**DETAILED MINUTES of the CRL Coordination meeting 2020**

**July 18th, 2020 via zoom**

## Brief overview of the activity of the Observatory from June 2019 to June 2020 and introduction of the working programme of the day

P. Elias: Last year the participants were 70 people. Now, in total, we are 47! The first part of a CRL coordination session. The first point is a brief overview of activity of the observation from June 2019 to June 2020, and the introduction of the working program by Pierre

P. Briole: So, it is as a matter of fact, it is important that you have a look at the report of the last year meeting and the minutes of the last year meeting, there is a lot of material in those two documents. So, please have a look. You will see that we did not have what is written and has not been done. I will talk about the activity of the observatory from June 2019 to June 2020.

My first impression is that the activity, the business of the observatory continued as usual during the year. So many instruments are working in the field not all, so there are weaknesses, but on the average the array is working, the telemetry is working. So, this is why I say the business as usual.

It works more or less with many weaknesses. One of the weaknesses is that mentioned in the report is the work on the unification of the telemetry systems. It is a trivial question, the fact that in an observatory, it is logical to have a unity of the transmission of the data from the field to the data centers, but this is not yet different from one year ago. There is a lot of information in the report and the minutes. My example is with the telemetry, there is no unity in the telemetry. And this is a problem sometimes. But there is no, I have not seen a big effort to improve the unity at any level.

And concerning the products. Maybe we'll discuss later today about this question. And the catalogs for example, or another example, for me, which is a little bit critical is I am not aware about official map of the faults of CRL. I don't know, which is the official map faults. So this is a general comment. With respect to one year ago, I don't see improvement on the unity of the whole system.

Another aspect, compared with one year ago, we do not have a global vision of the observatory as a united Observatory in terms of funding, we don't know how much is the cost of the observatory, we don't know how much is the manpower needed to operate the observatory on the database side, but also in the field is not quantified correctly. And probably over under estimated for the field work. And this is a problem that we don't have economic model clear for the field work and for the maintenance of the station. And so sometimes people who go to the field like P. Elias or me, we been obliged to go in a very strange conditions, like when P. Elias went with his personal car to maintain a seismic and GPS station in March. So, this is not normal, I hope in one year from now, we will declare that now this is a past era, and we don't go with our personal car.

About an aspect where I see changes, but it is a side effect on not or CRL is the CRL School, which is more and more I think becoming important in the system. Why? Because it is opportunity, we have to meet all together, it's not nothing, it's very, very important to this

meeting and work to bring in the CRL students. And after several years now of CRL school, I saw and also, I saw in the participants of the meeting people who met for the first time in this CRL school. So, the beginning it was not that important, but now I'm convinced it's very important the CRL to develop these aspects of education and maybe also outreach. This morning, we are going to discuss some aspects of maintenance and sustainability of the station and the field. In the afternoon, we will go more to aspects concerning the coordination, the governance and the link with a European plate observing system. And then at the end, we will talk about education. The first aspect that we are going to discuss this morning is the basement of all the rest. So, we need to have a very, very good strategy for our instruments who will be sure that they work not maybe not just the business as usual but something much, much more much longer. Also, we need to talk maybe about new instruments that we would like to add to the array we have seismic and GPS, but maybe we need to talk more for other kind of instruments, like tide gauges. Maybe we don't need the same number of GPS and seismic station but maybe we need them for example, if we want to analyze in a better way the swarms that were shown this morning during someone presentation. So, we need a very sensitive instruments in addition to the seismometers like tilt or strain meters to try to better describe the evolution of the deformation during the swarms or maybe the existence and quantify the possible slow events not detected by seismometers. So, this morning, I think we are going just to discuss the existing instruments, but at some point it will be good to talk about the instruments not yet existing Concerning the existing they will be a presentation by E. Klein and M. El-Assaoui maybe some Greek colleagues because there is a working group that has been set up during this winter, for the maintenance of the array, and there is a weekly bulletin that you can receive if you want so at the moment it is sent to a limited number of people, the people who are active management of the array but of course, other people can declare their will to receive also the bulletin and to contribute to the field work in a well-organized manner.

## Considering the 2019 meeting minutes, discussion and reassignment of the discussed tasks

P.Elias: Before we go to the maintenance, it's good to go to the last year reports to see the tasks.

Last year we were 30 participants now we are total 47. This is a good indication. I will go to see what are the task has been appointed. Beginning with the first one in the telemetry infrastructure session of the 2019 meeting, a coordination should be established for this kind of maintenance. I would like to say that there is no much coordination of all the groups that are going to maintain. I would propose firstly, if we could establish a mail list, so every time a group goes to the field, it's good to, to communicate with some others, just to know if someone's going to the field. Now, I would like to hear the proposals. You agree to maintain this task. So, you think that a coordination is good to be done for among all the groups involved or not?

P. Briole: It is essential.

P. Elias: Ok, well, let's sustain this. Next one, we have to agree to the role of each partner in the case of occurrence of a seismic event. I don't think that anything has been done. I don't know if someone would like to take this task, I mean, to have an idea to present an idea and

try to pass a document of in a case of an earthquake what would be the actions and the coordination that could be done? I mean, not to put the same instrument on the same location, perhaps one group could facilitate the other perhaps if someone goes first, it would be able to prepare the situation for another group, etc. Is it anyone that would like to have this task, to present roughly a task plan, action plan? We have to leave it open.

P. Briole: Today, with the density of the network, what is needed in case of an event inside the Western Gulf of Corinth, why we should add more instruments and how, the first question is why we need to add in principle, we should not need to add instruments in the in the middle of the observatory.

P. Elias: But if we have a swarm like the last one

P. Briole: We have to be ready for the swarms and not to wait for them to add the instruments. On the volcano observatories they don't add many instruments in case of an event just a little bit they read all the time.

P. Elias: So, you are suggesting that we have to densify the network?

A. Descahmps: Yes, I think that from the seismological point of view, it could be useful to densify the network.

P. Elias: I think this is also a task that will be shown after. In order to have a plan, what will be the next steps is something like to have a permanent more dense, more focused and smarter network instead of the idea of launching new instruments in case of an earthquake.

I. Kassaras: Are there available instruments to densify the existing network in case of earthquake?

P. Elias: For GNSS I would say yes, there are some available instruments very close to the field and could be launched very soon.

P. Briole: In the case of GNSS, it is not very useful. It is just to remeasure of some campaign points, but the important is the permanent network which must be dense enough for the needs of the observatory. In the case of a seismic station, maybe it's more interesting to densify during an event because you have a lot of earthquakes that maybe you want to do analyze in a better way. But in the case of geodesy is not very interesting.

H. Lyon-Caen: For seismology is very important. I think we will have to densify in case of an earthquake

G. Kaviris: Ok, like densify. But the thing first is to maintain the stations to find the budget to maintain them and the next step is this. First, the goal is to maintain our stations, I think.

T. Sokos: I just would like to comment a bit on that. First of all, I agree with, with Pierre that, at least for the western part of the Corinth Gulf, there should not be need for densifying after a strong event. Of course, we don't know that we would like to have more data. So in principle, I would say that if we have a strong event, maybe a limited number of seismometers could be installed. I think in this case, this is a task to be undertaken by the Greek institutes. Just for logistics, we are here, we can be in the field in a few hours. So it's easier to collaborate and decide about the place and all the logistics of the station installation. Overall, I think that there is no much need of installing new stations or extra portable stations after a big event. And if there is such a need, then maybe I don't know if

it's the National Observatory, if they would like maybe they should coordinate since they coordinate also the HELPOS project.

I. Kaasaras: I suggest maybe between the Greek Institute is to add the French people in process if they agree to ensure a pool of portable stations, that it would be possible to be moved and reinstalled within a short time after earthquake. I think that could be done.

P. Elias: A question to all if it could be possible to establish a road map firstly begin for each individual to suggest roadmap of an event, and then circulate and then end up to a single roadmap. Could this be possible.

Ch. Evangelidis: This is a general, for the aftershock deployments and the general coordination among Greek institutes and research centers. I think this is a major task taking from HELPOS project. And this is a this is an ongoing discussion on how we should proceed on that and how we should get organized on that. So, I think we should avoid doing the same job over and over in different groups. So my opinion is that if there is an agreement, and a roadmap for this aftershock deployment, in general for Greece, this of course includes the area of CRL, which, at the end of the day, I agree with T. Sokos and P. Briole that is already densely instrumented by seismic station. So I think, at the end of the day, after a strong event in the western Gulf, we won't have such a huge need of more stations to be installed. So, I think this is a general a question, a plan and roadmap that should be taken by the Greek institutions in general for Greece, and if this group managed to convert to a viable and sustainable solution for that, then this of course it can be applied for the CRL area as well.

P. Elias: So you don't suggest something to begin with CRL but to come back to CRL.

Ch. Evangelidis: Yes, because the people of the institutes that are responsible for temporary instruments or the deployment instruments, they're the same so I mean, they should discuss for general for aftershock deployment and they should have an agreement of that. And then coordinate for the whole area.

P. Elias: Is this procedure is going on?

Ch. Evangelidis: I think it is going on. I'm not involved on that directly but I think is going on in HELPOS. I think all the Greek institutes have seismic stations for aftershock deployments, they are involved on that, and they should convert according to my personal opinion to a common agreement for that. So, I think the largest problem, I agree with George, is that is what's happening now with the stations already there and not what's going to happen if we have a large aftershock. Because the real question is, if we are ok with all these stations. And if they are working all these stations to be ok with this density.

I. Kassaras: What is the policy to support these stages? How are they going to be deployed in case of an earthquake? Who decides? I think there is something missing here.

Ch. Evangelidis: This is a particular task within help us project. That's why I can say I'm not involved with that. I'm saying that for each institute, I think you are involved on that.

