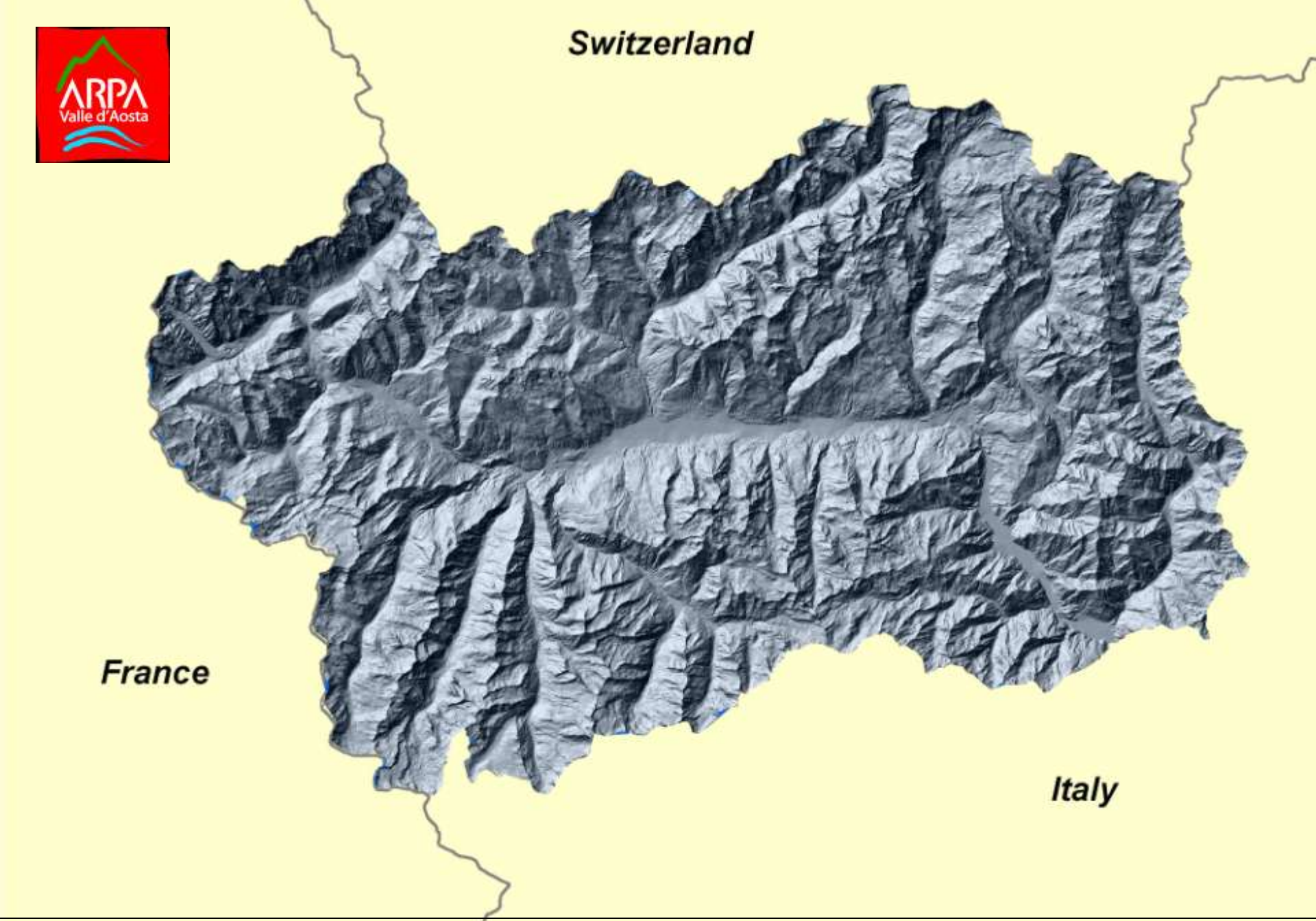
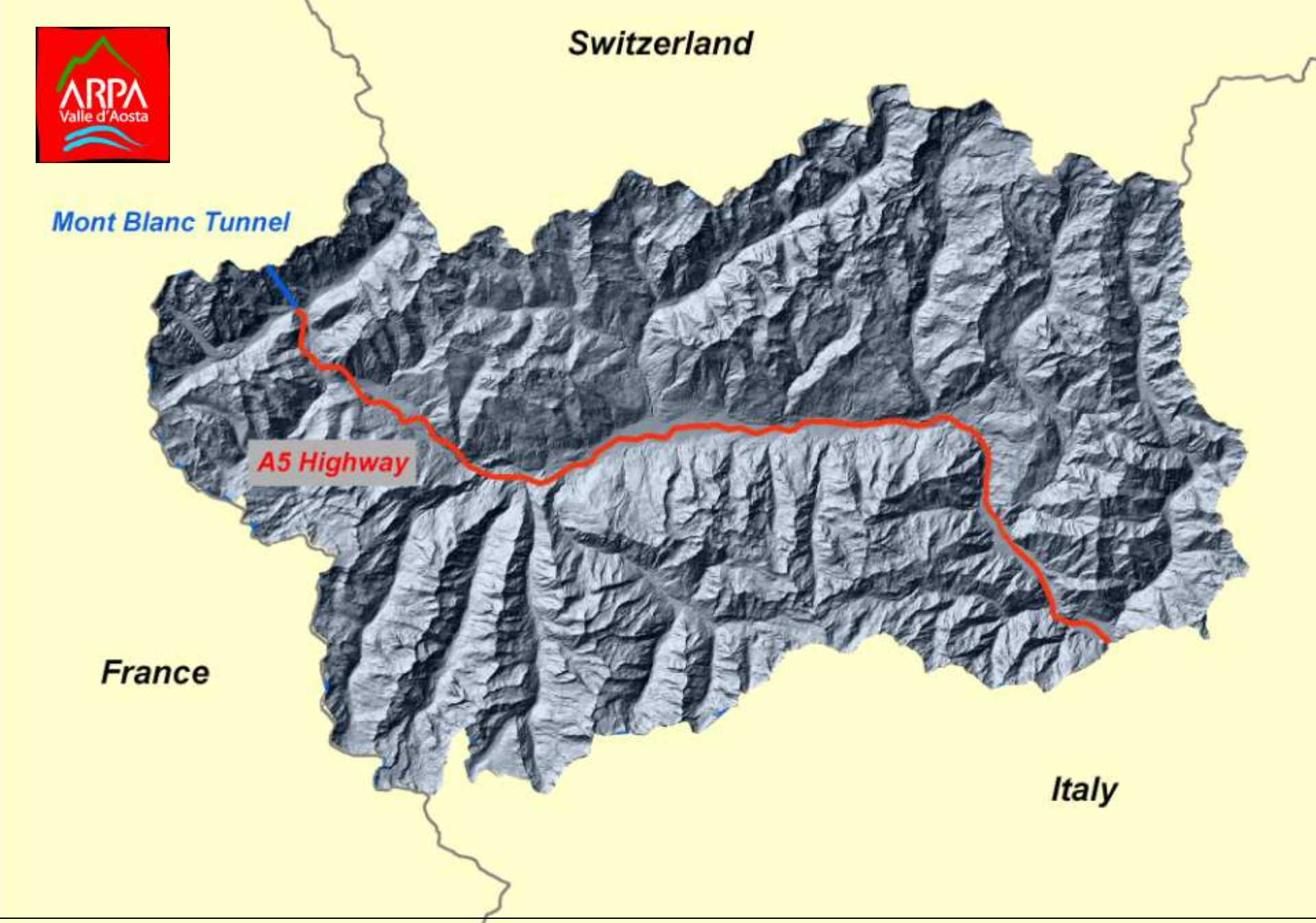
Aosta Valley Environmental Protection Agency

