



Growing
ideas
through
networks

APPLICATION OF UAV IMAGERY IN ENVIRONMENTAL RESEARCH AT THE UNIVERSITY OF SZEGED

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Advances in Environmental Monitoring with UAS, Debrecen, Hungary (30th March 2022)



Infrastructure

- **Platforms**
- **Sensors**
- **Pilots**
- **Hardver / Software**

Applications

- **Nature conservation**
- **Environmental monitoring**
- **Geomorphology**
- **Precision agriculture**
- **Geodesy**
- **Archeology**
- **Smart city**

Platforms



Sensors



- DJI Phantom 4 (FC330)
 - RGB / 12 MP
- senseFly S.O.D.A.
 - RGB / 20 MP
- Parrot Sequoia+
 - RGB / 16 MP + MS (G,R,RE,NIR) / 1.2 MP
- senseFly DuetT
 - RGB / 20 MP + Thermal / 640x512px
- (PhaseOne iXU 150 + DJI Ronin MX gimbal)
 - RGB / 50 MP



Flight planning and navigation

- Drone Deploy (DJI)
- eMotion (eBee X)
(+post-processing)

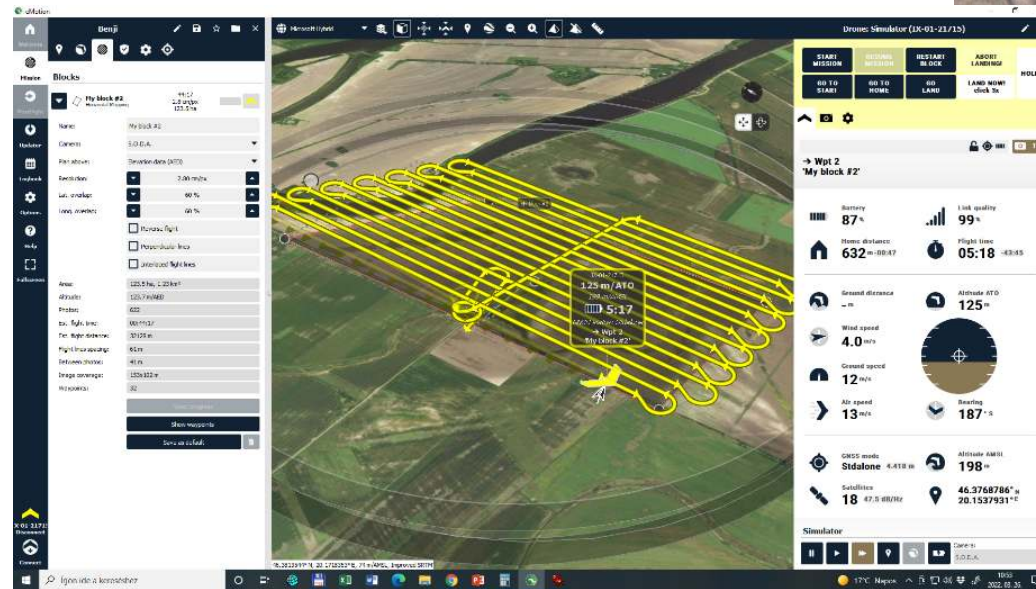
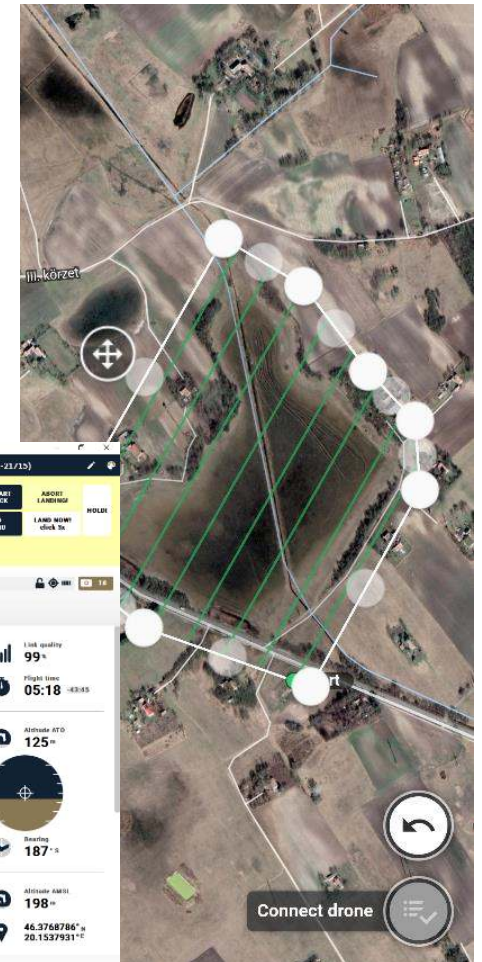
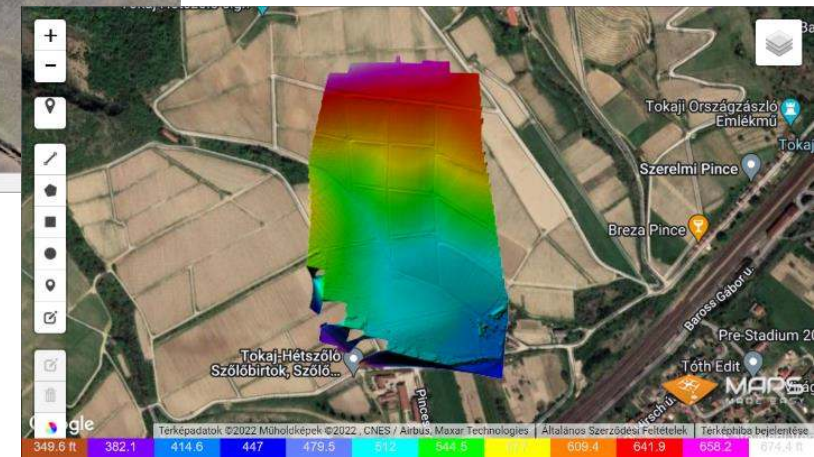
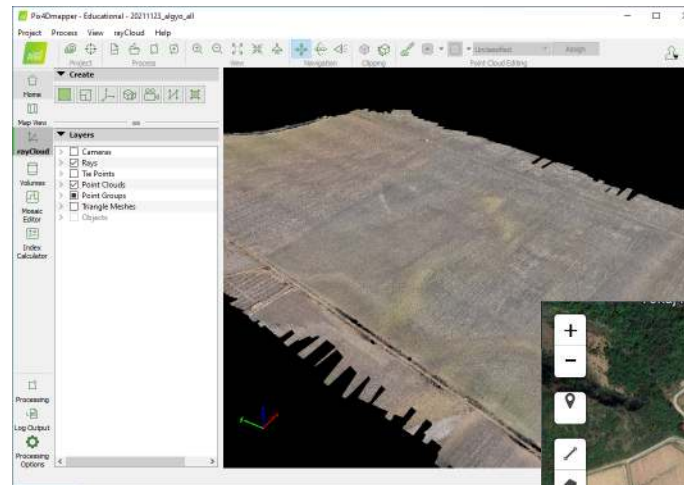
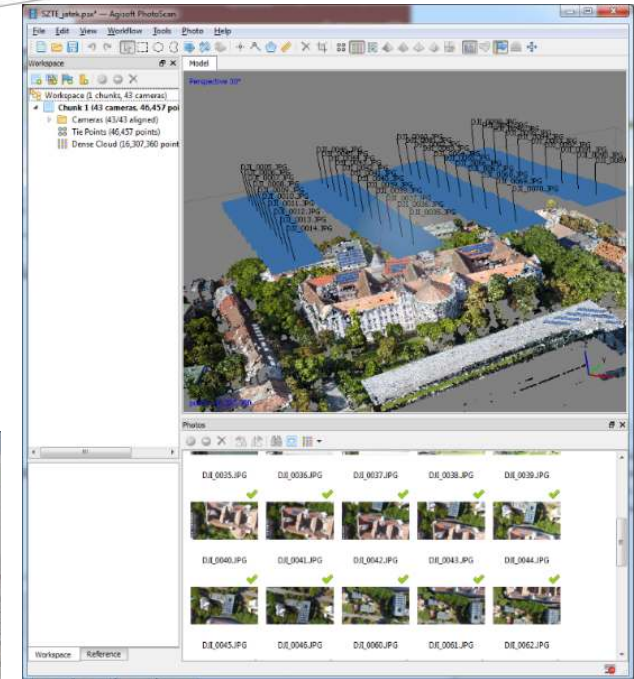


