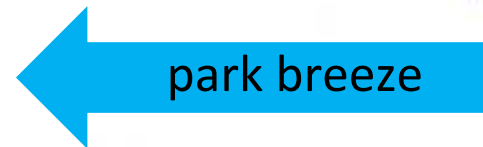


# Urban green areas: Lots of benefits, but some drawbacks



Jun.-Prof. Dr. Sascha Henninger  
Dept. of Physical Geography  
TU Kaiserslautern

# URBAN GREEN AREAS



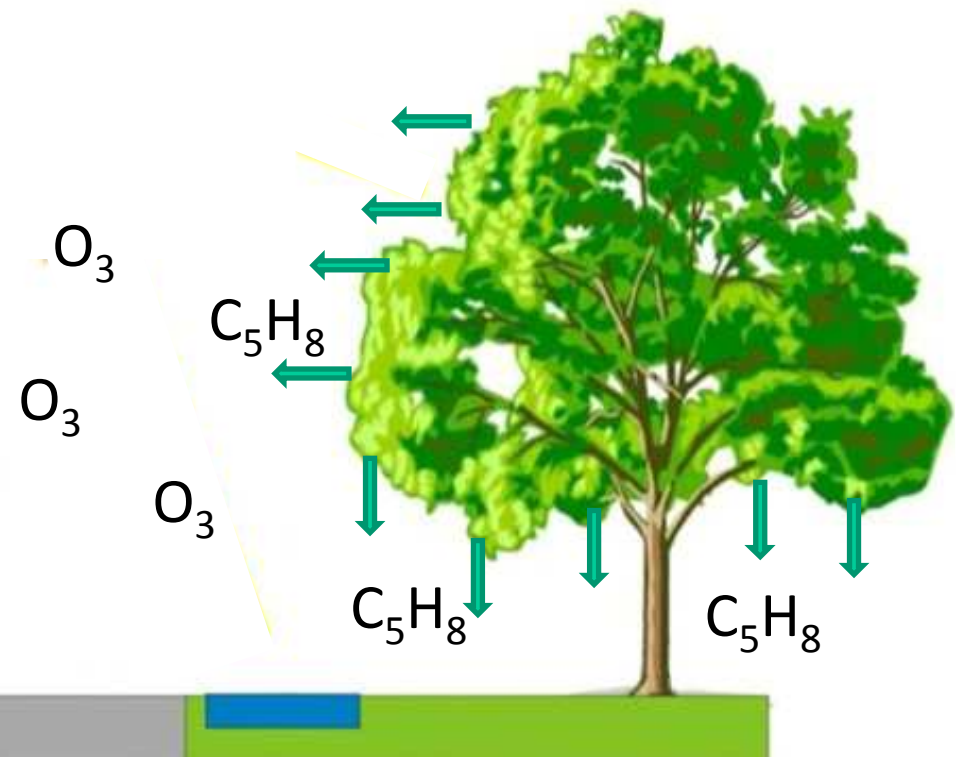
sealed area

urban green

# NEAR SURFACE OZONE & BIOGENIC ISOPRENE

$$E_{\text{isoprene}} = Es_{\text{isoprene}} HCLT$$

- by
- $E$  = rate of emission [ $\mu\text{g g(dry weight)}^{-1} \text{h}^{-1}$ ]
  - $Es$  = standardized rate of emission [ $\mu\text{g g(dry weight)}^{-1} \text{h}^{-1}$ ]
  - $H$  = correction term for air humidity
  - $C$  = correction term for atmospheric  $\text{CO}_2$  concentration
  - $L$  = correction term for intensity of the solar radiation
  - $T$  = correction term for leaf temperature



