

# CRL meeting 2021

The CRL coordination meeting, 19th of November 2021, virtual.

## Attendees

M. Foumelis, P. Briole A. Ganas, E. Papadimitriou, H. Lyon-Caen, C. Evangelidis, A. Deschamps. M. El-Assaoui. G. Kaviris, P. Elias, A. Avallone, E. Sokos, N. Evelpidou, J. Zahradnik, V. Plicka, S. Lambotte, P. Briole, H. Kranis, F. Gallovic, F. Vallianatos, P. Bernard, S. Bufferal, V. Kapetanidis, V. Karakostas, O. Ktenidou, Z. Roumelioti, V. Sakkas, A. Serpetsidaki, I. Spingos, N. Voulgaris, R. Davoli, I. Karamitros, V. Tsironi, A. Zymvragakis, K. Karampitiani, V. Kouskouna, A. Mouratidis and E. Vassilakis

## Detailed Minutes

[G. Kaviris]: There was the recent crisis in the western Gulf of Corinth which started in December 2020. This was the initiation maybe for the first time of the CRL group to work together in scientific issues. And we managed to make one common presentation in ESC. And then we managed to have a paper in the Seismic Record. And this, I think, was important as we showed that the people who are working for years in CRL could work together scientifically and exchange ideas. We had several meetings about this paper, which was the first and it is open access. And now we are going to have another paper led by A. Serpetsidaki and V. Kapetanidis with more details, because the first was a short paper, and there will be also specific papers as the one that J. Zahradnik is ahead about the February event. And of course, we also had the session in ESC for CRL and other NFOs. E. Sokos made a talk about CRL from its beginning, its history and its evolution, and the session was quite successful. We also have a special issue in Acta Geophysica with professor E. Papadimitriou being the editor of the journal and the Guest Editors are G. Kaviris, P. Elias, A. Ganas and H. Lyon-Caen. We already have a significant number of papers that intend to be submitted also from other NFOs. The deadline is 31 of December (moved to 28 February 2022) so we think that we can

also have more papers there and show to the community that CRL is working. It's a scientific treasure and we must keep it.

[P. Elias]: We'll proceed to the points-tasks of the last year meetings. So, the first point is the unification of the telemetry systems. Actually, we have two networks in Vodafone, with contract and paid cards, with the latter being paid every month and we haven't reached to the point to unify this network. Please comment. The Vodafone 3G will stop at the end of next year.

[G. Kaviris]: We have to foresee to change modems about this.

[P. Elias]: We have to check if we can add a few more sims in the system.

[M. El-Assaoui]: The problem we have with the payment of the cost of telemetry is we can't have a bill or invoice official invoice from the University of Athens or from NOA. So, if we could have this type of invoice to have more normal frame for the payment, it will be very nice for the next years.

[G. Kaviris]: The University of Athens does not permit to have an invoice different. It is certain, we cannot have it.

[M. El-Assaoui]: For example, we pass for through N. Germenis at Patras and I think at this moment is ok but I don't know in the future it can work because I can pay with money whenever it is needed. So I think we have to discuss how to proceed for making this payment more official.

[P. Elias]: And one thing is that if this payment is passing through an entity, like NOA or University, they may have an overhead upon it because this is the way if somebody's passing through the entity there is an overhead upon the cost.

[M. El-Assaoui]: The second point is that for Vodafone network you told there is a switch from 3g to 4g in a very short time, but I think if this network will be down the next year for example in November or in October. We could replace I think 70% of modems. I don't think we have the capacity to buy and replace all the modem in one year. I have discussed this point with Pascal and we have to write a letter for CNRS to have a special invitation but I don't think we will have this extra money. So we don't have visibility for the next year.

[G. Kaviris]: It is at the end of 2022 for Vodafone and there is the possibility that you can work with GPRS.

[P. Elias]: Confirm.

Next point, the official fault database, full database for CRL anyone wants like to comment? The next point could be discussed later, perhaps global vision, United Observatory in terms of funding, and the cost of the observatory. These are comments from previous years, some of them are obsolete, but I have to put it there to see how we have advanced

[G. Kaviris]: P. Briole written that the telemetry costs are paid by the institution and by the University of Athens, but we cannot split because we have special prices, we cannot split the invoice into two parts. I mean, the invoice of the University of Athens and French stations and Vodafone they cannot split it in two.

[P. Elias]: At least we have to communicate with Vodafone

[G. Kaviris]: We have done it many times

[A. Ganas]: For the faults there are two new databases, the first is the one created for the HELPOS project, which is the Greek sort of EPOS. This was delivered this summer. If HELPOS has a site the faults should be there. And then there is a new initiative by the EPPO that builds a new database of active faults. The

credibility of the data is almost certain because these are old databases, recompiled. The problem is that we don't have new data sets that will deliver new information either offshore or onshore. For onshore, the most part is okay. I think there's no disagreement for most of the faults either on the south side or the north side of the Gulf. The problem is the offshore faults which we don't have new data or if there is any new data they should be published. Otherwise, they cannot be, let's say incorporated into any database without any review. So, we have to wait for new data to come up. Or if there is any new data, just let us know that there is info about new fault traces, new recommendation, etc. The last thing about the faults, is that all the swarm activity in the Gulf illuminates some shallow structures. These are faults or fracture zones that have not been documented on a map. When we see some images of seismicity and cross-sections, there is additional information. So, someone should have to sit down and compile all this information, especially of the last 10 years or so. The last seismic data are from the late 2000, or early 2010, something like that. And, I'm not sure if CRL should have an official fault database, because faults do not stop at CRL boundaries, they continue outside the boundaries, first of all, and second, the fault database of CRL somehow should reflect the current state of the geological knowledge for the rest of the Gulf according and the rest of central Greece. So, it should be synchronized.

[N. Voulgaris]: We really hope that we in the University of Athens will be able to push forward with the efforts as I think that George would present, we have in mind densifying the network in the broader area of the Corinth Rift and in terms of seismological data. And I hope that the CRL will continue both with the EPOS framework but also individually, since we really need to find funds to continue our efforts on update our equipment. Thank you all for attending. I wish you all a very productive meeting. We'll see you soon.

[P. Elias]: There is also the fault database from SISCOR project. I don't know how it can be implemented somehow. I think it is not published.

[A. Ganas]: Who has this database

[P. Elias]: CNRS or at IPGP, I guess it was a project of IPGP

[P. Briole]: It was a joint project with several participants. Also, there were input from colleagues from Italy. I agree with A. Ganas. We need a unique catalogue of faults and from the faults point of view, there is no boundary, there is continuity. It is important to have a coherent fault map. So, as quite large amount of work was done in the SISCOR and other projects, what I would recommend is to visit what HELPOS did, analyze and maybe update if we think that the input from the past projects for some faults, disagree with the current HELPOS fault map. So maybe this is a task that will take, I don't know two years, maybe we need to take enough time, not in a hurry. But maybe we could have a roadmap for the next two years to check and improve the fault map to reach the end unique and with names. I think it is two years' work, we should set up steps to go step by step to a unique fault map. Unique doesn't mean that it is final because maybe we will discover mistakes or new faults so it has to be something alive that we can update at all time.

[A. Ganas]: For the HELPOS fault database, two institutions combined resources, NOA and HCMR. So, from NOA, I was responsible and I will give you now the full database for the onshore part. For the offshore part HCMR has responsibility. There is still a process of unifying these two together. But I will put the database, you can download and have a look.

[H. Lyon-Caen]: I just want to mention that one of the specificity of SISCOR database was, in fact, what you just said is that we tried to unify the offshore and onshore faults within the CRL.

[P. Elias]: P. Briole you said about the roadmap is for us to make the faults within the CRL in order to be incorporated somehow inside the other databases of the whole Greece?

[P. Briole]: Yes, I think we have to combine the two needs. One is to be compliant with the Greek catalog of faults, this is really important. And at the same time, as CRL is a special place with a lot of work being done. It's normal to have improvement year after year in fault maps and fault description. So, the CRL should have the freedom to update and then communicate to the Greek fault responsables and updates the local situation. And I will add one more thing, because the fault story is very much connected to the Digital Elevation Map. And since many years, I and others we tried to combine surface and offshore grids of topography. And at the same time, we want to have a unique fault catalog for CRL. I think we need also unique DEM to be shared in all the team. And those two things, I think that they are connected.

[P. Elias]: I think the timing is good now because EPPO is going to have a unified fault catalog. So maybe also interact with EPPO for the faults within CRL. Perhaps G. Kaviris and A. Ganas, do you think that there can be a link within EPPO and the CRL framework for unification of the fault database?

[A. Ganas]: The EPPO database will take a long time to be constructed, more than two years

[P. Elias]: Yes, then we don't have to be in a hurry. So perhaps there may be a link between CRL and EPPO. I think we have to consider this. We have made a progress for the communication of the groups going on the field. And I think it has been improved and communicating much better, even if the field campaigns were very strict, because of COVID. And we haven't progress in case of the occurrence of a seismic event, who will do what, how we will communicate and how we will coordinate ourselves. Perhaps this will be progress when there is a large earthquake. But in the recent crisis in the Gulf we haven't been on the field in order to discuss about this with more information. I don't know if it is crucial, or there is something that can be done. I mean, to coordinate our actions in case of an earthquake. Anyone would like to comment?

[G. Kaviris]: I think this will be evident when a large earthquake occurs.

[P. Elias]: So perhaps, we'll see by example. For the seismology, it has been told previously, that it is very important to densify the network, in case of a large earthquake, so these points are linked together

[G. Kaviris]: Yes, I can say that we are aiming here in the University of Athens to have a small pool, maybe of three or four stations, maybe next year to be available in case of an earthquake, generally in Greece, but of course, in the CRL area most important. Together with a pool of portable stations, because in order to densify the network in case of an earthquake, you have to have a pool of portable stations. But I think T. Sokos and C. Evangelidis can also talk about this, there are pools there also, right? And, of course Madani can comment, but it's also the time difference that they need more time to come and have the instruments from France.

[E. Sokos]: As I said in the previous meeting one year ago, I don't believe there is a big need for densifying the network. But anyway, maybe one or two instruments should be installed after a strong event within the CRL area. So, there is no problem about that, we can also contribute.

[G. Kaviris]: It is very important of course that we talk before going to the field, will certainly do this and define where each one will go to have the right geometry as a team.

[E. Sokos]: Of course, this is our obligation also in the Greek network.

[P. Elias]: For the GNSS it is important many times to have nearby measurements, necessarily right after the earthquake and actually in Athens there are a few GNSS from CNRS, they may not be enough, but the situation may be improved perhaps.

[M. El-Assaoui]: We have replaced many station's digitizers in the field during these two years and now I am able to provide, during the year 2022, a pool of four or seven stations with a short period seismometer.

It is Reftek digitizer with short period seismometers, so we have changed these digitizers in the CRL network because these digitizers had a problem of telemetry and communication in the network but for temporary stations, they are very good digitizers so, I think we can check this digitizers and make a pool of stations and for the next year I can provide four or seven stations

[P. Elias]: You mean that they can be stored in CRL?

[M. El-Assaoui]: Yes, we can put a part in Athens and a part in Patras. I don't know how we can proceed

[G. Kaviris]: You mean portable stations in case of an earthquake sequence, right?

[M. El-Assaoui]: Yes.

[P. Elias]: We have said also that HELPOS has established a roadmap for deploying seismometers. Is this right? It has been done? It was about to be done. But I don't know the situation. Now that HELPOS has finished. Anyone knows about this roadmap?

[C. Evangelides]: Which roadmap?

[P. Elias]: In the previous meeting, we have told that, I don't remember who exactly, it is written in the minutes that HELPOS is about to establish for temporary deployment

[C. Evangelidis]: Yes, there was a deliverable within HELPOS saying that that all networks that participate in the Greek unified seismic network, there will have some stations to this pool. And they will be able to deploy the stations immediately after a major event, some agreement and some communication between the parties. That is happening in all over Greece. So I think during HELPOS, we did that already for some



cases for some earthquakes, like Northern Thessaly, like Voiotia event, Thiva sequence. So why not? This should happen as well, for the CRL area.

[P. Elias]: Yes, we have agreed last year, but we will use the national roadmap made by HELPOS. So, it is possible to have this documented, put it in CRL portal. Is it written in English also?

[C. Evangelidis]: I think it is in Greek only

[P. Elias]: So could you sent us this document to see if we could translate it and put it in the CRL lab?

[C. Evangelidis]: I was responsible for writing this document as a deliverable. I think this document will be available on the HELPOS webpage with all the other deliverables. That's my idea about that. But, since HELPOS has finished the deliverables, I think, they will going become public, so we can get from there and put it on the CRL portal.

[F. Vallianatos]: Dr Drakatos is responsible for this deliverable. And I think it will be getting g public very soon. It is a long text

[C. Evangelidis]: Why you needed as a policy or something like that. As far as I know, this deliverable is not something like a policy paper.