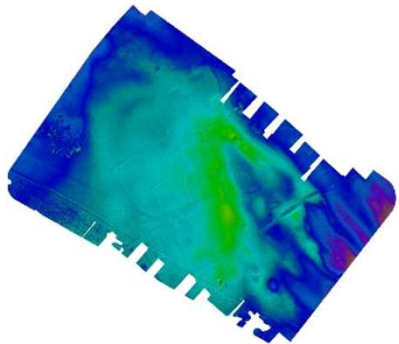
Image processing

- Agisoft Photoscan
- Pix4D
- MapsMadeEasy
- (Drone2Map)
- (WebODM)



Applications (1) – Nature conservation

- Monitoring of invasive species (CIR and RGB orthomosaic, classification)
- Habitat mapping (DTM + RGB orthomosaic + GPR) – *Nannospalax (leucodon) montanosyrmensis*



Article

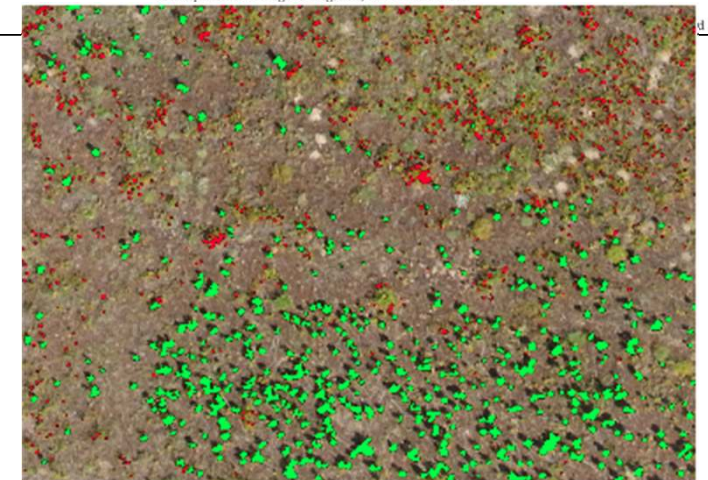
Monitoring Invasive Plant Species Using Hyperspectral Remote Sensing Data

Levente Papp ¹, Boudewijn van Leeuwen ¹, Péter Szilassi ^{1,*}, Zalán Tobak ¹, József Szatmári ¹, Mátys Árvai ², János Mészáros ² and László Pásztor ²

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Article
Sentinel-1 and -2 Based near Real Time Inland Excess Water Mapping for Optimized Water Management

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 * Correspondence: leeuwen@geo.u-szeged.hu; Tel: +36 62 343357

