

SPATIAL AND TEMPORAL INCIDENT ANALYSIS FOR EFFECTIVELY ALLOCATION OF RESOURCES

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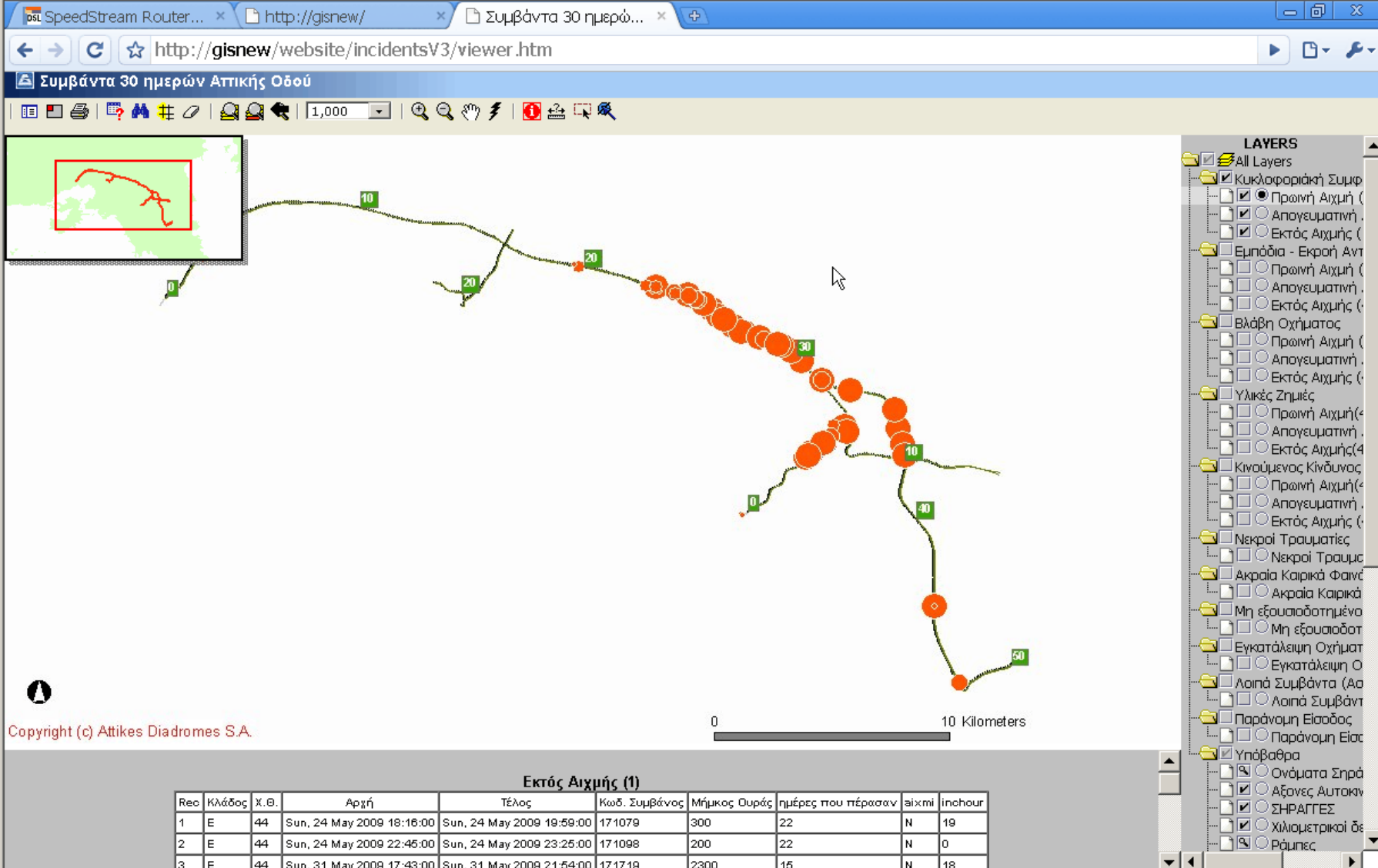
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GIS Approach

- GIS was first implemented in Attica Tollway in 2002
 - Infrastructure and Asset inventory tool
 - Data warehouse
- In 2006 first presentation in 1 ISFO
- 2004 till now an enterprise GIS system using web GIS technology.
- Information storage, presentation and **analysis** tool.
- Based on ESRI's ArcGIS Technology.

Web Interface



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0 10 Kilometers

Εκτός Αιχμής (1)

Rec	Κλάδος	Χ.Θ.	Αρχή	Τέλος	Κωδ. Συμβάντος	Μήκος Ουράς	ημέρες που πέρασαν	αιχμη	inchour
1	E	44	Sun, 24 May 2009 18:16:00	Sun, 24 May 2009 19:59:00	171079	300	22	N	19
2	E	44	Sun, 24 May 2009 22:46:00	Sun, 24 May 2009 23:25:00	171098	200	22	N	0
3	E	44	Sun, 31 May 2009 17:43:00	Sun, 31 May 2009 21:54:00	171719	2300	15	N	18

ID Visible Features

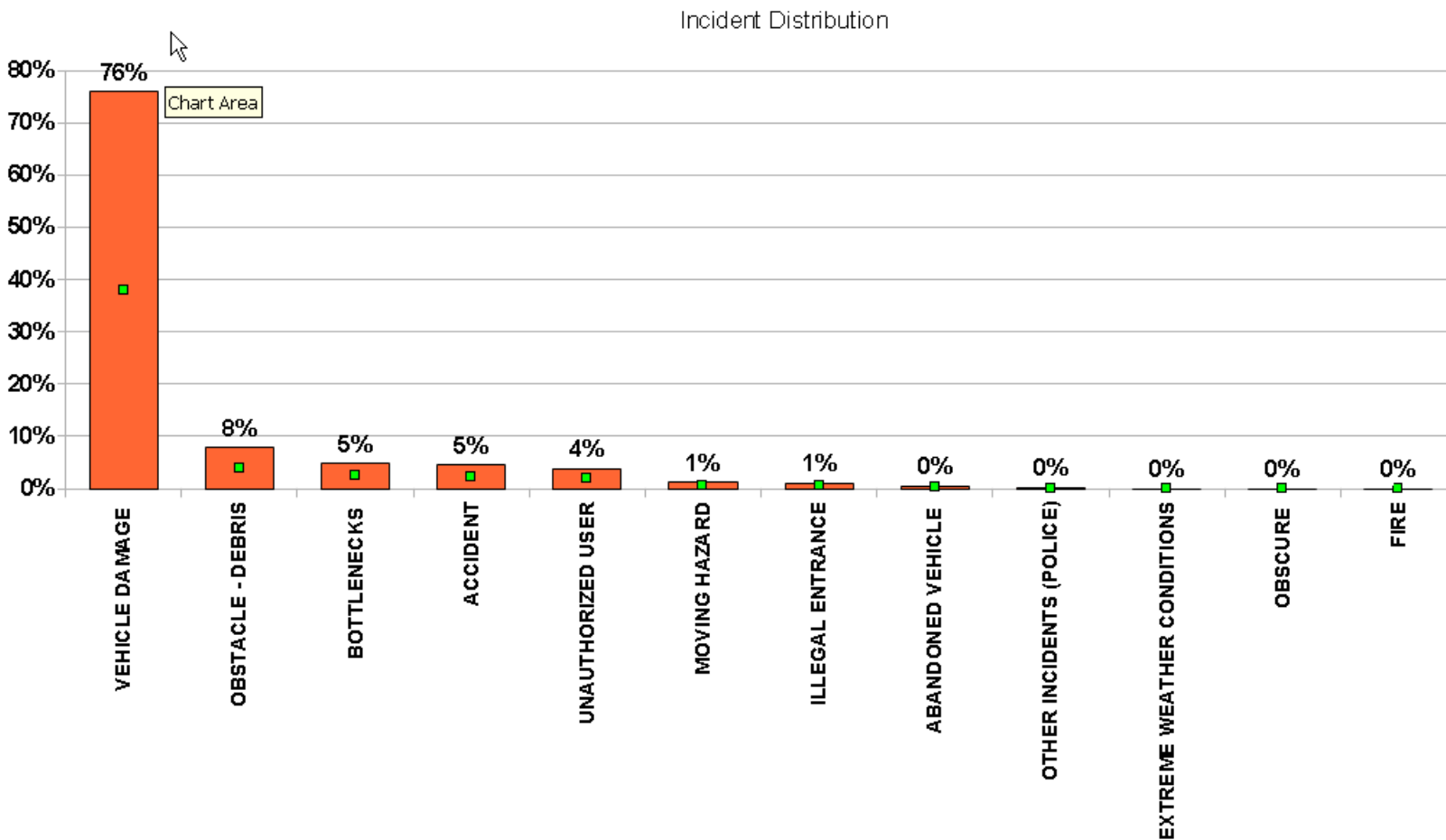
The problem

- Do incidents happen randomly ?
- Is there any time pattern ?
- Are there any spatial patterns ?
- Can we detect areas or time frames with higher probability than an incident may happen ?

