Impact of updated European biogenic emission inventory on air quality using Chimere chemistry-transport model

**NATURAL AND BIOGENIC EMISSIONS FACTS**

- Include lots of sources: vegetation, soils, sea spray, fires, volcanoes, lightning and others
- Non-linearly interact with anthropogenic emissions (e.g. NOx) contributing to ozone (O3) and particulate matter (PM) formation
- European Community is discussing the possibility of subtracting their contribution from PM violations (CEC, 2005)

**CONCLUSIONS**

- We evaluated the impact of natural/biogenic sources on O3 and PM_{10} using a regional CTM (CHIMERE) for year 2003
- Impact on O3 is on average 2.8 ppbv (5%) for summer 2003
- Impact on PM_{10} is on average 8 µg/m³ (40%) for year 2003
- Max impact in Southern Europe, particularly Iberian Peninsula
- Bio O3 is coupled with anthropogenic NOx, while bio PM_{10} is not
- In extremely hot summer of 2003 impact of BVOC oxidation reach 100 ppbv O3 and 35 µg/m³ PM_{10} in Spain

**CHIMERE eulerian chemistry-transport regional model (V200709C)**

**METEO: MMS forced by ECMWF analyses with nudging**

**DOMAINE: 0.5°x0.5° over Europe**

- Anthropogenic: gas and PM (EMEP), EC+OC (Lab. Aérologie)
- Natural/bio: VOC and NO (NatAir), dust, sea salt

**BIogenic VOC IMPACT ON OZONE (JJA 2003)**

Average O3 daily max w/ ANTHRO emiss. only

ΔO3 daily max + BVOC emissions

+ 2.8 ppbv (5%) over land

Large impact in Southern Europe, in Portugal >15 ppbv

Large impact also near major metropolitan areas

**NATURAL/BIOGENIC IMPACT ON PM_{10} (2003)**

Anthropogenic PM_{10}

Natural/Bio PM_{10}

+ 8 µg/m³ (40%) over land

Large impact in Southern Europe, > anthropogenic PM_{10}

Largely decoupled from anthropogenic PM_{10}

**REFERENCES**


**IMPACT OF UPDATED EUROPEAN BIOMASS BURNING EMISSION INVENTORY ON OZONE AND PM QUALITY IN southern Europe 2003**


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**SUMMARY**

- In polluted regions with significant BVOC emissions the probability of 8-h ozone limit violation is greatly increased.
- In Italy, model predicted violations increase from 5% to 13% when accounting for BVOC emissions.

- Very large episodic contribution of BVOC to hourly ozone: up to 100 µg/m³ (~50 ppbv) for one extreme case in Spain during August 2003.

- Very large contribution in Southern Spain: up to 35 µg/m³ (~80%) during summer due to SOA from BVOC oxidation!

- Sea salts up to 40% of PM_{10} at coastal sites. Saharan dust >20% in Southern Europe. Secondary Organic Aerosols (SOA) ~10% but in Spain.