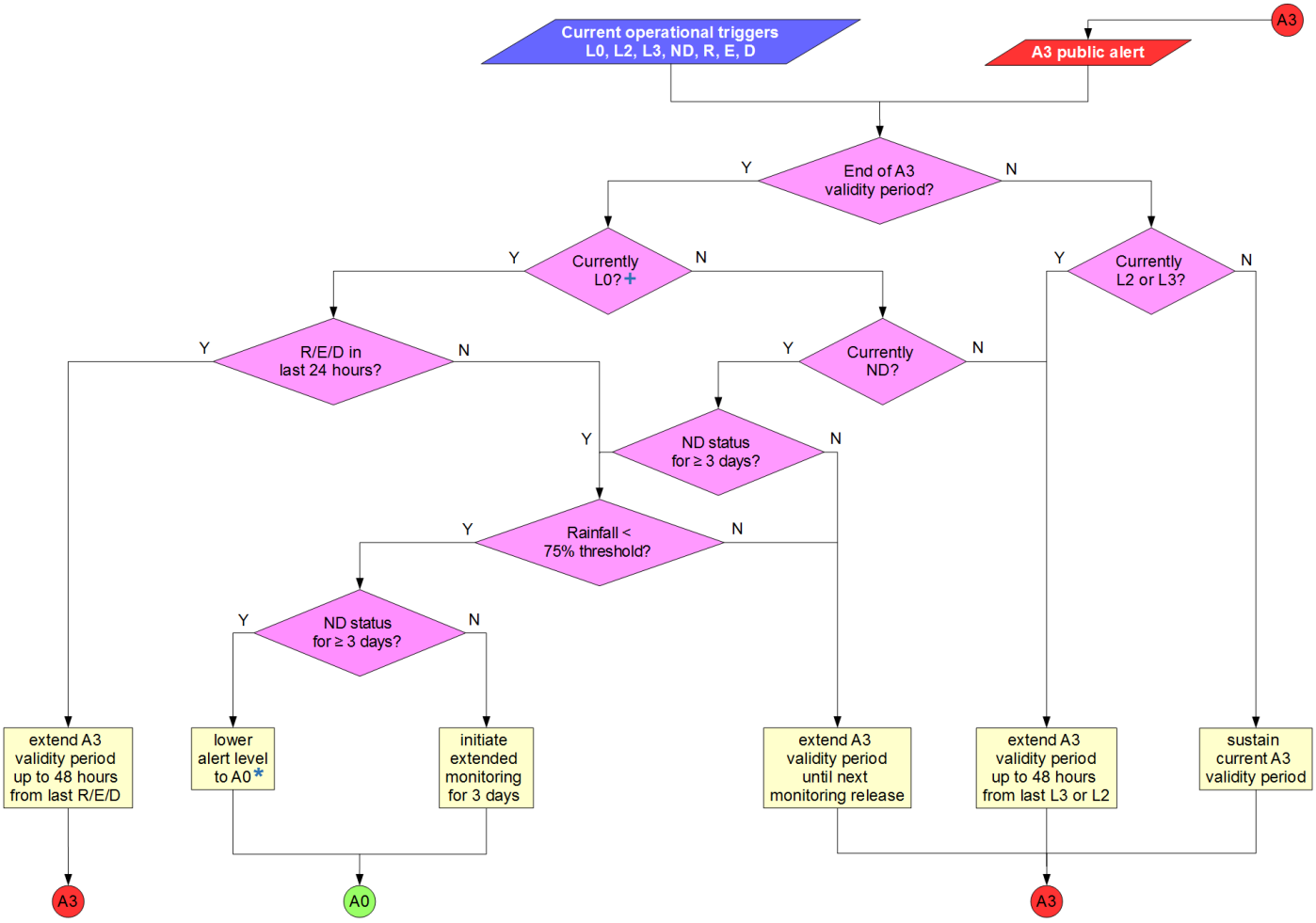
If the earthquake has a "processed" value of

1 – earthquake has been analysed. If no SMS alerts were sent, then there were no affected sites

0 – earthquake is yet to be analysed

-1 – an error occurred during parsing. Contact the IOMP-MT for earthquakes with magnitude >4