I. Kassaras: My role is to prepare some stations to be ready to go to the field.

Ch. Evangelidis : So I think this is a discussion, you should make all the people that you are all to prepare things and discuss and come to a common agreement. That's my personal view. So instead of doing that, again, for CRL, you should initiate the discussion in general. And

then of course, if there is an agreement, because as far as I know, there is no agreement. So, if there is an agreement at the end of the day, then this is applicable to the CRL area. We should focus more on the instruments that have been deployed and then for an aftershock.

A. Deschamps: I agree with Ch. Evangelidis. It is important that CRL seismologic researcher involved in CRL, have an agreement with HELPOS about this intervention. But it is also very important that you have to remember that it's a deployment, uniform deployment to allow to have a better understanding of the aftershock area, but you can have some specific deployment after large events, which is just to test some scientific point of view. And it is a good opportunity to absorb and to have a description of what is going on. So it is important that there is an agreement, and someone from CRL is discussing with the HELPOS Group.

Ch. Evangelidis: I agree with you, but I think most of the people, the Greeks are already they're here in the conversation, they're already part of this effort. You can discuss and then decide.

P. Bernard: I think there is a specificity of current respect to seismic surveys. First, there's always one or two or three stations not working from the permanent array, and those should be in hurry be replaced and doubled with temporary stations. We have to specify which we are the station not working, and these will be the first target. The second thing is that we had several precise surveys. And so we have already identified sites where station had been working for a couple of weeks or a couple of months in 2014 2015 and so on, and those places should be where we put back the temporary station for seismic surveys, because we already have information. And for instance, if you look at multiplets, it's quite important to know if the same area same repeaters are activated. So, we need the same station. So, we should have an inventory list of all the sites which have been occupied in a kind of non-permanent way, in order that those will be also a priority targets for the seismic survey. So, I say that the specificity of Corinth is that we know well the place enough so that we can decide in advance some specific targets for the installations and very different from the usual precisely surveys where we put the station wherever we can.

Ch. Evangelidis: I totally agree with you. But I can even propose a step forward on that, if we end up having, let's say three stations currently not working, and not going to be replaced tomorrow, or they're not going to be repaired tomorrow, we can come to an agreement between us that, for example, and I have three instruments that they are within my storage here, I can loan them, or I can put them there for as long as it's gonna take for you to repair your instruments. We could even do that. So in theory, we could have all the station of CRL working in parallel, right?

P. Bernard:

it should be, it could be great. But this is the next step of discussion with the maintaining costs, etc. But it is, of course, an excellent proposition.

P. Elias: I'm saying that it would be great to have this roadmap in general, but I think that each one should have to adapt it because they are not all the teams involved in a national network and in the same way.

So, the next task is the geometry and the densification of the accerelometric network. This is already discussed somehow and A. Deschamps said a few things. I think, these are the addition so we can move on. At the end of this paragraph, there is a working group to

investigate the improvement this densification of this network. And also, the unification of the rebooting of the system of the stations, I think, an issue very serious to save time and cost. So, if you'd like to have a working group for this, as we have decided last year. Anyone...no. On the products, workflow management execution tasks, we can an overall task that there is a need of coordination between the institutes to provide a quake ml, someone would like to comment?

Ch. Evangelidis: Concerning the NOA catalog, I think that easily all the catalog can provide in Quakeml. I'm talking about the national catalog, not the specific catalog for Corinth. But this of course includes the Corinth events as well.

P. Elias: You think that there could be the specific catalog for the specific stations in the web portal of CRL?

Ch. Evangelidis: I think is the same catalog. We can simply provide the FDSN events service I think for this catalog and the user can cut for the geographic area they want.

Since the last year we started getting in real time from the CL network as well. So the solutions we have for the western part of Gulf of Corinth as NOA, the National catalog will provide to the public and to the authorities, it has also pics from the CL network.

S. Lambotte: For the third catalog we have set up web service which is a up

P. Elias: Are this available through CRL?

S. Lambotte: I have to add a page on the webserver, I will do it these days

A. Deschamps: The CRL catalog for which Sophie is speaking is revised and in particulary integrate the data that we collect on the field when the station were not transmitting data. So it's while, we are one year late but it's more complete. What can be done by NOA of NKUA?

S. Lambotte: The catalog is not being processed in real time. When you do it in real time, sometimes you have some data missing. And if we reprocess year after year, then we done it on more completed data sets. And then we get more events than in real time. We included the missing stations

P. Papadimitriou: We processed in real time for CRL region, and we have manually picked 'p' and 's' since the last years and of course, all these data are published in our website.

P. Elias: Could we add a link to your site through the portal?

P. Papadimitriou: Yes we can discuss that. It could be done.

P. Elias: So next we can speak about Aigio borehole.

I. Kassaras: We have maintained some strong motion instruments from the Rasmon network. We moved all stations to real time continuous transmitting. We did it for Loutraki, Kiato , Xilokastro and Aigio, working since January February or March and they are all working at this moment. This effort was done by P/ Papadimitriou, V. Kapetanidis and myself and there is another station in Nafpaktos which is online but upon request. The task is to update a few more instruments near the CRL area, one of these is Lakka, Nafpaktos and it is possible to install a new real time strong motion instrument in Psathopyrgos in High School as we have been discussing the one year ago or something. The thing is that we don't have

instruments in a good condition, functioning and operate well so we're trying to do what best we can. So as to put in operation as many strong motion instruments we can in real time mode. That is a situation about RASMON. Galaxidi is also in our plan.

Ch. Evangelidis: So you're saying to us that you have upgraded some stations and some of the stations currently running in real time, right?

I. Kassaras: Yes.

Ch. Evagnelidis: So, are you going to distribute them through the Hellenic unified seismic network the stations in real time? That's the first question. And the second question is, of course, if you're going to distribute it through a real time system, you will also distribute it through the national EIDA node for all the users of CRL to be able to use them.

P. Papadimitriou: Of course. We just wait to see if everything's ok that's why we didn't finish it for reasons but I will do it.

I Kassaras: If you if you go to our website, you will see that all the stations are online

CORSA is priority and of HELPOS task to be maintained and upgraded. In this respect, we have purchased instruments now, with three six channel digitizers which are going to be connected to the borehole accelerometers and the surface one. So, that means that 15 channels will be occupied by existing infrastructure. Since 2012, we don't have any image of the subsurface infrastructure. We also maintained the building because it was in a big mess we managed and did some negotiations with the people within this polity and they clean the place now it is possible to visit it and access it. We have the instruments there waiting for us, we have installed the telephone line and next week we are going to go ahead and start the installation set connecting the digitizers with the borehole accelerometers.

P. Papadimitriou: This place it is clean around the small house and what we plan is to have the possibility to visit this place and of course we hope that the instruments working. P. Bernard did you install something in this area?

P. Bernard: I did not put anything there. We discussed the possibility to put water level measurements because there was a possibly a tidal effect in the boreholes but I don't have other instruments around. I had also the plan discussed with others to put the tiltmeter in the tunnel of the railway which is crossing the hills below the city of Aigio which is very close to the borehole center but I don't have anything around them.

I. Kassaras: We have three free channels if it works ok. So, we could possibly adapt some sensors.

P. Bernard: The possibility will be either to make test with a DAS system with let's say fibers going down the deepest borehole and be recorded in some way with the system that we develop already could also see a simple water and water level measurements which might can be kind of proxy of the earth tide and strain and it's easy to see I mean M. El -Assaoui has experienced on installing these these water level measurements the two of them are installed for tide gauge in Monastiraki and Makinia, could be a possibility, but then these are technical points that could be discussed when M. El-Assoui make this presentation.

This place it is very difficult to install instruments outside in the area because we will have problems with the people around. We will install in a ADSL line there. So, I suppose that we will have enough bandwidth. So, if we can if you think that we can install something more it will be possible.

P. Elias: To complete with this point, it said that the premises there is going to be clean and the strong motion network is going to be checked if it is operating. Moreover, the only instrumentation that is currently and the only functionality of the borehole is to host the strong motion currently and perhaps in the near future some tide gauge or another instruments may be installed too. So, we need to keep this borehole

P. Bernard: There is also the possibility to install a borehole tiltmeter in the deepest borehole, I was wondering was is the diameter of the boreholes. This is something interesting to know if we want to think about new instruments if benefiting from these boreholes, we should at least know the diameter.

P. Elias: Next point is if the strainmeter data should be link throught the EPOS NFO level

Ch. Evangelidis: There are not available through RESIF EIDA node?

S. Lambotte: Strainmeter Trizonia, Monastiraki and Riza and the tide gaude data are available through RESIF node and through EPOS

P. Briole: I have a question concerning the meteo data. Because, in fact, we are not meteorologist, but the National Observatory of Athens is the institute working in meteorology with an array of meteo station in Greece, and perhaps some of them are inside the CRL. area, there are meteorologists in the University of Patra, also. So, if we need meteo data, why we don't first gather the data from the institution and lab doing mythology? if we admit that we are not metrologist, we can still install our own meteo stations. And maybe it's a good idea. But we should at least have a clear vision of what the official meteo agencies are doing and which instruments are existing and which data are available. In that case, we should connect in some way those data to the web portal of the observatory.

A. Ganas: About the meteo data we should investigate their portals. Because they have also received some significant amount of money some several millions of euros for their own infrastructure like we have HELPOS. So perhaps the data is available somewhere already, we don't know how to link.

P. Elias: I heard that they don't have the historical data free. I can check and establish this kind of link.

A. Ganas: Some link to the CRL website with respect to the various data sources will be a good idea. Otherwise, people will be, let's say lost within various FTP sites. And we also lose valuable time and resources because we may be let's say Duplicate in data sometimes without knowing, for example, for me, wasn't aware that the strain meter data is available through RESIF. And strain meter is a crucial tool to monitor postseismic deformation for example. And also, other types of deformations related to fault motions and slow slip events, etc. So, this if we have some strategy to discover data, the best idea is to put them all in one web page in the CRL entry portal now saying that you want this data go there.