Incidents per day per year



Incidents Classification & Distribution



Incidents analysed

- VEHICLE DAMAGE (76%)
- OBSTACLE – DEBRIS (8%)
- BOTTLENECKS (5%)
- ACCIDENTS (5%)
- UNAUTHORIZED USER 4%
- MOVING HAZARD 1%
- ILLEGAL ENTRANCE 1%
- ABANDONED VEHICLE 0%
- OTHER INCIDENTS (POLICE) 0%
- EXTREME WEATHER CONDITIONS 0%
- OBSCURE 0%
- FIRE 0%

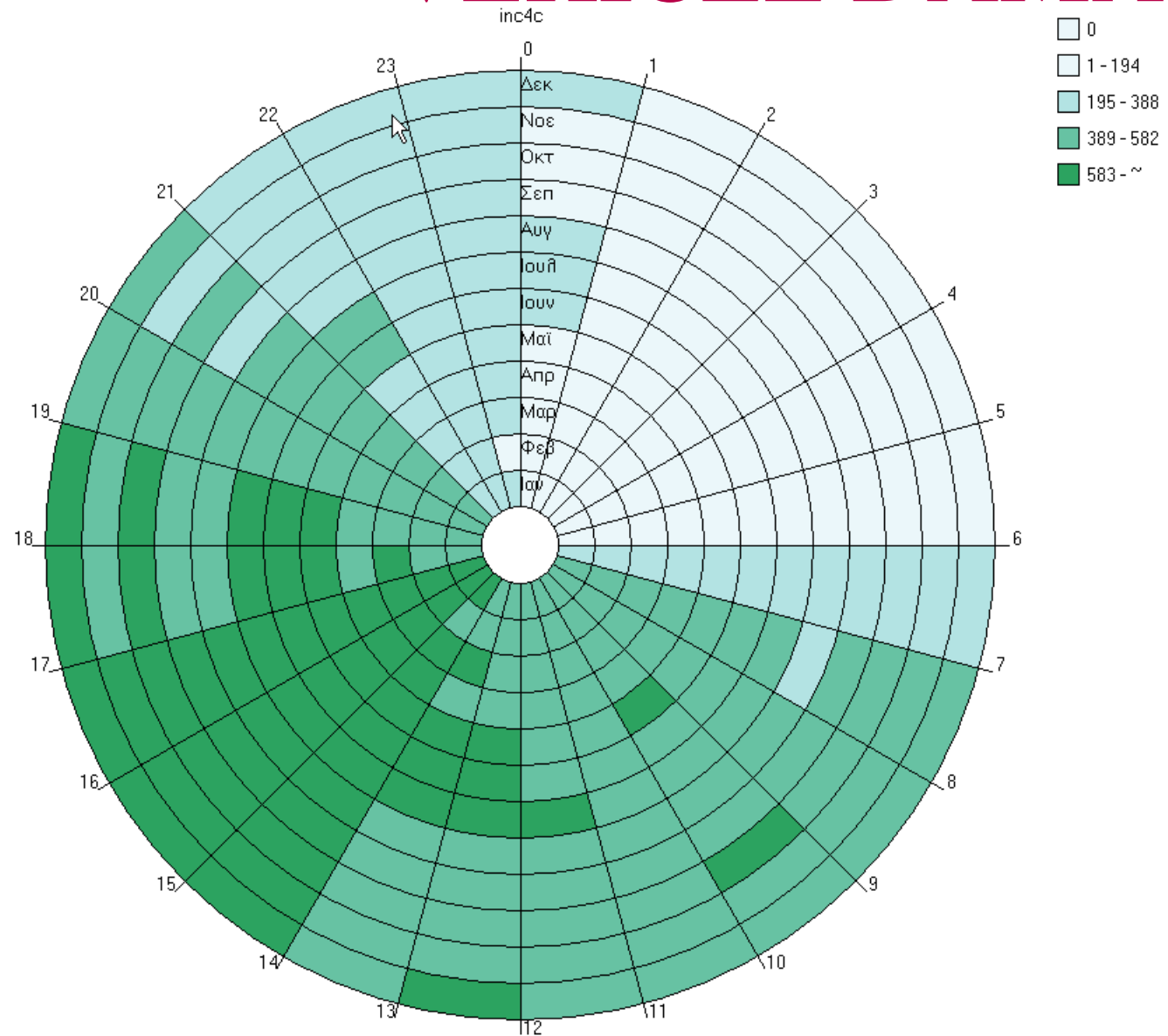
153781 Incidents

Period of reference 29/09/2003 till 31/05/09

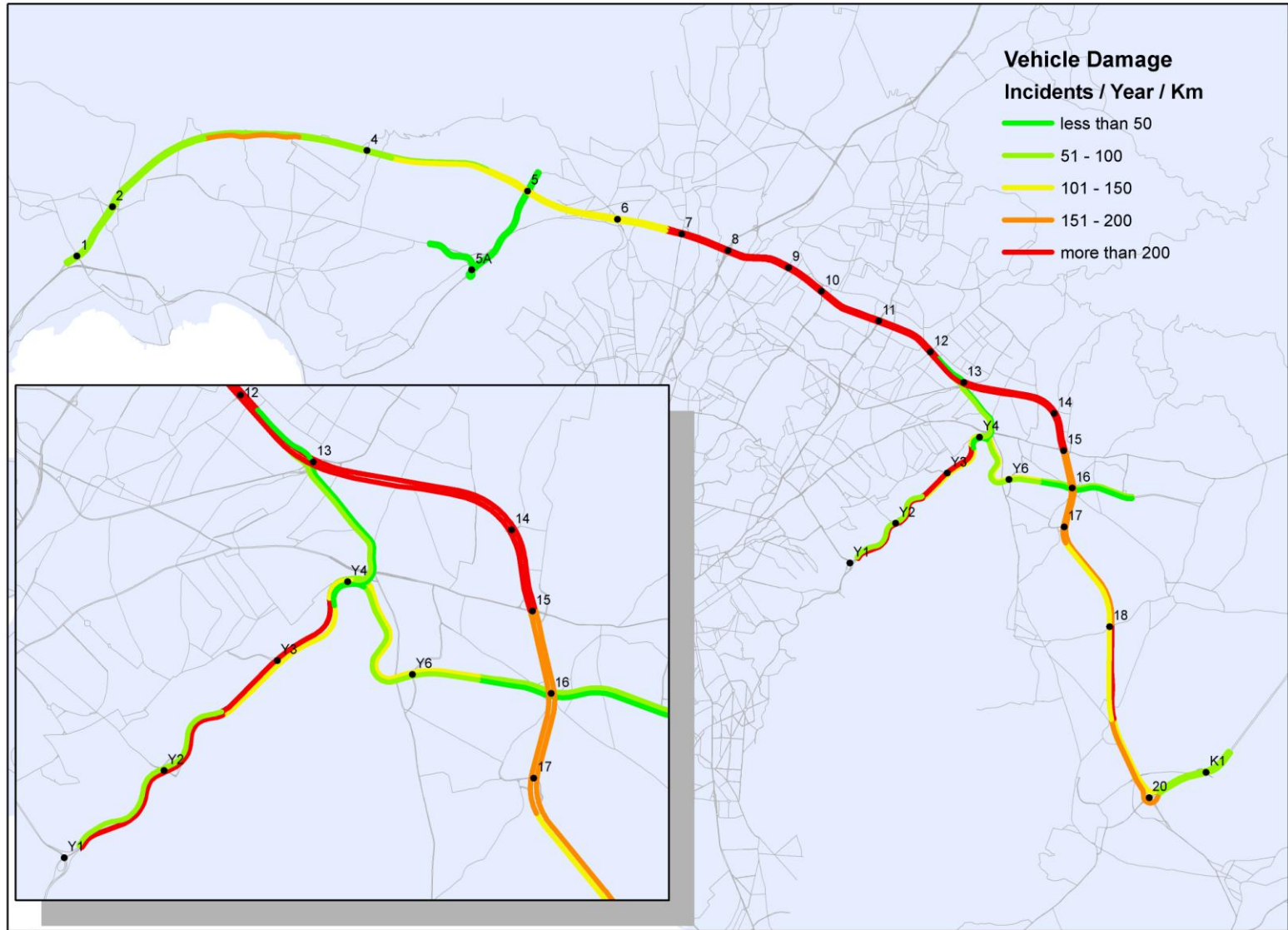
Methodology

- Development of a Geo-processing **tool** that
 - Aggregates certain categories of incidents
 - Transforms point events to linear features
 - Adds symbology
 - Produces “clock diagrams”
- Temporal analysis in
 - Hour of the day
 - Day of the week
 - Month of the year

