Monitoring Guide

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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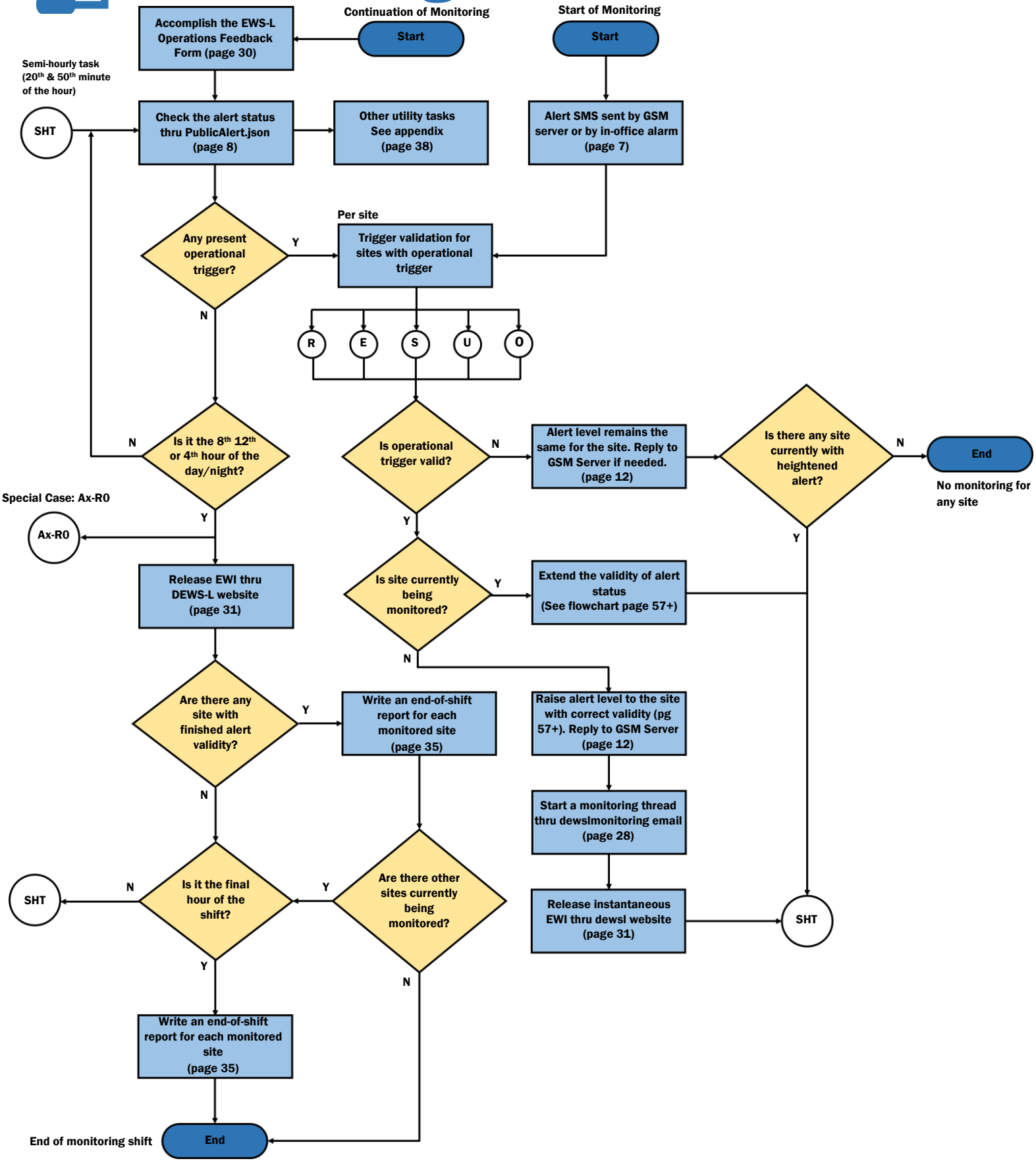
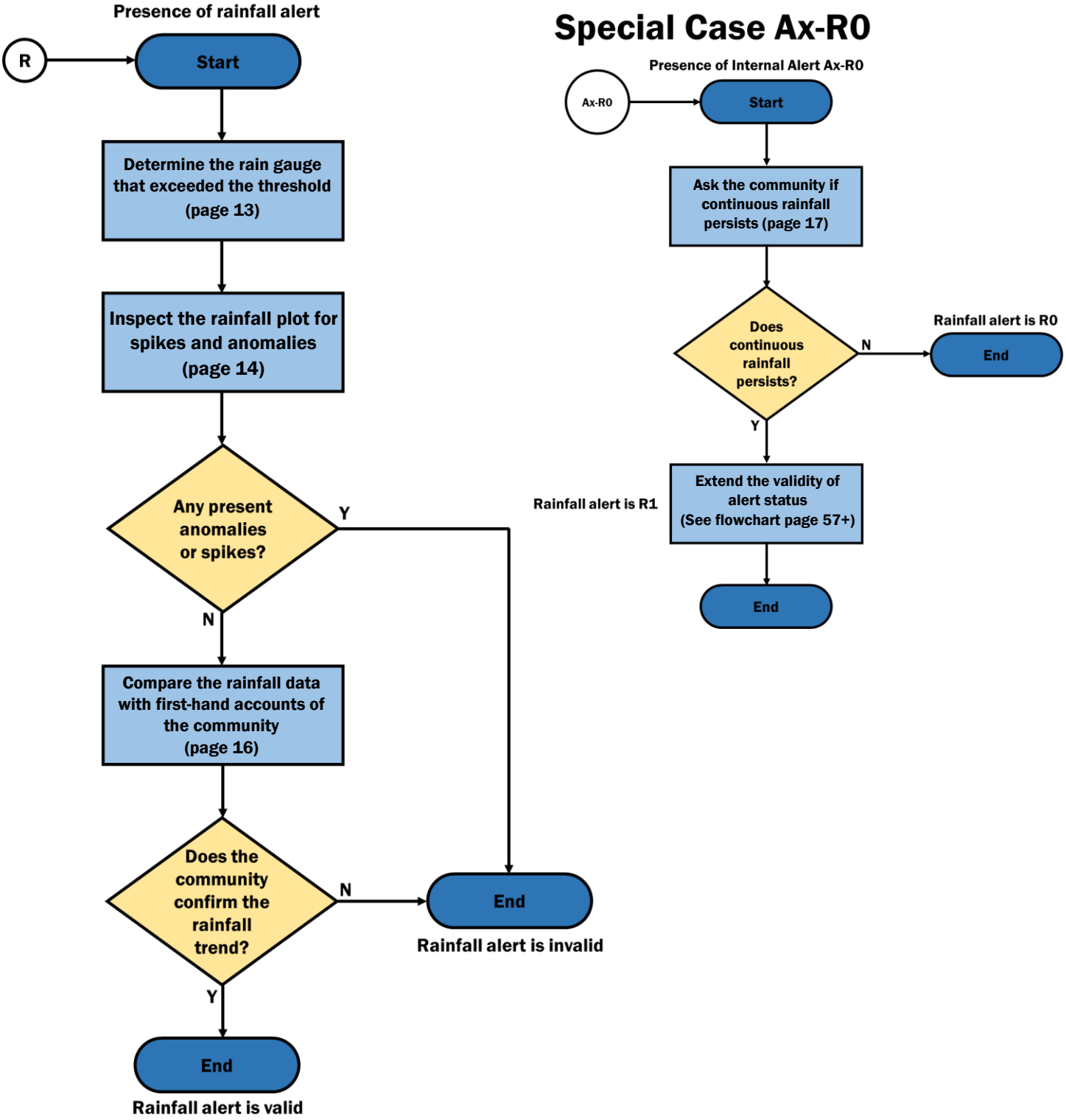
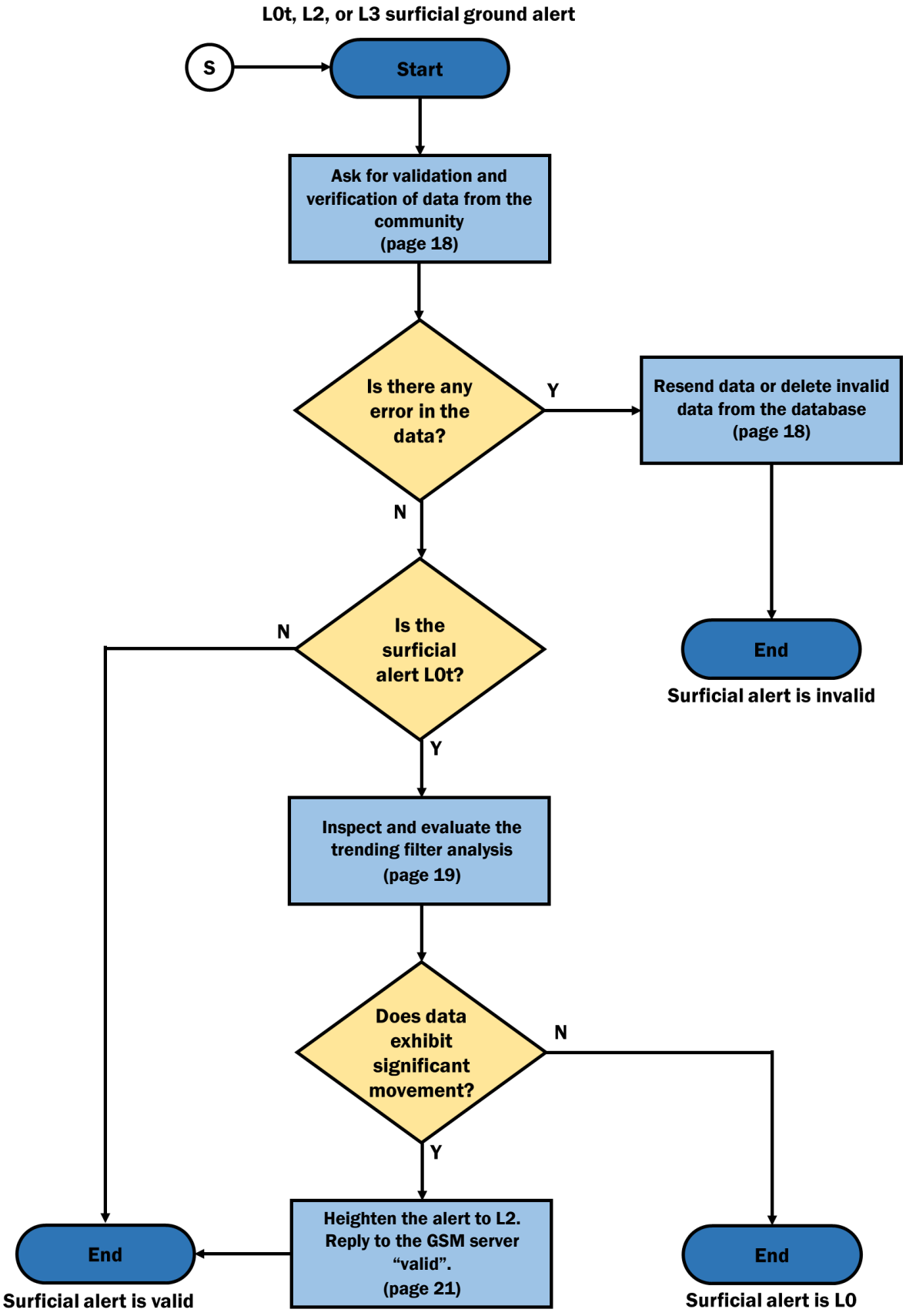
Monitoring Process Flowchart