P. Elias: You are right. Actually, the location for this exists in the data portal menu. If someone has a link with this information, please send to fill this menu. Perhaps the

meteorologists won't have historical data but It would be good if we reached the point to release at least the data of CRL

Ch. Evangelidis: We can simply say for some stations, for example, they have various sensors that we can simply have this information, I'm talking in terms of seismology and strain meter say meter things like that, for example channels HH-star eight are strong motion sensors and so on.

P. Elias: Please all are invited to enter at least information content in the CRL portal.

P. Papadimitriou: And what is the status of the big borehole. We haven't said that.

P. Bernard: I know that F. Cornet had a discussion with A. Tselentis about the future of this big borehole. I have no idea what was discussed at the time, it was maybe seven years ago. And I don't know if CNRS has some duty on that or not? Or if it is, on the shoulders of some Greek institution. I have no idea on that. But from the scientific point of view, I think, it's it's an interesting borehole that could be re instrumented. But it's extremely costly, and it is certainly not our priority, our priority is to maintain the existing surface instruments. However, there might be the possibility of instrumentation at a quite a low cost, but, of course, we need to launch a big project, it would be to pull down an optical fiber all along the borehole, up to perhaps the final depth around 1000 metres in order to detect with DAS systems, the vibration of the borehole and detect microearthquakes locally and investigate, possibly, slowly deformation on the top part of the fault. So they might be a use with not so much investments in terms of money of these borehole, but this is, in my mind, very fuzzy. And anyway, it's completely dependent on the status of the borehole, which I don't know.

P. Papadimitriou: The owner of the land property agrees to do something? Do you know him?

P. Bernard: I think there was a conflict between the CNRS and the owner because of the flooding. I don't know if this conflict has been solved and settled. And, and we have no news about the Owner. So, I don't even know if the owner cares about this borehole anymore.

P. Papadimitriou: So do you think that we must think about the best way to do something?

P. Bernard: I'm a bit puzzled. I'm sure that CNRS has no real information on this borehole even if scenarios might have some duty for it, I know also that GFZ has been doing the work, but I think they are not involved in keeping the borehole alive. So, it is quite difficult subject because the only possibility to have information would be either on the side of the owner, which I don't know, but it can be of course retrieved or on the side of A. Tselentis who had some information from F. Cornet a long time ago. So, these are the two entrances for having more information on the status.

P. Papadimitriou: Next week I will go in the place so, I will ask some information about it. And then I will discuss with A. Tselentis if there is a possibility to propose something. We must first of all know if we have the permission to do something. So, I have also a small question about the CORSA. if we have some problem with one sensor, I don't know if 100 200 meters and do you think that there is a possibility to clean the borehole and to install or to install another?

P. Bernard: Yes, the only the only trick is to cut the cable as deep as possible, because the cable then makes a kind of attack which impedes any new in your installation. So it has to be cut at the very bottom. And then you can add sand and you loose of course maybe five meters or so. But then you have a kind of new stable bottom of the borehole on which you can install the distortion. I don't know if the existing instruments are clamped on the side or laying on the bottom on sand at the bottom of the board. Do you know that?

P. Papadimitriou: No. We will start in the next week. So I will see what is the status and what do we can do.

P. Elias: And the next point is the lack of coordination for GNSS from NKUA and CNRS

P. Briole: I don't know it depends. In the CRL portal, you have access to several GNSS stations belonging to the CNRS, NOA and Charles University. But I know nothing about the possible existence of permanent stations belonging to the University of Athens.

V. Sakkas: We don't have stations right now in the CRL area. We are thinking that we may install one point later this year. But we have to think a bit about. Concerning the strict area of CRL. Personally, I download the data from the CRL portal, and they process them, it would be nice if we could have real time data, I mean, if we can have them just in case something goes wrong, but this is more or less, according to my opinion, it is how you manage the data and what is your policy about it. I can say that NKUA we would like to have real time data, if it's possible. Otherwise, for me, it's ok to use the data from your portal.

P. Briole: At the moment, real time with GNSS as it is, it is difficult, because it would mean problems of different level one is to do with the telemetry, another one is the software process the data and the other one is the fact that the receivers are old and if you put them in real time, it is because you want to detect very smaller events. So, this means you need to acquire first in 5-10 Hz and then the receivers that are in field they won't to do the job and the telemetry won't do the job too. The problem with the telemetry is that it is too slow in many places. Because now with GNSS you have a lot of satellite you have more constellations. So, progressively it's becoming more consuming than seismic station. the problem of high rate, if we have a magnitude 6 - 6.5, if you are lucky with one or two GNSS station locate in right place toy will have some signal but then for magnitude between 5.5 and 6, you need to be very lucky with the point where you put your GPS station and the point to the fault that will move. So the regular seismicity of CRL is not enough for high rate GPS, it is more interesting in the Ionian Islands and in the north Anatolian because the magnitudes are larger. But if there are the right GNSS receivers and the telemetry is good to be done.

If you can do if you have the receivers and the telemetry that allow you to hide, GPS, why not go ahead, but we don't we don't have the telemetry in most of the places they are not fast enough. Because of the modems and receivers they are older and cannot do the job. The first priority of GNSS is to maintain the existing working 100%. Last year, in 2019, we reached 96% of data available 96% it's high number and the year before, 2018 maybe 95%. And the first priority is not to go down to 80%. And to stay at the 96% it's very difficult to so maybe we should first focus on that.

P. Elias: Next is all GNSS solutions be visible in the CRL portal

A. Ganas: Yes, as I said before, we should not duplicate any efforts. So the national GLASS node is in operation in NOA and I can share the link with the chat. Now, in this area, there are three GNSS stations Aigio, NAFP which is in Platanitis and Riolos. In Aigio the station is near the port, on the hanging wall of the fault. The bullet saying that the GLASS node implementation will have been completed by July is done already. First priority is to collect and save the data. So, the 30" data are very important. And the historic data are also important because you can always reprocess. So, you need to maintain a database. So, the CLR database is excellent. And it should be continued like that, until we find the money to merge the two databases into a unified one. So, I recommend the CRL community to continue using the CRL GNSS data through the portal of CRL. And the existing GLASS node will host additional stations in due course, when there is money, or the Greek money or international money to incorporate more data and stations into this node, which contains only 27 stations at the moment, as you can see. The other bullet you have is about the processing software. I think it's great job that people can visit there and see the quality of the data. See a time series fantastic. You should be continually like I think it's the most documented NFO in the whole EPOS. This solution is the best for now. In the future, maybe 2,3,4 years or so, we can have the facilities at NOA to transfer all this so we can do this job and have some automatic machines to do that. This is something that we can discuss. So above the private data then the high rate. If you if you look at the the Americans, last year there was the Ridgecrest earthquake. So important one was 6.4, these stations there, they're working in 1". So, there are now plenty of papers coming out about the source properties about their actual rupture history, etc, using GNSS. So, 1 hertz and higher rate, up to 5 Hz, I think they're very, very useful for seismology and for earth sciences. So, we should always keep in mind this useful this valuable data source. And we should try to operate higher rate networks in CRL. Of course, P. Briole is right when he mentions that the magnitude of earthquakes, but I remind you that the last major earthquake was in 1995. All right, so that's a 25 years ago. And there's always a chance that another 6.5 event occur within CRL. And this probability is not zero is not 5%. A paper abstract says that there's more than 30% probability to have an earthquake above six within the next five years. So, we should try to operate highe rate GNSS in the CRL, and to support this if we don't have, institute money, we can support with project money. There are many projects around the CRL area from researchers at NOA, NKUA, University of Patras, Charles University, perhaps CNRS, perhaps these people can put one station or two stations, it's very useful to have the stations. And the third point is about the commercial networks. HEPOS is a state network. It is very, very difficult to get data, it is really crazy. Why is that happening? Because it's public money spending. And we push them to understand the need, we make very slow progress. But the last meeting we had with these people and was in the conference, we had in Greece, before the coronavirus lockdown in February, they promised that they will change their policy. But still, we have no news from them. So, we still pushing for the all the archive of 98 stations, they operate in Greece, and at least 10 stations, they operate in the greater CRL area, in Achaia, Ilia, Aitoloakarnania and the Ionian Sea. About the other two companies Metrica and TREE company, they're very helpful, they share the data exactly when we need the data. So, there will be no data shortage when it's needed. But I think they're not interested in some sort of agreement or anything like that, because they feel that they commit. And this is a general EPOS problem we have all over Europe, that we cannot convince the private companies to share their data officially. So an official is easily but officially they don't want to become suppliers or because they feel that they will be committed to some sort of a service and they can shut down whatever or they have to

compile the log files, very careful log files and this is a pain for them. And usually, we do that when we have some need. We do that for them anyway. Another thing is that we should encourage them to share more data is that they have upgraded the receivers to multi-GNSS, so now they collect all the 25 BeiDou and Galileo satellites. So, from one station example, in Agios Nikolaos south east of Kalamata, we receive Rinex 3 file. We receive more than 40 different satellites in one day from various constellations. So, the private companies, they are upgrading their equipment faster than us because they have competition. So, they have to sell the RTK service to be on top of the competitor. So, they invest a lot of money and they are really good at GNSS. I think we should be very close to these people and have a good relationship with them and try to involve them in our projects not not as part of the infrastructure not not as part of CRL perhaps we can have some sort of an associate membership for non-academia for industry. Ok, and this is also my comment to the P. Bernand comment about the borehole and P. Papadimitriou. I think the borehole is an asset CRL. If we try to involve also industry as associate membership, that would be great for the future of CRL.

P. Papadimitriou: I have a question for P. Briole. We will have one station to install in the area.We didn't decide yet. But if we are interesting, is there any place that you think that it could be installed the GNSS station?

