

# Morphological Residual Model

A NEW TOOL FOR ENHANCING EPIGRAPHIC READINGS

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# Case-study

Panóias Sanctuary (Vila Real - Portugal)

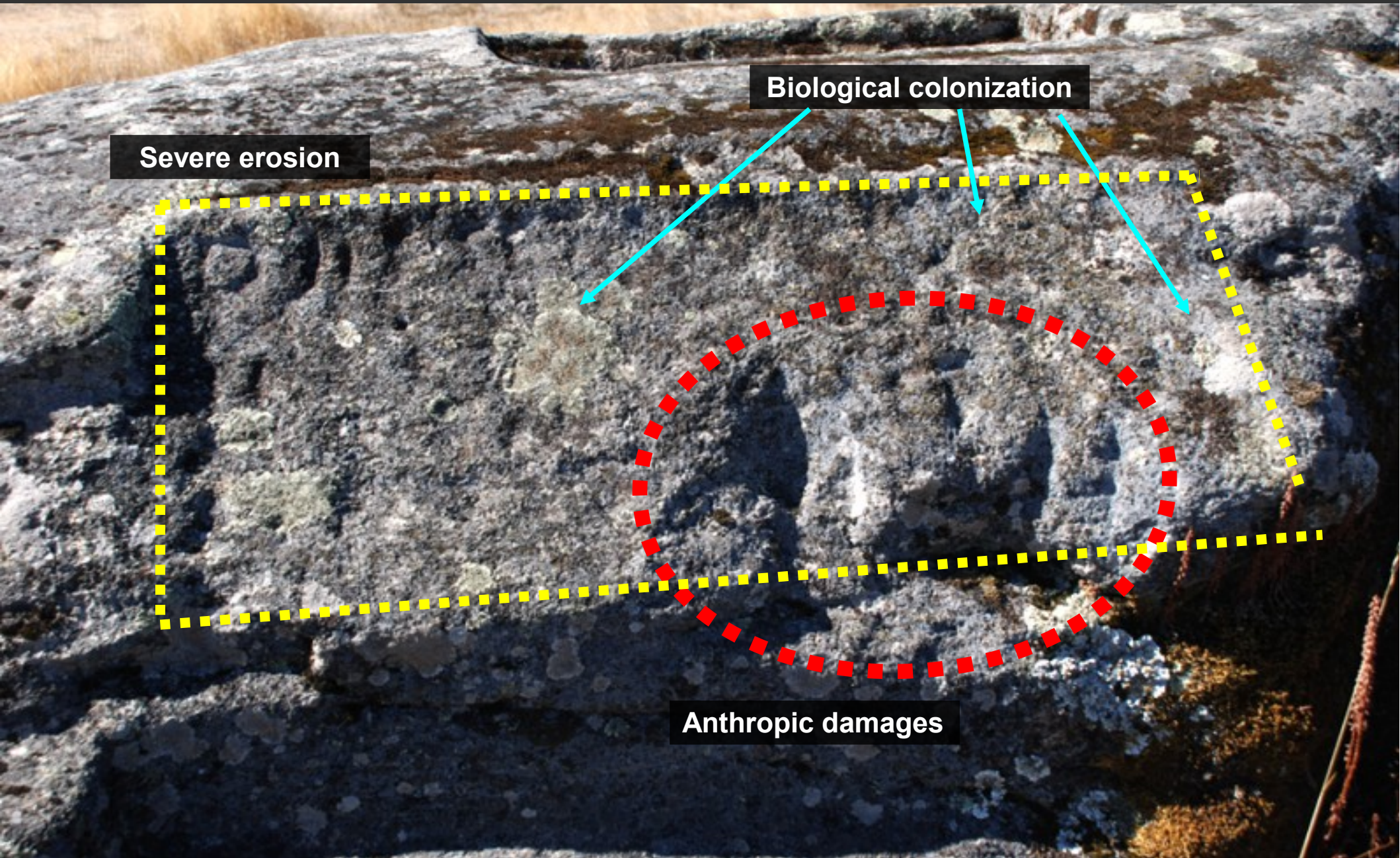


**MORPHOLOGICAL RESIDUAL MODEL** A TOOL FOR ENHANCING EPIGRAPHIC READINGS OF HIGHLY EROSIONED SURFACES



# Case-study

Panóias Sanctuary (Vila Real - Portugal)





# Conventional surveying techniques

## Raking light photography

### Raking light

is used to cast dramatic shadows so to enhance carvings visual perception, but presents several constraints...



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# Conventional surveying techniques