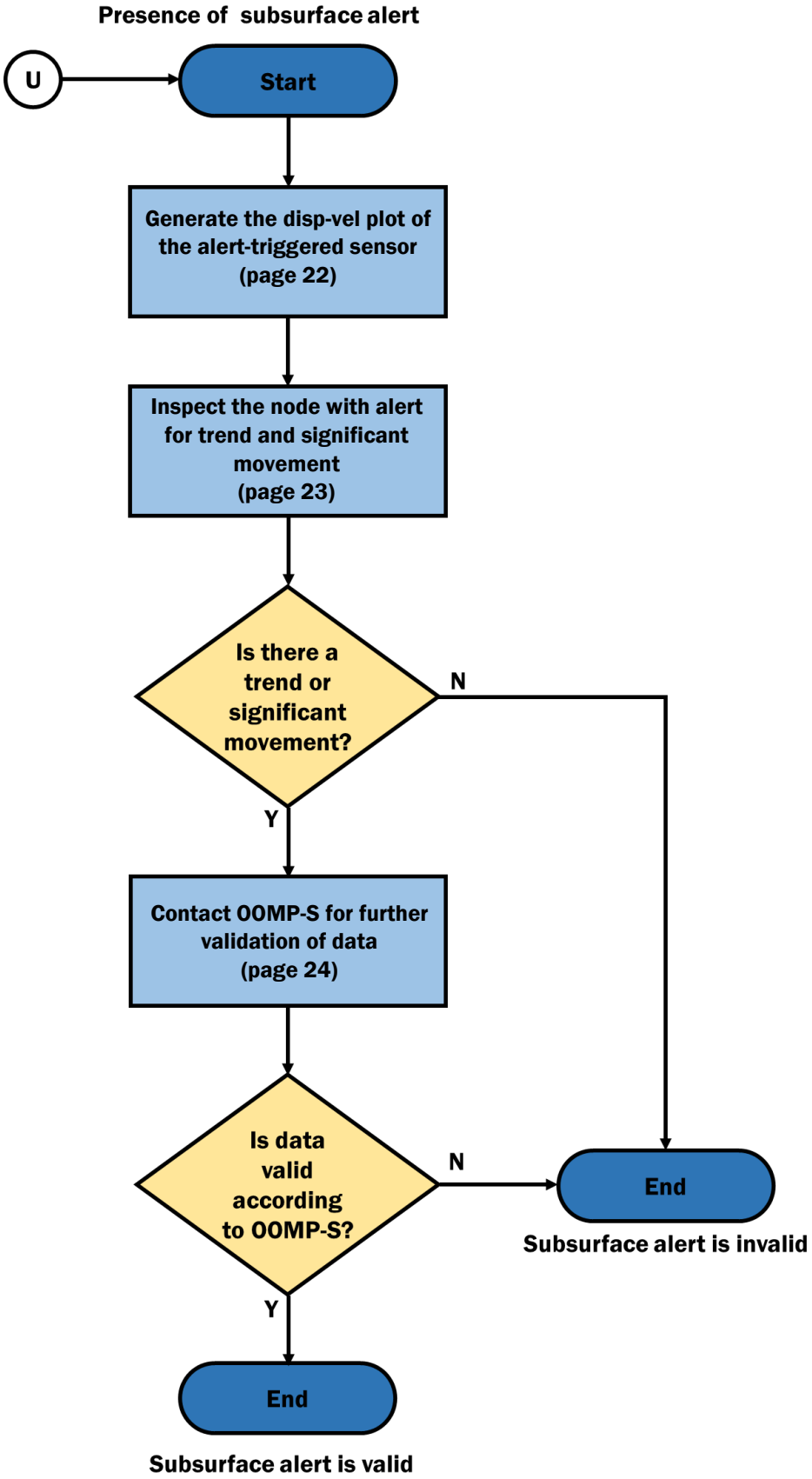
Rainfall Alert Validation



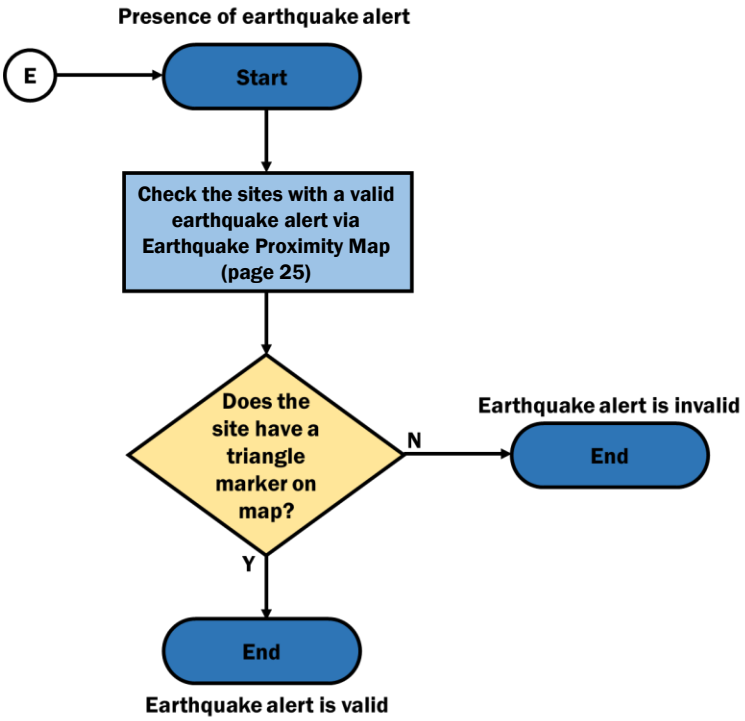
Surficial Alert Validation



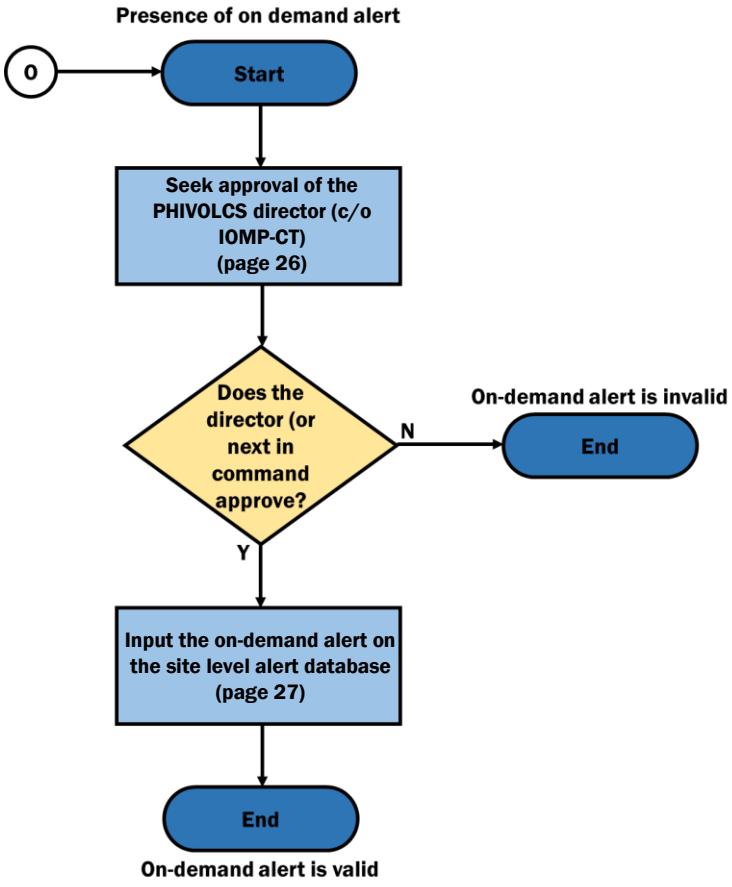
Subsurface Alert Validation



Earthquake Alert Validation



On-demand Alert Validation



Trigger Validation

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

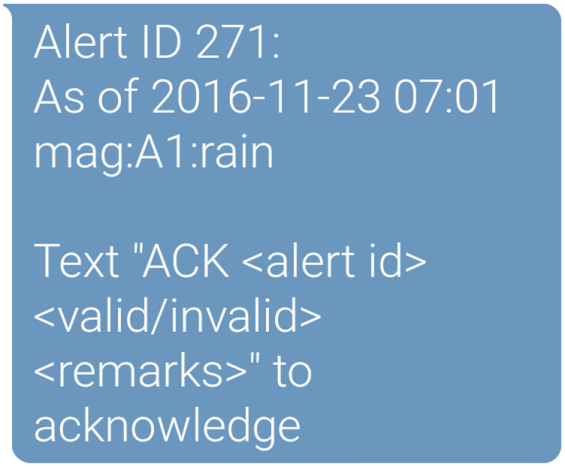
For sites yet to be monitored:

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:

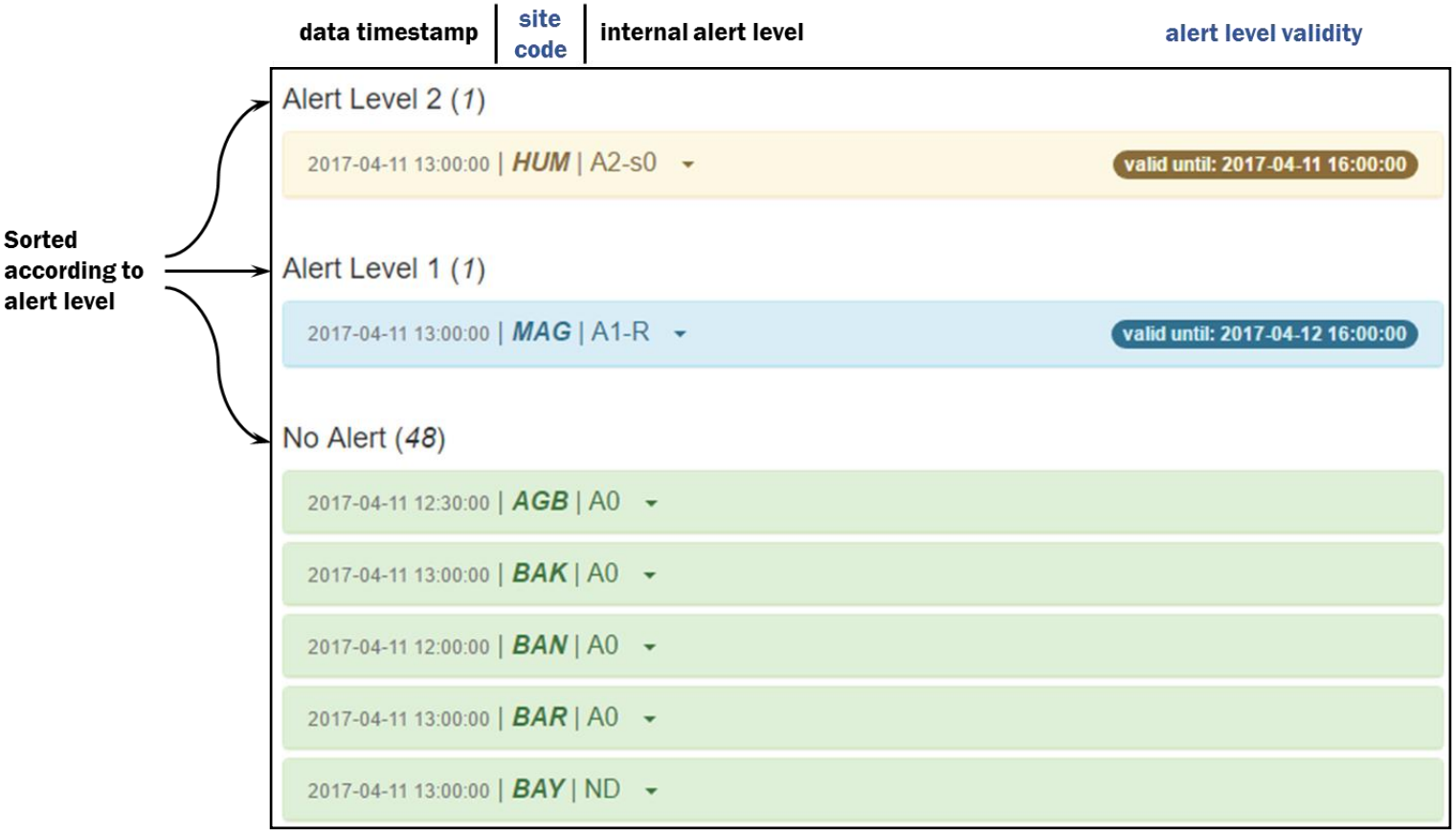


Tip: Alert information can also be viewed thru PublicAlert.json see next page

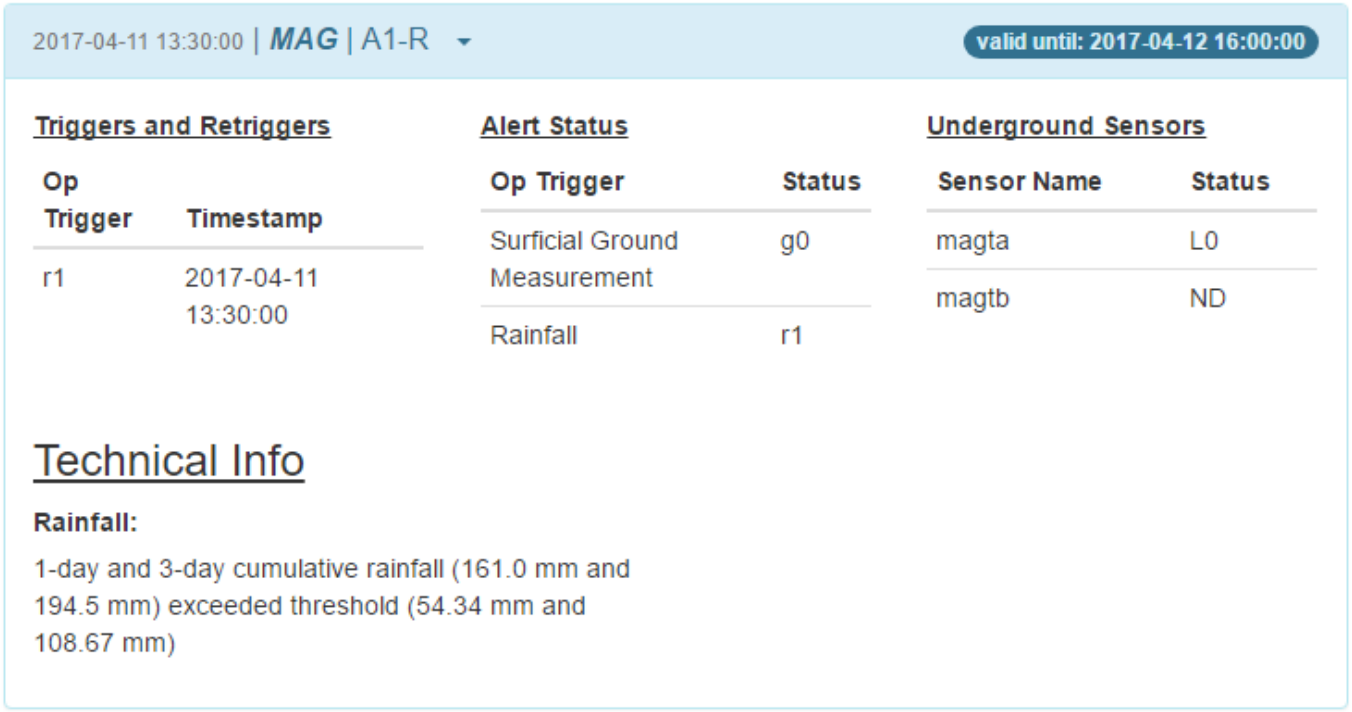
Checking the alert status thru PublicAlert.json:

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 12) and recent monitoring issues encountered are also shown at the PublicAlert.json page. If there are any significant issues encountered during your shift, you may edit the MonitoringIssues.txt (see instruction below).

Example:

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.

Monitoring Issues

to edit:
in Dynaslope Server, open Sublime Text (start menu->Programming->Sublime Text)
under MonitoringIssues folder, edit MonitoringIssues.txt

[EWI]
EWI tagging and Automatic/Manual Narrative logging is not working for the whole shift (12MN-,4AM-,8AM-releases)-done manually in the E-o-S Report. Automated Narratives were generated in the Accomplishment Report Generator but can't be seen and updated in the Narrative Report tab.

[ALL]
Rainfall: if instantaneous rainfall (black spikes) is above 50mm, alert is invalid
Ground: for invalid ground alert, resend correct data before acknowledging smsalert

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:

Type	Operational Trigger	pp.
Rainfall	R1	13
Surficial	L0t, L2, L3	18
Subsurface	L2, L3	22
Earthquake	E1	25
On-Demand	D1	26

STEP 2: Process ALL validated/invalidated operational triggers.

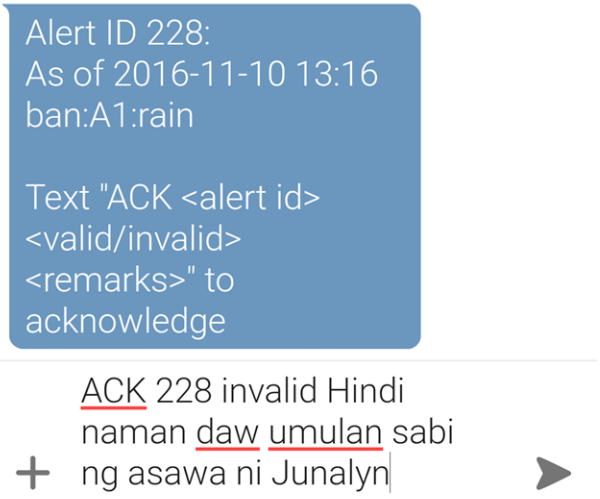
For sites yet to be monitored:

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.

Example:



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.**

→ For valid alerts, initiate monitoring by releasing the result of the trigger validation as an instantaneous public alert report – see page 30 with the corresponding validity (see page 57). Proceed to "Start of Monitoring" see page 28.

→ 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 30.

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:

[timestamp]_[site].png

Example:

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

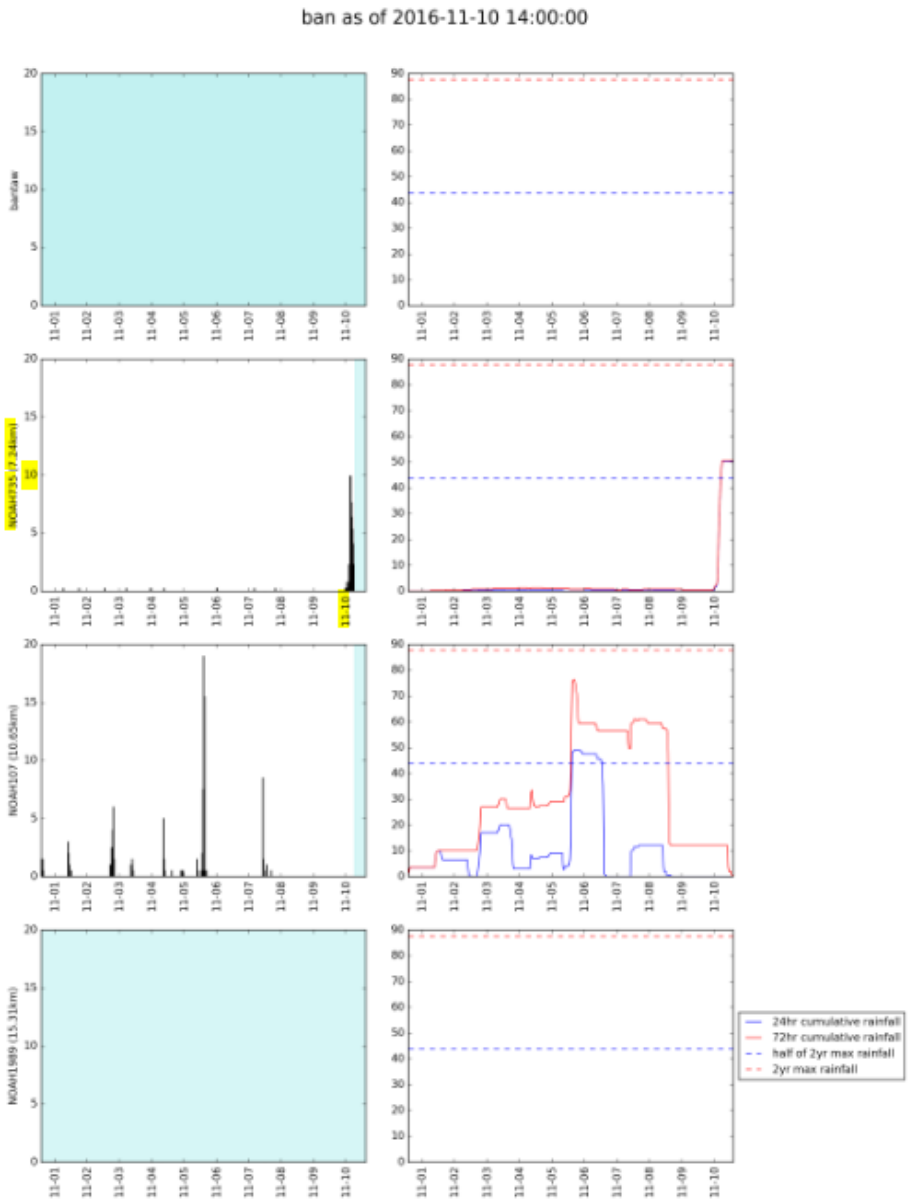
Look for possible spikes and anomalous data in the rainfall plots. As a rule of thumb, if the 15-minute instantaneous rainfall (denoted by the black bars on the plot) exceeds 50 mm, the data (hence the alert) is invalid.

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 12

STEP 3: Compare the rainfall data with first-hand accounts of community.

Seek the confirmation of the community by asking whether a significant rainfall event happened during the observed time of significant increase in rainfall found in the rainfall plot.

Example:

Community was contacted by the IOMP-CT, AC Junalyn 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 12

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.