P. Briole: This is something that it's important to discuss in advance. There is Kalithea where is a seismic station, the area is not coverred by permanentn GNSS. if we think that we need more equipment in this area between Aigio and Psaromita andf Trizonia but if we think that Psathopyrgos fault is dangerous and very active, we should put a station in the south of the fault near Pititsa, but the ground there is not very stable. We have to find the right place. But this is not covered. And there may be others.

P. Elias: The last task of this paragraph is networking project that actually has been decided in Postonja EPOS meeting that will be in COST, and we'll discuss it in the agenda afterwards.

A. Ganas: For the future GNSS installations in the area I see a gap east of Diakopto up to Xilokastro, there is no GNSS station operated.

P. Briole: it is a gap but it is out of CRL and the seismic network of CRL and we have to discuss.

P. Papadimitriou: If there is a big earthquake, it is important?

P. Briole: In my opinion, the Psathopyrgos fault is one of the most important fault we should monitor. It is in the middle inside the CRL area, there is the big city of Patra nearby the we know that it is deforming fast. So, we have to decide what is the highest priority

A. Ganas: The station ROD3 in Rodini. Is this station a benchmark or a permanent station?

P. Briole: It is permanent, it works well, despite the problems of electricity, it is useful.

A. Ganas: In this area the foot-wall of Psathopyrgos is full of neogen sediments, marbles and sandstone. The bedrock appears further south of Pitista. The area around Pititsa and other villages there are full of landslides. So, we have to be very careful.

## Link with EPOS & compliance with EPOS data & products, data & products portals, CRL DOIs, web portal & observatory

P. Elias: We proceed to the overall task linked with EPOS, we have discussed to have a doi for the data of CRL and clearly mentioned in the papers that use the data. Are there any comments about this? A working group that would like to unify this doi? No? So we proceed.

The next topic was governance and funding. Now we will discuss the points of last year and we will continue the discussion in the relative agenda. So the first thing I see is an overall task. We have to prepare a unique proposal for maintenance, within the year, to include the complete list of stations. We have said that it will be best to start a letter from the director of HELPOS. Now we would like to proceed in a way that a letter will be merged from the director of HELPOS directed to the CNRS. This letter should be signed by all 3 partners. We would like to unify our strategy within a letter (the letter will come from HELPOS and will be directed to the CNRS). I think this is a movement for the CNRS to see that the Greek institutes are interested to the CRL network.

P. Briole: I think it is not enough that a laboratory like my lab or IPGP contacts CNRS. It will be 10 times more efficient if the CNRS would be contacted directly by a Greek consortium which would tell to the CNRS ´We want to talk with you about the observatory and the organization´. It would be much more efficient.

P. Elias: So it would be good if the director of HELPOS, Tselentis, would be contacted for this reason. What do you say, those that are in GEIN: Thanasi, Christo and Olga?

A. Ganas: Panagiotis, what is the proposal exactly? Because here we have some description. You say we need to prepare a unique proposal for maintenance.

P. Elias: Yes, actually not just for maintenance, Pierre could say in a more clear way what it is needed, but I think we have to prove our interest in the network somehow and initiate a conversation and exchange between the institutions. Pierre, what do you think?

P. Briole: Yes, but I think the CRL is not the right level. I think that the right level would be a discussion between the National Observatory of Athens and the French CNRS INSU concerning the observation of Geosciences in Greece and the role that French people can have in your country in Earth Geophysics, in Meteorology and Astronomy, because there is a long tradition of collaboration between CNRS and the National Observatory of Athens and then, of course, also the Universities. But if we talk about observing the Earth, it is primarily the task of Observatories to observe. I am convinced that it would be interesting to have an exchange at that level and then CRL will be just one of the components of all.

P. Elias: OK, so it is not HELPOS, NOA should be. In the past some tries have been made to establish this link from NOA to CNRS, but with no success. The director of NOA is going to be director until the end of the year. He will put again candidacy and we do not know the outcome, but the fact is that if it was unsuccessful in the past, now that he is finishing his presidency, I do not think that is the right time to try again. So we have to postpone it and reconsider it.

A. Ganas: The problem is basically the lack of commitment of a Greek institution or a Greek consortium into CRL. I mean the legal commitment, not the unofficial commitment. The problem with the NFO has been partially overcome, because the NFO has a governance.

There are the University of Patras, the University of Athens and NOA. These 3 Greek partners are committed to the NFO.

P. Elias: Yes, not the maintenance.

C. Evangelidis: They are committed in terms of the infrastructure, the supporting and the offering to the NFO.

A. Ganas: Yes, that´s what I am saying. But here I read that there is a unique proposal for maintenance.

P. Briole: Yes, it´s right, because to be sustainable, an observatory needs to share some elements from the field, not only at the level of the databases but elements like telemetry, like the computer which we talk with instruments. At the moment the master computer is at the University of Athens with a time of 1100 days, which is incredible, so it works. So this basic level of the observatory has a cost in terms of equipment, of replacement of old devices and also a human cost and cost for maintenance. My feeling is that those costs are unknown by the partner organizations and the consequence was Panagiotis going in March this year, to the field, to maintain seismic stations and GPS stations, but maybe more seismic stations than GPS stations that time, with his own car and his own money.

C. Evangelidis: Yes because he is not going to maintain NOA stations. If he was going to maintain NOA stations then he could ask from NOA to support him for that.

P. Briole: This is the problem and this is the mistake. When you are on the field and when there is a station with problem, you don´t care if it is NOA, Patras, CNRS, you try to fix the station. And I can tell you because with Panagiotis, when we are in the field, we ignore who is the owner, what we know is that we have to fix this station. So some costs must be shared. The efficiency drops and, especially in the case of the French people, it is stupid to take the airplane to change the battery. It should be done by local people. Maybe by people from Patras, because they are in front of the battery. So we have to talk about this, to evaluate the cost, the human cost and the maintenance cost. Because if we declare that we ignore this station if it is not belonging to us, this means we don´t have an observatory.

A. Ganas: We all understand the need to maintain the arrays. All the arrays should be working perfectly because this is a very important area for seismology and earth science in general. The problem is of course the lack of legal commitment with respect to the governance of the arrays, so the EPOS NFO should in principle be in the best position to draft a maintenance plan and finance the plan based on the partners of the NFO. So, I suggest, before considering HELPOS, which is the other way, because HELPOS, and I make a parenthesis here, in order to service the stations it needs the stations to be transferred to HELPOS or belong to HELPOS. But, the other way is to look through EPOS NFO money, if they can be used somehow to support maintenance. Let’s investigate that and look carefully what will be the sources. If EPOS NFO can invest some money, we have to know how much money per year is available, and if we identify a lack of 3000, maybe 5000 Euros, then, as we did this year, Panagiotis Elias can ask NOA for an exceptional need for support and NOA will step in.

P.Briole: No, what is needed is 10 times that.

A.Ganas: I remember very well the breakdown Pierre, but we don’t know yet how much money will be available from EPOS NFO.

G. Kaviris: 0.

C. Evangelidis: I was 2 days ago in the EPOS consortium general assembly, we shouldn't rely at all for maintenance to the EPOS consortium and NFO. They don't have enough money to support the TCSs. Even if they had money to support the TCSs, they would not support maintenance and infrastructure and so on. This is the national research infrastructure obligation to do that. They will consider some of the efforts you put for the national research infrastructure, they will foresee as in kind contribution, somehow. Instead of putting money into EPOS, or additionally putting the national maintenance to EPOS, you will also put in some man months or services. Somehow, they want to include that logistically within EPOS, that they will also supply it. I wouldn't rely at all on getting money from EPOS NFO for the maintenance. This something that we have to solve ourselves, I am afraid.

A.Ganas: Christos thanks a lot for the information.

G. Kaviris: And this, Christos, was also discussed in the EPOS NFO meeting, where all of us, Pascal, myself, said that our main problem is maintaining our stations and they said that this cannot be supported by the EPOS NFOs.

P. Briole: It's normal, because what we ask to the EPOS NFO is not money, we ask to EPOS NFO a political statement that in Europe, there is the possibility that some observatories are not national, but international, I mean European. We just need this official declaration of EPOS that this observatory is European. If it is European, then each partner country should understand that they have to contribute proportionally to the number of instruments they have or proportionally to the time they need for to come. In the case of CRL we have at least 3 countries: Czech Republic, Greece and France. I think the people who participate in the NFO consortium, should request this political declaration of EPOS. As always we are in a system which is nationalist. Each country will take care of the instruments that are on each territory and bye bye 40 years of effort by Europeans who work in another country.

A.Ganas: George and Christos can you ask Lauro Chiaraluce

G. Kaviris: And Pascal and Thimios.

A. Ganas: And Pascal yes of course. Is possible to ask INGV or other people what is the thought about the international NFOs, if there is gonna be a strategy?

P Bernard: I think there is no strategy yet, this has to be discussed. From the French point of view there are tools which may allow starting building an international cooperation in a kind of legal framework. They are international laboratories which can live 5 years. At least, for the first time, probably, on the Greek side they have the possibility to have international, bilateral cooperation on a specific subject and CRL could be a target. It doesn't bring enough money, not for maintaining, but it brings some money. We must have a legal entity for the CRL, which does not exist. We have a legal entity within the NFOs, for databases, but not for maintaining the observatory. If we want to make this alive, we have to have a legal structure for maintaining this equipment. If we have a structure without money, at least we have the legal existence of this international laboratory, which may allow us to ask for maintaining funds, from the French side, from the Greek side and from HELPOS. This is a little money, may be not satisfactory. We have to find a structure at the needs of NFO CRL, which means attached to maintaining equipment. This might start with an international laboratory as proposed by CNRS. Possibly in the Greek Ministries you may have tools like this one of the

French side, which allows you to combine efforts with the French laboratory, to make a little structure allowing manage money. We need to manage money and ask legally for money. We need a legal existence. I don't know if on the Greek side there are cases where one of this laboratories of NOA, NKUA or Patras have been linked formally and legally to form an institution for 3-5 years allowing to ask legally money.