## Raking light photography



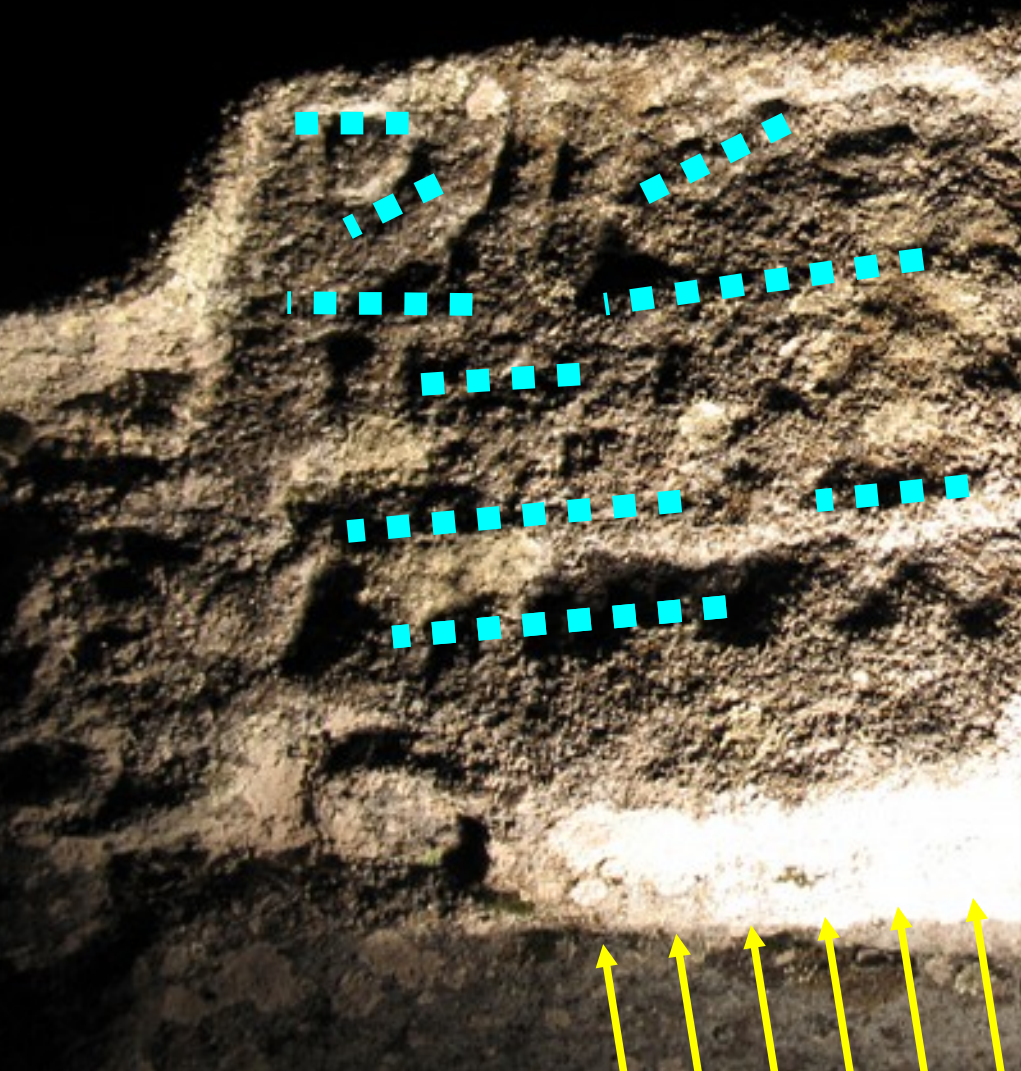
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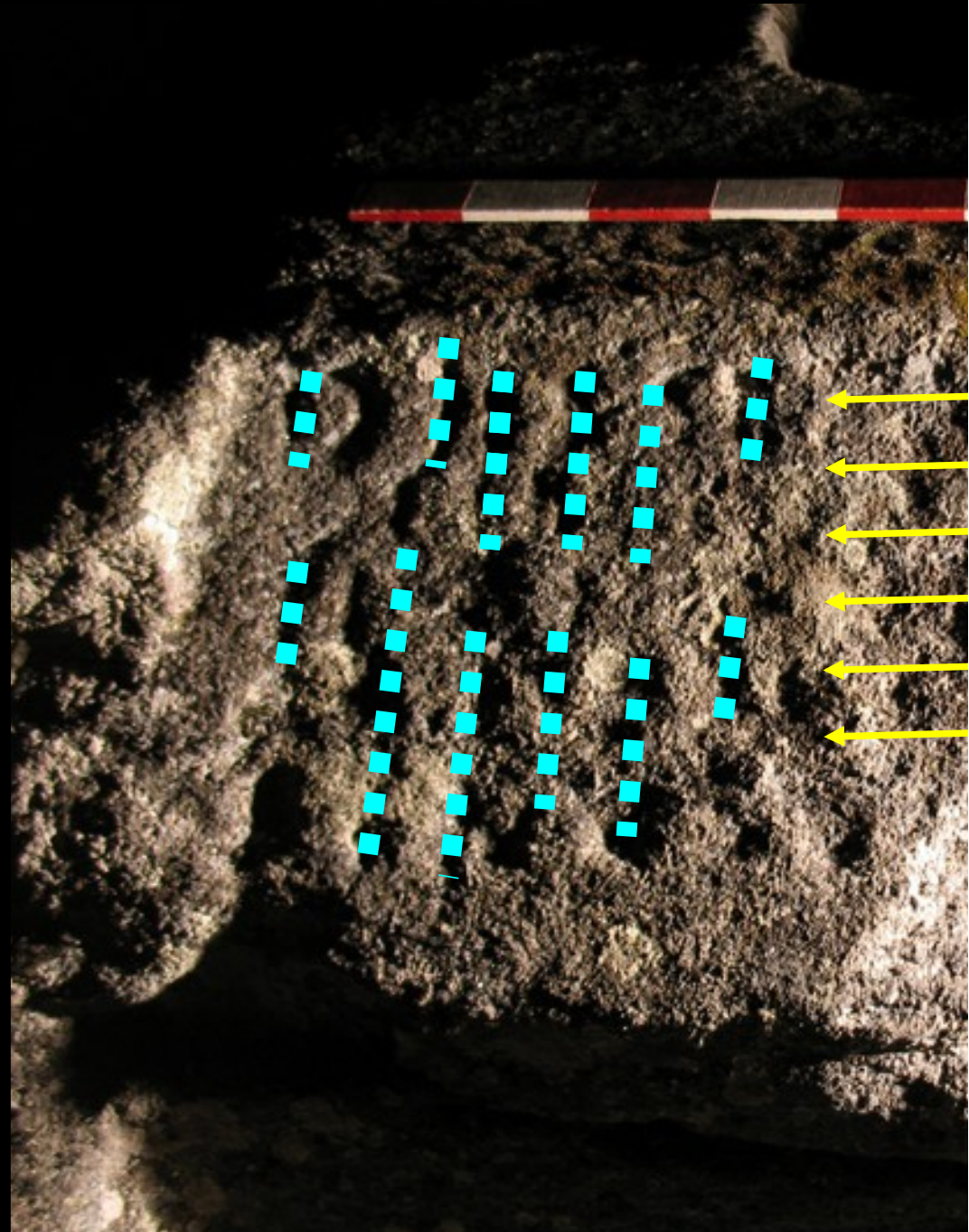
# Conventional surveying techniques

## Raking light photography

The visual appearance of carvings changes dramatically according to **light direction**.



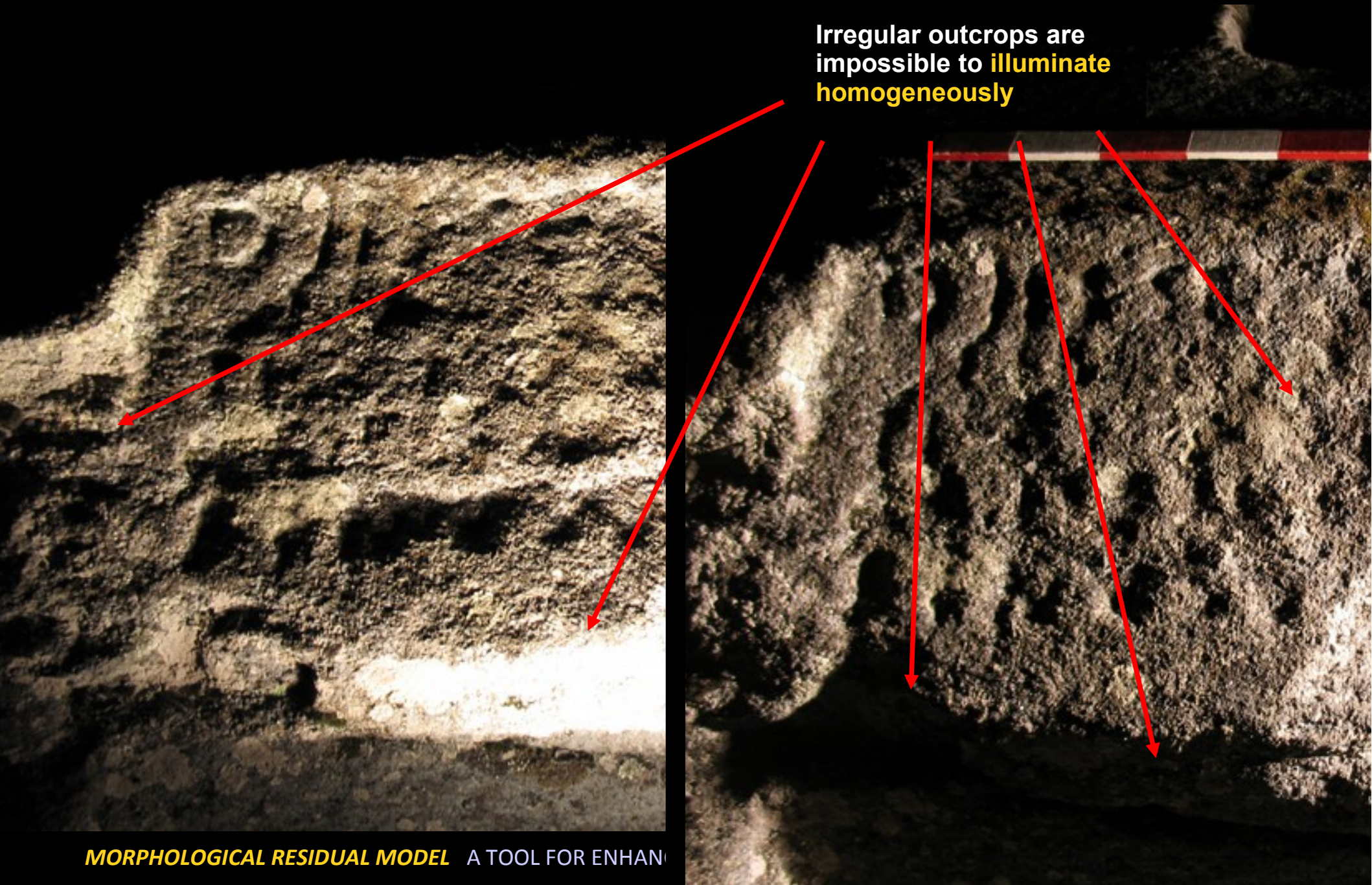
**MORPHOLOGICAL RESIDUAL MODEL** A TOOL FOR ENHANCING