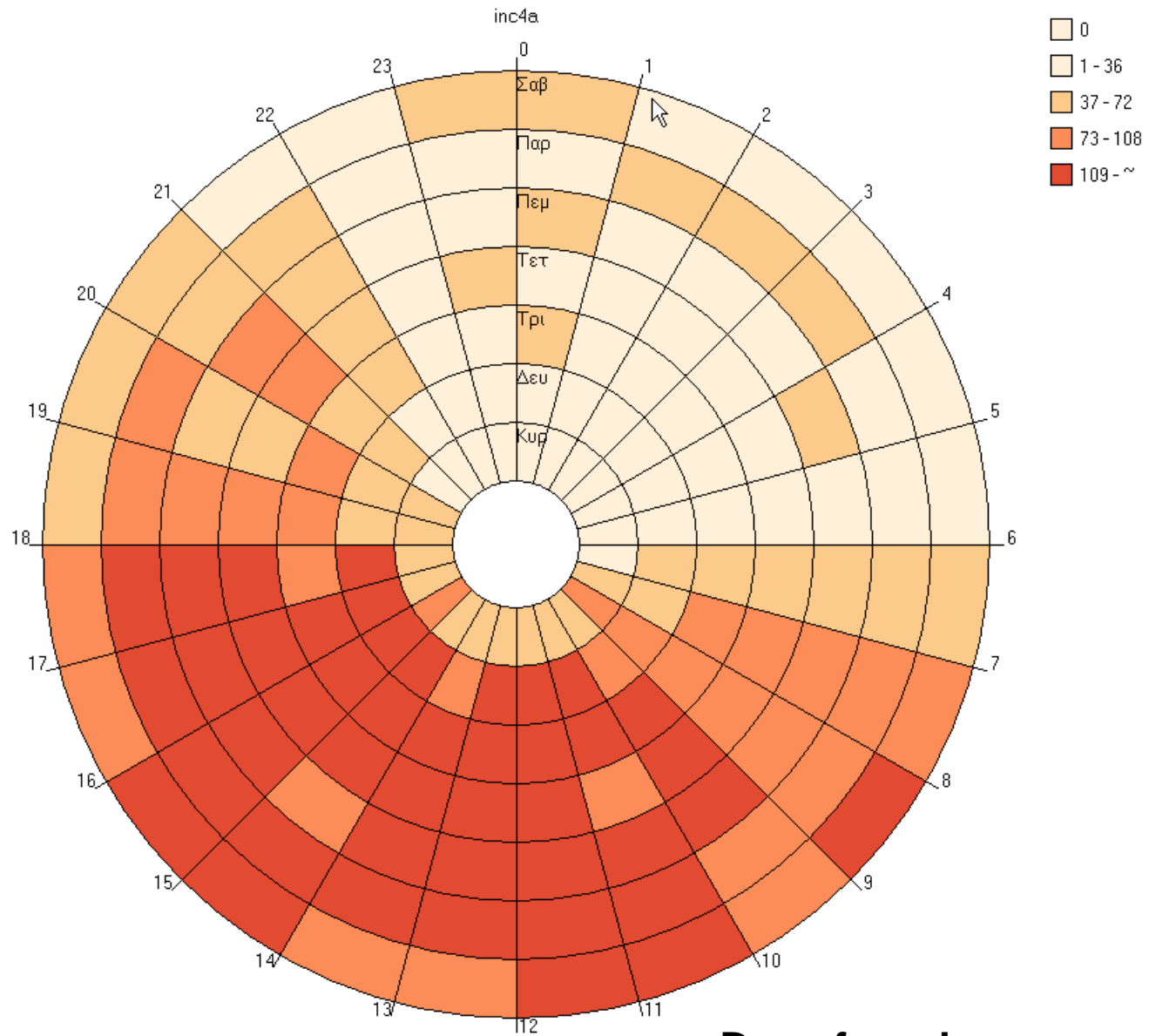
VEHICLE DAMAGE



VEHICLE DAMAGE

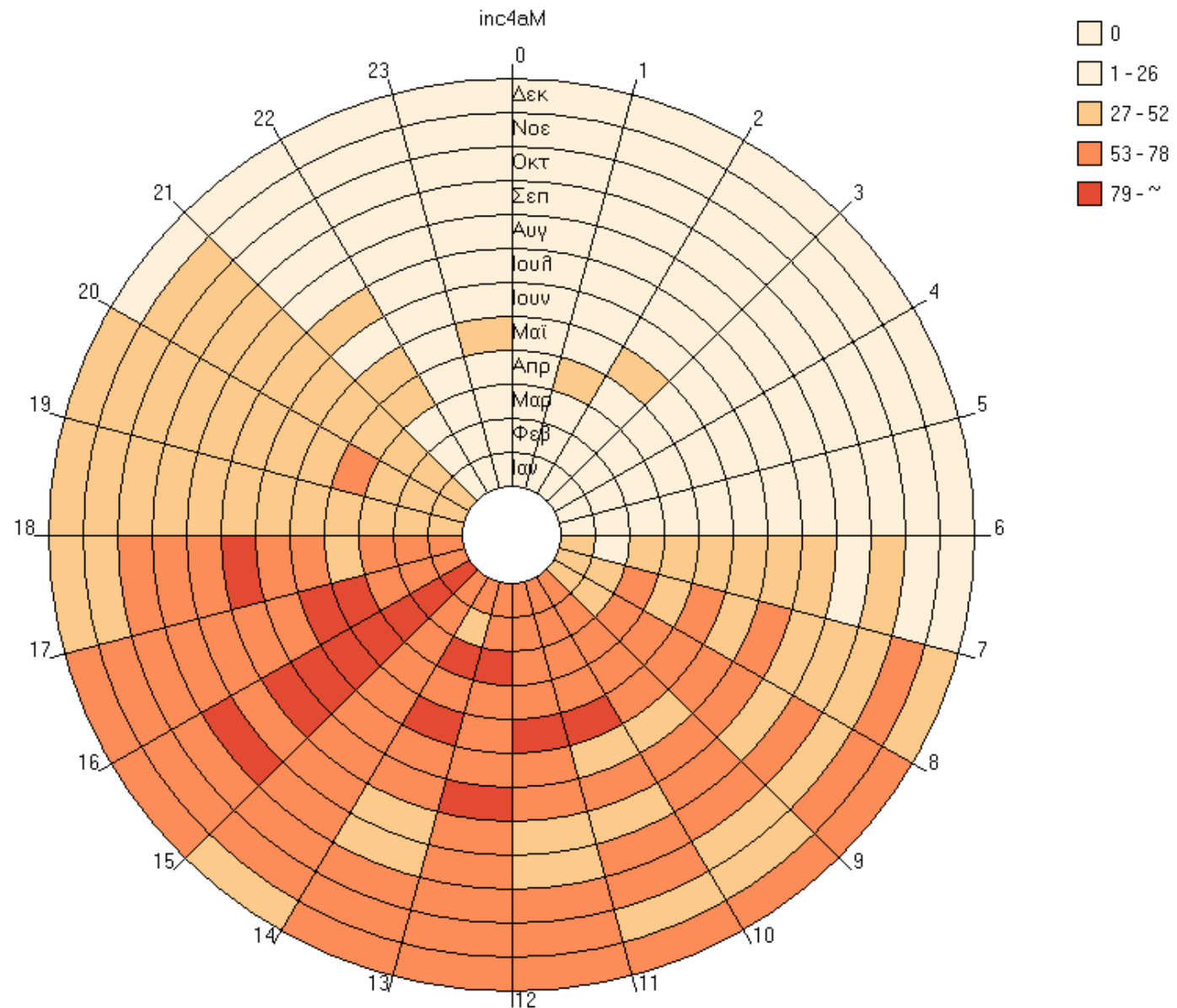


OBSTACLE - DEBRIS



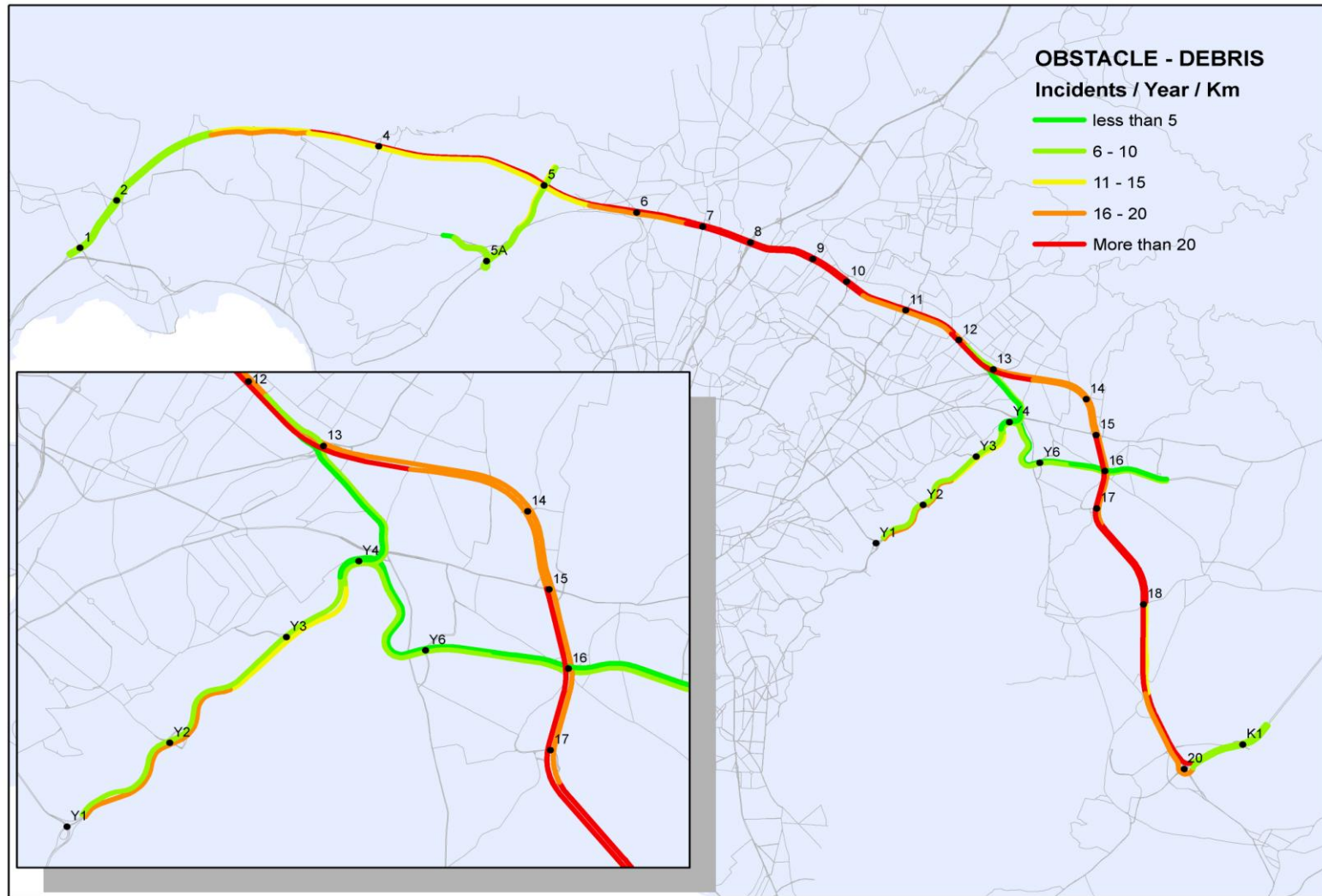
