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A bottom-up high resolution emission inventory from natural and anthropogenic sources for the port city of Thessaloniki, Greece

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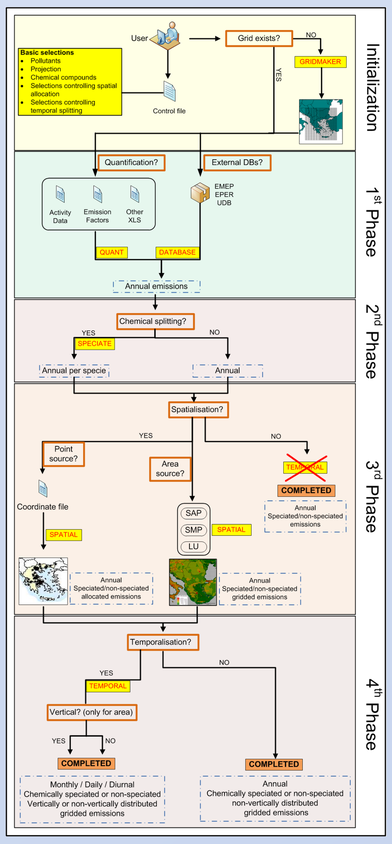
Anthropogenic emissions (2008):

- 2km spatial resolution (62x62 cells)
- CO, NOx, SOx, NMVOCs, $PM_{2.5}$, PM_{10}
- 33 different emission activities
- Hourly resolution

Natural emissions (2011):

- Sea salt, windblown dust, PBAPs, BVOCs
- Hourly resolution

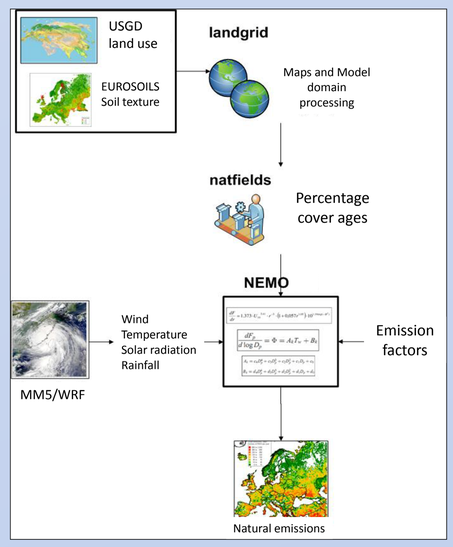


Anthropogenic:

MOSESS (coMputer mOdel for the conStruction of model-rEady emiSsion inventorieS**)**

- Compiles **model-ready** emissions e.g. gridded, chemically speciated, temporally analyzed, vertically distributed.
- Developed directly in **GIS** platform (Mapinfo 9.5)
- Calculates emissions for **55 anthropogenic** activities.
- More than 1 methodologies are available for numerous sources.
- The methodologies are based on the 3rd edition of the **CORINAIR** emission inventory handbook.
- Handles the emissions of **EMEP, EPER** and customized databases.
- The process is completed in 5 phases for each emissions source.
- Spatial disaggregation is based in several options.
- The landcover database (100m resolution) of **CORINE** can be used to allocate the emissions.
- All profiles (chemical, temporal, vertical) are fully customizable by the user.
- The standard configuration contains values for all of the profiles.
- An emission inventory can be compiled starting **from zero data available**.

MODELS USED



Natural:

NEMO (Natural Emission MOdel**)**

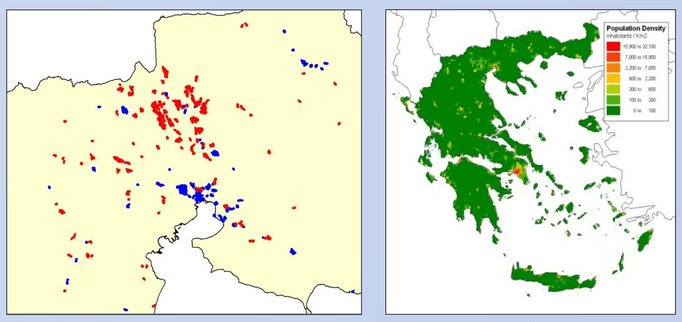
- Compiles emissions that are gridded, and temporally analyzed.
- Calculates emissions for sea salt (PM2.5 and PM10), windblown dust (PM10), PBAPs (Primary Biological Particles, PM10) and Biogenic VOCs (Isoprene, Monoterpenes).
- The methodologies used are those of Sofiev et al., 2011 (sea salt), Korcz et al., 2009 (dust), Winiwarter et al., 2009 and Guenther et al., 1994.
- The model is developed in the MM5CAMx and WRFCAMx preprocessors (FORTRAN) of the CAMx photochemical model.