[F. Vallianatos]: It was mainly scientific. So as far as I know, in the last meeting of HELPOS, we discussed that very soon, we'll have another finalized meeting. And maybe we can discuss this. But the key point for the list deliverable is G. Drakatos

[P. Elias]: Do you think that it's good to have it?

[F. Vallianatos]: I don't know

[C. Evangelidis]: I don't think that describes the policy. It is mostly use cases. I don't think it's going to be so useful for the CRL. But on the other hand, we, within the unified seismic network are trying to have this agreement for the temporary deployment. We can do it. CRL area is a small area within the whole perimeter that we cover with the unified network. So, it's the same policy more or less. I agree with E. Sokos about if we have a major event, within the CRL area in western Gulf of Corinth, I can't see how many more stations we can put in the area. If there is a major event more to the east then okay.

[P. Elias]: If we have a crisis like the last one, which is being spread widely, shouldn't rationally speaking more seismometers?

[C. Evangelidis]: I don't know. What is the magnitude of completeness for the catalogs we have with this network? I mean, I can see with this network is now operating even with the malfunction and the problems it has that V. Kapetanidis and the team, will manage to make a perfect relocation for the area. Also managed to see the sequence in very great detail. So many more stations you need in CRL. So, V. Kapetanidis and A. Serpetsidaki would be valuable to have more station? Just a simple yes or no.

[A. Serpetsidaki]: I think yes, of course, if there is a need to monitor the seismicity more closely, it will be valuable.

[P. Elias]: I mean, it will add more information, more concrete results. If we were using more?

[A. Serpetsidaki]: It depends on where the activity is located. As it was said before, if it's further to the east than the boundaries of the network, then, of course the stations would be helpful. Or maybe to the north or

to the south or wherever there's a small gap of stations, then it would be useful. But for example, if an event occurs in the middle of the western part of the Gulf, then I think there's enough coverage of stations.

[V. Kapetanidis]: I think that the important thing is that the stations are working, I mean, without problems with the components or the timing. For relocation, location and detection I think they are enough. Of course, if there is a crisis, maybe some temporal deployments could be useful, depending on the area. And then of course, there are other applications, which may need more stations to be deployed such as early warning if this is in the agenda

[G. Kaviris]: But we need to have maybe other type of instruments. Like more new modern instruments with smaller latency in transmitting the signal

[P. Elias]: Actually the digitizers to be faster. I think as we said in case of an earthquake E. Sokos could deploy one or two stations as he said.

[G. Kaviris]: And the University of Athens next year, we'll be able to have this pool of portable stations and we'll be able to install also two or maybe three stations.

[P. Elias ]: And if there is the pool, as M. El Assaoui told that could densify more

[G. kaviris]: Of course, I think for E. Sokos and the same for us, it has to be that not another seismic sequence is ongoing because maybe the instruments are there.

[P. Elias]: Anyway, perhaps there is redundancy for both Athens and Patras that also the CRL pool has stations. Next point is also conflict with the previous. C. Evangelidis told, as it sounds, that if there's a malfunction of a station, perhaps he could make a loan until the replacement of an instrument from CNRS.

But if there is a pool, this need perhaps isn't needed. This is somehow to agree how we can fix quickly a seismometer. C. Evangelidis, because you have told already, how could be performed, If you have a pool, of course.

[C. Enagelidis]: It is different the pool for the permanent network from the pool for the temporary deployment, this is for the permanent network?

[P. Elias]: Yes, for the permanent network. You told that perhaps there could be some help, let's say that you could loan a station for a period in order to replace the broken one.

[C. Evangelidis]: It is possible. If we're talking about sensors, we might have some not very broadband sensors, we might have some, to 30 seconds that might be used as a loan if a station has a problem with the sensor has to be replaced and get it out for repair and things like that, we could explore that. But this is not something that I can assure you and it's certainly not something that is stable, I mean, because we were doing that all the time within the network from all over Greece. So, we are changing stations, we are repairing things. So, I might tell you now that we have two sensors and tomorrow not.

[P. Elias]: Okay, that's normal, but there is a will of doing this

[C. Evangelidis]: Yes

[P. Elias]: Another problem is the unification of the rebooting.

[M. El-Assaoui]: I think we should think now about a common base for spares available within different institutes. Because when you're in the field sometimes you're looking for replacement and if you have the availables you know where the spare parts are located and make a decision for the replacement more

quickly. You don't have to waste time to search for a solution when you are in the field. We have to think in a common base for the spares available. For example, I have spares of a label of short period seismometer which are available at Patras for everybody who needs them in case there is a mission at this area. So, I will make an inventory of spared labels. So, the spares which are not being used, can be used in case of replacement. If we have a global base for example for anyone for Patras for sensor available for replacement. It would be nice to have a look when we need a spare emergency.

[P. Elias]: This could be a link in the CRL portal, simple like a text which has the spares, it could be done or not.

[M. El Assaoui]: I think the software solution is already exists.

[P. Elias]: Next issue is coordinating of actions to provide quakeml files. Someone would like to comment?

[H. Lyon-Caen]: I think it is supposed to be done by Stasbourg by S. Lambotte. I think it's in a good way. I think she already has basically all the things to do it. She just has not implemented it yet, at least for the CRL catalog that we constructing. We should be able to provide quakeml pretty soon.

[P. Elias]: Okay, so it's a good to put a link in CRL portal for the earthquake catalogs. It's something that can be done. And if you can send me the links and see how we're going to incorporate and share them, in the portal? I don't know how many earthquake catalogs we may have.

[H. Lyon-Caen]: The catalog we construct is already available in the CRL website.

[P. Elias]: Okay. We don't need any other catalog?

[G. Kaviris]: You mean about automatic catalog?

[H. Lyon-Caen]: Yes

[G. Kaviris]: So we can have a link of course with the manual catalog because there are manual solutions both from NOA and from the University of Athens.

[H. Lyon-Caen]: Yes, that would be good.

[P. Elias]: Yes, also we can communicate to Athens and all other institutes that maybe willing to add manual and/or automatic catalogs.

Another issue. We have discussed about RASMON and CORSSA networks

[G. Kaviris]: Since I. Kassaras is not here, I can tell you that certain stations are in real time and of course, they are also in EIDA. Is that right C. Evangelidis?

[C. Evangelidis]: I have just put the link, in the chat window, all the strong motion station that HA network has in EIDA.  
([http://eida.gein.noa.gr/fdsnws/station/1/query?network=HA&channel=\\*NZ&level=channel&format=text](http://eida.gein.noa.gr/fdsnws/station/1/query?network=HA&channel=*NZ&level=channel&format=text)  
)

[G. Kaviris]: We have CORSSA, Aigio, Drepano and Nafpaktos in the western part of the Gulf of Corinth and they are already available in real time. And of course, everybody can download from EIDA this link. They are all available in real time.

[P. Elias]: I will put it in the CRL portal.

[S. Lambotte]: About the quakeml earthquake catalogs: Web Services are available at EPOS. I have to update it. They are a few years outdated. I will work with H. Lyon-Caen to have a link to put the quakeml earthquake catalog in the CRL portal

[C. Evangelidis]: Which ones belongs to RASMON?

[G. Kaviris]: Except those belonging to CORSSA, all the others being in the east Gulf of Corinth, belong to RASMON

[P. Elias]: Another issue. We had a long discussion about the borehole situation and NKUA would go there to maintenance. This is also a strong motion there. We don't know if it is working. Also about the diameter of the borehole. P. Papadimitriou was about to ask A. Tselentis for the situation of the borehole. P. Bernard would like to know the diameter in order to plan the actions to be done. Anyone know the situation and can make a briefing about?

Another issue is the link with the meteo stations. As I have seen from the meteo web page there are not many stations within the CRL area. I show you the map. I don't know if there is of any use to incorporate some stations. In the western Gulf there is a gap of meteo stations. Is there any use to incorporate any of these stations? Please comment.

[M. El-Assaoui]: There is Psaromita station, but the data is not online yet. I think the data are available since 1995. The meteo station in Trizonia is not working. The data from Psaromita exists and I have to find time to put it in the RESIF database. We have meteo station in Monastiraki, at the strainmeter station, being available since 2018. I have also to provide the data and the metadata to the RESIF database. It is in progress but I haven't finished.

[P. Briole]: As you know, three years ago it was a PhD from a colleague from NOA from meteorology, Nikos Roukounakis, who is a meteorologist and his work was on the analysis of the impact of the meteo parameters, the atmospheric situation on SAR interferometry. So, my feeling at the time was that the National Observatory of Athens was interested in the CRL and in the meteorological aspects of CRL. So, you may approach the experts of meteo to know if there is any will to deploy instruments and to continue doing research in the CRL or not.

Perhaps if we have data from Psaromita and Monastiraki to share our data and they do the same. But do we mind about their stations? The closest ones are in Rio and Lidoriki. Concluding, the issue is if they would like to have a cooperation and densify the network within CRL.

[P. Elias]: Another issue. Also, we had discussed about and have a brief description of the various instruments in the CRL portal. So, if someone would be willing to send a description to enrich the content please do so, Another issue. We had discussed about real time GNSS and the necessity of having real time GNSS has been demonstrated, but there is not any evolution since. I don't know if you have anything to comment.

[A. Avallone]:

About real-time GNSS. I know that INGV and NOA are involved in a project funded by the Ministry of research of Germany. This project is called Eureka and the aim of this project is to prepare a sort of prototype system that goes from GNSS real time positioning to real time finite fault and inversion and real time detection of scenarios for tsunamis, or landslides or whatever. The main partners are GFZ and the University of Potsdam. INGV and NOA, C. Chousianitis are partners. In this project, we are testing a very reliable and robust software that could allow to have real time positioning with a really satisfying accuracy. We are going in the last year of that project and I hope that in INGV we can test it, but also I think that in parallel NOA is going to test the same software. So, this meeting is useful to send information. So, maybe you were also aware about that, but it could be in the next future related software for real time GNSS in



Greece. Of course, there are also some different public software for real time GNSS, like the ones developed in Germany or Japan. So, this is the information I have from the positioning from the analysis point of view

[P. Elias]: Very interesting information. We would like to follow any progress

[P. Briole]: First of all, since several years, there is one CLR station in real time, it is the Patras station, which is also EUREF. And in fact, on the front page of the Web portal of CRL, you can see at any time when it works, the real time coordinates of Patras. This was possible because of the fast internet link between the Patras University and the Internet and in particular CNES, the French National Center for Space Research, who is the entity who calculates in real time these data with their own software, because today there are more softwares to do this business of real time GPS positioning. So, if you look at the data, and also the time series, you can see that still there is a noise. While the position is in PPP and precise positioning, so not double differences, but just positioning with respect to the constellation of the satellites, for sure in double differences in a small network like CRL, you could achieve better results at the local scale. Today, in the PPP, real time, we achieve a few centimeters of accuracy, not a few millimeters, but a few centimeters. So, if you consider the two earthquakes of this year in the CRL real time would have been useless. So, we would have learned nothing with the real time in the CRL. This does not mean that it is useless at the scale of Greece in some cases in the last 10 years real time and the existing stations would have provided information, a little bit of information for sure information insufficient to model the fault and to be used alone in the modeling of tsunami because we have a problem of density if we consider magnitude 6.5 earthquakes for example, in Greece, we need a lot of GPS stations working to have a good probability to have enough in the near field of the fault. So, I think time is interesting, but there are limitations in the amplitude that can be achieved in real time and there is a problem of density of stations. This does not mean that we should not try hard with the real time I think we should. And the CRL, I think is an interesting place to develop the know how to install and operate real time to become a better in this business. If we want that, we need to upgrade all the GNSS network of the CRL because today instruments,

in average are at the age of 15-16 years. And so, there is an urgent need to change the GPS stations of the CRL first of all, because they fail one after the other, and second because we cannot do all those new applications with all those old instruments.

[P. Elias]: The station of Patras perhaps could be used to test this new software, just note that there is also this idea

[A. Avallone]: This was devoted to tsunami early warning. In this first stage only stations along the Hellenic Arc, in the western part, were taken into account. But of course, I think once the software is running, it is up to NOA to decide if it can be applied everywhere you want. The importance of the software is that you can apply ambiguity resolution and regional augmentation to increase accuracy, but of course, I know very well CRL configuration, so the distance between the fault and the station is important to detect. Anyway, station Antikithira 35 kilometers away from Crete, in the last Crete earthquake could detect one centimeter offset. Just as a perspective. Of course, everything said by pair should be taken into consideration and also the multi constellation receivers should be deployed, of course. So I also agree with P. Briole

[P. Elias]: In the previous it was said that all GNSS solution to be visible through the CRL portal. This has been done thanks to P. Briole. I think we can take from that point forward to maintain and improve it.