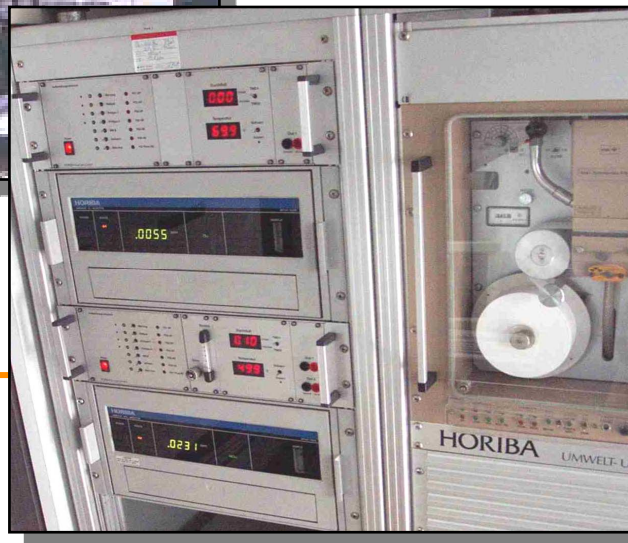
# MEASURING METHODOLOGY



Continuous registration of trace element concentration and meteorological values during measurement trips:

## Air quality indicators

- Carbon dioxide (CO<sub>2</sub>)
- Carbon monoxide (CO)
- Nitric oxide (NO)
- Nitric dioxide (NO<sub>2</sub>)
- Ozone (O<sub>3</sub>)
- VOC (e.g. BTEX)



## Meteorological values

- Air temperature
- Air humidity
- Global radiation
- Ultraviolet radiation
- Atmospheric pressure
- Wind velocity & direction

