We ask: “how can we predict reactivation on the Great Plains?”

1. What is ‘reactivation’?
   - Active dune fields: no vegetation, low economic value, expensive to build, mostly inhabitable.
   - Stable dune fields: high economic value, lower environmental value, habitable.
   - Reactivation is a change from stable to active.

2. Why study reactivation?
   - Climate change will reactivate dune fields - this has large economic, environmental, and societal implications.
   - Reactivation is difficult to predict.

3. Blowouts and reactivation
   - Blowouts are the first phase of reactivation in unidirectional ‘supply-limited’ dune fields (most of the Great Plains).

   **Our blowout model:**

   - Disturbance destroys part of the ‘protective skin’ of the dune field.
   - Sediment is exposed:
     - Situation A: shallow sediment
       - Blowout forms deposition apron
       - Blowout advances - reactivation
     - Situation B: deep sediment
       - Blowout forms deposition apron
       - Blowout is stopped
   - Sediment is not exposed: remains stable

   - Vegetation has two roles:
     1. Resist disturbance (as part of the ‘protective skin’).
     2. Arrest blowout dunes (colonizer species).

4. Quantifying the ‘reactivation potential’
   - Two independent variables can be isolated:
     1. The area of sediment exposed by disturbance (defined by protective skin toughness and disturbance).
     2. The ability for colonizer species to stop blowouts (defined by sediment transport rate, blowout size, and colonizer species deposition tolerance).

   **Example: Bigstick Sand Hills, SK, Canada**
   - **Present**: dominantly stable, isolated blowouts that stabilize.
     - Increase transport
     - Increase disturbance
     - Increase colonizer species vitality
     - Increase aridity
     - Increase toughness of protective skin

5. Experiments
   - We tried to artificially reactivate dunes in the Middle Sand Hills, AB, Canada
     - a) Artificial blowout
       - Results: quickly vegetated from deposition apron.
       - Disturbance insufficiently large?
     - b) Artificial fire
       - Results: only a small part of the protective skin burned.

Photos: D. Bender

Sevier Desert, UT, USA

Bigstick Sand Hills, SK, Canada, 50.182° N, 109.200° W.