Do we still want the newsletter because it has been also some discussion for a newsletter that could be issued occasionally? A kind of newsletter could also be made from the last crisis. Let's see that okay, we'll discuss it in the following respective session. E. Klein who is not here with us, being in Chile, has made a lot of work for the maintenance in the field and in her office, and she has prepared a presentation where afterwards P. Elias, G. Kaviris and M. El-Assaoui have added a few things.

Okay, you see my presentation. As I told you already, E. Klein issuing every week, every Monday the weekly report observation for both networks, seismological and GNSS network. And there you can see the history and the data flow, the data availability, the status, the situation the past and the current and we have

also to discuss if it is useful, because it takes a lot of time of E. Klein to prepare them and we should know if we don't really need it. The incoming data goes to crl0 and crlhub. There is a problem incorporating some data in the CRL hub, which is the new actual hub of the GNSS data with advanced handling that P. Briole prepared, but it's me with E. Klein that we're going to solve this problem. And we with Pierre can check the availability of the station and the data link and everything with telnet through the network. For the seismological one the data are checked from Ephesite, the French server.

The procedure checks for the availability of five days of data and if it is not the case, investigate SYNAPSE and basically investigate the potential cause from SyNApSE. This is what Emily's doing every week. The data are going to crl0. The weekly report is sent by E. Klein. if someone doesn't get this report and want to have it, he/she has to say and be added in the list. And there is also the history. It has been two years almost of weekly reports and there was not many feedback to E. Klein about the usage of this report. Me personally I'm using it very often if there is a problem and in order to see that there is a problem or not. And we have to discuss about it if there is a window of improvement, if someone wants something more or don't use it please I want to hear your opinions to understand if they are useful.

[G. Kaviris]: I'm also using it seeing what's happening with the stations but I think the most important is to hear other opinions as well.

[M El-Assaoui]: Generally, when I receive the weekly report, I correlate and make a comparison with my checking and sometimes because they give some diagnostics for station and I have a different checking in my site, so I can investigate more to see how for example SyNApSE has a status like that and how when I go to server inquire I found different things, so sometimes it can help to solve problems.

[P Elias]: So actually we are the four we are using them

[H. Lyon-Caen]: I think they are quite useful because we don't always check all the stations so I think it's a warning when something is going yes

[P. Elias]: Anyone else who would like to receive the weekly reports?

[M. El-Assaoui]: In the last mission we didn't have time to reinstall the ZIRI station but we managed to send our equipment needed by Patras and discussing and with E. Sokos and N. Germenis to plan something when they have time to install the station so the station this time is still waiting maintenance from Patras but I hope it would be in few weeks or next month. For Rodini we have problem with the sensor because mass position is very decentered and for this type of sensor to make recenter we have to remove the sensor and to adjust the mass with a screw. So, it is a little complicate to make this maintenance in the last mission but we have to plan this maintenance for our next missions. It is a little bit complicated but I think it is better to change the sensor. For Magoula antenna stations we have to update some firmware but we prefer to make this in local not in remote because we have a bad experience when we made this in MALA station. The stations MG06 and MG07 are not working because I think it is very high plant which make a problem of telemetry. So, we didn't reach them in our last mission when we were in the field. E. Klein was in PSAR in September, bad didn't manage to restart the stations. So, it is also a point to remind for the next missions. Panormos as we were discussing with G. Kaviris in the last mission, we would like to put outside the town hall, and it seems that the responsible persons agreed about that and we have to see how to operate and how to make a vault behind the wall of the town hall. In RIZA, I have a problem of the acquisition of the strain meter when we put the equipment in the flight during our trip between Paris and Athens, and I didn't manage to reinstall because we had a problem in the luggage. So, maybe the key point was shocked and has damaged the box. For Trizonia the strong motion accelerometer is down and at this time I didn't have a solution to replace it. So maybe if NOA or Athens have spare to lent us for a while to replace this sensor it would be good because the accelerometr is very important at this station. ALIKI station needs to be rebuilt completely because the pylon which brings the cable of electricity is totally destroyed and there is a risk of fall down

of the pylon on the way and tise can damage the wall of the house which is close to the site so we decided to remove completely the equipment in the last mission.

[P. Elias]: For GNSS there has been 65% of data for the 2020 for the rinex files, 71% of data for 2021 if we take the period from January 1 to October 31. And there are many interruptions due to telemetry issues. Little maintenance began of course as we told this a period in July in the September of 2021. We have removed six stations. There is work to be done also to resolve an issue for the for the processing of the data and in the new CRL hub and currently all the stations are operational. The main problem that also P. Briole has said about the high-rate that the GB-1000 are very old and they have a lot of problems and progressively they will fail. So, these stations that are smaller and more transparent are those that have been removed from the core CRL area, i.e. KRIN PSAT and ROD3 and three more from remote area. Generally, the field trips began again in 2021. It was from UPatras and in July was from Athens, UPatras and IPGP. Also in July 21 from NOA, September 21 was a big one from CNRS, ENS and NOA and October 21 from CNRS and ENS with A Rigo.

[G. Kaviris]: Also we already changed instrument in LAKA in July and is working since then.

[M. El-Assaoui]: I need to have feedback of the maintained stations. For example for the station of MALA, because I changed the configuration

[E. Sokos]: Just a comment. We are not so many here in CRL. I would suggest to have some better communication between us. It has been improved but it is a very good point yet. M. El-Assaoui explained that a few stations need maintenance. He did not give a clear view of what we should do or what is expected from us or what we might do in the future. This is what I am asking just an email saying that this station needs maintenance, the instruments are there and you can select a date and fix the station. Okay we need some better communication between us.

[P.Elias]: So it will be good if for example, E. Klein to start communicating with us as with and also M. El-Assaoui

[E. Sokos]: I am the network operator here in Patras. I do not receive this report. Doesn't matter for my stations because we have such reports for stations. But we don't have such reports for the CRL network.

[G. Kaviris]: As E. Sokos said about the Hellenic Unified Network, as said for Lakka, everybody has the information that the digitizer was changed. We need to have always this information from the CRL stations as well. And there is a question from C. Evangelidis for Madani, if these changes in instruments are reflected in the EIDA, he sent a relative link (<http://eida-federator.ethz.ch/fdsnws/station/1/query?network=CL&format=text&level=channel> )

[M. El-Assaoui]: I understand report of you T. Sokos, but for example ZIRI we already discussed about when we are in the field, and I have relaunched to ask again when it was possible to install the new station because the equipment was at Patras. And for this report you have seen today I made this summary very late last night. And I think all the points I mentioned are not very emergent, that's why I didn't talk about that with you or other people. I wait today to spread this information for all people and colleagues. So, feel free to give me feedback about what you can do or what you can do. When you have time, we can discuss what you can do.

[P. Elias]: Here is the email sent by E. Klein, weekly every Monday. I have seen that T. Sokos is not among the recipients. We have to put you in the mail list

[E. Sokos]: This is not critical for me, as I said for the stations of Patras, I know what is going on and I can fix.

[P. Elias]: Perhaps in this report M. El-Assaoui could send also this kind of formation. So, every time you will all get a report of this information and also what M. El-Assaoui would you like to share with all the colleagues, so this weekly report will be more valuable and would be enriched this way? Please comment.

M. El-Assaoui

I think we can improve the communication about what is required for the network, firstly for emergency maintenance. In the future, we can improve the way to discuss about

[P. Elias]: M. El-Assaoui could you add in the mail this information or perhaps add one slide? Is it ok for T. Sokos?

[M El-Assaoui]: For me, it is okay. The way of the presentation of seismology report for the stations is dense, but it's very summarized for the stations

[P. Elias]: Perhaps you can put some other things that perhaps T. Sokos would like to see, in the seismological network, like some actions that could be possibly be taken. E. Sokos would be okay, this way?

[H. Lyon-Caen]: I think it's two different things. This is a report for how the network is going on every day. And we should have more meetings to discuss the shaping of the network. But for me, it's a bit different

[E. Sokos]: Exactly. Maybe we do need to discuss all this today. It is too technical. All these technical information should be discussed more frequently. And in a smaller group.

[P. Elias]: So it was it has to be more technical meetings perhaps every two months or one month. You mean?

[E. Sokos]: It can be like this one, or we can set up a schedule who is maintaining what? Okay, we can decide on that. We cannot solve this today. It is not a discussion for today.

[H. Lyon-Caen]: What about scheduling a meeting?

[E. Sokos]: Now we are discussing for maybe more than one hour about technical things. I think it's not for today, this discussion. Too technical, it should be discussion between the other people per Institute, technicians that they want to solve, or they need to know more than us how to solve these problems.

[M. El-Assaoui]: I think we should plan a meeting before the end of the year to discuss about that. Because I think in our side, I don't know exactly the date, but maybe we have discussed with Pascal to make a mission there in February. So, if we can make a brief meeting about to discuss about this plan, E. Sokos and be added for technical meeting.

[P. Elias]: Okay. Who would like to participate in this technical meeting? Just to send me an email. So we'll see a meeting in within December.

Next point is sustainability of the CRL in total, including stations. This is a big issue. This question is open since years, if we're going to have a governance, this is linked to the other also section in order to be more sustainable, and have more funding opportunities as an observatory and this also has to do with the scientific council, administrative issues and the financial model. Anyone would like to comment?

[P. Elias]: I think it is both political and scientific problem. So, we have to analyze from both sides. The first is political. So, if EPOS is willing to exist on the long term with volcano observatories and near fault observatories, there is the need for EPOS to figure out what can be or how it could work. And one possibility is just national funding for the observatory, another possibility is help from some initiative, at European level, not national, international, inside the European Union. CRL is one of the examples, but there may be



others. My impression is that in the future EPOS will progressively understand more and more that it is good to have international initiatives and that there is the need to give a political support to this kind of initiative, which means to convince the national agencies funding agencies to talk to each other and find a way to give the possibility for scientists to manage such observatories.

[P. Briole]: So, your generation and then the people who are younger than you, I think one day you will be able to do that, my generation was unable to reach that point. The other aspect is from science point of view. So, we belong to universities and observatories and research laboratories, we are researchers and engineers, and if we have the will, working together and this year with this paper made and the other paper we prepare, it is evident that there is a will, then they can be this process from the bottom to, the other way is from up to bottom, so bottom to up means that we belong to universities and research center, we declare that, well, this is already an observatory, which is the case. And so we organize ourselves, we organize this kind of meeting like the one of today. We make clear publicity, we make a clear statement of the cost and everything. And so, from the bottom to up, progressively, we create the structure with science inside and so then we will not solve immediately the problem of money. But we demonstrate that there is the will, from science and humanity to be together. So, I would say we need to go from bottom to top and not from top to bottom to be sustainable.

[G. Kaviris]: We will discuss later in the EPOS/NFO part that for next year, there will be a funding opportunity for CRL but only for services. But I think this has to be discussed in the next session.

[P. Elias]: I don't have the feeling that could be a strategy of CRL, if there is no governance. Am I right?

[G. Kaviris]: I think we can say that the main goal is to maintain stations, first of all.

[P. Elias]: P. Briole proposed to do our work and progressively will be background and if would be some political will in the future, will take advantage and exploit the material that we have prepared

[P. Briole]: Yes, I just sent a written message, I think we need to have a scientific visiting committee to analyze what we did, and write a report and write recommendations for this observatory. Of course, this is one of the EPOS observatories, one of the near fault observatories. So, we have a real existence, we are not to justify ourselves and we exist officially, but for both the science and the sustainability of the science, I would suggest, to organizing near 2022 a Visiting Committee, not in videoconference, but with the people going to Patras, meet there and then having the opportunity to visit the sites or at least part of them, because if they are from USA, maybe they cannot join. I think this is needed in all the observatories in EPOS periodically. Evaluation from the science point of view, and our science is based on observations, we need sensors, there is a lot of developments in the field of sensors. So, we need to be on board of those developments. And so, of course, the science is completely linked to observations. This means that what EPOS will pay for cannot be just services, we are not servants, we are researchers. We need to make discoveries. And for that we need sensors, we need longer time series, we have to make this very clear. And we need also economic models that allow this acquisition of longtime series of data.

[P. Elias]: So you have anything to comment about the scientific visiting committee, and to be prepared for the near future.

[G. Kaviris]: It is a good idea. And in the EPOS NFO community, there is an advisory community for all the NFOs. I think that A. Avallone and P. Bernard are members of this. And maybe A. Avallone can also act as an external for CRL.

[A. Avallone]: I have accepted the invitation to user feedback group, a sort of people informed about the CRL and the EPOS community in the CRL.

[G.Kaviris]: And I think this committee will work from next year. So, I think that A. Avallone is a suitable person for what P. Briole is proposing.

[A. Avallone]: The people from user feedback group was asked in all the TCSs in all the thematic cores services, are asked if there is any service deployed within EPOS to test these services and also if there are any topics that maybe NFO's could relate with other thematic core services. About the role I think there was no meeting, I don't know why. So, this activity I suppose has not started yet.

