Report on the outcomes of a Short-Term Scientific Mission[1]

Action number: CA22164 NERO

Grantee name: Eduard (Edwin) Kok

Details of the STSM

Title: **Real-time wildfire analysis and resource management**

Start and end date: 28/07/2024 until 04/08/2024

Description of the work carried out during the STSM

Description of the activities carried out during the STSM. Any deviations from the initial working plan shall also be described in this section.

(max. 500 words)

The main objectives for this Short-Term Scientific Mission were:

- Understanding wildfire analysis and resource management
- Using data to effectively fight wildfires
- Learning the methodologies of fire analysis

The first part of this STSM was to be introduced in the systems that are being used in the National Civil Protection Authority (ANEPC). Almost all relevant information can be found in one system: the FEB Monitoring Platform. In this platform is information about the location of fires, the status of fires, the location of units and radio's, previous fires in the past years, types of vegetation and much more available. Almost all the information that is needed to do a good analysis during the fire is available in this particular system. During the STSM I used the FEB-platform to do analysis myself and do a re-analysis of a fire at the 24th of July. For this analysis I used a lot of data (fuel models, fire progression polygons, photos and videos and meteograms) to understand the fire behaviour and progression. This is one of the objectives of NERO: to use data to analyse (extreme) wildfires.

I learned about the AEO (strategical analysis) and the systematic work that is being done to predict the fire behaviour for the next three days. With information from IPMA, the meteorological institute, the basis for the weather forecast is available. The fire analysts are 'translating' this information to the fire behaviour that can be expected, based on four main 'parameters'.

[1] This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

- Type of fire (wind driven, topographical or convective (based on windspeed, boundary layer etc.)
- Rate of spread (based on windspeed/ISI)
- Intensity (based on FWI)
- Mop-up operations (based on DC/DMC)

For every parameter there is a table available to compare the values of the FWI (sub)index(es) with the rate of spread and fire behaviour that can be expected. I made my own analysis at the 2nd of August and I presented my forecast for the day, including also the WBGT-system that is related to heat stress in people. It was good to see that we could have a discussion about possibly adding the WBGT-system to the analysis so that commanders are more aware of the heat risks for firefighters.

Although it was not necessary to do a lot with resource management (because there were no very large fires) we discussed about the possibilities to (pre)position units and which choices are being made to send units to one fire or another. That was one of my main objectives to discuss in Portugal, because in The Netherlands we face this issue of resource management and we don't have a good plan for that yet. Not only the resource management in Portugal was relevant: there was also a request from the ERCC to send assets to East-Europe for assistance. Together with the analysts I made a prediction for the wildfire risk in Portugal in the next week and the conclusion was that the danger in Portugal was too high to send assets to another country.

I was introduced in using GIS-systems and putting information together in QGIS. I evaluated a fire from the 24th of July and made a report about this fire. Dr. Akli Benali and I together analysed the fire spread during this particular fire and I could see the value of videos and images from the units on scene and the thermal images from the plane (Oscar). This information is absolutely necessary to evaluate a fire, from the rate of spread to the (possible) fireline intensity.

Relation to the NERO activities

With the use of all kinds of data to analyse wildfires I matched the objectives of WG 1 and 2 in NERO. A lot of information and data sources I used in Portugal can also be used to analyse wildfires in The Netherlands, so we can do a much more process-based analysis of wildfire behaviour. I saw the necessity to have scientific information and knowledge combined with the operational reality (the fires) to improve models on the one side and the prediction of fire behaviour on the other side. That's part of the WG 3 objectives. And for the WG 4 objectives: I shared the information about this STSM on social media, I will do a webinar about my lessons learned and the necessity for science in wildfire analysis in The Netherlands and I made a report of 16 pages for the Netherlands Fire Service with my experiences and recommendations.

Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

(max. 500 words)

This STSM really exceeded my expectations. With an overwhelming lot of help from the analysts in NAD-AIR, Akli Benali and the (sub)commanders of the ANEPC I got to learn so much about doing a good pre-fire analysis (strategic analysis/weather and fire prediction forecast), real-time fire analysis, resource management and post-fire analysis.

I've learned that the basis to do a good analysis is data and information. You need to have good maps about fuel, fuel availability, previous fires etc. to predict the fire spread. You need real-time information about the status of the fire by the videos from the Ciclopes-system (camera watch-out towers) and helicopters or planes to see what the fire behaviour is like. You need to compare the information from

the videos and images with the strategical analysis and see if there are (local) differences. And you need to predict very early if additional resources are possibly needed and where you can get them from.

I've seen how researchers and scientists work together in the fire analysis. The specific knowledge of Akli Benali about fire behaviour can be used very good by the fire analysts. That's why I think it's very important that researches/scientists are actually knowing what is happening in the operational organisations. This is of course one of the objectives of NERO, to make sure that practitioners and scientists are working together to be better prepared for (extreme) wildfires.

Results

Enhanced decision-making process: I've learned how decision making is used in fire suppression, which includes understanding how strategic decisions are made and executed in real time. This knowledge is relevant for the goals of WG 2 of bridging researchers and practitioners and understanding how scientific insights are effectively integrated into operational fire management procedures.

Improved fire and environmental data utilization: WG 1 of NERO is about data collection and systematic analysis. I found out that although we have improved a lot in our data collection in The Netherlands, we have to do a lot more to really make good analysis. What was very good to see is the daily briefing with relevant stakeholders about the situation for the day (or the week).
I've learned to use the GIS-application, fuel models and combine operational information (e.g. photos, videos and fire perimeters) with the weather forecast and other relevant data sources.

Advanced fire analysis techniques: this topic is also relevant for WG 2. I learned to combine a variety of data to analyse fire behaviour. That was both real-time during fires (with analysis of photos/videos and the fire perimeter and rate of spread) and after the fire (within the report about the fire of the 24th of July I made and where I calculated fireline intensity and rate of spread). During this STSM, I learned about (and used) three 'types' of analysis:
- Strategical analysis with a more general forecast of the weather and predicted fire behaviour
- Real-time fire analysis
- Post fire analysis.

Follow up collaborations

It's clear that NW-European countries **have** to learn from the colleagues in Southern Europe. In NW-Europe there's limited knowledge and especially limited experience with (large) wildfires and the only way to get this knowledge and to get more experienced is by joining fire-prone countries and seeing what they're doing. That's why we discussed during the STSM that it would be very good to send colleagues from the Netherlands to Portugal to work together with the Portuguese organisations, for example on prescribed fires or wildfire analysis. We can also let Portuguese experts come to the Netherlands to train our fire analysts-to-be (they're still in training) how to do a good strategic and real-time analysis. And we can let people discuss with our dispatch center and commanders about resource management.