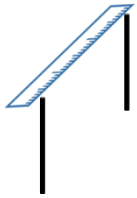
→ If rainfall has stopped as narrated by the community, lower the operational trigger to r0. Proceed to trigger evaluation if needed. See page 12

→ 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 12) 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]"

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 12). 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 12. You may use the result of the following analysis as reference.**

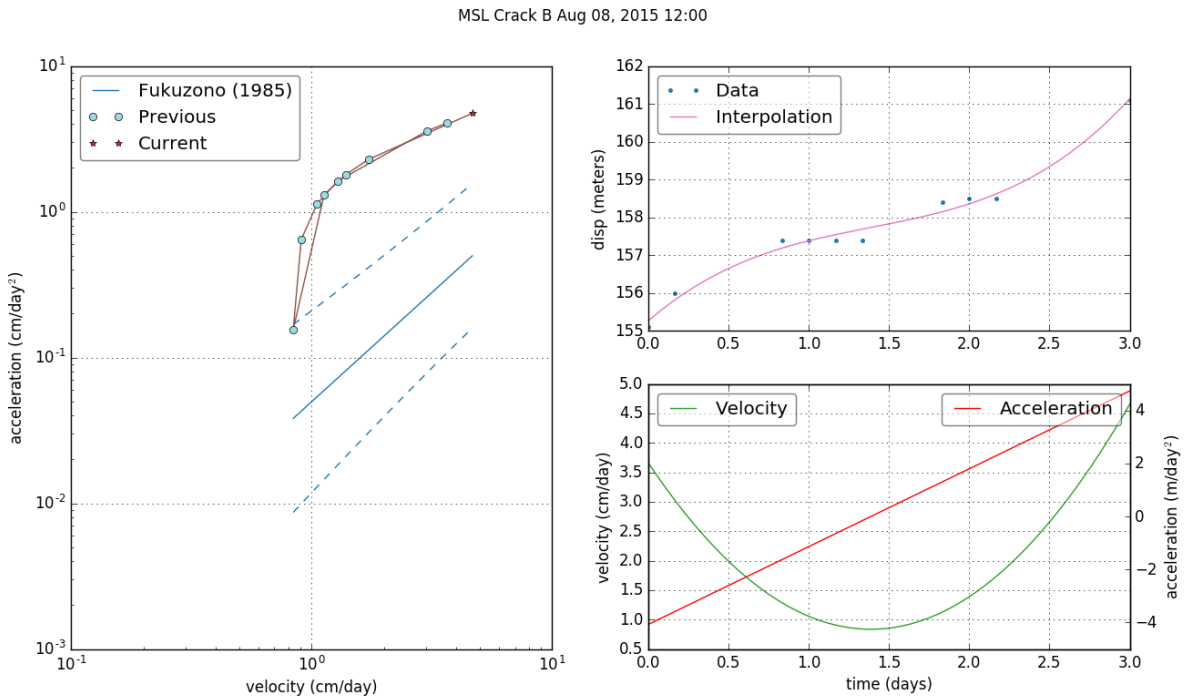
Open the trending plot for the specific site and marker found at

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.

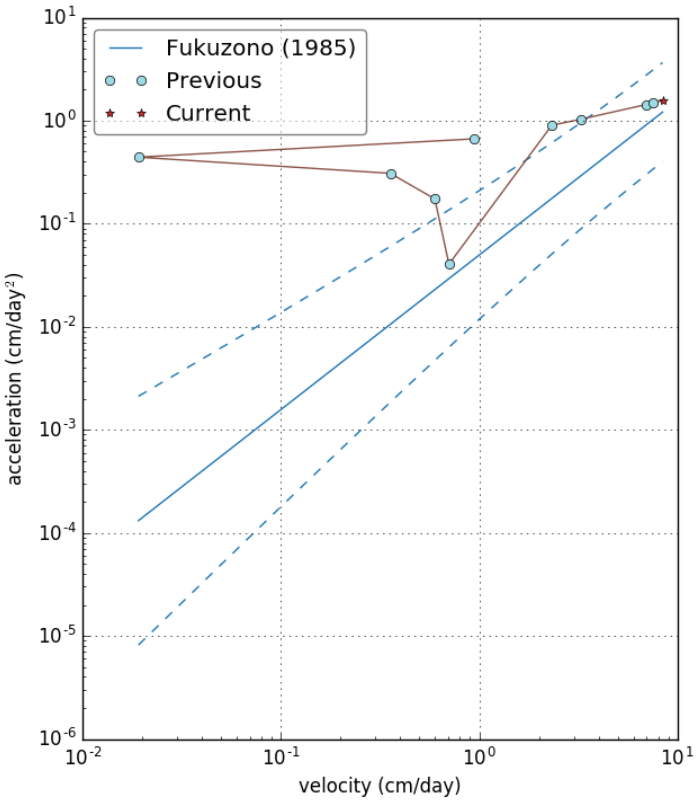
Use the following criteria (with guide questions) as reference for the evaluation.

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 12 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.

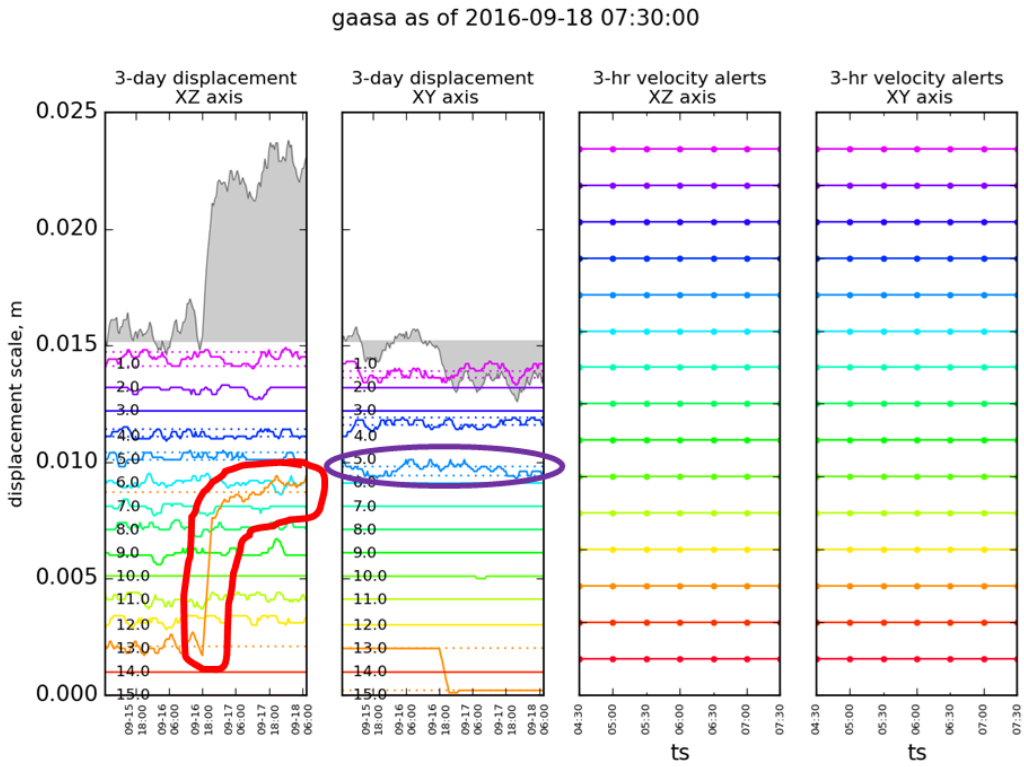
Check if the displacement of the node in question (as indicated by the SMS alert) is significantly higher than apparent noise ranges and is constantly increasing/decreasing.

Tip: In the interactive mode of the python plot, you may click the magnifying lens icon to zoom in to a selected area for more easy viewing.

Example:

Gaasa's node 13 and node 10 exceeded the threshold as indicated by the SMS Alert during September 18, 2016 7:30 AM. Disp-vel plot shows that node 13 (circled in red) is constantly increasing and is significantly higher than the apparent noise range (circled in violet).

→ Since node 13 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 12.

STEP 3: Contact the OOMP-S for further validation of data.

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 12.

Trigger Validation

Earthquake

STEP 1: Determine the details of the earthquake that triggered the alert.

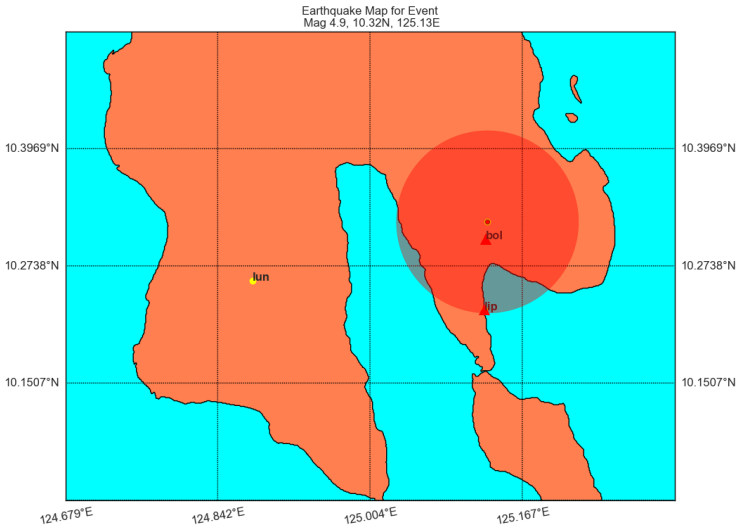
Once a site has been identified to be affected by a recent earthquake event, the GSM server will send an alert SMS to the IOMP-CT and IOMP-MT and the earthquake alert code will generate an earthquake proximity map found in (*Desktop/MonitoringOutput/EQ*). The map contains the earthquake's location, extent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

Example:

EQ Alert SMS and EQ Proximity Map

Alert ID 777:
As of 2016-12-06 09:11
bol:A1:eq

Text "ACK <alert id> <valid/invalid> <remarks>" to acknowledge



→ Sites with a triangle marker in the eq map has a valid earthquake alert. Proceed to step 2 of "Trigger Validation". See page 12.

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 12).

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

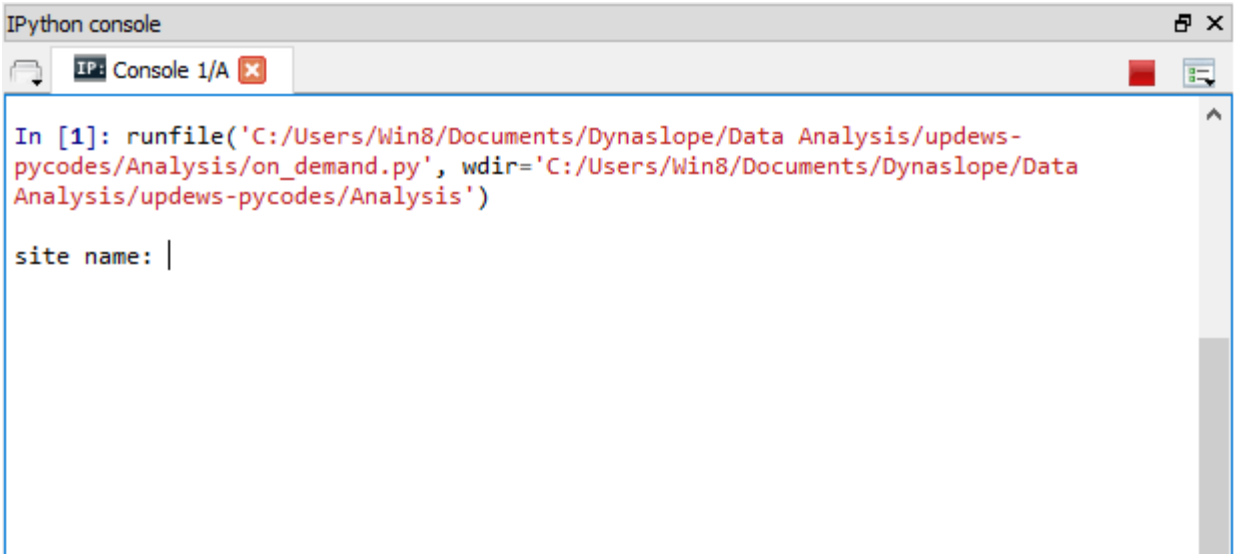
STEP 2: Input the on-demand alert on the site level alert database.

