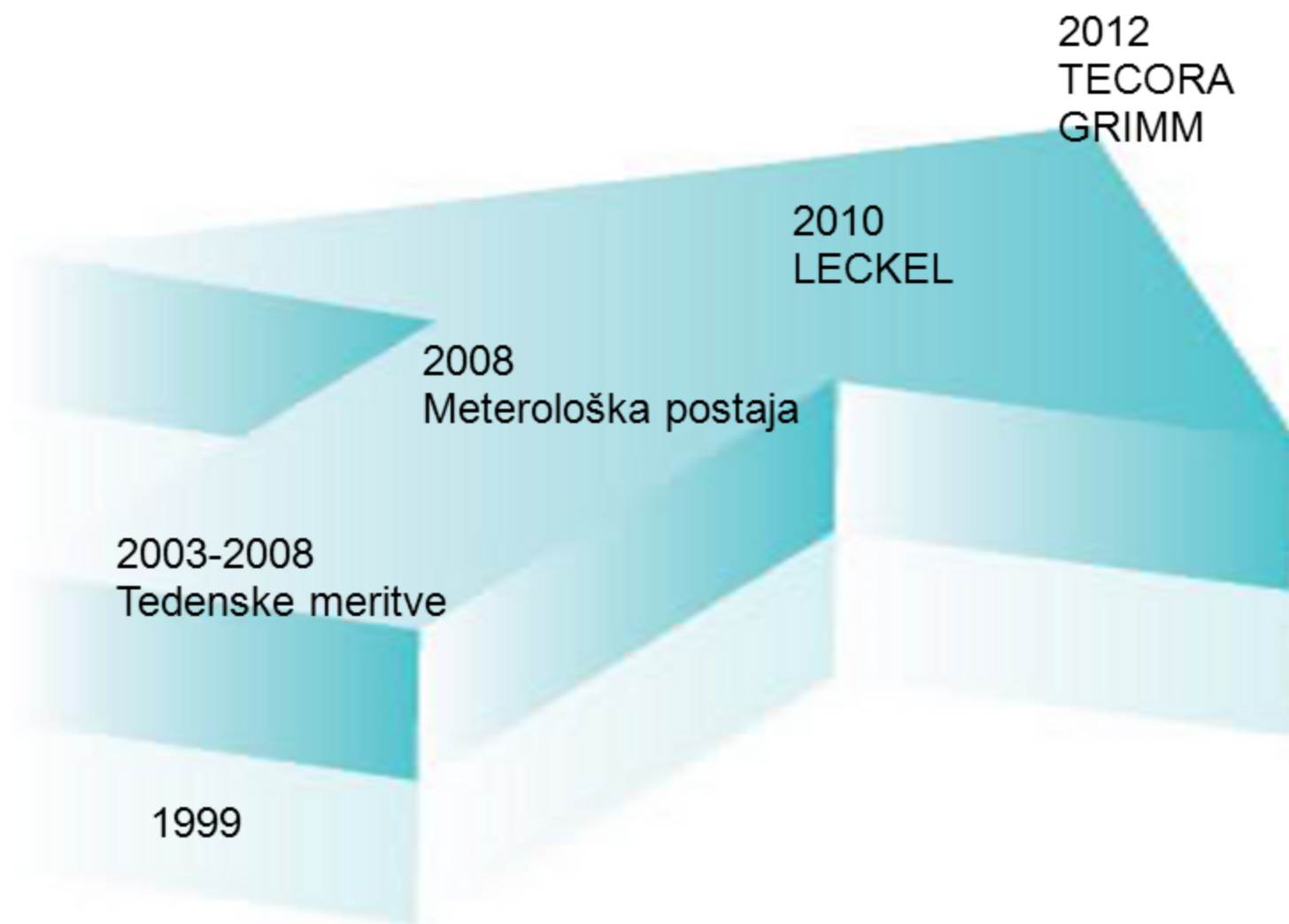


Luka Koper in PM10-let

dr. Jure Pražnikar

Univerza na Primorskem,
Inštitut Andrej Marušič





Meritve prašnih delcev na območju Luke Koper

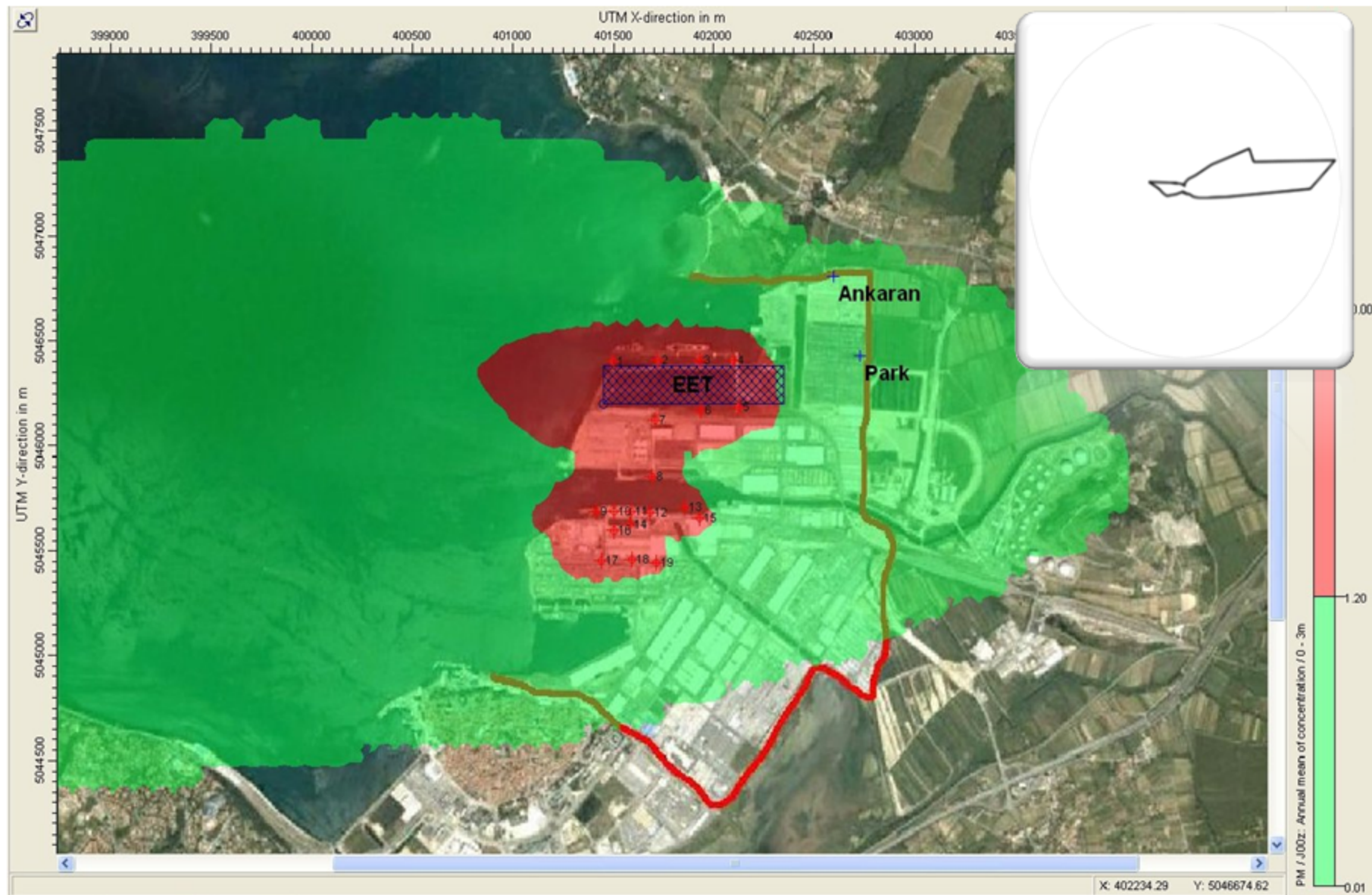
PM10 ($\mu\text{g m}^{-3}$)	2009	2010	2011	2012
smer Ankaran	24	25	26	24
smer Bertoki	20	19	27	26