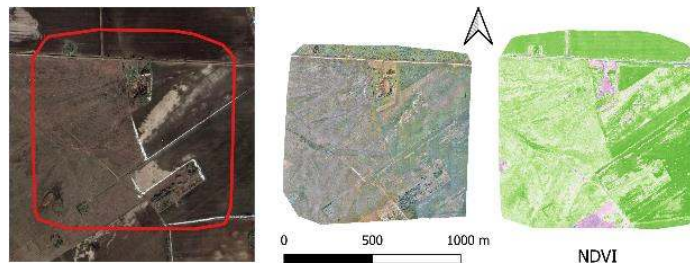
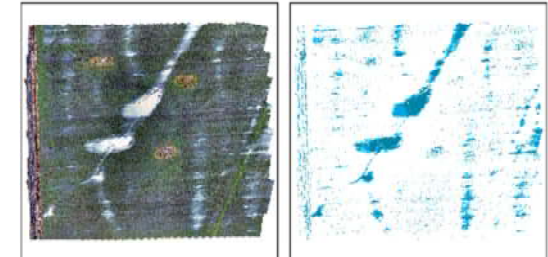
Received: 25 February 2020; Accepted: ...

Abstract: Changing climate is ... the world. In the Carpathian B...

Applications (2) – Environmental monitoring

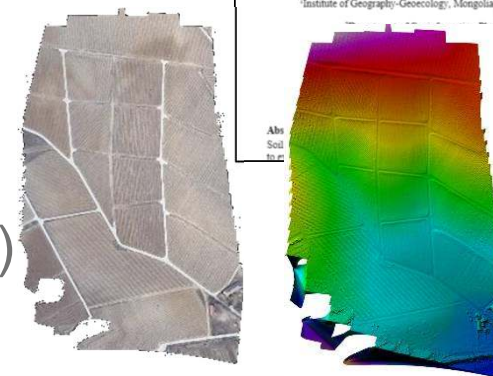
■ Inland excess water floods

- Research (DTM generation)
- Monitoring (CIR and RGB orthomosaic, NDVI)
- Validation data for satellite based classifications



■ Soil erosion

- Research in vineyards (DTM generation)



sciendo *Journal of Environmental Geography* 14 (1–2), 47–57.
 DOI: 10.2478/jengeo-2021-0005
 ISSN 2060-467X

THE IMPACT OF SOIL EROSION ON THE SPATIAL DISTRIBUTION OF SOIL CHARACTERISTICS AND POTENTIALLY TOXIC ELEMENT CONTENTS IN A SLOPING VINEYARD IN TALLYA, NE HUNGARY

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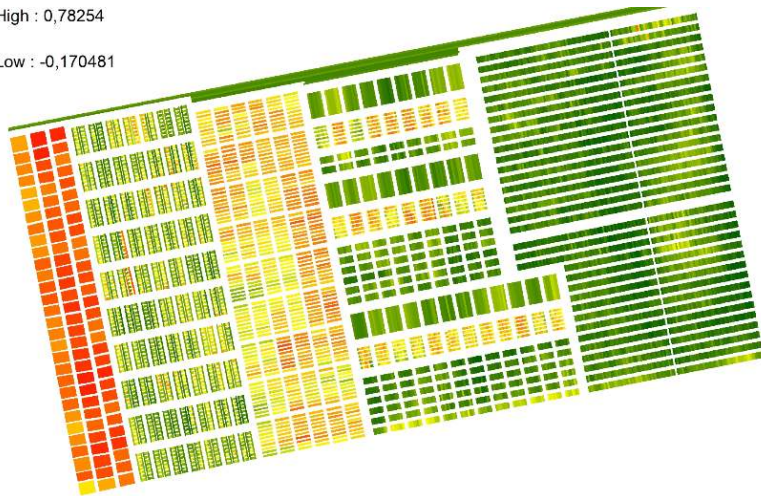
15 February 2021, accepted 23 April 2021

Abstract: Soil erosion can dramatically affect soil quality and fertility. The present study aimed to investigate the impact of soil erosion on the spatial distribution of soil characteristics and the soil's potentially toxic element (PTE) contents.

