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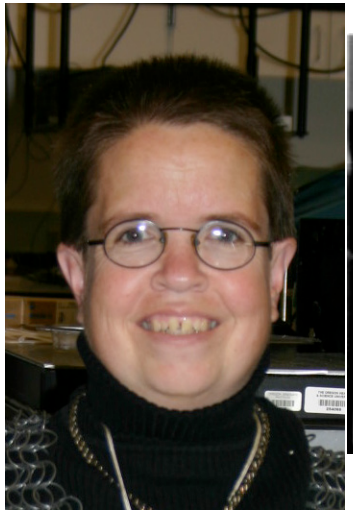

Abrasive Effects of Lunar Dust, JSC Simulants, and Sandpapers on Skin and Acrylic Samples, Measured by Electrical Resistance and Confocal Microscopy

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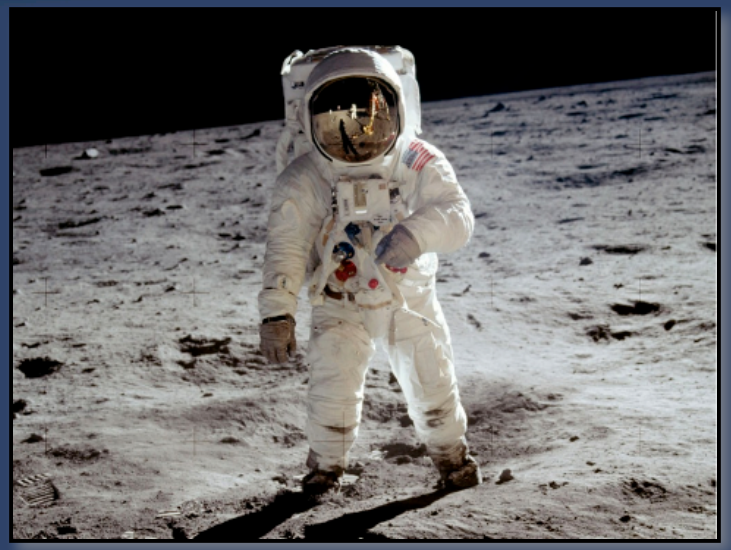
Presented by Laurel Jones, 7/22/09

The Lunar Dust Skin Abrasion Problem

Consider:



- Potential risks of lunar dust entry into the spacesuit is skin abrasion
  - --Loss of skin barrier function
  - --Fluid loss?
  - --Risk of infection?

- EVA suit wear can cause damage to the skin--abrasion, erythema, contusions--at anatomic prominences, at stitching and fabric folds.
  - --Can lunar dust make this problem worse?

- How much dust entry into the EVA suit is too much?

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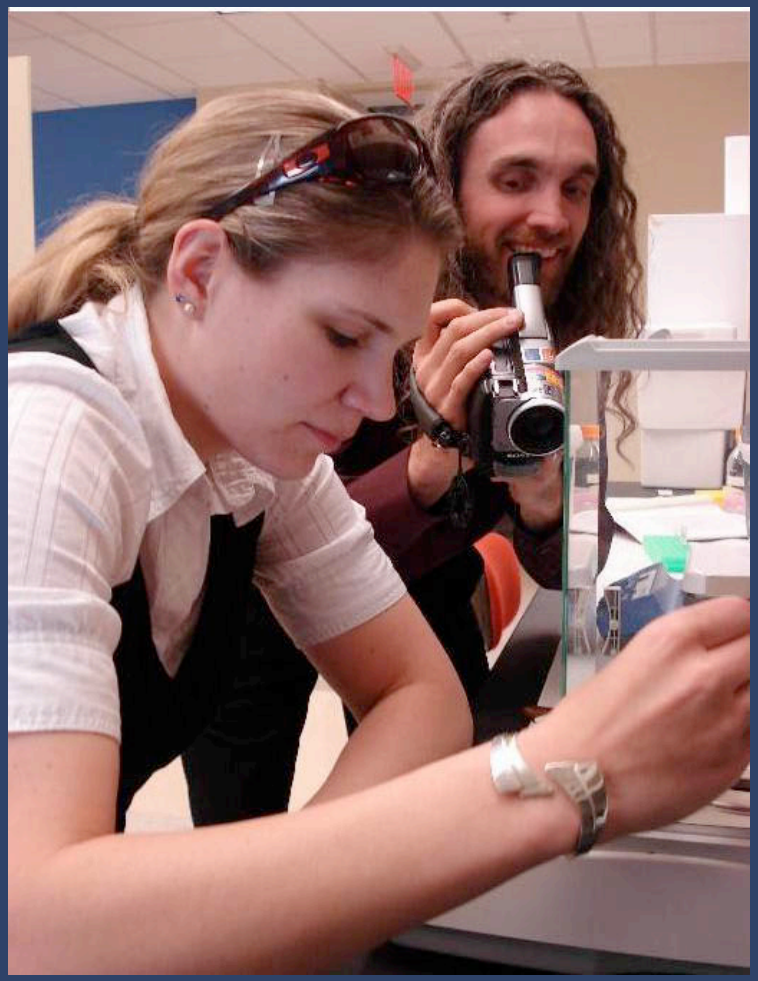
JSC1a & Lunar Regolith Effects on Pigskin

