Considerations about wind gust thresholds related to social impact: study of different regions in Catalonia

Barberia L. (1), Amaro J. (1), Aran M. (1) and Llasat M.C. (2)
(1) Meteorological Service of Catalonia, Barcelona. Spain; (2) Dept. Astronomy & Meteorology. Univ. Barcelona. Spain

Correspondence to: L. Barberia (barberia@meteo.cat)

1. INTRODUCTION

Severe weather can cause several damages on a territory and its population (Munich Re, 2016). Wind is one of the most important meteorological phenomena which cause remarkable economic issues (Concilio de Compensacion de Seguros, 2015).

PREVIOUS STUDIES

a) Fixed wind thresholds: MEXIK (Janes et al., 2014), Catalanman Meteorological Warning Alarms (Vila et al., 2010).

b) Different wind thresholds for different regions: 58% percentile of daily maximum gust speed (Hewston et al., 2011), South America (Stepek et al., 2012), Pyrenees area due to changes between strong winds and gusts (Gayà et al., 2015).

The vulnerability factor is included.

CURRENT STUDY

AIM: To obtain, for each county in Catalonia, thresholds of gust speed from which a remarkable social impact is observed. Applications: Better knowledge of the gust speed values that cause damage in different areas in Catalonia. In the future it could be used to consider new thresholds for Civil Protection alarms. Therefore, a higher accuracy by region will be reached.

APPLICATIONS: Housing damage, liquefaction occur, soil behaviour, fragility of a structure, the location requested to be protected.

2. AREA OF STUDY

 Catalonia

Topographic diversity

Diversity populated

Different wind regimes

A REGIONAL ANALYSIS IS NEEDED

Catalan administrative division will be used: 42 counties

3. DATA AND METHODOLOGY

Studies conducted by the Social Impact Research Group, in the frame of MEXIK, stated that requests related to damage claims received in Meteorological Services are a good proxy indicator of social impact (Amaro et al, 2010).

REQUESTS

Cites, correspond or organisations ask for data for a period in a certain location

EVENT ANALYSIS

Association of the most representative weather station of the SMC network for each event, individual treatment of each request: WIND ACOUNT

METEOROLOGICAL REPORT

Report with the most representative data for the location requested.

Criteria for the study database: a) Requests received between 2011 and 2015, related to events of any year b) Requests which only demand gust speed data c) Period requested: less than a month d) Not included if it was not related to a damage claim

NEW DATABASE: REQUESTS vs GUST SPEED by county

4. RESULTS: REQUESTS VS GUST SPEED

a) RANGE OF GUST SPEED VALUES

P25: lowest outliers due to mistakes in the dates requested should be below those values

P25 could be linked for some damage, not severe

P75 Gust speed provided in reports (2011-2015)

P20: highest outliers due to mistakes in the dates requested should be above those values

P75: limits outliers due to mistakes in the dates requested should be above those values

P25 Gust speed provided in reports (2011-2015)

P50: median value

P75: 97.4 km/h (2011-2015)

P50: 72.4 km/h (2011-2015)

P25: 60-100 km/h (68% of the requests)

Example

For visual exploration, description and comparison of the data (Gaussian Kernel smoothing, default bandwidth with 8 package).

For each county of Barcelona province (black lines) county:

GIR), due to differences between 60 km/h and 100 km/h. Requested limits outliers due to mistakes in the dates requested should be above those values.

P75: median value

P75: 97.4 km/h (2011-2015)

P50: 72.4 km/h (2011-2015)

P25: 60-100 km/h (68% of the requests)

Example

For visual exploration, description and comparison of the data (Gaussian Kernel smoothing, default bandwidth with 8 package).