

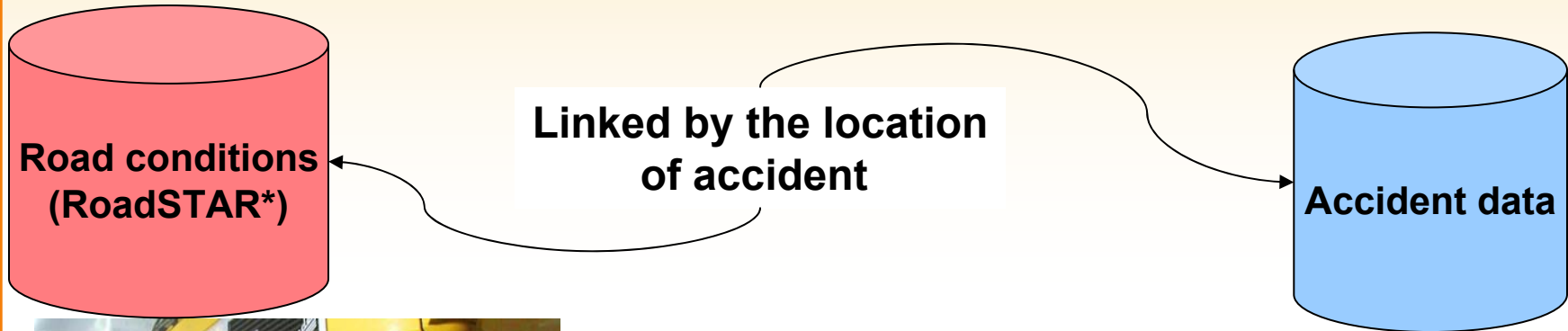


## MARVin—Model for Assessing Risks of Road Infrastructure

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## Idea of MARVin



\*Road Surface Tester of arsenal research

## Idea of MARVin

**Combine detailed information on:**

- Road Geometry (**horizontal curvature, gradient and crossfall**),
- Road Surface Condition (**roughness, rut depth, texture depth and skid resistance**)
- **and Road Accidents.**

## RoadSTAR – Road Condition Monitoring

### Pavement Management - Road Safety

- Skid resistance
- Texture (cracks)
- Transverse evenness (ruts)
- Roughness
- 250.000 measured values/km at 60 km/h



## RoadSTAR – Registration of route/trace parameters

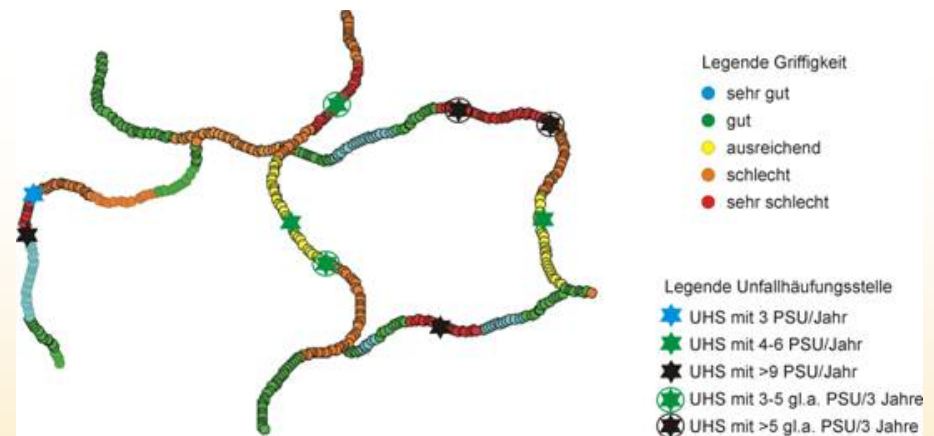
Inertial navigation gyre incl. dGPS-System