- Lunar regolith measured by mass
- Applied to a damp cotton denim patch



Measuring Regolith

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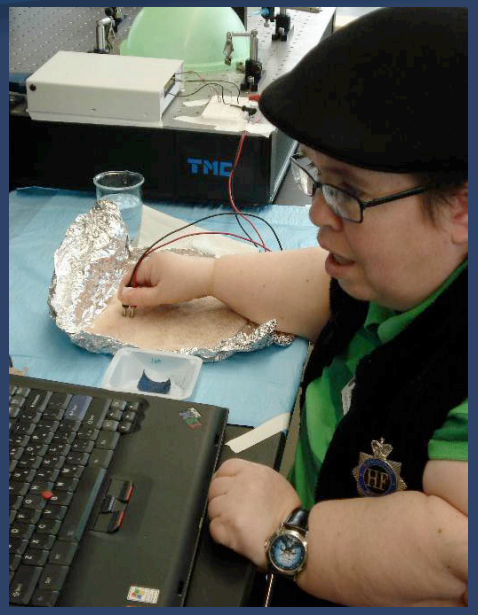
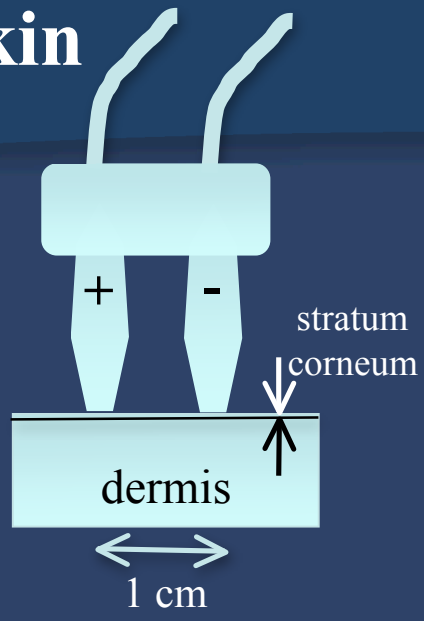
JSC1a & Lunar Regolith Effects on Pigskin

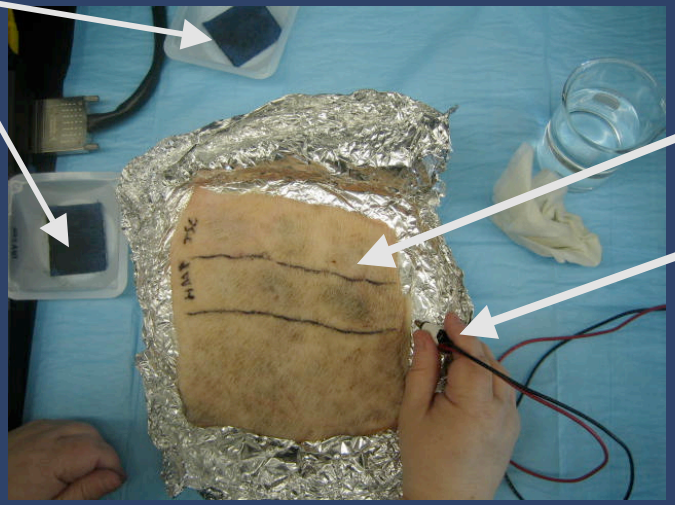
- Stratum corneum abraded stroke-by-stroke using 2-finger pressure
- Electrical resistance measurement determined the amount removed