Kolikokrat smo bili nad mejo
35 dni v enem koledarskem letu?

Nikoli! (tipično med 15 in 27 dni)

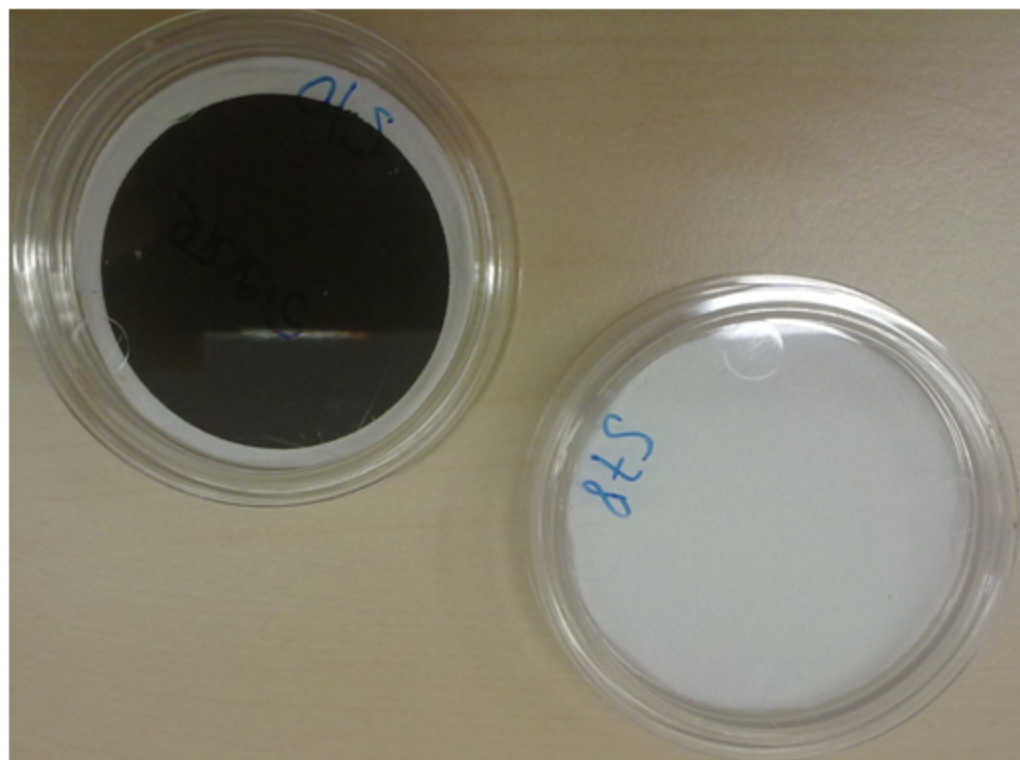


Dodatna obremenitev zunanjega zraka – erozija vetra



Tedenske meritve v obdobju od 2003 do 2008

Mikroanalitskegi center
Fizika nizkih in srednjih energij
Institut Jožef Stefan, Ljubljana



