klimaat voor ruimte
climate changes spatial planning

Projectnr CS4

Projecttitle
The regional climate impact of aerosols

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Background

Aerosol particles reflect solar radiation; this is a cooling effect.
Aerosols also indirectly cool via influencing clouds: aerosols are the nuclei on which clouds form.
Clouds are composed of droplets that reflect solar radiation.

Currently there are more aerosols than in pre-industrial times.
The reflection of solar radiation/energy is therefore higher.

AR4-WG1:

The enhanced reflection is expressed in terms of Radiative Forcing
- Direct reflection of solar radiation
- Cloud albedo effect = cloud reflectivity effect

Part of TABLE taken from **AR4-WG1** (Figure 2 of Summary for Policy Makers)

RF Terms		RF values (Wm^2)	Spatial scale	LOSU
Total Aerosol	Direct effect	-0.5 [-0.9 to - 0.1]	Continental to global	Med - Low
	Cloud albedo effect	-0.7 [-1.8 to - 0.3]	Continental to global	Low

RF stands for Radiative Forcing LOSU=Level Of Scientific Understanding

The cloud-albedo effect is the most uncertain RF Term. The effect occurs on a regional scale:
in our region the value is ~ - 5 Wm-2 (!!) as compared to the forcing by the GHC of + 3 Wm-2.

Approach in the project

Dual
1. Modeling the climate impact with existing information
2. Obtaining information, from measurements, on the local aerosol

1. Model:
Parameterisation of aerosol/cloud interactions in the regional climate model RACMO.

Calculation of the aerosol field with chemistry transport model LOTOS-EUROS
Parameterisation of aerosols to Cloud Condensation Nuclei CCN

Incorporation of CCN as submodule (combination with project CS6) in RACMO
Testing of the parameterisations

2. Measurements
Emphasis on the local/regional aerosol component AMMONIUM-NITRATE
This is a combined product of the emissions from traffic and agriculture

Needs novel monitoring tool
Experiments in cloud chamber to assess the role of this component in cloud formation
Next phase: measurements of the aerosols coming from the biosphere: “CARBON”-aerosol

Results:

We refer to the sister-posters of CS4 for details on approach and results obtained so far.

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