- **Curve radius**
- **Transverse slope**
- **Longitudinal slope**
- **Actual longitudinal profile**
- **Registration of lane  
(Possibility of creating  
route graphs)**



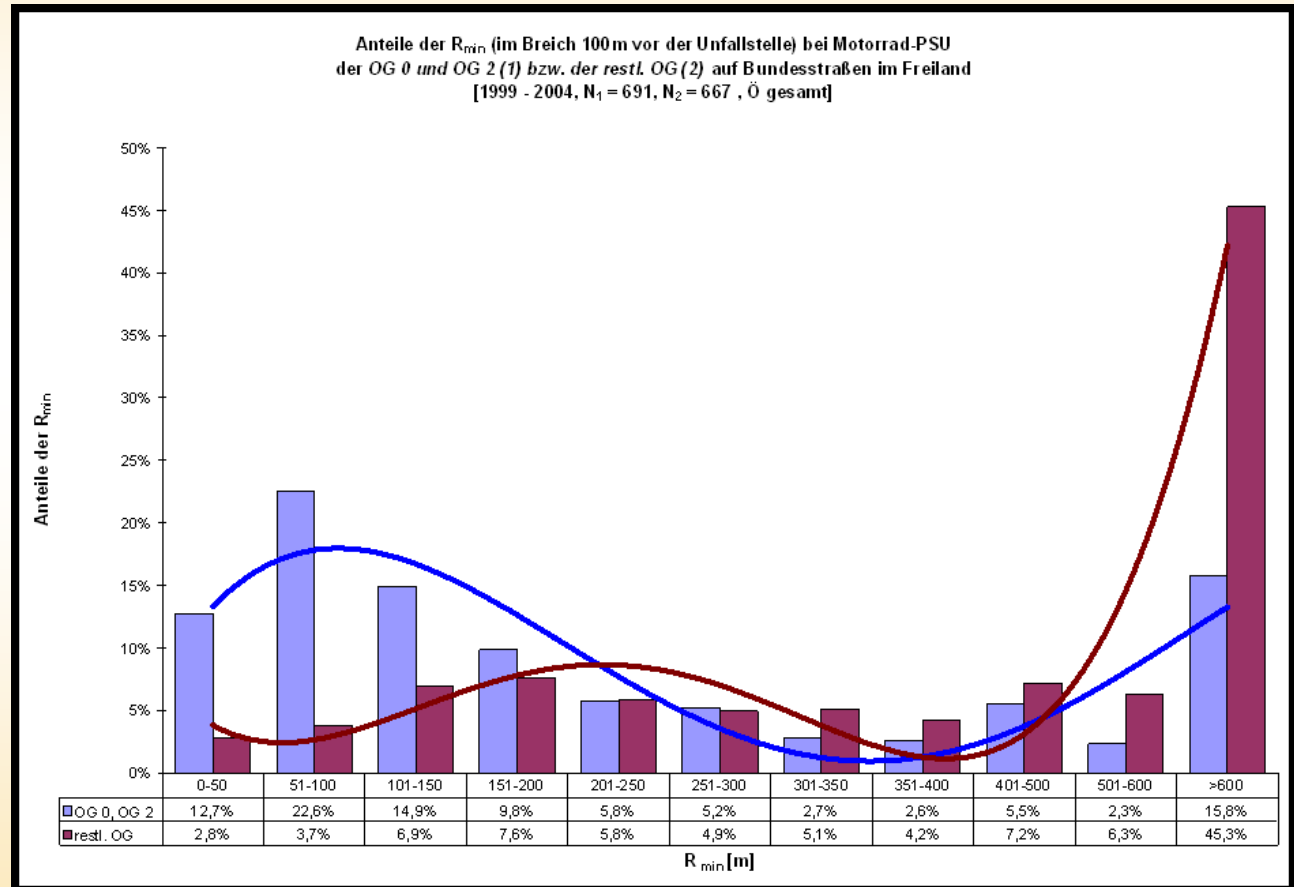
## MARVin – Road Safety Analysis

- Visualisation and elaboration of road condition data with arSis (arsenal research road information system)
- Correlation with road safety data
- Prognosis of scenes of accident
- Accident prevention
- Reconstruction expertise, reconstruction plans



