Estimating cm-scale Morphology of Volcanic Terrains using MOC Images

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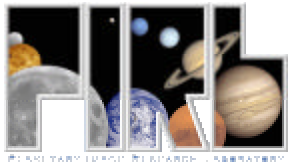


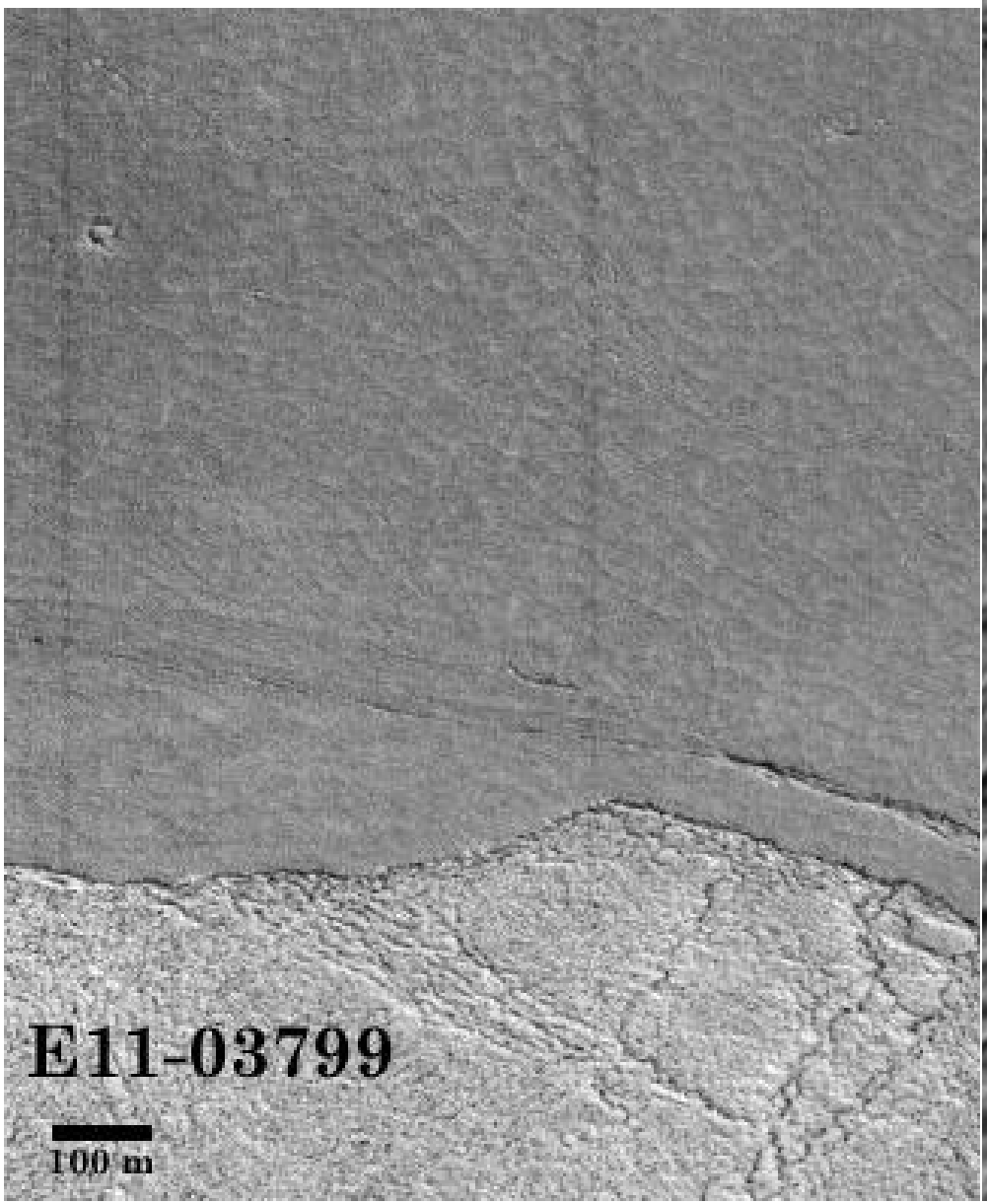
Outline

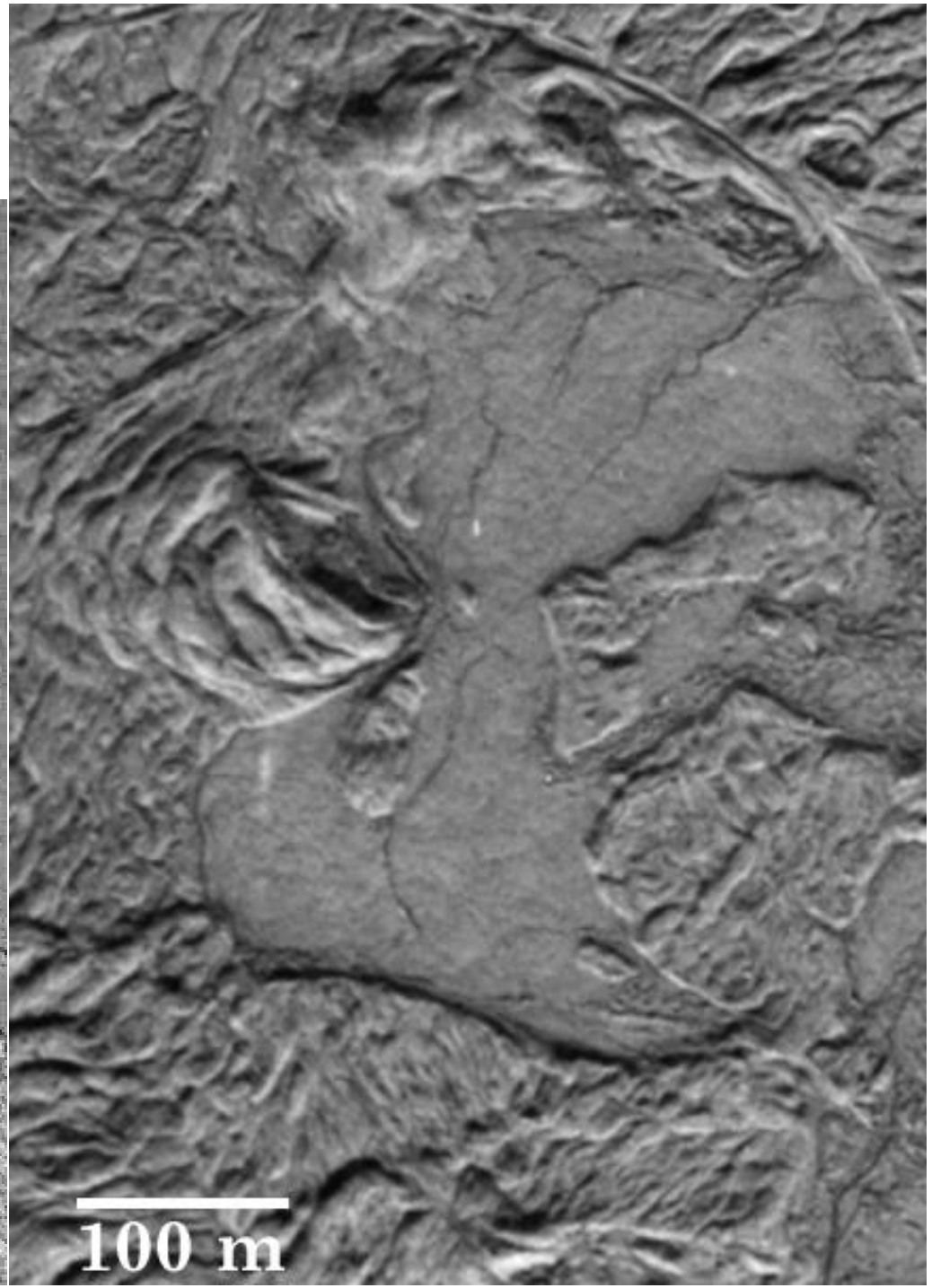
- Why? Get down to rover wheel scale from currently available data.
- How? Biologic Neural Net (BNN) with >10 years of training.
- Results for each landing site.
- More details on Athabasca

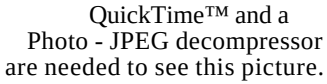
Basic Lava Types

- **Ponded** (near vent and flood lavas)
- **Pahoehoe** (Shield volcanoes - flood lavas)
- **Aa** (Shield volcanoes)
- "**Platy-Ridged**" aka "**Rubbly Pahoehoe**" (Flood lavas)