[P. Elias]: Now we're just discussing about another scientific visiting committee that will be only for CRL. If you all agree, we can proceed and you have to send us your suggestions for scientists to invite for this reason, perhaps five or six would be okay, or perhaps even three. So, if you're okay with this effort, try to have an evaluation and a kind of strategy that they can propose according to their experience. Do you have something about this?

[A. Avallone]: I think that the vision proposed by P. Briole is suitable and maybe CRL community or the CRL scientific committee could think about some proposals and relate with the EPOS, this is one road, maybe there are others

[P. Elias]: That should be different from EPOS, linked somehow.

[A. Avallone]: I understand that the infrastructure is complex, there is not only one road, EPOS is one, probably for some things, services or even stations in a sense, because if I have no data, I cannot propose any service or any products to EPOS. For example, for the RING, EPOS has some support on an IT for some services, on the data and metadata. This is an example but supported also some improvement in the

connectivity of the network, for example. But not so many. The most important is to make a lot of efforts in the community, people should speak between them, and find together a solution.

[P. Elias]: Yes, it's also a good possibility for this scientific visiting committee because it is outside the CRL. And this will be also an initiation of discussion of the CRL but from people outside CRL. And also, it's a good point. So, we will proceed in this way to make this committee. They must be bounded somehow to prepare this evaluation and strategy of CRL within a few months. They have to commit somehow if they accept.

About the governance structure, how can we succeed for the long term and the short questions? How can we solve some questions, some short-term problems? For the funding and the proposal question, we don't have the COST to fund networking. Are we willing to look for the next COST? But since the next COST should be proposed centrally from all the NFOs, we cannot do anything ourselves? The people from NFO should have to have this task

[G. Kaviris]: There was a proposal, I think from P. Bernard that the previous part done by P. Briole, for the French part to be financed for maintenance and stations, right? Was it accepted?

[P. Briole]: We know at the moment, we do have some funding from the French side which cannot allow to cover for all expenses, we cannot make maintenance of everything with this funding first. And second, this funding was obtained by a sideway, I would say because it is based on the science proposal in which we say okay, we want to do this science. So, we will need to maintain these instruments. It works partly. So it is a contribution. In fact, we could not claim that this was for the observatory, we could claim that this is for science. And it's not good. If we have a real observatory, which exists really, officially, at some point, it is normal to have the right to claim that this is within this observatory. The science is done within this observatory. So of course, the funding goes not just for one particular science project, this project plus all the other projects that other people can perhaps perform in the same observatory. I think in the future,

probably in France, and I hope also in Greece or in Czech Republic, in Italy as other countries, we can find the possibility to get some funding for maintenance. But progressively, we should be more clear on the fact that there is a need of funding for the observatory. One of the first steps I would recommend and we did it in previous years is to evaluate the real cost. Okay, so each team can evaluate the cost, I mean, how many months that we spend each scientist involved, each person can evaluate how many months spends on this work, then evaluate the cost of the mission, evaluate the cost of the maintenance, the cost for the new sensors, the cost for analyzing the data, everything. I think we should set up year after year an evaluation of the cost. And then we put this information on the website and the web portal and we are transparent. And then how we manage to pay for that it can be explained also or not, but at least we write how much this cost first is, and then this will facilitate for the future.

[A. Avallone]: I fully support what P. Briole is saying. I think it is really important to have a sort of administrative balance also in terms of how much funds I need to spend for maintenance per year for maintaining permanent stations or how much I need for the assistance of the servers or the telemetry. If we put out all these stuff in the table also personnel, if you haven't fixed term positions of the personnel. I think that it could be more helpful to understand because we can have some projects devoted to infrastructures or the projects devoted to science. So we could address the funding in a way or another if we have a clearer view of the overall. I fully support this sort of funding balance year per year for the CRL.

[G. Kaviris]: There are no calls for maintenance as far as I know. I know that CRL finally managed to be part of the proposition for the European Union but again it is for new instrumentation and for science and for people outside our community coming here and but nothing for maintenance. I haven't seen something that can be a submitted for maintaining our instruments that's the issue.

[M. El-Assaoui]: There's two things to consider about this cost of maintenance. So, I think we have a lot of estimation of the cost in the past for different meeting we have given estimation for the maintenance sites, but the problem I think now we use for this maintenance you have to separate two things , there is the real

cost for the maintenance of the station, but we also have the cost to update the network. For example we have to replace all the mode. I made an estimation of an amount close to 15,000 euros. It's the estimation I made and for example, the money we have for the mission the next year and for the new equipment, we don't have this amount of money. So I think we have to make the cost of maintenance and the cost to update and to keep the network updated. These are two things different.

[P. Elias]: But actually somehow the cost of upgrading could be hidden within the cost of maintenance because it is work that will be done constantly. But anyway, this could be reflected in a document that we can prepare to have some concrete and as we said before we can put it in the CRL portal and could be send to EPOS as information. One thing is to write down this document to agree all of this and okay about the maintenance proposal it's another. So do we agree to reflect our cost in a document. Yes. Okay. Does someone that would like to help to prepare this document to gather opinions and quotes from everyone?

[P. Briole]: I will help

[P. Elias]: J. Zahradnik. We haven't discussed yet your participation but since you have also equipment it is good if you participate closer to this effort.

[V. Plicka]: I can describe the situation about our stations and the how we maintain them

[P. Elias]: V. Plicka later on you will present

[P. Elias]: Well, Pascal, we have discussed about the coordination and the maintenance, and I will also describe the points briefly because we have to take some actions. So, you will hear them anyway. Perhaps, I will also discuss a few points if we have the time, and you will answer them. We shall continue now. We are discussing about the governance, funding and the long-term sustainability issues. We have not made an

evaluation of the cost in order to write it down. We should write the cost in the CRL portal or send it to some other entities like EPOS.

[G. Kaviris]: Panagiotis, just to say again, it's just an update, we have done this.

[P. Elias]: Yes, but we do not have a concrete document describing the situation. We have not done it yet, but we have a cost and Pascal knows that we have a cost, but it's not the final one and it is not something that we can write and disseminate. Also, comparing to previous meetings, we are now in a better situation because we know the cost and we should write it down.

So, Pierre has proposed to have a scientific visiting committee, with members outside of CRL, in order for them to join us on the field so as to see the work that is being done and they will have some evaluations that they could propose to CRL.

I would like from all of you to propose some evaluators from all the globe and if you would like to add something about the governance and the funding. We have also been told that there has been a proposal from you Pascal and EPOS. If you have any briefing about this, we would like to hear it from you.

[P. Bernard]: Yes, there are two things, but, there may be new things that you are not aware of. The first thing that some of you are already aware of, because it has been kind of formalized between Greece and CNRS, is a French project, called International Resource Project, which has been discussed with NOA, University of Athens and Patras in order to allow for the French CNRS to provide some funds every year for five years. Those funds will not be utilized for field maintenance or field observatory but for paying for trips to Greece for coordination.

The cost is about 15,000 euros per year to the French teams in order for them to travel to Athens or Patras and of course, at the same time, this will help paying for the fieldwork on the sites. However, the main purpose is to have a formal collaboration frame between Greece and France in Greece. You have three institutions involved, University of Athens, University of Patras and NOA and on our side, it is myself in

the name of CNRS for all the teams involved in this. From the Greek side it is George Kaviris from the University of Athens.

It must be mentioned that this will not provide funds for the Greek colleagues, but it allows us to travel to Greece and to try to improve the coordination level of CRL. Consequently, it complements EPOS, so this was the first thing.

The second thing is the project called GEO inquire, which is led by GFZ, in which Gaetano has a work package (work package 8). This work package is led by the University of Napoli and it is devoted to cross disciplinary research involving something like seven or eight test beds, and among these test beds there is Corinth. The idea is to make calls and proposals for instrumentation or research in the fields in Corinth. So, this is open to the foreign teams, for instance, it could be Italians or Germans, it may also be other Greek people, it can be also French people despite the fact that we are already involved in it, but can be other French people not involved in the core of CRL management. This project has been just submitted.

We hope that it will be funded by Europe, the amount of money which is asked for this work package for CRL is, for Greece, 126,000 euros and for CNRS, for France, 58,000 euros and those funds are divided in two parts. The first part will utilize the funds to provide for the travel expenses of the teams proposing to measure something for instance, and we can ask GFZ to come with a DAS System and investigate the fiber that may be available. So, we will pay GFZ for the fieldwork, but will not pay for the instruments. The other part of the funds will go to France or Greece for the CRL teams in order to be able to assist and prepare the field trip of these people.

So, we will make the calls, we will see a lot of projects coming and we have to select them at the level of maybe 5,000 or 10,000 euros each for a few projects in order to allow them for investigating their research and benefiting from what we can bring with all the CRL measurements (geodesy, seismology etc). So, this is really the spirit of this project, a transnational access. This will help us certainly to improve our own instrumentation, because we have to be sure that we can obtain good quality of data. When these people come, we want to make sure that the instruments that they will need to complement their own instruments will be in perfect order of work and will provide a perfect quality of data.



I think it is a very good thing which will open Corinth to other institutions and make a good advertisement to what we do. These were the two main things. In addition to this, there is a French project which I am coordinating, called FIM-OPTIC which has three aspects: one is the instrumental aspect on optical system, one is the application of these instruments to a deeper mine in Sweden and the third part is an application of these instruments to the CRL, installation of new optical instruments. So, as you know, I've been working with the engineers at EGO in France, to build new kinds of instruments, optical instruments, which are not as a DAS system, which is investigating the strain within the fiber, but we are developing very high quality and high dynamic instruments, which we will put at the end of the fiber. So, we use the optical seismometers in Guadeloupe two years ago, it was still working. It provides many things, so it is similar to a seismometer, but it's purely optical. There is no electricity in it. The other instrument we develop is a strainmeter, which, at the end of a long fiber, we put a small five metre fiber and this five metre fiber acts as a very resolving strainmeter, which has an accuracy of something like  $10^{-9}$ . This instrument will be put in Corinth and the idea is to provide more strain data, because strainmeters that are working in the north coast in boreholes, are not enough for resolving all the problems of strain transients that we might meet. For instance, we observed the postseismic strain after the 17th of February  $M=5.5$  event. There was only one measurement, because it is in the closest station, Monastiraki. Trizonia station strainmeter observes something but because its calibration is almost impossible to do it's just a qualitative measurement and the Riza strainmeter was out of order.

So, with this we only have one point. The idea with this new optical strainmeter is to have more points and probably it will be installed in tunnels. We are in discussion with Thymios in tunnels near Psathopyrgos. In addition to this, the Malamata borehole seismometer, which is out of order will be replaced, probably, with an optical seismometer, the interest of which is that it cannot fail because there is no electronics. So, if there is a failure, it will be the interrogator which will be at the surface so it's easy to replace or repair, but this borehole seismometer will be 200 meters, replacing the older Guralp system. Hopefully, this will be done within one year.

This new project allows us to have new instruments, seismometers, strainmeters, and also long base tiltmeters. So, when the specialist comes, you know that he installed the long base tiltmeters, maybe almost 20 years ago in Trizonia, which has been working for a few years, but now the technology has been changed, which means that the instrument is looking at the water level in the two sides of the tiltmeter with laser beams, so it's also an optical instrument, which will be installed probably in one of the tunnels.

So, all these new instruments will be installed within two years. In addition to this, I think we have to think all together about using communication cables, optical cables for DAS systems. This is part of what could be proposed as a call for this transnational access with GEO INQUIRE thing, but we were not sure that this project will be funded. So if it's funded, that's fine. If it is not funded, I believe that we should go ahead with the DAS systems, whatever the funding, we have to go ahead with DAS systems. I know from Christos that NOA will probably acquire DAS interrogator within next year. It could be an opportunity for making the first test and as we discussed with some of you, you need to look for existing communication cables and there was one very interesting in the University of Patras for making some tests maybe there are some others. On your side before obtaining any funds for doing this or for having a DAS system either rented or bought, it will be good to have the kind of inventory of all existing communication cables and the authorization to use some of the fibers of this cable. This will probably be the future of instrumentation, which will certainly change the way we look at seismic data, locate data and perhaps do a new tomography etc. It is really a kind of extraordinary system. This in compliment to the optical instrument that we can provide within our French project.

Last thing is that it would be good also to have a kind of project that will integrate instrumentation and research. I do not know if it will be a Greek budget, a Greek project or a European one, but around the city of Patras and in order to combine the new instruments that we could put near Patras across the fault either a DAS system or it could be our own optical system. I am thinking about having something offshore and if we have a DAS available then it will be easy to interrogate the fiber which would be put offshore. It is quite easy to put a simple fiber, maybe there are existing communication cables already offshore, going from Patras to the Kefalonia Island to the following year, for instance. Also, I am thinking about planning the

installation of an optical seismometer as we do in Paris in order to complement this fiber and the DAS system with highly resolving seismometers at the end of the fiber.