# MARVin – Motorcycle Safety Analysis

**Curve radii  
 vs.  
 Accident  
 Types**  
 (sample: 1358  
 accidents)

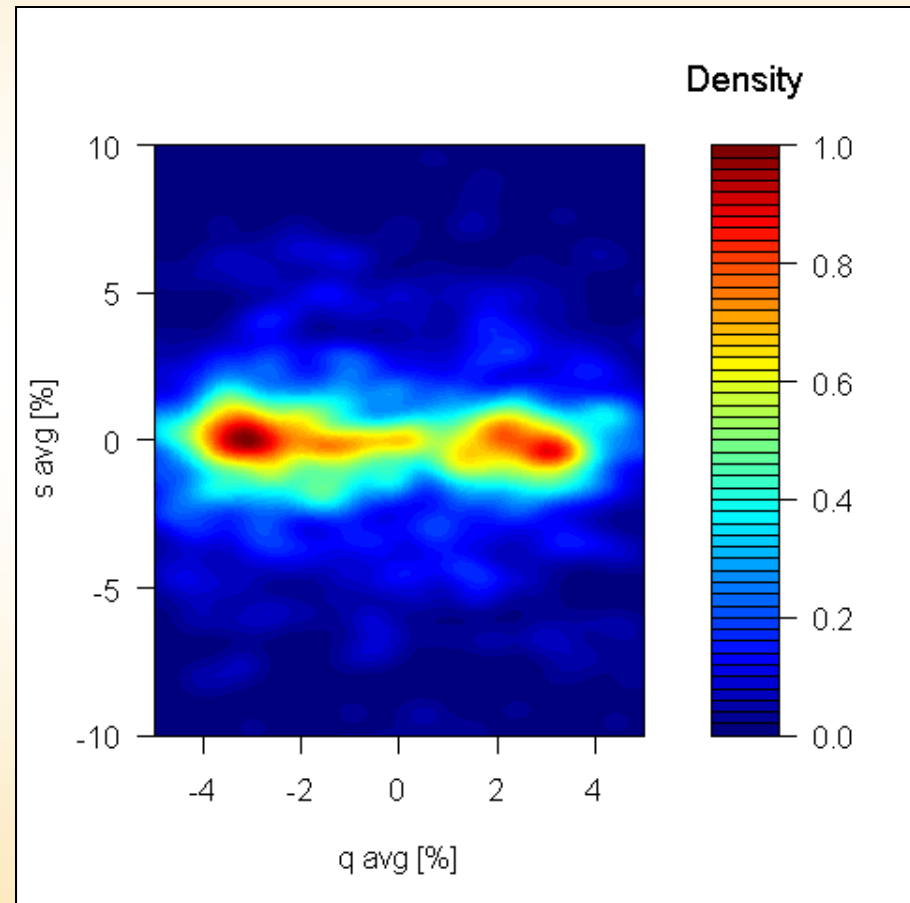


## MARVin – Current Results

**Average crossfall (q-avg)  
+ average gradient (s-avg)  
– 100m before the position  
of accident**

**(run-off accidents;  
sample: 5918 accidents)**