Ponded



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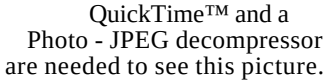
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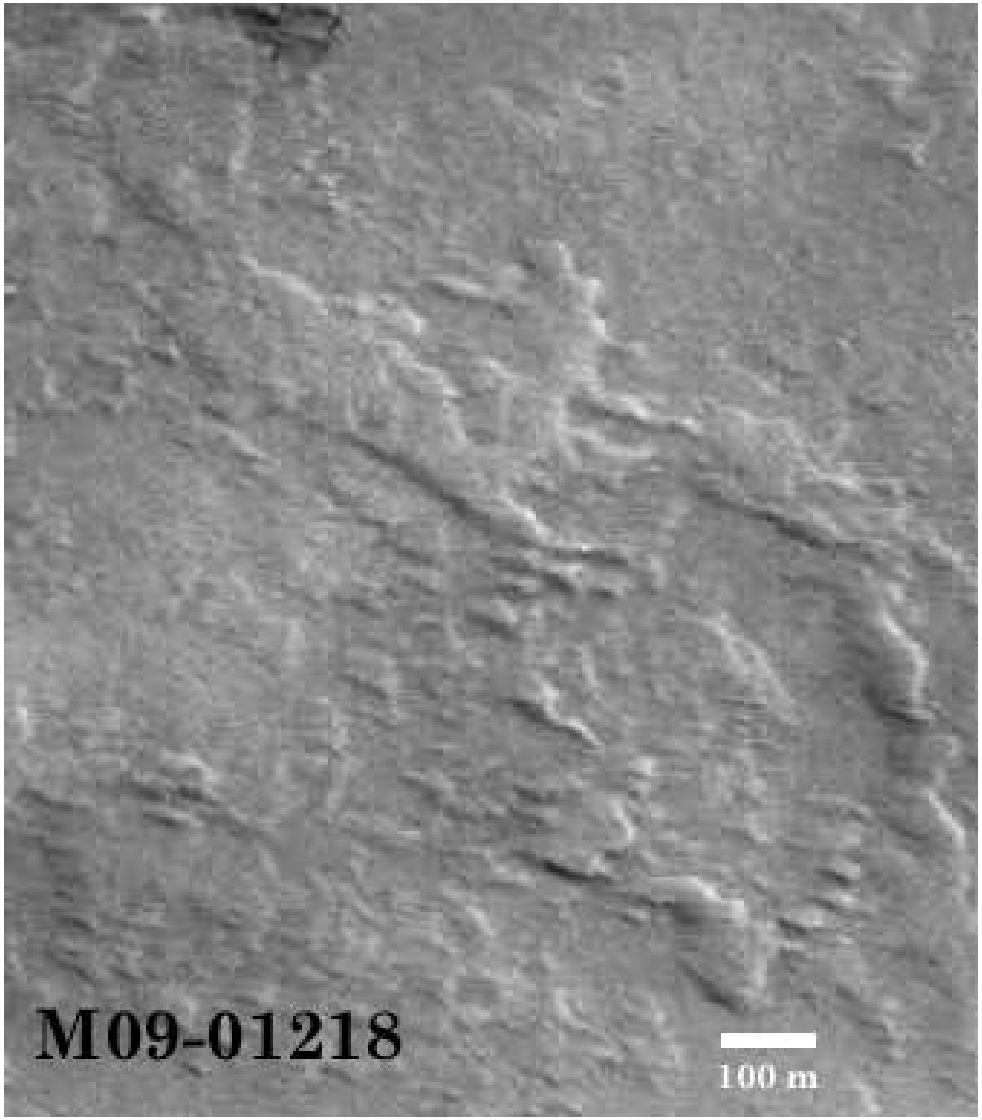
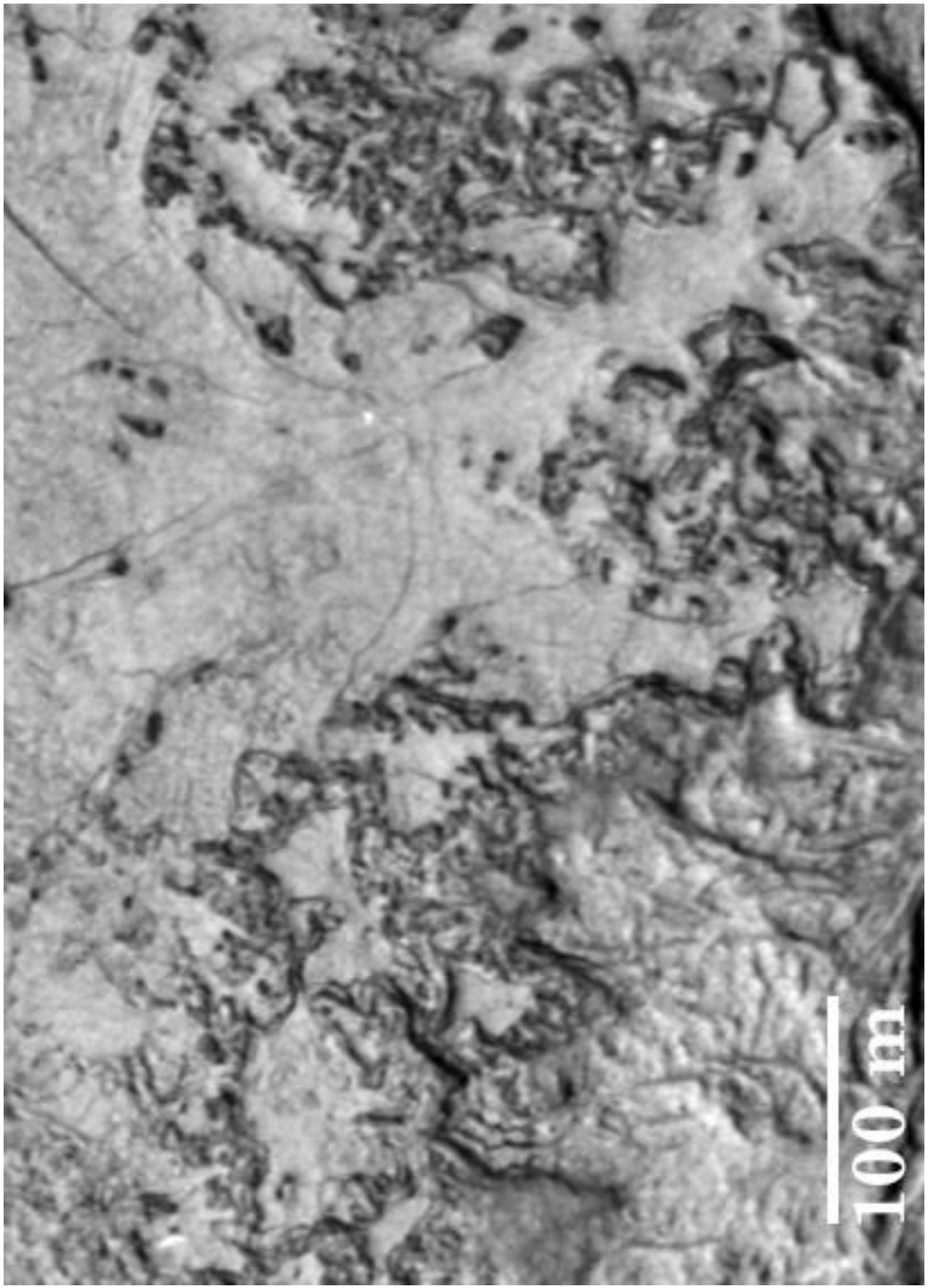
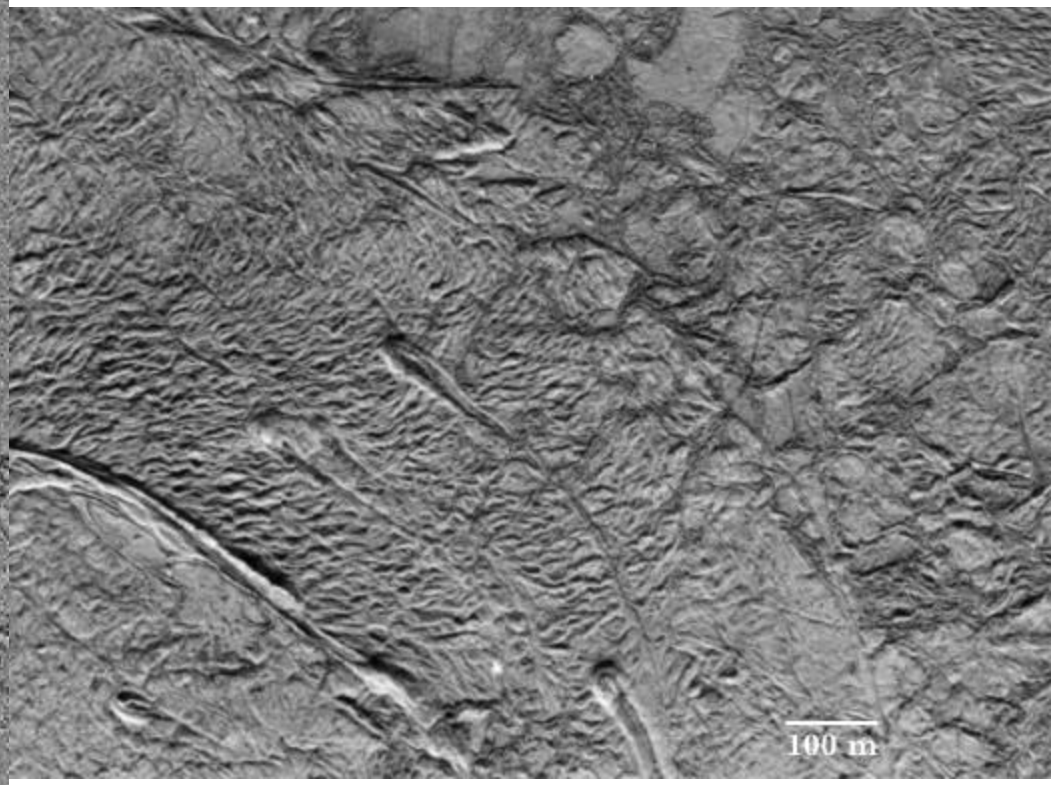
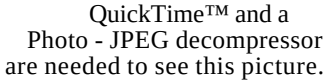
Pahoehoe (Inflated)





Rubbly Pahoehoe

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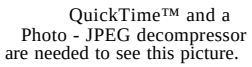
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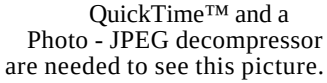
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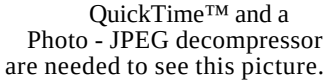
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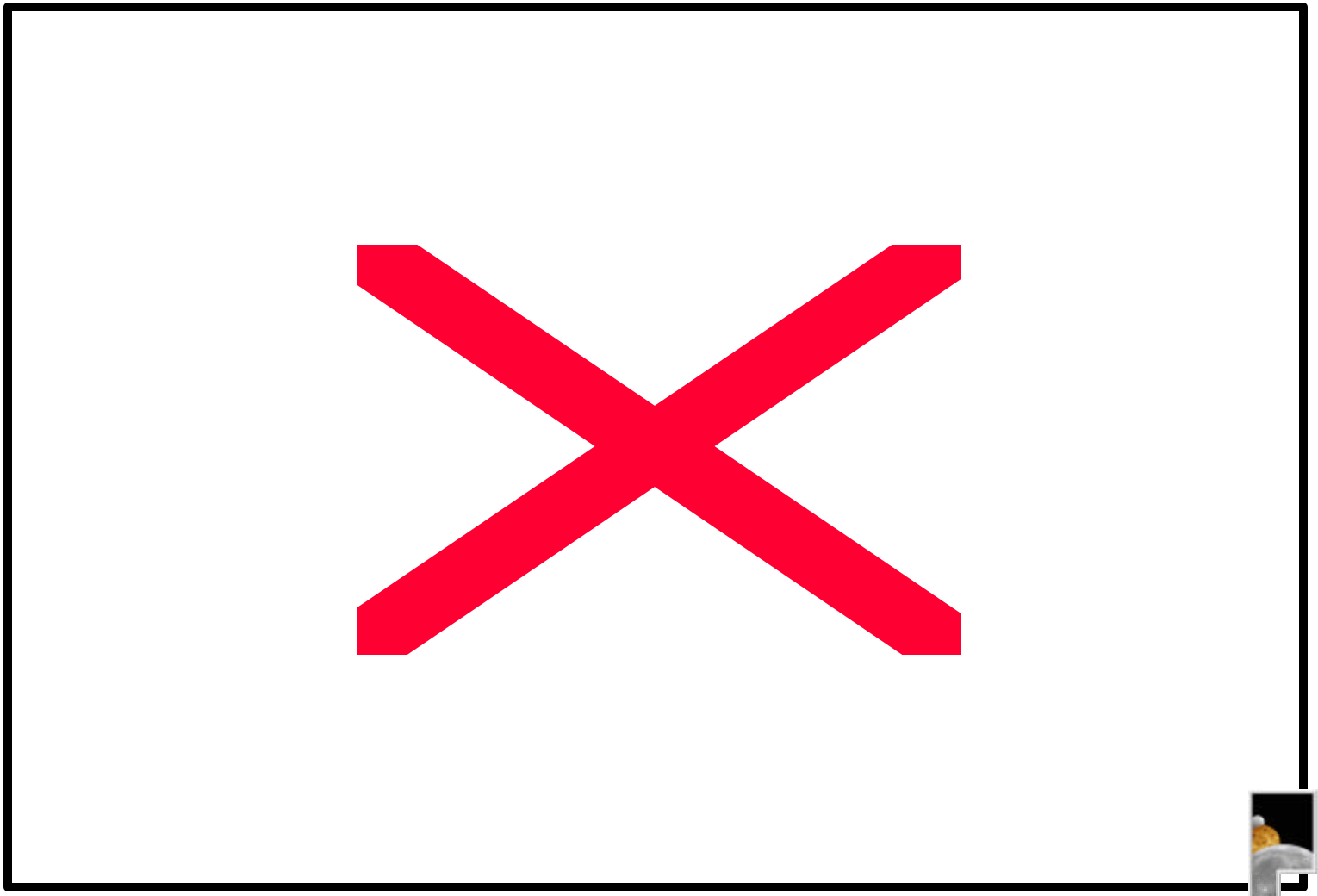
FRESH Lava Roughness