# Conventional surveying techniques

## Raking light photography





# Is 3D scan the solution?



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# 3D Scan

## Results and drawbacks





# 3D Scan

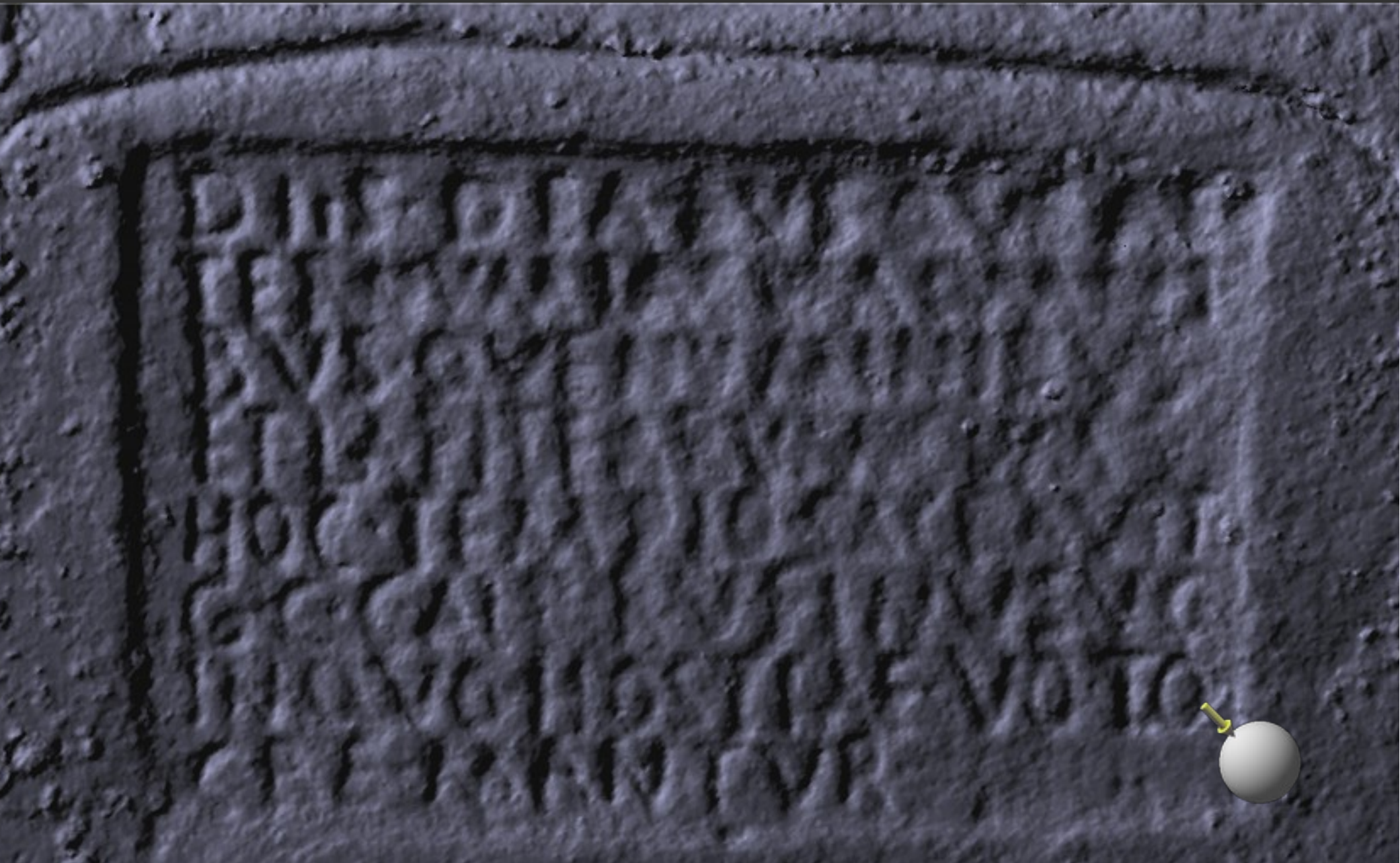