Taking Electrical Measurement





Cloth Abrasion Patches



Pigskin w/dust

Electrode probe

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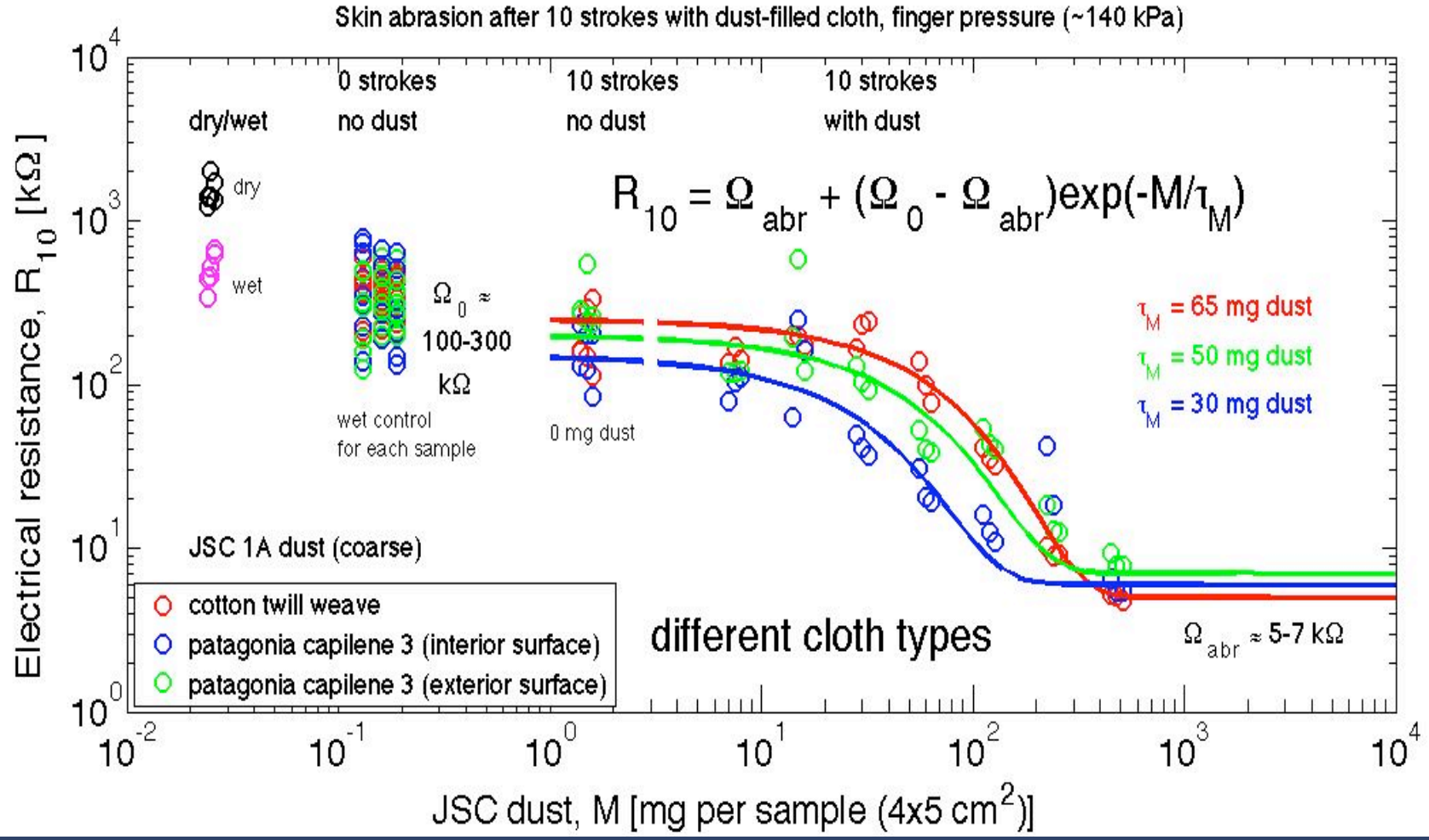
JSC1a Effects on Pigskin