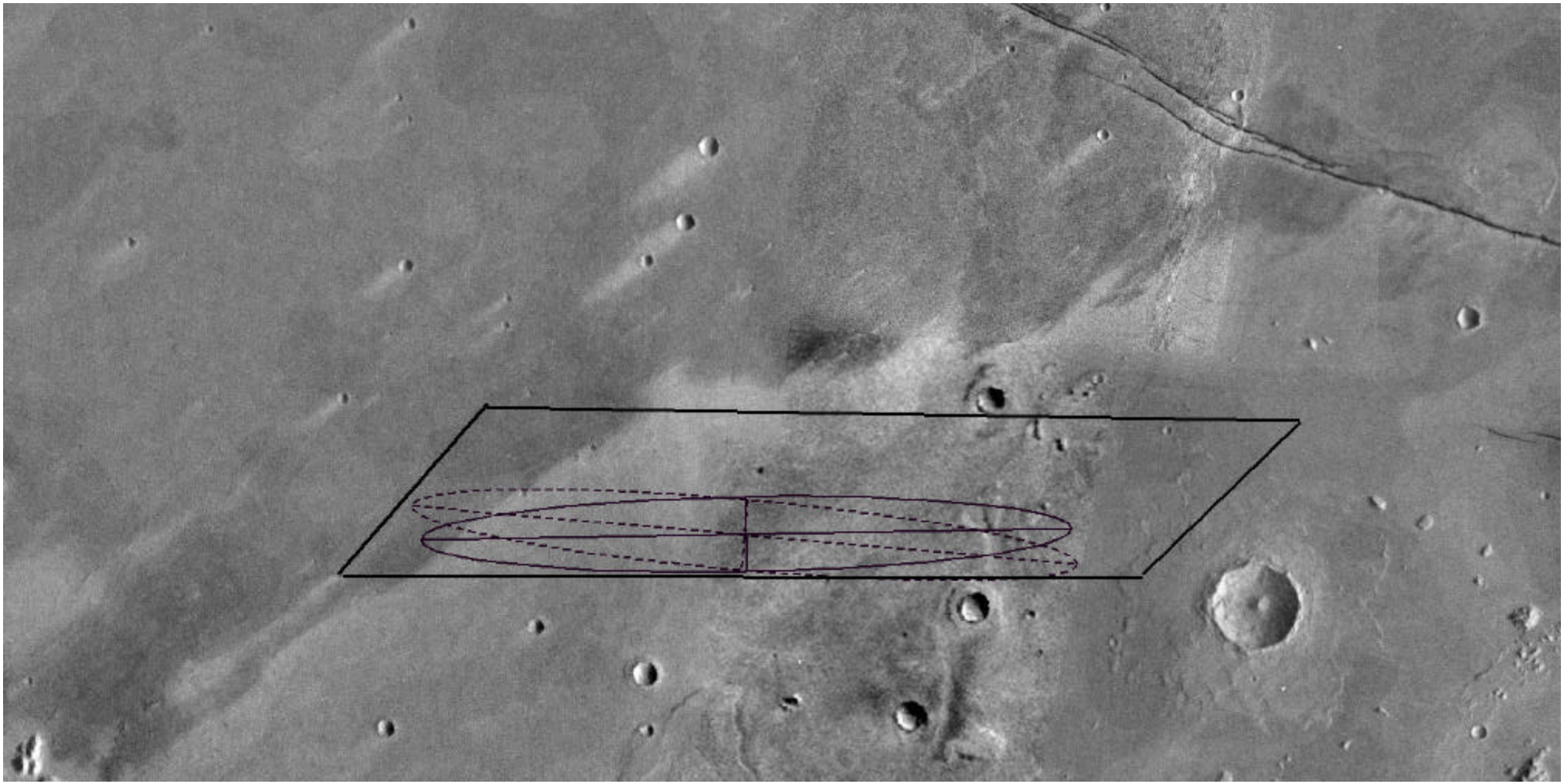
(The Good, the Bad, and the Even Worse!)

Scale	Ponded	Pahoehoe	Aa	Rubbly
mm	smooth	smooth	Very rough	smooth
cm	smooth	undulating	very rough	very rough
dm	undulating	rough	rough	**very rough**
m	flat	rough	rough	very rough
10 m	flat	undulating	smooth	undulating
100 m	flat	flat	smooth	flat

MER Landing Sites
Lava Coverage



Athabasca



Athabasca Vallis Site (MER-B=red)

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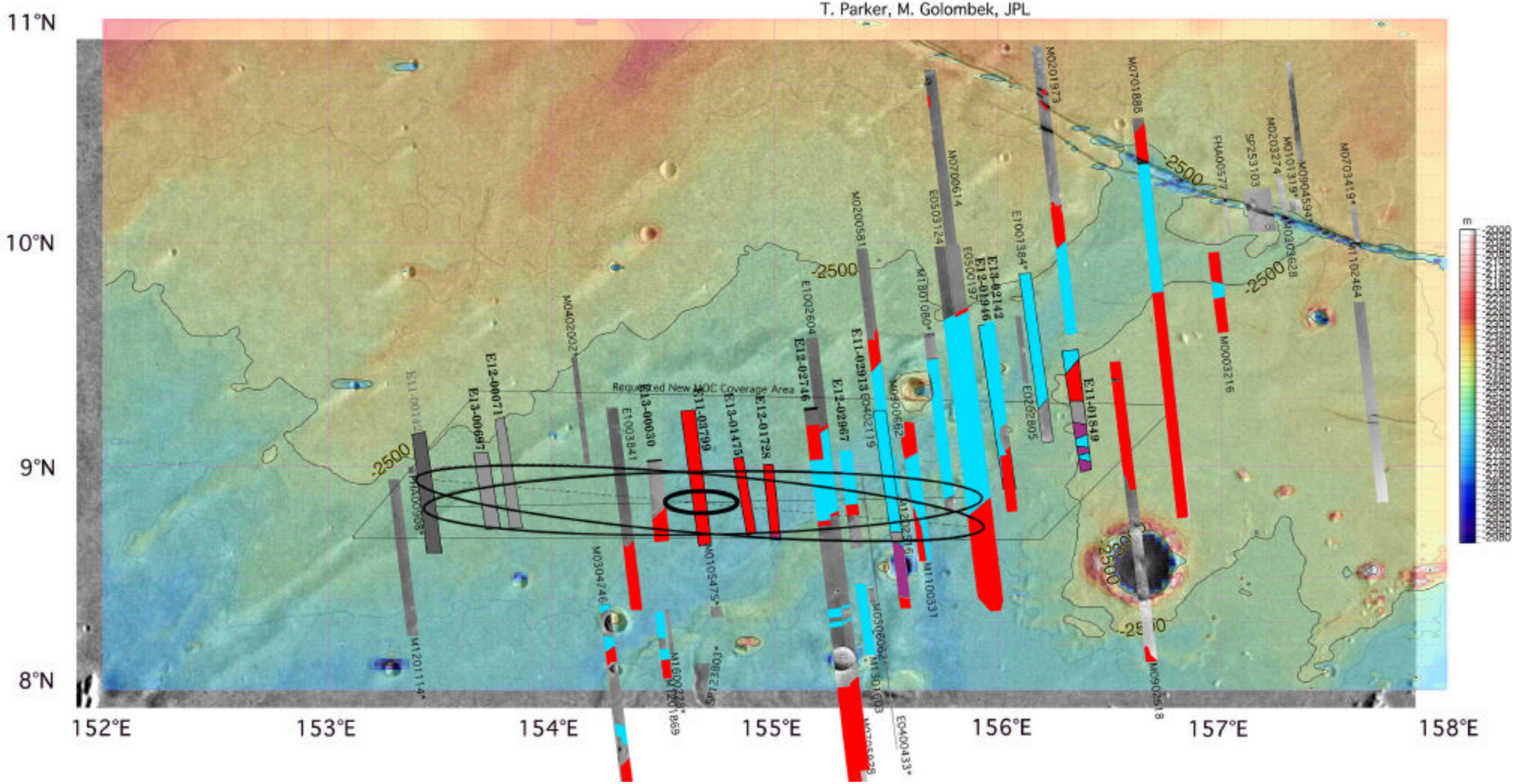

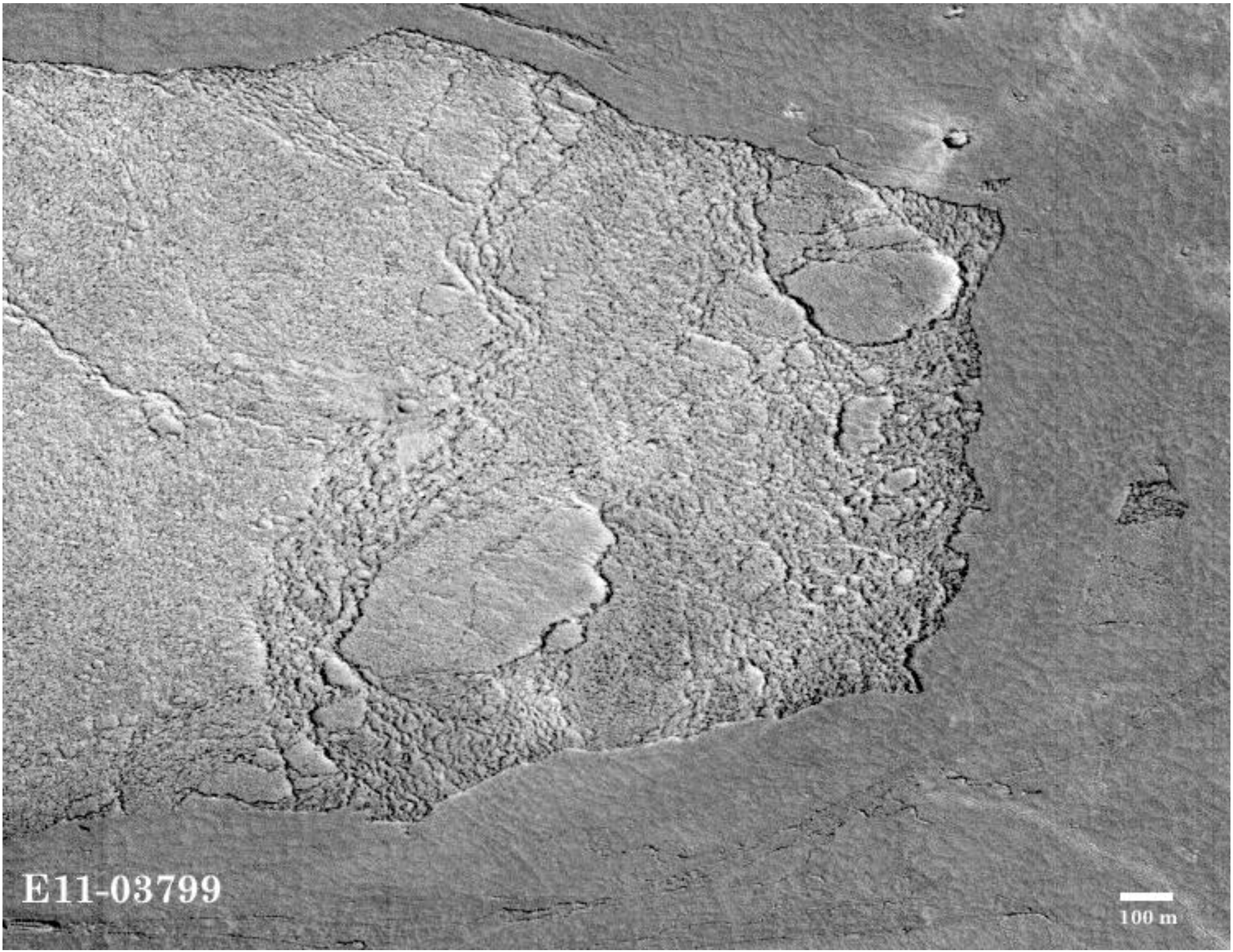
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100 m