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: newlandslidesens0r2

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**
- **Significant/critical movement from subsurface data**
- **Significant/critical movement from surficial data**

→ 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 30.**

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 APPENDIX section as reference for useful commands and actions that you may need to do during your shift – see page 38.

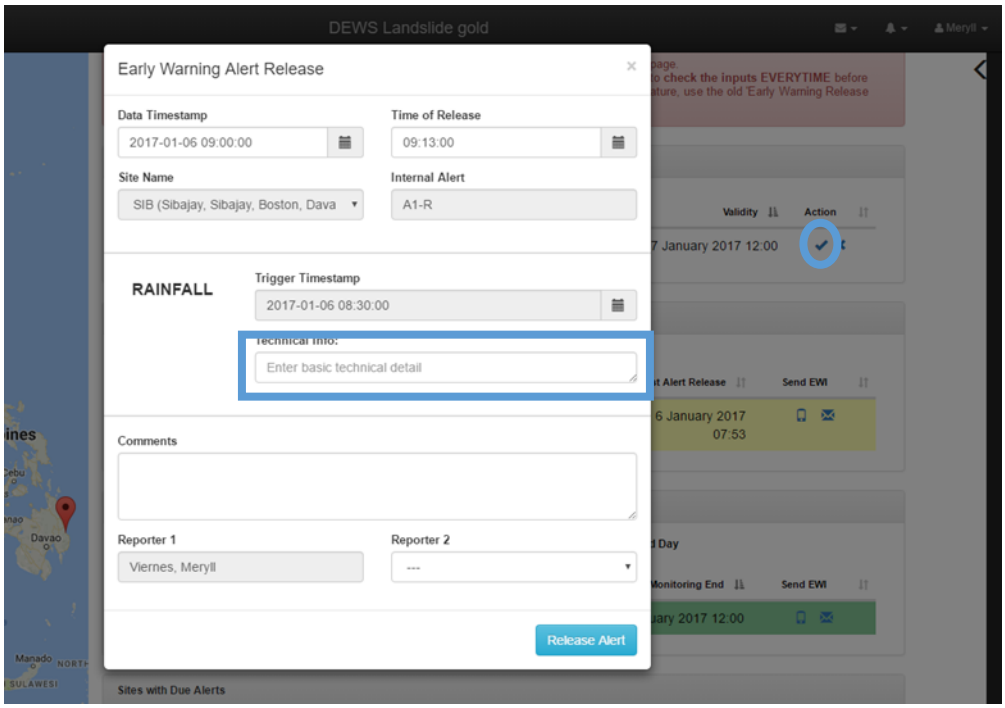
When the number of sites being monitored exceeds 10, you may call for reinforcements – see page 33

→ Proceed to "End of Monitoring" for the final steps of your shift see page 35.

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 13*

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 13*

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 13*

Subsurface

"[col name] Node/s [node id #] exceeded displacement and/or velocity threshold." See page 49

Surficial

"[Marker name]: [displacement with respect to previous measurement in cm] difference in [time difference with the previous measurement in hours]." See page 53

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]

Calling for Reinforcements

In order to prevent each monitoring shift to be too taxing to the personnel, if the number of monitored sites exceeds 10, the current monitoring personnel may call for another IOMP-MT and/or IOMP-CT by doing the following steps:

STEP 1: Start a "Call for Reinforcement" email thread.

Using the dews-l monitoring email, start an email thread with the following details:

Recipients: phivolcs-dynaslope@googlegroups.com; phivolcs-senslope@googlegroups.com;

Subject: Call for reinforcement staff for monitoring shift [datetime of start of shift – datetime of end of shift]

Body:

1. Volunteer basis, first come, first serve (reply to this thread, then fill-out on the monitoring shift schedule spreadsheet)

2. Subject to confirmation and notification of IOMPs 2 hours before start of your shift (5:30am/pm) that >10 sites will have valid alerts during your shift. Notification to be sent via dynaslope and senslope googlegroups mail, chatterbox, and PHONE CALL.

3. Subject to approval of your immediate team leader in case of your absence in the succeeding days due to the offset work hours accumulated during these shifts.

STEP 2: Contact the interested personnel and give real-time updates.

Use the 'Dynaslope Member Profiles' spreadsheet or the 'Chatterbox' from the DEWS-L website to contact the personnel who signed up for the staff reinforcement and give updates regarding information of the monitored sites.

STEP 3: Divide the monitoring tasks equally.

Each site being monitored should be distributed equally to all monitoring personnel. This is to ensure the quality of the monitoring operation as well as for the monitoring task to be manageable. Hence, the quality and timeliness score of the monitoring personnel is evaluated according to the sites the monitoring personnel was designated to.

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 trends, approximate rainfall amount received, 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 28).

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: rainfall 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

4:00 – EWI for 4:00 PM sent

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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 – 2 CT shifts

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**
- **Team Earl**
- **SWAT & Sir Jun**

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

Total Load to be distributed = $MS + FW - 18$

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

FW **– Total load from fieldworks**

18 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.**
- **For February 2017: Max of 3 admin persons with shift per week. Other months: Max 2 admin persons with shift per week.**
- **Persons in fieldwork cannot take any monitoring shift.**

OOMP-MT duties

1. At the onset of any monitoring event, the OOMP-MT is the one with the task of evaluating the trigger and notifying the IOMP-MT personnel.
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-MT's discretion if he/she would report to the office to fulfill his/her monitoring duty.
3. For the IOMP-MT 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.

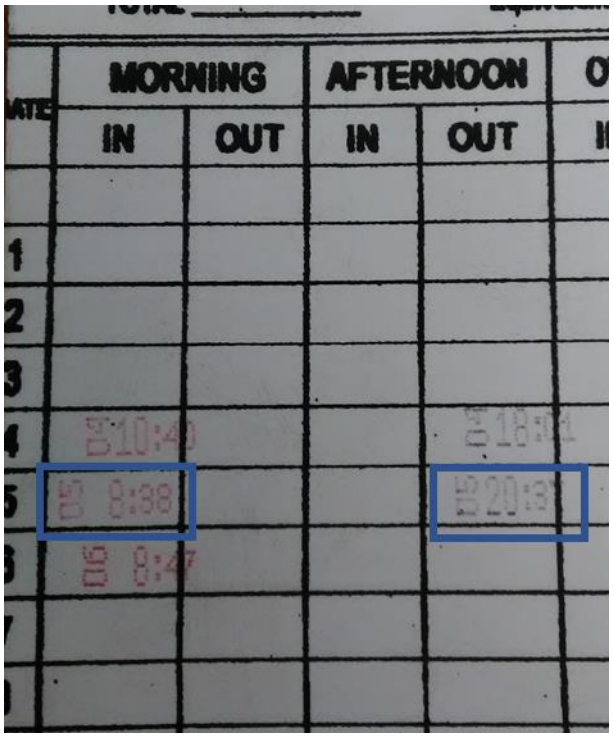
Example:

OVERTIME PERMIT

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

ACCOMPLISHMENT REPORT

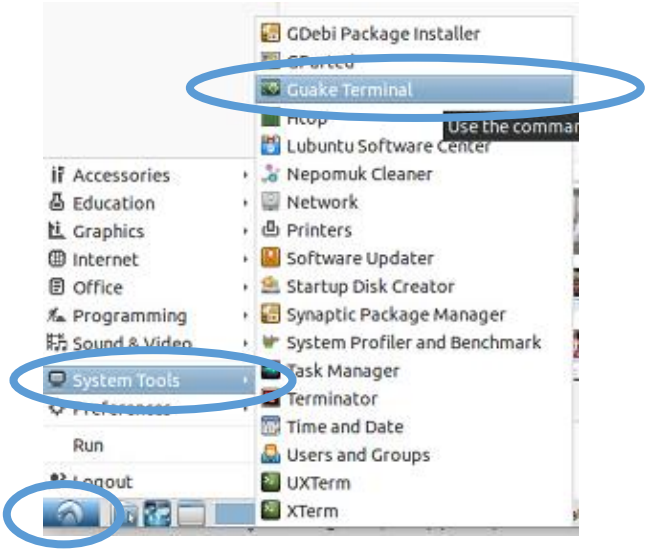
Date	Work Accomplished	REMARKS
08:38-20:37 05 Jan 2017	Event-based monitoring for: SIB (Brgy. Sibajay, Boston, Davao Oriental)	A0/A1/A2/A3- will/(not) continue to next shift



How to launch Spyder on the Monitoring PC

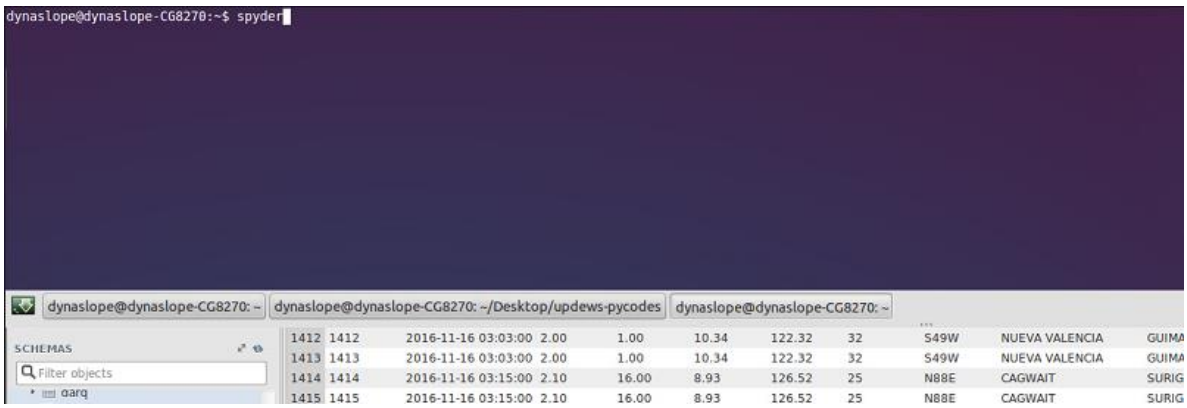
Step 1: Launch the Guake Terminal

From the Start Menu, choose System Tools then “Guake Terminal”



Step 2: Use the Guake Terminal to launch Spyder

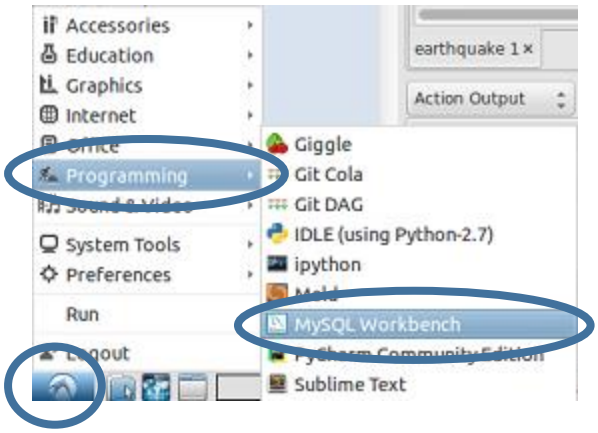
Press F12 to open the Guake Terminal, key in “spyder” then press enter to launch Spyder.



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

Step 1: Launch the MySQL Workbench.