# Alert Level Flowchart: A3

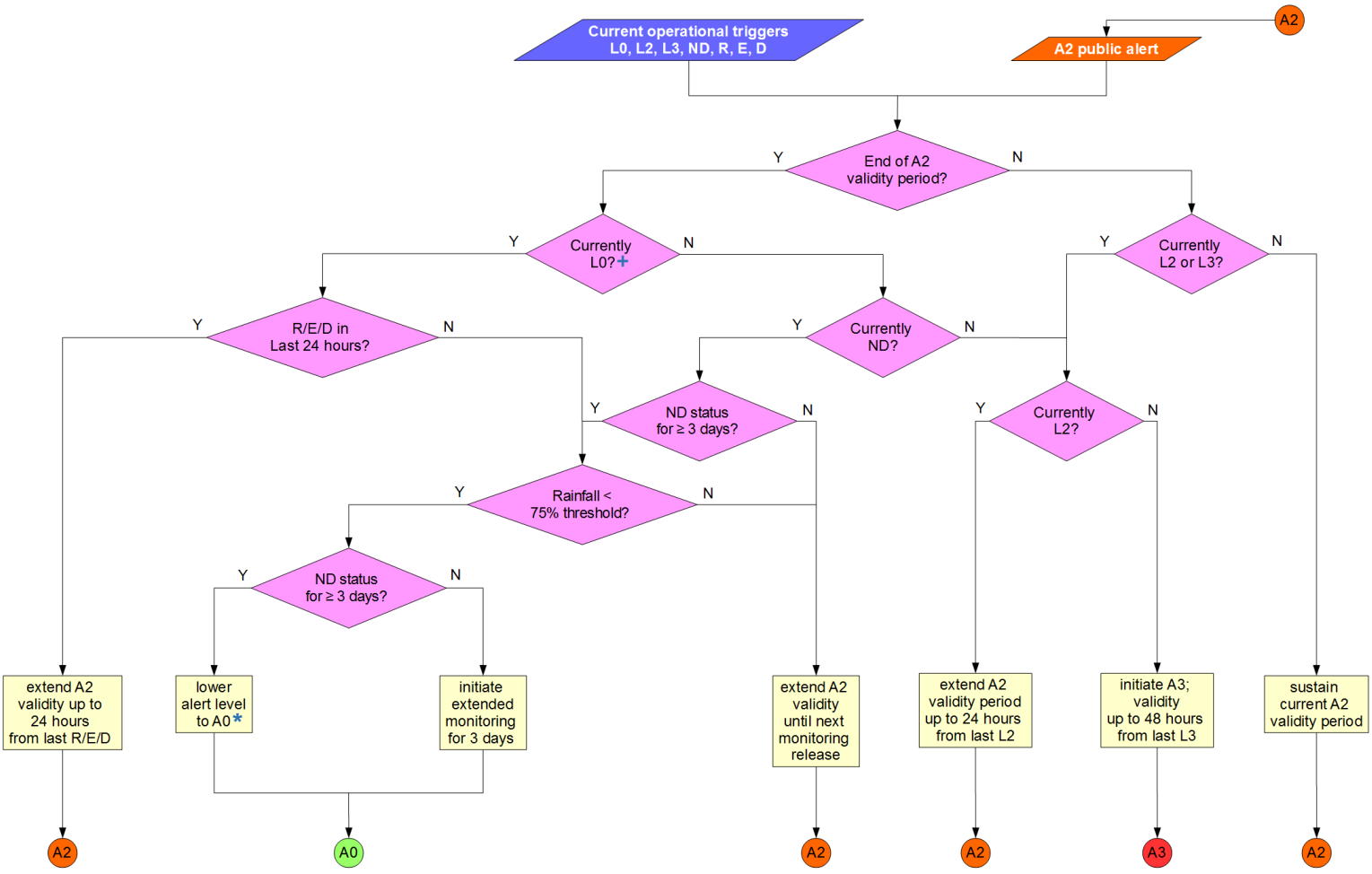



**Notes:**

**+ Exclusive Lowering: Only a L0 surficial alert can lower a heightened surficial alert and only a L0 subsurface alert can lower a heightened subsurface alert.**