Athabasca Vallis Site (MER-B=red)

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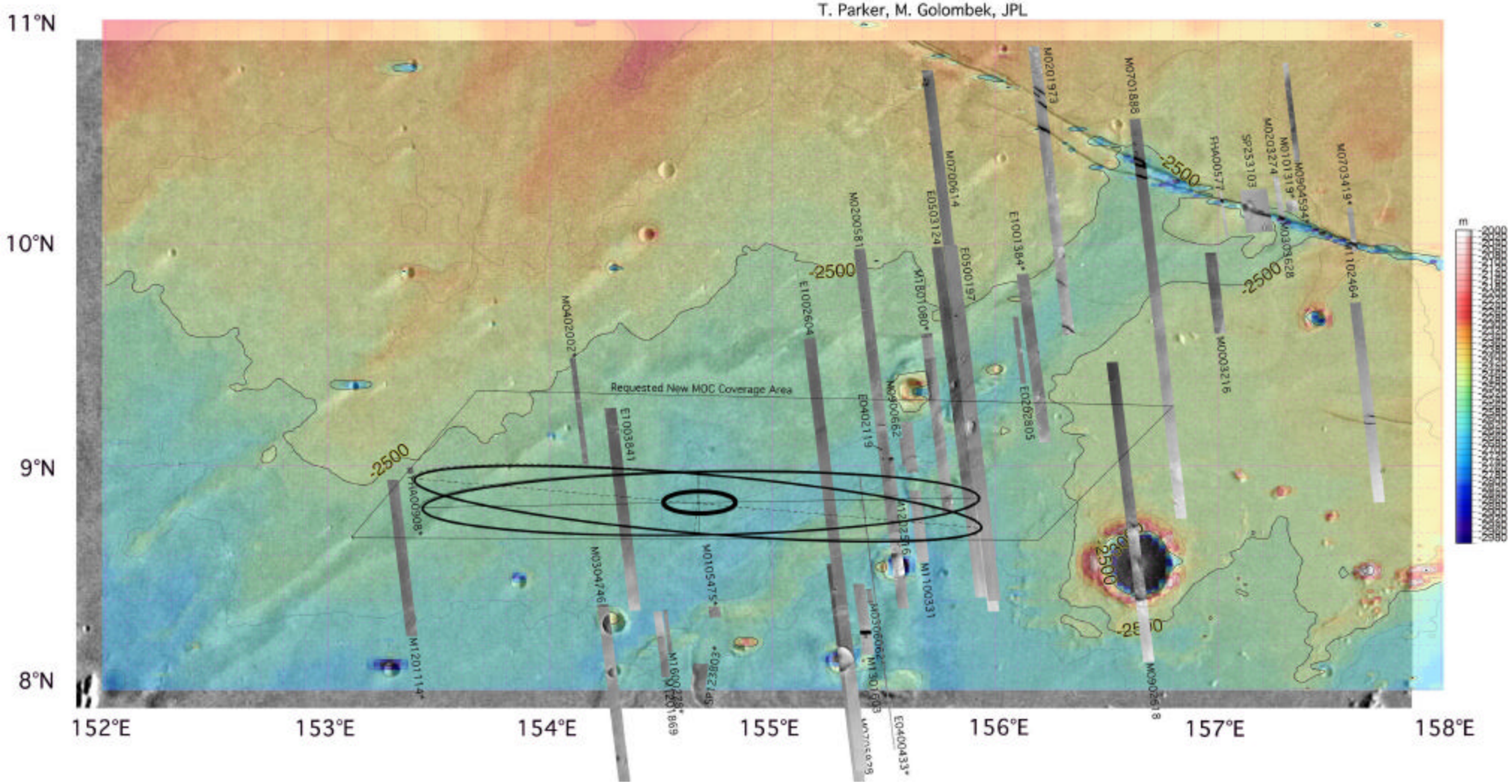

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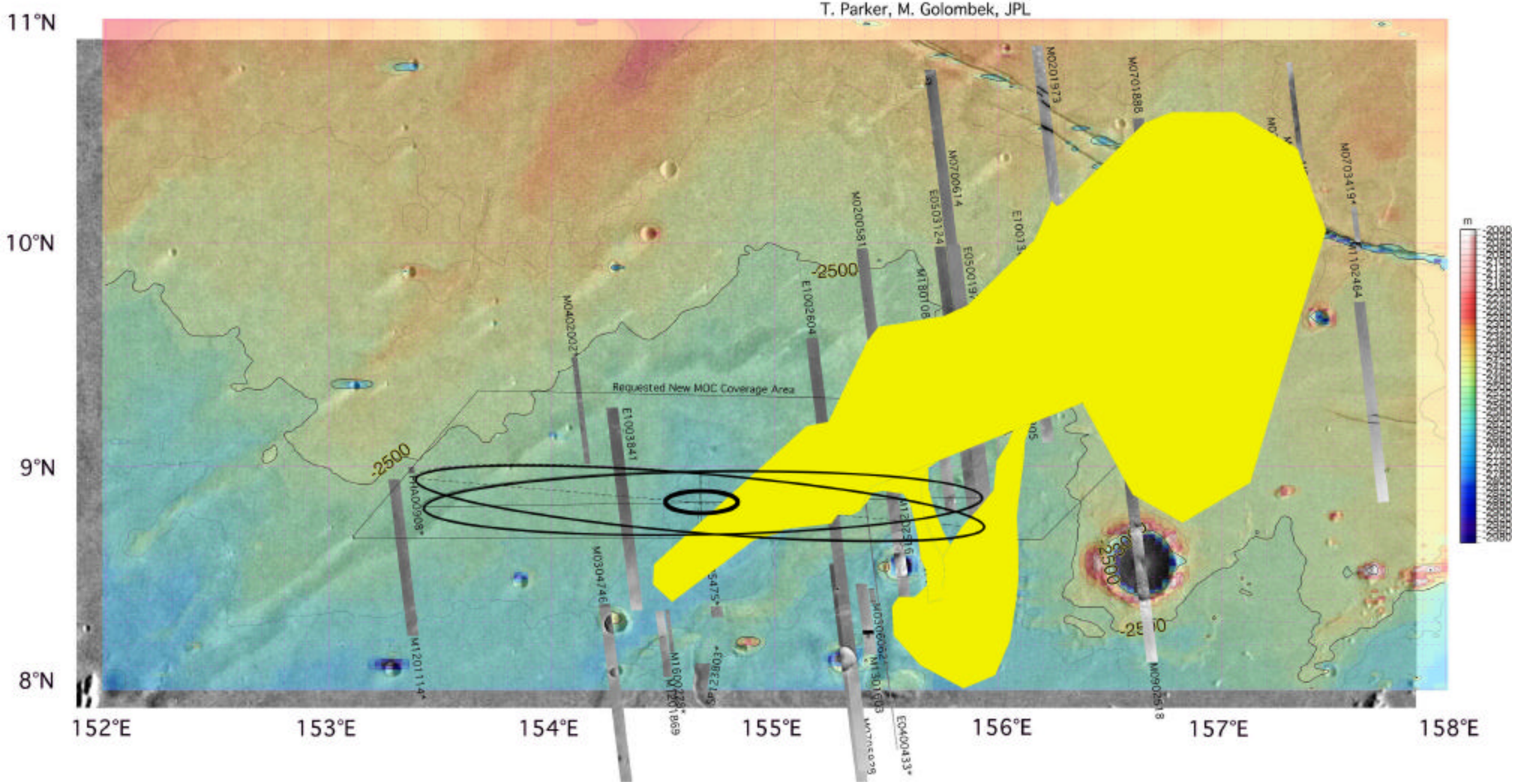

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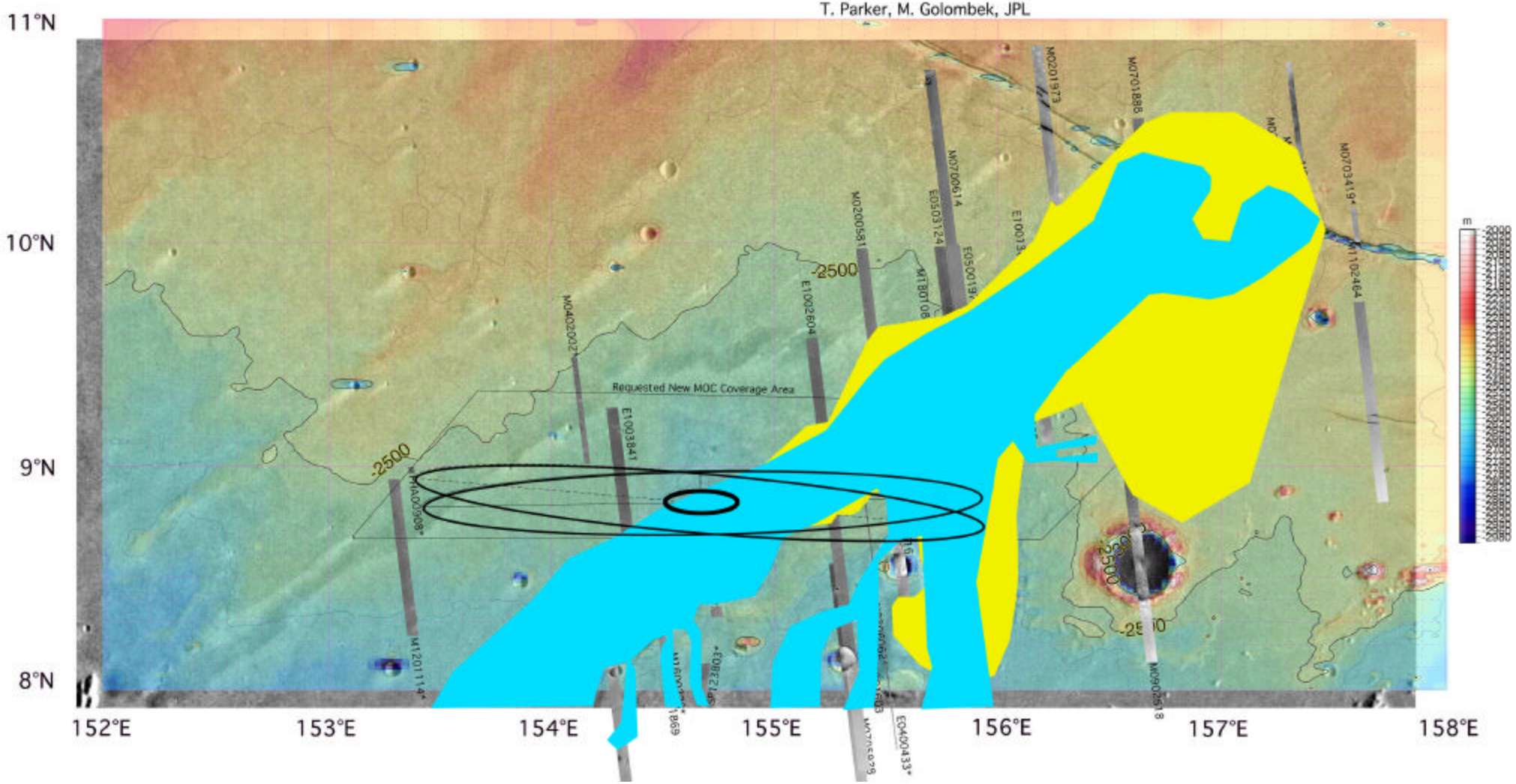