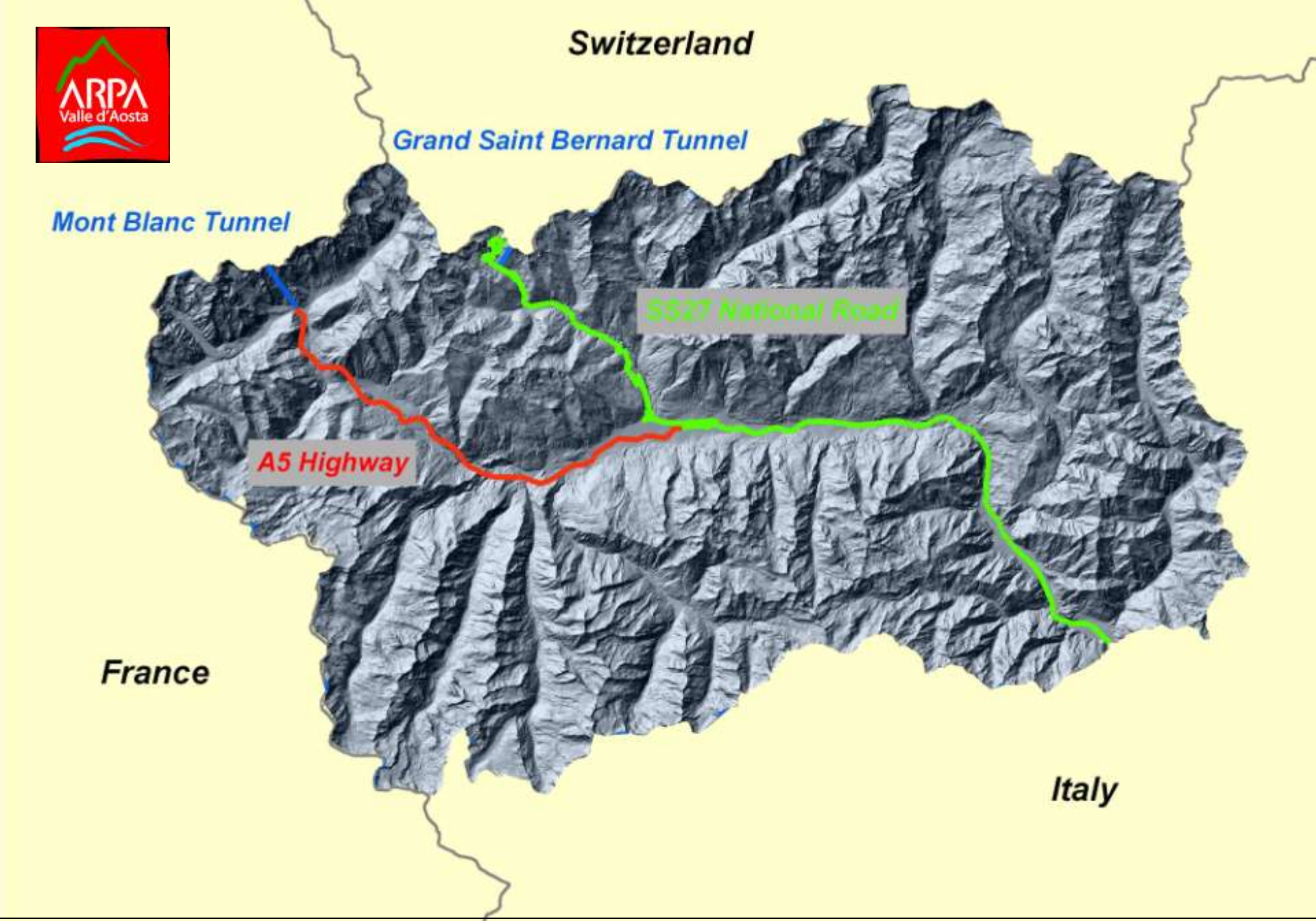
Noise impact of an international traffic corridor: a useful method to support traffic infrastructure planning

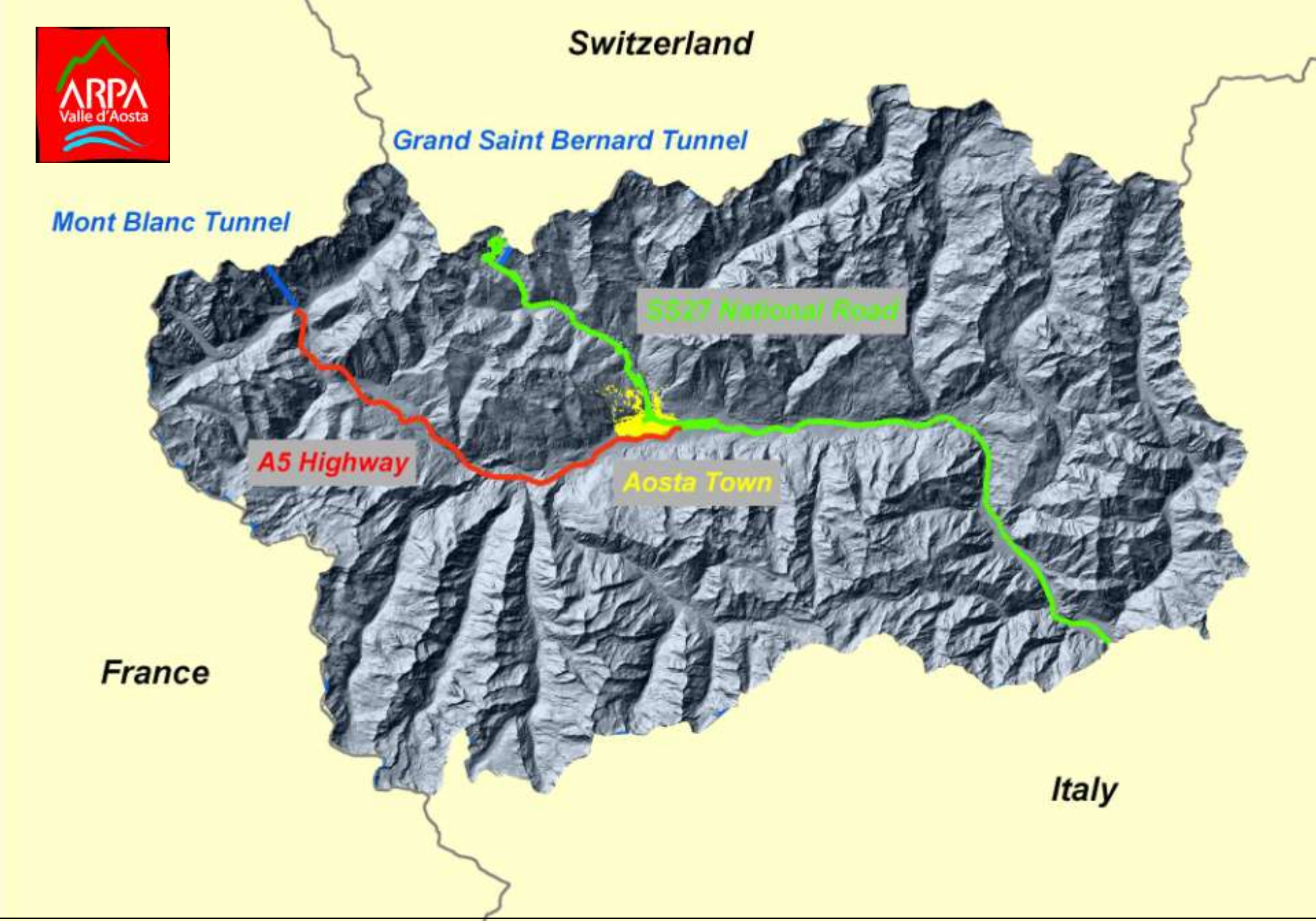
Filippo Berlier, Giovanni Agnesod, Marco Cappio Borlino, Christian Tibone, Christian Tartin, Daniele Crea