*** No need to initiate 3-day extended monitoring.**

# Alert Level Flowchart: A2

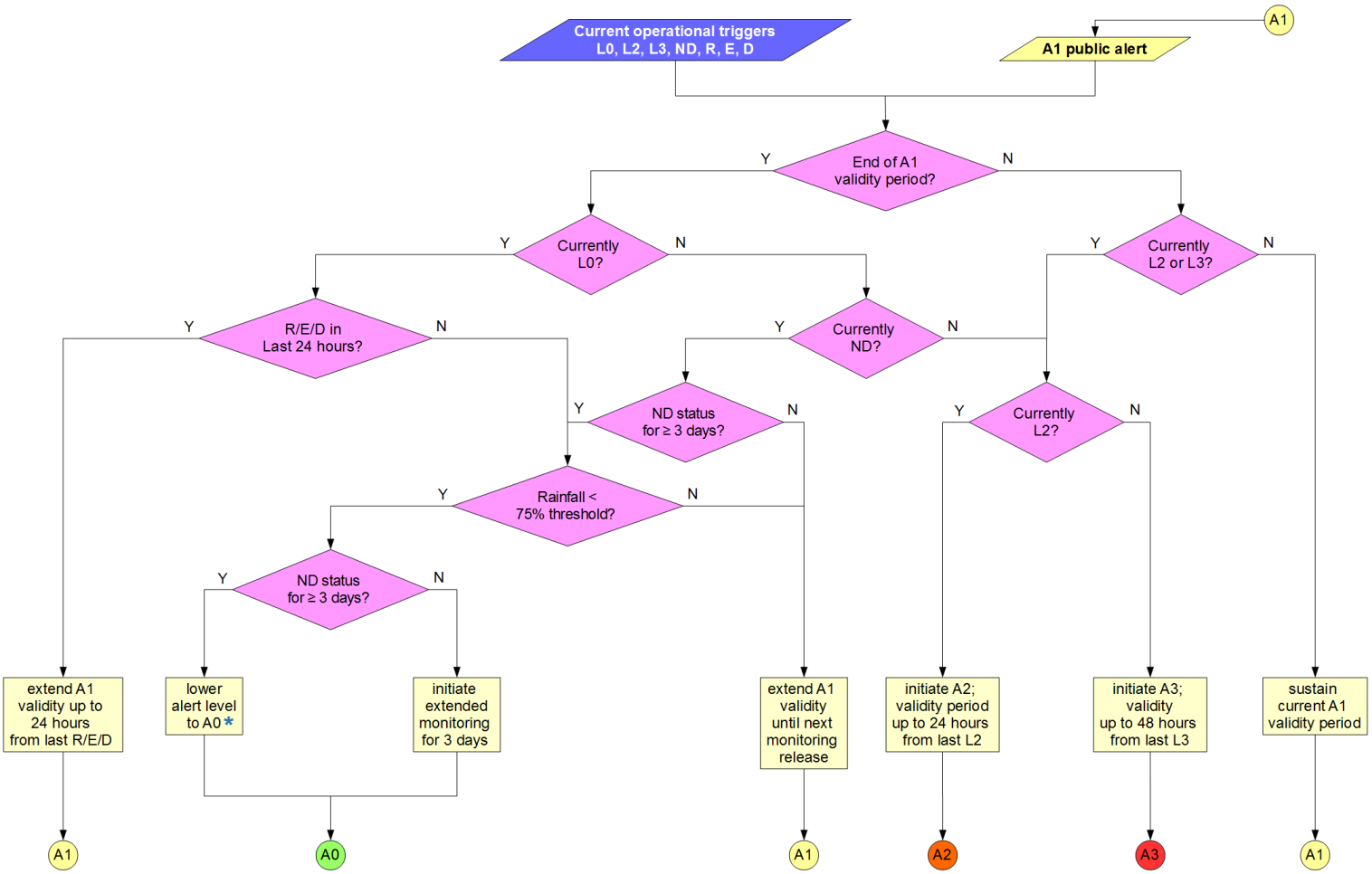



**Notes:**

**+ Exclusive Lowering: Only a L0 surficial alert can lower a heightened surficial alert and only a L0 subsurface alert can lower a heightened subsurface alert.**