Day of week vs our of the day

OBSTACLE - DEBRIS



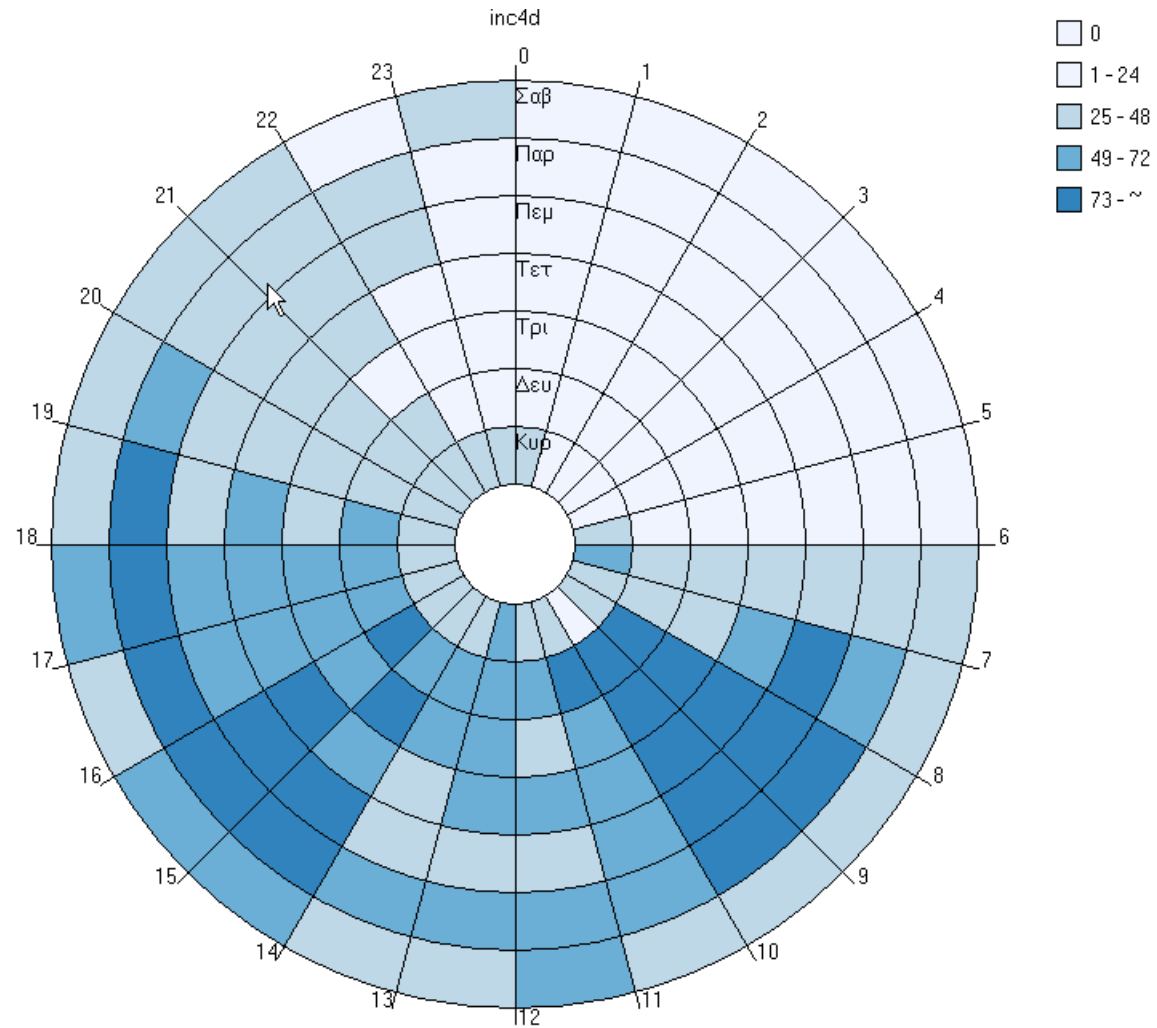
Month of the year vs hour of the day

OBSTACLE - DEBRIS