The Aosta Valley: its position in Europe and Italy

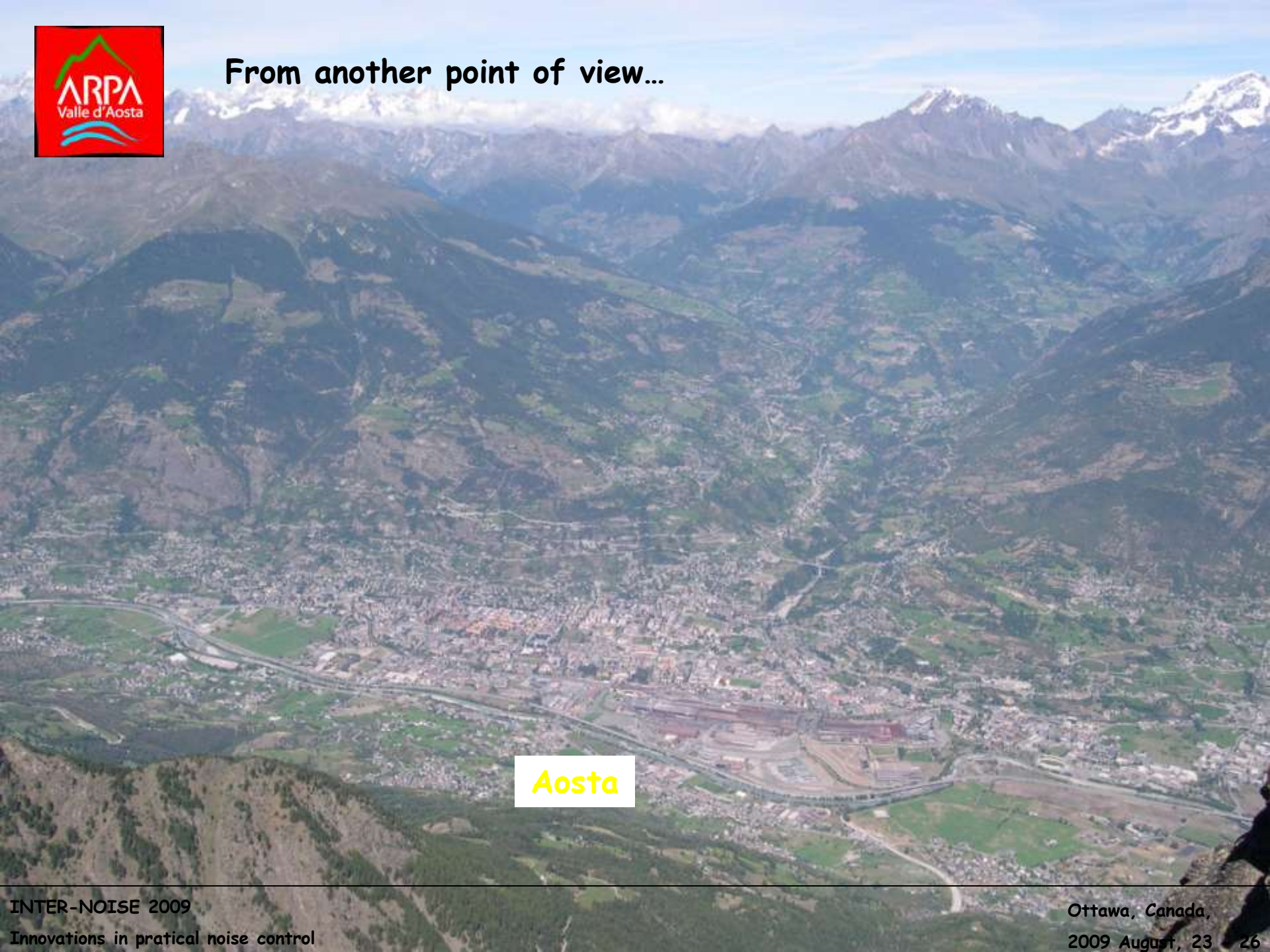

Switzerland
France
Italy


Switzerland
Mont Blanc Tunnel
A5 Highway
France
Italy


Switzerland
Grand Saint Bernard Tunnel
Mont Blanc Tunnel
S527 National Road
A5 Highway
France
Italy