**... road condition: WET**



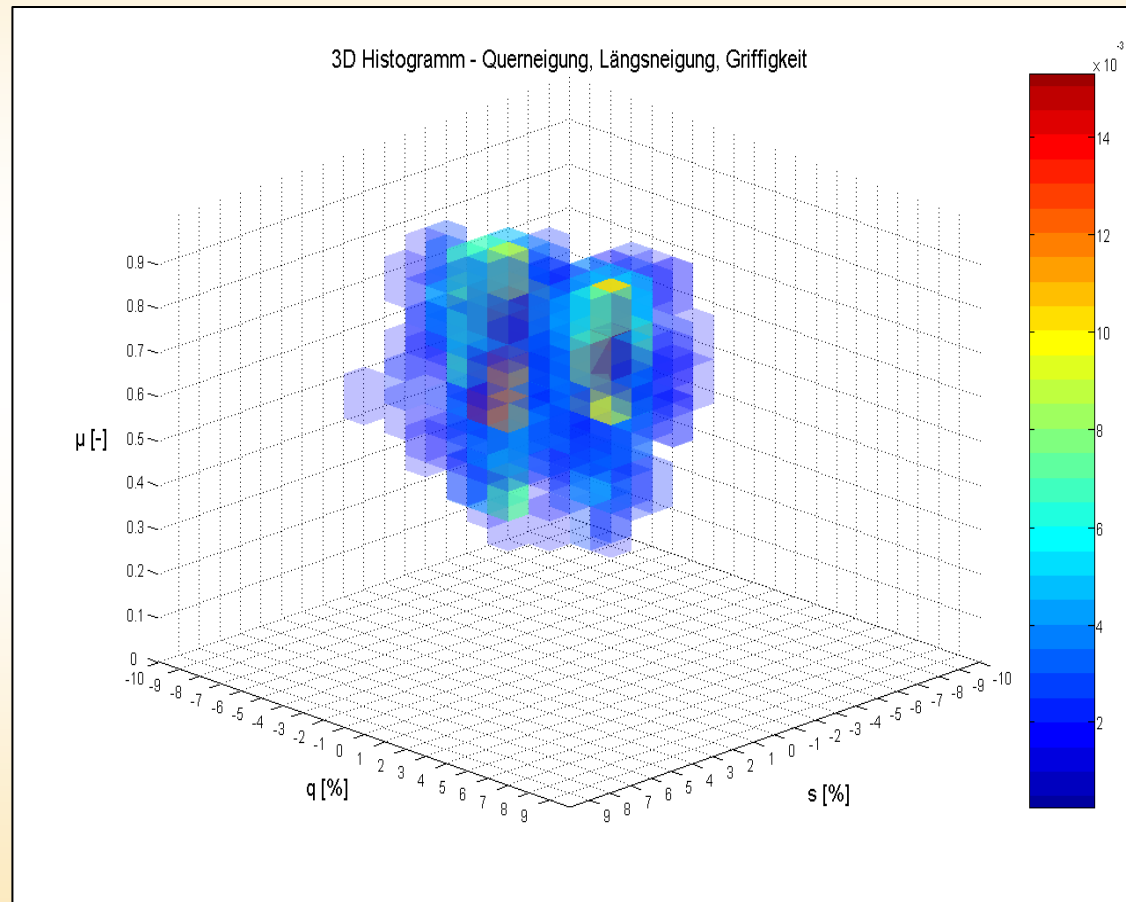


## MARVin – Current Results

### 3D-Histogram:

Average crossfall (q-avg)  
+ average gradient (s-avg)  
+ skid resistance ( $\mu$ )  
- 100m before the position  
of accident

(accident type 011: run-off right  
on a straight lane, sample: 1951  
accidents)



