



Geographical **I**nformation **P**rocessing for
Environmental **P**ollution-**R**elated **S**ecurity
within **U**rban **S**cale environments

Title: Toward to GEPUS

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1. Air pollution emission 1/1

(Sources types, categories and size)

- Big size point sources

There is a few big point air pollution sources in Montenegro, which become IPPC cathegory:

- Aluminum Plant Podgorica (SO₂, NO_x, F, PM, Metals)
- Iron Factory Niksic (SO₂, NO_x, PM, Heavy metals)
- Thermo-power Plant Pljevlja (SO₂, PM, NO_x)
- Mine of coal Pljevlja (SO₂, NO_x, PM)

- Characteristics

- Current total amount of emission is smaller than one expected from installed full capacity, because these sources have worked under limited capacity or temporary only.
- Status of treatment (cleaning) of emission substances is at un-adequate level, because objects did not install needed equipment, or it is out of work.



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1. Air pollution emission 1/2

- Medium/small size point sources
 - Port of Bar - port land and water activities (PM, smoke particles, specific gaseous substances),
 - Plantation of grape-vine and fruit Podgorica - agriculture activities (use of fertilizers and plant protection products – NH₃, pesticides),
 - Hellenic Jugopetrol Kotor - Petrol storage installations at Port of Bar and Tivat (manipulation activities - VOCs, PAHs, HC)
 - Airports at Podgorica and Tivat - air traffic (LTO activities – CO₂, CO, NO_x, NMVOCs, SO₂, PM)
 - Dump of alumina, Niksic (Fluorides, PM)
 - Municipal solid waste dumps (un-treated waste, un-controlled waste combustion)



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1. Air pollution emission 1/3

- Diffuse emission sources
 - Road traffic
 - Petrol stations and traffic infrastructure
 - Wood processing (waste incineration, protection like impregnation etc.)
 - Of-road vehicles
 - Private small-size agriculture manufactures (farms of hens, cattle and pigs; plants)



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1. Air pollution emission 1/4

- Important, but temporary regional impact:
- Deposition of desert dust from North Africa
(PM, Heavy metals – mostly Fe)



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2. Air quality data, are available 2/1

- National monitoring:
Monitoring is under responsibility of MTSD.
Implementation institution is EPAM. The monitoring has realized by a tender selected institution. At the recent years it was JUCETI.
- Monitoring under HMI network: Network station for air quality monitoring is established in HMI since 1975. The stations are located at the meteorological stations. Measuring program is shown at Table 2. Sampling period is 24h (7h-7h by UTC).



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2. Air quality data, are available 2/2

- Other activities:
Modeling and forecast of desert aerosols deposition at Montenegro area established in HMI. It was the I phase of the planned Project. The II phase – validation of modeling data, did not implement yet, because of financial gaps.
- Previous projects:
 - *Inventory of sulphur emission at Podgorica area, by HMI*
 - *Study: Air pollution at Montenegro (in terms of air quality and meteorology), by HMY*
 - *Acidity of precipitation as possible factor of forests drying (as part of the large project), by HMI, etc.*
 - *Basic air quality and meteorology studies for Spatial Plan for overall Montenegro area, as well as for National parks and other protected areas.*



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2. Air quality data, are available 2/3

- Historical data:
 - HMI: Data from EMEP station Zabljak 1993-1999 (SO₂, NO_x in air, Chemical composition of precipitations, content of Hg, Pb and Cd in precipitations)
 - IPH: (monitoring of air quality till 1996; Fluorides in air)
 - JUCETI (monitoring of air quality: Smoke, SO₂, NH₄, F, HM)
 - JU CETI (different particular measurements; some emission data)
 - Institute for technical researches (different particular measurements)
- Some particular studies
- P. Djuraskovic: Correlation between meteorological conditions and air quality parameters, Master thesis, 2000. (related to Podgorica-Niksic area)
- Other



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3. Existing network stations 3/1

Table 1: National program`s network (operated by CETI)

Station	Location	Program	Remark
Podgorica	Urban area	CO, NOx, PM10, benzene, benzo(a)pyrene, Pb, Meteo par.	Automatic
Niksic	Urban area	CO, O3, SO2, NOx, PM10, PM2.5, benzene, benzo(a)pyrene, Cd, As, Ni, Meteo par.	Automatic
Zabljak	Urban area	O3	Automatic



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3. Existing network stations 3/2

Table 2: HMI air quality network

Station	Location	Program	Remark
Podgorica	BTF	Air: SO ₂ , Smoke Prec.: pH, Cond, main ions	Manually
Danilovgrad	Radio-station building	Air: SO ₂ , Smoke	Manually
Niksic	Meteo station	Air: SO ₂ , Smoke Prec.: pH, Cond, main ions	Manually
Zabljak	Meteo station	Air: SO ₂ , Smoke Prec.: pH, Cond, main ions	Manually



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3. Existing network stations 3/3