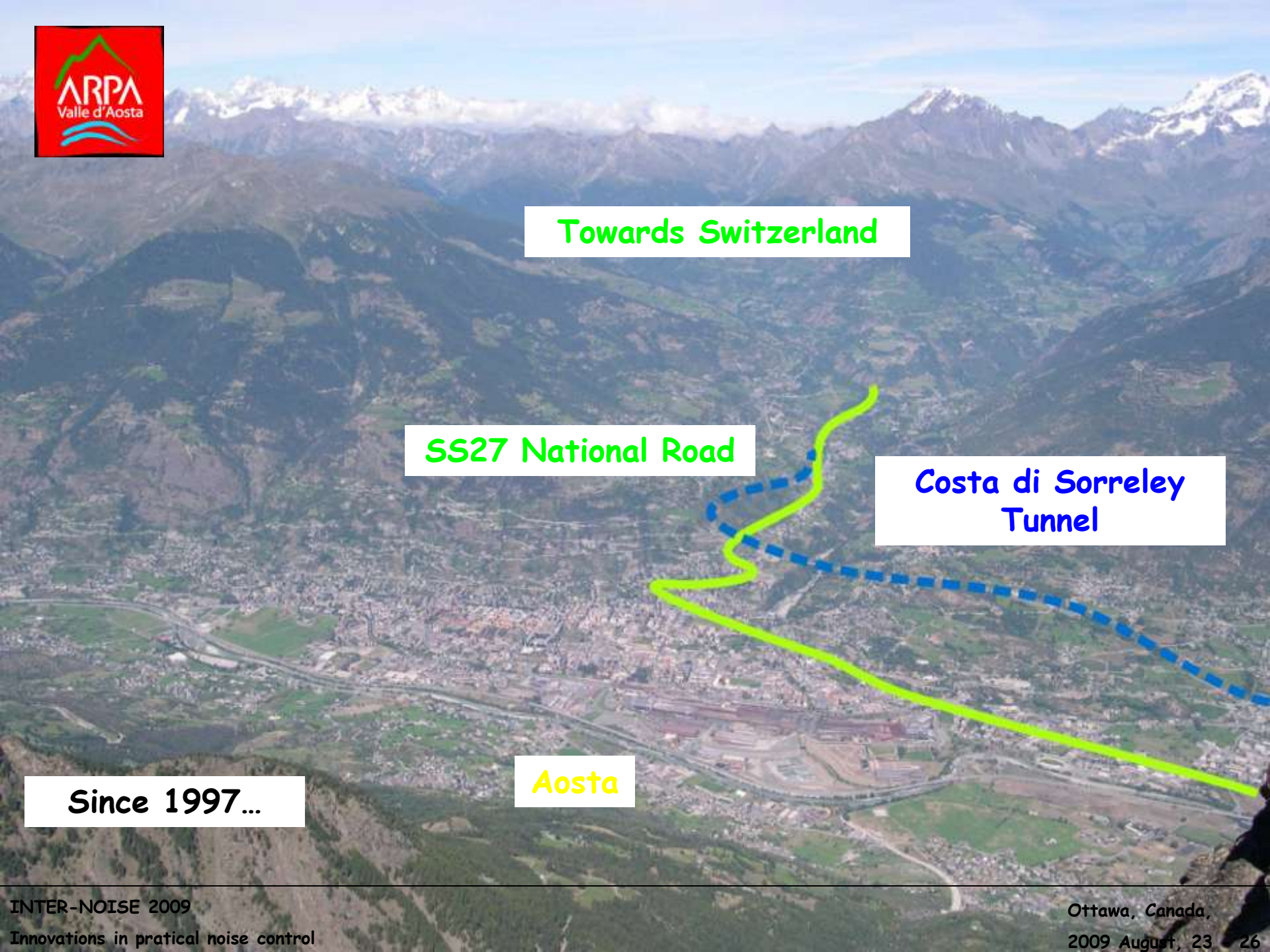

Switzerland
Grand Saint Bernard Tunnel
Mont Blanc Tunnel
S527 National Road
A5 Highway
Aosta Town
France
Italy

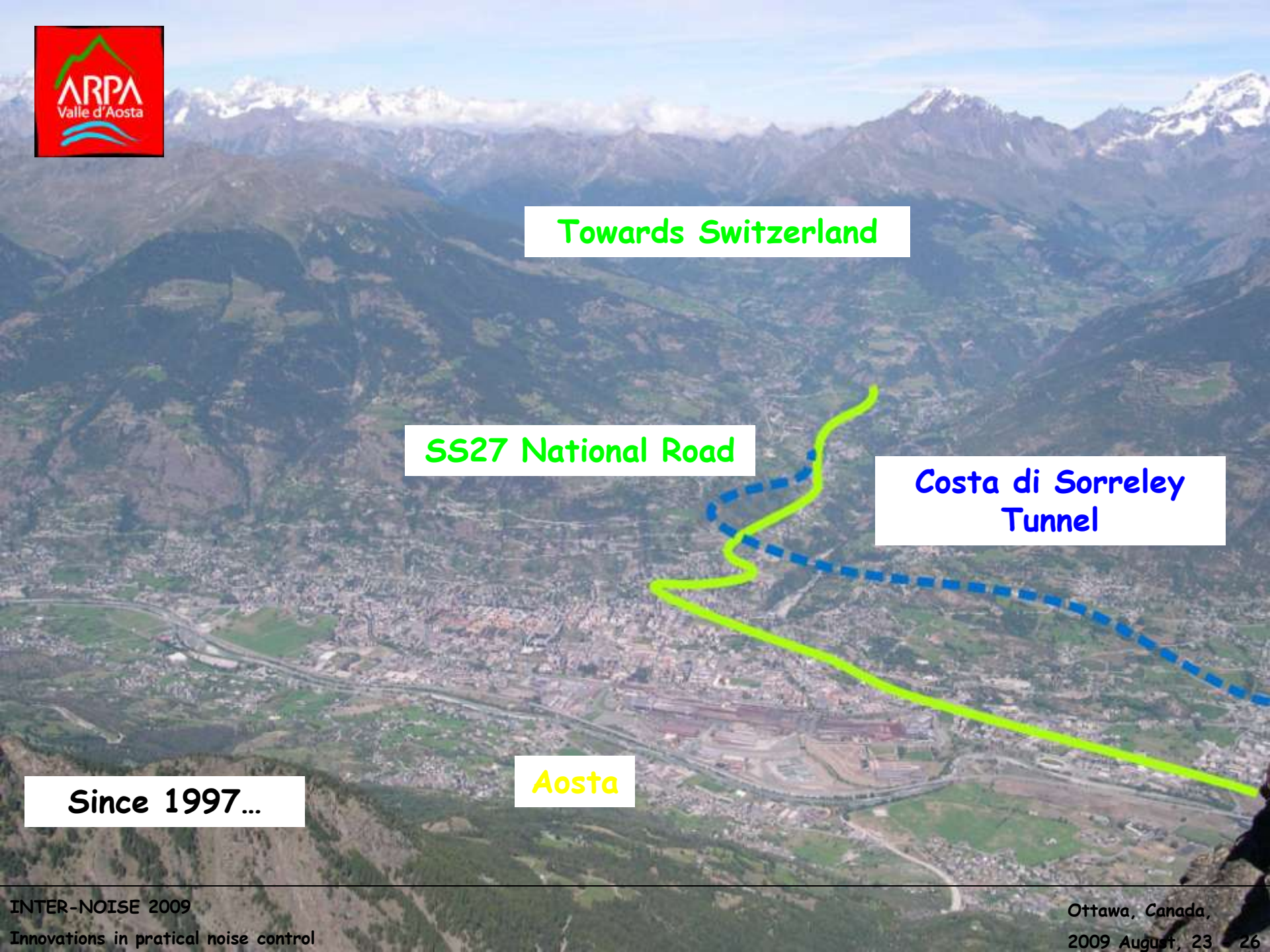
From another point of view…



SS27 National Road
A5 Highway
Aosta

Towards Switzerland
SS27 National Road
Aosta


Towards Switzerland
SS27 National Road
Costa di Sorreley
Tunnel
Aosta
Since 1997…


