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Investigation of accident modelling data in Greece

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Ευρωπαϊκή Ένωση
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Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης

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Introduction

- Road traffic injuries are a leading cause of death for people of all ages and the number of road fatalities in several countries remains unacceptable
- However, budgets for road safety measures are limited, and decision makers and road safety stakeholders worldwide have to decide about the most effective use of available funds
- Quantitative road safety analysis methodologies have been developed over the years, to enhance evidence-based decision making
- Common ground of most such methods is the necessity of high quality data on:
  - road crashes and casualties
  - infrastructure geometric characteristics (e.g. curve radius, lane width, etc.)
  - traffic attributes (e.g. AADT, synthesis)

Scope of Study

- Investigation of the availability and accuracy of crash modelling data in the primary (non-motorway) rural road network of Greece through three short case studies:
- Case study 1 on the availability and accuracy of crash data in rural non-motorway roads in the sub-region of Viotia
- Case Study 2 on the availability of traffic data in rural non-motorway roads in the sub-region of Viotia
- Case study on the reliability and accuracy of geometric design data obtained through common Open GIS Data Platforms, evaluated on a segment of Patras-Pyrgos two-lane highway

Case Study 1: Crash Data

- The Hellenic Statistical Authority maintains the official road crash database in Greece, used in the study
- Data collected by the Police in standardized templates and checked and codified by the Hellenic Statistical Authority
- The database includes road crashes in which at least one involved road user was injured (slightly/seriously) or killed

Case Study 1: Crash Data

- Data for all injury road crashes in the sub-region of Viotia were considered for the five-year period 2011-2015
- In 51% of total injury crashes there was no indication of the road on which the crash occurred.

Year	Total Accidents	Unknown Road	Unknown Road (%)
2011	118	57	48%
2012	92	53	58%
2013	101	55	54%
2014	75	35	47%
2015	65	32	49%
Total	451	232	51%

Case Study 1: Crash Data

- In a further 9% (42/451) of total injury crashes, although the road code was available, the specific crash location was unknown and was not included in the database.

- Only for 39% (177/451) of total injury crashes both the road code and the road station was recorded.

Year	Accidents – Known Road	Known Road – Unknown Station	Known Road – Unknown Station (%)
2011	61	9	15%
2012	39	14	36%
2013	46	8	17%
2014	40	8	20%
2015	33	3	9%
Total	219	42	19%

Case Study 1: Crash Data

- Further investigation in 14 specific rural roads whether basic infrastructure characteristics of the crash database coincide with the actual characteristics of each site
- Considered characteristics were:
  - presence of intersection
  - curve or straight segment
- In 46% (23/50) obvious discrepancies between the crash database and the actual conditions were identified, indicating a possible miss-location of the crash

Year	Accidents – Known codified Road and known Station	Matching of infrastructure characteristics (accident database and road coding)	(%)
2011-2015	50	27	54%

Case Study 1: Crash Data - Results

- The findings overall indicate that only approximately 20% of available crash data in rural non-motorway roads is potentially usable for purposes of safety analysis and modelling that requires precise crash location.