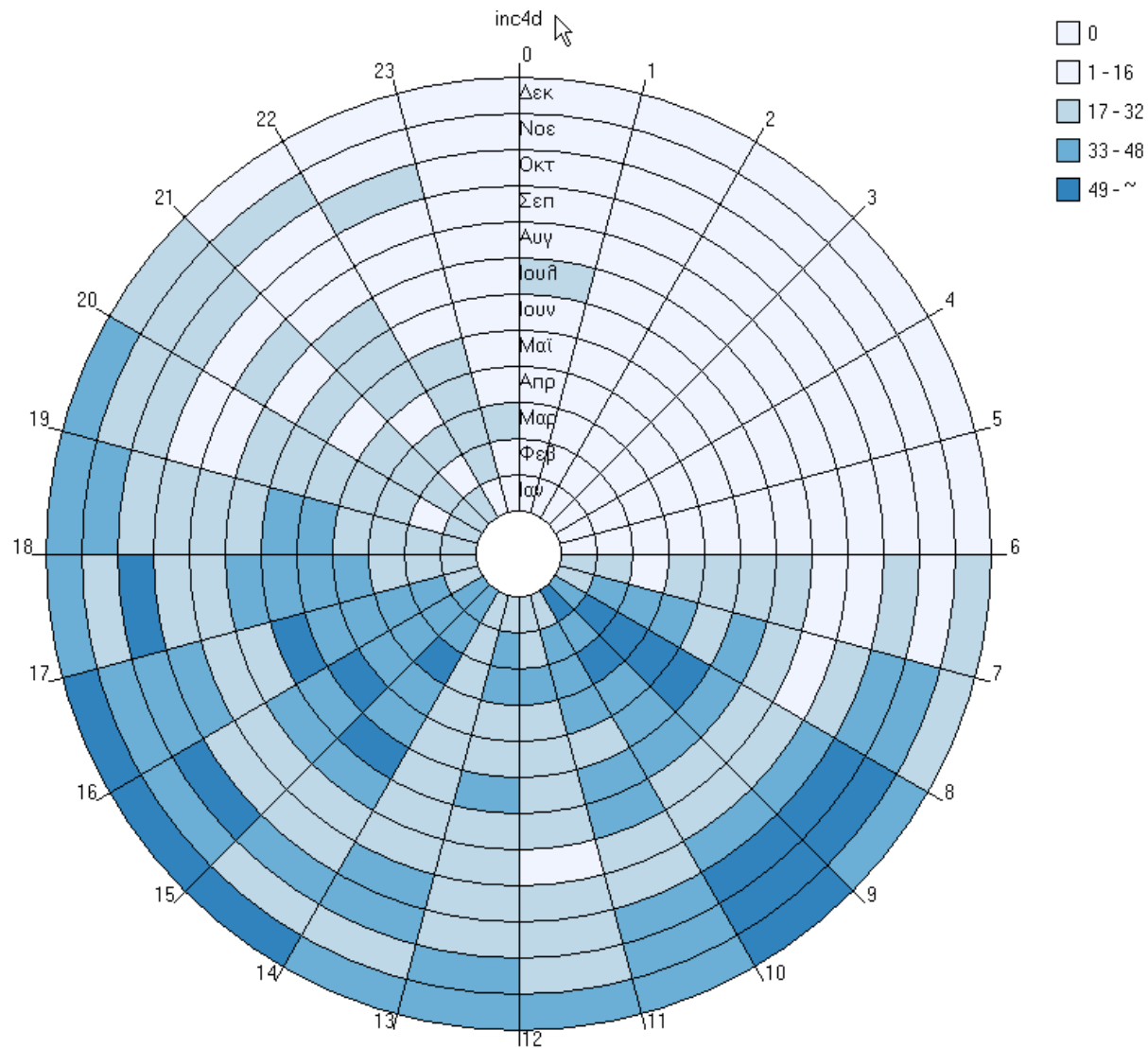
Spatial Distribution

Accident



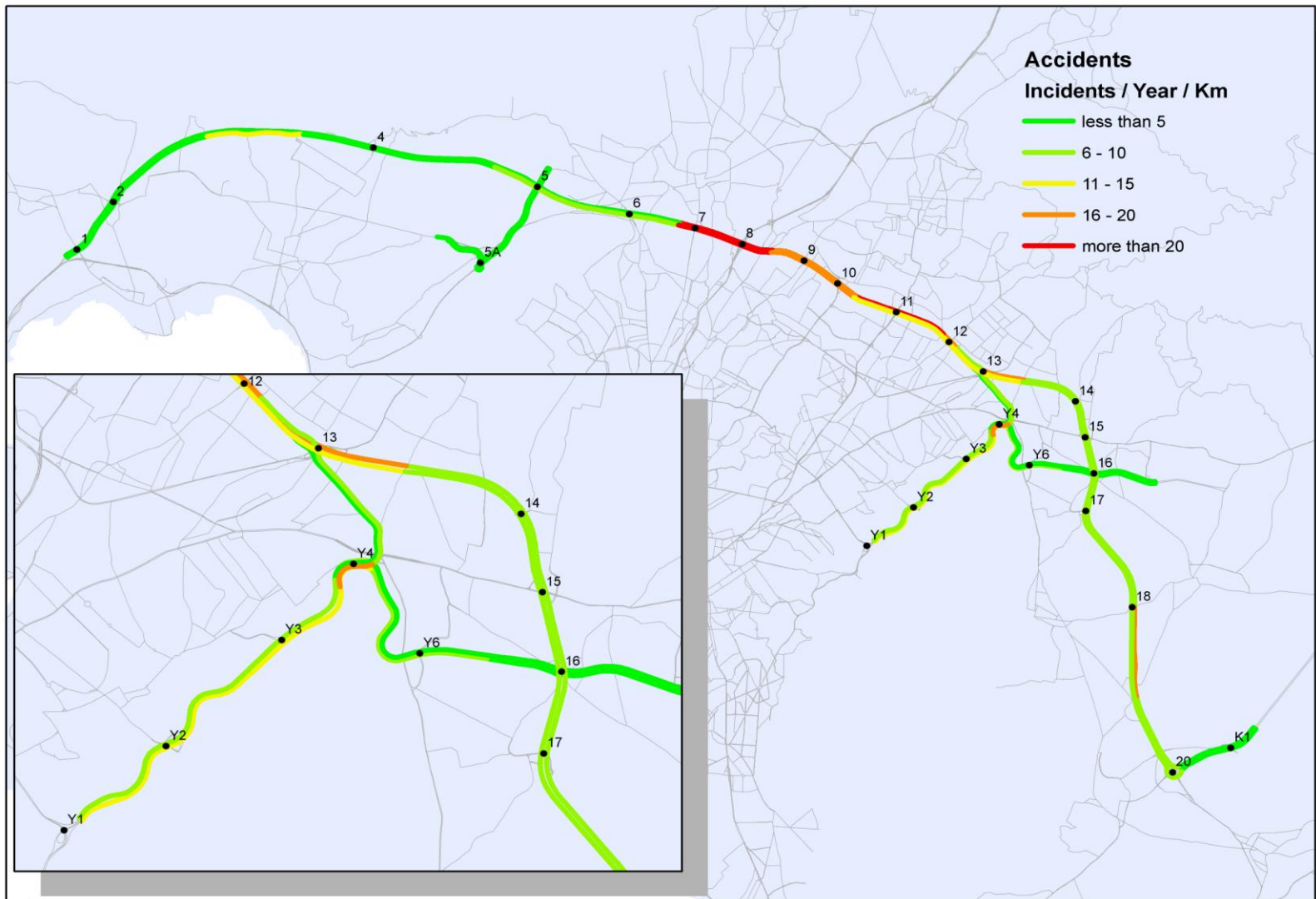
Day of week vs our of the day

Accident



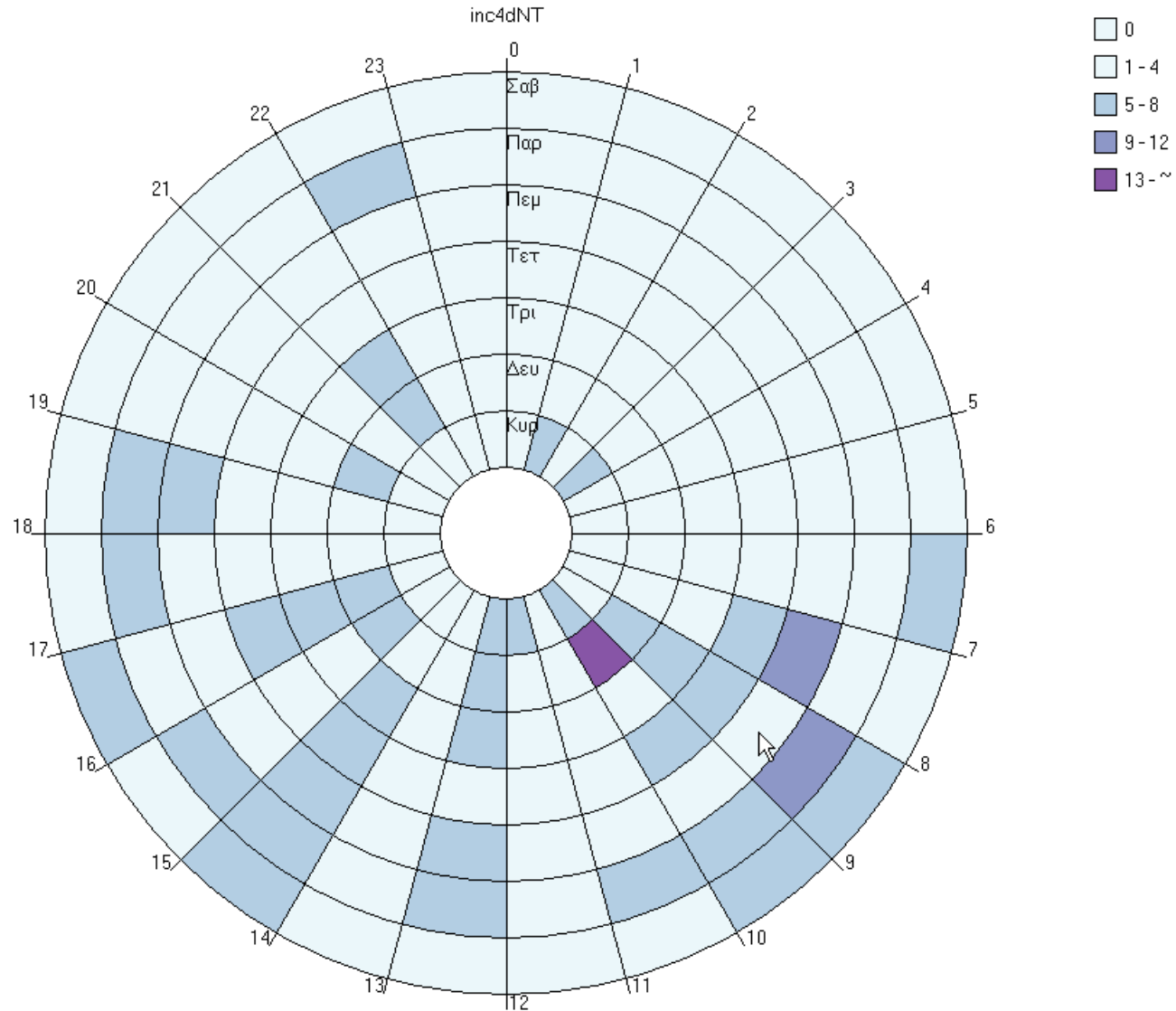
