Predicting Fire Effects on Future Forest Landscapes

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JFSP Project, "Fighting Fire with Fire in Alaskan Black Spruce Forests"
Successional trajectories modelling

• How might changes in fire severity affect landscape forest composition?

• Simulation experiments:
  – ALFRESCO (Alaska frame-based ecosystem model)
  – 2004 Boundary Fire
  – Estimate future patterns of forest recovery
  – Explore implications for landscape flammability

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2004 Boundary Fire

1. Start with pre-fire vegetation

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2004 Boundary Fire

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2. Add on fire severity (NBR)
3. Include scenarios for low or high surface severity

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2004 Boundary Fire

1. Start with pre-fire vegetation
2. Add on fire severity (NBR)
3. Include scenarios for low or high surface severity
4. Model black spruce recovery trajectories
   – extended deciduous phase under high surface severity

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10 YPF | 30 YPF | 50 YPF | 70 YPF

LSS | MIX | HSS

1 No Veg | 3 BroadLeaf | 5 White Spruce
2 Shrub | 4 Black Spruce
2004 Boundary Fire

1. Start with pre-fire vegetation
2. Add on fire severity (NBR)
3. Include scenarios for low or high surface severity
4. Model black spruce recovery trajectories
   - Impacts on future landscape flammability

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Scenario 1: High surface fire severity

Scenario 2: Low surface fire severity

Scenario 3: 50% High-low surface fire severity

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Summary

- Possible to use real landscape and fire data to project future forest composition
- Including variations in surface fire severity
  - Alters projections of future forest cover
  - Leads to vegetation effects on fire propagation – even in conservative scenarios
- **Bottom Line**: Fire-initiated changes in successional trajectory can have important, long-term effects on landscape flammability