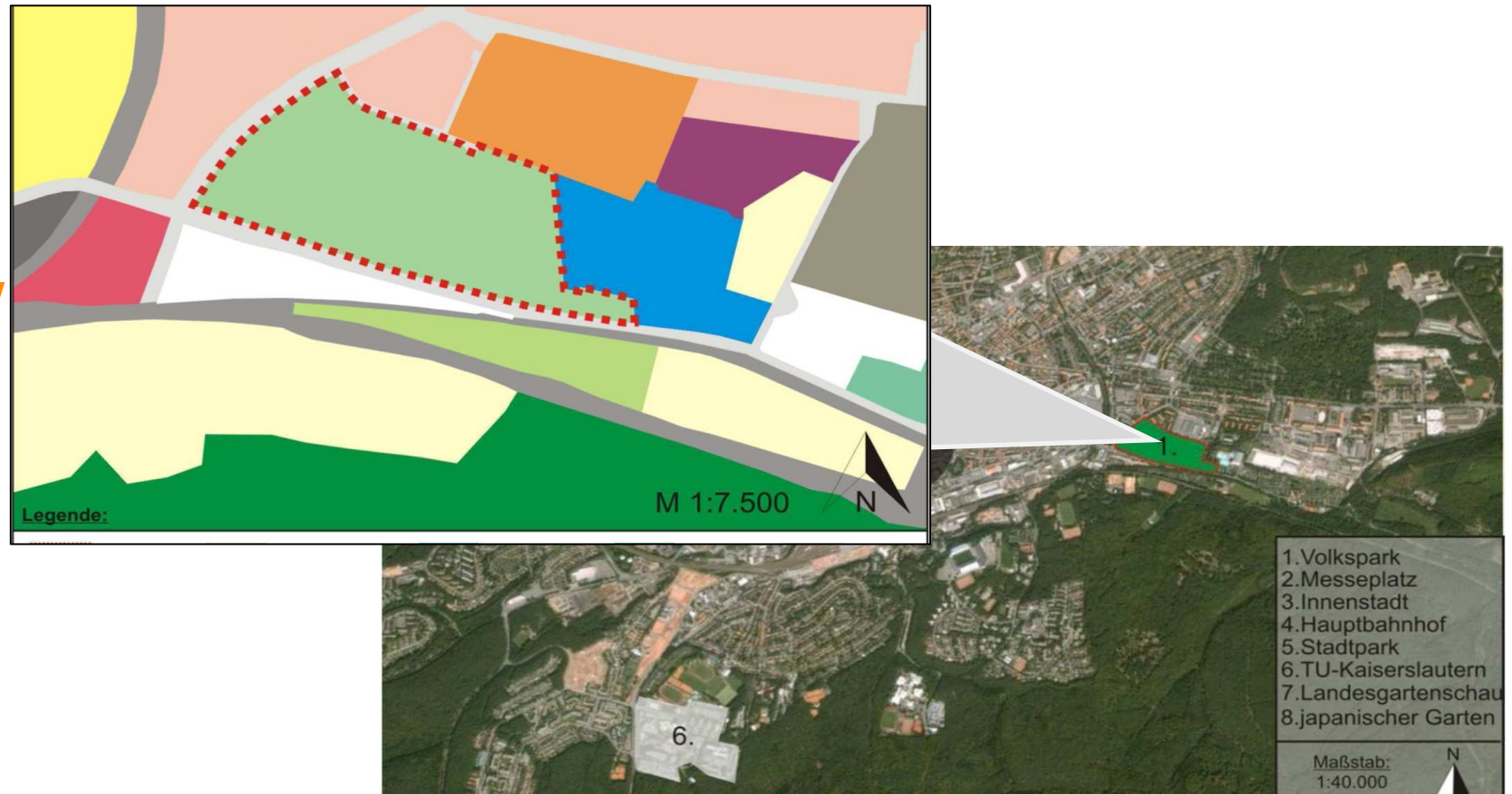
# ASSESSMENT OF AIR QUALITY

Assignment of trace element dependent emissions into DAQ index value and DAQ index classification and their grades, exemplarily offered for ozone (modified by Mayer et al., 2002).