- More JSC1a data comparing cloth types

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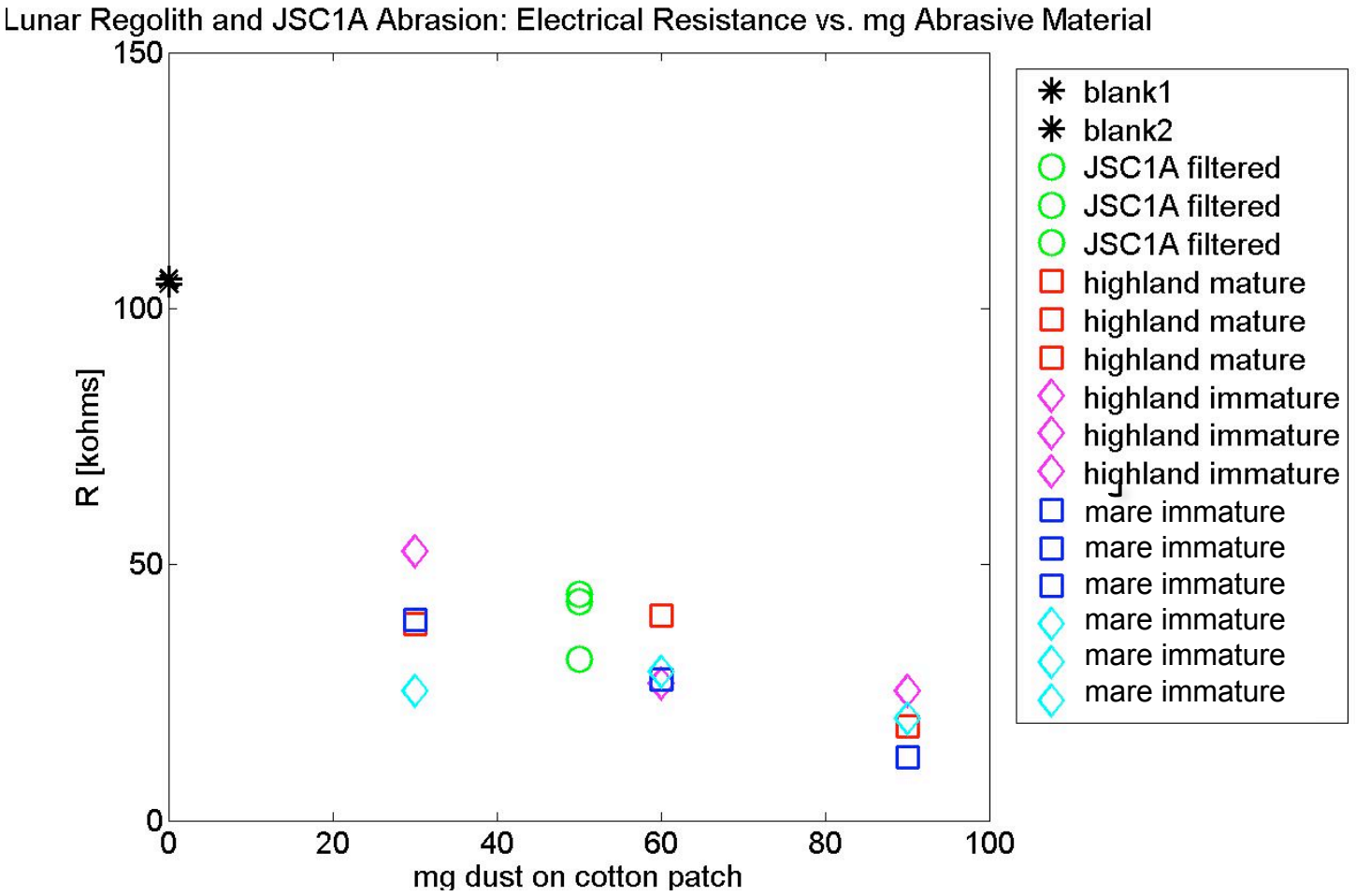
JSC1a & Lunar Regolith on Pigskin