Towards Switzerland
SS27 National Road
Costa di Sorreley
Tunnel
Aosta
Since 1997…

The objectives of the study

1. Assess the noise effects of the opening of the new road through the comparison between the two scenarios (before and after 1997)

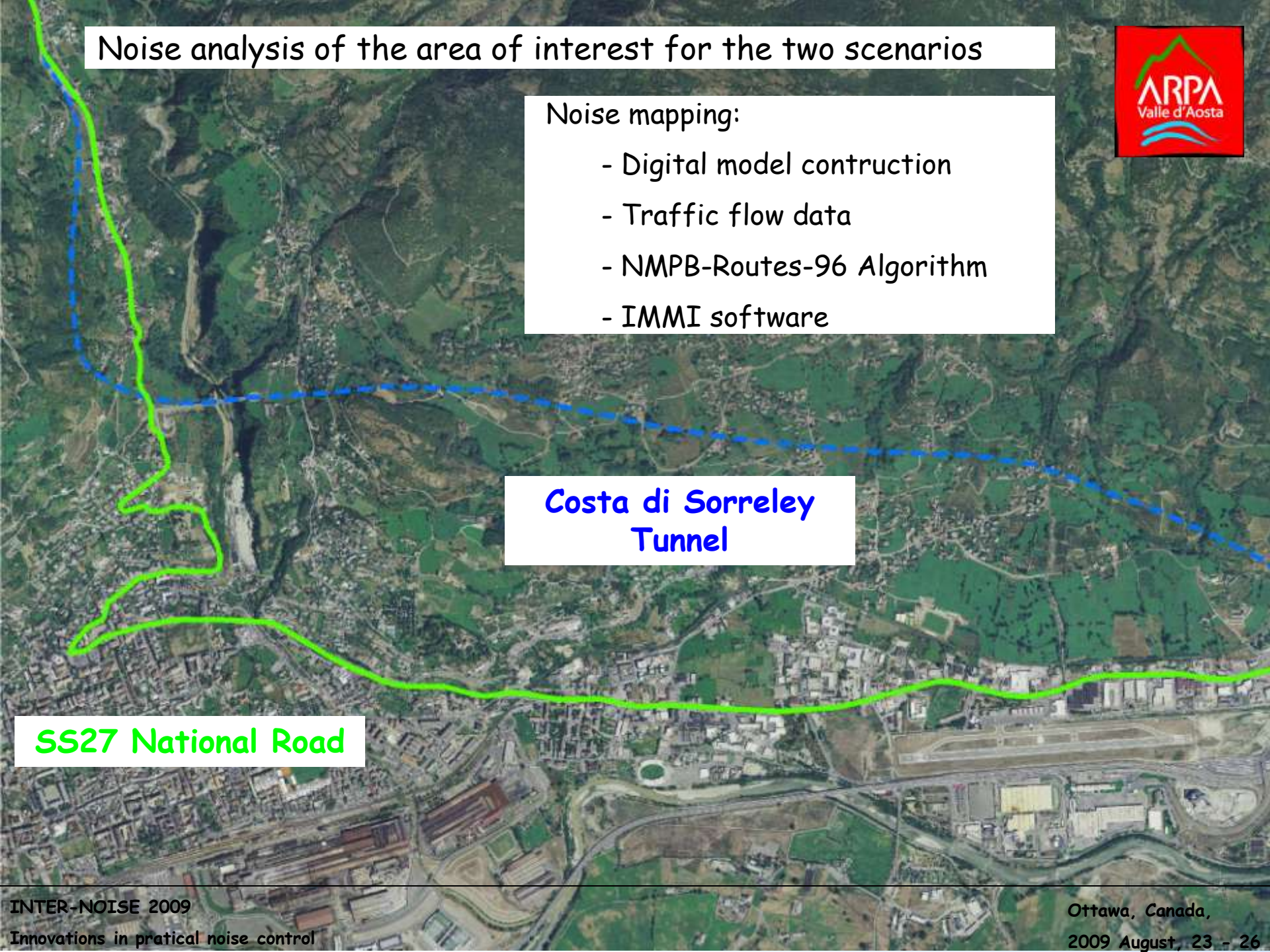
2. Analyse how the traffic flow changes affected the population noise exposure

… with the aim to give helpful methodology to assess further and future measures in order to reduce the negative effects of traffic

Noise analysis of the area of interest for the two scenarios

Noise mapping:

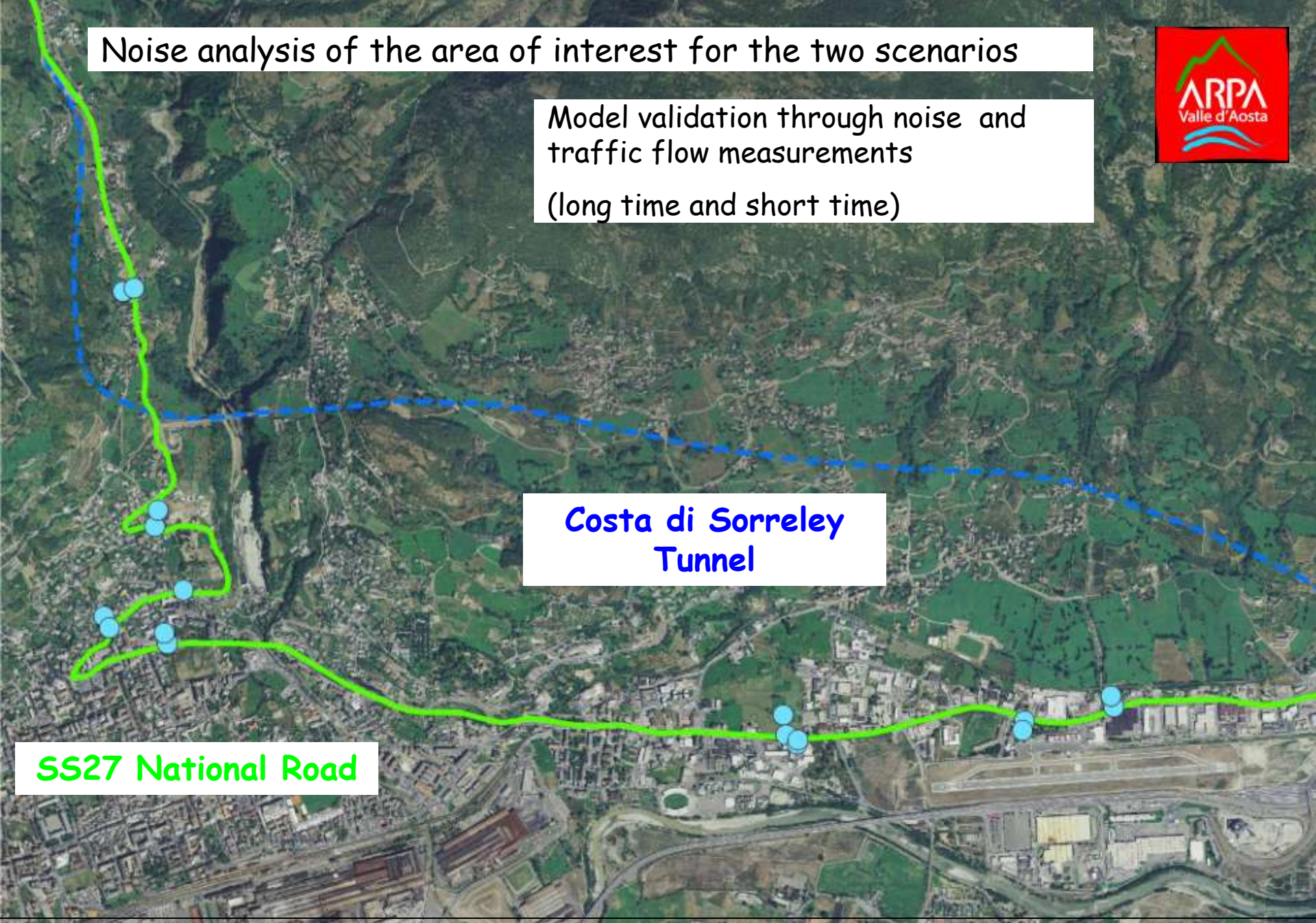
- Digital model contruction
- Traffic flow data
- NMPB-Routes-96 Algorithm
- IMMI software



