

**2013 Esri Europe, Middle East and Africa
User Conference**

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**Sight distance for road
safety analysis using GIS**

César de Santos

Technical University of Madrid (UPM)
cesar.desantos@upm.es

Introduction

- Geometric design ↔ Traffic safety
- Available sight distance ↔ Required sight distance for:
 - Emergency stops
 - Overtaking
 - Merging manoeuvres
- Technical specifications for roads

Difficulties

Complexity of road and environment



Analytical approaches



3D approach needed

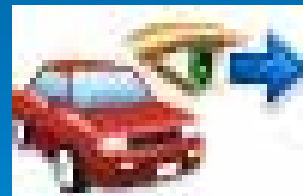
Difficulties

- Alignment data
 - Not available or reliable
 - Restoration, Rehabilitation, Resurfacing
 - Vegetation and buildings



Solution developed

- All new application
- ArcGIS environment
- Programmed in .NET
- Button in toolbar



Solution developed

Inputs needed

- Digital Elevation Model (DEM)

- Photogrammetry ☹️

- LIDAR 😊

➡️ Triangular Irregular Network (TIN)



Solution developed

Inputs needed

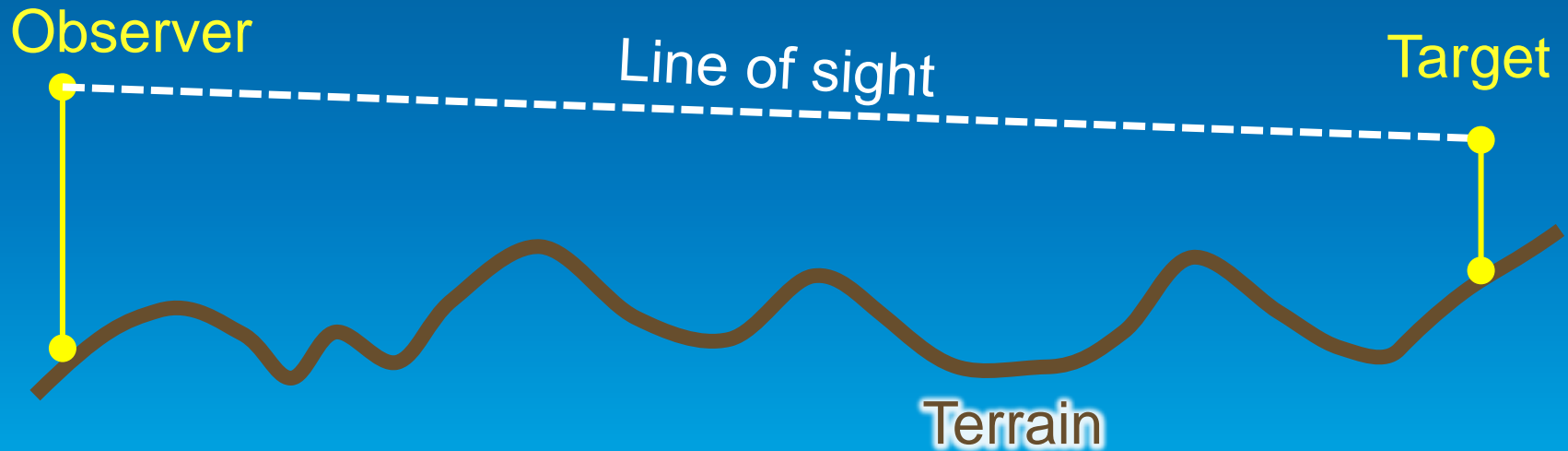
- Vehicle trajectory
 - Cartography or ortophotos
 - Project
 - GNSS on a car



