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Effects of lithology on bedrock channel occurrence: an examination from the Seogang River in South Korea

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• Introduction

- Bedrock channels mainly occur in transport capacity exceeds bedload sediment supplies.
- The distribution of bedrock channels has not been well studied.
- Lithology affects resistance and relief, and channel morphologies vary depending on lithologies.
- But previous studies didn't well consider the influence of lithology on bedrock channel occurrence.

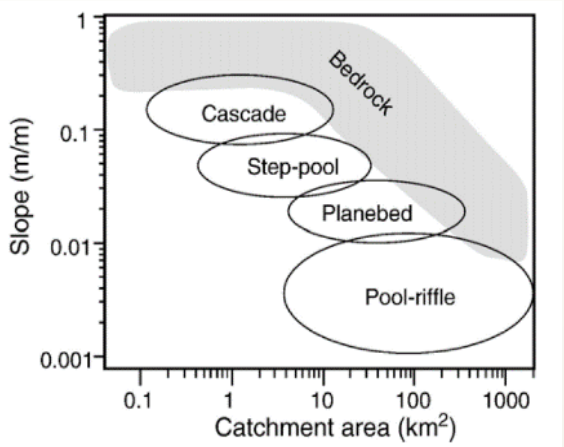

Figure 1. A generic model of channel reach morphology in mountain rivers. (Thompson et al., 2006). Bedrock channels are much steeper than alluvial channels at the same catchment area.

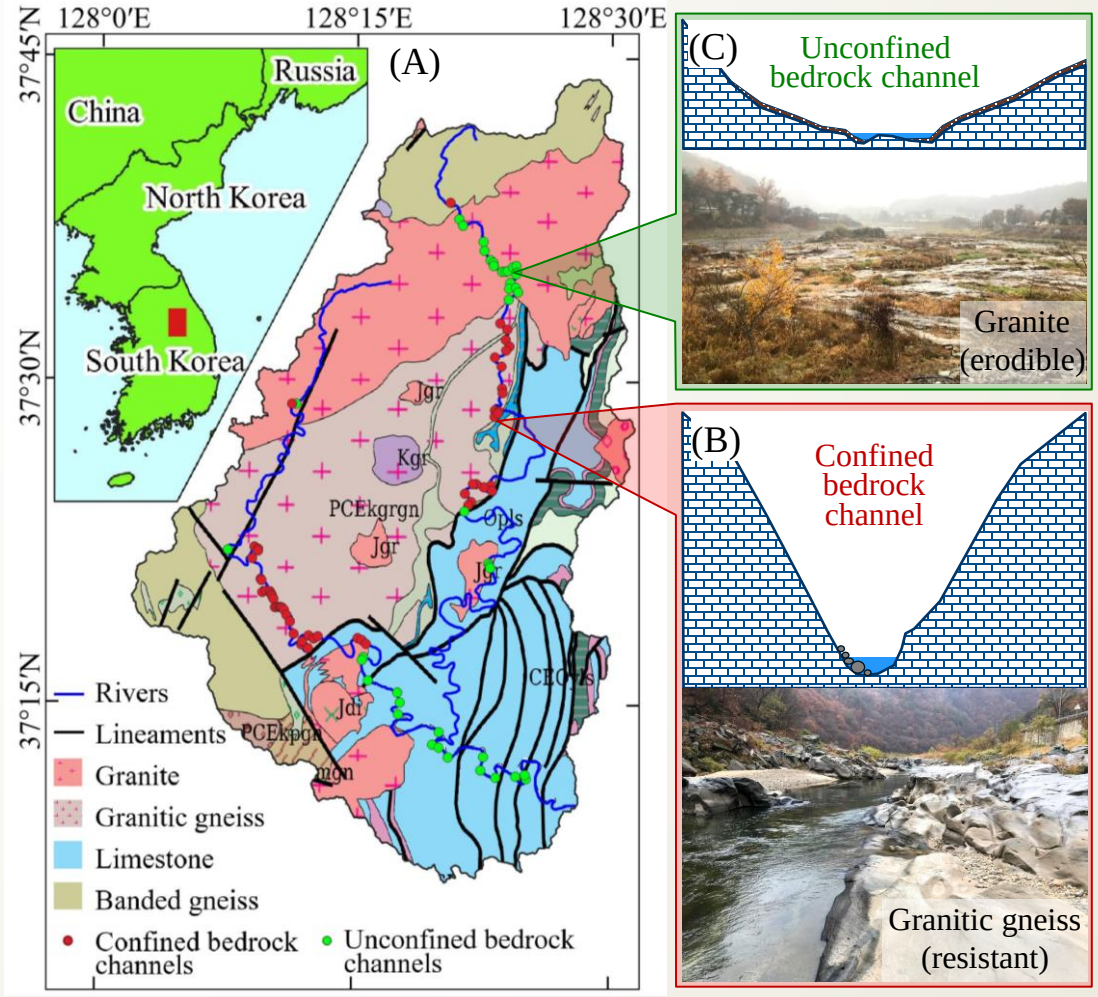

Figure 2. (A) Geological map of Seogang drainage. Banded gneiss, granite, granitic gneiss, and limestone are mainly distributed from north to south. Confined bedrock channels (red dots) mainly occur in granitic gneiss regions. (B) Confined bedrock channels reside within steepened and narrow rock-bound valleys. (C) Unconfined bedrock channels are much wider and gentler and flow along flat and broad valleys.

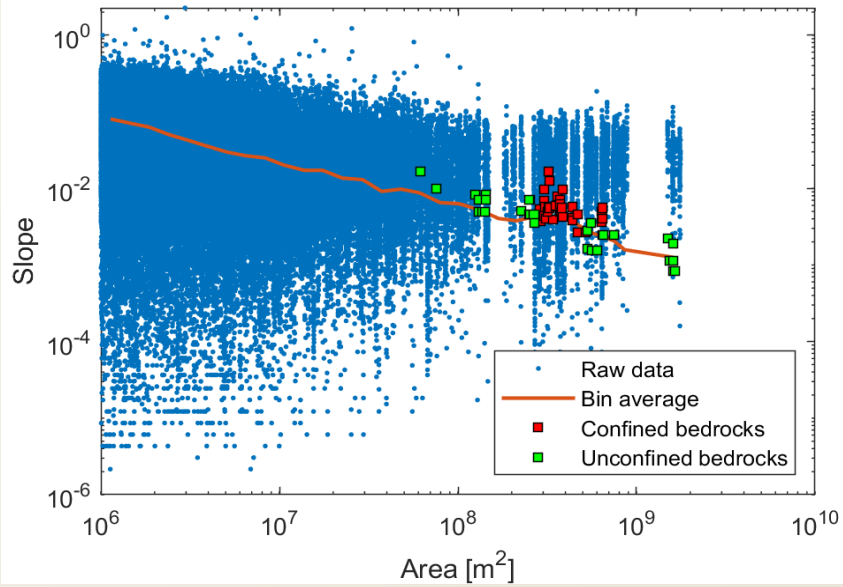

Figure 3. Slope-area scatter plot in the log-log scale. The orange line shows average values for raw slope data (blue dots) in log-bins. Confined bedrock channels (red squares) are steeper than unconfined bedrock channels (green squares) at the same catchment area.

• Conclusion

- Bedrock channels occur in all rock types, but channel types vary depending on lithologies.
- In resistant rock regions, channels are confined by narrow and steepened valleys with high transport capacities, and bedrocks are exposed continuously.
- In erodible rock regions, bedrocks are also exposed, although the transport capacities are not high. Unconfined bedrock channels occur locally and in isolation.

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