CLIMATOLOGY, CAR ACCIDENTS AND ROAD SECURITY
CASE STUDY: IP4 (PORTUGAL)

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Introduction
The regional atmospheric dynamics, sources, and fundamental importance in planning because of the spatial human occupation reflects the opportunities and constraints of each place.

This study considers the climate and weather influence over the structures designed for the terrestrial mobility, namely roads.

Objectives
Our main purpose is to understand the threats caused by adverse meteorological situations over road mobility and road safety. We want to evaluate how and which are the different weather types play a role with the specificities of the road to affect the driven security.

Parameters Affecting the Road Security

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![Map of Portugal highlighting IP4 area](image)

Case Study Area

The “Aveiro Norte” IP4 is an important Portuguese road concluded in 1993, connecting the districts of Porto, Vila Real and Braga.

Since then it accumulated 460 road accidents with X deaths and Y injures.

![Main Hydrographic Network and Slope Map](image)

Results

1) Case Study Topographic Profile

![Case Study Hypsometry](image)

2) Signification Entailed in the IP4 Case Study Area

![Total of Road Accidents with Period and Weather Conditions, in the Case Study Area, Between the Years 2001 and 2007](image)

3) Percentage of Deaths Associated with Good and Bad Weather Conditions, in the Case Study Area, Between the Years 2001 and 2007

![Table of Correlation and Comparison of Variables: Air Temperature, Relative Humidity, Wind Speed, Precipitation](image)

Methodology

1) Direct Acquisition of Data:
- Registration, in situ, of the temperature (Celsius) and the relative humidity (percentage) values with five seconds interval using the Thermo-hygro-thermometer Digital Delta Ohm HD-6551.
- Measurements realized on 17th May 2006 at Braga, Vila Real and Aveiro.

2) Adopted Model to the Treatment of Data:
- Definition of measurement points, 124 in total catalogued with 65 meters equidistance.
- Statistical analysis using “Non-Parametric One-Sample Kolmogorov-Smirnov Test”, using the “SPSS 15.0” statistical software.
- Information and results processed and presented in graphs and in maps created with the GIS “ArcGIS 9.2” software.

Conclusions

- The percentage of injuries and deaths as result of accidents is higher in adverse weather situations.
- The occurrence of more accidents during good weather conditions, the percentage of injuries and deaths resulting of vehicle accidents is higher in adverse weather situations.
- During the analyzed years, the highest number of car accidents happened in good weather conditions which correspond to the majority of the days in our area.
- The road studies present some construction deficiencies that promote an accumulation of vulnerability factors (slope, share vs solar exposition, and altitude) that contribute to a high number of severe accidents.

Bibliography

- Relevant studies and references related to climatic and meteorological variability and its impact on road safety.