Sequence of stations

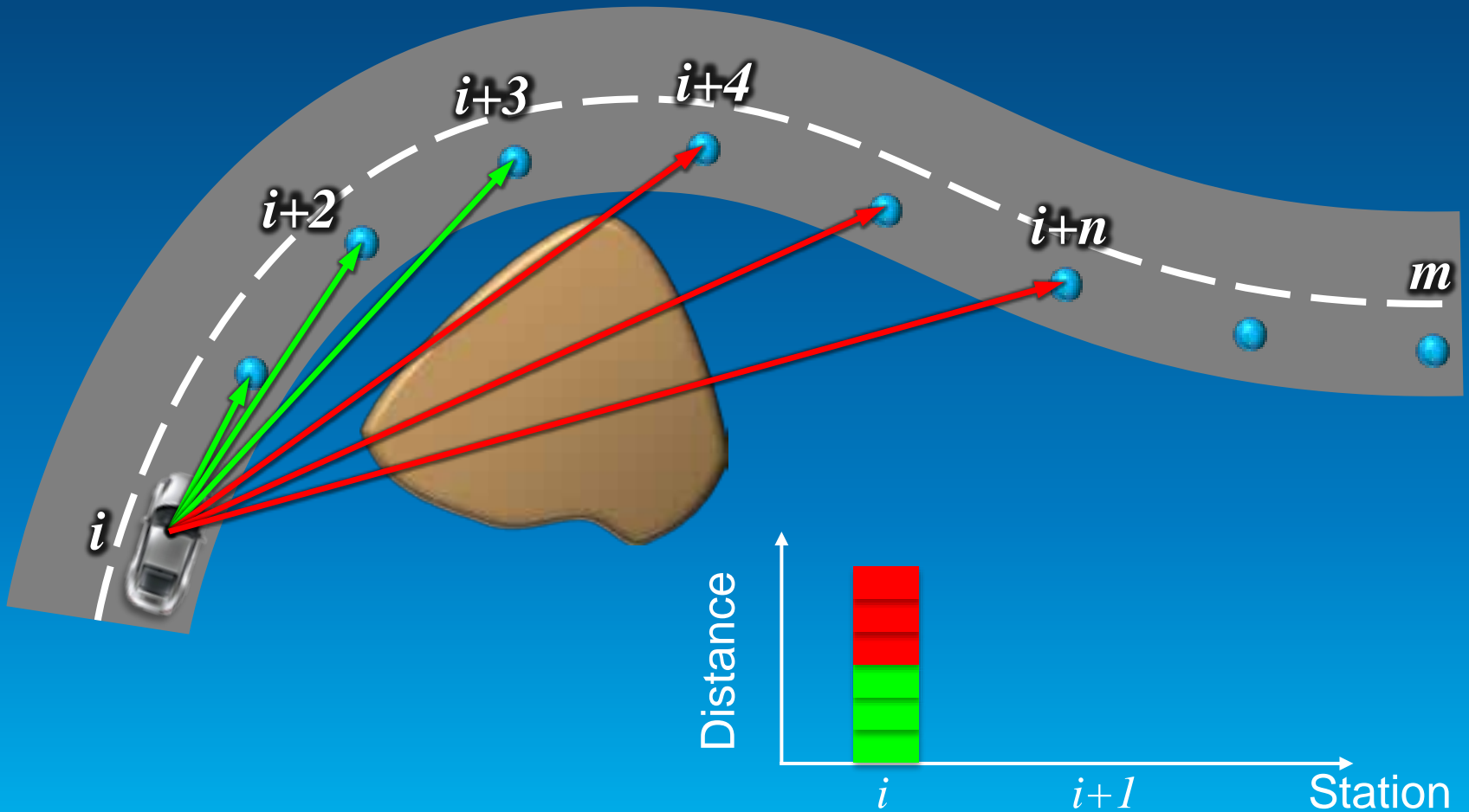
Algorithm

- “Get Line Of Sight”
 - Longitudinal profile of terrain



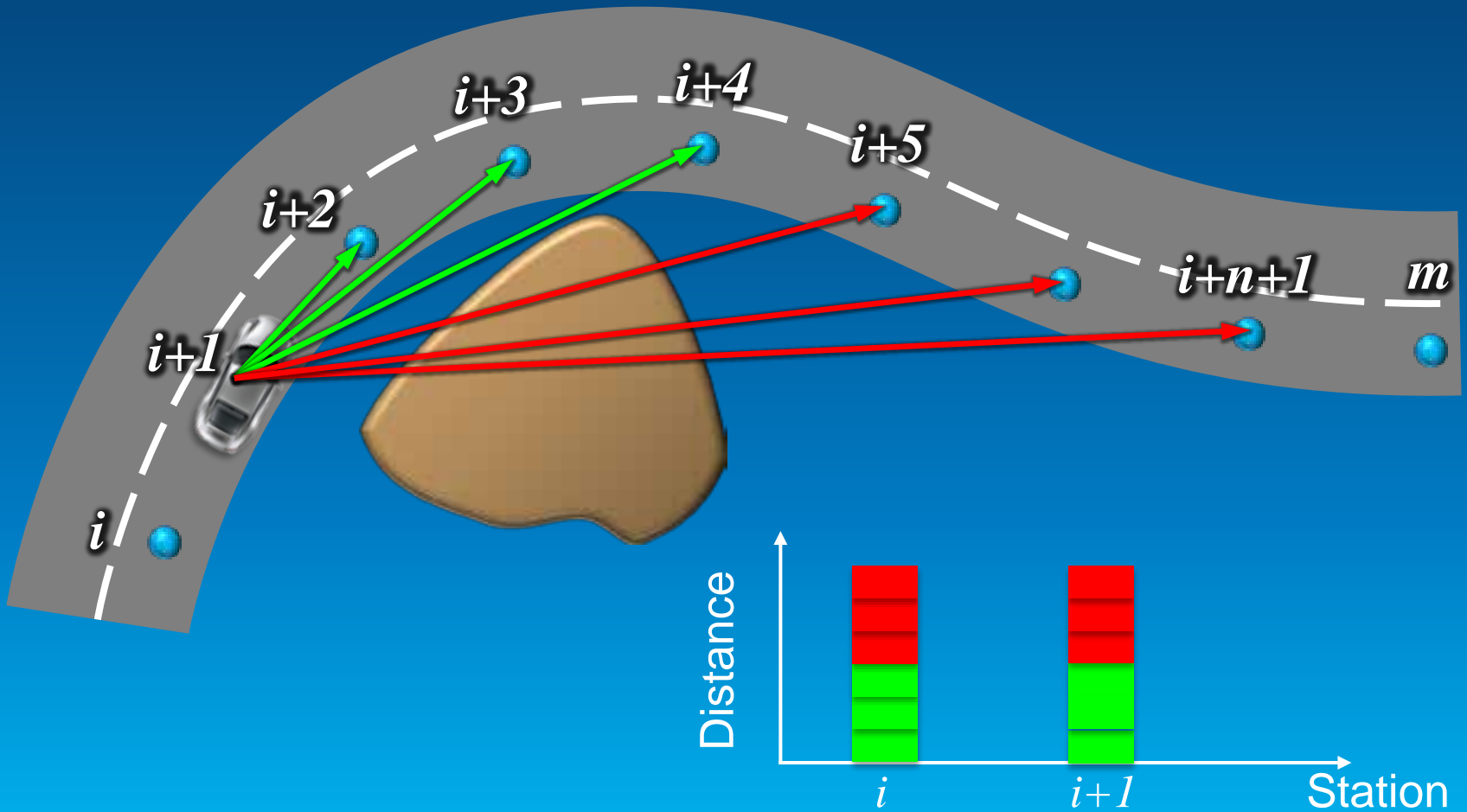
Algorithm