Month of the year vs hour of the day

Accident



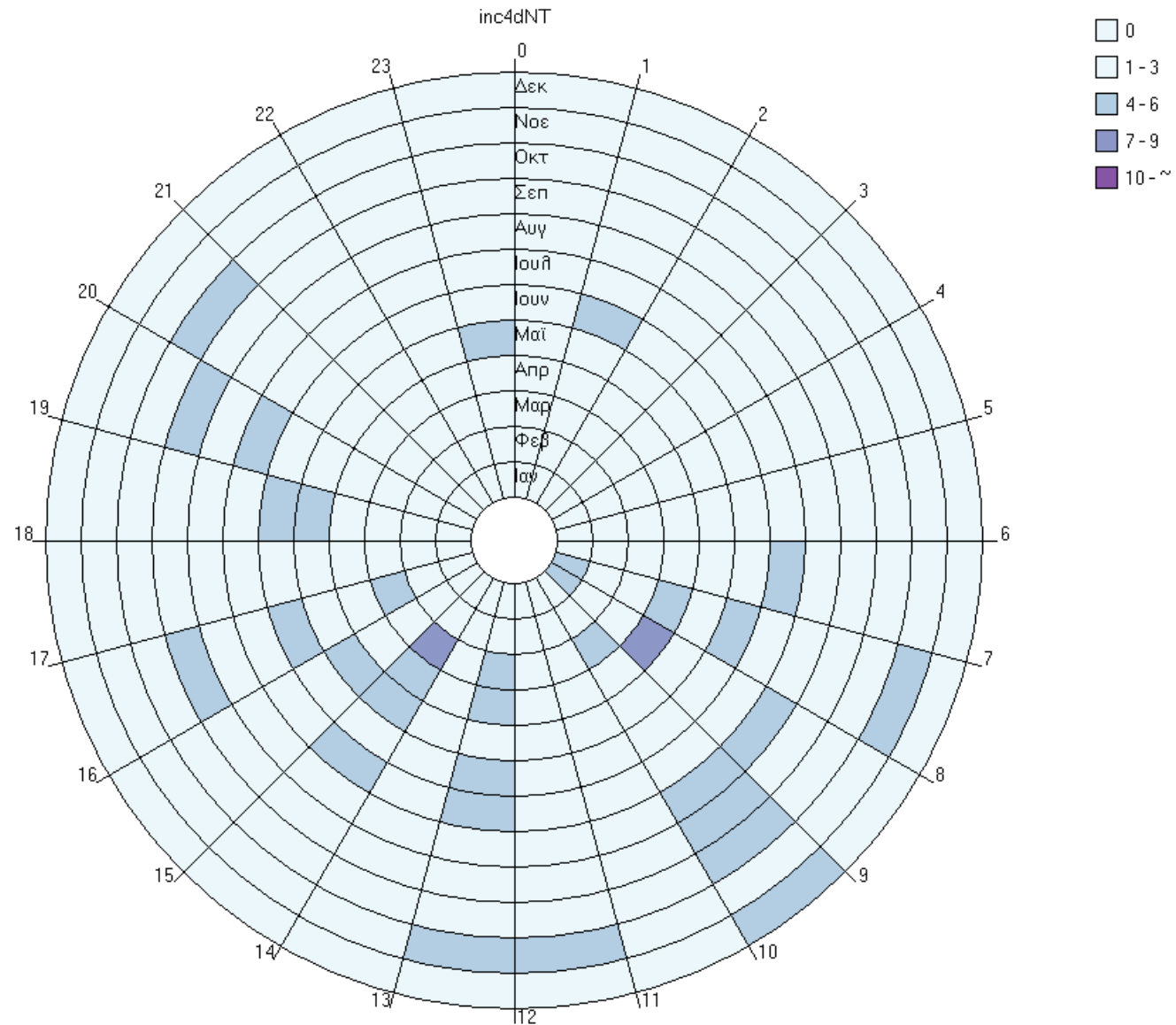
Spatial Distribution

Accident (with injuries - fatalities)



