Dennis Gabor University
Budapest

Field Measurement Report

(IMAGE PROCESSING)

2025

Location of the measurement /image/:

On-the-spot image about you:

Verifier: Jozsef BERKE

Author (neptun code too) :
Maximilien ROUSSEAU (UL2EN1)

Date of the measurement : 07th of April, 2025

Guideline

Use the Microsoft Publisher software to fill the interactive report.

I. Please fill just the red gaps!

II. Where the Report asks **IMAGES**, please insert the correct, small image and if I click on it, I have to reach the original resolution image too.

III. SAVING: If the protocol has been filled out, it must be saved in pdf format with the name of the person filling it out without accents and their Neptun code (e.g.: own_nev_neptun-code.pdf).

ARC. TO BE SUBMITTED:
the .pdf file (1 file),
the attachments in a separate "attachments" subdirectory,
packaged as .zip (1 file).

A PAGE CANNOT BE DELETED FROM THE RECORD!

YOU CAN ADD A NEW PAGE ONLY WITH THE PERMISSION OF THE HEAD TEACHER AFTER THE LAST PAGE, WHICH MUST ALSO BE MARKED IN RED IN THE LIST OF CONTENTS !!!

Back to the first page

Main parts of the Report

General data

Measurements data

Attachments

Introduction of the measuring team

Team number: 4

Team name:
OneManArmy

Name and **NEPTUN CODE** of the members of the team:
ROUSSEAU Maximilien (UL2EN1)

On-the-spot image about the team

Date and **location** of the meeting:
7th of April, 2025 at the train station (Balatonmagyaród)

Date of the departure:
7th of April, 2025

Introduction about the location of the measurement

Image about the arrival

Introduction about the location of the measurement (6-8 lines)

Kányavári Island is located inside the Kis-Balaton wetland, a strictly protected core area of the Balaton-felvidéki National Park in western Hungary (≈ 46.62 °N, 17.17 °E).
Reeds, open water and wet meadows shelter over 250 bird species.
No motor traffic or light pollutionwhich is perfect for precise optical tests.
Boardwalks and towers let observers reach points without harming wildlife.
Simple amenities (tables, fire pits) support day-long measurement work.

Introduction of the tasks before the field measurement

This test aims to record a series of measurements and compile them into a report, refining each photo's coordinates while adjusting colour temperature, applying flat-field correction, reducing noise and optimising camera settings.

Introduction of the devices which you use

(highlight with green color the different data within the team)

Technical data of the GPS device /min. 5 parameters/:

- **Device used:** iPhone 14 Pro Max
- **Application used:** Apple Maps
- **Coordinate format:** Degrees, minutes, and seconds
- **Location accuracy:** High Precision (up to ±1 meter)
- **Location data based on:** WGS84
- **Unit of measurement (altitude and distance):** Meters

Video /with image/ technical data /min. 5 parameters/:

Format : MP4
Definition of video recording : 1920 × 1080 p (Full HD)
Frame-rate : 30 fps
Codec : H.264 / AVC (High Profile)
Average data-rate : ≈ 10 Mb/s
Parameter of camera : see next paragraph
(1080 p @ 30 fps is one of the official iPhone 14 Pro recording modes)

https://drive.google.com/file/d/1XFteUuNtGPBJHWO9qjBV_fQof69O1p4K/view?usp=sharing

Digital camera 1. /with image/technical data/ type, CCD geometrical resolution, lens, + highlight with green color 2 other, different data per person/:

- **Main sensor:** 48 MP quad-pixel (24 mm eq.)
- **Additional sensors:** 12 MP ultra-wide / 12 MP telephoto
- **Rear flash:** dual-tone LED
- **Size of photosites**: 1.22 µm (2.44 µm effective after 4-to-1 binning)
- **Photo-lens aperture:** ƒ/1.78
- **Distortion correction:** automatic for ultra-wide shots

Other measured information

Description of other information about the measurement
(for example, map data, description of the measurement steps, posteriori measurements, humidity, wind, blast, temperature, other measured data, etc.):

- **Weather at the time of imaging:** overcast sky, ambient temperature ≈ 5 °C, high humidity, noticeable wind.
- No additional on-site parameters (e.g., precise wind speed, pressure, or sound level) were recorded.

