

Report on the activity carried out during the STSM

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STSM type: Regular (from Italy to Spain)

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STSM Topic: Multivariate extreme models vs Matrix based method: the case of Jiquilisco (El Salvador)

Host: Prof. David Rios Insua, Universidad Rey Juan Carlos, Madrid(ES), david.rios@urjc.es.

The visit to URJC in collaboration with I Prof. David Rios Insua, has led to the following activities:

1. Discussion and advanced drafting of a paper entitled: “Extreme Weather Risk Assessment: The Case of Jiquilisco, El Salvador”;
2. Writing a divulgation paper entitled: “Cambio climático, fenómenos meteorológicos extremos y análisis de riesgos” ;
3. Preparing a research proposal to be submitted as part of the Marie Skłodowska-Curie actions 2014.

The period at the URJC has allowed progress on the analysis of data and relationships between ENSO phenomena, and natural phenomena related to it such as droughts and floods. This relationship has not yet been established in quantitative terms in the literature although several attempts in this regard suggest the existence of such dependence.

The paper currently in preparation is the first outcomes of a larger project, which has as a case study Jiquilisco, located in El Salvador, it has as main objective to define a general framework for risk adaptation/mitigation to extreme weather events related with climate change that affects the region: in particular the main threats are floods (some of them due to hurricanes and tropical storms) and droughts .

The first part of this work has as objective to evaluate in probabilistic terms, within the risk analytic framework, the occurrence of events as flooding and drought, based on data that we have collected from 1970 until 2012. The first phase is the analysis of occurrences and their impact consequences on the area. The type of questions that we aim at responding are: over the next ten years, how many drought months and flood days do we expect in this area?

We have built several probabilistic influence diagrams for the problem, assessed the corresponding priors to build the distributions and nodes and built some simulation programs to respond to the type of questions mentioned above. The crucial point remaining is building a forecasting model for ENSO events. We are working right now with a Markov chain model with three states with apparently good results. An advanced draft of the paper is written and we hope to finish it by end of September 2014. These forecasting models will be a key ingredient for the continuation of this work which aims at deciding the best adaptation strategies. We have also developed a scheme for such paper based on maximum expected utility. At this point, it is important to note that even important references in climate change, like the SREX (2012) IPCC document tend to promote matrix based risk assessments. Thus our work would make a change in the state of the art approaches in the field. From a practical point of view, we should stress that we are dealing with one of the most climate stressed areas (Jiquilisco) in one of the most climate stressed countries (El Salvador) in the world..

Another activity developed during the period of the mission, was writing a divulgation paper. This paper has as its objective the dissemination of information on how climate change is affecting the entire planet, specially as far as extreme weather is concerned, and how probabilistic risk analysis methods, with incumbent expert judgement techniques, are key methods to facilitate mitigation and/or adaptation.

Based on this work, during the STSM period, we started preparing a proposal (EXODUS) in the context of Marie Sklodowska Curie Intra European Fellowships, which will be submitted in its final form in September 2014. The project will be presented with the STSM beneficiary as a researcher in charge, and professor David Rios Insua as main host, who will be joined by Dr. Oswaldo Morales at TU Delft, both partners of the COST EJNET. It will have a duration of 24 months. The overall goal of EXODUS is to provide a decision support methodology for extreme weather change adaptation/mitigation in medium-long term. We aim at defining the best portfolio of countermeasures, given constraints, protecting a local community from extreme weather events, which can minimize the consequences of the phenomena under study. We shall focus on the need to protect simultaneously from several threats. The methodology will be tested through two case studies, one that already the subject of study, the community of El Marillo II in El Salvador, mainly

affected by flooding and drought, and Southern Italy, focusing more specifically on landslide risk , flooding and drought. The two case studies will help to develop general methodologies that show how the decision-making process and policies can be influenced by social and cultural, in the broad sense, contexts and expressed by values, of the communities themselves.

As a conclusion we believe that this STSM has contributed to the EJNET project mission. Despite the shortness of period, it served to strengthen collaboration between partners, led to some publishable and applicable research and to potentially a longer collaboration between three nodes in the network (Italy, Spain, the Netherlands).