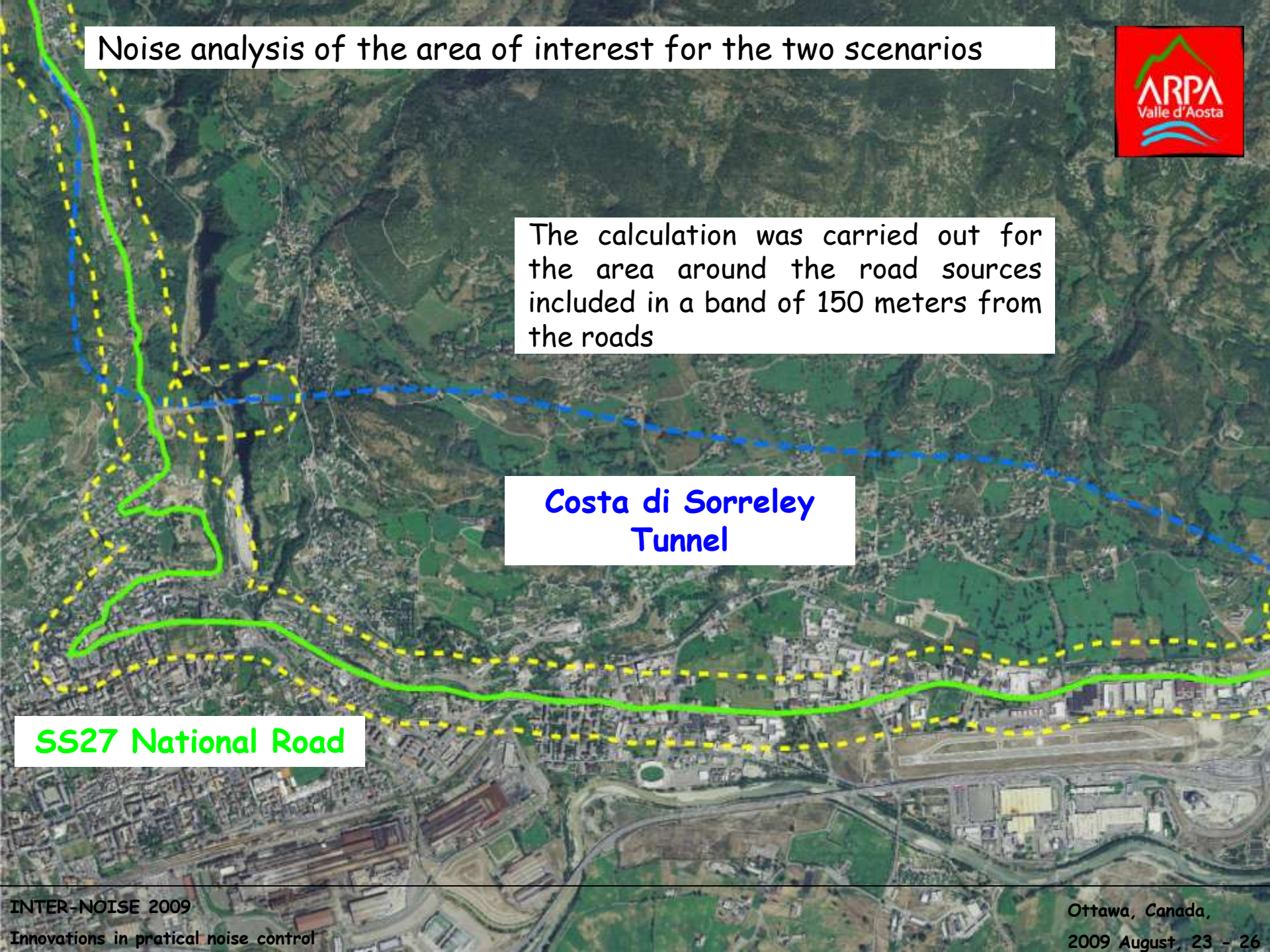
Noise analysis of the area of interest for the two scenarios

Model validation through noise and traffic flow measurements

(long time and short time)



Noise analysis of the area of interest for the two scenarios



Noise indicators

European Environmental Noise Directive 2002/49/EC

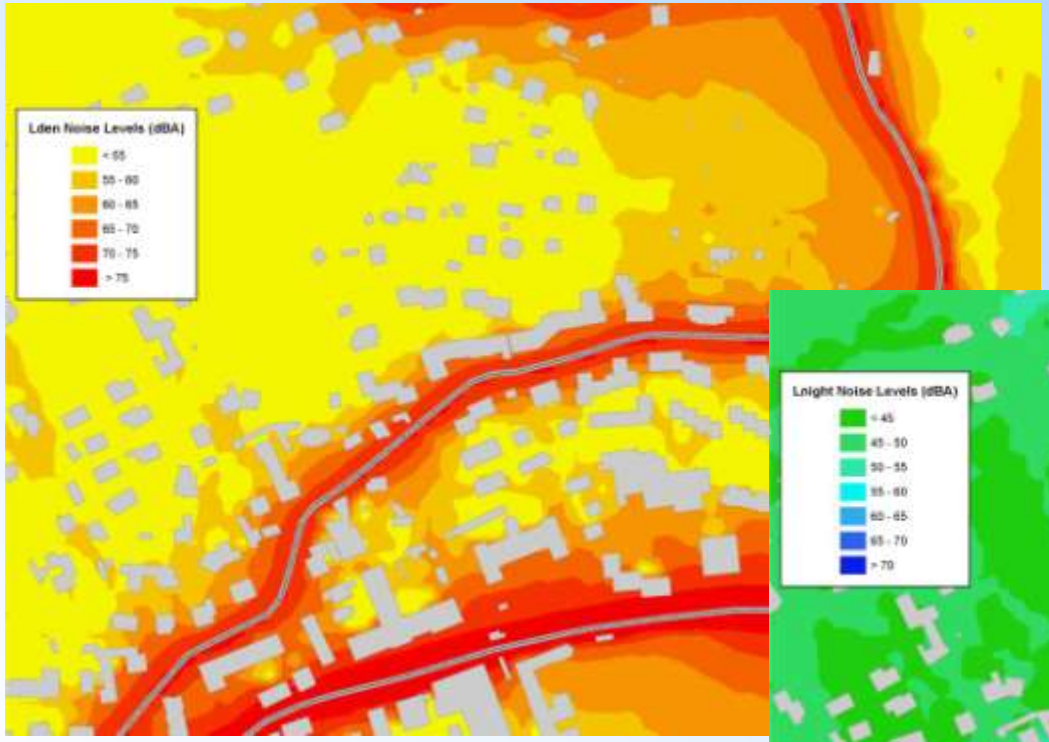
Italian Legislation, Dlgs 19/08/2005, n.194