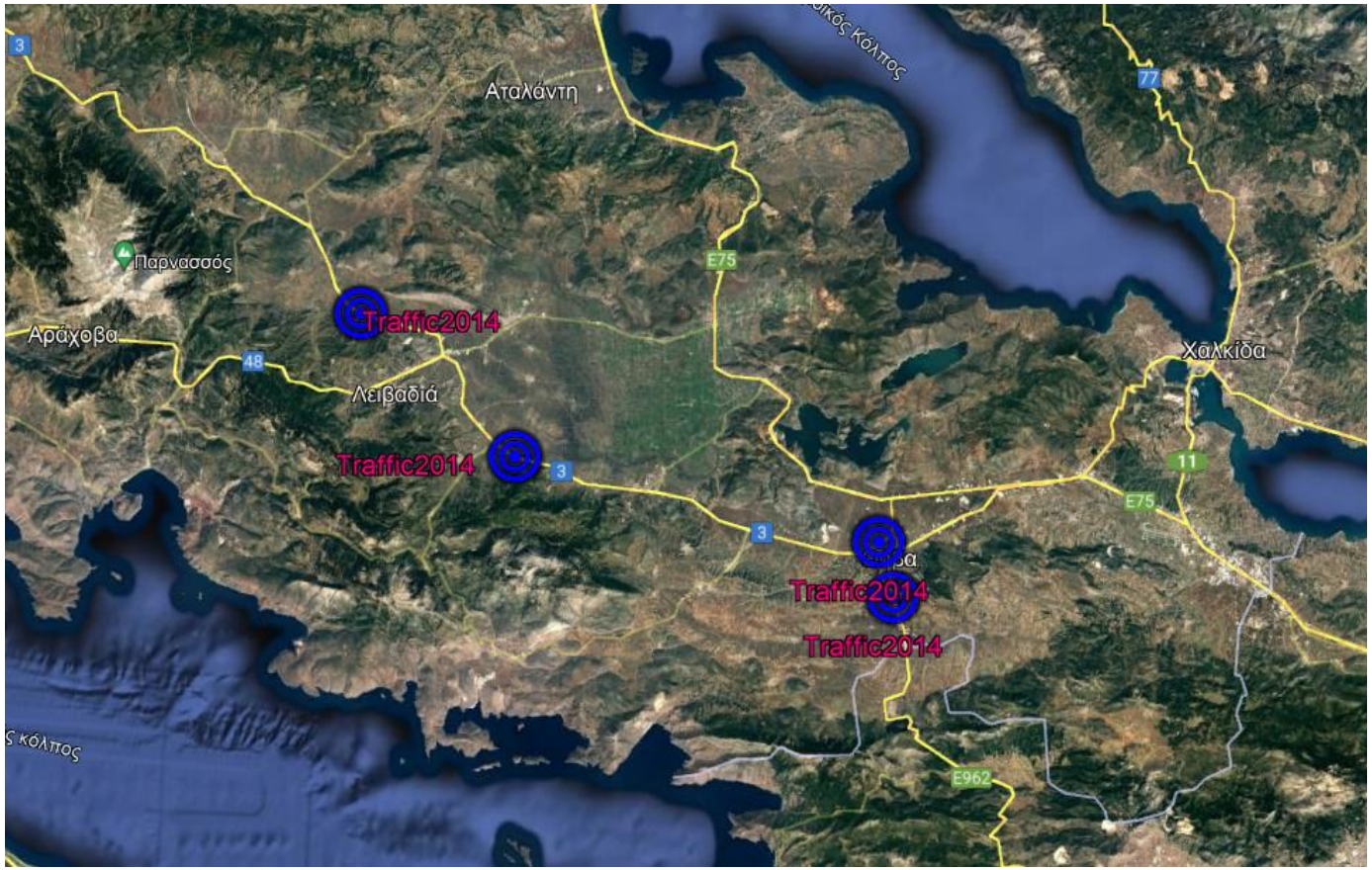
- Detailed screening and in depth crash data investigation is required prior to using crash location information for road infrastructure safety management in Greece.

Case Study 2: Traffic Data

- No official national database in Greece for traffic data
- Regularly updated datasets exist only for some urban areas and for toll-operated motorways (not always available to researchers and practitioners)
- Traffic data on national and/ or regional rural roads are collected on a per-case basis by regional road authorities, commonly using spot traffic counts.
- The lack of traffic data is an important obstacle in road infrastructure safety research and safety analysis

Case Study 2: Traffic Data

- Investigation of traffic data availability was performed in the national and regional road network of the sub-region of Viotia
- Over the last five years prior to the study, four spot traffic counts surveys were identified, each covering a 12h per day period (8am to 8pm) for a period of three days (in 2014) for both directions of travel.
- Traffic synthesis data were also available.



Case Study 2: Traffic Data - Results

- Data potentially useful for road safety analyses, after suitable elaboration to estimate the AADT.
- Yet, the available traffic data cover a very small fraction of the road network in Viotia sub-region, limiting the scope of the analyses