Sight-distance calculation

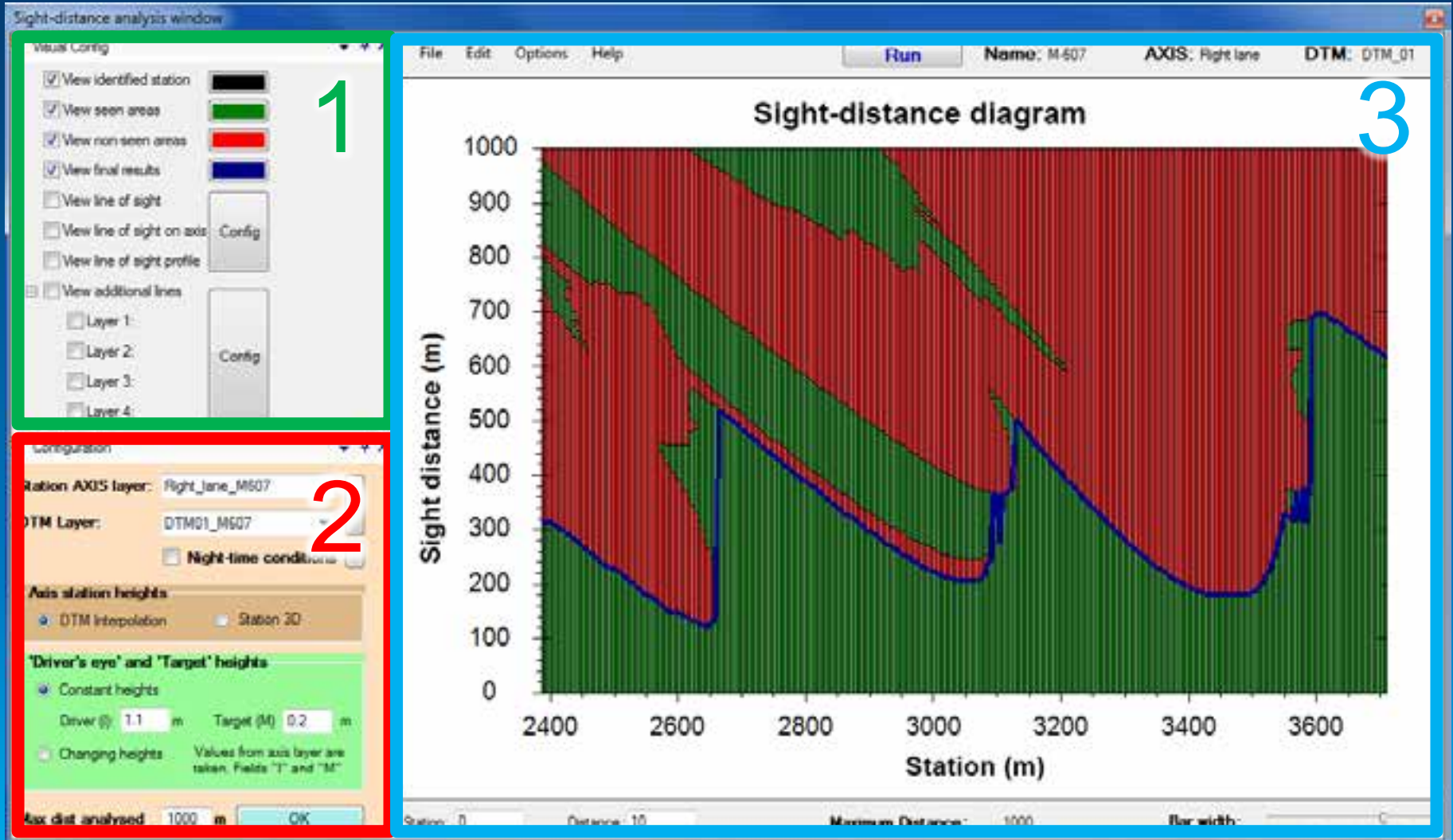


Algorithm

Sight-distance calculation



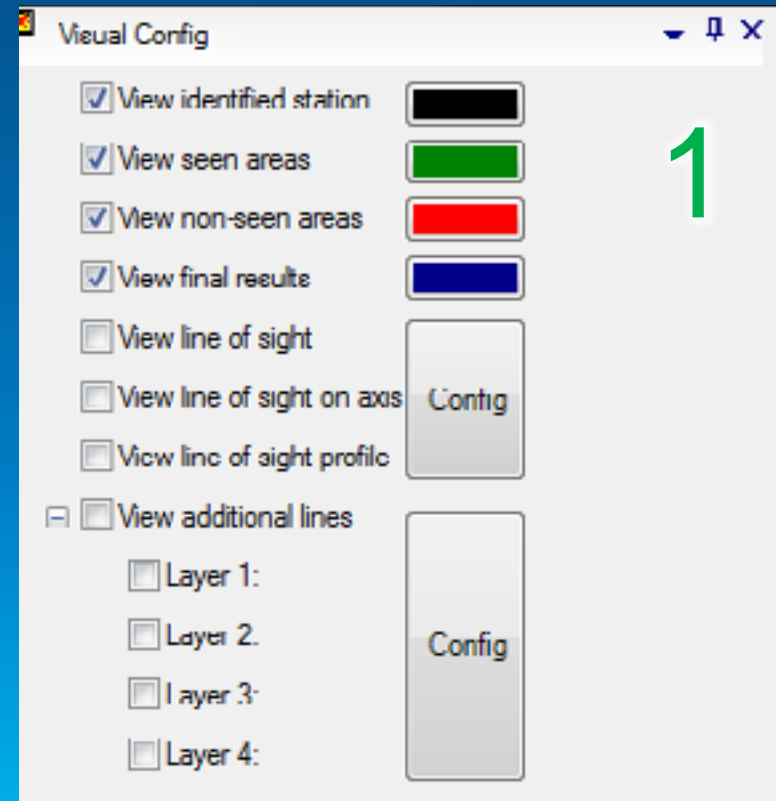
Commands



Commands

