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## P.5.9 - Evidence of coupled wind-fire natural disturbance in Atlantic Maritime forest soils

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Forests in the Atlantic Maritime Ecozone of North America are subject to intense, periodic windstorms that entail mass tree uprooting and arboturbation of soil. The time for soil formation is limited by the frequency of extreme windstorms, varying from several decades to centuries during the Holocene. In addition, the fires that commonly follow these windthrow events consume both above-ground and below-ground biomass, particularly support roots holding uprooted soil clods. Immense quantities of charcoal are produced during such coupled wind-fire disturbances, much of it sequestered after burial under redeposited soil mass. Moreover, mineral soils exposed in uprooted clods can transform with intense heat creating diagnostic reddened morphons.

Diagnostic features of soil profiles indicative of coupled wind-fire disturbances include: 1) cauldron-like structures with inverted stratigraphy resulting from the redeposition of soil mass, 2) stacked soil profiles with several buried A horizons, 3) lenses and clusters of charcoal in B horizons, 4) morphons of reddened soil mass in B horizons, and 5) charcoalified rootwood in the reddened morphons.

This study uses assessment of soil profile morphology and AMS-radiocarbon dating of buried charcoal to evaluate the frequency of intense wind-fire disturbances in Nova Scotia forests. Our preliminary results show that windthrow affected the soil cover of most upland sites every 300 years in the last 3000 years; the time of stable soil development not exceeding 3ka in the Holocene epoch. Fires occurred less regularly than windthrow, with coupled wind-fire events peaking between 4 and 6ka ago and in the last 500 years. Periods of lower windstorm activity appeared to favor development of Podzolic (Spodosol) horizons, whereas higher frequencies of wind disturbance led to disruption of Podzolic horizons and the formation of Brunisols. In addition to being of pedological interest, such soil assessments can contribute to ecosystem-based forest management planning in the region.

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