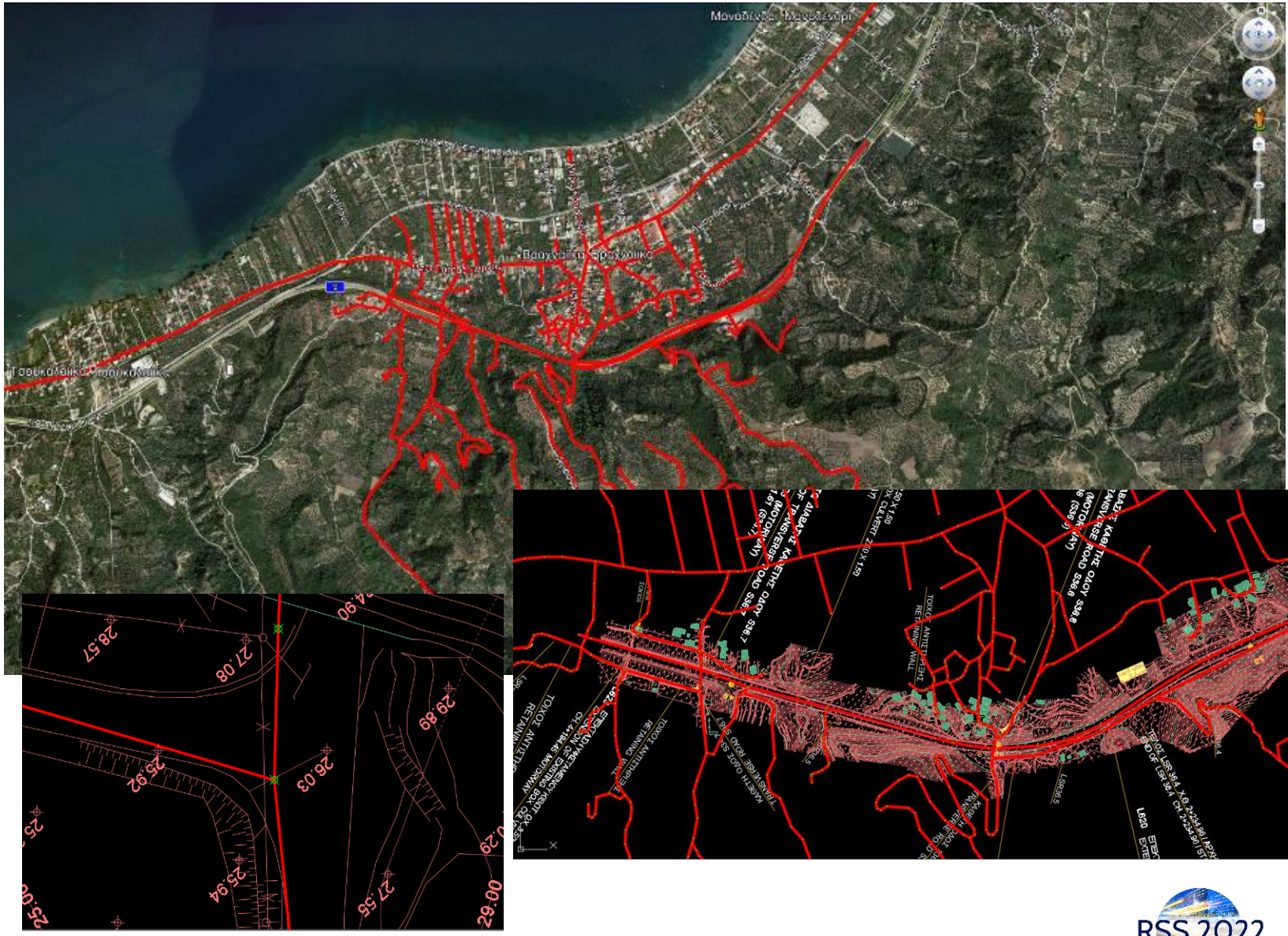
Case Study 3: Geometric Data

- The development and application of crash prediction models and road safety assessment techniques is closely related to the availability of geometric design data:
  - horizontal and vertical alignment,
  - cross section elements
  - roadside conditions
  - other road features and equipment

- The correlation of geometric design data with crash data, while also considering exposure (i.e. traffic data) is a fundamental element of quantitative road safety analysis.

Case Study 3: Geometric Data

- Examination of the road axis of Patra-Pyrgos National Road in the area "Vrachneika"
- Comparison of road geometry data retrieved from OPEN GIS sources to the actual data as derived from a detailed topographic survey at scale 1: 500



Case Study 3: Geometric Data

- Small differences (commonly less than 1m) were found in the comparison of the horizontal alignment → horizontal alignment data derived from the Open GIS sources can potentially be used to build a road geometry database for road safety analyses.

- Street surface elevations obtained from Open GIS applications have very large deviations when compared to actual surveyed elevations (1m-over 10m) → accurate information for vertical alignment and road elevations cannot be effectively collected from Open GIS data sources

Case Study 3: Road Elevations

Point no.	X (Easting)	Y (Northing)	Elevation (Blender)	Elevation (Survey)	Difference in elevations (m)
1	294999,85	4225789,11	29,18	25,98	3,20
2	295066,33	4225763,10	42,33	43,17	0,84
3	295230,16	4225760,95	48,94	49,60	2,36
4	295506,68	4225736,57	49,35	47,40	2,34
5	295867,39	4225772,21	68,33	71,20	2,94
6	295901,81	4225838,99	66,06	64,40	4,56
7	295917,74	4225759,28	82,82	87,10	13,55
8	296081,10	4225921,02	58,82	56,80	0,82

Point no.	Latitude	Longitude	Elevation (GPS Visualizer)	Elevation (Survey)	Difference in elevations (m)
1	38,15933492	21,661877543	28,90	25,98	2,92
2	38,15911579	21,662643230	43,50	43,17	0,33
3	38,15913362	21,664512330	49,60	49,60	1,70
4	38,15897678	21,667673047	47,40	47,40	0,39
5	38,15937938	21,671776748	71,20	71,20	0,07
6	38,15998853	21,672150183	64,40	64,40	2,90
7	38,15927434	21,672354699	87,10	87,10	9,27
8	38,16076776	21,674171548	56,80	56,80	1,20

Conclusions

- Limitations of study:
  - Focus only on the rural non-motorway road network. Motorways and urban roads are not considered.
  - The 14 selected roads of case study 1 may not be representative of the road network of Viotia
  - Crash data accuracy and traffic data availability in Viotia may not be representative of the entire road network
  - Limited extent of investigation of Open GIS geometry data

- Despite the obvious limitations, the study highlights the significant efforts required to improve road safety data availability and accuracy in Greece:
  - improve training of Traffic Police for crash recording,
  - equip Traffic Police with GIS equipment for crash location identification,
  - systematic traffic data collection,
  - improve the national road network registry and include road infrastructure geometric data

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