1. **Lessons learned (**including organizational, legal, data-related issues)

The involvement of the Earth Sciences Department from the Barcelona Supercomputing Center in the MyGEOSS project has been overall an enriching experience for our group. It allowed us to know about the datasets available at the GEOSS portal and getting a first interaction with the GEOSS community.

First of all, through this project, the European Commission has given us the opportunity to develop an application that we had in mind since some years. After the success that our first CALIOPE (Iberian Peninsula domain) application had in Spain and Portugal, we found it as a target to develop a similar application for the European domain, in order to increase the outreach of our forecast service and also to boost the visibility of our department.

Thanks to this project we had the chance to overcome this challenge, increasing the number of forecast hours from 24 to 48 and reaching to a much bigger and heterogeneous population (increasing the number of stations and the number of countries).

As a side effect, we have also had given to the community the opportunity to expand our work, by releasing our code as open source, as it was one of the project requirements. In this sense, besides we plan to continue maintaining our application and covering all the issues that can arise, the potential for improving it is now much bigger, in case the community find it interesting to do it.

The commitments acquired with the European Commission, the requirements to share our data in GEOSS, as well as the guidelines provided for the data management plan, made us to adapt some rules that we were not using before. Learning how to write a complete metadata file to describe our datasets, by paying attention to the different fields, and solving the different issues that appeared through the documentation process, were very good exercises to increase the robustness of the data that we share in the CALIOPE system. Other issues like a documentation for the system or traceability of the data were concepts that we really were taking care before. Summarizing, our participation in this project has been a very good learning opportunity and a way to develop some best practices to strengthen the robustness of the system.

One example of that is that we discovered the different ISO rules for data typology and different ways in how the data generated by the CALIOPE system can give a georeferenced information. We realized that we were sharing our data in a non-standard way. So, again we made our application better.

Related to the metadata and the documentation, as it was a commitment for the project, we now have a User Manual, which we did not have before, and have expanded also the documentation within the source code, now that it has to be available for the public, one task that not always receives the appropriate attention.

Another interesting point is that with our participation we realized about the strictness of some data policies. In our field, we tend to use and reuse data from many different sources without even asking which policy protects that data. This has been a quite major issue for the use of the NCAR Mozart model inputs for the chemistry model. Until we participated in MYGEOSS, we have been using this outputs without taking care about the openness of these data. Therefore, as the European Commission established an exception for our case and some other similar we now are aware that we need to inform our users about this situation.

Related also to this data usage policy is the fact that before participating in MyGEOSS we were using Google Maps without thinking if there was any restriction in the usage of this map services, licensing terms speaking. The fact that the Google Maps service has become kind of a standard, the robustness of their API, favored with the enormous feedback they can get with their so high number of users, and the accessibility and easiness of use for starters, gives the false impression that it is a free service. In fact, the only restriction that we cared before was the limitation in number of daily connections, because that could constrain our service in a sense of accessibility. But we never thought about if we were providing also an Open service.

Therefore, at the time we presented the first version of our CALIOPE EU application, which was Google Maps based, we were warned about the constraint on data openness that this Maps API has, so we had to move to an open platform like OpenStreetMaps to overcome this limitation. This was an extra technical challenge that we did not consider in the project design, and not a trivial one, which is to move from a very well-known system for us like Google Maps to an unknown like OpenStreetMaps. Finally, we decided to use Leaflet, which is a library that is able to work with OpenStreetMaps (<http://leafletjs.com/>), and thanks to its easiness and usefulness, and most of all, to the similarity in structure with the Google Maps API, we did not have any constraints in this aspect and we did not have to perform big changes in our code. Even more, we could replace an Open Source library which we were using to handle customized layers, with a new self-made library much simpler than the one we were using, thanks to the shortcuts that Leaflet provides in its API for the most common operations.

Thanks to this change, now we can offer completely open map data, without any limitation in the number of daily users, and with the fact that we are not tied to a proprietary service that one day can change its conditions of use. Furthermore, we now can work with different map layers and we can provide the ability to be switched by the user inside the application.

Another interesting point to outline is the visibility increase for our application after participating in a project like this. Uploading our data in a service like GEOSS has given us a huge visibility in the community, which is always a positive aspect. In this sense, it also enforces you to produce and give the best service as possible to the users.

To celebrate and increase this visibility, we published a press note in our institution’s website, and some information and reviews were provided by the general and specialized media, so our outreach has been even greater.

So, as you can see we took a lot of good practices and experiences after our participation in MyGEOSS program.

In order to provide some numbers about the outreach of the project, we are pleased to say that in such a short time we had got around 700 application downloads, which we expect to rise as the project is better known for more users.

**Some recommendations:**

1. It would be very useful to have a list with documents and useful bibliography to read before starting developments. Recommendations, examples and a list of requisites would be a nice help for the participants. In the GEOSS portal there is a lot of documents and when your start your project is hard to find the right document to start reading.
2. In this sense, based on previous recommendations like ours, and in order to avoid more common pitfalls, it would be very helpful for the participants to get a list with more common non-open data sources (Google Maps) and the open-data alternatives (OpenStreetMaps). In our case, this would have avoided to perform a lot of extra work to us.
3. We had also a few problems to build our metadata file. In fact, we gathered a few existing metadata files and we created ours. It would be very nice to have an example with commented and explained methodology and fields to fill.
4. As a notification, we also wanted to inform you (in case you are not concerned about this), that the GEOSS portal has a few links which are broken.