

Monthly Meeting (June, 2020)

Date: June 30, 2020

Time: 2:15pm - 3:24pm

Location: Park Seismic Office

Attendees:

In the office: Choon Park and Jin Park

Via Skype: Josefin Starkhammar and Nils Ryden

The meeting started with Choon's greetings to team Sweden. We talked about COVID 19 and that it was getting worse especially in the USA. Our talk about COVID also included test availability, anti body testing, Vaccine development, travel restrictions, etc. We agreed reluctantly that our planned travel to Sweden in October for the joint field test would not be possible due to the COVID. Everybody is now realizing that it will last way longer than we expected in the beginning to live like this. During the summer vacation Team Sweden has no travel plan and that means they are staying home and maybe working only for MnDOT project. This talk naturally leads to Josefin's talking about her work on building the hardware system.

Topics regarding Administrative work (All)

1. Monthly Payment: Last four months, Park Seismic made the payment to Norrfee Tech even before receiving the payment from MnDOT each month because MnDOT was far behind the payment schedule. Jin wants to catch up the payment schedule between MnDOT and Norrfee Tech whenever it is possible.
2. It has been around the 15th of each month for us submitting the monthly invoice package to MnDOT, and we will keep doing so.
3. Team Sweden confirmed that 2:15pm ET in the US (8:15 pm in Sweden) is the best time for our recurring monthly meeting when Jin asked about it.

Topics regarding Technical work

1. Hardware (AD Converter) Development
 - Josefin comments that building the AD system is now finished and it has been tested by using the old receiver array ("SYS-RYD-2019"). It successfully samples microphone data and saves them in TDMS format. The Infra Red (IR) thermometer and GPS data can also be saved in the TDMS file. However, its retriggering speed is slower than the old system. It seems the different driver that causes it. Nonetheless, the current re-arm time is 30 ms, which seems to be fast enough. This speeds amounts to triggering every 0.1-m while rolling at 10 m/s speed (36 km/hr). All these results are based on the lab tests and therefore more realistic results have to be obtained through the field tests planned soon. Choon comments it should be fast enough in time and dense enough in spatial sampling for now.
 - She also comments there seem to be ways to improve this re-arm speed by using special approaches such as digital triggering mechanism. She will check them in the

near-future. It seems only either of the two, not both, is available with this system; i.e., fast trigger or availability of pre-trigger samples. She sent inquiries to NI and is waiting for reply.

- Josefin and Nils agree that triggering mechanism needs to be studied in more detail because it is also closely related to the possible risk of "false" triggering by the ambient noise. So, both the triggering amplitude level in the system and the mechanism itself (e.g., by detecting the sound level at channel #1 or the level at a separate microphone attached near the source) should be simultaneously considered. It seems very important to find the optimum trigger level that is not easily influenced by the ambient noise.
- Josefin comments the re-arm time seems fixed regardless total number of channels.
- Josefin and Nils comment that, because Josefin has not been physically well for a while, they could not go out for field test yet. But, it seems they now can go out to do it soon.
 - Choon comments that, for September NRRRA presentation, we can plan to show some new field data set collected by using the new system and/or old system also for reference.

2. Hardware (Receiver Array) Development

- All (Choon, Josefin, and Nils) now talk about the optimum array configuration. All agree it has to be as much close to the previous development as possible because otherwise it will take another lengthy R&D stage. Choon comments if it would be long enough to use current configuration for 24-channel with 0.75-cm channel spacing to cover the aimed HMA layer thickness range (e.g., 5 cm - 25 cm). Nils replies it will have to be based on the new field test results. Nils replies it would be a sufficient configuration for now that can generate results comparable to those obtained with a full 48-channel system. But, the new field test results will be able to tell us more about it.
- Choon wants to know if the 24-channel array can be long enough to measure the curved part of A0 mode, or it needs to be longer to catch it. Choon also asks Josefin if it is simple to change the 48-channel array to 24-channel array with twice current microphone spacing. Josefin replies it can be relatively simple.
- Nils comments he will collect walkaway data sets by using different impact sources (e.g., bouncing ball, hammer, etc.) during the next field test.
- Nils comments that it was always tough to observe the curved part of A0 mode from his experience. On the other hand, the Impact Echo (IE) can also be useful as an alternative (or supportive) method in the thickness (H) evaluation.
 - Choon comments that he tested the two IE approaches described in the two papers Nils sent and both turned out highly promising. So, he plans to include IE as another method of H evaluation.

3. Future Plan

- Choon comments about the Sept. presentation and wants to have the new data set collected by using the "new" system. Josefin and Choon talks about if it is possible to build the new optimum 1D array soon. Although Josefin says it is possible, Nils warns again that we'd better wait until we come up with new field data set.
- Josefin talks about the possibility of procuring new cables, but Nils recommends again that it may need to be done after the field test. Choon urges that we should go ahead and order the new cables now because they will be needed anyway. But, Nils again suggests that it should be done after more field test to figure out the exact configuration.
- Nils suggests that we collect more and diverse field data sets by using the old system to assure the best-quality of recorded data sets that will be used for the optimum configuration of the new receiver array. Only after that, we can start designing the new receiver array.
- Nils and Josefin considers that the new AD converter may be able to be used with the old receiver array for field test before Sept. meeting.
- Choon says it will be an enough progress by then. The most ambitious goal would be to come up with a complete system of AD converter and one 1D receiver array by then. But, it may be too ambitious.
- Nils again emphasizes that we should not hurry too much to start building the 2D array because the optimum 1D array will be the most critical part. So, we have to be thorough in the study for the optimum 1D array. Otherwise, we may end up with wasting the budget and may need rebuild the 2D array at a later stage of the project.
- Choon suggests Josefin and Nils take as many photos and video clips as possible during the hardware development and field test.
- Josefin proposes her video demonstration of the data-collection software to be used for the Sept. presentation. Choon requests the entire field test procedure be recorded to make a video clip.
- Choon talks about the 2nd quarterly report due in July. He mentions that the 1st quarterly report was overly thorough and lengthy. He now proposes a new much simplified format of only a few pages (e.g., 2-4) with itemized check list so that each participant can check and fill out with a brief description of 1-2 paragraphs. He will send the new format soon.

Agreed to do:

1. Team Sweden will try to collect more HMA field data sets by using the old ("SYS-RYD-2019") system soon (e.g., July).
2. Choon will send a template of the 2nd quarterly report to everyone.

The meeting adjourned at 3:24 pm.