Table 3: HMI meteorological network

Station	Location	Program	Remark
Podgorica	BTF	Temp., pressure, wind direction and intensity, humidity, precipitation	automatic
Danilovgrad	Primary School	Temp., pressure, wind direction and intensity, humidity, precipitation	Manually
Niksic	Meteo station	Temp., pressure, wind direction and intensity, humidity, precipitation	automatic
Zabljak	Meteo station	Temp., pressure, wind direction and intensity, humidity, precipitation	automatic



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4. Program and area of interest

- Project aim
 - Establishing a modeling and forecast of air pollution from point sources and their validation by concrete measures of air quality at selected stations.
 - Defining the characteristic air quality and meteorological measuring program and related network.
- Provisional Project elements
 - Aluminum Plant in Podgorica is selected as point emission source
 - Provisional project network: Podgorica (BHT), Danilovgrad (Police Academy), Niksic (Meteo station), Zabljak (Meteo station). (see Figure 1)
 - Provisional measuring program
 - Meteorological parameters: Temperature, wind direction and intensity, pressure, humidity, precipitation
 - Air quality parameters: SO₂, NO_x, F, PM₁₀ and 2.5, Smoke
- Needed equipment, due to realization the program: Automatic meteo (1) and air quality stations (4)



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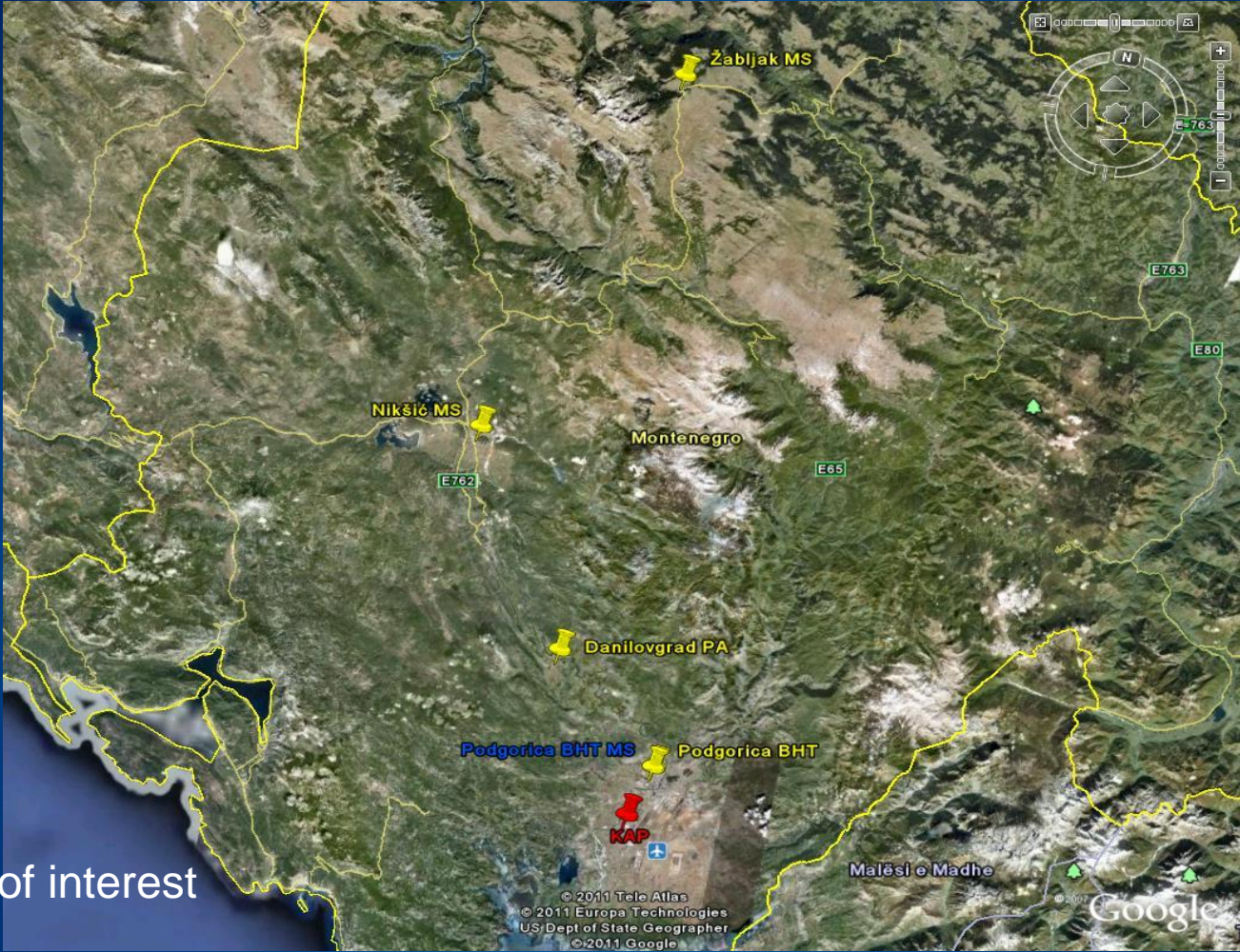


Figure 1: Area of interest

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Questions, Suggestions?



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