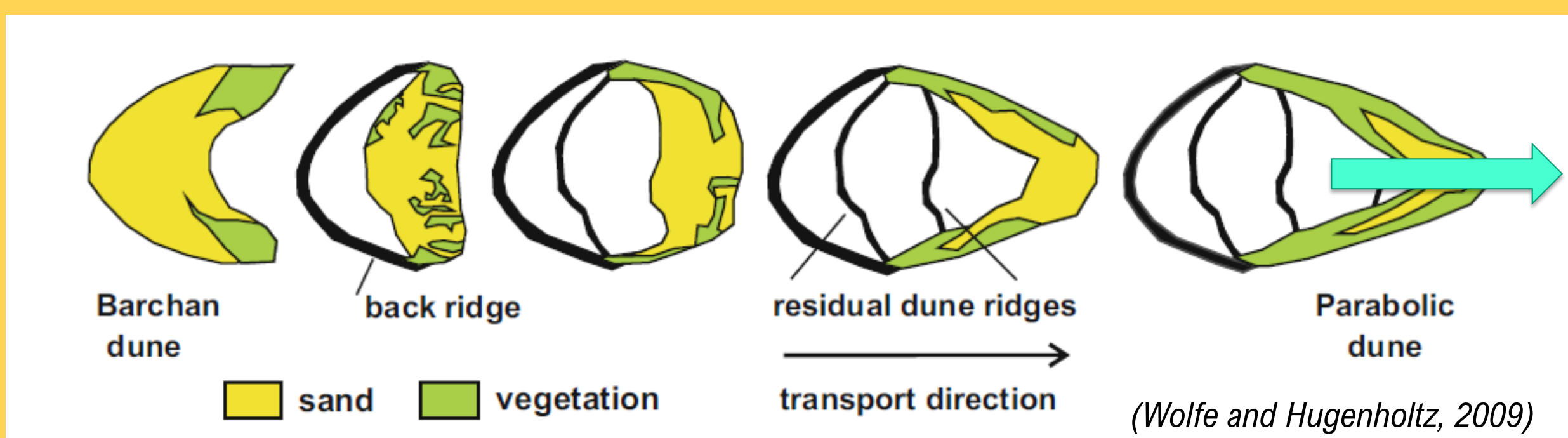


What is a parabolic dune?

- Limbs (arms) and nose (head) form parabola shape, limbs are anchored by vegetation and extend upwind while nose contains bulk of sand (Pye and Tsoar, 1990)
- Can be indicator of climate change (e.g., dry conditions, paleowind direction)
- Range of complex shapes are possible
- May form by transformation of barchan dunes