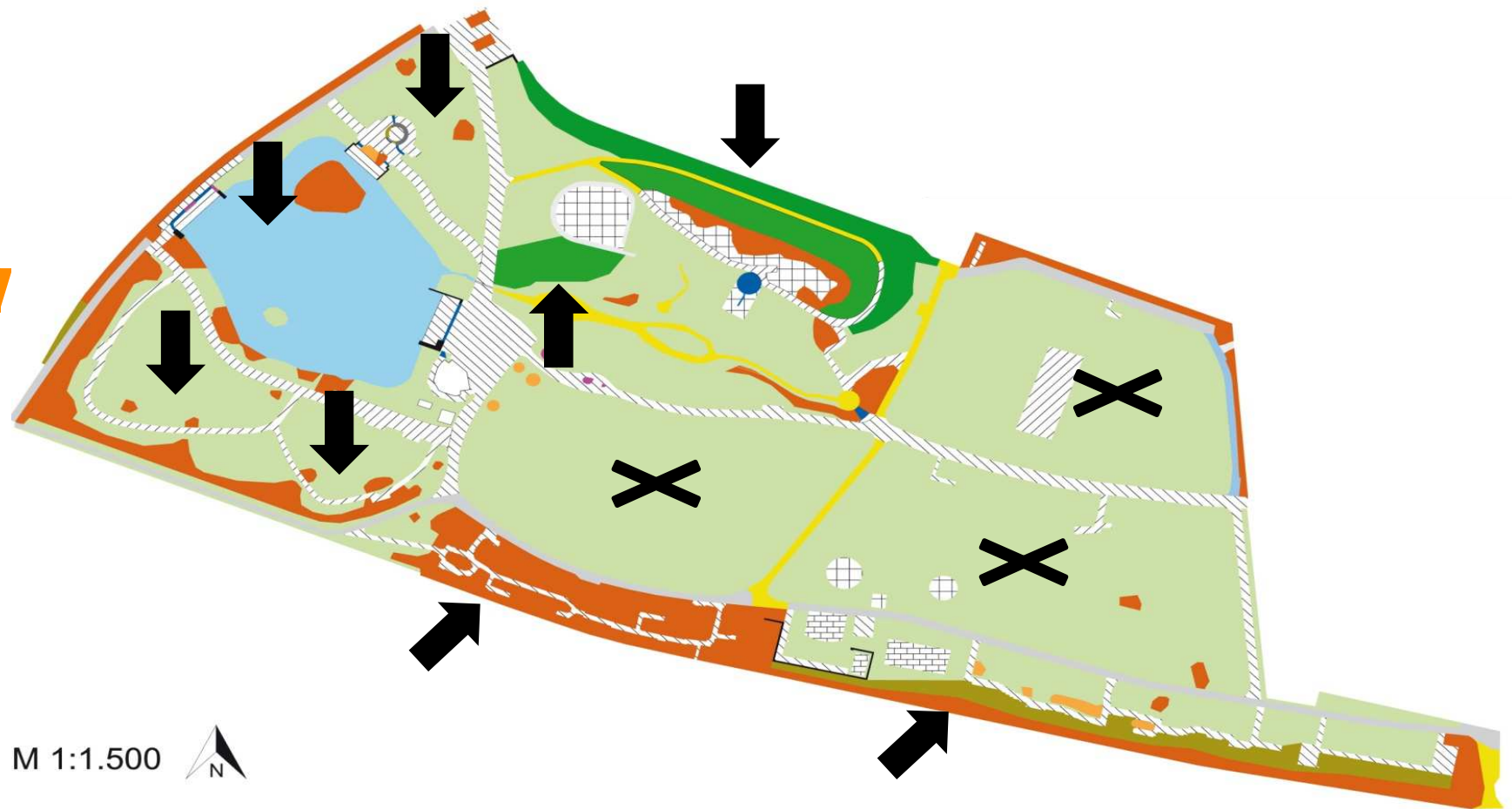
O <sub>3</sub> [µg m <sup>-3</sup> ]	Index value	Index classification	Grade
0-32	0.5-1.4	1	very good
33-64	1.5-2.4	2	good
65-119	2.5-3.4	3	satisfactory
120-179	3.5-4.4	4	adequately
180-239	4.5-5.4	5	poorly
≥ 240	≥ 5.5	6	awfully bad