Visual configuration

- Diagram graphic options
- Line of sight representation
- Longitudinal profiles
- Additional graphics



Commands

Calculation configuration

- Vehicle trajectory
- DEM
- Point height options
- Observer height
- Target height

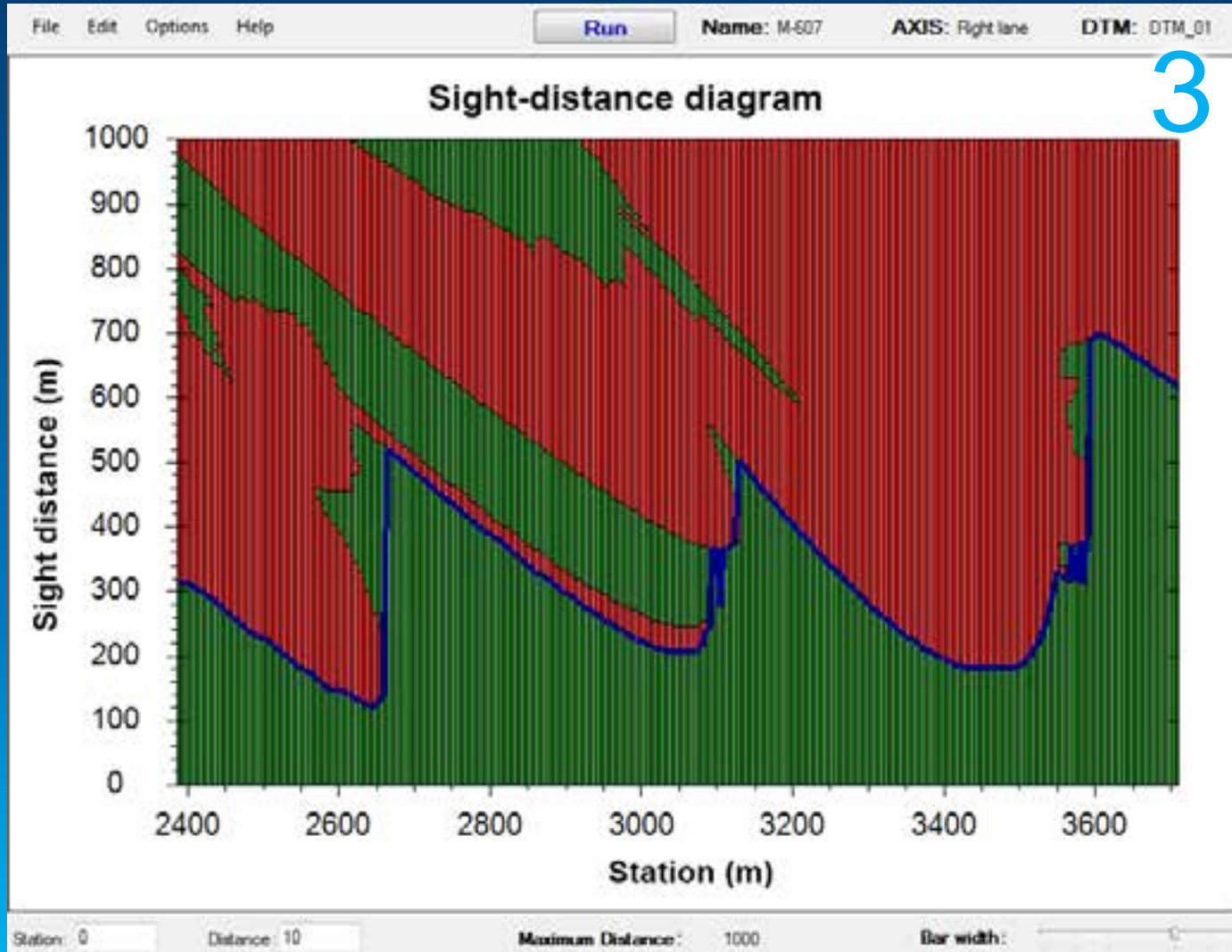
The screenshot shows a 'Configuration' dialog box with the following settings:

- Station AXIS layer:** Right_lane_M607
- DTM Layer:** DTM01_M607
- Night-time conditions
- Axis station heights:**
 - DTM Interpolation
 - Station 3D
- 'Driver's eye' and 'Target' heights:**
 - Constant heights
 - Driver (I): 1.1 m
 - Target (M): 0.2 m
 - Changing heights
 - Values from axis layer are taken. Fields "I" and "M"
- Max dist analysed:** 1000 m
- OK** button

A red number '2' is overlaid on the right side of the dialog box, near the DTM Layer dropdown.

Commands

Sight-distance diagram

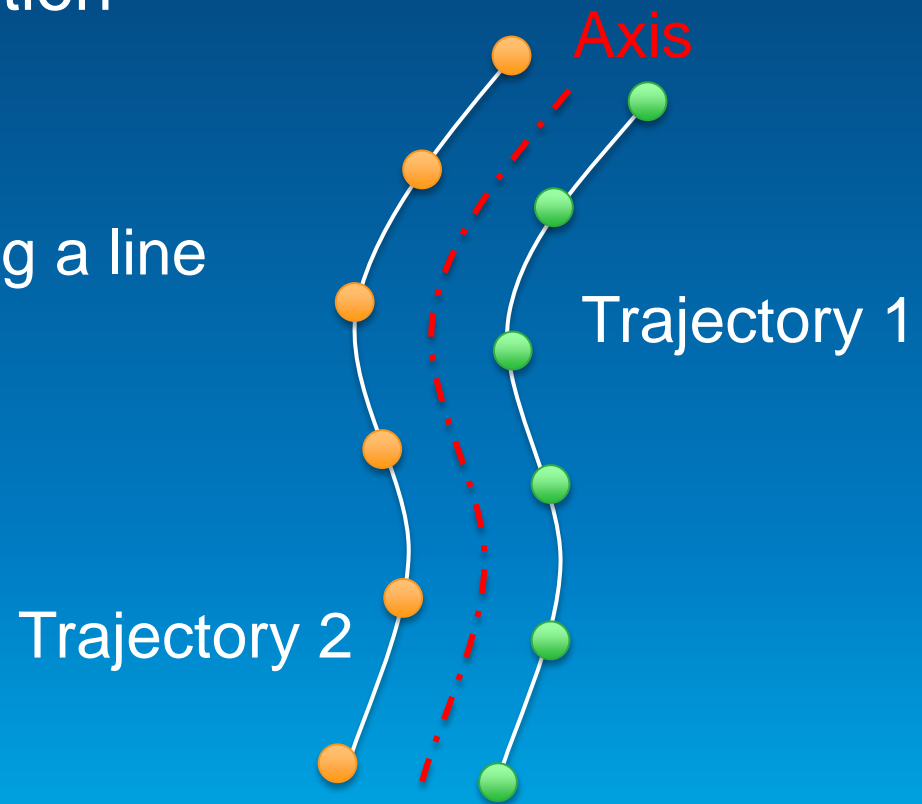


3

Commands

Menu bar: previous tasks

- Vehicle trajectory definition
 - Copy parallel
 - Create new points along a line
 - Points displacement