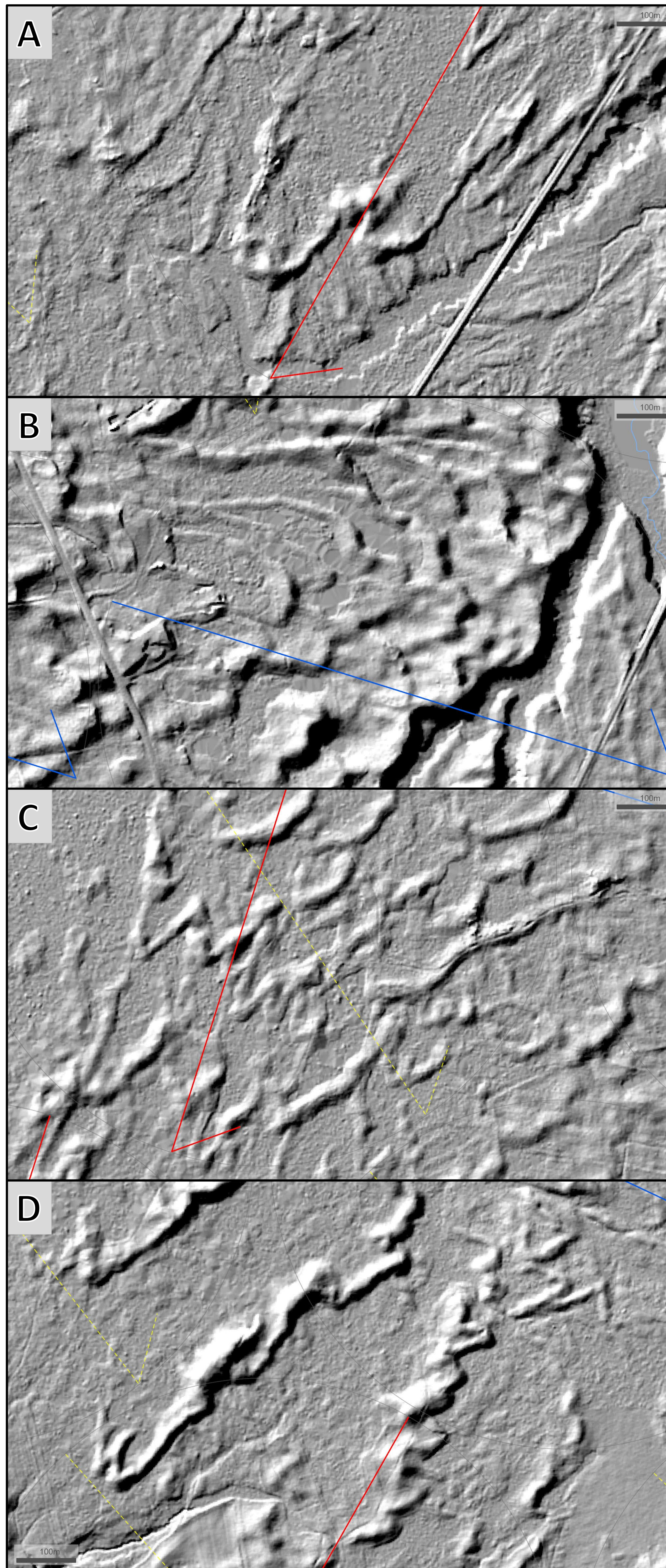
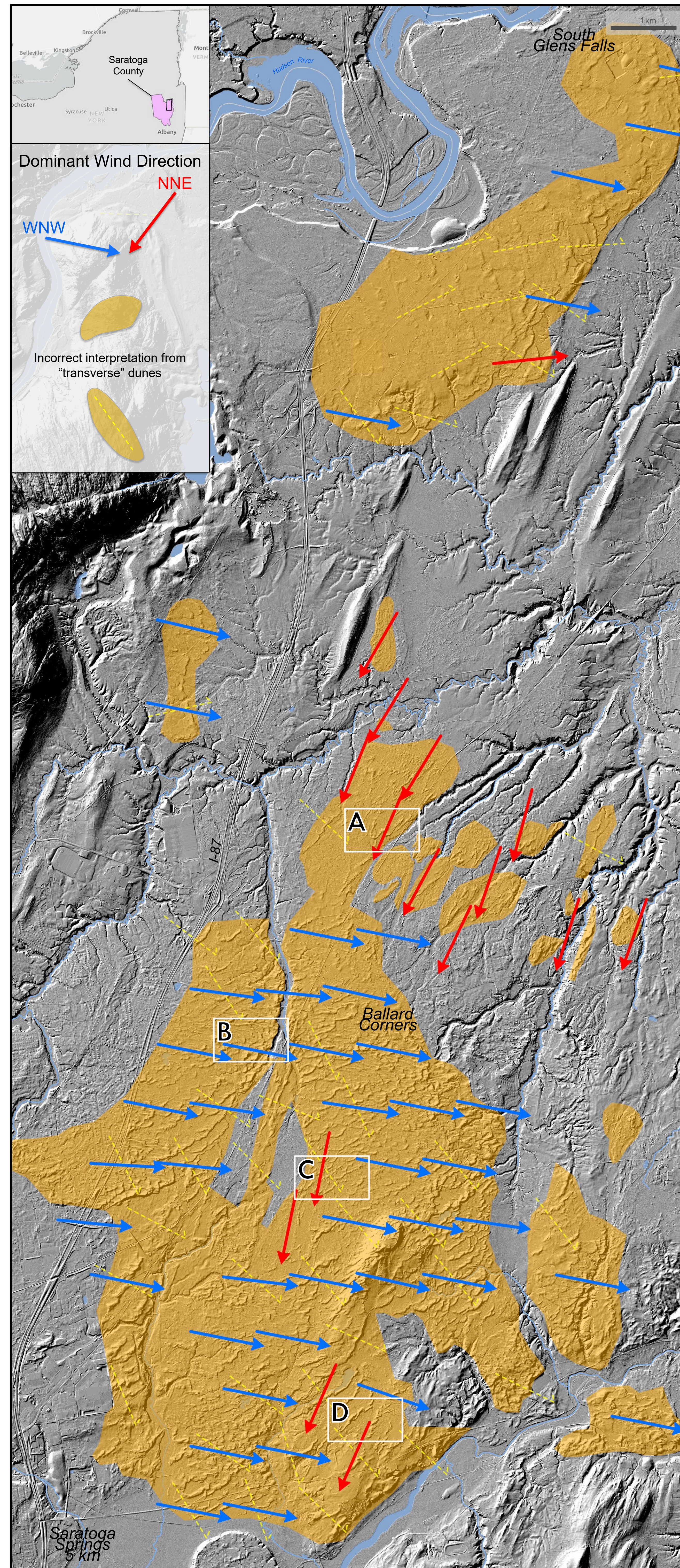