Applications (3) – Environmental monitoring

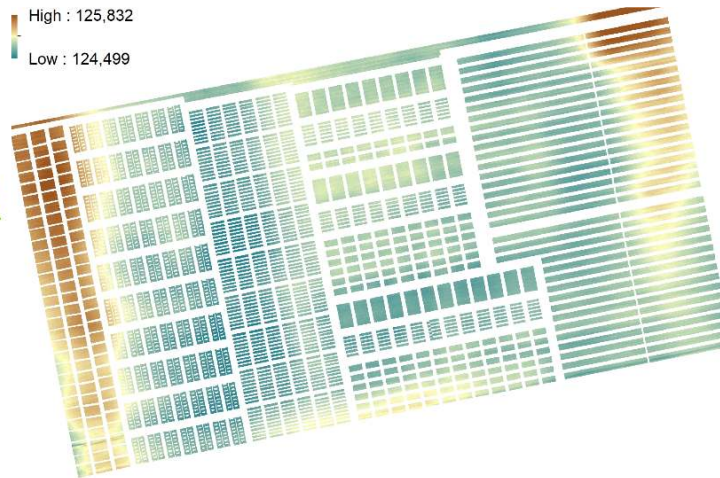
- Vegetation phenology
 - Drought monitoring (CIR and RGB orthomosaic, NDVI - biomass, height), wheat and maize

High : 0,78254
Low : -0,170481



cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

High : 125,832
Low : 124,499



Interreg - IPA CBC 
Hungary - Serbia



Aszály és belvíz monitoring és menedzsment, valamint a kapcsolódó kockázatok a Dél-Alföldön és a Vajdaságban

Monitoring, rizici i upravljanje sušom i suvišnim unutrašnjim vodama na jugu Mađarske i u Vojvodini

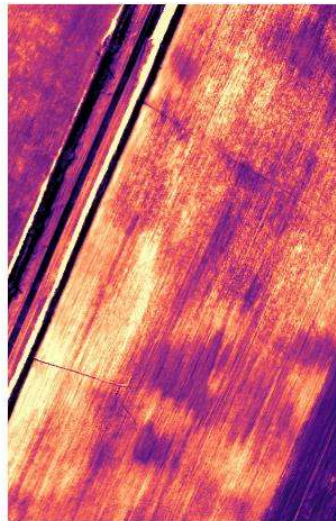
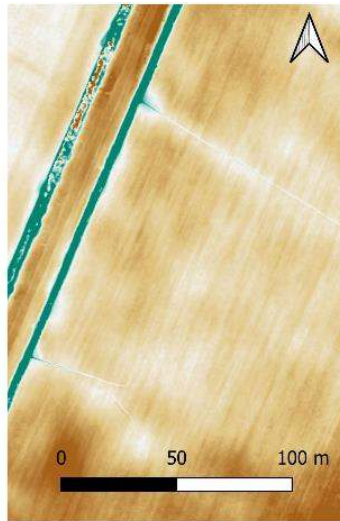
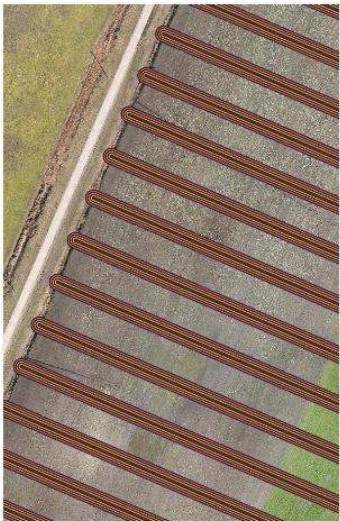
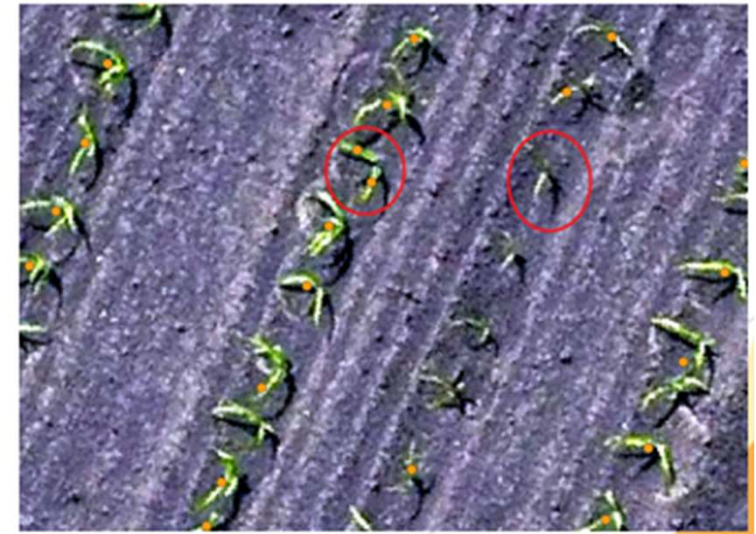
Monitoring, risks and management of drought and inland excess water in South Hungary and Vojvodina