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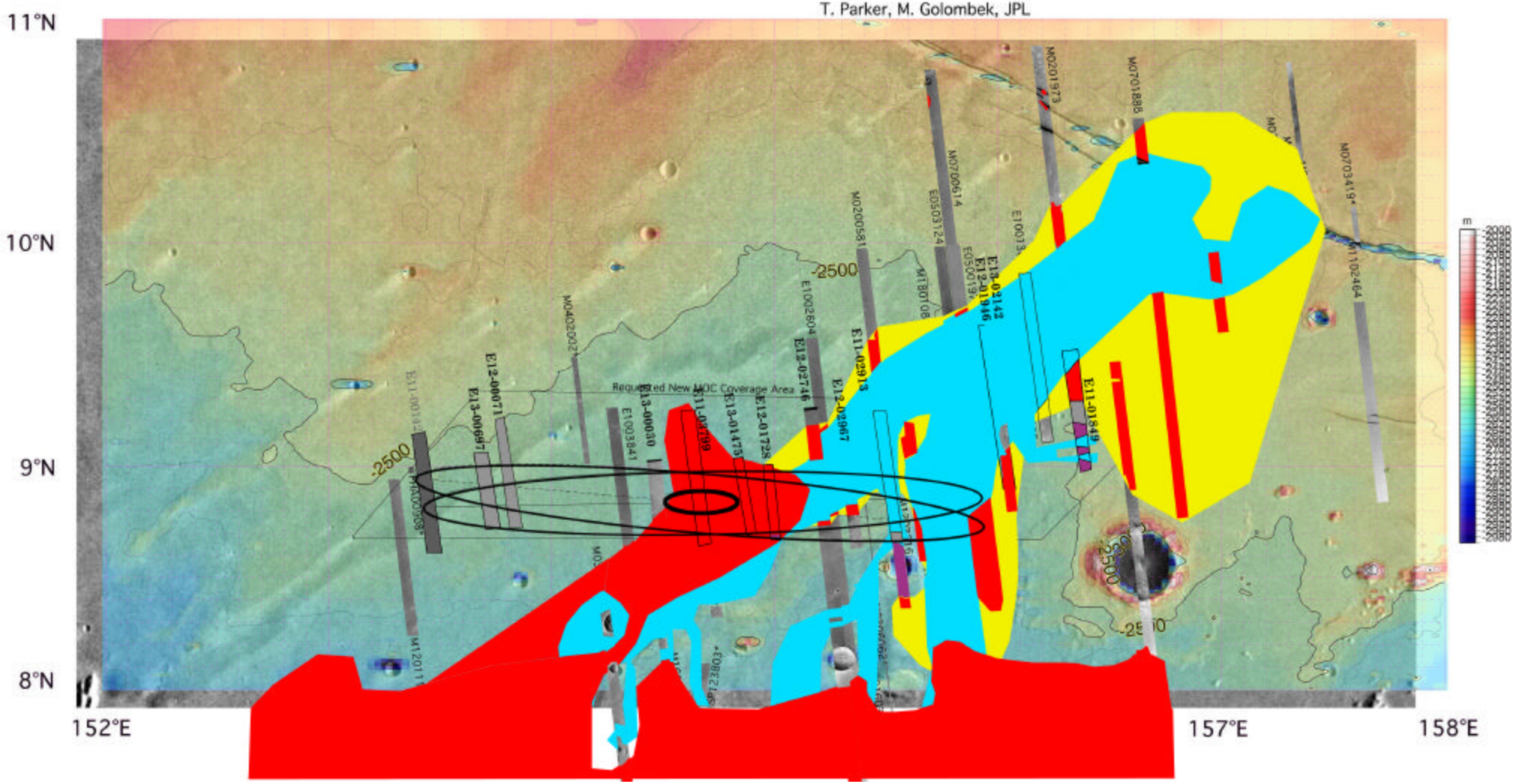

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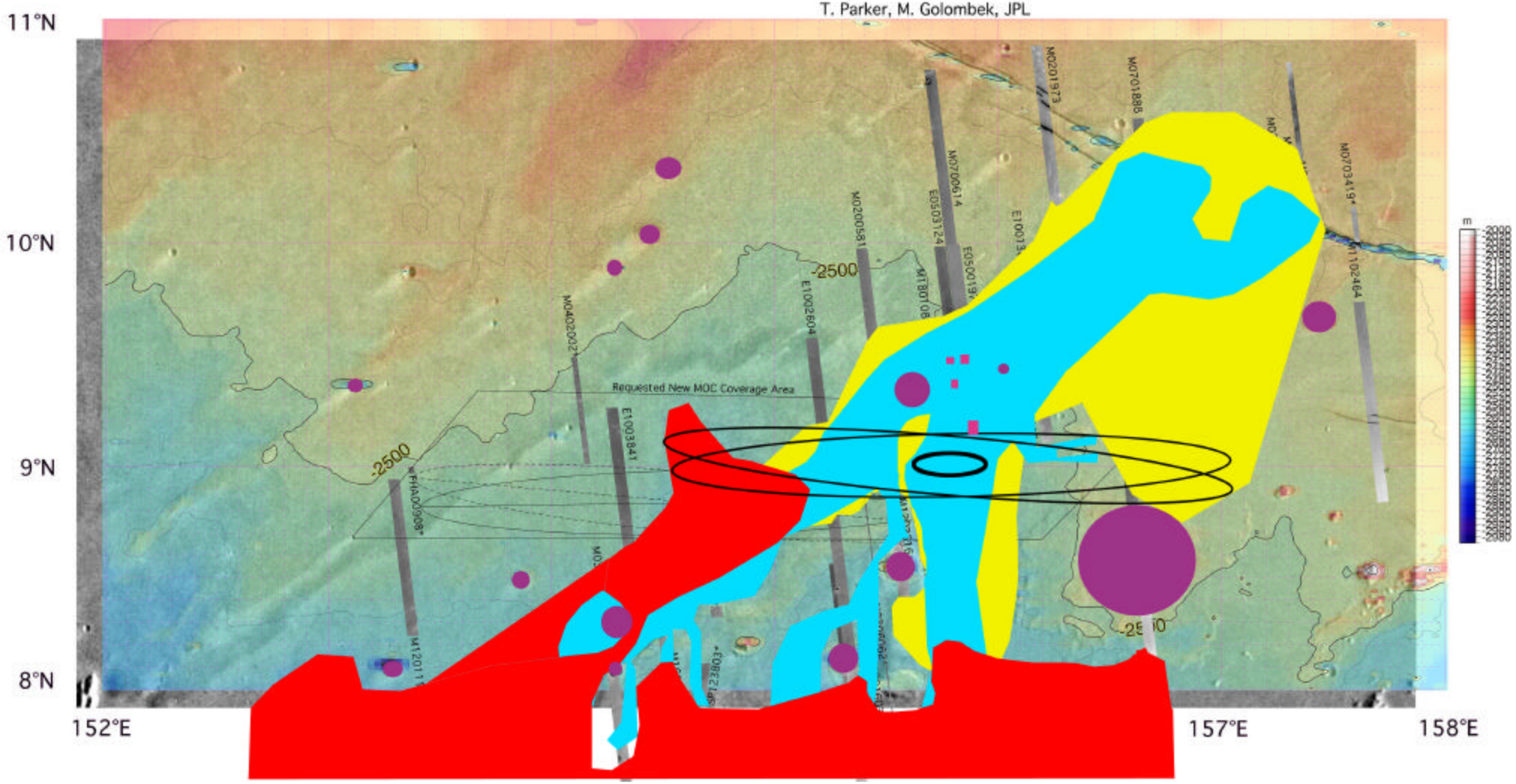
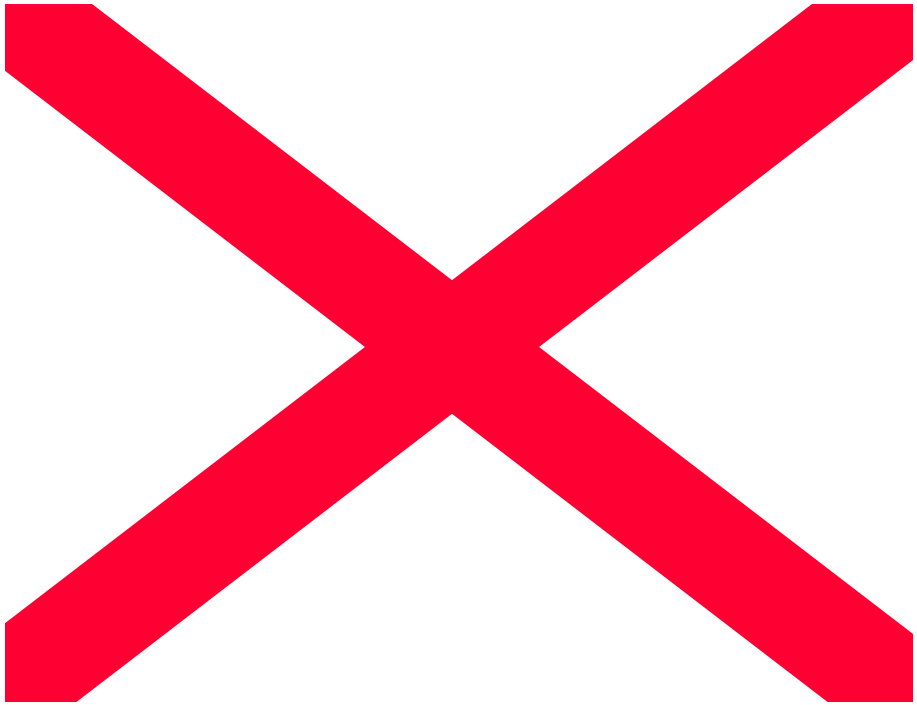


CONCLUSIONS

- Lava a hazard only for Athabasca.
- Current landing ellipse is very dangerous.
- Can reduce danger, but cannot eliminate it.
- Is the science worth the risk?