Main Characteristics – Emission sources covered

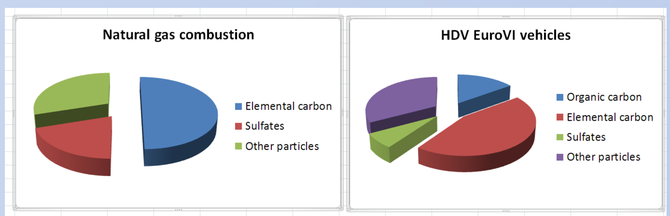
	Central heating (SNAP2)	Aviation - LTO emissions (801)
	Industry (SNAP3,4)	Aviation - Cruising emissions (802)
	Distribution of liquid fuels (SNAP5)	Agriculture machinery (804)
		Industrial machinery (805)
		Forestry machinery (806)
		Household machinery (807)
		Railway transport (808)
SNAP6	Painting applications (601)	Maritime - Small & medium vessels (809)
	Metal degreasing (602)	Maritime - Fishing boats (810)
	Dry cleaning (603)	Maritime - Passenger ships/ferries (811)
	Foam processing (604)	Maritime - Cargo shipping (812)
	Printing (606)	Maritime - Harbour operations (813)
	Oil extraction (607)	
	Wood preservation (608)	
	Car dewaxing (609)	
	Domestic use of solvents (610)	
SNAP7	Passenger cars (701)	Municipal waste (902)
	Light Duty Vehicles (702)	Agricultural waste burning (908)
	Heavy Duty Vehicles (704)	
	Urban Busses, Coaches (708/709)	Manure management (109)
	2 wheelers (710)	Animal husbandry (110)
	Evaporative emissions	Fertilizer application (111)
	PM non-exhaust emissions (712)	Grazing (112)
		Legumes(115)

SNAP8 SNAP9 SNAP10

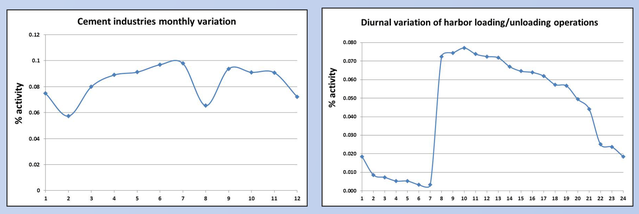
Derivation of emissions: Sources for which their emissions were taken from pre-compiled databases are the industrial (SNAP3,4) and distribution of fuels sectors (SNAP5). All other sources were quantified based on information from local and national sources or extracted from the international databases of GAINS which is available at http://gains.iiasa.ac.at/gains/EU/index.login.



Spatial disaggregation: For the spatial disaggregation of emissions the landcover database of CORINE (blue dots – industrial, red dots - agricultural) and numerous GIS digital maps (population density) taken from national sources were used.



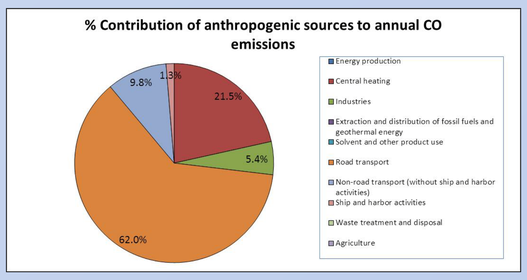
Chemical splitting: MOSESS accepts chemical profiles for each emission sub-sector and/or process included. The majority of PM chemical profiles originate from EPA's SPECIATE database while for NMVOCs from TNO/EDGAR. A number of profiles comes from the CORINAIR handbook.

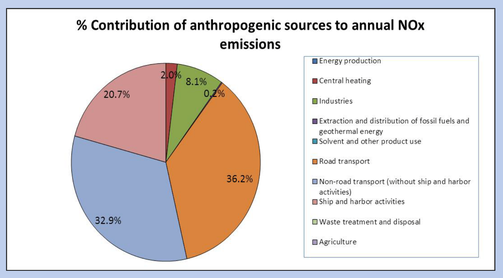


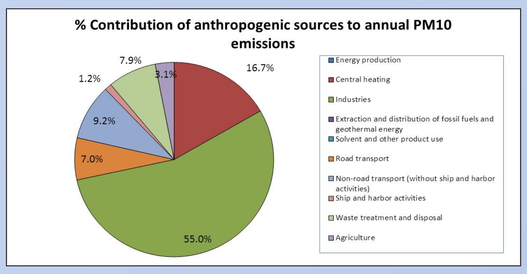
Temporal allocation: MOSESS accepts annual, daily and diurnal profiles for each emission sub-sector and/or process included.

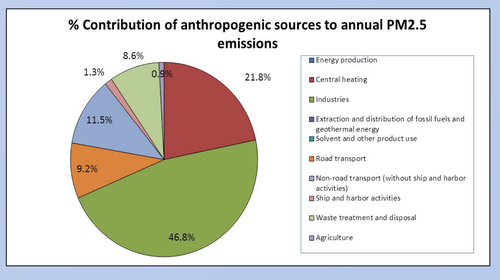
- Profiles derived from activity data.
- Profiles derived from national statistics.
- Profiles derived from the GENEMIS database