 The project is co-financed by the European Union

Good neighbours
creating
common future

Applications (4) – Precision agriculture

- Replacing traditional plant counting methods using CNN
- Mapping of drainage systems



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CONDITION ASSESSMENT OF SUBSURFACE DRAINED AREAS AND INVESTIGATION OF THEIR OPERATIONAL EFFICIENCY BY FIELD INSPECTION AND REMOTE SENSING METHODS

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²Department of Geoinformatics, Physical and Environmental Geography, University of Szeged, Egyetem u. 2-6, 6722 Szeged, Hungary

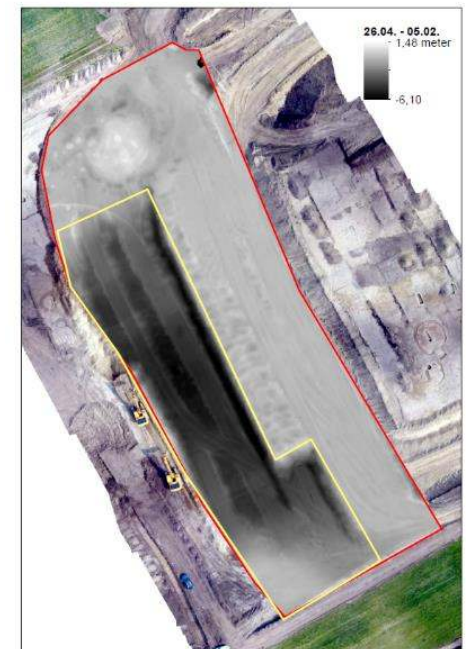
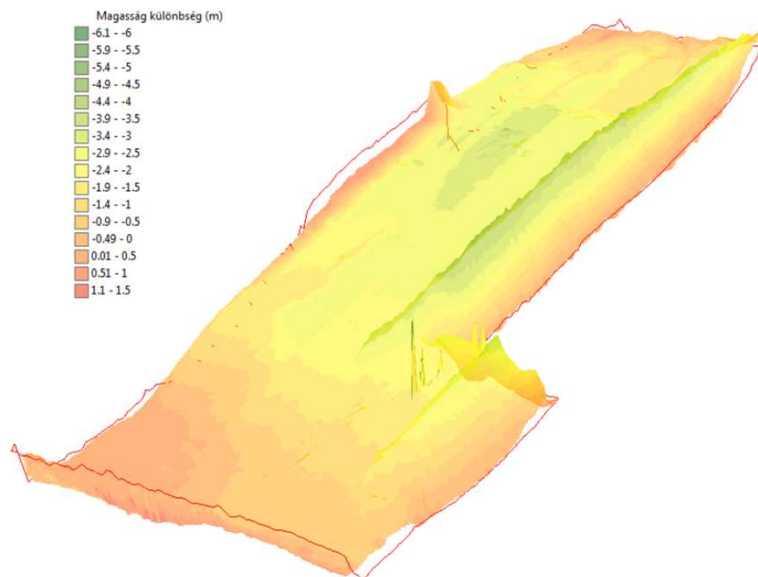
*Corresponding author, email: turi.norbert@uni-mate.hu