## Results and drawbacks





# 3D Scan

## Results and drawbacks





# 3D Scan

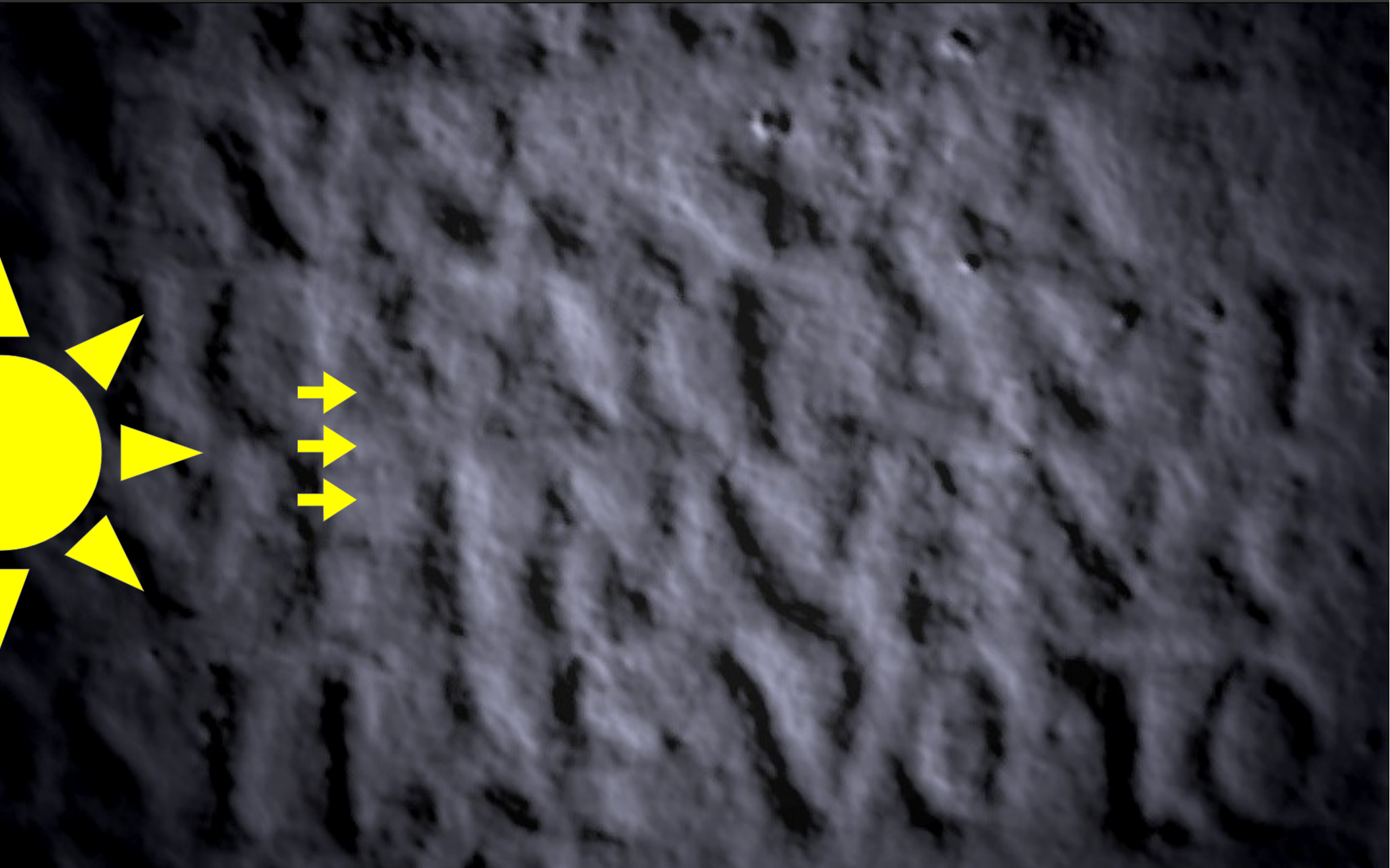
## Results and drawbacks





# 3D Scan

## Results and drawbacks





# 3D Scan

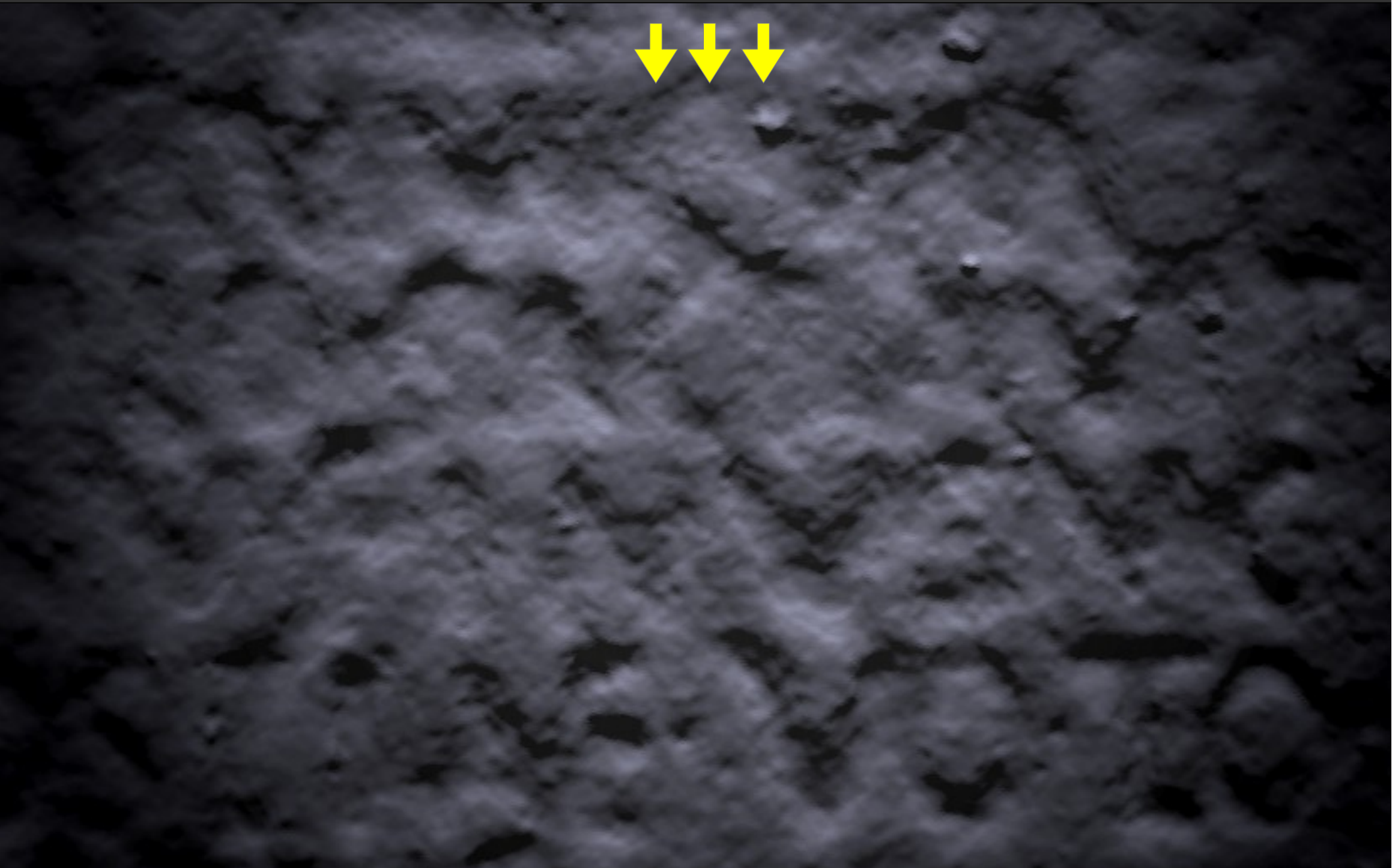
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# 3D Scan