*Analysis of five years measurements of elemental contents in
airborne particulate matter
Jure Pražnikar, Franka Cepak, Janez Žibert*

Tedenske meritve v obdobju od 2003 do 2008

Izvor	Kemijski elementi
Zemeljska skorja - prst	S K Ca Ti Sr
Težka mehanizacija, ladje	V Ni Cu
Prežetovor premoga in železove rude	Mn Fe
Morska sol	Cl Br
Industrija in promet	Zn Pb
Krom	Cr

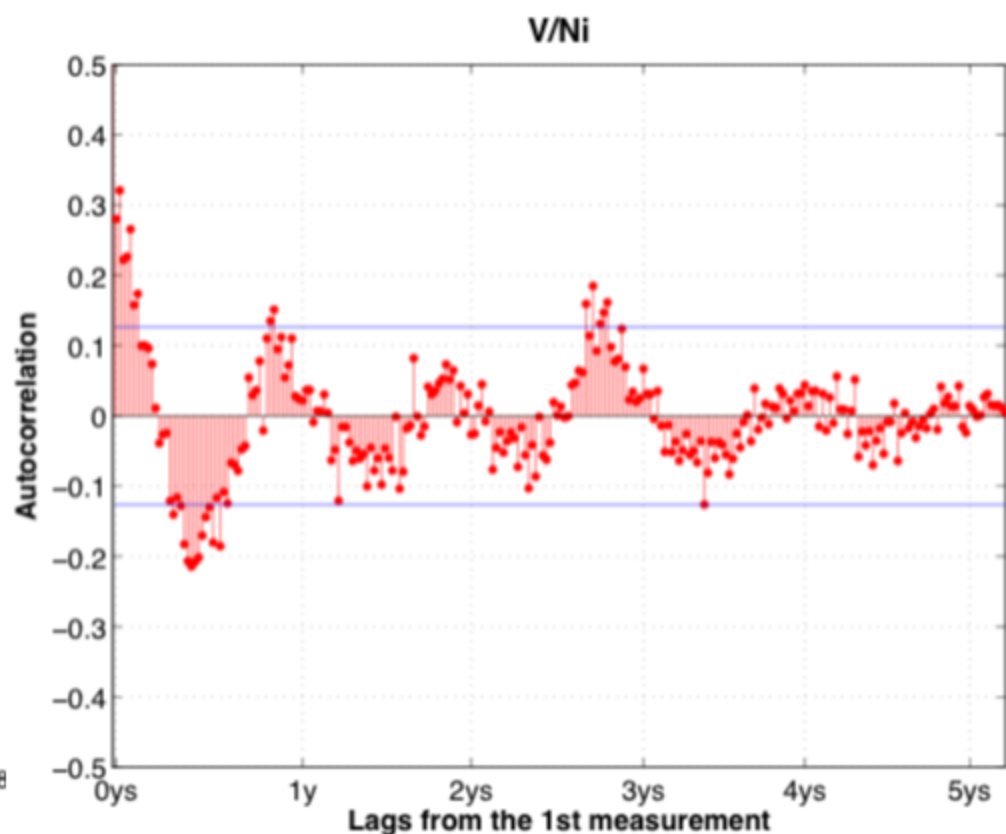
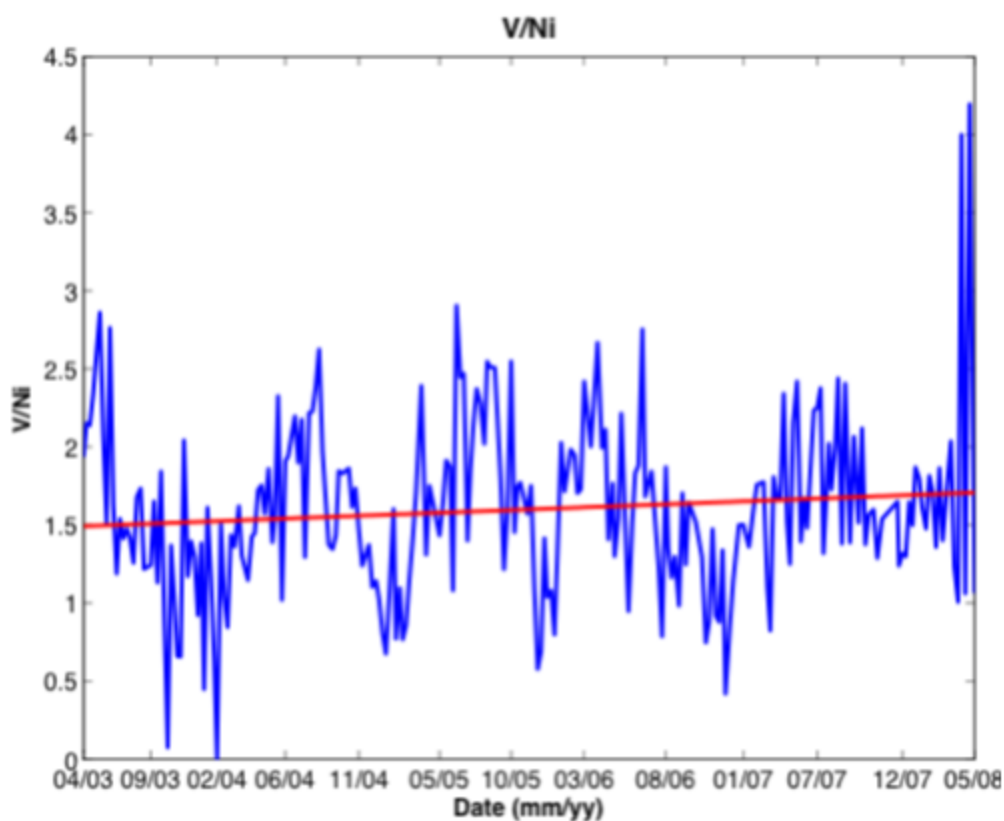
Vanadij in nikelj – težka mehanizacija