We analyzed the results immediately

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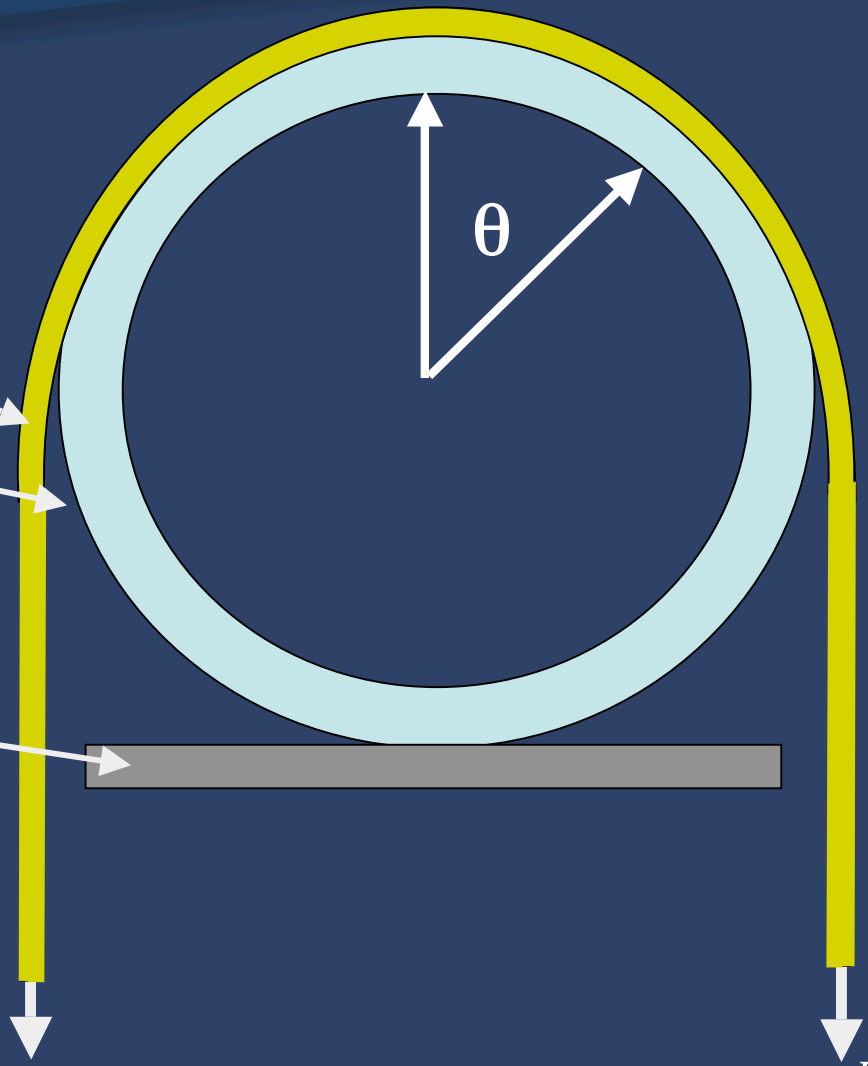
Acrylic Samples-Calibration of Abrasion Depth with Confocal Microscope

Abrasion Belt (220 grit sandpaper strip)

Acrylic Plastic Cylinder (end-on view)

Tabletop with cylinder base affixed by industrial-strength double-stick foam

We also abraded flat acrylic samples with JSC1a mounted on card stock to simulate sandpapers