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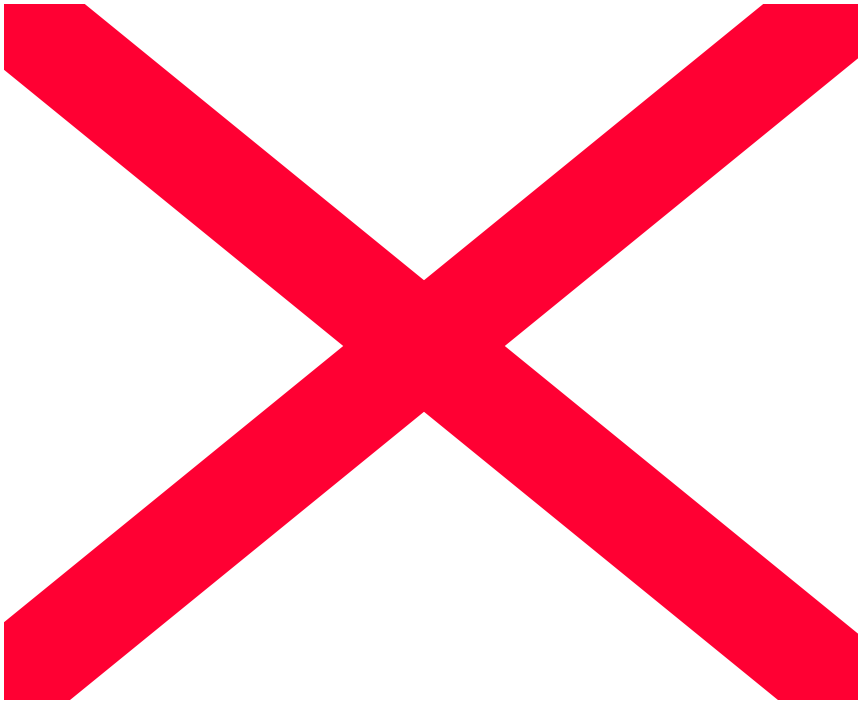

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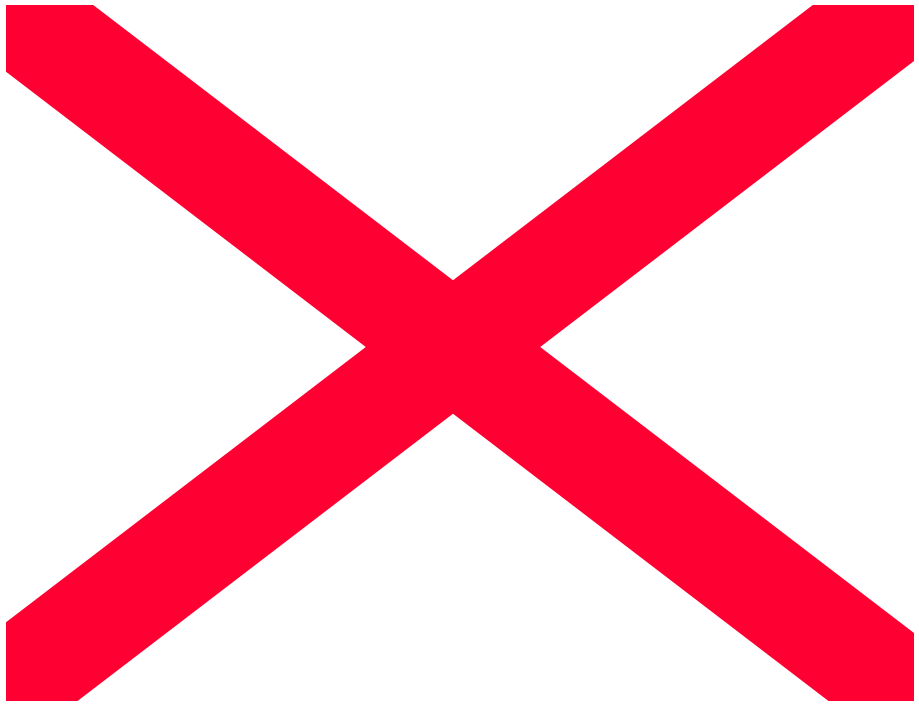

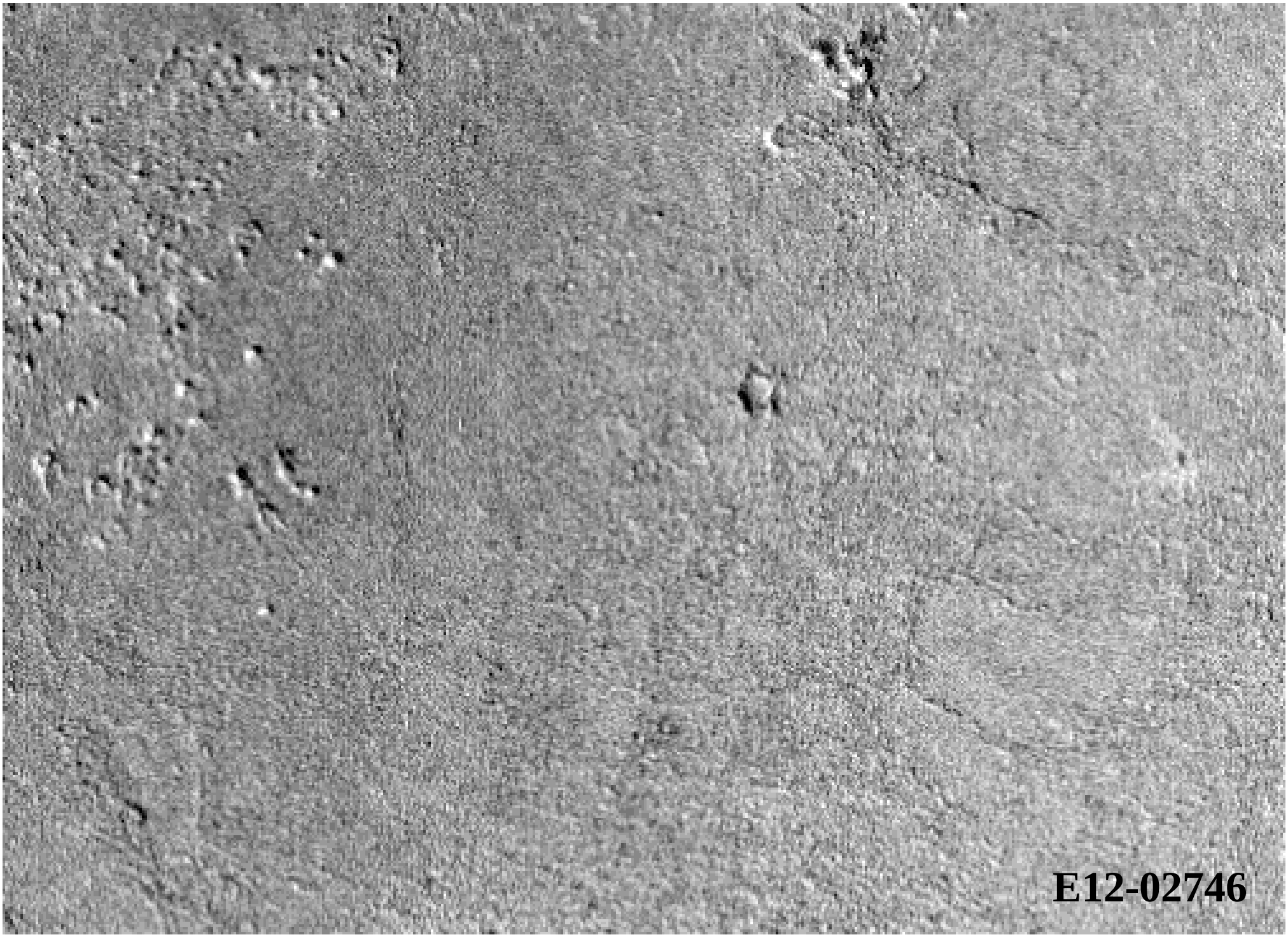
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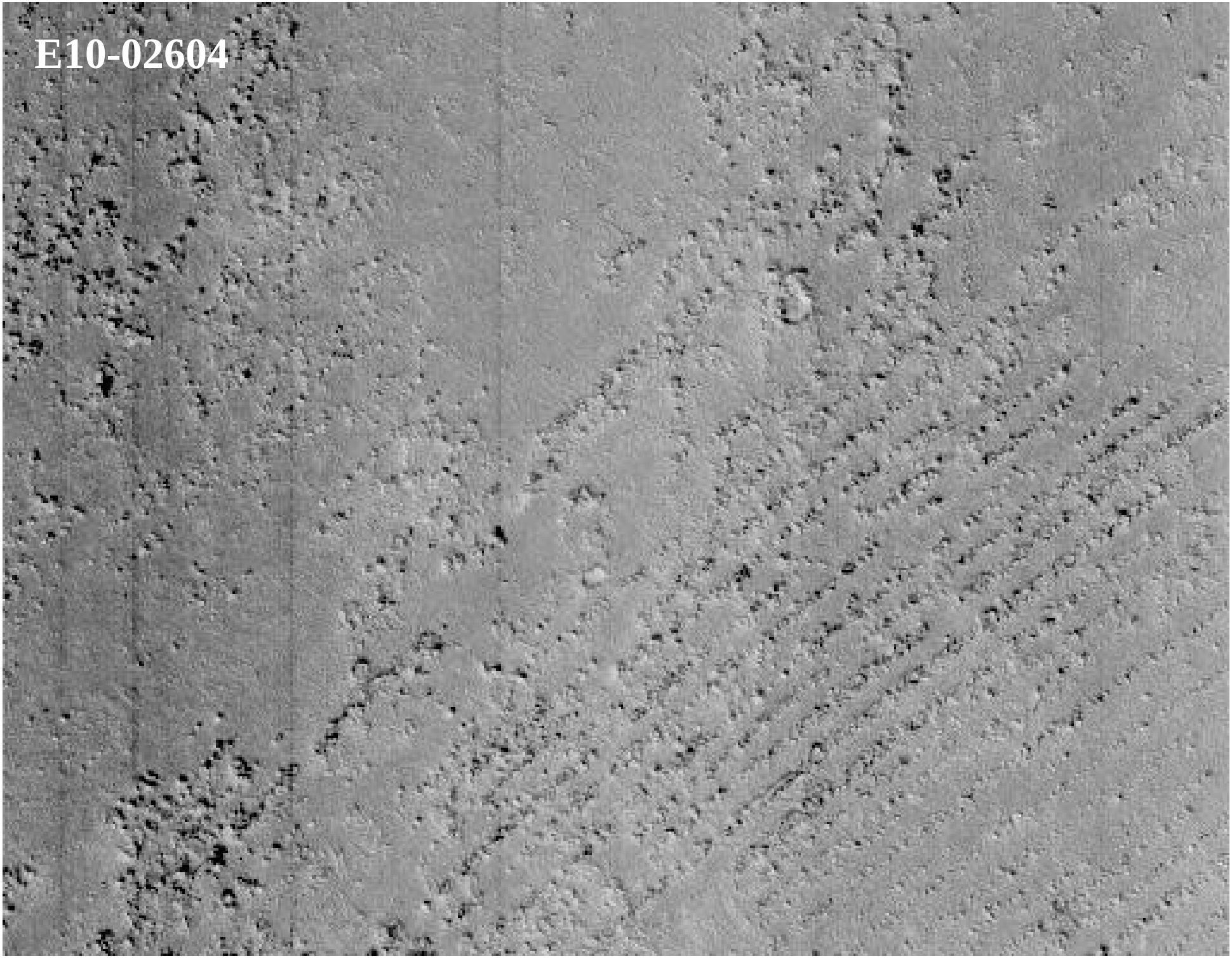
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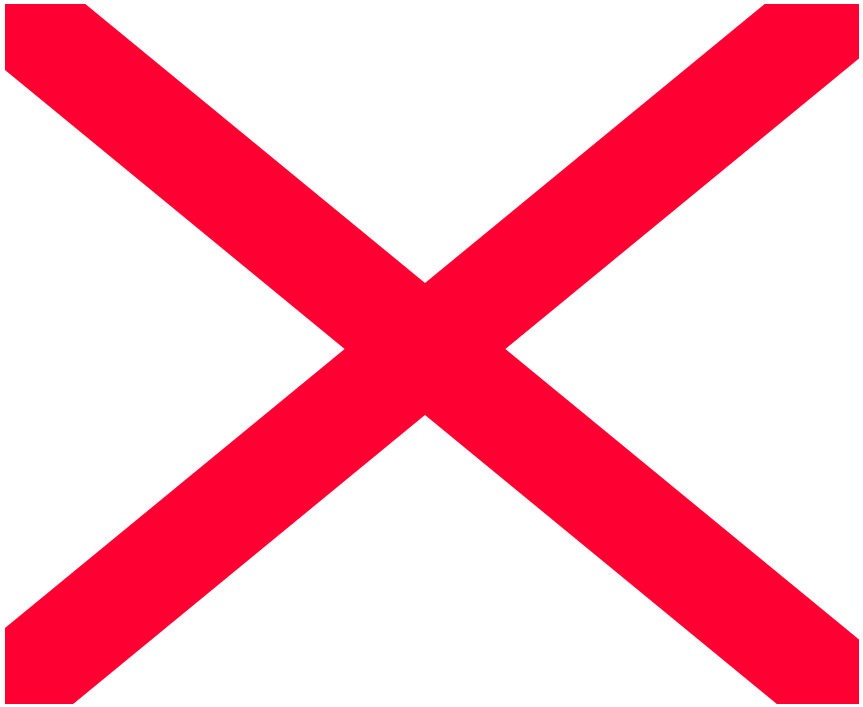