Mapping Strategy

- 2-meter resolution lidar data DEM and hillshade
- Dune polygons drawn around sand accumulations
- Create evenly-spaced set of 1 km-diameter circles across valley, consider dunes only within circle
- Avoid interpretation where dunes are not present, preservation is poor (due to erosion, residential development, etc.), or interpretation equivocal
- Draw arrows reflecting dominant direction of sand transport (proxy for wind)

Observations

- Found along Hudson Valley between Glens Falls and Saratoga Springs in Saratoga County, NY
- Cover an area ~120 km²
- Extend up to 3 km length and 10 m high
- Higher-relief dunes with open arms to the **WNW**
- Low-relief dunes with open limbs to **NNE**
- Complex dunes with overlapping noses (heads), irregular crests (e.g., zig-zag)
- Many form semi-continuous “transverse” shapes
- Detailed maps of 4 selected areas **A, B, C, D**
- Low-relief limbs and heads behind dune “front”



Interpretation

- Dunes sourced from glacial sand and silt deposits associated with Laurentide Ice Sheet (LIS), as well as sand deposited within proglacial Lake Albany (DeSimone et al, 2008; Heisig, 1994; Cadwell and Dineen, 1980-1988; Dineen and Hanson, 1983)
- Two separate intervals of dune formation occurred in nearly perpendicular directions
- **NNE** dunes are older than **WNW** dunes
- **NNE** dunes are modified by **WNW** winds
- **WNW** dunes align with present-day wind pattern of North American westerlies

Conclusions

- **NNE** dunes likely associated with katabatic winds off Laurentide Ice Sheet (LIS) while ice still “near”
- **WNW** dunes probably correlate with parabolic dunes in Albany Pine Bush Preserve (Jensen et al., this conference) and ~11.5 Ka parabolic dunes in the Rome Sand Plain, western Mohawk Valley (Murari et al., 2016)
- Further evidence supporting multiple wind directions is found in dunes within the St. Lawrence Lowlands of northern NY, southeast Ontario and Quebec
- Interpretation of paleowind directions can be tricky due to the complex dune shapes found where wind direction and speed has changed.
- “Transverse” dunes formed by overlapping parabolic dunes are not reliable paleowind indicators

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References Cited

Cadwell, D.H., and Dineen, R.J., 1980-1988, Surficial geologic maps of the Gansevoort, Mechanicville, Middle Grove, Niskayuna, Round Lake, Quaker Springs, Saratoga Springs, and Troy North 7 1/2 minute quadrangles: New York State Geological Survey-New York State Museum, Open-File Maps.

DeSimone, D.J., and LaFleur, R.G., 2008, Deglacial history of the upper Hudson region: New York State Geological Association, Field Trip Guidebook, Trip 4, p. 35-56.

Dineen, R.J., and Hanson, E.L., 1983, Bedrock topography and glacial deposits of the Colonie Channel between Saratoga Lake and Coeymans, New York: New York State Museum Map and Chart Series, no. 37, 55 p.

Heisig, P.M., 1994, Generalized stratigraphy, surficial geology, types of aquifers and 1988-89 groundwater pumpage in eastern Saratoga County, NY: USGS Water Resources Investigations Report WRI 93-4029.

Jensen, M., Carl, B.S., Wolfe, S.A., Franzi, D.A., Gontz, A., Pantoja, G., 2024, Geomorphology of parabolic dunes in the Albany Pine Bush Preserve, NY: GSA Abstracts with programs (this conference)

Murari, K.M., Domack, E.W., and Owen, L.A., 2016, Timing of late Quaternary landscape development across the eastern end of Oneida Lake, NY State, defined by LiDAR topography and luminescence and radiocarbon dating: Friends of the Pleistocene Annual Conference Field Trip Guidebook

Pye, K., and Tsoar, H., 1990, Aeolian Sand and Sand Dunes. Unwin Hyman, London.

Wolfe, S.W., and Hugenholtz, C.H., 2009, Barchan dunes stabilized under recent climate warming on the northern Great Plains: Geology, vol. 37: p. 1039-1042.