Ladje

$$\frac{V}{Ni} \approx 3$$

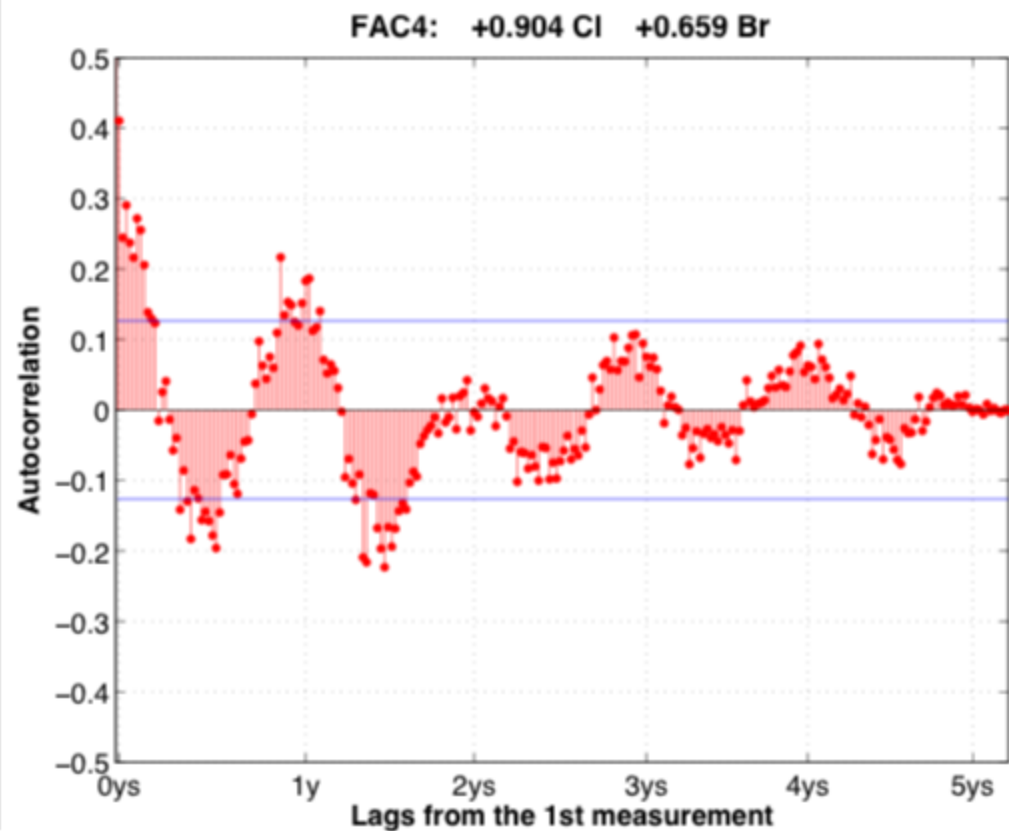
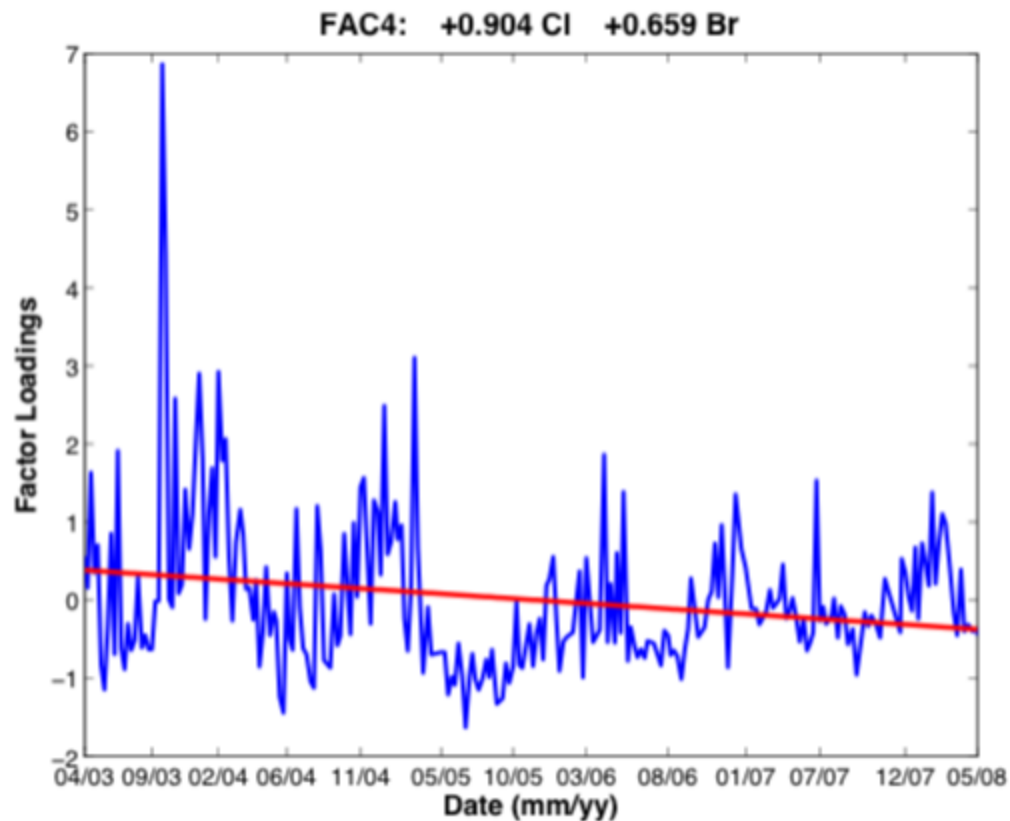
Prst-zemlja