So, these are the kinds of targets that I see with existing funds on one side and perhaps the money pending to be asked or which may be arriving through the GEO inquire project. So, these are my main points.

Something else, the DAS System made by the observatory can be complemented for short term with the DAS system that we have here in Paris. This DAS system is shared between different projects, and it could go next year or later at some point. We could test some fibers before it has its own system. It could be used maybe for one week of recording into the fiber which is at the University of Patras or the fiber from the observatory of Pylos and Methoni of Peloponnese down to Patras.

[F. Vallianatos]: We carry out an experiment this summer, to which I participate, using the optical fiber that starts from Methoni goes some kilometers on the sea in a depth of 1500 meters. So, we carried out an experiment with DAS system last summer.

[P. Bernard]: Yeah, this is with Antonis Laden I think?

[F. Vallianatos]: Yes, and at the same time, just a week ago, we finished the experiment in Crete, using DAS instrumentation for the observation of earth ambient noise, in the city of Chania, we use fiber optics that is five kilometers in East-West and three kilometers in the North-South direction.

[P. Bernard]: This is very interesting, because this is something which touches the kind of applied seismology, which may interest engineers, if you have fibers not only in the fault system, but also in the Patras city. So, I am keeping the idea of making an effort in the Patras rift area, then this kind of study that you just did, could be very interesting for engineers for looking at site effects in a city, like Patras, so this can be kind of an important part of proposal at a Greek level. We have the DAS, so I do not know, which was the DAS system that was used?

[F. Vallianatos]: The das system was from the university of Alcala.

[P. Bernard]: Ok, so Alcala has a DAS system. I see that already people are getting equipped with this nice system.

[F. Vallianatos]: In any case, personally, I'm involved in the project that is submitted last summer, but not from the University of Athens, but as a collaborator of the marine Research Center of Greece in the frame of ENSO

[P. Bernard]: Yes, in the frame of ENSO. So there are plenty of opportunities to progress on this and to start progressing on those DAS systems. I think it is an opportunity that we should not lose, but we have to be quite fast in definition of investigation on the available fibers from telecom or other and to see how we can get authorization for short term usage or a more longer term usage for long term monitoring. So, that was my point to the DAS systems.

One other little thing. At the French level, we are not in fact formally organized for CRL. We have all these projects, all the French labs together, but what I want to start now is building a Consortium for only the French teams to present to all the institutions involved, something like a framework of cooperation, in order that we get funds from all these institutions. There are many institutions you know, there is in Paris ENS and IPG, Strasbourg, there is Nice, there is Montpellier, Grenoble, there is ESN, there might be other institutions as well. We have more than five, perhaps up to ten institutions, and if an institution provides, for instance 5000 euros, which is almost nothing, we can obtain 50,000 euros to utilize them for maintaining the equipment, which is something that is missing. It is difficult at the moment to have money from the CNRS to maintain the equipment, but this will ensure that the French side can contribute to the maintenance and the replacement of the instruments when they fail. I do not know how you get organized on the Greek

side, but this is part of the way we see the future of Corinth for the budget of maintenance. To conclude, this was a rapid presentation of all the points we see in the future in terms of budget and funding.

[G. Kaviris]: Pascal, when you were absent, we discussed about the two first that you referred to, the international research projects in France and the GEO INQUIRE as you said, we thought it was called Serve. However, it is ok, that is what we described before briefly. For the others I did not know. For the University of Athens side, we have managed to find a few money for maintenance of our stations including the stations of the CRL area as well. We will have three to four stations for temporary pool for aftershock sequences. So, if it happens in the western Gulf of Corinth, it will be there and we are ready to get very soon, some new stations, digitizers and seismometers that are mainly going to be in Attica and the eastern part of the Gulf but maybe towards the west a little bit so as to have the whole Gulf covered. But for the maintenance only a few money is provided and only for a few months, unfortunately.

[P. Bernard]: Okay.

[P. Elias]: Okay. Thank you Pascal. I would like to ask about the DAS system, I have asked the technical state in NOA about the fiber link of the observatory in Helmos to Kalavryta because we have discussed this option with Christos in the frame of the proposal and he told me that it has, in every some kilometers, repeaters in the line of fiber, so this does not permit the use of it.

[P. Bernard]: Yeah, so this just means that we have to start from one of the two ends and to stop at the repeater. So, I do not know where the repeaters are but I do know the length of the segments between the start of the fiber and the first repeater.

[P. Elias]: Yes. So, this could be done only between this area you mentioned, and if there are black lines also because I think that there are no black lines, but it is a new fiber, without black lines. I do not know,

perhaps the budget was very limited, but you can find more details with Christos. Previously before you logged in, we had started the session for the governance mainly and for the funding of scientific tasks etc for the CRL. Pierre said that we have to proceed as we do to make the dissemination to make the advertisement of the CRL work and the governance as an entity of the CRL will come from a political decision from above. I don't know if you have to comment anything about this.

[P. Bernard]: I think what I have to say is that this international research project, which has been accepted by CNRS, which adds a little money on the French side for the direction of CNRS, it was the first step to the construction of a real international observatory. At the moment CNRS has some ways to construct formally international observatories, but for astronomy, there is one in Chile for instance, in which France contributes, but for solid earth at the moment CNRS has no framework to provide the structure of such observatories. IRP is a first step to show that there is an international cooperation and this into 2022 will be the direction of solid earth in CNRS and will try to convince the CNRS to permit having the same possibilities of building international observatories as they have for astrophysics and astronomy. So, if this works it will mean that in 2023, we can start about the construction of a real international observatory at your level, which involves France and Greece with devoted money for maintaining and also devoted money for contracts with engineers, for forming and maintaining. So, the budget is not for instrumentation only but also for human resources. So, this is an important point, in my opinion, this kind of formal governance, because it will not only concern EPOS and data processing/availability etc., but it will also concern the fieldwork instrumented. It will be a real formal governance international, but this may take one or two years more.

[P. Elias]: Perhaps it will be good also, if we have an initial discussion among the Greek institutes.

[P. Bernard]: Yes, and more precisely the international research project allows us to come to Greece and discuss on different levels. Especially this project is the preparation of that and to have time for meetings

and discussions. So, you have to make propositions and meet the right people in the ministries. This is a work that we have to do in the first year of this IRP project that starts on the 1st of January, which means that we should have the first meetings in the first six months before summer to start all the things that have been discussed.

[P. Elias]: Okay, it is good to be informed in Greece and in Czech Republic also, in order to see how things are going on. Perhaps, we have to consider taking our actions from the Greek side and being coordinated somehow. So, it will be good if you inform us in order to be more active in a coordinated way.

[P. Bernard]: Yes, I agree.

[J. Zahradnik]: I would like to emphasize that our situation or approach is very similar to what Pascal said. So, for a couple of years, we were receiving support from national infrastructure, which was part of EPOS and now this has been ended in our country. There is roadmap of EPOS in our country, and it does not contain any possibility to apply for a continuation of the support mentioned above. Therefore, even though there are many branches of physics and chemistry and everything, there is no chance to submit a new proposal for national infrastructure. So, they are dependent on two sources.

Fortunately, we have great support (institutional money) from Charles University from the department of mathematics and physics. Those funds can be utilized for coordination trips, trips to stations in Greece and even and for example for this year, for repair of the stations. However, it is time consuming.

The second possibility for us are only projects of national grants, which means that they are applying for new projects constantly. Those projects are scientific ones, so the amount of money which we could plan for things like visiting stations or changing batteries is extremely limited. That is because we must work towards research and papers.

So, that is all, thank you for giving me this chance to describe our situation.

[P. Bernard]: I would like to take this opportunity to say that I think that you are not part of the GEO inquire project led by GFZ which is the one that I talked about with the work package on the testbeds and including Corinth. This means that you might be allowed to make a proposal and to answer the call that we can make. So, we can invite you to conduct some experiments. So, this may help you to have at least the money for traveling to Greece. Normally you should not be able to have money for maintenance, but if we invite you through this project, we will be able to pay you the travel expenses and the fees for living. This means that on our side, the Greek side or the French side, we can pay for maintaining the equipment that you will use, because you are coming for equipment usage, and we can help you make the work on the field.

[J. Zahradnik]: OK, Pascal, thank you very much. Now we are trying to use all these possibilities to combine them together. Thank you for this offer.

[G. Kaviris]: But of course, we have to wait for the proposal to be accepted first.

[P. Bernard & J. Zahradnik]: Yes, of course.

[G. Kaviris]: Yes, and it is certain that you will be selected later.

[J. Zahradnik]: Later V. Plicka will provide you with more details on our financial status.

[P. Elias]: Yes, there is a good possibility for you joining this project. Now, let us return to the project and the cost that it has not been proceeded. I do not know if anyone has a comment on this. I mean, how can the cost be pursued? In other words, what are the projects for the near future that could be available? Has anyone foreseen them? I do not know if anyone has, because most of the funding I have seen that is from national sources or from institutional loans. So, I do not know if anyone has a comment for this.



[P. Bernard]: Well, I do have a comment. I think if there is something at the European level, it should be led by Greek people. Because I think it is normal and it could associate any of us to many things involved and it should be very attractive, I do not know in which call it will be incorporated. For instance, I think it could be a technological project if we proceed to go for the optical systems because it is kind of fashionable at the moment in Europe.

So, maybe at the European level, the Greek community could start seeing what the calls are in which optical technology could be utilized for seismic hazard. In this case something could be proposed for Corinth or maybe more specific to the Patras region because there is a higher risk and a higher visible hazard there which would include the instrumentation with new technology.

So, if you propose a classic project in terms of technology instrumentation then it will be for classic science and scientists that are into classic science. Consequently, it will not be so exciting to answer in any call.

But if there is a special call for technology in which they usually investigate the possibility to have something passed around Patras with inquiry involving engineers and academic research for assessing seismic risk, there will be a possibility to develop a new instrument. Maybe there are private companies in Greece, especially in Patras at the University or connected to the University, which could be interested in developing some of the instruments that we have here in Paris that could be adapted to some more specific targets.

It should be led by the Greek side because I think otherwise, it is not going to be really credible. I mean, the reviewers must see that this is something going to Greece and that it is attracting other people's attention from outside like French or Czech people. The Greek side should lead the coordination to this.

[P. Elias]: Ok, thank you Pascal.

[J. Zahradnik]: In our department, there is a group developing Rotaphone instruments for recording rotational components. So maybe this is a good idea to involve it also through technical grant agencies, not through the scientific agency.

[P. Bernard]: Ok, of course

[J. Zahradnik]: This is a promotion for everybody because Rotaphone has already existed, and it has been installed in Paravola together with the seismic station.

[P. Bernard]: Can you please describe a bit more what your instrument is exactly?

[J. Zahradnik]: It is a short instrument recording diameter like 30 centimeters that is recording all components of rotational motion. It works predominantly in high frequency range, which means that it does not record things like long term tilts. It has been tested and proven in other countries for example in Iceland.

[P. Bernard]: Is this built in some institution in Czech?

[J. Zahradnik]: Yes, in Prague, in Faculty of Mathematics and Physics. This is Johana Brokesova and partly in the institute of rock structure and mechanics. They have attended it also.

[P. Bernard]: Okay. So, I think you Christos had a plan like this.

[Evangelidis]: Yes, we do have a plan and we said that within this GEO-inquire proposal we will acquire some portable rotational seismometers. So, if everything is succeeded in those, we will have some of them available for some time across the CRL areas. We plan to place them side by side for comparison purposes. I believe that it is an excellent opportunity to observe rotational motions.

[J. Zahradnik]: Christos and Pascal, please let us exchange emails in order to discuss about this subject.

[Bernard & Evangelidis]: Ok

[P. Elias]: I would ask if anyone has any questions or wants to add something about the governance or the funding. Ok, since you do not have anything to comment, let me share. Now I will just share the minutes of last year.

Beginning for the funding, Horizon helps and the National funding is the one of ELIDEK. I have to say in this point that the ministry mentioned that 80 million will be funded in projects like those. This is something that we will have to wait on. Perhaps, ELIDEK project will continue to be accessible.

However, there is a significant problem on ELIDEK in accordance with its implementation and evaluation. They may have passed one and a half indicators to evaluate the project, the proposal etc.

[P. Bernard]: Please, wait one minute, what project does ELIDEK support in the Greek side?

[P. Elias]: ELIDEK supports researchers, PhDs in the first call and second currently proposed synergies between researchers and private companies. This money was provided by National funding agencies to support research and technology development.

[G. Kaviris]: Relatively, there was a very low success rate.

[P. Elias]: The funding is not much; they will put 8 million, as we had a briefing from our director.

[C. Evangelidis]: Panagiotis, the question is if any of the Greek partners is awarded an ELIDEK proposal in this second call, so is it going to work within the CRL area? I do not know because they have not announced anything yet, in fact, they have announced only the numbers of the proposal without saying who is getting what and this is not the final decision.

However, I am sure that there will be more calls in the near future.