Division of labor within the team:

The project was carried out by a single researcher; therefore, every preparatory, acquisition and post-processing task was handled personally.

~~Description of how to make the video /operator, cutter, format, software, other/:~~

Link to the video

https://drive.google.com/file/d/1XFteUuNtGPBJHWO9qjBV_fQof69O1p4K/view?usp=sharing

Other on-the-spot images

/individual task/

46.59
17.177

46.6
17.18

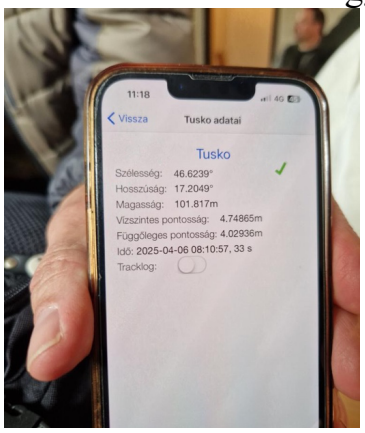
46.616
17.165

46.6050
17.16645

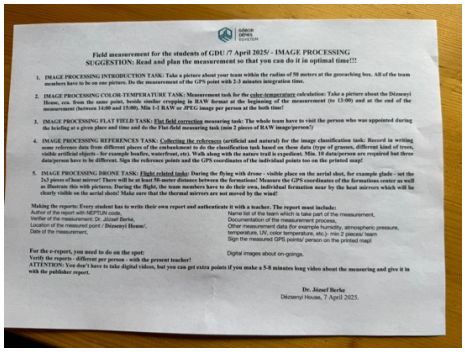
GEOCACHING data

Description about the detection of the geocaching box:

I entered the above coordinates into Apple Maps, then verified the spot with the *My GPS Coordinates* app. The container - holding the DIGKEP task sheet and four Easter eggs - was hidden at ground level next to a tree trunk.



Scanned file of the DIGKEP task:



Field measurement for the students of GDU (?) April 2025/ - IMAGE PROCESSING
SUGGESTION: Read and plan the measurement so that you can do it in optimal time!!!

1. IMAGE PROCESSING INTRODUCTION TASK: Take a picture about your team within the radius of 50 meters at the geocaching box. All of the team members have to be on one picture. Do the measurement of the GPS point with 2-3 minutes integration time.
2. IMAGE PROCESSING COLOR TEMPERATURE TASK: Measurement task for the color temperature calculation: Take a picture about the Dézsenyi House, cca. from the same point, beside similar cropping in RAW format at the beginning of the measurement (to 13:00) and at the end of the measurement (between 14:00 and 15:00). Min 1-1 RAW or JPEG image per person at the both time!!
3. IMAGE PROCESSING FLAT FIELD TASK: Flat field correcting measuring task: The whole team have to visit the person who was appointed during the briefing at a given place and time and do the Flat-field measuring task (min 2 pieces of RAW image/person!)
4. IMAGE PROCESSING REFERENCES TASK: Collecting the references (artificial and natural) for the image classification task: Record in writing some reference data from different places of the embankment to do the classification task based on these data (type of grasses, different kind of trees, visible artificial objects - for example bonfire, waterfront, etc). Walk along with the nature trail is expedient. Min. 10 data/person are required but three data/person have to be different. Sign the reference points and the GPS coordinates of the individual points too on the printed map!
5. IMAGE PROCESSING DRONE TASK: Flight related tasks: During the flying with drone - visible place on the aerial shot, for example glade - set the 2x3 pieces of heat mirror! There will be at least 50-meter distance between the formations! Measure the GPS coordinates of the formations center as well as illustrate this with pictures. During the flight, the team members have to do their own, individual formation near by the heat mirrors which will be clearly visible on the aerial shots! Make sure that the thermal mirrors are not moved by the wind!

Making the reports: Every student has to write their own report and authenticate it with a teacher. The report must include:
Author of the report with NEPTUN code,
Verifier of the measurement: Dr. *József Berke*,
Location of the measured point / Dézsenyi House/,
Date of the measurement,
Name list of the team which is take part of the measurement,
Documentation of the measurement process,
Other measurement data (for example humidity, atmospheric pressure, temperature, UV, color temperature, etc.)- min 2 pieces/ team
Sign the measured GPS points/ person on the printed map!