Results Anthropogenic



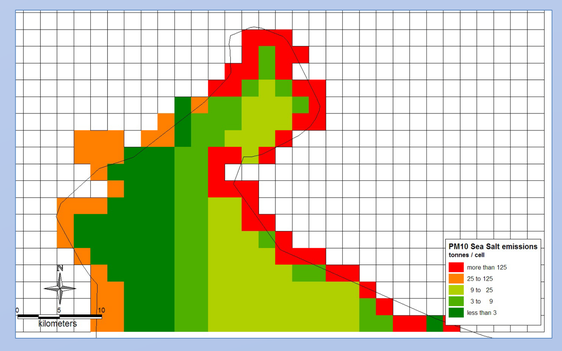




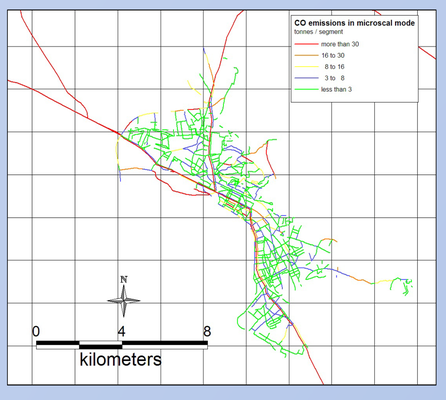


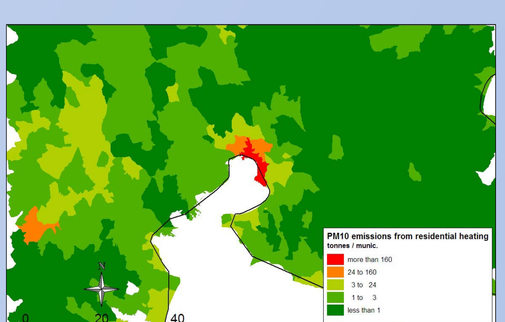
Results Natural

Natural Emission Sources	June		
	NMVOCs	PM10	PM2.5
Biogenic	1707	-	-
Sea Salt	-	14617	1242
Windblown Dust	-	8.5	-
Anthropogenic	2540	1290	914

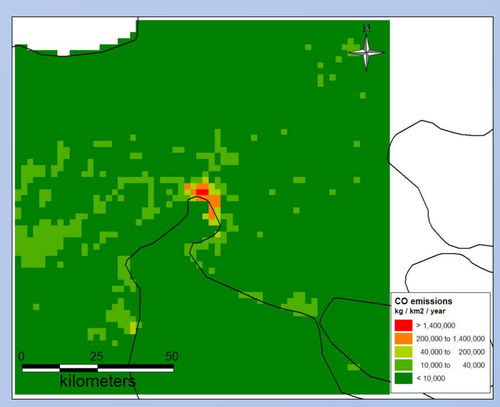


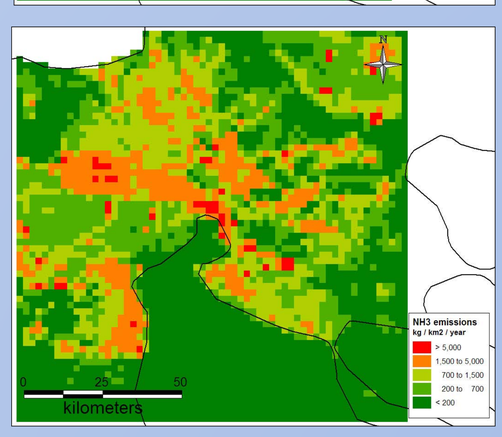
Activity level

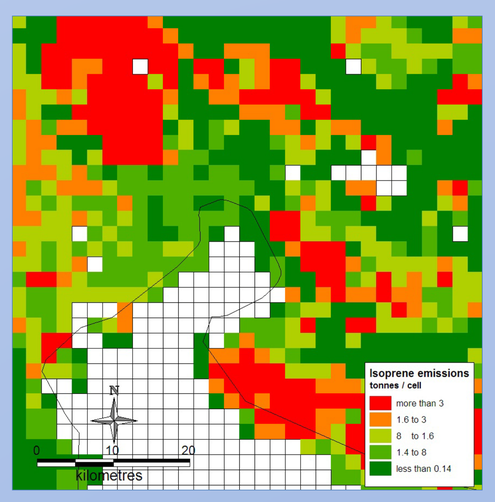


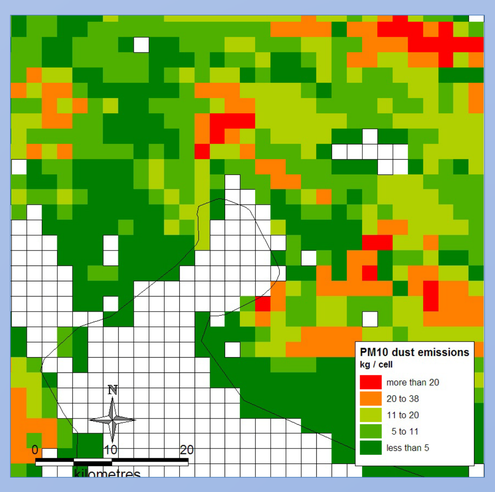


Grid level









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