[P. Elias]: Yes, and perhaps they have put some money but most probably they will support PhDs and this kind of collaboration.

In addition, the MOSAIC project is a big effort led by Pierre Briole which is for 16 PhDs in the field of geodesy. It has been submitted two times, where the evaluation points have been increased but it has not succeeded so far. So, there could be a third MOSAIC and as it was mentioned in a previous meeting, this ought to be led by someone else. It is a fact that every time it is being proposed, it rationally gets bigger evaluation in terms of indexes. I do not know if anyone has a comment in this.

Finally, we have to close the COST proposal, does anyone have a comment in this?

[A. Ganas]: Panagiotis, about the MOSAIC, I was involved in the previous proposals, and I think that they were very good and the people involved are really good scientists, and the topic in general was quite interesting. However, the core of the problem was the innovative aspect of the proposal. The reviewers did not give good marks because we did not propose something innovative. But now by hearing to Pascal's new initiatives, and by also having Fillipos Vallianatos who is experienced with the optical seismology, I believe that the MOSAIC3 should be more or less directed into applying these new technologies to the Gulf of Corinth. So, the PhD topics should be on this new application and technology. Also, together with high rate GNSS, as Antonio mentioned before, and algorithms to process this vast amount of data. So, my proposal is to proceed with MOSAIC3, but we have to incorporate new topics and I'm ready to help with that as well. Also, about ELIDEK, I would like to inform that my PhD student, Varvara Tsironi has won an ELIDEK scholarship, and her PhD is partially on the CRL inner outer core area. Thank you.

[P. Elias]: Okay, thank you Thanasis.

[P. Bernard]: I think that this was a very good proposition. The thing is if you incorporate DAS systems in this MOSAIC3 proposal, then it may become huge because DAS systems are really producing a lot of data.

The latter involves a lot of software development, because this is a very new technological aspect. It is very exciting. So probably this will help for the acceptance of the MOSAIC three proposal. However, MOSAIC was mainly part of the geodesy field before so it may be a definitely change in MOSAIC. So, I do not know how big this DAS patch should be in the new proposal.

I would also add that if we want to keep up with new technology and geodesy, we might be interested in involving other optical systems that are first there as commercial systems which are DDSS. Concerning the technological aspect, they are similar to DAS systems but instead of integrating seismic frequencies, they integrate the fiber to have a strain in different pieces of the fiber. Of course, they do not have a very high resolution, it's  $10^{-6}$  or  $10^{-5}$ , but if you have a fiber that is integrated with commercial interrogators in over tens of hundreds of kilometers, then this will not be a problem. Then you will be able to see all the places which are straining, you can observe all the faults that are crossed by the fiber and perhaps you can also see their reaction when they are shaking in terms of a few microns of slip of the fault. So this is an old instrument but it is used for Geodesy in the frame of CRL and it could be very new and could be very exciting because it complements geodesy with GNSS. In addition, it could be included in the new MOSAIC. Also, the higher resolution strain that we put at the end of the fiber, which we propose in our FIM-OPTIC French project. This could be a technology that will require analysis of the signals in comparison with GNSS. So, this could be kind of marginal, but also it will be included as a new technology in this MOSAIC three project.

I do not know when it should be submitted, but it would be a good idea if we had the time to discuss all this.

[F. Vallianatos]: In any case, since we have capitalized some experience with a previous application of DAS systems, my collaborators, which are not only geophysicists and seismologists, but some are also electronic engineers, will be available to contribute in this direction. We will be happy to be involved in this because we have interest, and we plan to invest in this direction within the future. In addition, in continuation with what Thanasis said, we have one PhD student, Elena Partheniou, which is supported by

ELIDEK, and her PhD will partly use infrastructure of GPS data from CRL. So, we have some overlapping work.

[P. Elias]: So that is all about the MOSAIC, which seems to be very positive for evaluation but there has to be someone who will propose it and also to run it and to coordinate. So, we have to consider who this person will be. It will not be for this year. The deadline will be in December or in January, as it was in the past. Perhaps we can arrange a certain meeting for the MOSAIC within the beginning of 2022 in order to see the possibilities.

[A. Ganas]: I think that the deadline was actually this week. We have missed it because I am currently involved in another proposal. However, we need to prepare the third application very carefully because it has to be a good one.

[P. Briole]: I have a comment on the MOSAIC project, so in the system of grants for PhDs, there are three categories and we applied for one of them, which is a joint doctorate. In the other categories, the doctorate is not supported. They are given by one particular university, not to universities. The question is why we did that? In my personal opinion we did that because we and the colleagues that were with me in those two proposals, thought that it was a good idea to have a joint doctorate gathering two universities, one from Greece, one from other country of the CRL team and another one from another country. While the other place for application were more on the technology side. I had sent you a message concerning another European project on volcanoes and this one is at its end, and it is advanced technologically. So, those who will lead the further trial they must think about the continuation of the joint doctorates or decide not anymore joint doctorates. I think joint doctorate was a good pick. If we all think that it is good, then we have to make the team stronger. The team was not strong enough to provide good working conditions for the 15 PhD students in all Universities and we have to think very seriously about that. Also, we definitely need the critical mass of scientists that would be able to supervise those 15 PhDs.

[A. Ganas]: I agree with what you said. However, I would like to express that we need to concentrate more on new science. So, about the geodesy part, I think it would be just a component on the third application and not the main aspect. We need seismology and we also need new tools in order to make it successful. That is what I understood from the previous marks that the reviewers provided us.

[P. Briole]: I agree, in MOSAIC2 this was already the case because geodesy in MOSAIC2 was a minor component.

[A. Ganas]: Yes, for example, we should focus more on studying the swarms in the Gulf of Corinth because it is a very important physical process for people working there. So, this ties with the dense seismic network that we have and with the strainmeters that are going to be developed there and the tiltmeters. This also ties with the slow slip events located on the Hellenic arc. In addition, if there is any slow slip event occurring beneath the Gulf, it will be detected by strainmeters or tiltmeters. So, all of this ties together within your proposal.

[P. Briole]: In the ITN project, they pay just for the PhD and for the meetings around the PhD. This means that when we submit this kind of project, we have to declare and to demonstrate that the other needs in terms of funds that will be fulfilled. You already have your instruments, or you have projects that have already been funded for instrumentation. ITN is not to support the instruments in the field and not to develop new instruments, but it is to pay the PhD grant.

[P. Elias]: There will be a conversation in the meeting that will be specific for MOSAIC. Please send us an email everyone who would like to participate in this meeting in order to proceed.

Continuing, we have talked about the internships that could be organized between France, Greece and the Czech Republic. So, we have to have a point in our minds about organizing these kinds of internships. Does

anyone have a comment in this? Okay, about the independent scientific council, we have been told that we will have to see the scientific visiting committee about the proposal that we have discussed about.

The last three bullets perhaps have to go with the NFO.

Now, we can proceed with the next point from the agenda, which is the Czech participation. Our colleagues from the Czech Republic want to be more involved in many different aspects, and I think they have prepared a few slides for us to discuss.

[A. Ganas]: P. Elias, before we proceed, I want to ask about the COST initiative, because last year you went to Postojna and I want to ask, what is happening on this matter?

[P. Elias]: I communicated with Gaetano and asked him about the status and what is their opinion about that. They have given a lot of effort on this proposal that Pascal talked about before, and today they have not told me anything about plans for the future. This is what I am wondering about, can we as a CRL proceed to a COST proposal? According to what we have said previously we cannot because the COST must come from a bigger Consortium, which are all the NFOS. So, the COST action can come for all NFOS from Gaetano and Lauro. So, I believe that we cannot do anything. I did not receive any positive indicators about the COST proposal from their side. This is my feeling.

[A. Ganas]: So, if a COST proposal is focused on the NFOS then I suppose they are getting funded by EPOS or some other. I do not think that the reviewers of the COST will find it particularly interesting to finance an already existing Consortium of people. We should think of a COST involving also other communities. If you want to make it successful, we should bring a bigger community of people, not only people that are working on Alto Tiberina, in the Gulf of Corinth and Valais. For example, in the karst area that you visited there is a strong interaction between hydrology and mass movements and in strain deformation and perhaps also modulating some seismicity, as people in California have already demonstrated in a number of papers. I am talking about that the amount of stress that is affected by mass movements because of hydrological



signals that can also induce some earthquakes. This is sort of new ideas that the Consortium could perhaps deal and not to just bring together people that have been working together for 15 years.

[P. Elias]: Yes, so it could be some sites, for instance a volcano or near faults in order for the interaction to occur. This effort could be started from us.

[A. Ganas]: I do not agree that it should be started by us, perhaps people in Slovenia should be the leaders for that.

[P. Elias]: Yes, but we must understand that we are not talking about karsts only, but also for volcanoes and all the possible things that will bring new communities together in general.

[G. Kaviris]: Slovenia will talk about this at the NFO session. in ESC They have just become observers in the NFO community, and they are willing to be part as members.

[P. Elias]: That is a different aspect which does not involve the EPOS and the COST. If we are discussing to have some sites with CRL perhaps, Marmara or Etna, or even some other volcanoes, we will have to think what will be the main thing that will connect all of them and who will be the person that would prepare this? What do you think we can have in mind? We can discuss this via emails.

[G. Kaviris]: We are on interested in the COST as it was described previously.

[P. Elias]: Yes, but we can exchange emails in order to be updated if a critical information shows up.

[G. Kaviris]: About the Czech Republic, I would like to say that the things that Pascal said before about being an international NFOs is really important. As Pierre mentioned before, it is really important to have an international NFO.

In my personal opinion it is very important that Czech Republic wants to be more active and if we had a new agreement, the new MOU or maybe a new consortium agreement, it would be very positive. If of course Vlada and Frantisek agree to be members as Charles University in order to be more international. They have worked in the cage in the western part of the Gulf, and I think that this is self-evident that it could happen.

[P. Elias]: Do you have some slides to show?

[J. Zahradnik]: Yes, first let me thank you for inviting us to this meeting because in the previous years we did not take part in those organization meetings. I really appreciate this possibility and I would like to participate also in future meetings. Once again, thank you for this and we will present you some slides.

[V. Plicka]: This presentation is about what we did during the 24 years of cooperation between Patras and Prague. On this slide, you can see the current status of our seismic stations. We are part of the CRL, but just a single station belongs to this network. However, we are monitoring a greater area of Western Greece and our current status is that we have 15 stations, 9 of which are broadband seismic stations, 11 are strong motion stations and 6 are GPS stations that are involved. The GPS stations are depicted in the map by 4 triangles, but one is Paravola station and the other is south of Peloponnese. Our seismic stations are all working in real time and their data can be accessed through NOA and EIDA and are part of the Hellenic Unified Seismic Network. What we did during those several years, was done mainly by a group of three people, for historical purposes, there were more people involved but at the present time only three from our Department me, Dr. Gallovic and Dr. Zahradnik achieved what we present to you. We have close cooperation with the geodetic observatory Pecny and Dr. Kostelecky who manages our and his GPS stations

and of course we could not "exist" without the cooperation with Patras, Thymios, Anna, Nikos, Paris and I hope that I did not forget anyone. During those 24 years, Prague purchased 9 broadband and 11 strong motion seismometers and also 3 GPS. The highlighted line shows the total number of Euros that we invested to instruments, the cost for repair and the maintenance. The group of Kostecky installed 3 GPS stations. The maintenance in our case is dependent by the University of Patras that takes care of the stations continuously. However, we try to visit the stations at least one time per year. When the latter happens, we visit all stations in Greece for one week with 2 people. As mentioned before we strongly need money from our institution and we are lucky to be supported from our Faculty. In the past it was much more better because since 2000 it was relatively more easy to obtain funds for maintenance and not for buying the instruments. What we plan is actually a short-term plan, we want to sustain the network and we are not planning to increase the number of stations, mainly due to lack of people which can manage those stations and also the money is not so clear for the future. However, we will be pleased if we keep the network as it is. As I mentioned before, seismic data are available through EIDA and GPS data are available through the GNSS data portal and our data exchange with our partners from NOA and METRICA can be downloaded via a link. If one wants more specific data, then he/she can contact Dr Kostecky.

During the past years we developed new methods that were applied to significant earthquakes in Greece, Turkey and Italy. I assume that almost all of you are aware of the ISOLA package, utilized for multiple point source inversion and moment tensor. This package is constantly upgraded by J. Zahradnik and E. Sokos.

Personally, I am involved in empirical Green's functions techniques for slip, finite-fault kinematics and dynamic Bayesian slip inversions.

Next, I present you a list of significant earthquakes, such as the Kefalonia, Zakynthos, Lesvos and Samos earthquake. I must say that it was a pleasure cooperating with all teams and members of CRL about the work for the CRL crisis from the last year.

Thank you for your attention, if you have any question comments, please ask and me and my team will try to answer.

[G. Kaviris]: Vlada thank you very much. My comment is actually the same as the one I made before, which is to be more active. If we have a future agreement or an amendment or an MoU, then you will be active partners.