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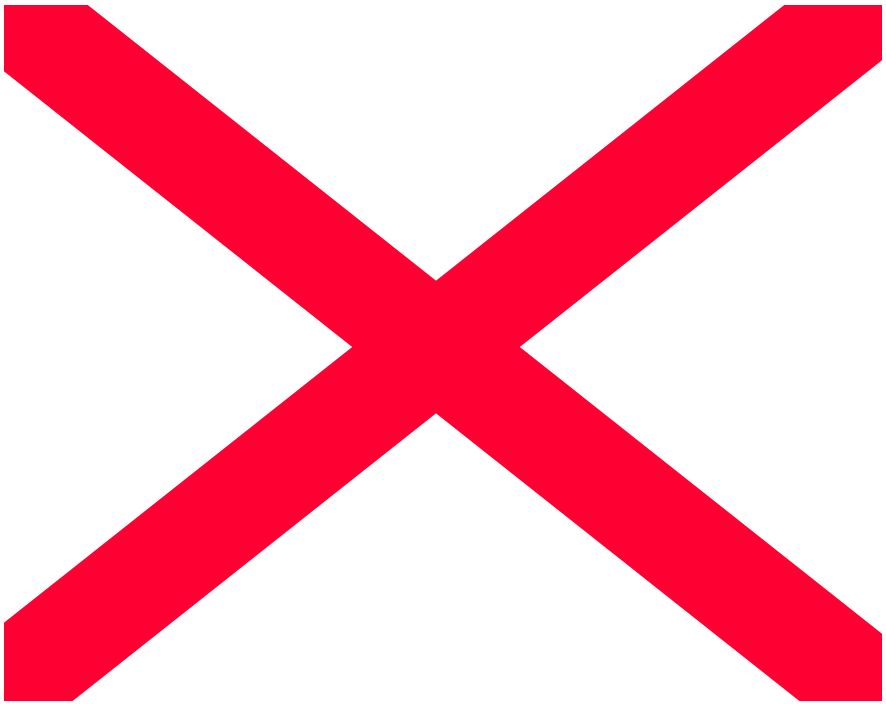

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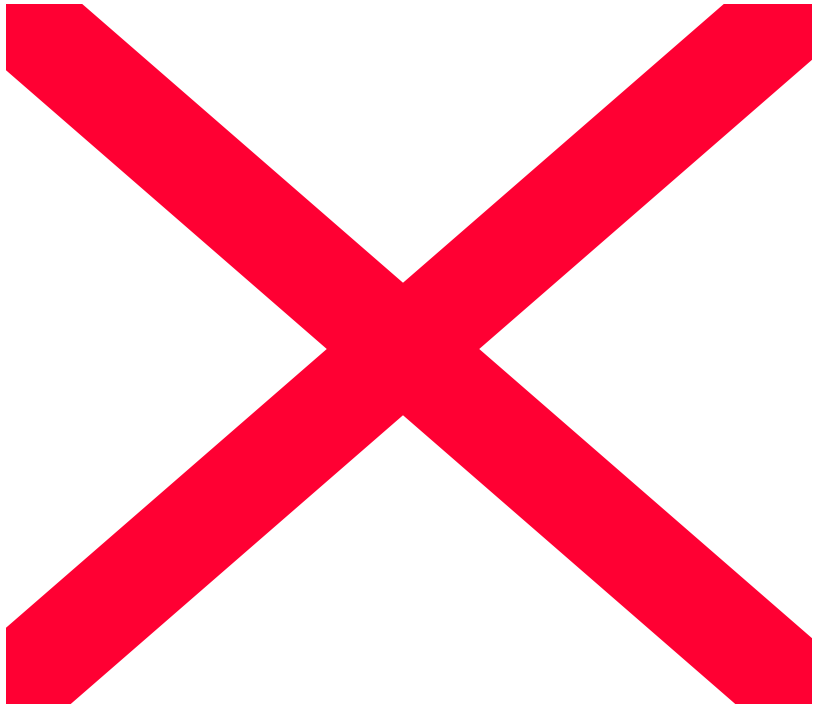

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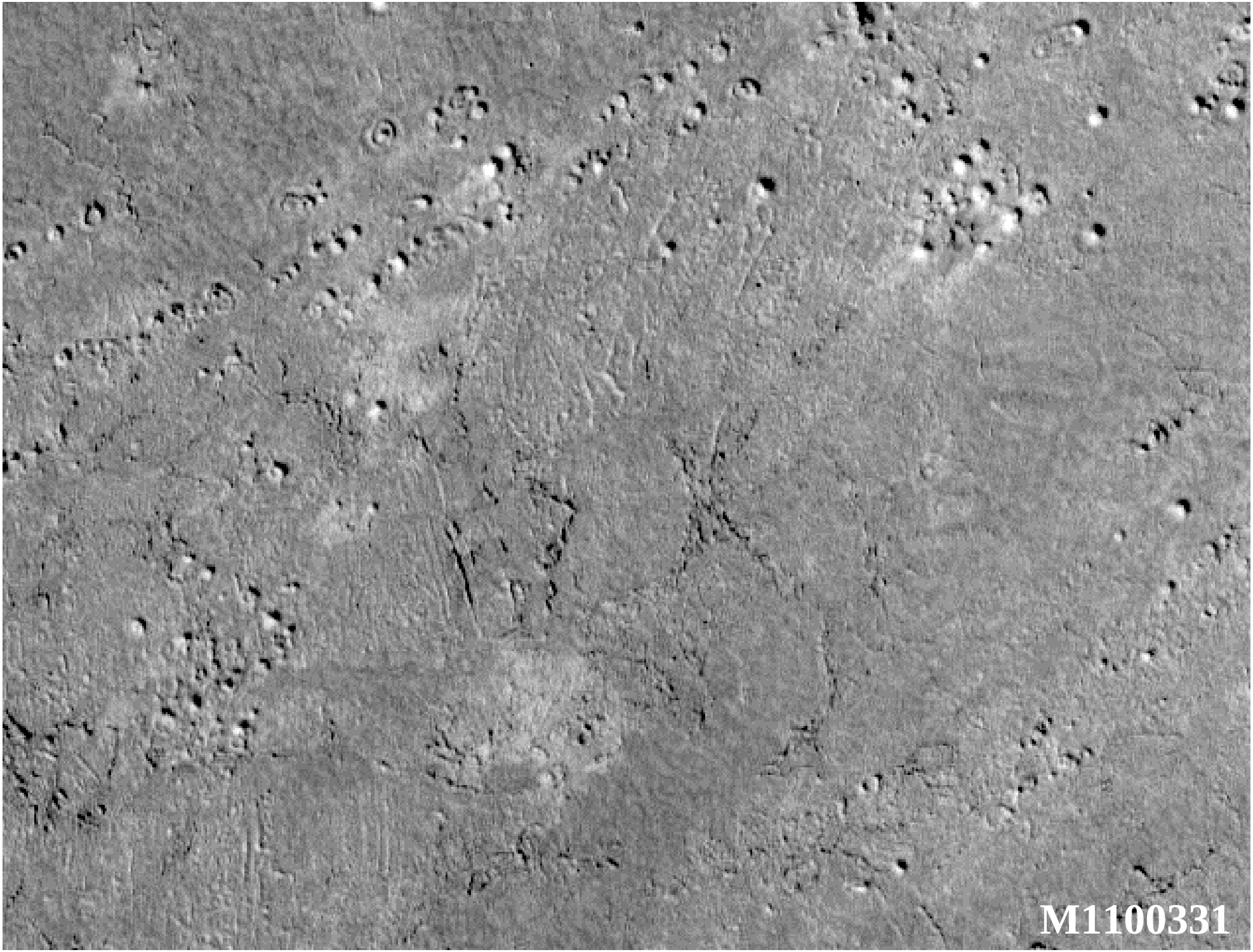
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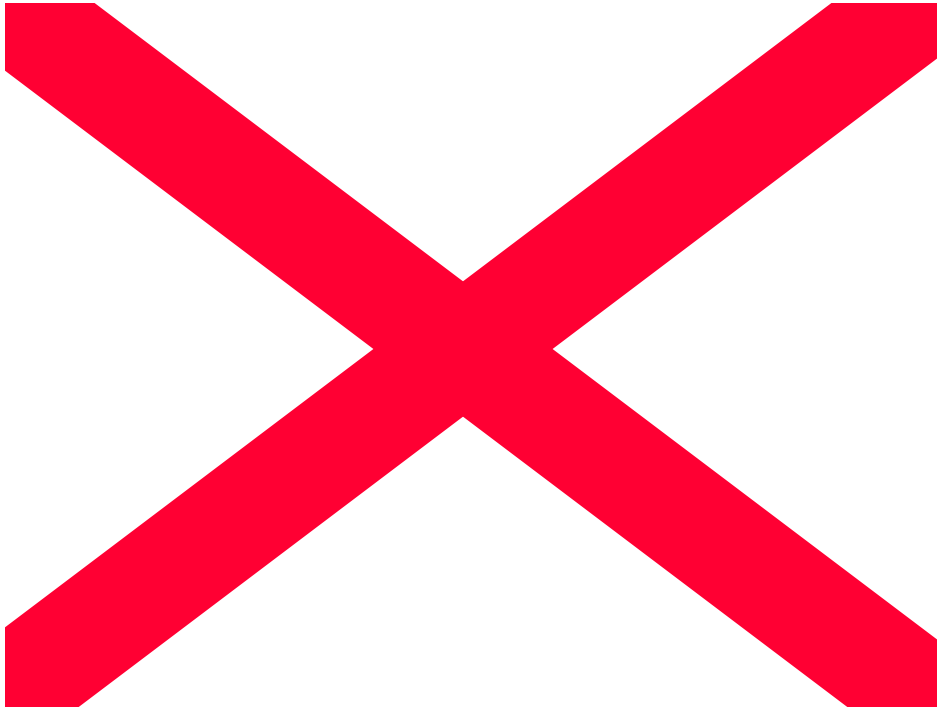