Commands

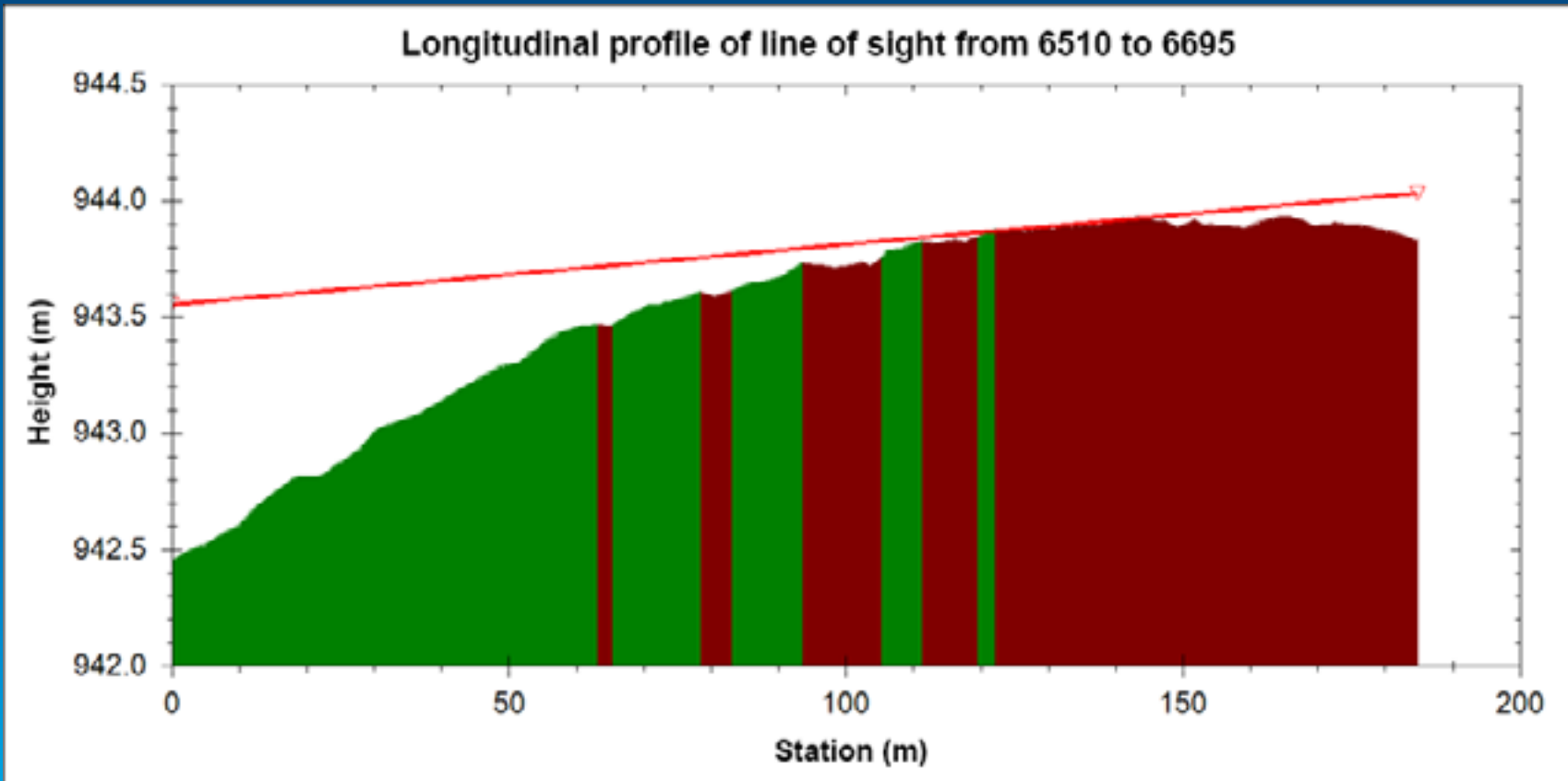
Menu bar: post-processing tasks

- Gross errors filtering
 - Manually and automatically
- Reports saved as text files
 - Available sight distance
 - Partial roadway disappearances