*** No need to initiate 3-day extended monitoring.**

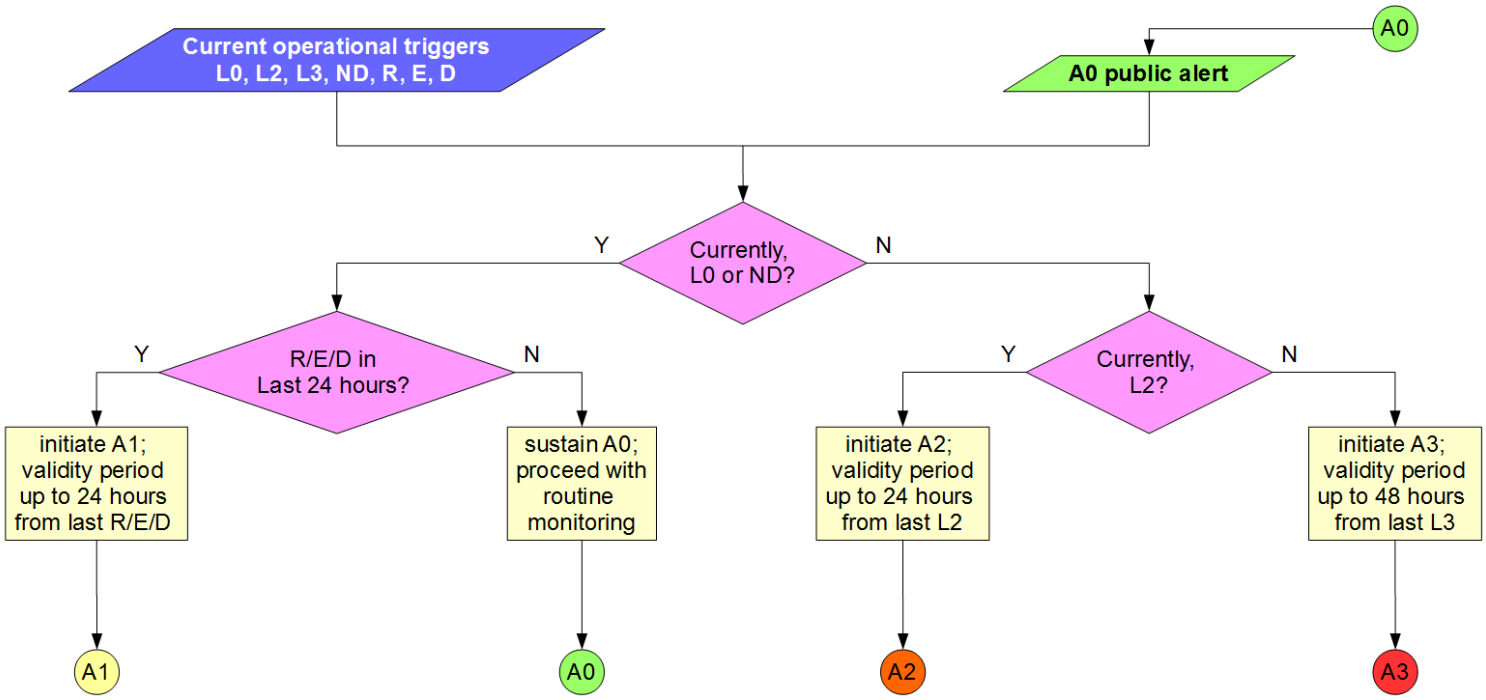
# Alert Level Flowchart: A1




**Notes:**

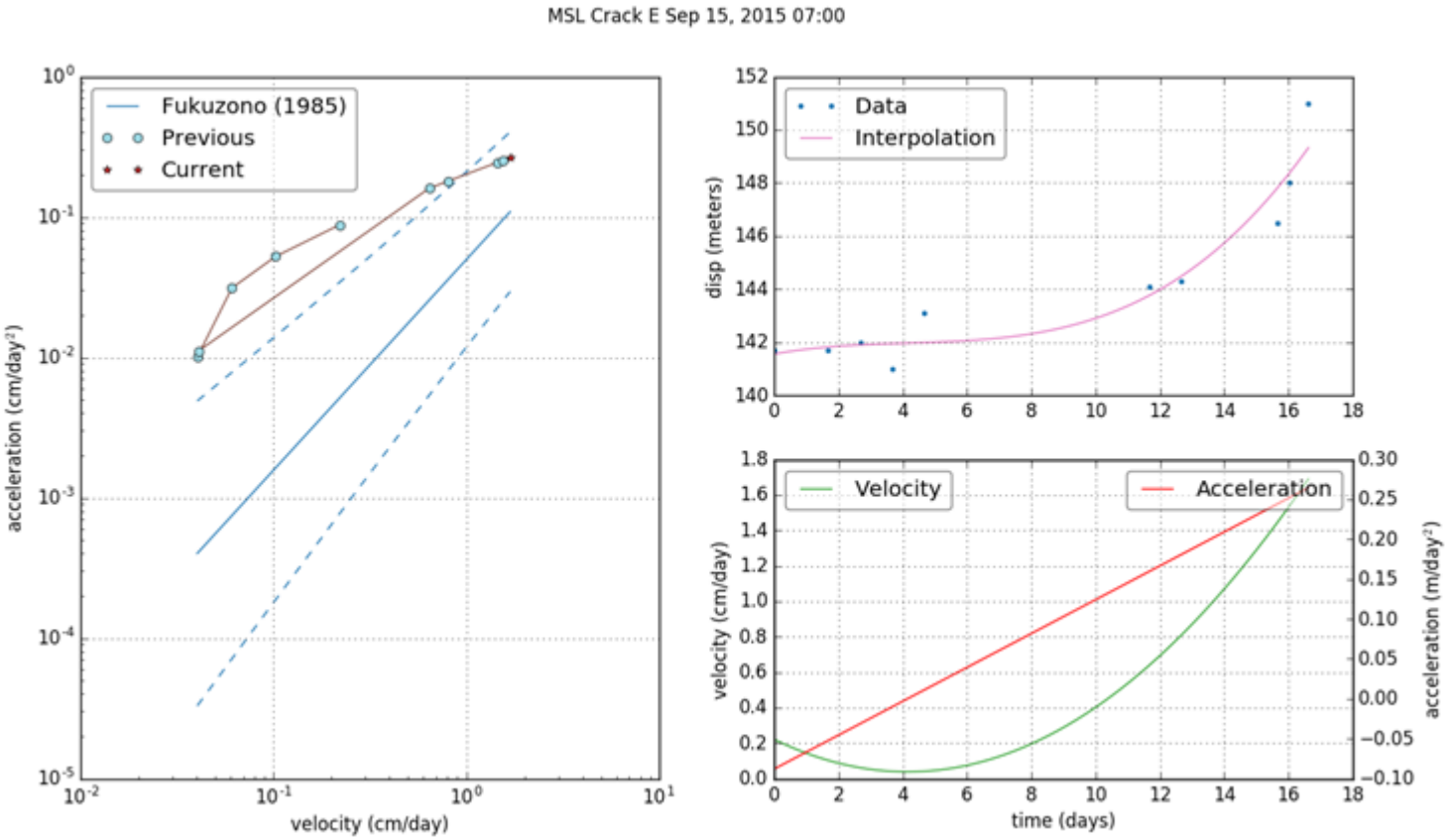
*** No need to initiate 3-day extended monitoring.**

# Alert Level Flowchart: A0



# Ground Measurement Trending Plots

**On September 15, 2015 7:00 AM site MSL submitted a ground measurement for Crack E that has a displacement equal to 1.70 cm in 1 day, enough to trigger a L2 on the basis of the old alerts. The velocity vs. acceleration trending analysis flagged the movement as legit trending with the following plot.**




## Goodness of Fit

**Though the interpolation deviates from the actual value of the community ground measurement, it captures the increasing trend well and behaves as expectedly.**