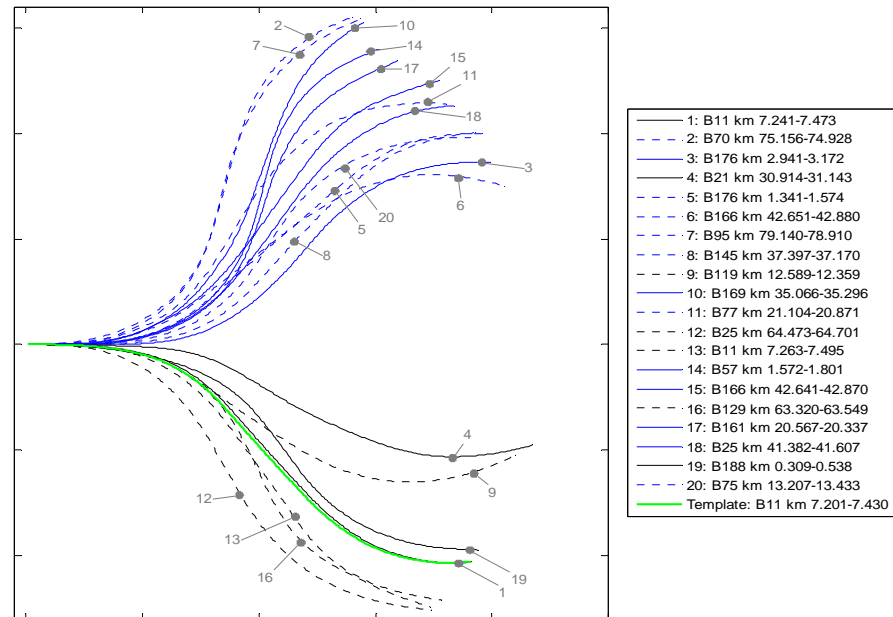
# MARVin – Current Results

## “Similarity Search”

Finding similarities in road geometry

(simulation and search in the whole road network)