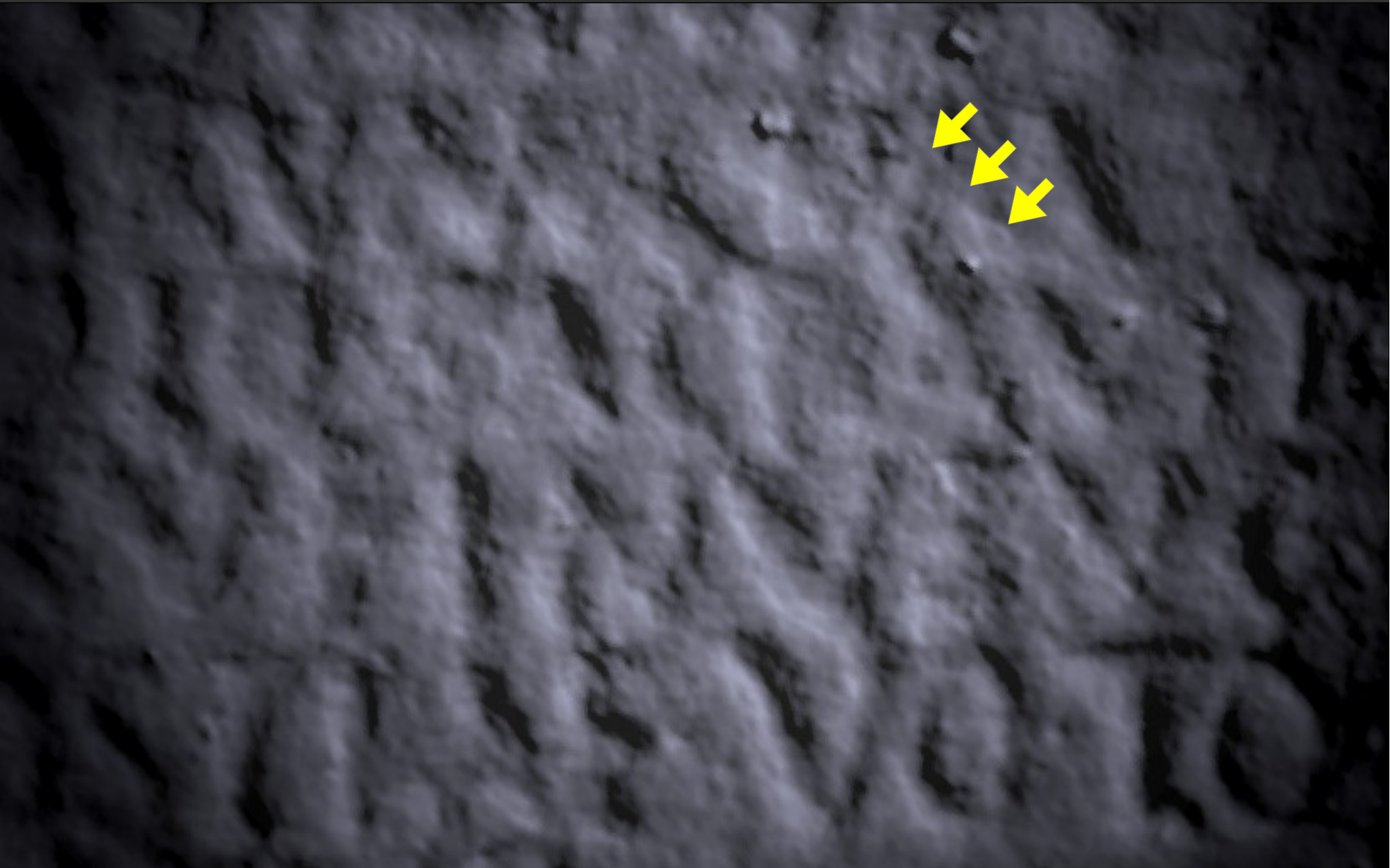
## Results and drawbacks





# 3D Scan

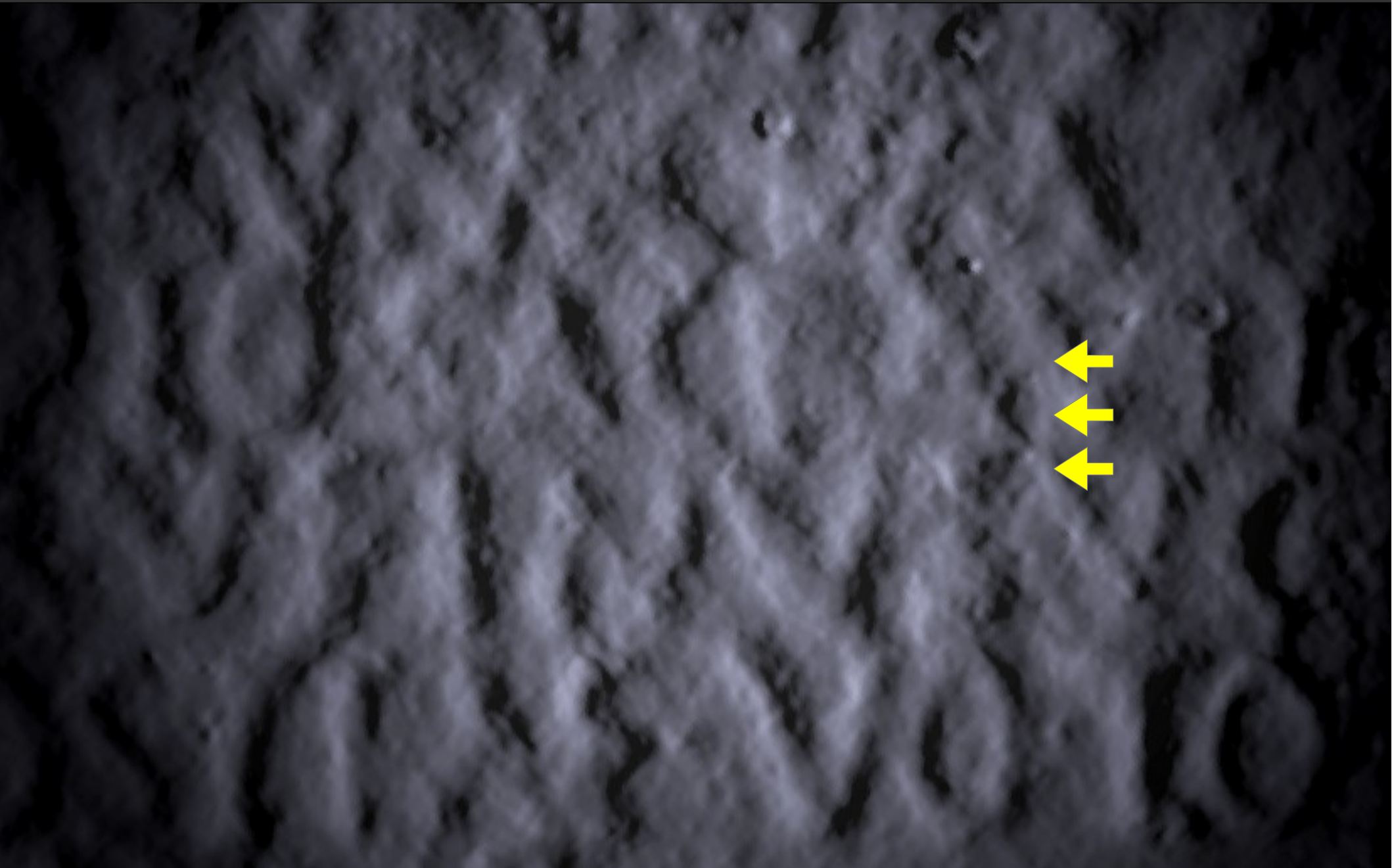
## Results and drawbacks





# 3D Scan

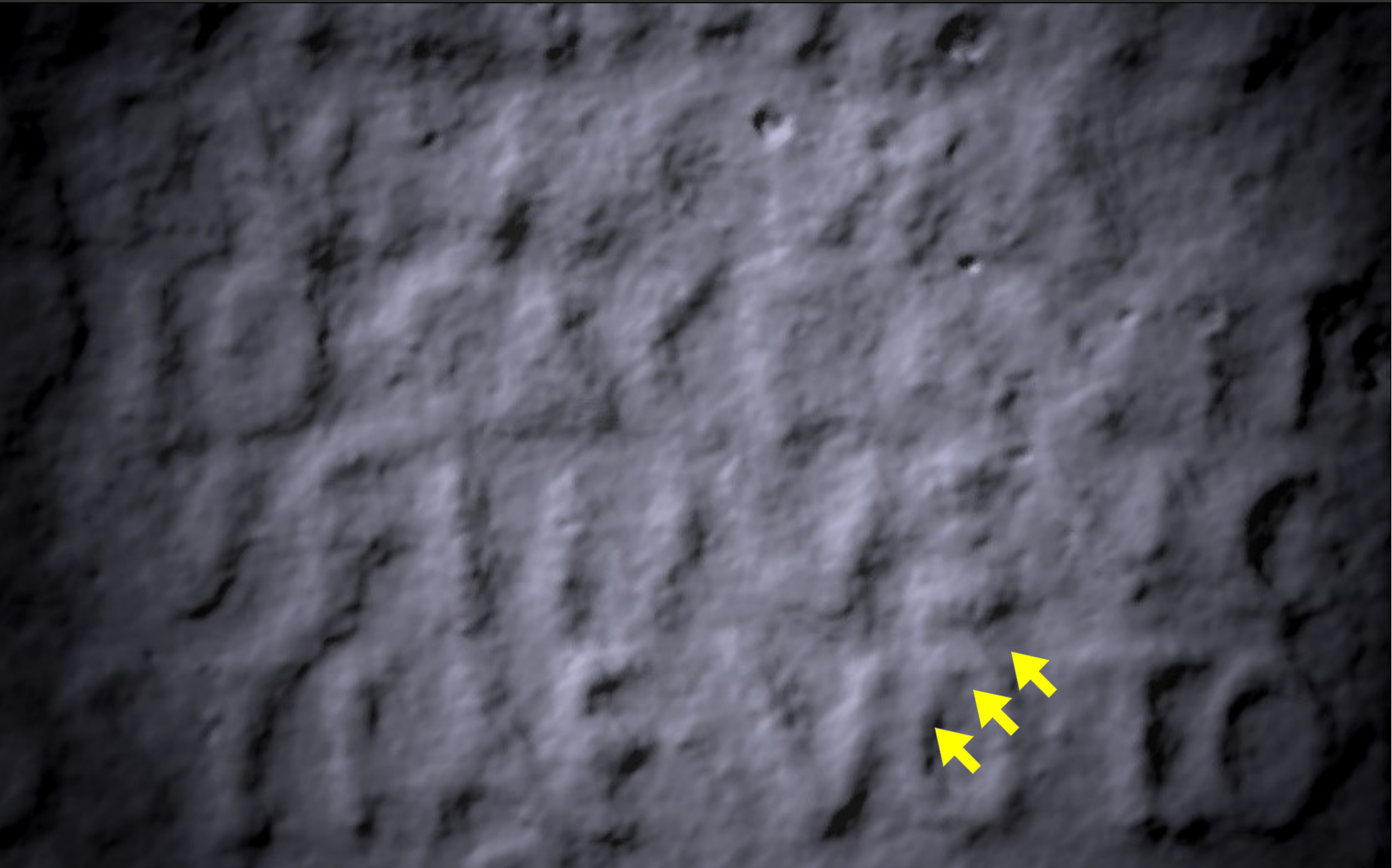
## Results and drawbacks





# 3D Scan

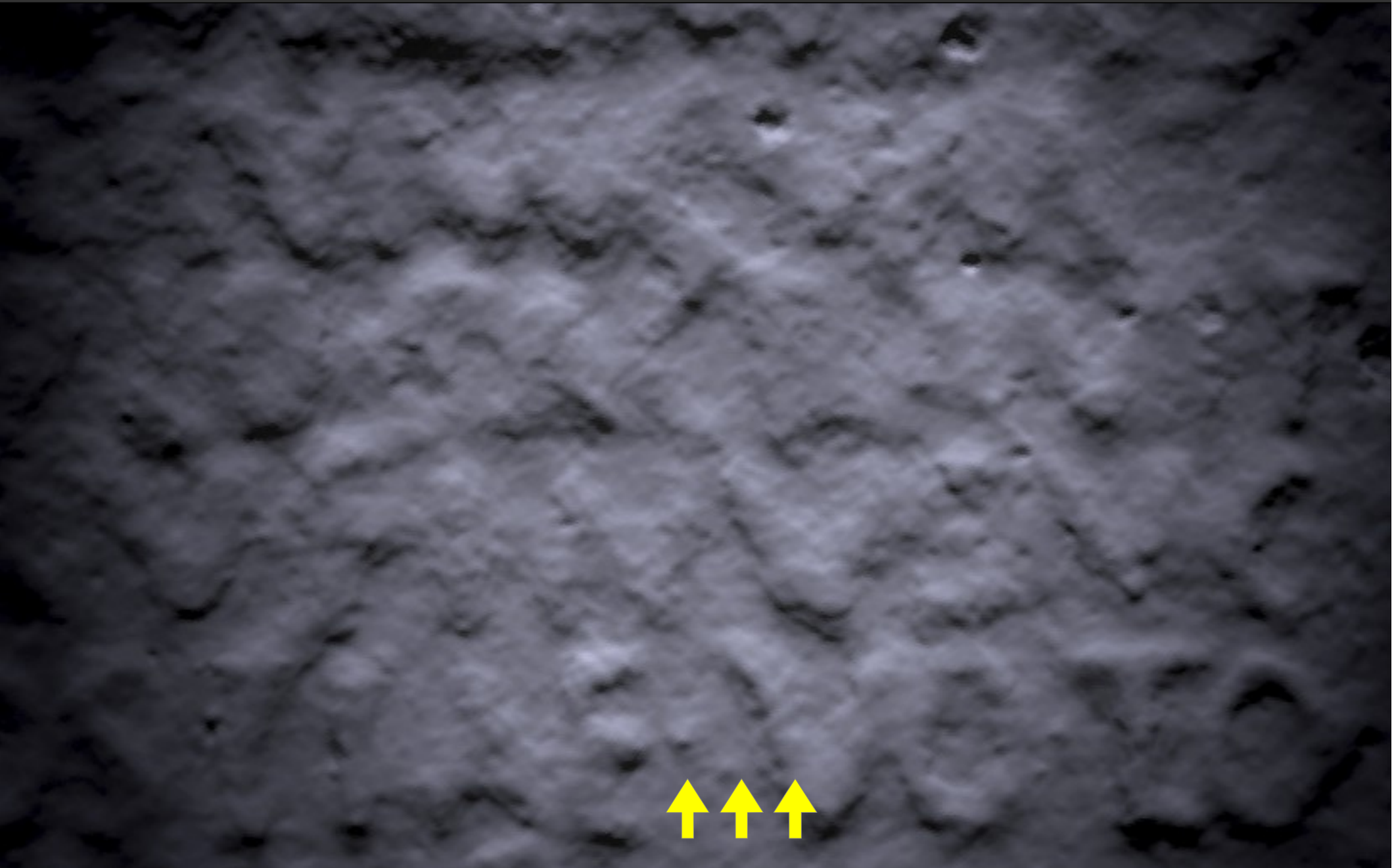
