

# SIMULATION METHODS FOR WATERSHED MANAGEMENT

Calculation – homework (SCS-CN, UH, G-A)

# Homework – SCS-CN

- Time step: 10 minutes
- Precipitation pulses: 12, 18, 40, 29, 16, 8, 6, 4, 3, 2, 1 mm
- Precipitation in 5 previous days 58 mm
- Land use and soils:
  - 7% - arable land, infiltration rate 19.5 cm/day
  - 15% - arable land, infiltration rate 12.5 cm/day
  - 18% - arable land, infiltration rate 2.15 cm/day
  - 9% - meadows, infiltration rate 11.3 cm/day
  - 11% - meadows, infiltration rate 5.7 cm/day
  - 12% - forests, infiltration rate 29.3 cm/day
  - 5% - forests, infiltration rate 7.8 cm/day
  - 12% - forests, infiltration rate 2.3 cm/day
  - 5% - vineyards, infiltration rate 6.9 cm/day
  - 6% - urban areas, infiltration rate 1.8 cm/day
- Calculate direct runoff amount in each time step

Land use	A	B	C	D
Arable land	72	81	88	91
Meadow	30	58	71	78
Forest	45	66	77	83
Vineyard	43	65	76	82
Urban area	77	85	90	92

# Homework – Green-Ampt

- Describe one infiltration calculation method according to your own choice
- Calculate infiltration values into the clay soil with 10 min time step using Green-Ampt method. Set initial value of soil moisture to average value of effective porosity and dry state. For iterations use the initial value of  $F$  as higher from

$$\sqrt{2 \cdot \psi \cdot \Delta \theta \cdot K \cdot t} \quad K \cdot t$$

- Calculate the runoff from the input precipitation (not effective precipitation or direct runoff) given in last homework
- Calculate runoff hydrograph using unit hydrograph given in last homework

# Homework - UH

- Timestep: 10 min
- 10min UH ordinates: 0; 1; 3; 6; 9,5; 7; 5; 4; 3; 2.2; 1.4;0.8; 0 m<sup>3</sup>/s
- Effective rainfall pulses: use both the rainfall pulses calculated by SCS-CN method as well as the rainfall pulses calculated by subtracting infiltration obtained by G-A method from input precipitation given in SCS-CN homework
- Calculate result hydrograph