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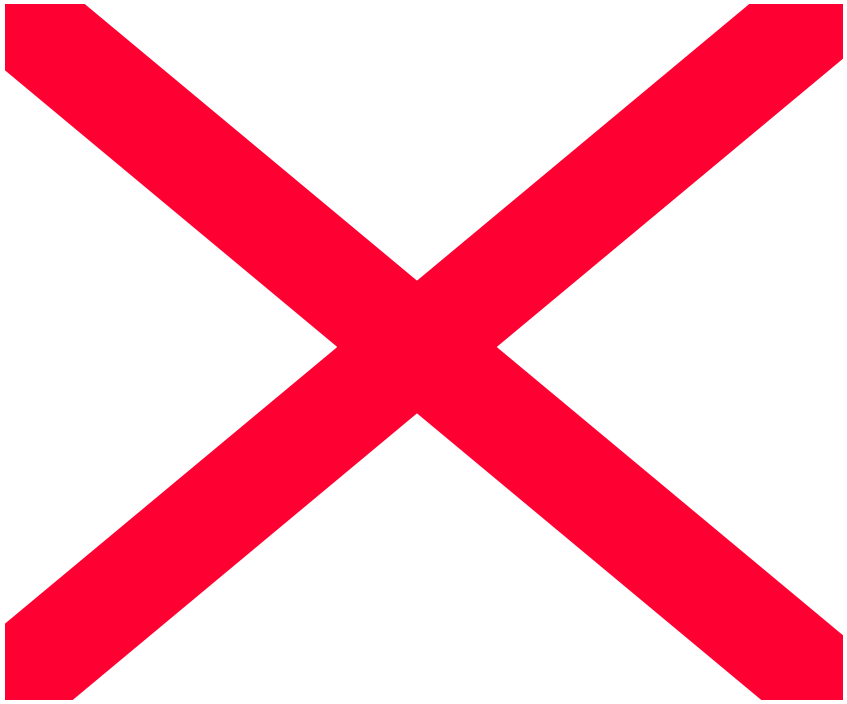

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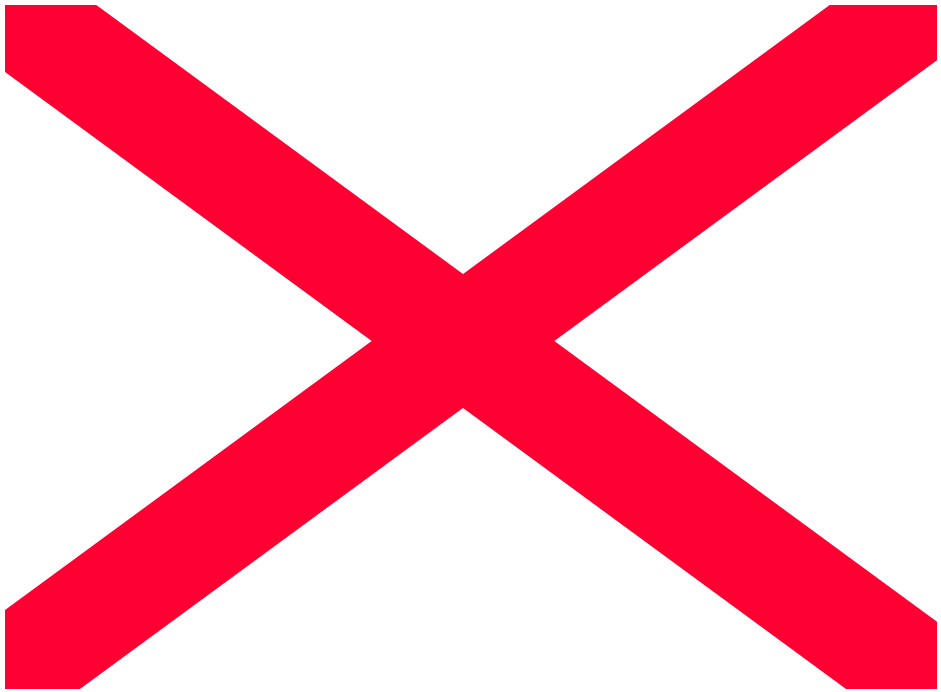

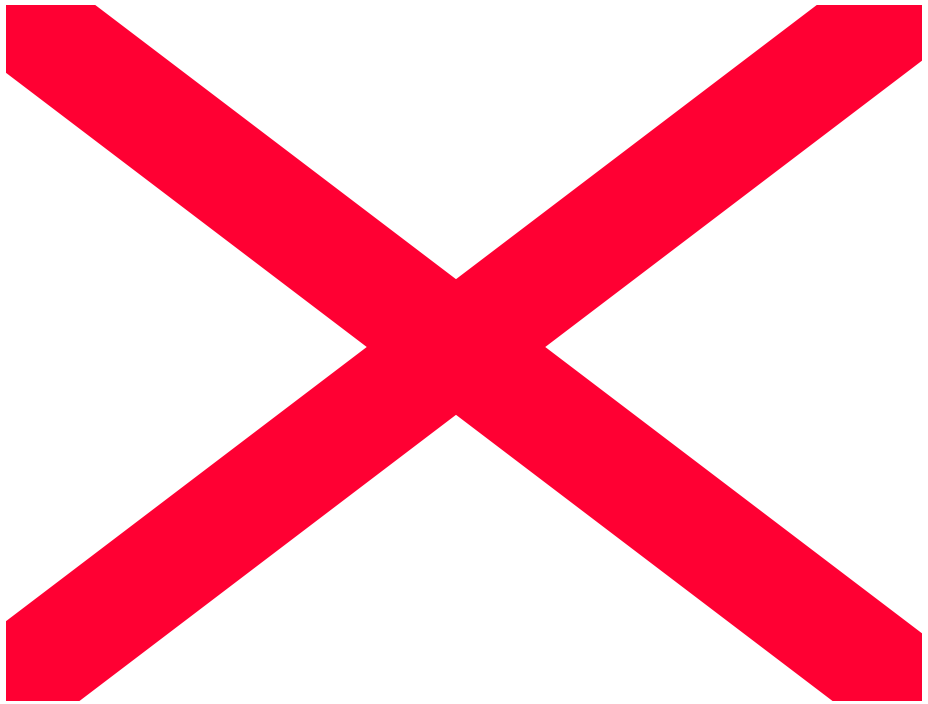

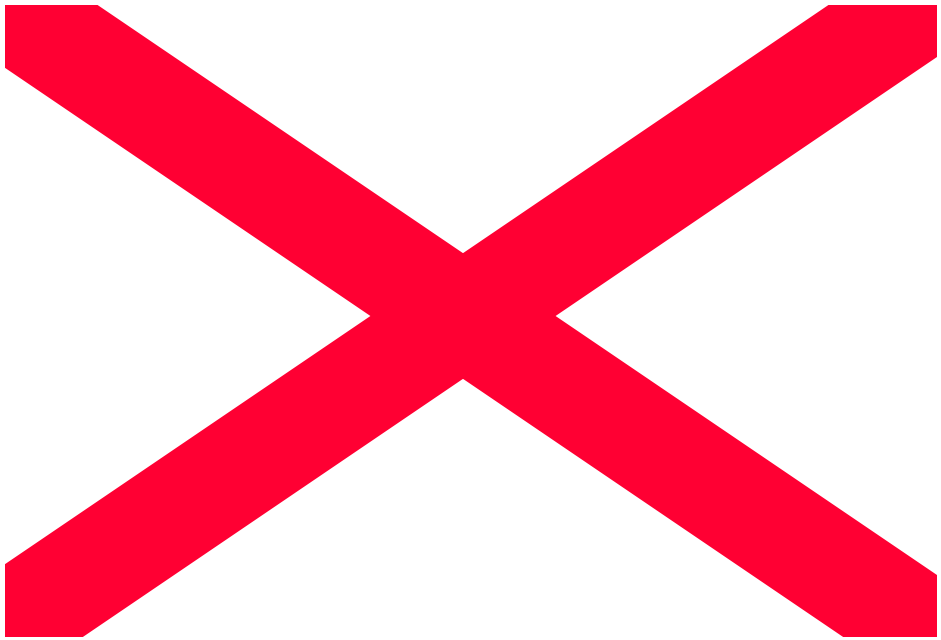

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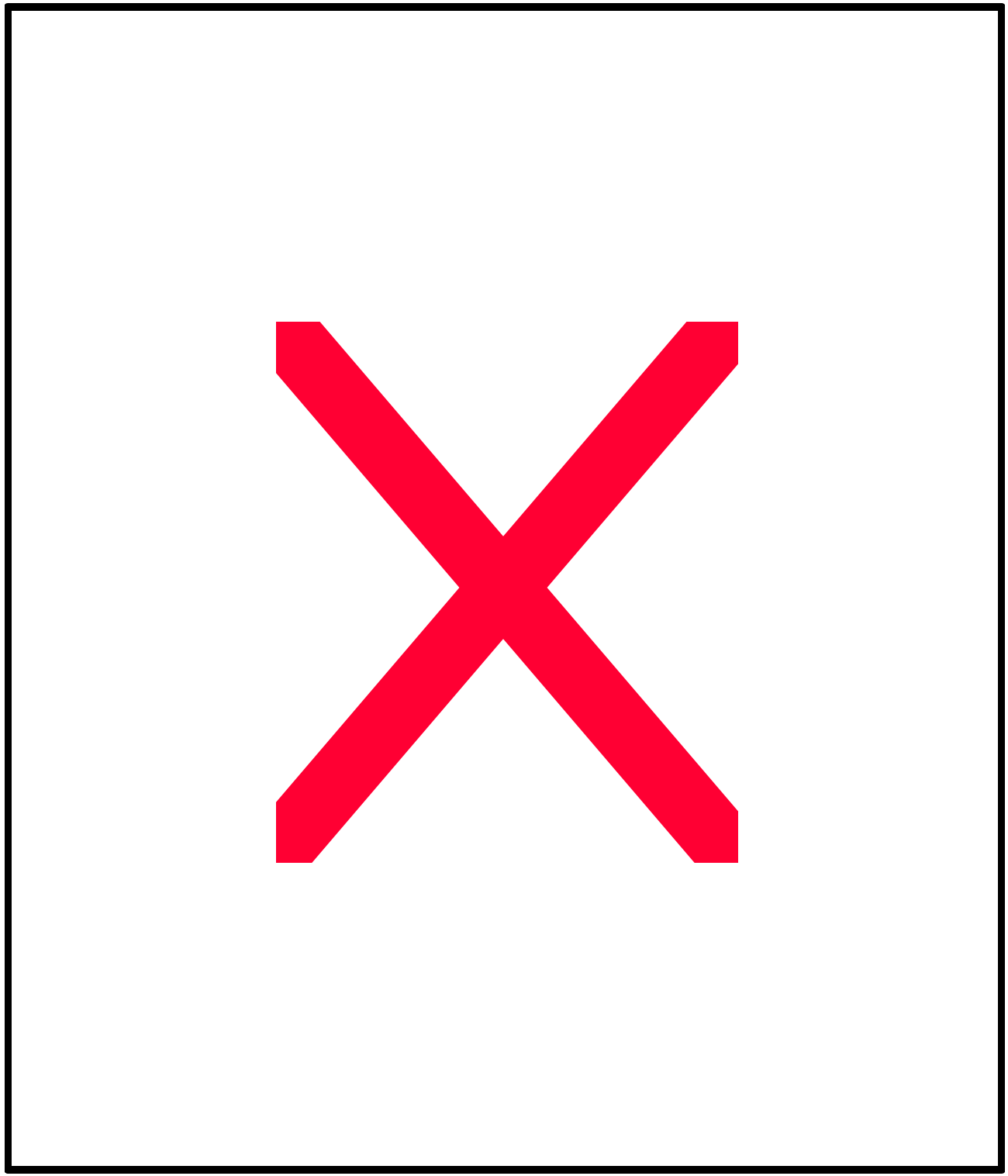

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