For the e-report, you need to do on the spot:
Verify the reports - different per person - with the present teacher!
Digital images about on-goings.
ATTENTION: You don't have to take digital videos, but you can get extra points if you make a 5-8 minutes long video about the measuring and give it in with the publisher report.

Dr. József Berke
Dézsenyi House, 7 April 2025.

Images (min 2 pieces) about the box (based on the 2. Task):

Image Time (local) How to verify

RAW #1	**07 Apr 2025, 14 : 02**	EXIF in DxO or Finder › Get Info

RAW #2 07 Apr 2025, 14 : 02 same

Color temperature measurement and correction
/individual task/

Use DxO software

1. on-the-spot RAW image

Time of the 1. shooting (month,day,hour,minute)
7th of April, 2025, 14:02

2. Time of the 1. shooting (month,day,hour,minute)
7th of April, 2025, 14:02

Color temperature of the original image (K):
1. image: 5400K
2. image: 5003K

2. on-the-spot RAW image

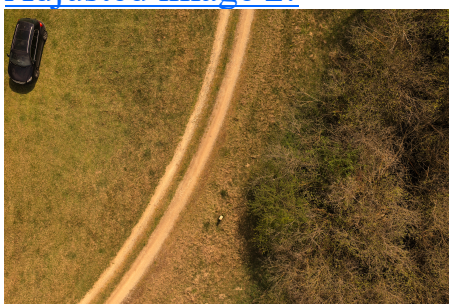
Exposition data (ISO, shutter, time)
1. image: 100, 1/1000s, no flash, ISO 400
   35mm f/6,3 (lens)
2. image: same - 100, 1/1000s, no flash, ISO 400
   35mm f/6,3 (lens)

Adjusted image 1:

Adjusted color temperature of the 1. image, properly to the morning period:

Color to 3046 K, it's slightly more blue

Adjusted image 2:



Adjusted color temperature of the 2. image, properly to the evening period:

For the evening, I adjusted the color to 7124 K, it's look a lot warmer

Evaluation of the Time Lapse records
/individual task/

Name of the selected object: dirt road

Date of the photography:

1. 7 april 2025 14:03
2. 7 april 2025 14:03
3. 7 april 2025 14:03

On-the-spot image 1. On-the-spot image 2. On-the-spot image 3.

Image about algebraic sum of the three images (1+2+3)

Image about the algebraic difference of the 1-2 images

Evaluation of the Dark-frame images
/individual task/

Keep this page empty

Original (not dark) image

Dark image related to the original image

Histogram of the original image

Histogram of the corrected image

Manufacturer and type of the camera:
Data of the recording (ISO, shutter, compartment):

Short description of the measurement

Average intensity of the original image:

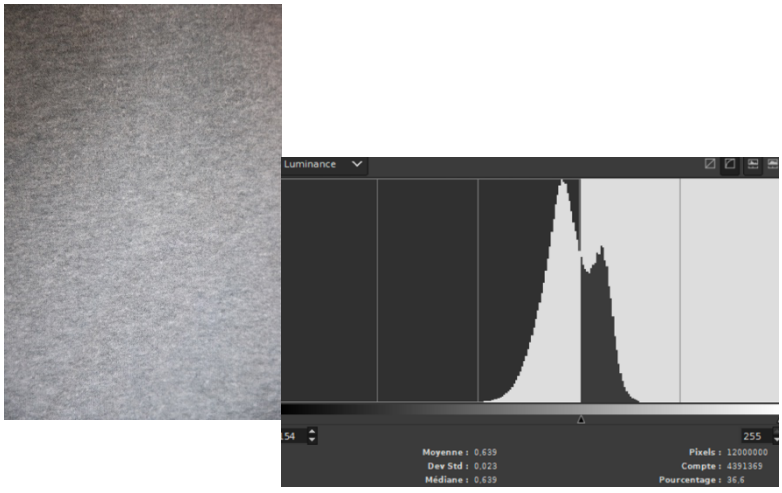
Average intensity of the corrected image:

Relative value of the wrong pixels in percent, correlate to all pixels of the sensor (based on the Dark image):

Description of the Flat field correction
/individual task/

The original (grey) image:

RGB histogram of the original image:



Flat field image, description of it with punctual time:

The flat-field frame was captured on 07 Apr 2025 at 13 : 18.