Ähnlichkeitssuche: österreichisches Bundesstraßennetz  
 Parameter Krümmung



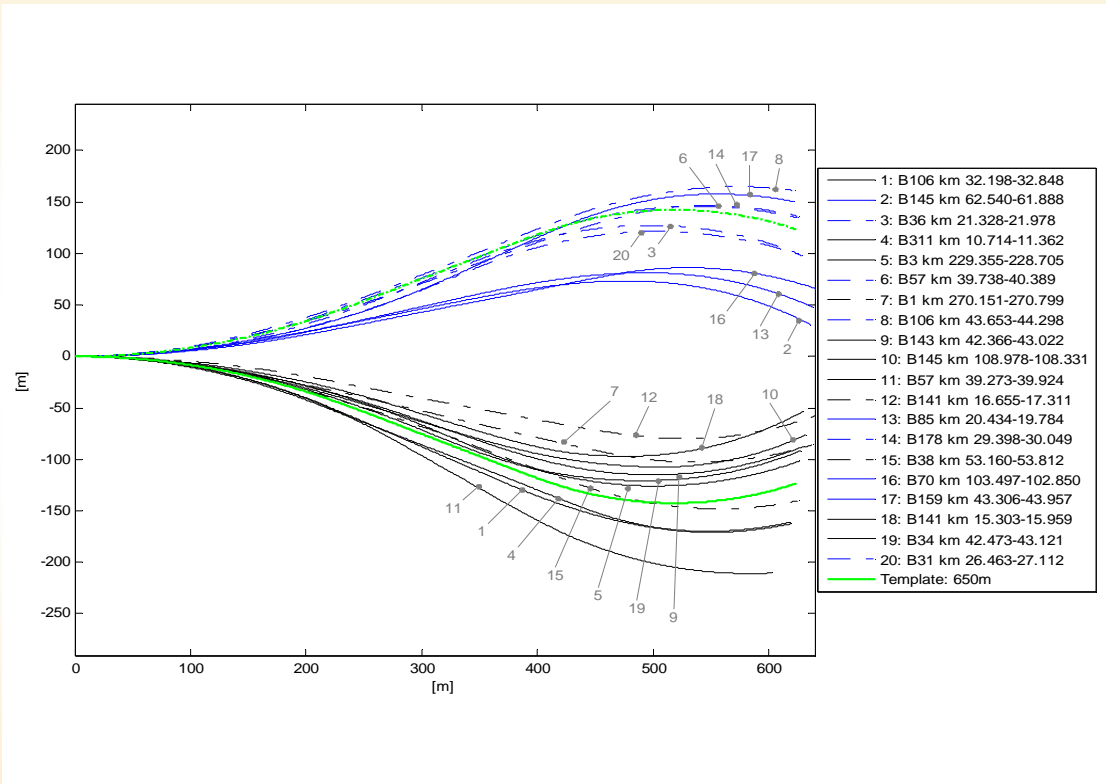
... for Road Safety Inspection

# MARVin – Current Results

## “Similarity Search”

Finding similarities in road geometry

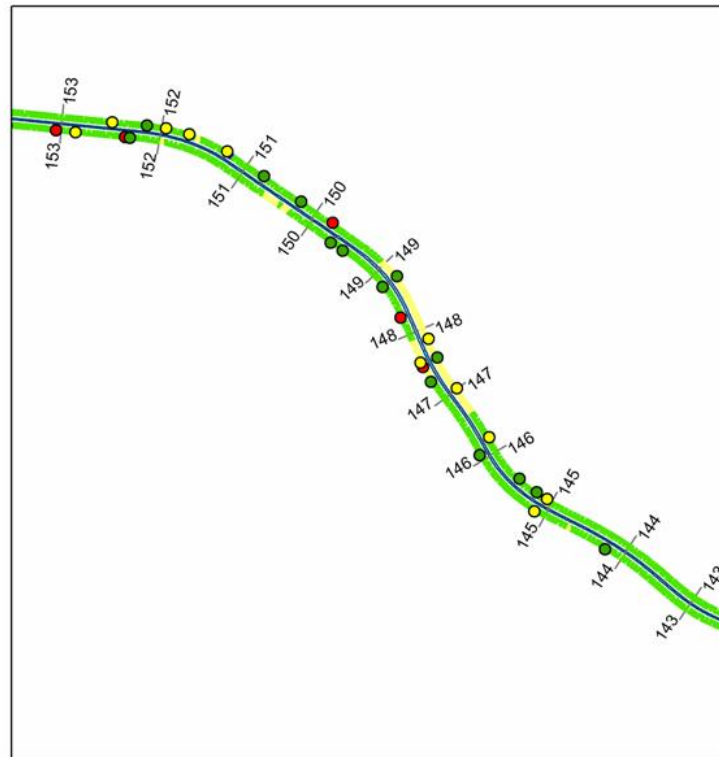
(simulation and search in the whole road network)



... for Road Safety Audit

# MARVin – Current Results

**Visualisation  
of results**  
(skid resistance,  
crossfall, gradient,  
accidents...)



**A1 km 143- km 153**  
**Legende**

**Verletzungsgrad**

- tot
- schwer verletzt
- leicht verletzt
- nicht erfasst

**Griffigkeit**

- μ**
- sehr schlecht [ $<0,38$ ]
  - schlecht [ $0,38-0,45$ ]
  - ausreichend [ $0,45-0,59$ ]
  - gut [ $0,59-0,75$ ]
  - sehr gut [ $>0,75$ ]

## Our goals... our commitment



### Our goals are:

- Explanation of so far unexplored accident causalities
- Demonstration of the connection of different parameters for accident sources using mathematical models
- Clarification of accident events on similar route sections
- Accident analysis and crash-causes-research specifically regarding powered two-wheelers
- Innovative accident prognoses and derived preventive measures

## Our goals... our commitment



### We reach these aims by:

- Linkage of the road conditions data with accident data based on the locality of the accident
- Development of suitable mathematical models for the verification of accident causalities
- Implementation of accident-cause-research within Road Safety Inspections and Road Safety Audits
- Identification of connections between data on road accidents and traffic infrastructure and development of specific preventive measures
- Specific measures to create awareness in combination with driving education, based on detailed accident statistics and conclusions of accident analyses of motorcycles

## Our Motivation...



**THANK YOU FOR YOU ATTENTION!**