$$DAQ = \left[ \frac{(DAQ_{up} - DAQ_{low})}{(c_{limit,up} - c_{limit,low})} \times (c_{current} - c_{limit,low}) \right]$$

# INVESTIGATION AREA



# INVESTIGATION AREA





# THEORETICAL ESTIMATION OF ISOPRENE





# THEORETICAL ESTIMATION OF ISOPRENE



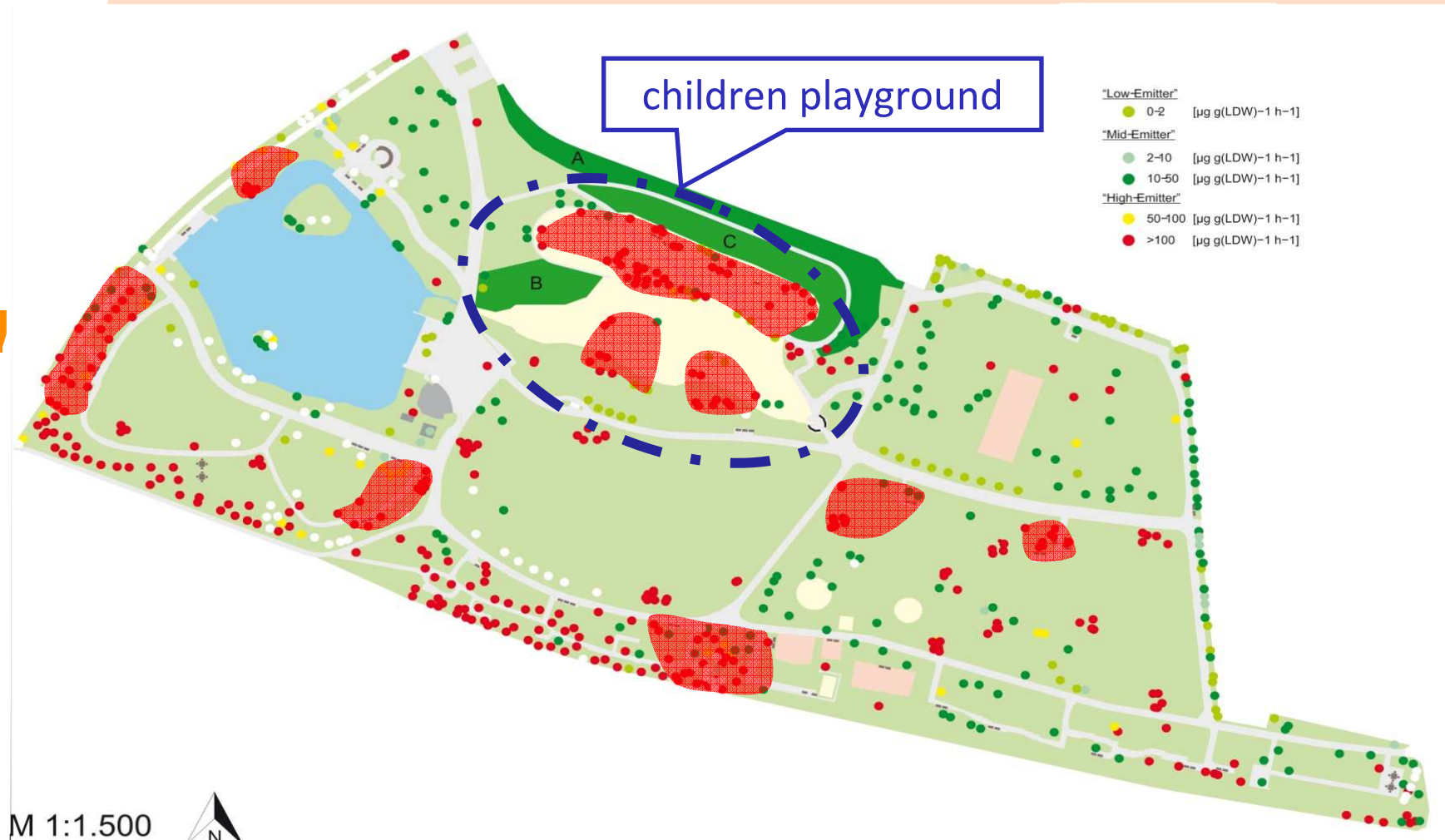
O <sub>3</sub> [µg m <sup>-3</sup> ]	Index value	Index classification	Grade
0-32	0.5-1.4	1	very good
33-64	1.5-2.4	2	good
<b>65-119</b>	<b>2.5-3.4</b>	<b>3</b>	<b>satisfactory</b>
120-179	3.5-4.4	4	adequately
180-239	4.5-5.4	5	poorly
≥ 240	≥ 5.5	6	awfully bad

**113.06 µg m<sup>-3</sup>**

# THEORETICAL ESTIMATION OF ISOPRENE



# MEASURING RESULTS



# SHORT-TIME EXPOSURE

O <sub>3</sub> [µg m <sup>-3</sup> ]	Index value	Index classification	Grade
0-32	0.5-1.4	1	very good
33-64	1.5-2.4	2	good
65-119	2.5-3.4	3	satisfactory
120-179	3.5-4.4	4	adequately
180-239	4.5-5.4	5	poorly
≥ 240	≥ 5.5	6	awfully bad

# CONCLUSION

It could be helpful taking into account that ...

- ... also the vegetation could lead to air pollution,
- ... a simple mapping of the stock could identify where potential biogenic isoprene source would be.

**No implication that such areas have to be deforested and newly planted, but it can be a guidance for further urban green projects!**

# THANKS FOR YOUR ATTENTION!



Jun.-Prof. Dr. Sascha Henninger  
Dept. of Physical Geography  
TU Kaiserslautern