E. Sokos: First of all, HELPOS is not an entity, there is no legal entity in HELPOS yet. It is a project which will stop soon, maybe by the end of this year. We do not know if there is going to be any legal entity for the Greek regional network after that. There is only a MoU signed by all the partners, there is no legal commitment. Our University, Patras, Athens University and NOA, have signed a consortium agreement for the NFOs, and within this consortium agreement we are taking the responsibility to maintain our stations. These are the facts that I know at this moment. So are we discussing some sort of formal support by the National Observatory, by this consortium of the Greek Universities or sending a letter to CNRS to support the maintenance of the French stations of the CRL, or we are discussing the long view of how this stations can be supported after 5, 6, 10 years?

G. Kaviris: I think both. What we are doing today and what to do 5 years later.

E. Sokos: I don't think that we have the tools right now to discuss the long term. We don't have a legal entity in Greece that will connect all the Universities, all the people that maintain seismic stations. Right now we beg for some money from our Universities. or we have some projects and we maintain our stations. So there is no long term view.

A. Ganas: First option is EPOS-ERIC. Christos informed us that they discussed and they said no. But this no may be yes in the future if we continue pushing for the uniqueness of the international character of the NFO CRL. So maybe we gain something. Option two is HELPOS. HELPOS is a project, as correctly said by Thimios, but there is also the possibility that HELPOS will grow into a Panhellenic Solid Earth maybe, one day. So it's not immediate, but maybe there is a vision. At least the people who have a vision in Greece, they can think of this structure, where data will be shared and some organization responsible for running networks, and people, the students will do science with this data. Option 3 is HORIZON, another international infrastructure call, like the one that EPOS was initiated. So maybe we can apply with Pascal or other people all the CRL community, for money from EU, for infrastructure. Option 4 is ELIDEK, the Hellenic Research Foundation. ELIDEK has calls up to 2 million Euros for infrastructure support. The problem in option 4 is who is going to write the proposal and who is going to be the coordinator. The Greek community has to discuss and agree if we follow that. So, I identify 4 options with respect to short-medium and long term.

G. Kaviris: This time I think there was no call of ELIDEK for 2 millions for instruments.

A. Ganas: They will be in the next call George.

P. Elias: That's good information.

C. Evangelidis: Getting money for maintenance through calls and projects is nice but not sustainable. Even if you get 2 million euros for 3 years, then you don't have money.

P. Elias: So the next one is something that will be discussed in the session of EPOS and the Science council and the advisor report. Student exchange could be also discussed in the following sessions according to the agenda. Just to note that Thanasis, George and myself, we had to propose and circulate list of groups and team leaders.

Another issue that we have raised is what platform we would have all of us, a common platform, in order to store our work on the instruments, to be unified and be the same for seismological and GNSS. I remember that we have checked WebObs, but it may not be the perfect one.

P. Briole: Concerning WebObs, this is a work done by some people of IPGP and others, before ten years. WebObs is now used in several volcano observatories in the world. The information was shared among volcano observatories through the World Organization of Volcano Observatories, which depends on IUGG. I have heard very good feedback from volcano observatories concerning WebObs. Probably WebObs will be maintained in the future. My feeling is that the CRL team is not using WebObs, not because it is not good software, but because we have not taken the time to learn how to use it. But, in reality I think that is excellent tool for observatories.

P. Elias: If anyone would like to have an account should write to who?

P. Briole: Panagiotis, at the moment we don't have the latest version of WebObs. If there is a decision to use WebObs seriously, we need to ask for the latest version to install it properly. At the IPGP there are people who know how to use WebObs, I guess Madani knows very well. After that, we can distribute accounts in the future and, probably, we need to teach the people how to use it. When people go to the field, in the evening, they have to fill the forms and write exactly what they did. But when it is done, you are much more efficient when you go to the field. Because before going to a station, you first have a look at all the actions that were done before you.

P. Elias: So, if there is no objection to try to have the last version and all of us try to incorporate among the field work this platform? So we can proceed with this.

E. Sokos: Greek partners have their own system to record changes at least for the seismic stations. We are talking about the maintenance and changes in the response of the stations. Because I don't think it is so important to record that somebody just visited the station.

P. Briole: It is extremely important to know the name of the people and the date of the visit to each station.

E. Sokos: At least us, if we just go and make a reset or just connect or disconnect, or do something that does not change the response we do not record it.

P. Briole: Because you are talking about your station, the one that belongs to you. But when I go with Panagiotis we ignore who is the owner of the station. We go because we have to go. Maybe it belongs to you, e.g. SERGOULA, I've been myself to your station. We go, we fix if we can and then we write in the WebObs what we did, for the next who will go. So the point is if we want to be efficient all together and to share the cooking of the observatory, or if we don't want, if you want to cook the dessert and maybe NOA the main course and so on. It's a political decision.

C. Evangelidis: Pierre we do the same at NOA. We have our own ticketing system that when we go at the station we record everything. I think it is right to record somewhere and to have the history available to everyone.

P. Briole: Of course it is right, but can Thimios read your files, the information about your stations? They are available to the other teams?

E. Sokos: Some things that are related to the stations that we have in common to the Hellenic Network yes, I can see. When there is some change in the response I know they have changed something.

P. Briole: Yes, but you are seismologist, you are talking about your seismic stations, but then you have the GNSS, the tilt station, the meteo, the tide gauges.

E. Sokos: No, I am talking only about seismic stations.

P. Briole: Yes, but I am talking about an observatory, which is multidisciplinary, in which you have a lot of different instruments. This is why WebObs was invented, because in the volcano observatories it is multidisciplinary, like in CRL. CRL is very similar to volcano observatories. It's not just a toy of seismologists. It is something much wider, ambitious.

E. Sokos: I am not against this Pierre, I am just a bit conscious because then somebody would have to maintain another software. If somebody is willing to do this and we know that this will be maintained and it is something that we can trust, then I can force myself, because I am also going to the field, and force our technicians to record the changes to WebObs.

P. Briole: Yes, you went several times to fix GPS stations around Patras. So when you do that in the future, you will use the CRL WebObs because that GPS station is not in your own system or just your seismic station.

P. Elias: This also have to do with the feedback, about keeping a record of the future visits of each team. If I go to the field and you told me that you need to reset a station that I am passing anyway nearby, I will do it. If I have access to a common system, I would also know the password to do a copy. This is to facilitate and make our lives easier.

## Maintenance actions during last year and raised issues. Sustainability of the CRL including stations

G. Kaviris: Now we go to Emily and Madani, who will present the `Maintenance actions during last year and raised issues`. This part will have this presentation of Emily and Madani, and then a small talk about the monthly bulletin.

E. Klein: The idea was to make an overview of the field action over the last year. Madani will talk after, focusing on the seismological network. It is the work a lot of people, not only me and Madani, but also of Panagiotis and George and many other people. I will start speaking about the weekly report. It's been a few months that I've been doing these short reports about the data, seismological and geodetic observation. The goal is to check once a week the data that are arriving on the server. For the GNSS network it consists of checking directly on CRL0 if the data of the past week are stored. If they are not, we try to communicate to diagnose what is the problem and if we can, to reboot it remotely. For the seismological network, I am checking on the French server Ephesite. If the data are not here, I try to diagnose using the SyNApSE tool and try to figure out the reason. All this information is available already for everybody on the CRL webpage, on the different servers. The idea of this report is to provide a digest of the state of the network to the principal actors of CNRS. The report for the GNSS status is a sheet. It's a permanent link towards the sheet, which is on the cloud, and you can see that there is every week so we can really track the evolution of the station. I usually show when there are issues with some signals, in particular for the

seismological networks, I am showing screenshots to explain what I saw and keep track of what is happening. The idea of this report is to provide a tool for diagnoses, to detect very rapidly, within a week, when data are not coming in or when there are issues at normal signal or issues of power, which could be worsening. It allows limiting data gaps, because within a week we realize that a station can be disconnected with some telemetry issues and, if it's possible, we can very quickly reboot them. For example, station KALE was offline in the beginning of May, and the week after it was rebooted and sending data again. I try to keep track of the past operations and write the future operation needed, maintenance needed, because this tool is also some help to plan the maintenance of the station. I am already sending this report to a list o people that we decided during the past meeting. If you are not in this list and you want to receive this weekly report, please do not hesitate to send me an e-mail. I use this reports to try to make some statistics. For the GPS station the last operation of maintenance occurred in mid March by Panagiotis and Giannis. They worked on 3 stations that are now fully operational. Last week, they were only 2 stations offline and one that has been down some time now because it actually needs some maintenance. I made the statistics for the last 2 years and statistics since January 1st and we have 87% of the data on CRL0, knowing that the data we are missing, in the vast majority, is only due to telemetry issues. This means that the data are on the receivers, they are not lost. We should reach more than 90% of the data. One main comment is that most of the receivers are old receivers and within the next years we will have to replace them little by little.

P. Elias: Last year there was a presentation describing how old the stations are. Everyone can see it.

M. El Aissaoui: The presentation is composed by 2 parts. There is a summary of the important field actions of the 3 last years and a short road map to improve the quality of the stations. Last year we have maintained TRIZONIA, we made a new vault in 2018, because in the old one there was water infiltration that damaged the seismometer. It had a mass centre problem. It was also sent for maintenance in 2018 and brought it back to the new vault in July 2018. We replaced the Reftek digitizer. It was an R130 by Nanometrics Centaur.

In DIMITRIPOULO station we removed posthole seismometer, it was a short period 2 Hz and we replaced it by a Lennartz LE-3D, a short period enlarged, 50Hz - 5 seconds. The reason is the water infiltration and the posthole had a problem of waterproof.