[V. Plicka]: Yes, sure. It will be our pleasure.

[G. Kaviris]: In addition, it will be a pleasure for all of us as well. I don't know if there is any objection to this by anybody?

[P. Beranrd]: No, of course not.

[G. Kaviris]: As Vlada mentioned, it was very important that we started cooperating even in a scientific point of view for this first paper. Now that we are continuing, we will cover all aspects, the instruments, the science, everything.

[V. Plicka]: Thank you very much for this. I will just make a comment about our group which is very small, subsequently we always hide behind everything else's back. But it will be great if we could participate more of course.

[P. Elias]: Thank you. We will also write down this component to the forthcoming actions since everybody is in full agreement. Pascal forgive me I forgot to tell you about the new project you had told us about, the one from national funding and the new sensors, that if you are able to put some information in the CRL portal about this.

[P. Bernard]: OK, I have just prepared a poster about our new three applications of these new instruments for a French meeting for seismologists. So, what I can do is to make this poster available. The only problem is that the title and the abstract is in English, but the main comments on the image on the poster are in French. However, I can either translate it or you perhaps can study the papers which will be referenced in this poster. So I will upload this on the CRL with a link to the CRL website.

[P. Elias]: So, if you do not have anything else to comment on this session, we can proceed to the next one.

[P. Bernard]: Excuse me, but I was thinking that I will present this on next Friday, which means that I can send you the link in order to have access on my talk. About the exact hour, it will be at lunchtime maybe on two o'clock so for Greece it will be on three o'clock. The duration will be approximately one hour. I do not know how everyone can have access to the link that I will send you. Maybe Elias keeps a track on the participants.

[G. Kaviris]: Perhaps you can make a reply to all at the mail I sent you.

[P. Bernard]: Perfect, that makes sense.

[P. Elias]: Well, I can provide you with a list, which will be a little more correct. But both solutions work. So, George, would you like to put the meeting points to have it in front of you?

[G. Kaviris]: Sure

[P. Elias]: Great, so I will share my screen and then you may proceed.

[G. Kaviris]: I must say that I will need the help from Pascal and Christos in this point as Thymios is not here. Are you sharing your screen now Panagiotis?

[P. Elias]: Yes, and these are the points from the previous years.

[G. Kaviris]: Yes, I know. Now for the Consortium Agreement, as we said last year, Valais from Switzerland, and Marmara from Turkey are inside. Iceland is off because after many trials, there was an official letter that they never replied. In addition, Gaetano said that they never replied to anything in EPOS. Slovenia sent all the necessary papers to become an observer and during our last meeting on Monday we were discussing it quite a lot. They want to take part because they have very few stations. Slovenia will be accepted as Observer because everything that the NFO community was requesting was fulfilled by Slovenia. However, there will be a decision from the NFO board for the requirements for a new member, in order to become a permanent member of the NFO community. Then we will initiate discussions on how many stations they will have access to, the quality and the availability of the data etc. The Slovenians are now becoming observers to the NFO community.

For the NFO Advisory Committee, we discussed before with Antonio, that this was decided from the NFO community in which Pascal and Antonio are members of this. Semih Ergintav is the name from Marmara, he is the person in charge of the NFO board for this NFO Advisory Committee. As I understood from Antonio, and maybe Pascal knows something more, this committee will start next year right Pascal?

[P. Bernard]: I do not have information about this yet. I hope it will start this year because it is important.

[G. Kaviris]: I agree with you, it is indeed important. Continuing, let me jump now to the Vp/Vs service because we have to discuss the issue that is also related to this as well to all other services.

[G. Kaviris]: Perhaps it will be needed to define it better as it is now. This is what we said Pierre, this will be decided within the NFO board, specifically it will be decided what is NFO and what is not. Indeed, the Slovenians have a very sparse network, and it has nothing to do with CRL or even with Valais and so this is what will be done. They are observers, but not permanent members.

So, I will need your help now for this, we were informed by Gaetano and Lauro that there is no funding for the NFO community. First of all, let me update you that previously we were informed that there were some funds to be provided with, in order to connect with IT services. We discussed with all institutions that are in the agreement, i.e., the National Observatory of Athens, CNRS, the University of Patras and the University of Athens, and there was really no IT person available. This was because, and Christos please correct me if I am wrong, the people that were in NOA are not still there. So, there was a very big difficulty in accepting this. This IT person must be dedicated because this was a big service. The funds are in the order of 18,000 euros for this person and Thymios who is not present here, accepted to take this part. However, this changed because now, we are informed that it is the first time in which there will be funds for the NFOS in 2022. Panagioti may I share my screen?

[P. Elias]: Yes, but let me inform you that Thymios has logged in.

[G. Kaviris]: You are back Thymios? Sorry I did not know that you were logged in. Maybe you can correct me if I say something with less detail.

Let me share my screen. As you can see these were the NFO services that we have declared. Among these only the three green ones are going to be funded, so CREW is not ready. FRIDGE is the main service and from all the other NFOs, only CRL and Marsite are going to be funded at this point as well. This is very important for CRL because only international NFOs are going to be funded. So, you see here we have this data services provision for CRL. The institution that was declared from the beginning responsible as service provider was France CNRS. From the total 73,000 euros we have declared 45,000 euros as an annual contribution for EPOS-ERIC. In the next slide we have the Envelope Proposal, and you are able to see only

the upper table from my share screen. As you can see, FRIDGE and CRL are going to be fully covered with the requested funds if this is accepted. So, we anticipate to have 45,000 euros in CRL for the next year. All these were just screenshots that I had from Monday, we do not have the minutes because it is too soon now. Thymios said that this money won't be kept but it will be given to other people for ICS and ITs. So Pierre only services are paid and nothing else.

Now, I will show you, and I believe that nothing has been changed since then, this table that shows what are the DDSS. These numbers are the services that we have to provide, for instance 1, 1b, 2 and 3 etc. So we have to provide all the depicted services in 2022. This is why the funds are needed for and of course to also provide this to the EPOS community, so an IT is also needed. what was said from the NFO community is to decide who will be the service provider, more specifically which institution and who is going to execute the job. There is only one who can be the service provider. So, it has to be decided if it will remain CNRS or if it will be a Greek partner. That's what I remember. Christo and Thymio since you were in this meeting please add anything that I did not mentioned before and Pascal we are waiting for your comments if you want to make some.

[P. Bernard]: The first thing that I want to comment on is that we are not sure that these funds are going to be available nor the probability that we will have them in 2022.

[G. Kaviris]: Indeed, it is not certain, but it is a high probability.

[P. Bernard]: So, we provide the services that are listed in the DDSS table. Part of the services are already online and distributed, which means that we have to see what is left and to manage the work that needs to be executed for the DSSS which are not already available to the community. I do not remember exactly what these numbers mean though.

[E. Sokos]: The services that have a priority are listed in the "ICS level" column.



[G. Kaviris]: So, we are talking about the numbers 1, 1b, 2 and 35. All of them are seismological data. Number 1 corresponds to velocity seismic waveforms, number 1b to seismic stations information, number 2 to acceleration seismic waveforms and number 35 to strainmeter for water level pressure. Number 2 which is seismological data are already there. Station information is there. Acceleration seismic waveforms is there and 35 is strainmeter water level pressure. Thymio are you sure that these are the ones only?

[Sokos]: Nothing is for certain because there is so much bureaucracy with EPOS. Probably we will have to also complete some services on the left column as well. The idea is to include data on the FRIDGE, for example Vp/Vs ratio and GPS data. All these should be fixed.

[P. Bernard]: My point is that these 45,000 euros are for this year only or for the next year as well?

[G. Kaviris]: Well, these funds are for this year for certain and we do not know if we will keep getting them for the next years.

[E. Sokos]: In order to be provided with funds for the next years we will need to perform well in our objectives.

[P. Bernard]: That means that we have to show that we provide new things.

[E. Sokos]: I do not know if we have to show new things. The sure thing is that we must provide continuous data with high quality. I believe that this will be enough. However, this does not mean that we will receive the same amount of money. But of course, it will not guarantee us that we will get the same amount of money.

[P. Bernard]: The question is, what are your needs in terms of IT, GPS or GNSS data and to communicate with FRIDGE on your side? Because on our side, we do not have much need except perhaps for the website and communication and data management in Paris, rather than in distribution. Because distribution goes to Strasbourg, so maybe there will be a need in Strasbourg, but so, on the Greek side, you need someone part time for doing part of the job.

[E. Sokos]: Yes of course we need some IT person, we cannot do it on our own.

[G. Kaviris]: Yes, an IT person is needed. I do not know if it is going to be a full-time job. Probably not.

[El-Assaoui]: I am sorry for interrupting, but I wanted to mention that I can comment as a TCS group member of the Near-Fault, the Vp/Vs web services are already available and developed by the TCS group. So, I think we have to ask Lauro to be in contact with the developers at INGV to give you the package for the web service for Vp/Vs

[G. Kaviris]: That is the thing Madani, the fact that there are many things that can be given, but the main concern is how they will be given and that is why we need an IT. We need someone that can lead us.

[El-Assaoui]: Okay, the second point that I want to comment on is that the structure of organization at French varies as a separate task for each team or Institute. This web service I didn't know if it still has a label at the distribution node which is installed at the institute EOS. So, we have to ask Sophie Lambotte the state of this web-service for distribution if actually is available. And if it is operated services or if it is not yet implemented in the website service of RESIF in France.

[P. Bernard]: Well, Sophie has left so she cannot answer. However, I can ask her about the progress on that in Strasbourg. This is because Strasbourg will be the main place where there might be some information about this topic of DDSS.

In accordance with the IT person on the Greek side, if you have a budget for a part time job about this position, then I believe the IT person should be shared among the three Greek institutions. You have to see how this might work. Do you prefer to have a small part time job inside each institution in order to make specific developments attached to specific data from Patras or from Athens?

[E. Sokos]: It is not so critical for us here in Patras. I believe that this position should be given in the National Observatory because they collect all the data. So probably a person in the National Observatory would make more sense.

[C. Evangelidis]: Well, I don't know about the data curation or the operational or some field maintenance

[P. Bernard]: Field maintenance is difficult with this money. So, you can try to use it in some way. But it should not be kind of open. The open stuff

[E. Sokos]: One thing that I would like to mention is that it is not clear how this money will be spent. From the information we have from Gaetano, it is not clear if this money is only for IT people. What is the purpose of this money? Is it for salaries or it can cover travel expenses? Moreover, can it be utilized for equipment maintenance?

[G. Kaviris]: What I would like to propose is to keep part of the money for station maintenance even if it is not meant to be utilized in this way.

[P. Bernard]: I suppose that you can make this proposal acceptable unless there is someone who controls the funds.

[G. Kaviris]: What I mean is that it could be also for a person's salary who could go to the places needed. Something like a part time job for the fields of seismology and GNSS.

[C. Evangelidis]: George, we have done this in the past, in the EPOS IP project, we had the budget here at NOA and we could employ someone.

[G. Kaviris]: Yes, I believe it could be something like that. However, now it is something more global. For instance, I assume that it can be one person for seismology and one for GNSS whose job is to fix the stations when needed. The stations could be from CL, NKUA, NOA and Patras.

[P. Elias]: Yes, this could be a good solution.

[G. Kaviris]: In addition, this might help the French party because stations could be fixed faster, especially CL stations. It will not be a full-time job but the people who are hired could spend one week or ten days in the field to fix the stations, if we have the instruments of course.

[P. Bernard]: Also, we have to make sure that the required DDSS are completed at the same time. However, we must complete and the less important DDSS in order to be funded in the next year.

[G. Kaviris]: Of course, we have managed to complete several services like Vp/Vs, focal mechanisms and many more that belong to the left column. We can provide this IT person with those. Now, I do not know if there is availability for travel because we do not know these details.

[P. Bernard]: Yes, I have a question to ask maybe for Lauro. Is the money only for manpower or for travel also? Maybe we will have to wait until we obtain the funds, because the ways, which are going to be utilized will be clearer then.

[G. Kaviris]: It was said that a request approval must be sent from the General Assembly of EPOS in December of this year. In addition, it was said that we need a multi-year consortium agreement. The list of the proposed services must be given in February. Consequently, we must decide what will be asked to be funded and then there will be a contract within 2022 with the service provider who we have to decide who this is going to be.

[P. Bernard]: At the moment, it is said that it will be CNRS, but it can be changed anytime.

[G. Kaviris]: Well, I understand that they need a decision very soon.

[P. Bernard]: What do you mean by very soon? In December or in early 2022?

[G. Kaviris]: Maybe earlier than December, right Christos and Thymios? They said it is urgent.

[P. Bernard]: Okay, my guess is that the dominant part of the budget will be given in Greece, and it would make sense actually as it would be more efficient, what do you think?