$$\frac{V}{Ni} < 1$$



Porast ladijskega prometa za 20%.

Morska sol – naravni vir prašnih delcev



Kam in kako naprej? Ali je PM10 dovolj?



Delci PM2.5?
Črni ogljik?
Število delcev v zraku?

Merjene in analiza koncentracije črnega ogljika

Black Carbon as an Additional Indicator of the Adverse Health Effects of Airborne Particles Compared with PM10 and PM2.5

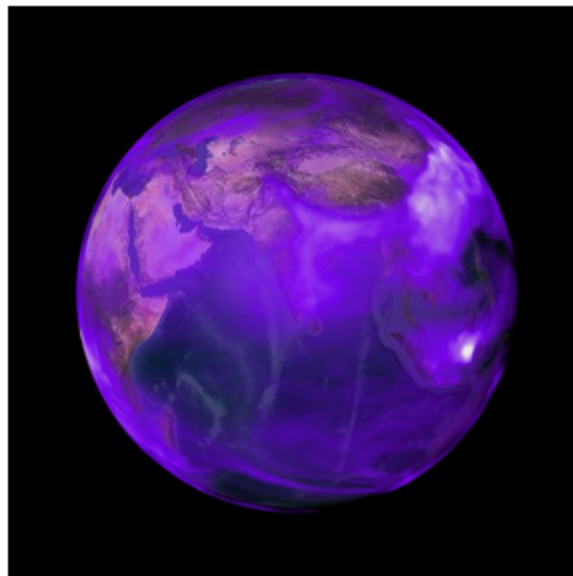
Nicole A.H. Janssen in sodelovaci:

Environ Health Perspect. 2011 December; 119(12): 1691–1699.

... our review shows that BCP is a valuable additional air quality indicator ...

... we do not promote BCP as an alternative marker for PM mass ...

Črni ogljik kot dodaten indikator!

