

# IP2: IMAGE PROCESSING IN REMOTE SENSING

## EXERCISE 3

**Due Date:** Mo. 23.06.2014, 8 am

**Scope:** Spectral properties, the atmosphere and sensor basics

Please send your solutions via e-mail to: [germer@informatik.uni-hamburg.de](mailto:germer@informatik.uni-hamburg.de)

Use the subject "IP2-Ex3 GROUPNAME" and write your solutions

- Either as plain text or
- Convert them to PDF and attach the PDF to the mail.

### 1 APPLICABILITY OF SPECTRAL RANGES

10 P.

Which spectral range needs to be chosen, if we want to monitor:

- a) Chemical properties?
- b) Physical properties, like e.g. the temperature?
- c) The conductivity and moisture?
- d) Areas at night?
- e) Areas under cloud coverage?

Briefly explain your answers.

### 2 THE ATMOSPHERE

10 P.

- a) Describe the role of atmospheric windows by means of Remote Sensing.
- b) The Ionosphere is both a blessing and a curse. Give an example for each pro and contra.
- c) Explain briefly why the sky is blue.
- d) Distinguish between the following scatterings.
  - I. Rayleigh scattering
  - II. Mie scattering

When do they occur, and what are the main effects?

### 3 SENSOR RANGES AND REFLECTIONS

4 P.

Derive the maximum terrain difference (by means of surface roughness), for which the irradiated radiation is still mirrored at the surface, for three different sensors at different spectral ranges:

- a) A (visible) red sensor at  $\lambda = 710 \text{ nm}$
- b) A n infrared sensor at  $\lambda = 5.0 \text{ }\mu\text{m}$
- c) A SAR-Sensor at X-Band  $\nu = 10 \text{ GHz}$

### 4 SET-UP OF MULTISPECTRAL SENSORS

6 P.

Describe the following multispectral sensors by means of their electronic and mechanic complexity. State advantages and disadvantages of the sensor set-ups and describe the geometry of the resulting images:

- a) Circular Scanner
- b) Cross Track Scanner
- c) Along Track Scanner

**Total points: 30**