[Evangelidis]: Let's see what is efficient and what is eligible. We have to discuss about the cost as soon as possible. George did you say something that they have a board meeting on December?

[G. Kaviris]: I had this screenshot, where it is depicted "request approval from the General Assembly" and "General Assembly approves the activation of virtual access of the financial envelope in December".

[Evangelidis]: OK, is this the general assembly of EPOS-ERIC that has a meeting? I think it will be on 15 or 14 of December, and then they have to get a general approval for all these actions.

[G. Kaviris]: Are you are a member there Christo, are you going?

[Evangelidis]: I was a member until some days ago. I do not know if I am going to participate by myself from now on or someone else is going to participate in this from NOA

[G. Kaviris]: Pascal, are you a member?

[P. Bernard]: No, but probably from the level of CNRS it is H. Pedersen.

[G. Kaviris]: Yes. But we have to know what happens. That's what I mean.

[C. Evangelidis]: No, it is the delegate of France

[P. Bernard]: OK. So, it's higher level even.

[C. Evangelidis]: Yes. It is the General assembly, so one delegate from each country that pays the fees.

[P. Bernard]: OK. So, it's a ministry level. So, I will ask her what is decided.

[C. Evangelidis]: It is either a ministry level or some scientist from an institute that pays the fees. Up to now from our side it was Akis Tselentis and I was his substitute. In addition, my guess is that if a decision goes to the General Assembly for an approval, that means that it is going to happen.

[G. Kaviris]: Yes, but maybe they need to know who will be the service provider before that, if I understood correctly.

[C. Evangelidis]: I do not think so.

[P. Bernard]: I believe it is kind of a global acceptance.

[C. Evangelidis]: But for sure we have to discuss it as soon as possible.

[P. Bernard]: I believe that a Greek provider would make more sense.

[C. Evangelidis]: If it is for personnel, then that is not a problem.

[P. Bernard]: But then again you will have to see what is eligible.

[C. Evangelidis]: It is completely different hiring one for the IT position and to know that you cannot use this IT person for maintenance, right? So, we have to think about it a little bit more.

[P. Bernard]: Maybe they will be two people or three.

[C. Evangelidis]: Yes, we will figure it out.

[P. Elias]: Should we continue on EPOS according to the schedule? In the agenda that is TNA in CRL.

[G. Kaviris]: Could anybody else who knows better about TNA please explain in detail? It is related to what Pascal said before about the project but within the framework of EPOS TNA it will be effective. Then the NFO community is going to apply TNA, right, have I understood correctly? Christo? Pascal? Thymio? If you could correct me if I am mistaken.

[P. Bernard]: I have no information.

[G. Kaviris]: That was said before when you were not present.

[C. Evangelidis]: I am not sure that I understood your question can you please repeat it again?

[G. Kaviris]: What about the TNA in NFOs within the framework of EPOS?

[C. Evangelidis]: I do not think that the TNA is getting paid from EPOS. It is just because they do not have money, and they do not have yet enough money to support the TCS in EPOS. So, this is the reason that they will not fund TNA yet.

[G. Kaviris]: Well, they might fund TNA in the future, right?

[C. Evangelidis]: Indeed, especially if we manage to have more countries to start paying fees for EPOS.

[G. Kaviris]: So, that's all for this from my side.

[C. Evangelidis]: Just to give you an information within this General Assembly that we will discuss about the multi-year service activation roadmap. We are not going to discuss anything about TNA. So, I do not know.



[G. Kaviris]: We have to decide after learning what is eligible.

[C. Evangelidis]: Yes, but who is the service provider? For CRL, who is the service provider? Who is providing data and services? To EPOS for CRL.

[P. Bernard]: NOA and CNRS.

[C. Evangelidis]: That is a little bit tricky here. You know, you cannot add other things, one of the two can get some funds. For example, what is going to happen to CNRS who is providing data and services if NOA gets some funds?

[P. Bernard]: Maybe we have the possibility to split the money, but the French administration will keep the part of the money. I do not know if this is enough.

[G. Kaviris]: This might happen? For the Greek side, if NOA is the service provider, then NOA must give the money to CNRS.

[C. Evangelidis]: But NOA cannot be the only service provider for CRL, because there are certain products are coming from CNRS side.

[G. Kaviris]: Yes, but only one service provider can be declared.

[C. Evangelidis]: Well, apart from the waveform data, all the other services that are declared are coming from the CNRS side.

[P. Bernard]: Yes, I agree. So, if CNRS remains the service provider then we will have to find an official way to transfer the funds to NOA. Maybe it will not be so complicated.

[C. Evangelidis]: Well maybe, but then again, we will have to find a way to solve this.

[P. Bernard]: Yes, sure I will ask. Maybe it will be less sophisticated if we maintain the funds because you will utilize them more freely. If the money is provided to CNRS then you will not have a direct control. Then, when is needed we will provide you with the necessary funds and in return you will have to compose a little report about this manner. Maybe in that way it will be easier, but we will definitely have to think about that. However, it is not the right time to decide now because the proposal is not yet accepted.

[A. Avallone]: Excuse me, can I ask a question? So, if I understood correctly, EPOS does not provide funds, instead you receive money from the national institutions - ministries. Should the CNRS and NOA be declared as service providers, then you will receive funds from the French and Greek ministry. To conclude, is it the same in Italy? Are the costs eligible so we could utilize them for travelling purposes, personnel or maybe something related also to the infrastructure?

[C. Evangelidis]: Antonio, some people from EPOS have decided that they will redistribute some of the funds they have obtained via national memberships back to some TCS (Thematic Core Services) providers and so on. I know for a fact that this is already happening with the field of seismology, because they redistribute some funds to ORFEUS for coordination and so on. Consequently, they will manage to do that for other TCS as well. At the point, somehow, the EPOS-ERIC organization will provide funds to INGV for FRIDGE, right?

[A. Avallone]: I am not updated about FRIDGE at the moment. However, I have a knowledge about the GNSS part in Italy. I imagine that EPOS-ERIC could provide funds to INGV for FRIDGE probably. I knew

that. I must mention that now we are in a phase where only governments are funded, so maybe in 2022 something will change but I do not possess information about that even for the TCS of GNSS.

[P. Elias]: So, we have reached a conclusion for the EPOS NFOs. Also, we can schedule a meeting when we know something more.

Continuing to the last session, which is the CRL School. I will briefly show a presentation, but first things first I do not know if you would like to say something in advance, George.

[G. Kaviris]: No, I think you can perfectly describe it.

[P. Elias]: Okay, so let us start. Two CRL schools have been conducted since the last meeting. For the year 2021 we had many applications that were above 60 for the students, sadly though 21 of them appeared. The conclusion is that the online versions are not very attractive. In addition, 9 high school teachers had participated. For the previous year, 2020, 23 students and 10 high school teachers had taken part in CRL School. The school has been recognized by the Ministry of Education for the previous academic year and the recognition for the current academic year is pending. There has been a proposal from NOA through the ESERO, but it hasn't been taken into consideration, unfortunately. This proposal has not been accepted yet. Lastly, I must mention that I have uploaded material for the CRL school.

Another point that I want to add is the lack of foreign participation from students and teachers. We desperately need some channels to disseminate the information for the next CRL Schools for students and teachers to participate. We found the way in Greece to disseminate through the Ministry for the teachers and through the Universities for the students but we lack of support from outside Greece. So, we need your help always. Currently, I have some links with the Athens School of Fine Arts in order to take an action that will involve more people in this and for the School to be more attractive. It is very early to have some results, since we have reached almost one week of action.

In the next year hopefully our CRL School will be conducted in the field on 23 to 27 of September, approximately. In accordance with the organization, there are some students that will aid us, those that are currently logged in are Angelos Zymvragakis and Katerina Karabitiani. Perhaps, there could be more students but their answers are pending. I do not want to go into this with full detail, so if anyone wants this presentation, I will send it. However, I will not upload it in the CRL portal, therefore, I will send it via email to anyone who is interested.

Every time a CRL school has been held, we provide both students and teachers a different questionnaire, which we analyze upon completion and we send that analysis to the Ministry in order to recognize the school. Let me provide you with a sample of this questionnaire with some questions that are written in it. One of the questions is how you rate the CRL School globally. We also have a pie graph and some evaluations. In addition, we have some comments as well. Another question is how you rate CRL globally from the scientific point of view. There are some other questions as well but as I mentioned above, I will not go in full detail about this. In general, most reviews are positive and many of them are helpful in order to upgrade the CRL School for its next conduction.

I also have two things more to say about this. We are considering the recognition for different aspects, for instance the vocational education training and the lifelong learning unit. It is something that the teachers may use it. In fact, we are in communication with Fotis Danaskos to see if this recognition will be viable for them. We do not have a concrete answer yet. Also, there is something that we were discussing about some years ago and that is to be recognized and be able to give through the University of Athens, European Credit Transfer and Accumulation System (ECTS) to the students. So, this could be for a student and the previous could be for the teachers. Probably, this will be beneficial for the teachers from the Technical High School, perhaps not the Classical High School, but we will have to see.

Also, there has been some thoughts about a mutual session with Etna, but we have not received comments from Pierre, but it is not the right time now, because there might be some changes in the future for the Etna school. So, we will have to see this later.

Concluding with the CRL school, is there anyone who would like to add something? Maybe George or anyone else?

[G. Kaviris]: We hope that next year, the CRL School will be conducted on the field in Patras and Nafpaktos. There were no significant problems when it was held via ZOOM or WebEx, but it was definitely not the same thing as the main components were lost. Those components were about going to the field, seeing the stations, seeing the faults, and also one of the main things was that people got to know each other and they were discussing about all of those things that they were witnessing.

[P. Elias]: Does anyone else have a comment? Now, let me show you one point, that we are not going to discuss about it, and that is about the student exchanges among partners Universities and accepting internships.

[G. Kaviris]: At this point I would like to ask Pascal if they can now accept PhD students, because our agreement in Erasmus is only for MSc students as you know, is there any change Pascal? Because we really need it for PhD students.

[P. Bernard]: I do not currently know anything about this subject.

[P. Elias]: Okay, continuing now for the public outreach, as I have mentioned before, the only thing that we have done is to compose the letter of the seismic crisis and CRL. Also, we have initiated a link with the School of Fine Arts that could help us because they have plenty of experience of doing some activities with the people on local communities. They also possess the ability to film the actions that we take during the CRL Schools, and they know the channel that they can perhaps fund this type of action. So, we'll see how it will go this way.

Let me make a parenthesis at this moment because I remembered that Pascal since you were not from the beginning, we have told that there has been some discussion about the borehole, the diameter and to know some more things on this subject. Unfortunately, no one has answered on this matter.

[P. Bernard]: Do you mean about the deep Aigio borehole? I think the only person who has information for this is Christophe Brunet, because, as you know, Francois Cornet passed away almost one year ago, and he had all the information that we need now. Christophe Brunet who was the engineer that was working with him, maybe has a copy of his documents. I don't think that this is documented at the CNRS even though part of the support was coming from the University. It was part of a European project, which means that they might be some reports that are available somewhere. So, there are three ways to recover this information, one is through Christophe Brunet, one is through the reports in this project to EC and the last is through internal reports in CNRS. I will investigate it via the first way, which is to ask Christophe Brunet.

[P. Elias]: Concluding, we have to highlight some points. We ought to create a fault map within the CRL area that will be incorporated to the National fault map. Maybe this will be prepared by EPPO. We also have to upload the manual and automatic earthquake catalogues in the CRL portal. Lastly, a link to EIDA within the CRL portal must be added. Also, a technical meeting concerning the maintenance of the instruments in the field must be held. In addition, we have to take actions to set up a scientific visiting committee that will consist of 3 to 5 or 6 members outside CRL in order to evaluate and propose some strategy for the CRL and prepare a document that could be a basis of the political aspect of the CRL as an entity. Also, we have to proceed with the cost now that we know what the cost is, but not the detail and not with every aspect. From all the partners, Greek, France and Czech, we need them to put it in a document the expenses in order to claim it also as a document to insist the governance. This could be disseminated through the CRL portal and perhaps to other entities like EPPO, so they have to take these actions to work among us. A discussion must be conducted in Greece with the CNRS and others about the CRL as an entity and to coordinate somehow. We have to consider the MOSAIC project, please send me an informational

document every one of you that wants to be involved. We can conduct a meeting when we have a clearer vision about the MOSAIC3 in order to discuss some aspects like who is going to be the leader of the MOSAIC3. Pascal will send us the next link for the video conference that will be for the instruments. Last, we must make a decision about the money from EPOS for the next year, how it will be disseminated and from which entity.

Those were the actions that must be taken. I do not know if George has something to add.

[G. Kaviris]: It was a huge meeting, even again, it was not in person for one more year. Let's hope that next year we'll be able to meet in person for this annual meeting as we did in Patras or in Athens. Panagiotis analyzed in detail what we said today, we have several actions to take and let's hope that things will get better for funding and for science. Thank you.