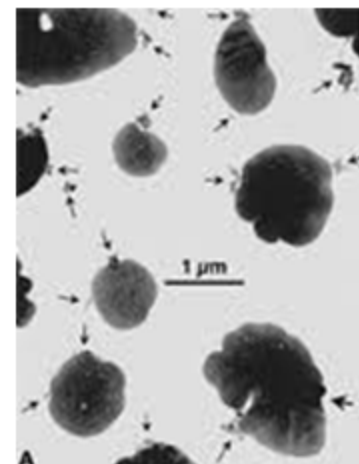


Vir: http://en.wikipedia.org/wiki/Black_carbon

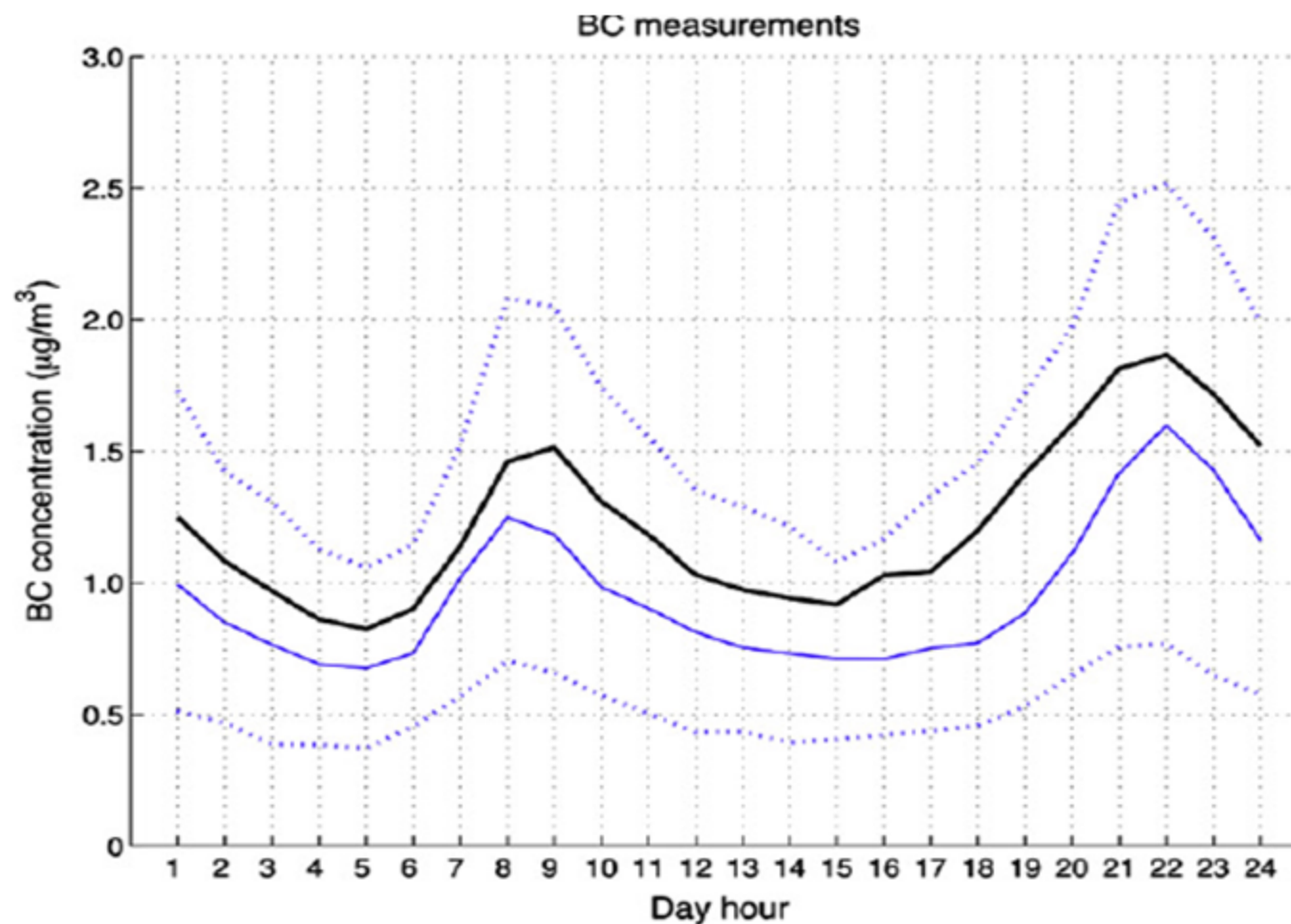
Cluster analysis of particulate matter (PM10) and black carbon (BC) concentrations

Atmospheric Environment
Volume 57, September 2012

Janez Žibert & Jure Pražnikar,
Institute Andrej Marušič, University of Primorska



Vir: Nasa.gov



Masa ali število delcev?