$$L_{den} = 10 \cdot Log \frac{1}{24}\left(14 \cdot 10^{\frac{L_{day}}{10}} + 2 \cdot 10^{\frac{L_{evening}+5}{10}} + 8 \cdot 10^{\frac{L_{night}+10}{10}} \right)$$

Where : Daytime level = 06-20
Eveningtime level = 20-22
Nighttime level = 22-06

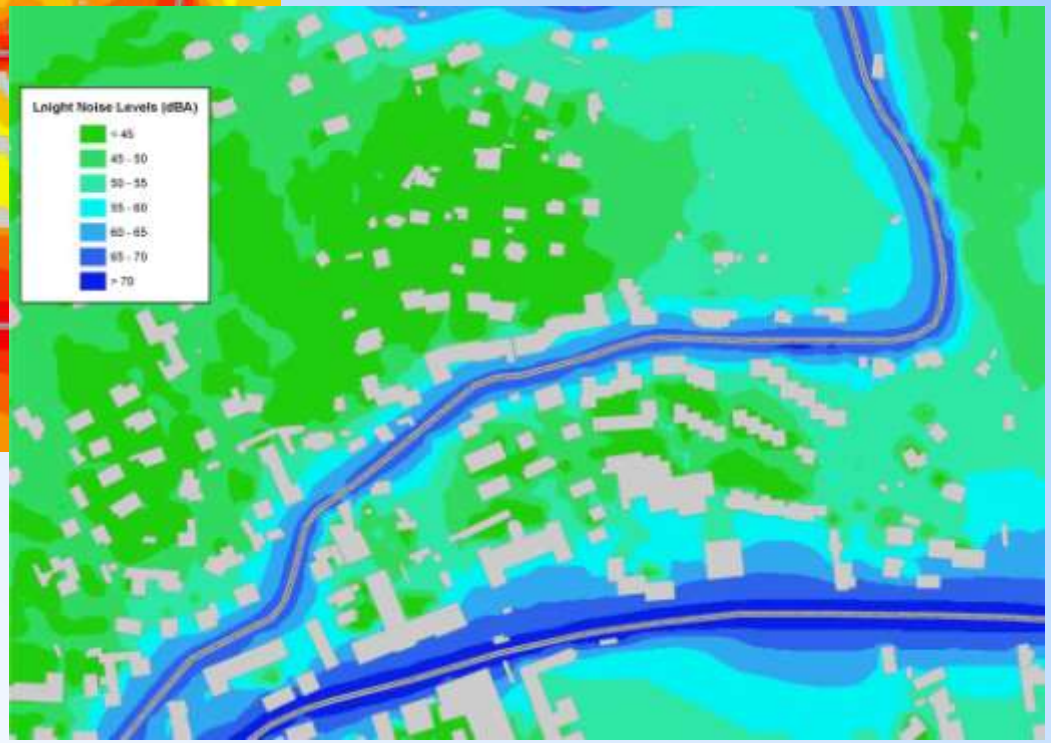
L_{night} Evaluated from 22:00 to 6:00

First result: noise mapping



Lden

Lnight



Population exposure

- the analysis took into account only resident inhabitants

- the number of inhabitants of each building was supplied by the public administration of the town of Aosta

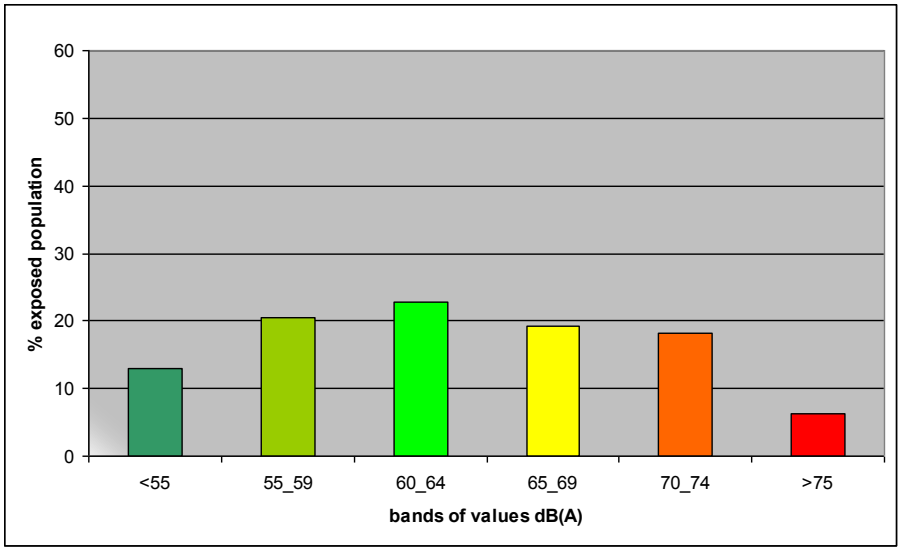
Two methods were followed to refer the number of inhabitants for each building to sound levels