From the Start Menu, choose
Programming then "MySQL Workbench"



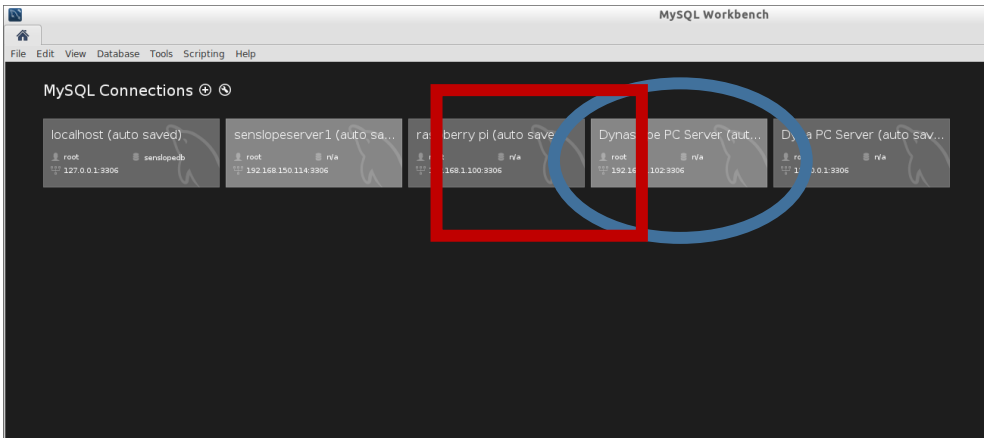
Step 2: Open the Dynaslope PC Server connection.

From the MySQL connections, choose

Dynaslope PC Server (192.168.1.102:3306) (red boxed)

or Raspberry Pi (192.168.1.100:3306) (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

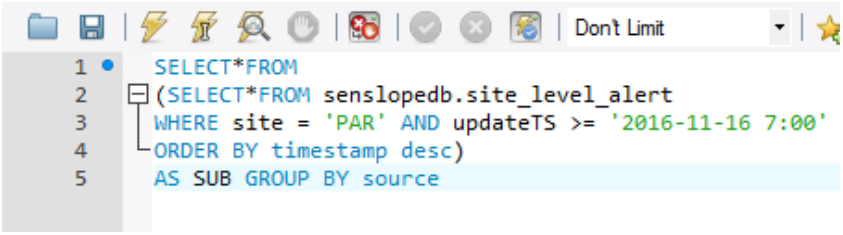
```
SELECT * FROM
(SELECT * FROM senslopedb.site_level_alert
WHERE site = '[site]' and updateTS >= '[timestamp]'
ORDER BY timestamp desc)
AS SUB GROUP BY source
```

Press CTRL+SHIFT+ENTER to execute the command

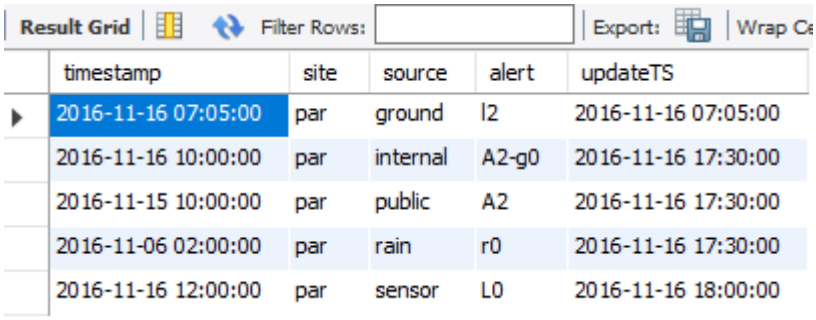
Example:

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

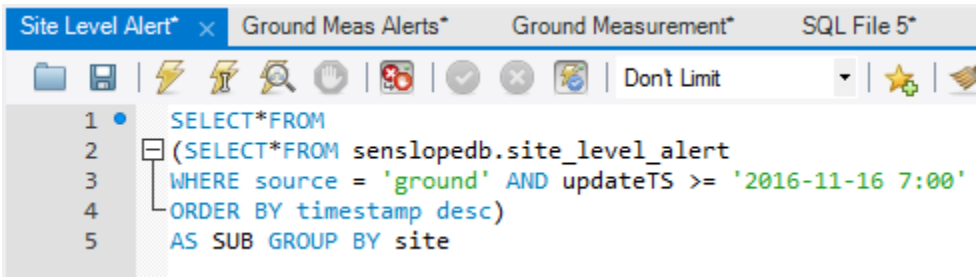
On the MySQL Workbench (Dynaslope PC Server) query tab, key in

```
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

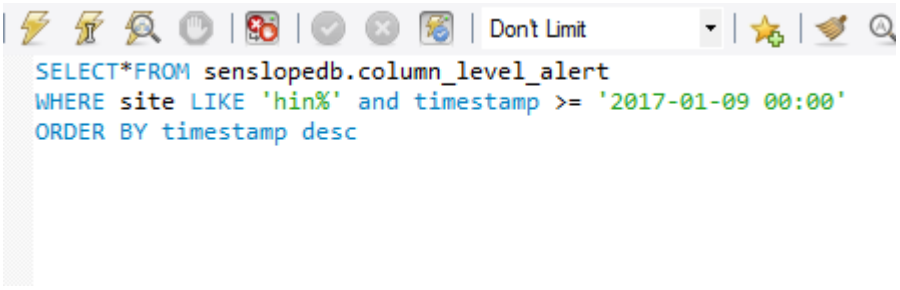
```
SELECT * FROM senslopedb.column_level_alert
WHERE site LIKE '[site code]%' and timestamp >= '[timestamp]'
ORDER BY timestamp desc
```

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,

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

How to check which marker for a specific site exceeds the surficial movement thresholds

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

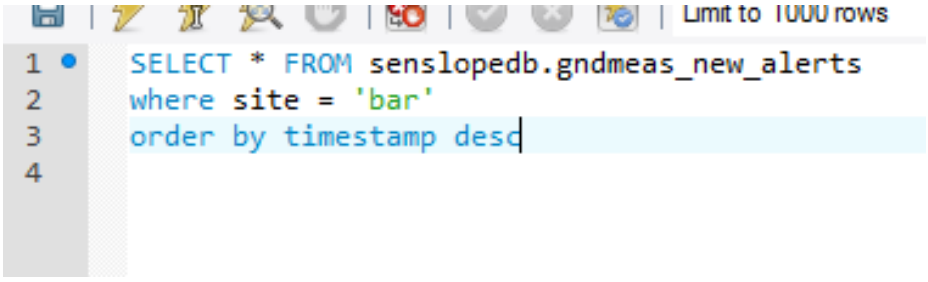
```
SELECT * FROM senslopedb.gndmeas_new_alerts
WHERE site = '[site]'
ORDER BY timestamp desc
```

Press CTRL+SHIFT+ENTER to execute the command

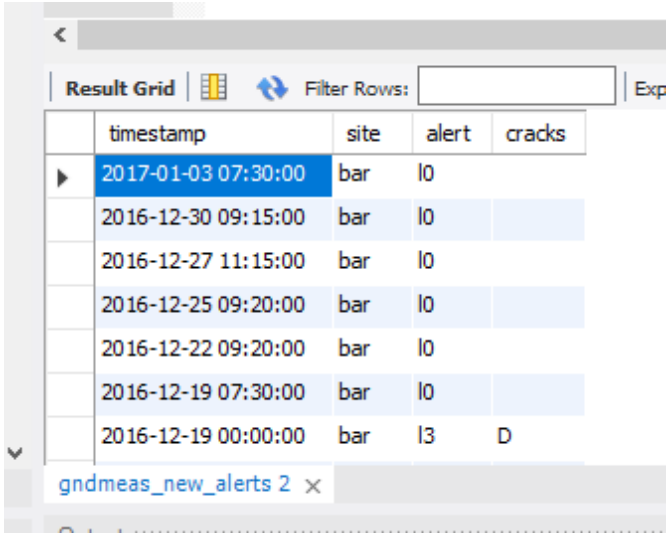
Example:

Check which marker of site BAR exceeded the threshold during the December 19, 2016 alert.

Input:



Output:



How to view all surficial ground data for a specific site

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

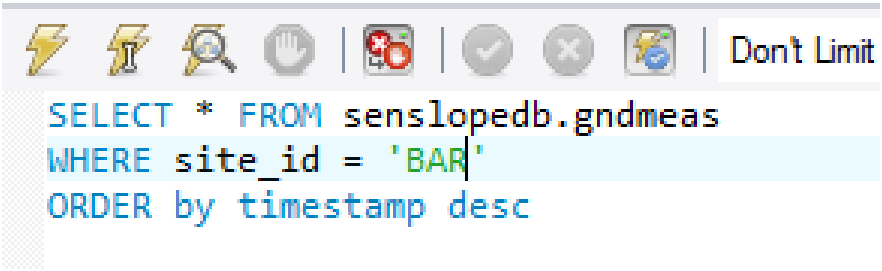
```
SELECT * FROM senslopedb.gndmeas
WHERE site_id = '[site]'
ORDER BY timestamp desc
```

Press CTRL+SHIFT+ENTER to execute the command

Example:

View all surficial