## Results and drawbacks





# 3D Scan

## Results and drawbacks

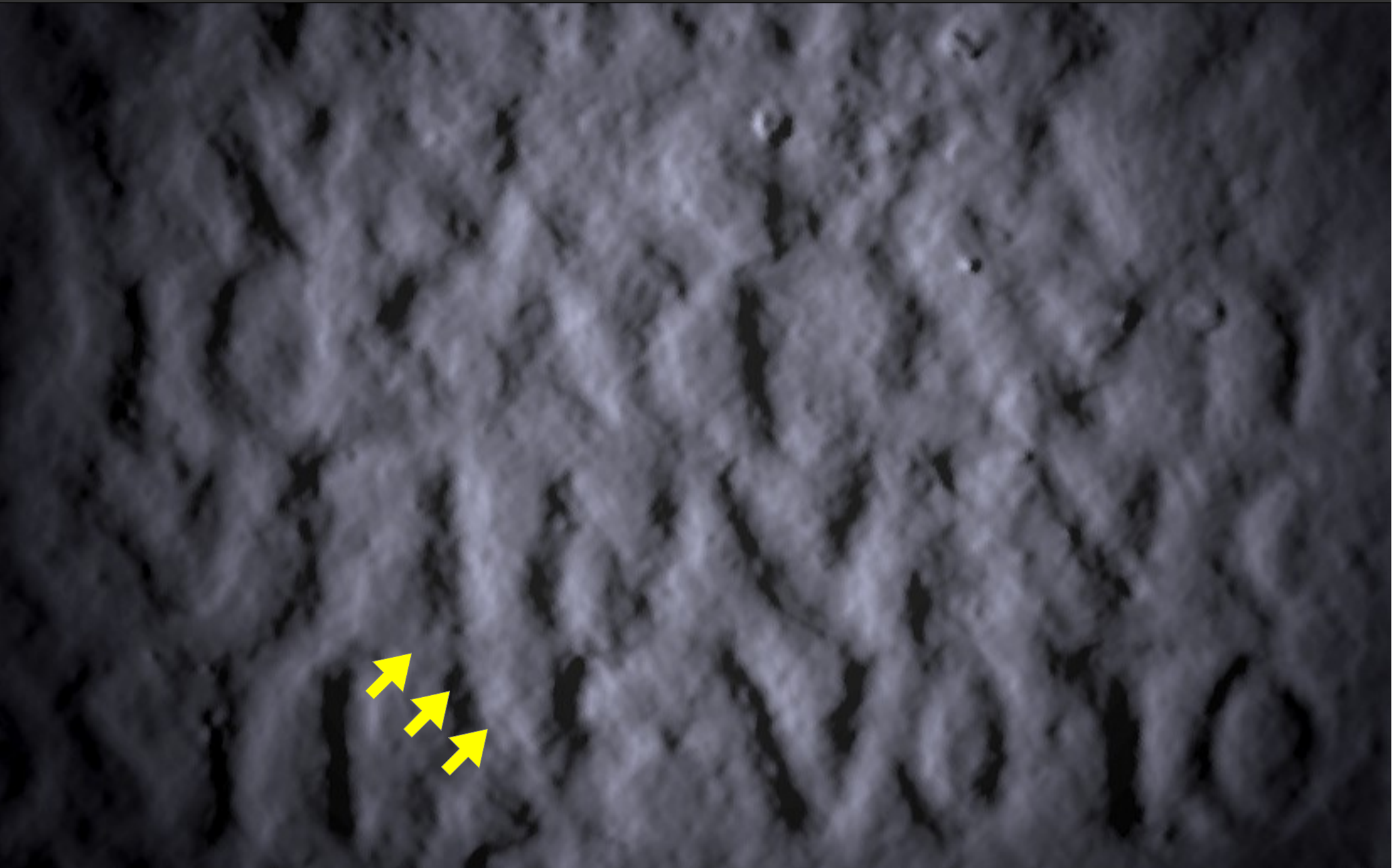


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# 3D Scan

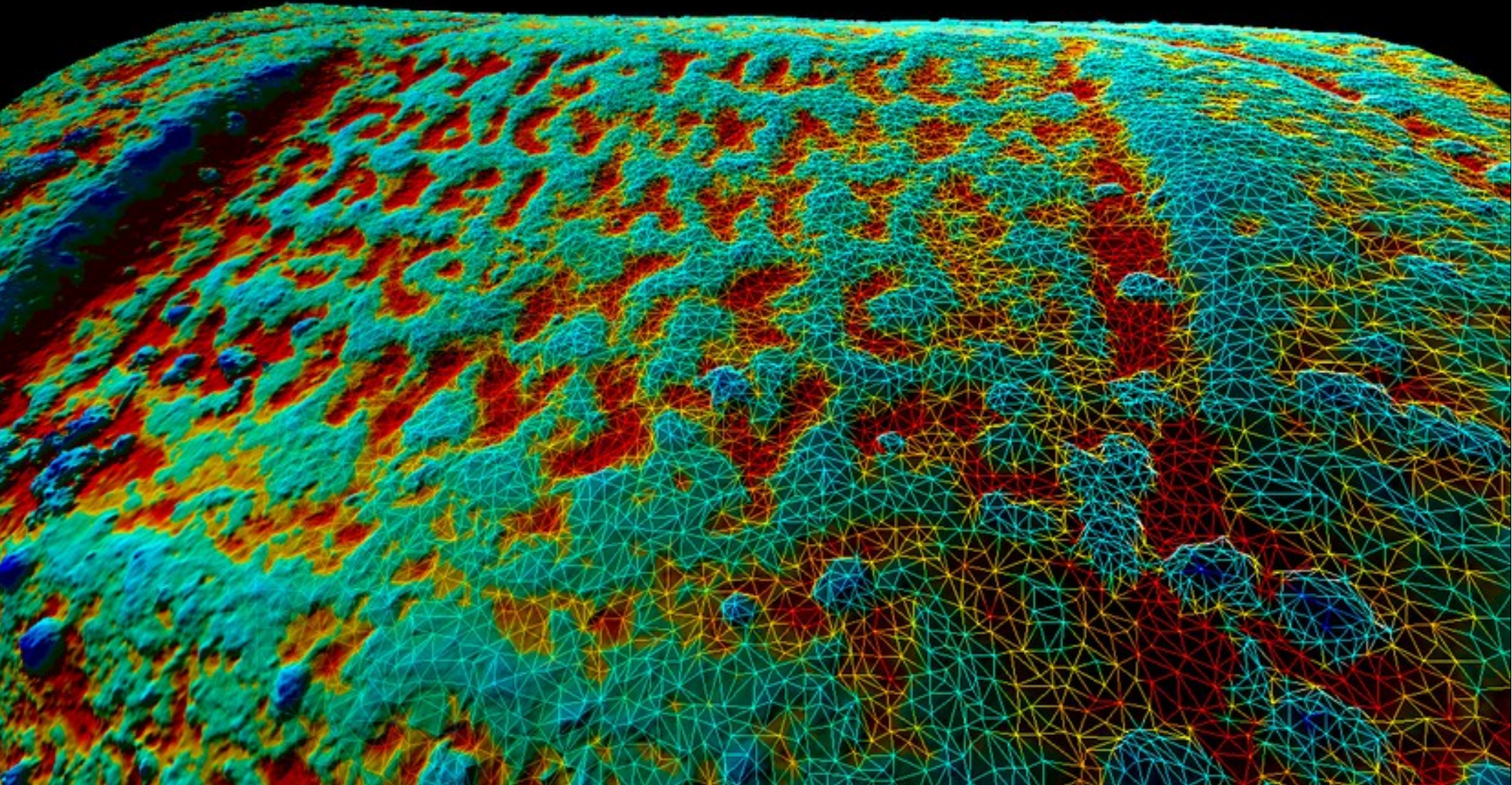
## Results and drawbacks





# Beyond 3D

The MRM approach to the detection of engravings



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# Beyond 3D

