Determining long term erosion rates in Panama
An application of $^{10}\text{Be}$

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Introduction and Background

- Erosion effects on water resources
- Human influences on sediment generation

Photo credits: K. Nichols
Introduction and Background

- Cosmogenic isotopes
  - Near-surface residence time
  - Provide long-term data

Diagram:
- Cosmic rays
- Quartz (SiO₂)
- \(^{26}\)Al, \(^{3}\)He, \(^{21}\)Ne
- \(^{3}\)He, \(^{10}\)Be, \(^{14}\)C
Introduction and Background

- Avoid sediment increase in Panama
- Use of cosmogenic nuclides, as a proxy for erosion, in tropical climates

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Objectives

- Determine long-term background erosion rates in Panama using $^{10}\text{Be}$
- Explore the physiographic controls on erosion in tropical climates
- Quantify the sediment input on rivers as an effect of landslides

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Methods

- Sampling
  - 2002 – Rio Chagres
  - 2004 – comparison to Rio Chagres
  - 2007 – spatial variation of erosion rates


- $^{10}$Be extraction and analysis
  - UVM Cosmolab
  - LLNL Center for Accelerator Mass Spectrometry
  - CRONUS Earth

- Analysis
  - Spatial
  - Statistical
Preliminary Results

- Erosion rates (m/My) vs. Slope (degrees) with $R^2 = 0.0841$
- Erosion rates (m/My) vs. Elevation (m) with $R^2 = 0.051$
- Erosion rates (m/My) vs. Area km$^2$ with $R^2 = 0.014$
Thanks for your attention