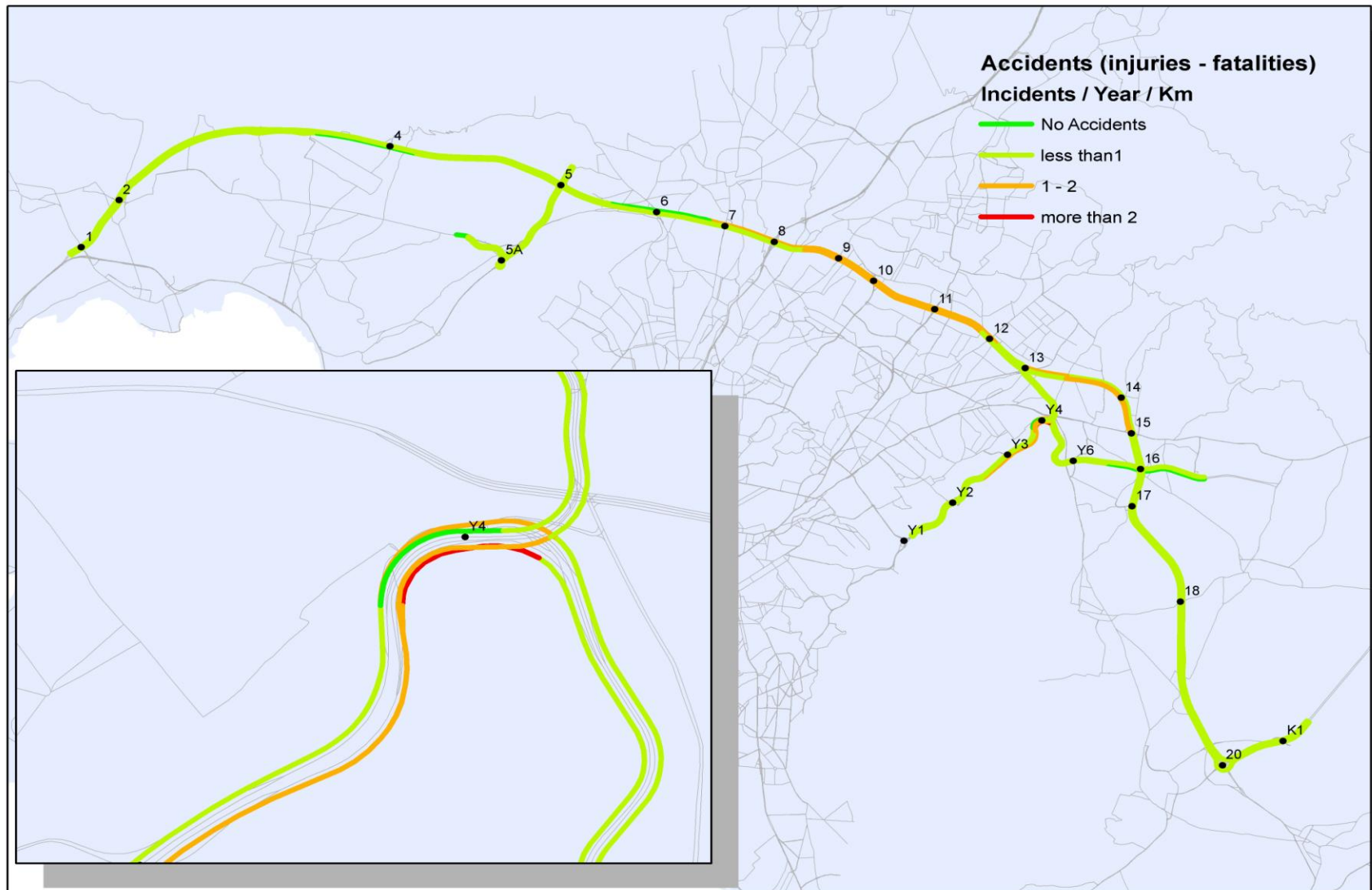
Day of week vs our of the day

Accident (with injuries - fatalities)



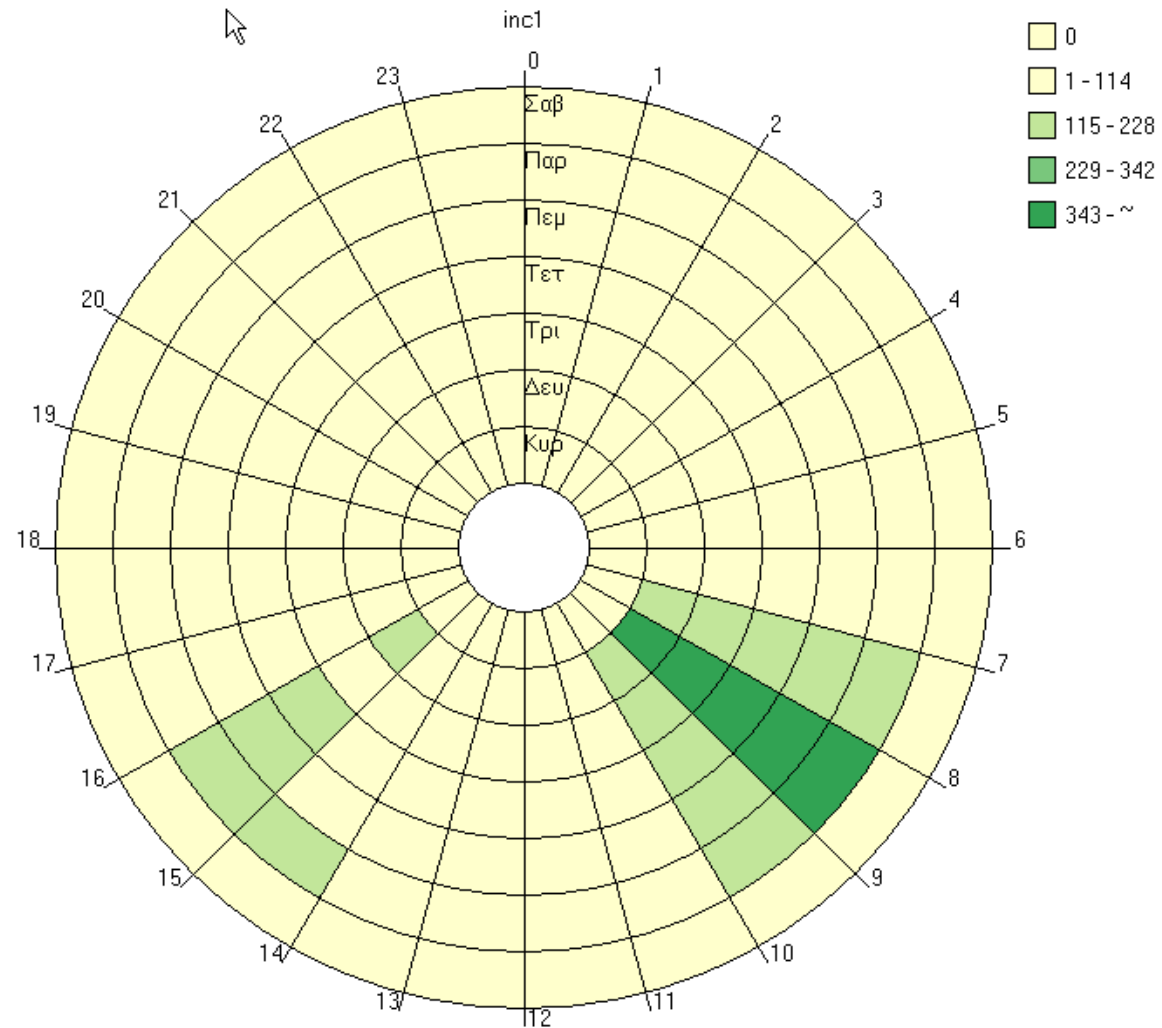
Month of the year vs hour of the day

Accident (with injuries - fatalities)