Research article, received 4 April 2021, accepted 12 October 2021

Abstract
The extreme weather events highlight the need to develop action concepts to maintain agricultural production security in the future. Hydrological extremes can occur within a year in the form of surplus water (i.e. inland excess water), water scarcity or even drought

Applications (5) – Geodesy

- Volume calculation (sand pit)

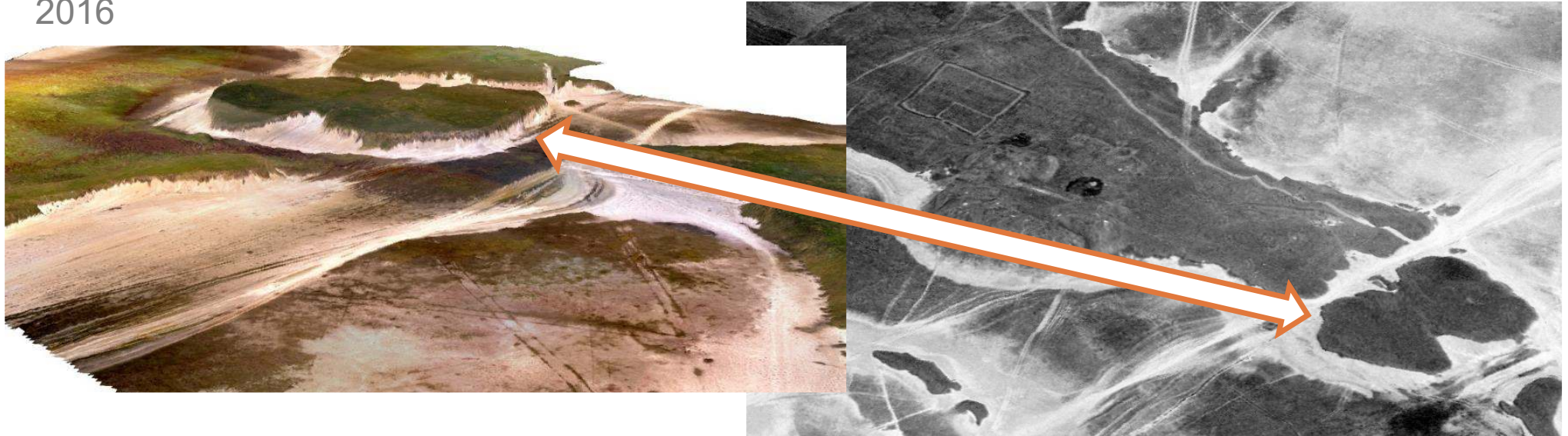


Applications (6) – Geomorphology

- Erosion of saline forms
 - Precise 3D measurement, monitoring

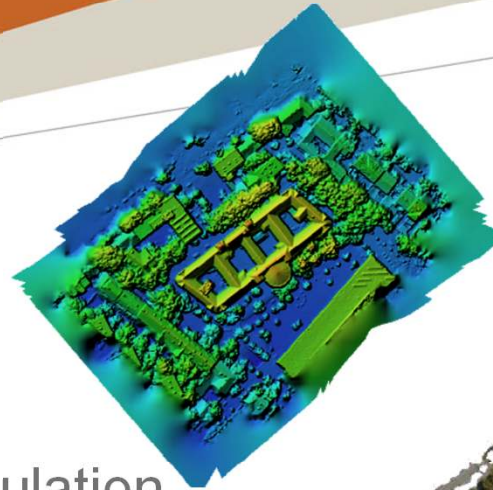
1961

2016



Applications (7) - other

- 3D city models
 - visualization, PV energy calculation
- Archeology
 - site mapping, DTM
- Macro plastic in rivers - Tisza





Thank you for your attention!