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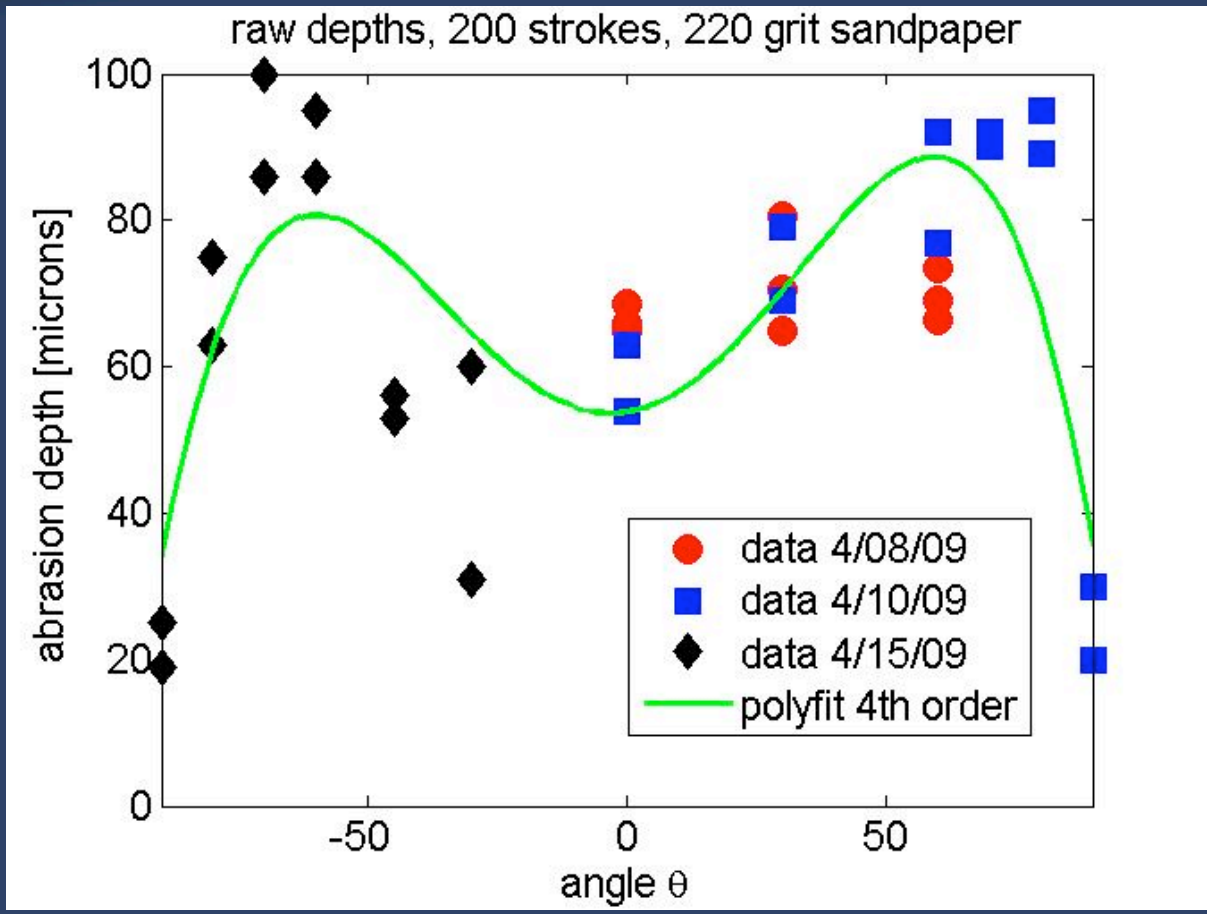
Distribution of Abrasion Depths Over Cylinder

Abrasion depth measured by axial scan by confocal microscope.