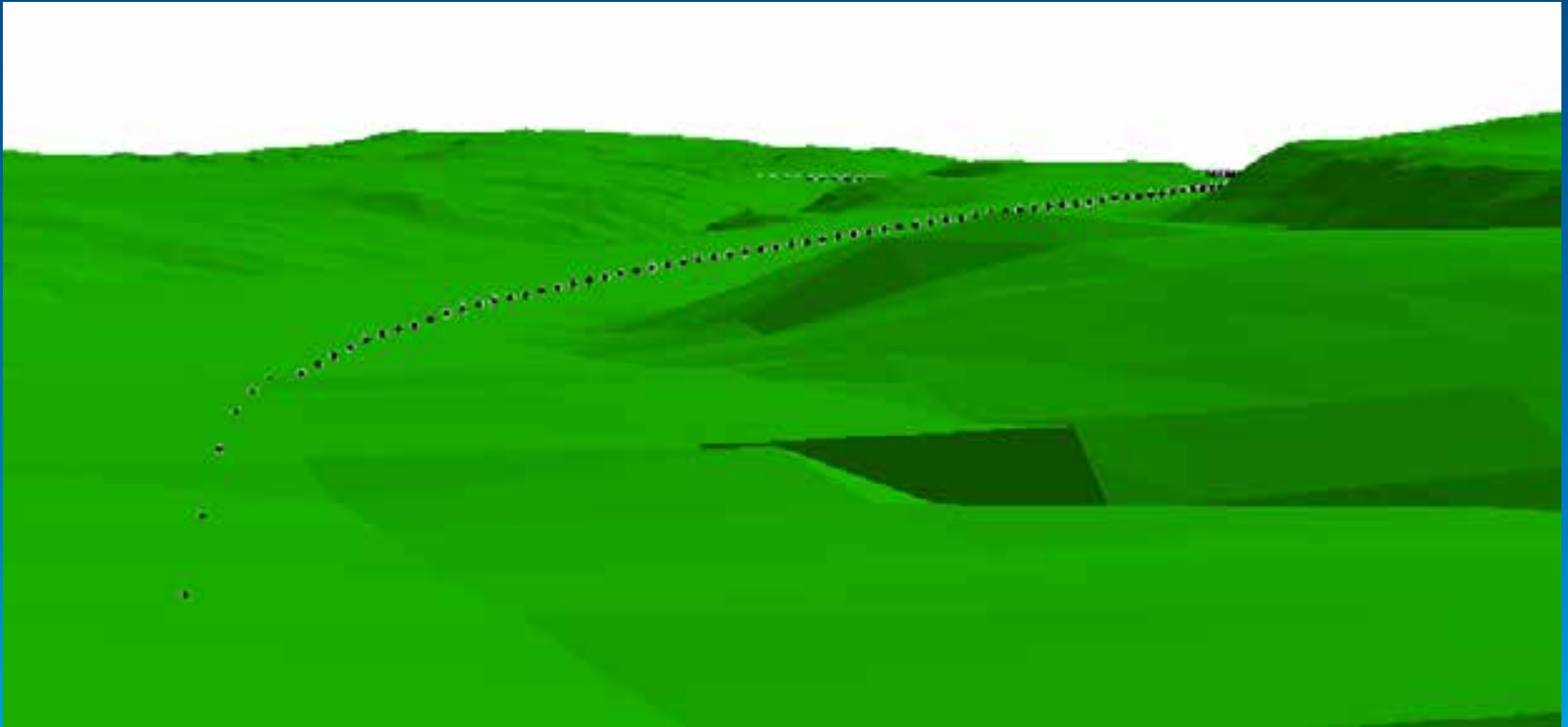
Checking process

- Longitudinal profiles of line of sight



Checking process

- ArcSCENE



Further study

Thematic maps

- Outcome visualization








Further study

- Safety audits
 - Available sight distance
 - Design consistency
 - Traffic flow
 - Speed
 - Crashes



Conclusions

- Integrated analysis 
- Big data analysis with ease 
- High accuracy 
- Short computing time 
- Georeferenced data 
- Further study 

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Thank you for your attention!

Vielen Dank für Ihre Aufmerksamkeit!

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