At AGIOS IOANNIS, in 2018 we brought back the digitizer because there was too much humidity in the station and the vault and the digitizer had a problem of water infiltration.

In PANORMOS, in 2019, we replaced the Reftek digitizer with a new one revised by Reftek and it was returned for maintenance. In 2020 we replaced the charger Mascott by a TecSup. This type of charger is used in medical equipment and it has better performance than the Mascott. We also put an isolation transformer on the incoming power of the station, because there was a big noise in the sector. We also put an ethernet switch to allow remote control to reboot the digitizer. We put this switch because on the whole network, since 2 years, we noticed many problems with the old generation of Reftek. Sometimes the digitizer is not reachable and the only way to communicate again is to reboot the digitizer. I contacted Reftek for this problem and they don't give a reason. So, I think in the future we have to replace all the Reftek on the CRL network.

At ALIKI station we have a problem of many failures of station, essentially due to electricity problem. In the last mission, in 2020, we changed the cellular modem.

At RIZA we put a level-water instrument, based on PDC1830 sensor and a DAVIS rain gauge. In 2016-2017 we also put and upsized solar panel, because we had a lot of energy problems. As we add more equipment every year, we upsize the power and now we have close to 800 Watt on the solar panel. In 2016, a few km from the Riza station, at the port of Makinia, we installed a tide gauge.

At MONASTIRAKI, where there is a sun meteor instrumentation, in 2019 we installed, close to the station, a level water measurement based on a pressure sensor CS451. In 2017, a few km from the station, at the port of Monastiraki, we installed a tide gauge.

We have some new equipment that will be available to upgrade the stations within the next years. We have three Nanometrics Centaur digitizers with 6 channels. One is in the stock at Paris and it was bought by GEOAZUR, while 2 are ordered by the ENS and we will receive them soon. We have 2 Lennartz LE-3D/50Hz-5s seismometers at IPGP, to replace some old seismometers on the field. We have also received 2 cellular modems NB800, ordered by GEOAZUR to replace or for the new stations on the field for the next year.

I will make a little presentation about the road map to improve the network for the next years. We have big problems on RIZA. I hope to replace the box with electronic boards of the strainmeter instrumentation in September-October.

For RODINI, we have to upgrade the digitizer, to replace the Reftek for a Centaur and we have also to check if the seismometer Guralp CMG40 will be sent to maintenance, or maybe we will discuss with Pierre and Pascal and Helene to see if we can put a Lennartz this time.

For PANORMOS we have to upgrade the digitizer, to remove the Reftek and replace it with a Centaur. As the station is in a room of a town hall, it is disturbed sometimes and sometimes, the power is disconnected, so the station is out of batteries. We think to put the station outside and the seismometer in a vault in the ground during this year or the beginning of the next year.

For the station PSAROMITA, we have to change the Reftek and put a Centaur.

For TEMENI we also have to change the Reftek with a Centaur.

For PYRGOS, we want to replace the Reftek with a Centaur. In this area we have noticed very bad cellular network, so maybe we will have to put a high gain cellular modem with a good antenna, because it is very difficult to have a good signal to have continuous data.

In ALIKI we have to rethink the station, because there are a lot of problems of humidity in the vault of the station. There are also problems in the electricity sector. I think that the best solution is to put a box on the enclosure of the road side and put all the instrumentation in this box. There is also a problem of herbs and vegetation. As in PANORMOS, we have very bad quality in the electricity sector, so I think we should also put an isolation transformer. Maybe, as we have a lot of problems with electricity, we think to put a solar panel to prevent power failure due to electricity problems.

For the station MALA we have to connect the station to the electricity sector.

At AGIOS IOANNIS we have a big problem of security. I went many times there and it is very dangerous to work in the station. When we go to the station we have the dogs of the owner behind us. It is very difficult to watch the dog and to work on the vault, when we make some maintenance to for station. In my mind it can be very dangerous if there is a dog attack. I think we have to change the position of the door and to put the door in the side of the road.

P. Papadimitriou: Madani, the owner is not there? You are alone when you visit the station?

M. El Aissaoui: I have already seen many times the owner. They come sometimes with his family and children and they play in the garden. I already discussed it with him. He is not always there. Sometimes he came at the end of the week to get a look around and sometimes he doesn't stay for a lot of time.

P. Papadimitriou: I didn't understand why in PYRGOS there is no a good signal.

M. El Aissaoui: We don't know. We made a lot of investigations and many times I went with Alexander, with Pascal, we have changed the modem, we have changed the antenna, we put a bigger antenna. For any reason the bandwidth can change and the signal decreases. I think the quality of the signal in the area is very bad. We have to change the model of the modem and to put a modem with high gain antenna to see if we can catch a better signal.

For TRIZONIA we have also to rethink the whole station. We have many problems of rodent attack on the cable and this is the major problem on the site. We made missions with Pascal and people of IPGP, it was the 4$^{th}$ or the 5$^{th}$ problem on the cable. Each time the cable is cut and we have to repair it on the field or we have to change it. The idea is to put the box close to the vault and to make a very short cable for the instrumentation and the seismometer.

For ZIRI, we have to move the station to the Museum, to protect it from the rain and the climate. We think the station will be better at the Museum for the quality of signal. This station has a solar panel very high on the wall and it is very dangerous to maintain those solar panels.

There was the first mission in March 2019, with Pascal and I, where we made the tour of all the stations of the network. The second was made in July and I was with A. Nercessian and we also visited all the stations during the missions. In June 2019, there was P. Briole with D. Dimitrov, P. Elias and E. Klein, who made survey measurements and maintenance visits. The survey measurements was for GPS stations. The stations were: NAFP, PANR, MG0 and PSAR.

The next mission was in September 2019. There was P. Briole, S. Bufferal, P. Elias, G. Kaviris, E. Klein and L. Petit. They also did survey measurements of GPS stations and the maintenance of: ANOC, TRIZ, PSAT, ALIK, PSAR and KALE.

The next mission was recently by A. Nercessian and me for maintenance of seismological and strainmeter stations. The stations were: TEME, ALIK, TRIZ, PYRG, PANR, PSAM, MOKI, RIZA.

There were also some missions of some Greek colleagues in January 2020 and March 2020. They were P. Papadimitriou and I. Kassaras and made the maintenance of LAKA.

Sorry, Panayotis for the cable. When you asked me for the cable there was confinement at France and I didn't go to the laboratory. So I hope you managed.

P. Papadimitriou: I have the station, but I have not the cable. So we are waiting for it.

M. El Aissaoui: I came back to IPGP 3 weeks ago, so I will try to send you a cable.

P. Papadimitriou: Ok, thank you.

M. El Aissaoui: There was also the preparation for the installation for CORSSA.

P. Papadimitriou: We tried to clean the area to record the situation. Next week we will go again to continue to maintain the place, to install an ADSL line and to see how to put out the station there and to re-install the new stations obtained by HELPOS. So, I don't know the situation of the boreholes. I don't know if all the boreholes are working. That's why I asked to Pascal, perhaps, if we need to see, to rebuild or to do something in any case we will have this kind of problems. Our effort is, in the next month, to try to re-organize and re-operate this important site. We have serious problems in the building of LAKA station and we try to find somebody to repair these important things and we hope to do something in the next month also in LAKA. Within this summer, our task is to repair these stations and to make real-time transmission. Anne said to me that LAKA is very important, the problem is the building now.

I. Kassaras: Every time it rains it floods.

P. Papadimitriou: We have to repair and replace the problems that we have here, that's why we are not ready to do it in the next days. But we hope, the next month, that we will be ok.

M. El Aissaoui: So we keep in contact for the cable. In March 2020 there was P. Elias and I. Karamitros for maintenance of VALI, EYPA, LIDO and TEME stations. For the CRL website, there is no information, at this time, about strainmeters, tide gauge and meteo stations. We already discussed it with Pierre, Emily, Pascal, our French colleagues and I hope this year, we will start to make a page for the EPOS CRL website, to make some links for photos and the description of the stations. We asked to have some right for editing webpage in the server, because the server is at the ENS, Paris, and this work is in progress now.

E. Klein: We saw that there is a lot of field work by many people. It could be interesting and important to better track of what is happening through reports that we could all upload on the CRL wabepage, for example, or WebObs on which we should keep track and report everything we are doing in the field. This way it can be much easier to follow how stations are doing and what is necessary to plan for future maintenance operations.

M. El Aissaoui: Thank you Emily. So if you have any questions.

G. Kaviris: Yes, please go ahead if you have any comments for Emily or for Madani.

E. Sokos: A small comment to Madani. Why you did not connect the power yet in MALA?

M. El Aissaoui: Because we didn't have time. The last mission was very short. We had a lot of surprises. During the last mission we put our effort in TRIZONIA and PANORMOS. Why we don't connect the electricity? Because the station works at MALA and to use half day to go there and check the connection is not necessary. We preferred to make this work later, when we have time.

E. Sokos: Ok, I undertsand. So, it is not a critical point, I mean the station is working.

M. El Aissaoui: Of course.

E. Sokos: I thought that the station is already in power. Anyway, this is a good example that the information is not transmitted to everybody correctly. For example, I have travelled to the area many times, I could connect it to power. So we have to do something better there.

M. El Aissaoui: So, if you pass close to the stations, we can synchronize to make something.

## Monthly informational bulletin

G. Kaviris: The next issue is an idea of issuing a monthly bulletin for CRL. Emily, would you want to describe as you are already doing the bulletin for the stations?

E. Klein: I am not sure, would it be like a digest of the whole month, not the weekly, like more statistics, that's the idea?

G. Kaviris: Yes, for the whole month and not including only the stations, but also other information that happens during the month, if we decide to make it monthly, or maybe we may decide to do it every 3 months. We can also include seismicity of this period or focal mechanisms, or any publications to journals regarding the CRL region.