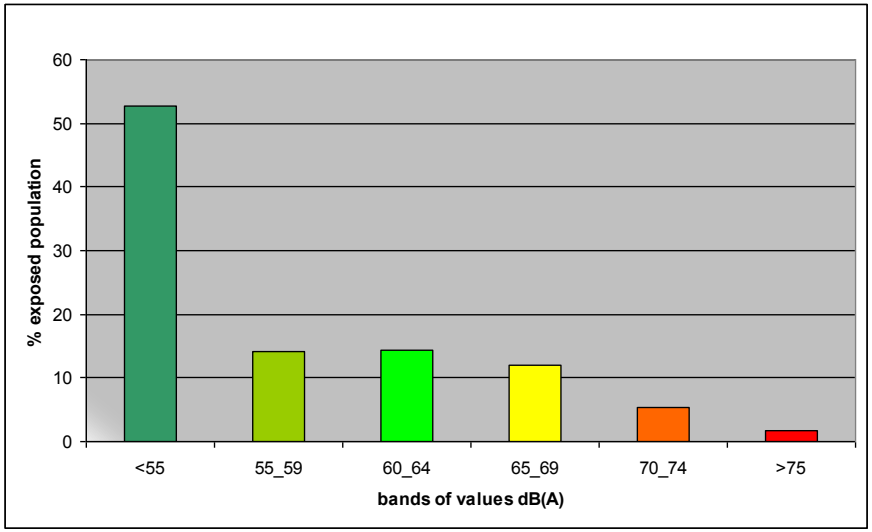
- referring all the dwelling inhabitants to the most exposed façade level (END 2002/49/EC method)

- assigning the inhabitants proportionally to the dwelling façades (German assessment VBEB method)

Second result: population exposure with reference to two different evaluation methodologies

- referring all the dwellings inhabitants to the most exposed façade level

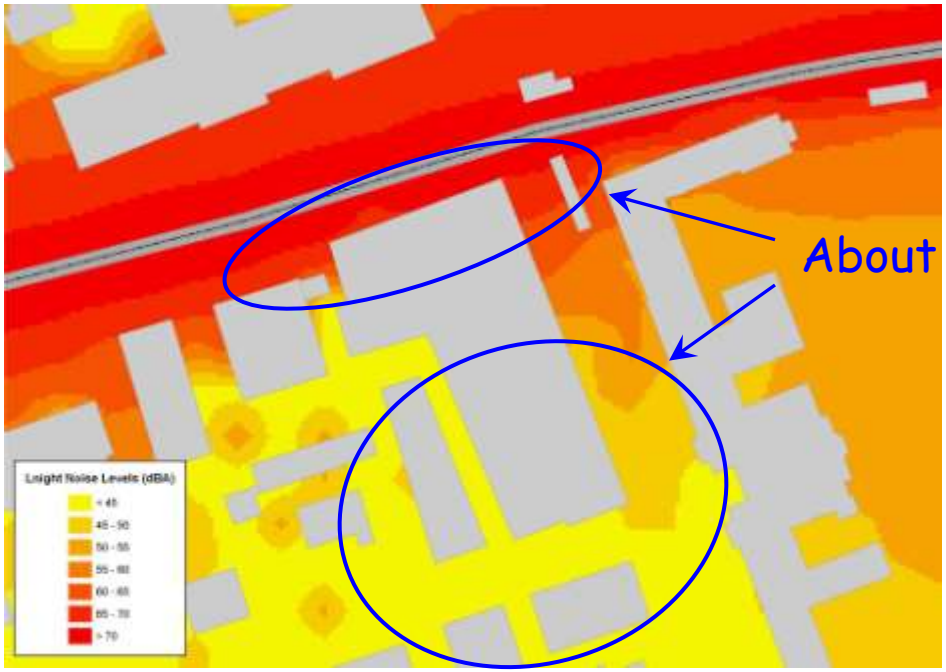




- assigning the inhabitants proportionally to the façades

Second result: population exposure with reference to two different evaluation methodologies

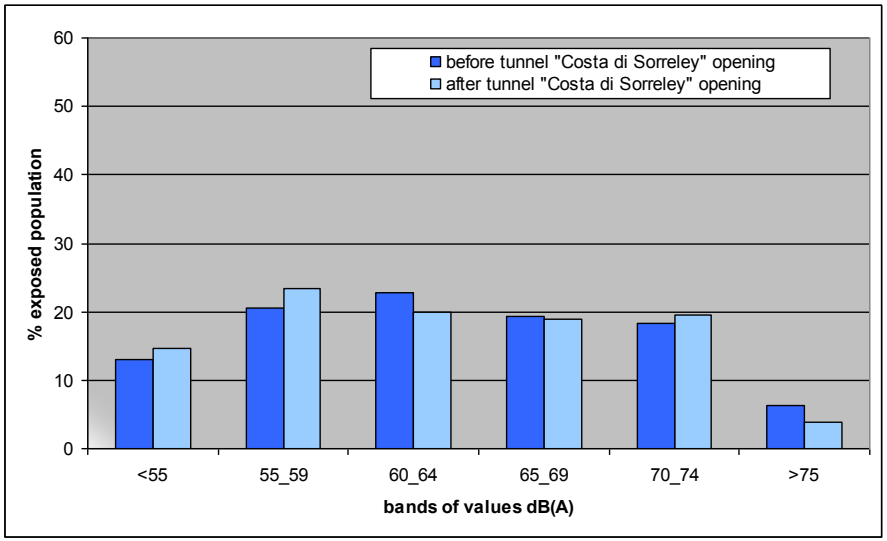
About the difference between the two methods:

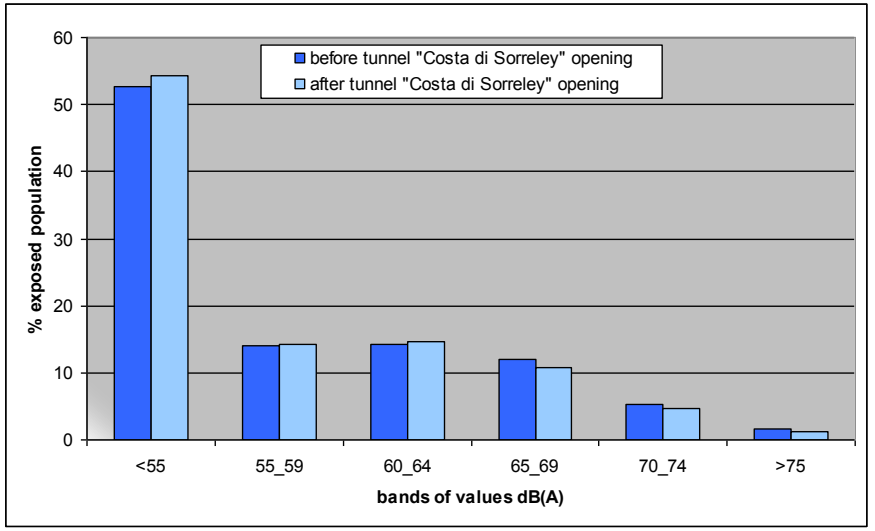


referring all the inhabitants to the level of the most exposed façade is in agreement with caution and prudence principles, but it could lead to overestimate the noise exposure and to adopt excessive abatement measures

Further result: comparison between two scenarios

- referring all the dwellings inhabitants to the most exposed façade level





- assigning the inhabitants proportionally to the façades

Final considerations

Noise level maps representing existing or predicted noise levels are not the final result of an analysis.

They are useful elements for action planning.

The cross between noise maps and population distribution is a fundamental step.

The result is the population noise exposure evaluation.

During the population noise exposure evaluation, in order to develop traffic infrastructures planning, it is necessary to carry out very attentively each of those steps

Thank you very much !