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	

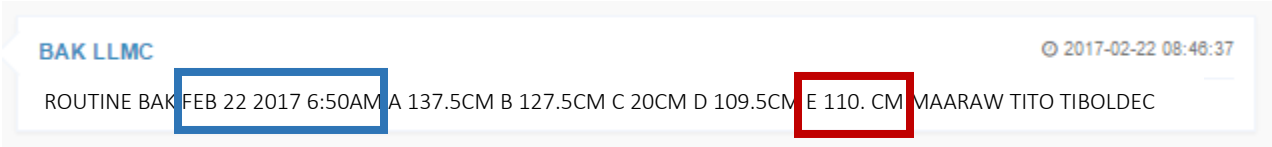
***Note:**

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 54.

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	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	

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]

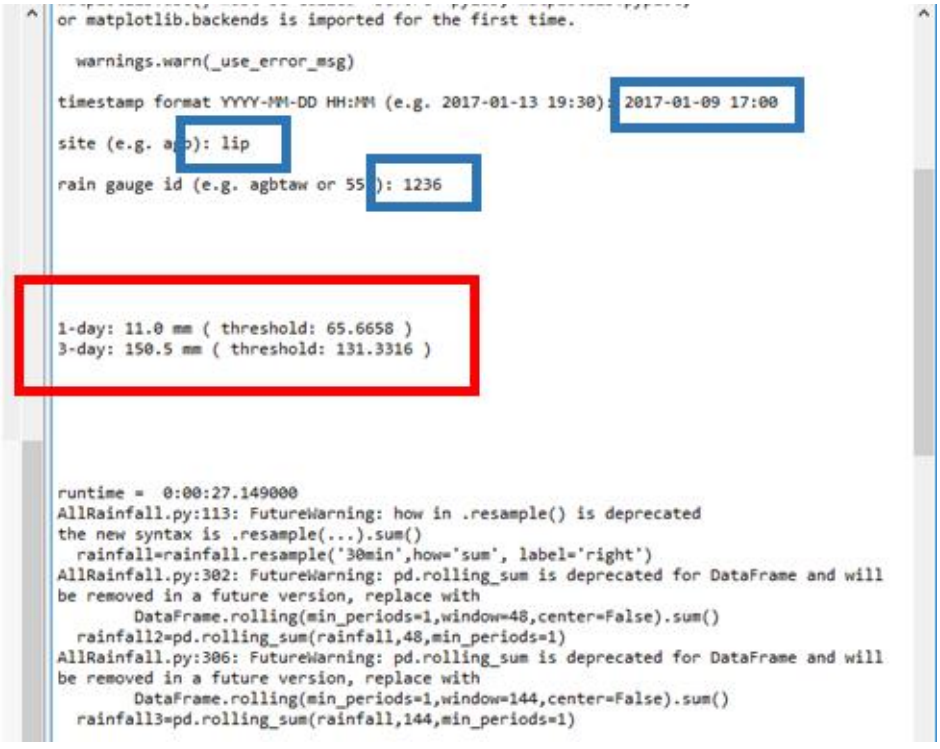
[rain gauge of interest]

Output:

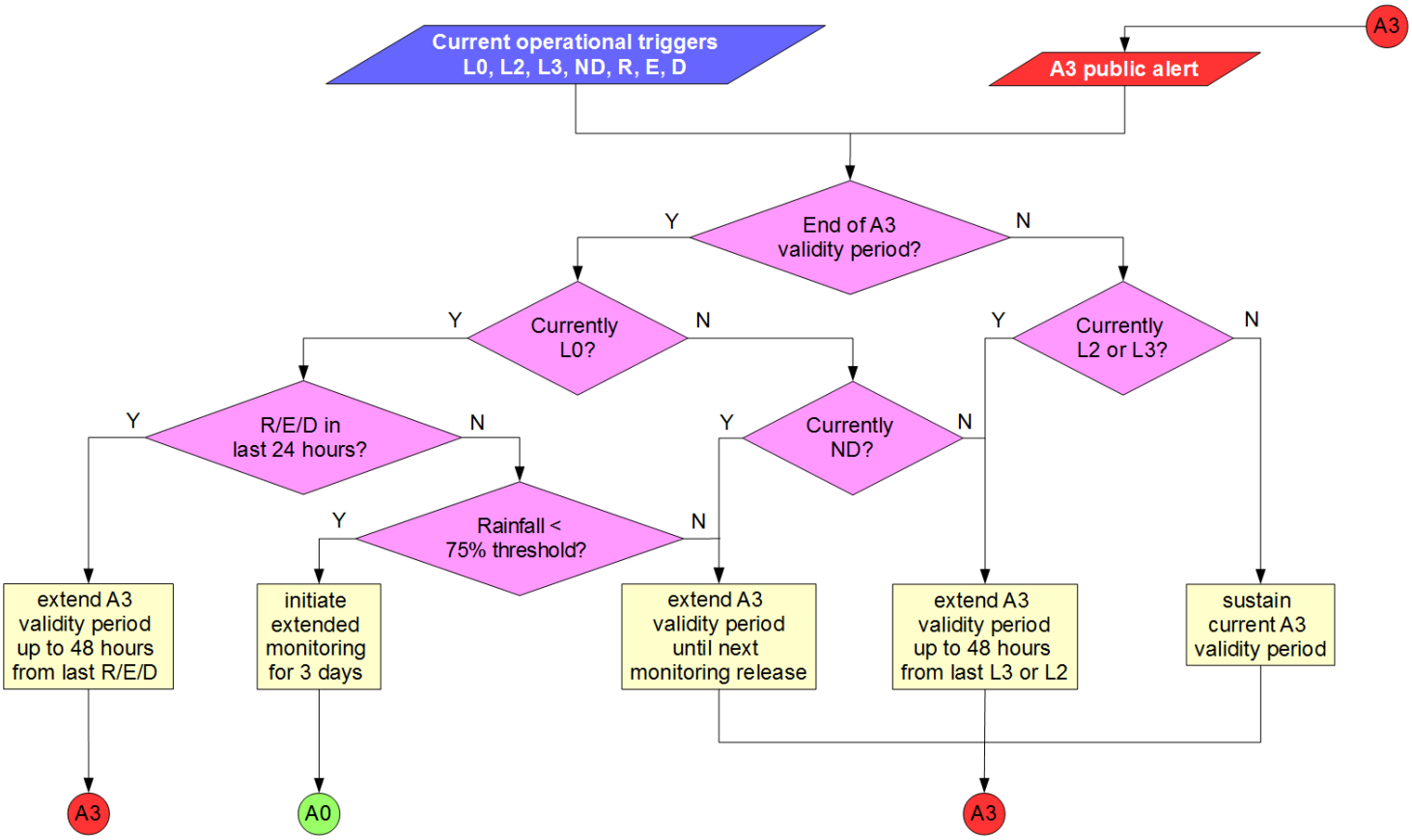
1-day rainfall value (threshold)

3-day rainfall values (threshold)

Example:



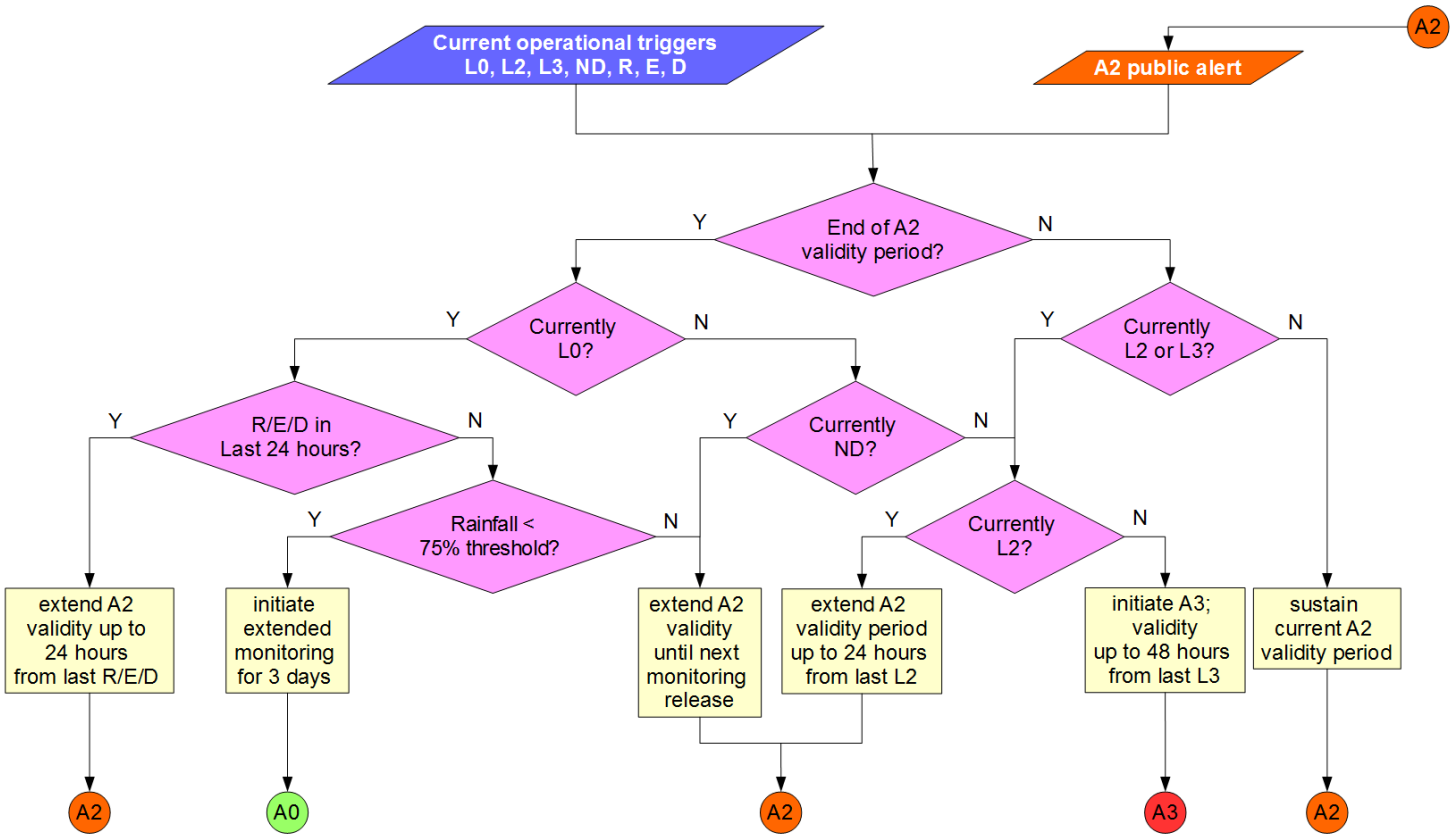
Alert Level Flowchart: A3



***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.

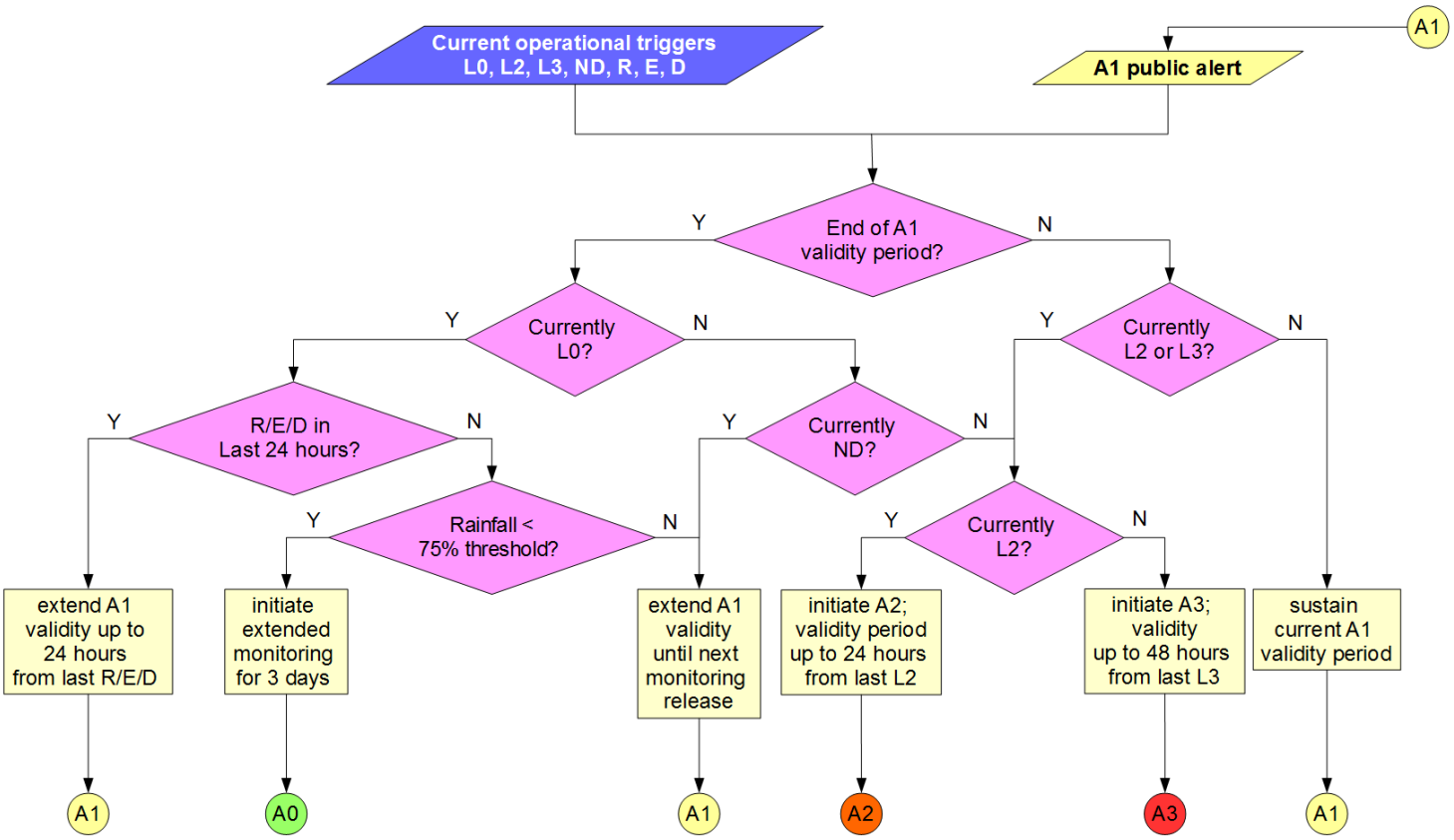
Alert Level Flowchart: A2



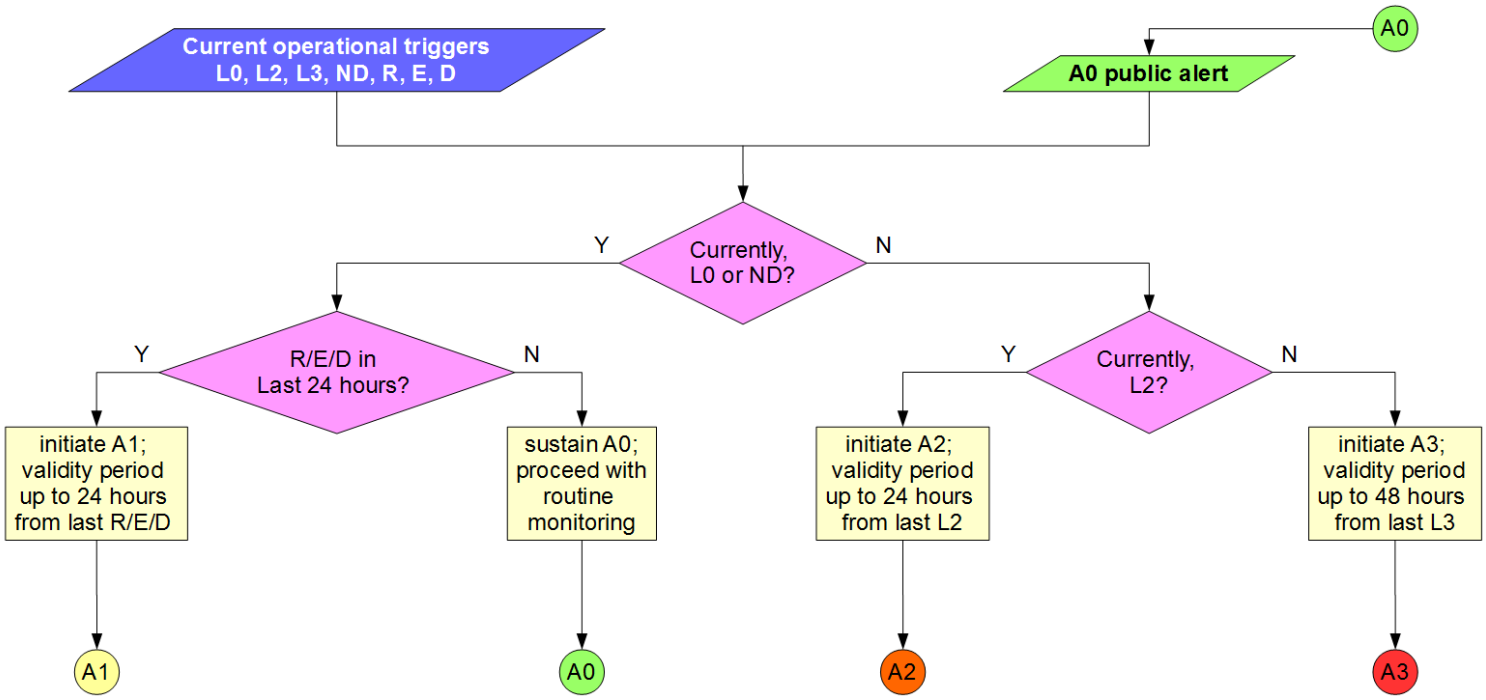
***Notes:**

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.

Alert Level Flowchart: A1

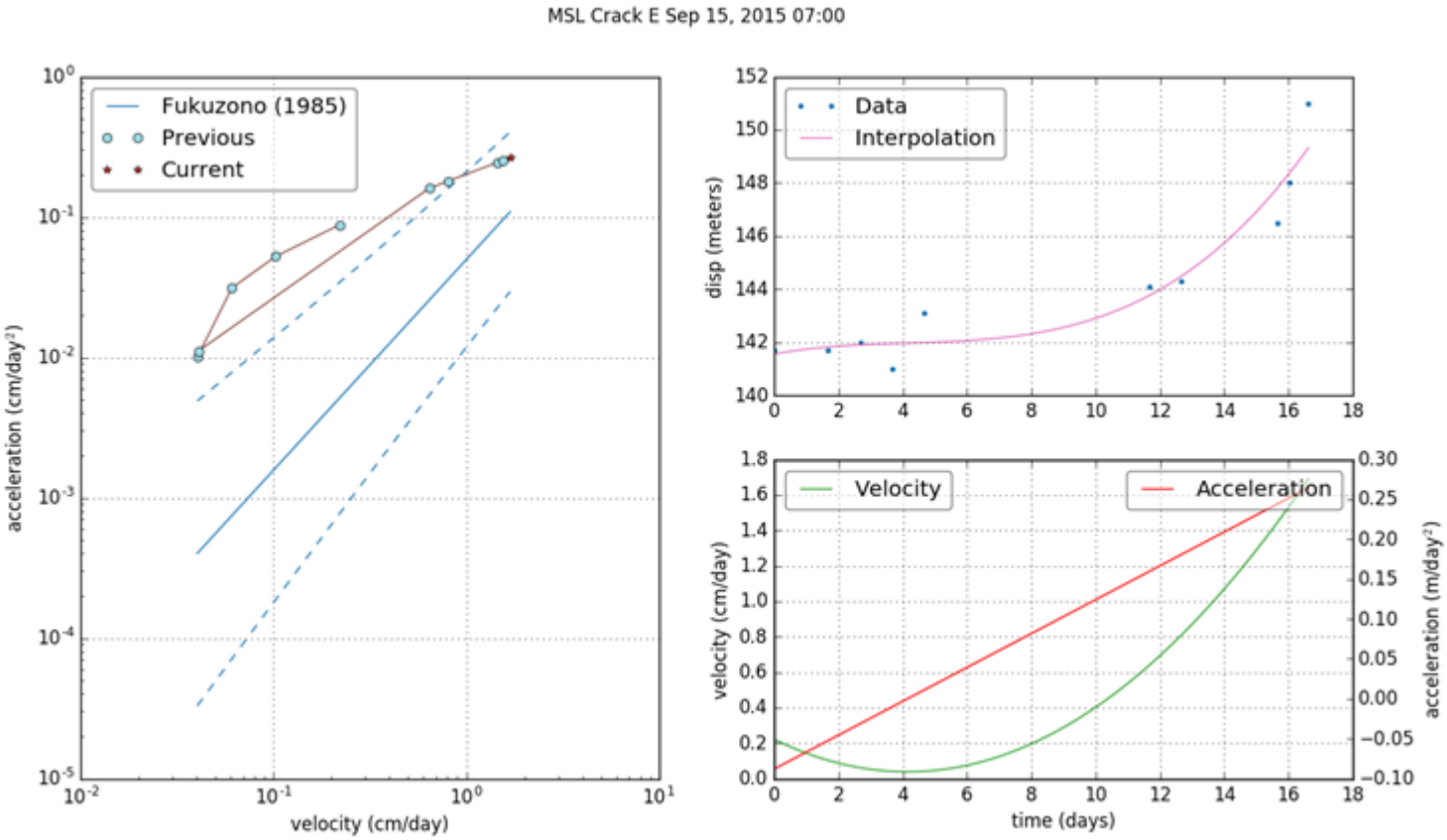


Alert Level Flowchart: A0



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

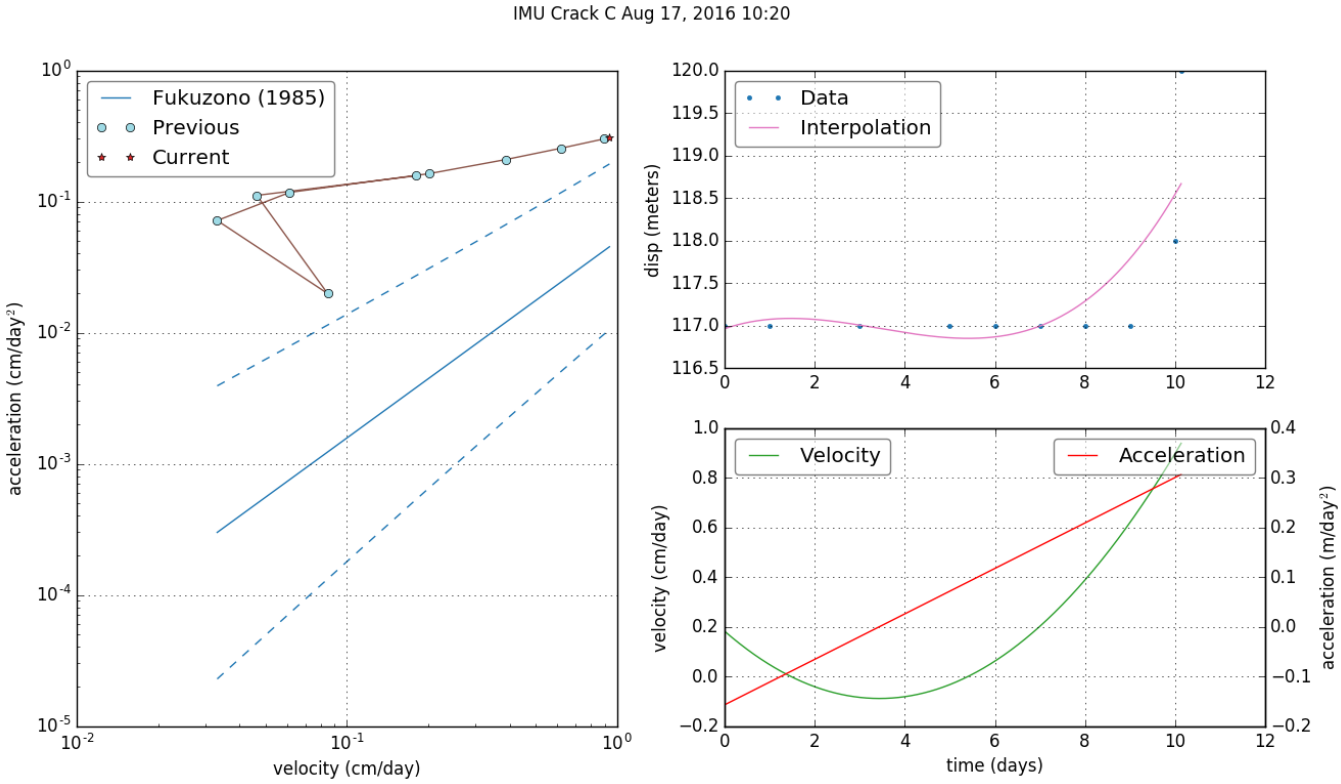
The value of the velocity and acceleration of the current movement is just enough to fit inside the confidence interval. We also note that the trend of the velocity vs. acceleration point towards inside the confidence interval, which what we would expect for creep movement.

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.