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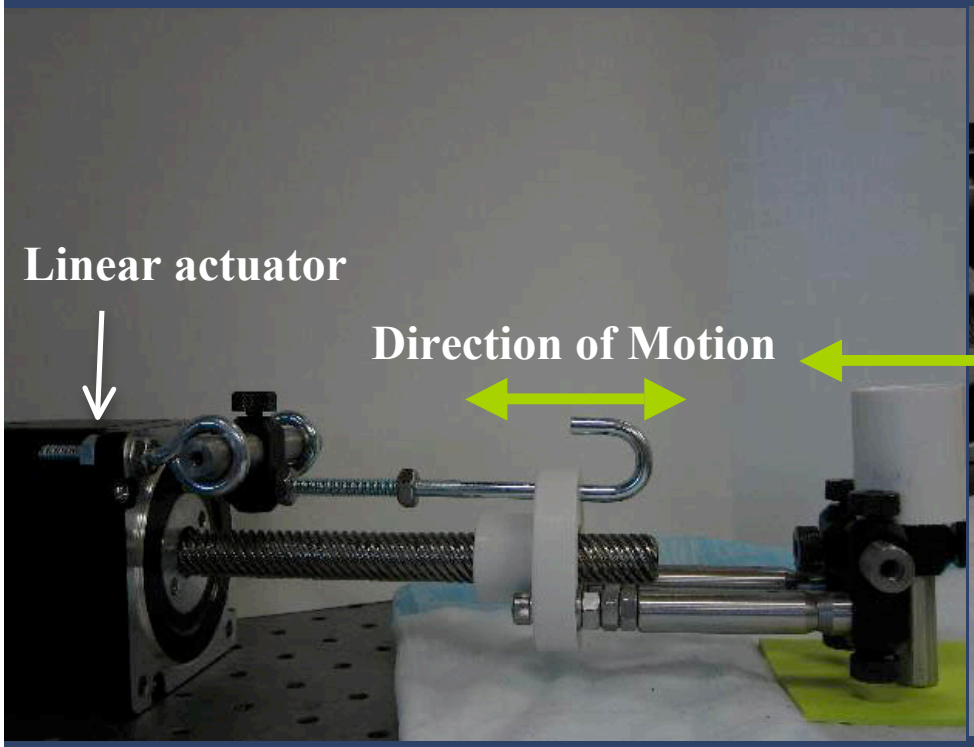
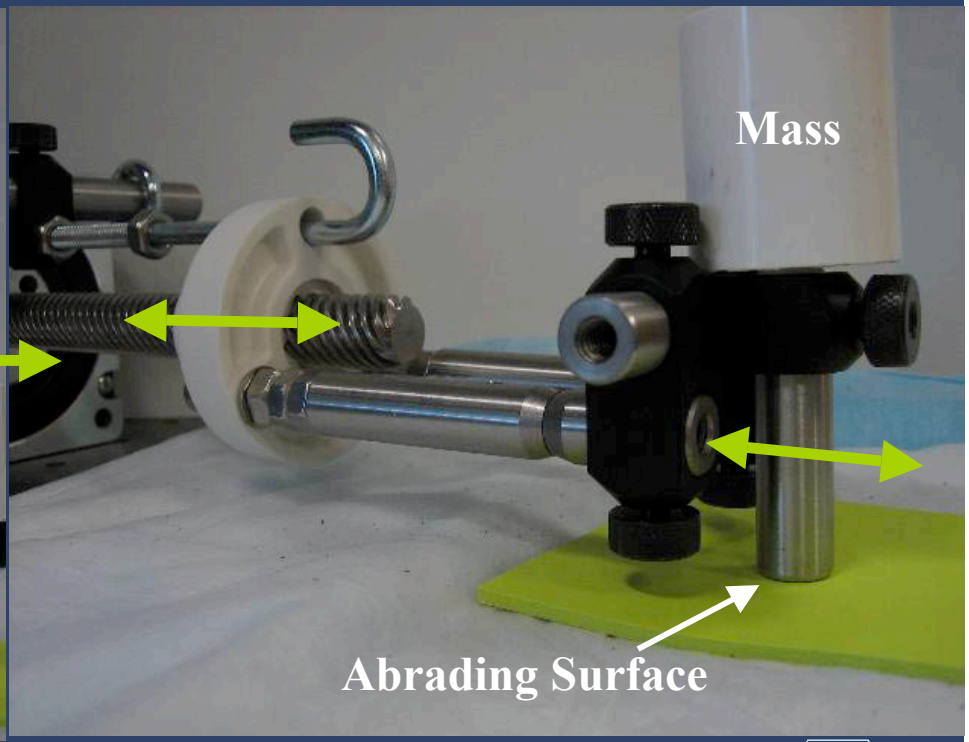
We Decided to Build an Abrasion Machine





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Conclusions

- Lunar Regolith Abrades Skin
- The behavior of the Lunar Regolith is comparable to JSC1a Regolith Simulant on pigskin.
- The behavior of the JSC1a is comparable to 220 grit Silicon Carbide sandpaper on acrylic plastic.

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Kevin

Ravikant

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