E. Klein: The weekly reports that I've been doing are very operational, it's a very practical way to keep track of what is happening, but we can of course think about a monthly or 3 months bulletin. But then it will involve more scientific information, if you want to show the seismicity or that kind of information, which is interesting. I am not sure I would be able to gather the most interesting information, for the whole CRL of project. I think it should need more efforts, including more people, like a newsletter, the publications of the last 3 months about CRL. Maybe, instead of a mail, it could be something on the CRL webpage, like the front page with the news of the observatory, or something like that, with a free contribution of all the participants of the project.

P. Papadimitriou: I think that Sokos, in the frame of HELPOS, prepared a very well presented newsletter. Thimios you can help to create something more than a catalogue, no?

E. Sokos: We are talking about a newsletter for CRL or not?

P. Papadimitriou: Yes.

E. Sokos: I think it's a common effort.

E. Klein: Yes, it has to be a common effort. It can't just be one person.

P. Elias: Yes, we have to decide what could be the context, how often would be issued and then we try to see how we can contribute. It could be linked to what we have done, what we have published and things that we have to mention for the area.

P. Papadimitriou: I think that it will be open to everybody.

P. Elias: Yes, to be for more people, in plain language.

G. Kaviris: Yes, to let more people know what's happening in CRL. First of all if you agree to issue it and how often do you think it should issued?

P. Elias: Perhaps one month is very short. Then we go to 3 months? In order to have a content.

G. Kaviris: That's what we discussed with Panagiotis Papadimitriou yesterday, that maybe it would be better to be every 3 months.

P. Elias: At least we may start with it, and then we see.

P. Papadimitrio: I think that this is important for the CRL. There is something important happening there and everybody must know what happens, what is ongoing.

E. Klein: I guess that the first issue would be easy to build with summing up the scientific presentations of this morning. If each speaker could make a very short publication and make one newsletter with that, information about the coordination as well, if you think is necessary. Then I guess a good chance to diffuse it, would be through all our laboratories webpages. All institute laboratories have one, so that could be something that we could publish in addition to the CRL webpage.

G. Kaviris: I think that we have already talked about the sustainability of the CRL, including stations.

## Governance and funding of the Observatory, scientific council, administrative issues.

P. Elias: Thanasis mentioned four pillars that we have to follow for the funding. We heard two opinions. One to have an international observatory alone and the other issue is that the stations must be maintained by the institute to which they belong. These are two different strategies.

M. Geraga: It was a very productive meeting as a result of all the efforts that were made all these years. I will support the suggestion of Dr. Ganas. During this mature phase of CRL we have to focus on a big funding as Horizon. It's not only the scientific part of CRL, it's also the education, IODP and all these can support a big proposal. With this a lot of issues will be solved. I realize small issues as communication and the equipment to be in a good condition. There are financial problems as the transportation of the participants and of the students. These will be solved by funding, as the financial issues will increase due to COVID and I believe we have to solve them time by time. Three or five years of secure funding are better than looking for a permanent source of unsecure funding.

P. Elias: Another issue is the previous effort of MOSAIC submitted twice by Pierre Briole. It is strictly for PhDs, not for maintenance, but scientific and exploitation of the data.

P. Briole: I will not write a third MOSAIC proposal but if there is someone younger who wants to do it, I will help as much as I can. I think we can win such a proposal because Greece has won very few ITN proposals until now. To be winners we have to solve some problems of the first two proposals. One problem was the lack of enough leaders on the Greek side and young people being in the Universities, as we are talking for PhDs. Another problem is that we do not have strong experience of Cotutelle which is very demanding. I would recommend trying a third time, not me being the leader, after fixing several problems. The leader has to be a University and is good to be in Greece. It is ITN and the impact is major if we have Professors of Universities, people that can be Directors of PhDs. There is also another level regarding education, before the PhD. There is Master 1 and Master 2, two years. If we want PhD students we must focus to students doing Master. We

need to organize the internship reciprocally between France and Greece and also with Czech Republic and other countries that participate in CRL. Internships are shorter and Professors must take care of students. In France we would like to welcome Greek students for an internship of 4-5 months in our labs. This will help for PhDs later on. And the CRL School is a good tool to boost this communication but is not enough. Internships must be well organized for the interest of the students.

P. Elias: Regarding the Scientific Council, do you think that we should include people outside our NFO and that in this way we can gain more experience or that we do not need to have a scientific council at this stage?

P. Briole: I believe it is very important to have an independent scientific council with people outside from CRL. This is high priority.

P. Elias: Please send e-mails within one-two weeks, proposing people for the Scientific Council? We have to consider how many there will be. We can move on to the EPOS session.

C. Evangelidis: Regarding Postojna, all information is in the minutes of the meeting that were distributed.

P. Elias: It has been decided to apply for a COST proposal and the deadline has been postponed for autumn. Regarding the last NFO CB meeting there were also minutes that were distributed.

G. Kaviris: First, congratulations to Thimios because he is appointed member of the Executive Committee of NFOs, proposed by all CRL representatives. We have some NFOs that have signed: CRL, Taboo, Irpinia and the Romanians. As observers waiting to sign the Consortium Agreement within the next days we have Valais from Switzerland and Marmara from Turkey. We don't know about Iceland. Some more NFOs would like to join us, such as Trieste and Czech Republic. One thing is COST, whose deadline is at the end of October. The first thing we have to discuss is about the services that we already provide. It is decided after two years of discussion to provide a Vp/Vs service. We have to provide it as CRL and we should decide who will provide it. A second issue is that if we wish to provide services by the end of this year or the beginning of next year, then we have to decide as an NFO which services we want to provide and the percentage of their sustainability which we can support. It was very clear that we shouldn't anticipate economic help at this point. The third issue is that to propose one or two or three names for the NFOs Advisory Committee, composed by at least 6 people which may or not belong to NFOs. This will go to the next NFO CB meeting in July. We are not sure if the names that we will propose as CRL will be accepted but we hope.

P. Elias: These persons should be asked.

G. Kaviris: Of course, except if they are here. That's why we have two propose more than one name, as they will be asked and we don't know if they will accept.

P. Papadimitriou: I propose Anne Deschamps, Helene Lyon-Caen, Pascal Bernard and Pierre Briole as they work several years for CRL and have a lot of experience.

P. Briole: I am not a volunteer. I think there is a need for younger people.

A. Deschamps: I cannot be any more involved in such Committees. New people must be in charge. I am scientifically interested but I cannot manage any more.

H. Lyon-Caen: I am in the same line with Anne; it has to be younger people. We have to go to another generation.

G. Kaviris: Pascal is not here, but he will be notified.

P. Papadimitriou: There is also George Tsoflias

G. Kaviris: I think this is a good solution because he knows the Greek territory, he is a Professor in the U.S., in Kansas University, and he has experience. He also brings students from Kansas University to Greece for both Geology and cultural trip. Until now we have Pascal Bernard who is not here and George Tsoflias. Any other names?

P. Briole: What is the role of members of the Advisory Committee?

G. Kaviris: According to the text of the Consortium Agreement, they will propose to which direction NFOs should proceed, if they are working well.

E. Sokos: The role is to provide advice on the development of the NFOs

P. Briole: So, we need people with strong experience, working on observatories context. A good proposal is Antonio Avallone from Italy who installed 15 years ago 40 permanent seismic and GPS stations in South Italy. He has wide experience of what is an observatory. He also knows the place. You can find other people also from Iceland who monitor faults and volcanoes or Portugal. We need a good scientist who also has a deep experience of what is an observatory in real life. Antonio Avallone is not very young but is from another generation and ηas the profile.

E. Sokos: I agree with Pierre. We just need to know if Antonio is willing to participate to the Advisory Committee.

G. Kaviris: So, we already have three names: Pascal Bernard, Antonio Avallone and George Tsoflias. If there are other proposals please send an e-mail and then we have to ask if they are interested. Regarding the Vp/Vs service, çe looked into what they say they are doing in Italy, as they wrote it is not operational now. They provided a pdf file describing the software which seems automatic. It has to be decided who from CRL will provide Vp/Vs to the FRIDGE.

P. Papadimitriou: In order to do it we have to know which is the method that we will apply. I don't know if we can trust an automatic procedure.

G. Kaviris: They said that it is automatic.

E. Sokos: This is a service that eventually all the NFOs would like to have. It would be nice to have it as a common service. Lauro said that they will provide the software that we suppose that will be easy to install and operate. It will be an automatic procedure.

P. Papadimitriou: Which is the applied method?

A. Deschamps: You have to read the paper of the Italian researchers who provide it. It is better to be installed either in NOA or in NKUA who operate manual picking and web service to retrieve the picking.

G. Kaviris: It is written that within two months we have to provide one Vp/Vs service as CRL. Who will do it?

E. Sokos: I cannot provide

C. Evangelidis: You need to have a FDSN event service. The most complete for CRL is the one provided by CNRS. So, the Vp/Vs service should be based on that FDSN event service.

P. Papadimitriou: So, we have to investigate more before we decide.

G. Kaviris: When we have the full information from Lauro, we will talk about this again. The other issue of the agenda is the services and their percentage of sustainability that will be provided to EPOS-ERIC in 2021.

C. Evangelidis: We discussed about the sustainability of the stations. It is simple, how sustainable are for each one of us the data and services that we provide. For example NOA is providing two stations. Are they sustainable? Are the stations working, δo they provide data? We should have ways to estimate this.

E. Sokos: I think we have to provide numbers.

C. Evangelidis: Yes, we have the tools for the seismic stations even through EIDA. We have to say for example, we have one station providing data with a percentage of 99% for 2019.