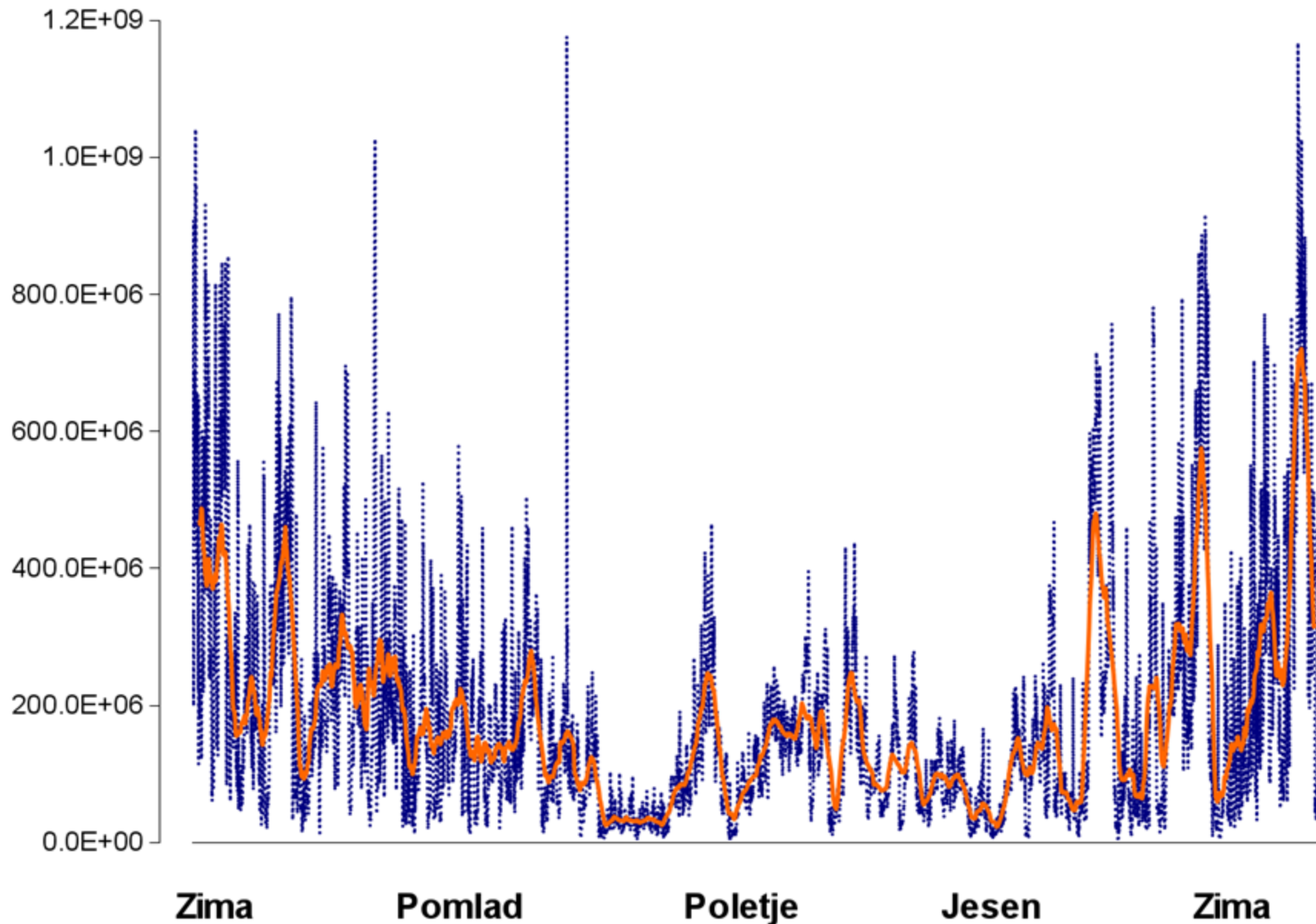
Merilnik na potniškem terminalu - 2013

Delci	Koncentracija $\mu\text{g m}^{-3}$	Dni nad $50 \mu\text{g m}^{-3}$
PM10	19	6
PM2.5	14	
PM1	14	
Število delcev	?	?

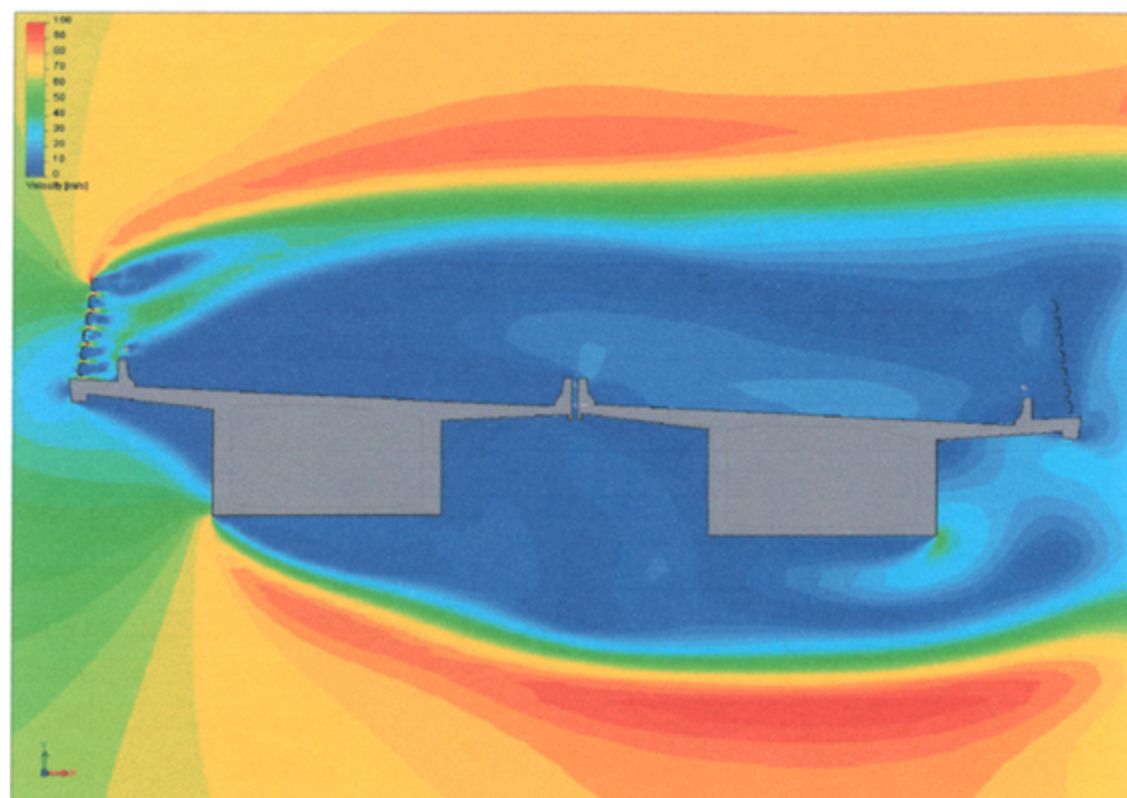
Markovec (ARSO),
do avgusta 4 preseganja dnevne mejne vrednosti.

Masa ali število delcev?

Število delcev v litru zraka.