## The MRM approach to the detection of engravings

Hill-shaded 3D model



Morphological Residual Model



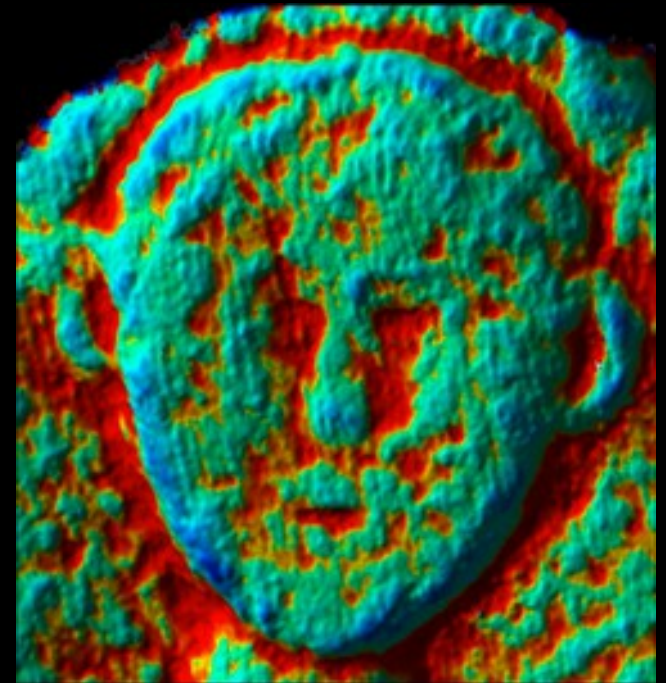


# Beyond 3D

## The MRM approach to the detection of engravings



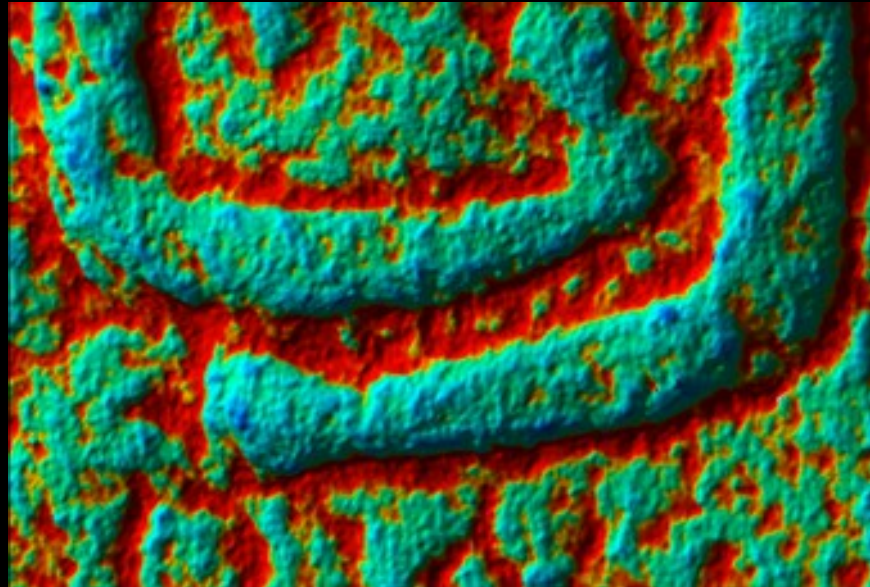
Lighting **does not affect**  
**visual perception** of the  
carvings.