A uniformly lit grey surface was photographed to map sensor vignetting and dust.
Analysis in GIMP's histogram window gives the following statistics for an 8-bit scale (0-255):

Number of pixels between the 0-10 (dead pixels) intensity values: 0

Number of pixels between 245-255 intensity values:

Note the number of intensity points between 0-2560 and 62720-65536 in case of a 16-bit histogram.

Manufacturer and type of the camera:

Canon EOS R5

Lens & focal length: RF 24-105 mm @ 50 mm

Data of the recording (ISO, shutter, diaphragm):

- f/4,5
- ISO 100
- 1/125 s
- 105 mm
- 5464×8192 px

Noise filtering

/individual task/

Original image /link too/:

Corrected /filtered/ image /link too/:

Name of the noise

1. Luminance noise – fine-grained brightness jitter caused by ISO amplification (sky and shadow areas).
2. Chrominance noise – colour speckles, most visible in uniform

mid-tones.

3. Fixed-pattern / banding – faint vertical stripes from sensor read-out.
4. Slight motion blur – reeds softened by wind-shake during the $1/100$ s exposure.

Description of the filtering

Filtering workflow carried out in DxO PhotoLab 8

- DeepPRIME noise reduction to suppress luminance and chroma speckle.
- Light Microcontrast boost for texture; global sharpening left off to avoid halos.
- Stripe Noise tool applied to clear faint vertical banding.
- Local Clarity brush on the foreground to counter mild wind-blur.
- Subtle ClearView and Smart Lighting tweaks to balance haze and shadows.

The file was exported as 16-bit TIFF, then down-sampled to JPEG for the report.
Result: noticeably cleaner sky and crisper reeds compared with the original capture.

Classification III/I.

Suit the shots as panorama /link too/:

Classified image /link too/:

Unfortunately, I'm unable to do this because there is no compatible platform

available for macOS

Reference data of the classified image (line number, name of the object, RGB code)

1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
11.
12.

Classification III/II.

Line number/filename of the original aerial images:

Scanned version of the reference data which you collected during the field measurement:

Classification III/III.

Calculation of the geometric resolution of the classified image (cm/pixel):

Keep this empty

The chosen classification method and its JUSTIFICATION:

Implementation of the extra task

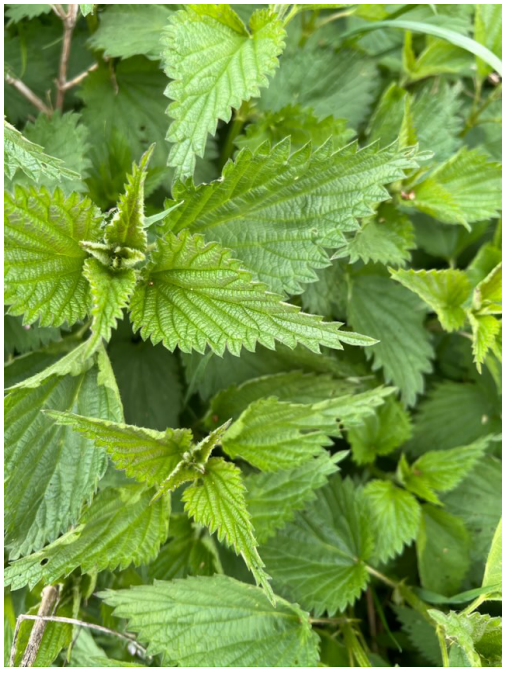
/published before the field measurement/

Description of the 1. extra task:

Answer of the 1. extra task:

Description of the 2. extra task:

Answer of the 2. extra task:



Attachments I.

(Scanned version about the sketch of the on-the-spot report)

Attachments II.

(Scanned version of the allocated map)

Attachments III.

(other information: tabular details of the allocated images, description of the other tasks during the field measurement, other GPS data, notes, etc.)

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