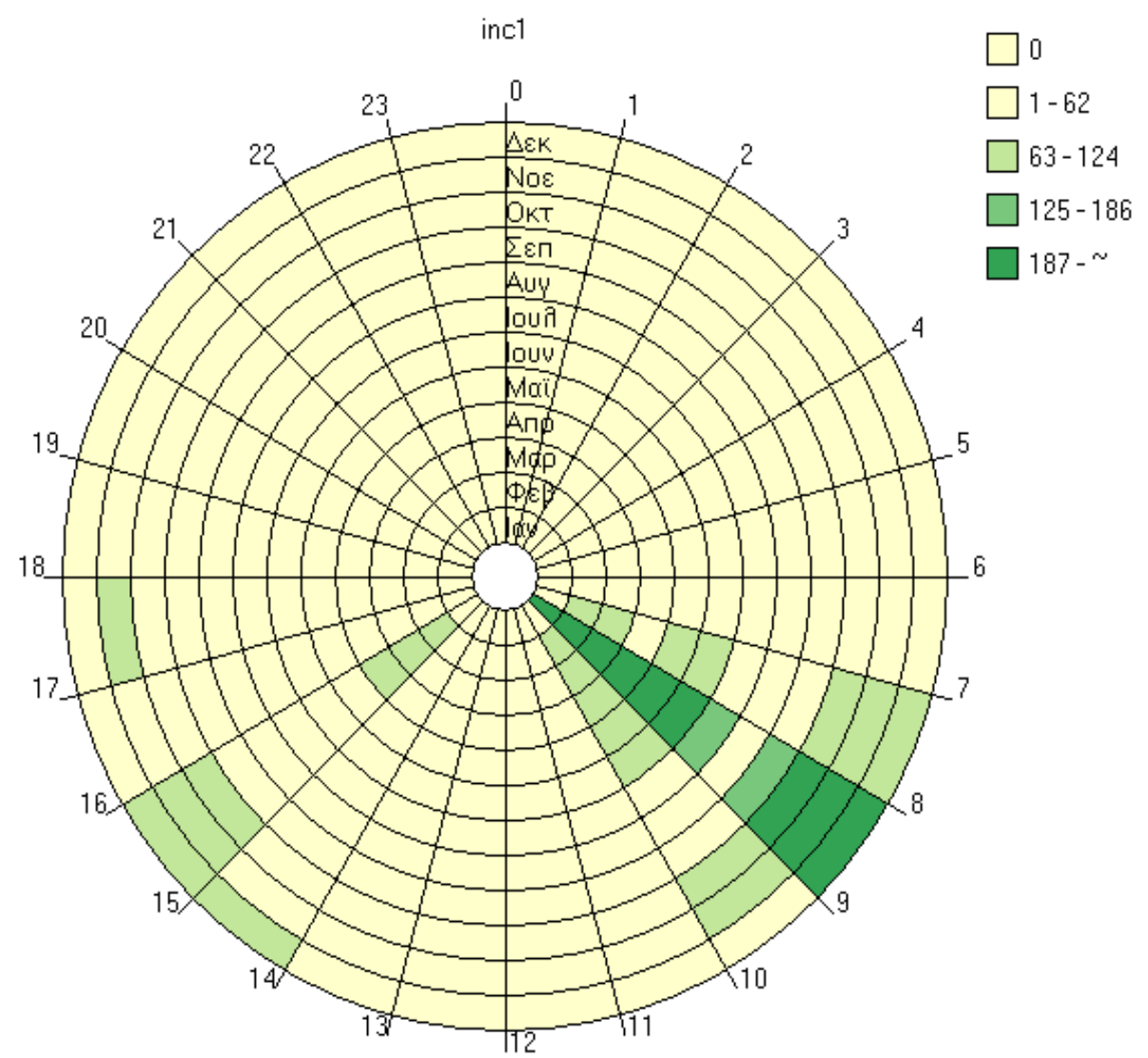
Spatial Distribution

BOTTLENECKS



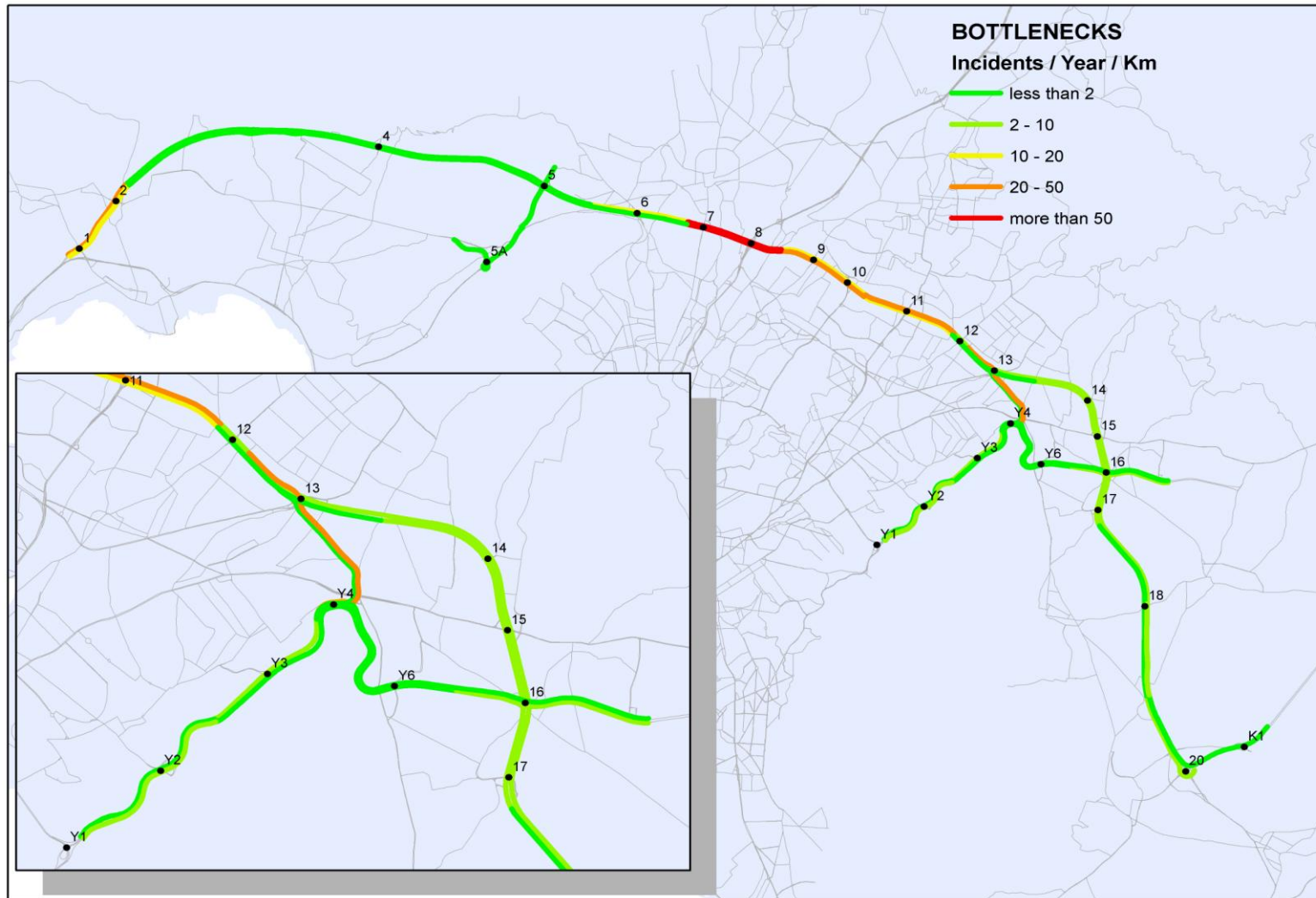
Day of week vs our of the day

BOTTLENECKS



Month of the year vs hour of the day

BOTTLENECKS



Spatial Distribution

Conclusions

- Incidents have temporal and spatial distribution.
- Different type of incidents have different distribution.
- Incidents temporal and spatial distribution is highly related to traffic volume.



ESRI
*Special Achievement
In GIS Winner
2008*

Mahalo