G. Kaviris: It is also the services, the catalogues, focal mechanisms etc

C. Evangelidis: Yes, if stations are level 0, then we can go to level 1 regarding the services produced by the data. We don't have a unique procedure vow, even for level 0.

## Education, public outreach and CRL School

P. Elias: We will continue to the next session is education, public outreach. First of all, we're wanting to make the CRL school 2020 remotely, actually as we have said in the email. it is something that it's not easy, to consider, because there is the chance to lose the international component apart from losing the field component. But we would like to have the continuation and, and not to lose touch for two. Well have received many positive messages and 10-12 considering that teleconference is a necessity, it is not best but according to the conditions it is good to be done this way. And so, this one will go to the field, we've got our Metro. On March with G. Karamitros we have visited the municipality of Nafpaktos and have asked for their support for the school (not for 2020 but after that). And I tried to have some facilitation from the municipality, like a small bus to facilitate our movement to the field and from university to the hotel, and some help for the outreach. Also I said that we can have dedicated talks to the people, in Greek, so it is a public outreach. I would like to say that with G. kaviris and with the help of Danaskos and K. Makri, we have submitted a proposal to the Ministry of Education, for the recognition of the school. It was something that we were considering since two years and now waiting for the answer, but the application was for this year. But if it is recognized for this year, even if it is not going to be done, next year will be there to be recognized. So, this will facilitate the traveling of the Greek teachers to follow to and to attend the school.

And lastly, I will like to say that I have, I have been put in a contact through some people from the municipality with someone who is going to have to film a documentary for the Gulf of Corinth. Generally, he was planning to film such a documentary, but without any special objective of the film. And I will contact him to see what we can arrange in order to film

some aspects of the CRL and its school, and occasionally in the future to have a documentary, a video that we can share and perhaps broadcast to some media in Greece in order to gain more visibility in the public. And also be more visible in the municipality in the region of West Greece. So if you would like to say something about this year in school, 20 and 21, or public outreach or educational component, even for a student exchanges, or more partner universities, please do so.

P. Briole: The European Geoscience Union supports the CRL school. And I understand that the committee for education of the EGU considers that this is a good initiative. The way they support mostly is to support got the travel and stay of five, six teachers from other European countries press some marginal support for the master students . This is important because it is a financial support. Not big, but we don't need  big money. I think CRL school will have a long life, as long as it costs very few. Because when the cost is low, you have more chance to have a longer life. So the model is I think it's not bad. And I think it's good to have this recognition of this year's School by EGU. So, it is an aspect important this year. They were ready to support. But it's not the right year. But I have seen that it is clear that they will support next year also.

P. Elias: Yes I have receiver a message for C. Laj about this.

G. Kaviris: And another thing is that we mentioned this also to the EPOS NFO meetings about the CRL School and how successful it is. And they accepted to include it for sure, let's say to the Cost Action and it's already written in the minutes

P. Elias: if we have the support of EGU and perhaps from the project like a networking one, and trying to use facilitations that will be given from the local community or the prefecture to proceed. So, we have to consider how many days would be this year, because I've seen positive messages so far. So perhaps the way it is more to the realization of this year through teleconference, and then we can go straight to working for 2021, and have more power to do this. Also, a few issues that have been discussed from the last year meeting. One is that we have told to have a special session in European Seismological Committee congress, which is something that it has been done, proposed the session and accepted but the conference has been postponed for almost the same period next year. So on 2021 will have also the special session on CRL and generally, it will be open to other NFOs. Last year, we have also proposed to arrange a field trip to visit some places in CRL, perhaps you have to consider again, since we have a lot of time to prepare, and think, if you'd like to have after the end of the congress to have this visit to the CRL. And also from last year to transfer that we have told to make a working group to work on the connection between universities and make an inventory of what exists now and disseminate the list all of us. If we still would like to do this, I think it will be good. Can you do it, G, Kaviris?

G. Kaviris: Yes

P.Elias: To work on a connection between universities and make an inventory of what exists now and disseminate the list.

R. Davoli :  I was a participant of last year, I want to say my opinion on the matter. Because I think first of all, it was an amazing experience for me. We don't have that many opportunities for students to get so extensive course, and something so applied. So it was really helpful for our experience. And it opens many opportunities to start entering in the academic work, and in meeting people meeting our students without our mentalities. So the

only thing that I had to object, I told and in the meeting last year, it was the visibility of the CRL School. For me, I was from one of the partners universities. So it was extremely difficult to find that the school is happening. So I would like to say that this year, for example, that it will be a teleconference and he has practically almost zero cost, it will be very good opportunity to make publicity of the school in other universities to and to attract more persons. Because we can have a bigger number of students involved in the school for this year. And it could gain a lot of publicity from this, like a webinar extended to different universities all over Europe.

P. Elias: This year we are trying hard to find out ways to disseminate this information in time and every year we get the more ideas but we don't know something central that could help us. So, I think that everyone that has an idea or knows such an opportunity for dissemination of certain events in the whide area  of universities and students, please do so. It is really needed to get the visibility and to have higher impact and be more popular.

R. Davoli:  For example, in the University of Granada, there are two masters of Geology, one is geophysics and the other is a applied geology. And I think that with an email to the coordinators, it would they will disseminate in the students, especially the webinar, and I think many people would have the interest to participate.

P. Elias: if you or anyone else have a special people that should be contacted, and facilitate our job to coordinate these actions, please send this mail in order to be to disseminate.

P. Elias: Concluding, I think that one main plan will be to find and participate to a relative project that may come, we have to look for calls that are suitable for this kind of observatory. So please, if anyone see an actual call like that, or even pre call please disseminate this it to have all the opportunity and the time to react. So I hopefully one planning action will be a proposal. For the CRL School, we'll have a decision after your reply.

Is anyone planning any filed visit this year?

P. Briole: I am not planning a visit this year.

M. El-Assaoui: If we manage to repare the board of the instruments of the strain-meter this year we thibk to  plan a mission at the end of Seprteber or beginning of Octover

P. Elias: Most probably the next CRL School will be at 18,19, 20 of September

It is very important if we can be synchronized, exchange more information for the next mission, and being more efficient.

G. kaviris: I have received messages from E. Kouskouna that she would like to attend next meeting and she wanted to talk about the earthquake suitcase that they have prepared and it is relevant to CRL School and to brought connections with USA students.

P. Elias: We have all of us to give a good try to put material in the CRL portal

H. Lyon-Caen: I think you with such a large number of people, it's difficult to discuss some specific points on and we've seen some points in seismology that came out, in particular, and I wondering if we should have some smaller, some smaller special discussion for seismological issues and things like that.

P. Elias: Perhaps it is a time to do so. Perhaps one could be done in October, for example. Or even to have some, even to have some targeted discussions.

H. Lyon-Caen: Just, for instance, the seismic catalog and there are different CRL catalogs, maybe there are two or three, four different catalogs. I think we need to work to discuss and at the end we have one, there is no reason there should be NOA of French catalog and another one.

P. Elias: I we got there such issues, topics, and if many of them gathered to consider the realization of it in intermediate meetings smaller, perhaps half day, of course, or a few hours. It's better to communicate more often but not so long.

T. Sokos: Just to comment on what H. Lyon-Caen said is very important. We meet only once per year, more or less, and during the rest of the year, well just meet with each other not all together. So maybe should meet in smaller groups more often. And also, if we want to optimize the maintenance, we need to have more often technical meetings. That's my opinion. I agree with what H. Lyon-Caen said I'm ready. If she wants to organize such a meeting, I'm ready to participate.

P. Briole: I want to add two short things. One is the CRL observatory, there are two aspects that were not very much discussed today, but they are important. One is the observation with the satellites, this was mentioned in the morning, but of course, we don't operate the satellite ourselves but there is a lot to be done with satellite data and the amount of satellite data will increase in the future. So, we have to be aware of that and include this aspect in Observatory in very visible manner in the web portal, the space is so important. In the CRL School, for example, I think we try with the help of the space agency, Terradue is trying to teach that but it has to be very much visible also in the portal and in the actions. Second is the offshore part of the observatory. This was not so much discussed today. We have a very few instruments in the sea, but the sea is present in the CRL we have in particular in Patras, we have a team which is very strong in marine research with M. Gerraga, G. Papatheodorou and others. I think we should think more about which sensors we would like to install in the sea, or which structural data we still need from the sea. So, those two aspects maybe should be developed.

A. Nercessian: There could be also some observation with optical fibers because last time I was in the field I saw that there were grooves in the roads and there are optical fibers all around the Gulf of Corinth and it's an opportunity since now we have DAS instruments to make beautiful observation.

P. Elias: You mean for the network of the telecommunication?

A. Nercessian: No. Optical fibers can be used as sensors themselves.

P. Elias: Yes, even if they're being used for other reasons?

A. Nercessian: We should investigate if there are black fibers among them, which could be used for sensing at least for a while.

P. Elias: So you mean that we have to make a contact to the telephone service. And use a black one, I mean, some pairs of fibers that are not being used right now?

A. Nercessian: Yes. Usually there are some spare fibers, yes, in the cable. And possibly, we could use them for observations, at least for a while not permanent.

P. Elias: Perhaps it would be interesting to begin from Psathopyrgos where the deformation is around the fiber network

A. Nercessian: The range of this instrument is about 30 to 40 kilometres. And since we're 40 kilometres, it's hard for the Gulf and there are fibers on the north side and on the south side. And now, in the academical world, we have at least the possibility to gather two instruments two interrogator which can sense the fibers

P. Elias: Does this could sense reflectanceses or just the straight line.

A. Nercessian: Each part of the sense acts like sensors. There is the phenomenon of reflectanceses, but the principle of sensing optical fiber is just interferometry between two parts of cable. And it's a possibility to measure nanometric displacement of the fiber. And there are a lot of work around that. But I think the, the Corinth Gulf is the ideal place to make observation with the system.

END OF CRL COORDINATION MEETING 2020