## Proximity to the Confidence Interval

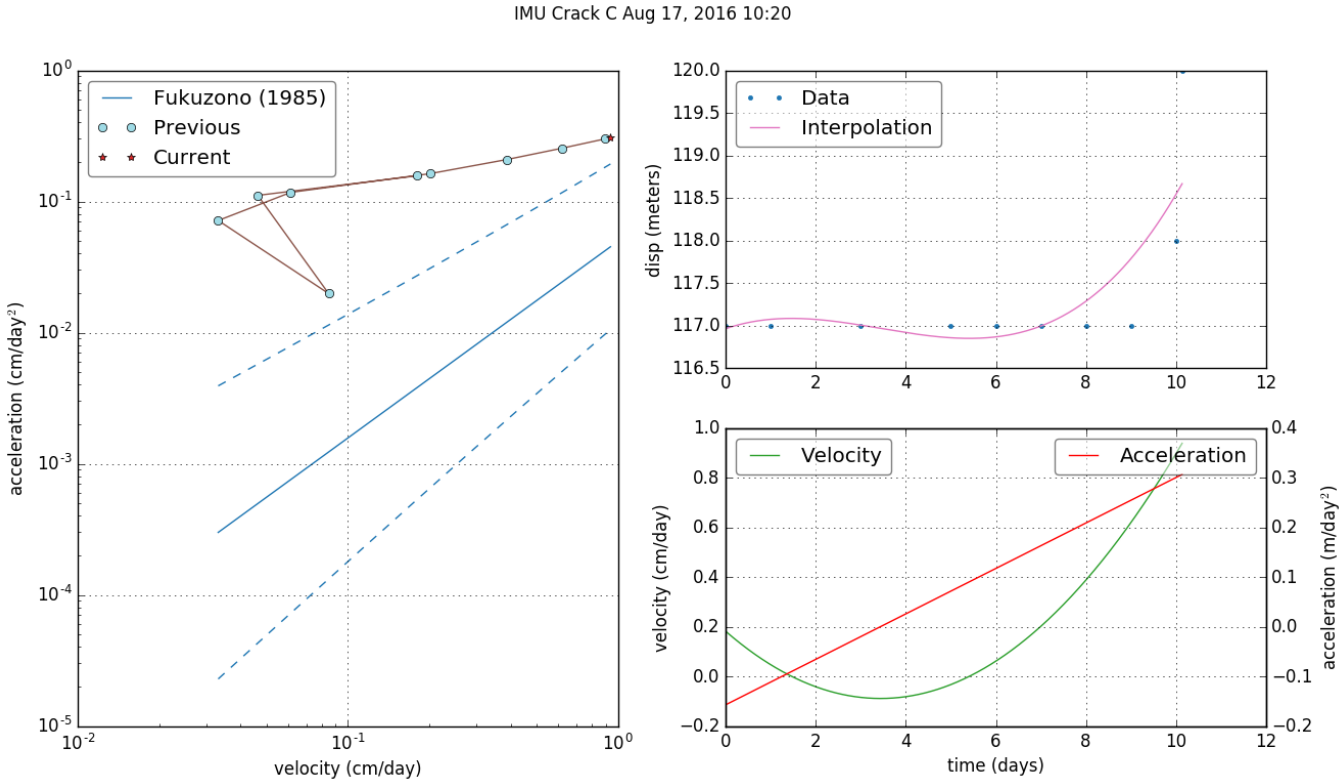
**The value of the velocity and acceleration of the current movement is just enough to fit inside the confidence interval. We also note that the trend of the velocity vs. acceleration point towards inside the confidence interval, which what we would expect for creep movement.**

## Overall (Data ✓ Interpolation ✓ Result ✓)

**The trending filter was successful in flagging the movement as legit trending.**

# Ground Measurement Trending Plots

**On August 17, 2016 10:20 AM site IMU submitted a ground measurement for Crack C that has a displacement equal to 2.00 cm in 3 hours, enough to trigger a L2 on the basis of the old alerts. The velocity vs. acceleration trending analysis flagged the movement as non-trending with the following plot.**




## Goodness of Fit

**The cubic spline interpolation did fairly well on estimating the velocity and acceleration of the data. It wasn't able to capture fully the increasing trend at the last 2 data points. But the response is satisfactory.**

## Proximity to the Confidence Interval

**The velocity vs. acceleration point is outside of the confidence interval but we see the familiar trend of the velocity vs. acceleration pointing towards the theoretical line of failure. Hence this could be a case of the velocity-acceleration threshold that is incompatible with the established threshold. It would be better to have more velocity vs. acceleration points for a more accurate analysis.**

## Overall (Data ✓ Interpolation (Fair) Result ✗)

**We may have heightened the L0t alert to L2 alert due to the apparent trend present in the data.**

# INDEX