# Beyond 3D

## The MRM approach to the detection of engravings

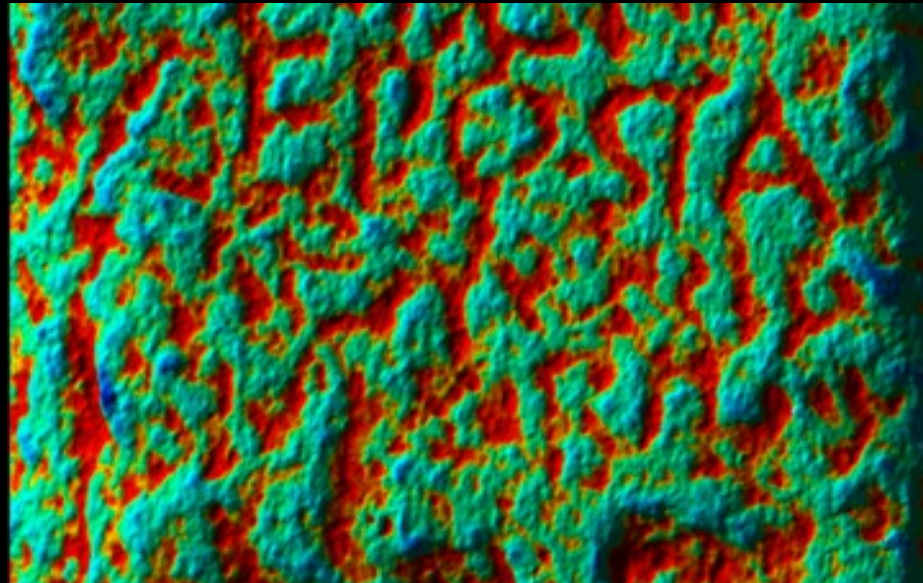


Irregular surfaces  
are contrasted  
regardless of  
factors like shape  
or light orientation.



# Beyond 3D

## The MRM approach to the detection of engravings



Heterogeneous  
surface colour  
doesn't affect  
carvings  
visualization.