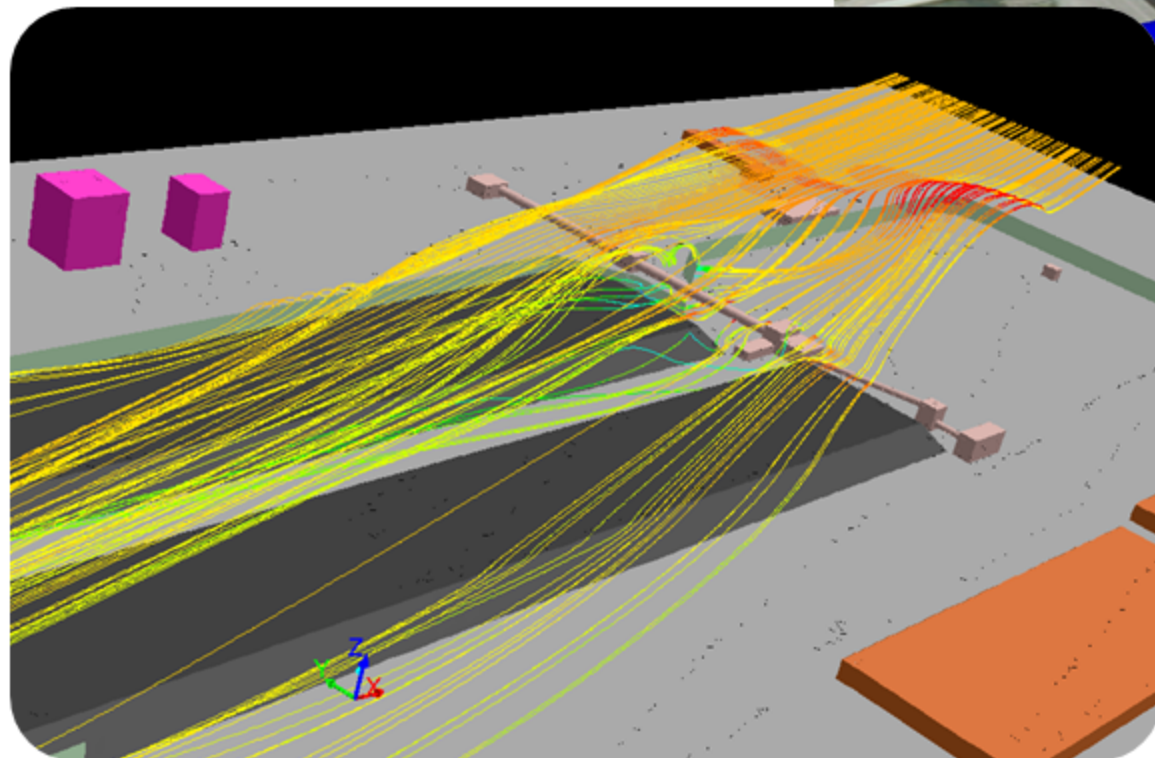
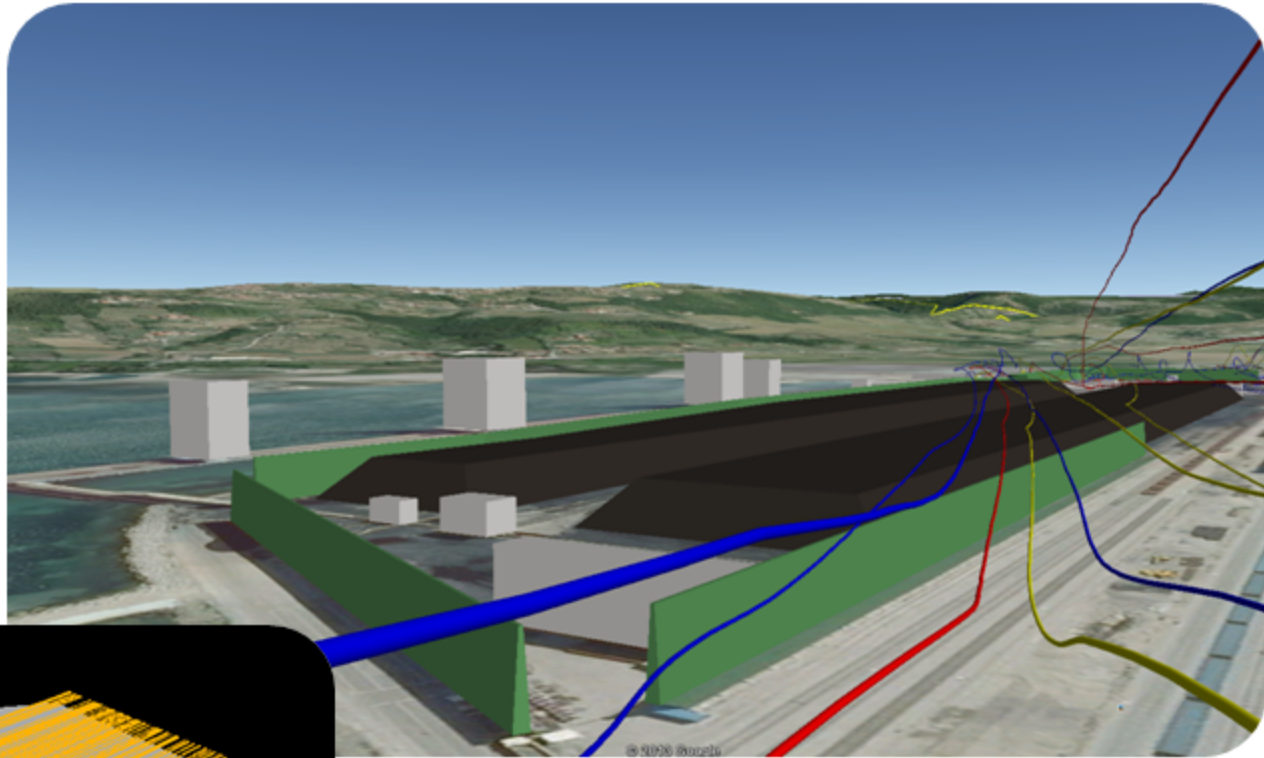


Nadaljne raziskave



Brane Širok, Inventing
oblikovanje koncepta delno prepustne ograje za
DARS na viaduktu Črni Kal

Nadaljne raziskave



Hvala za pozornost!