Lessons from Brown Dwarf Science: Signatures of Youth in NIR Spectra

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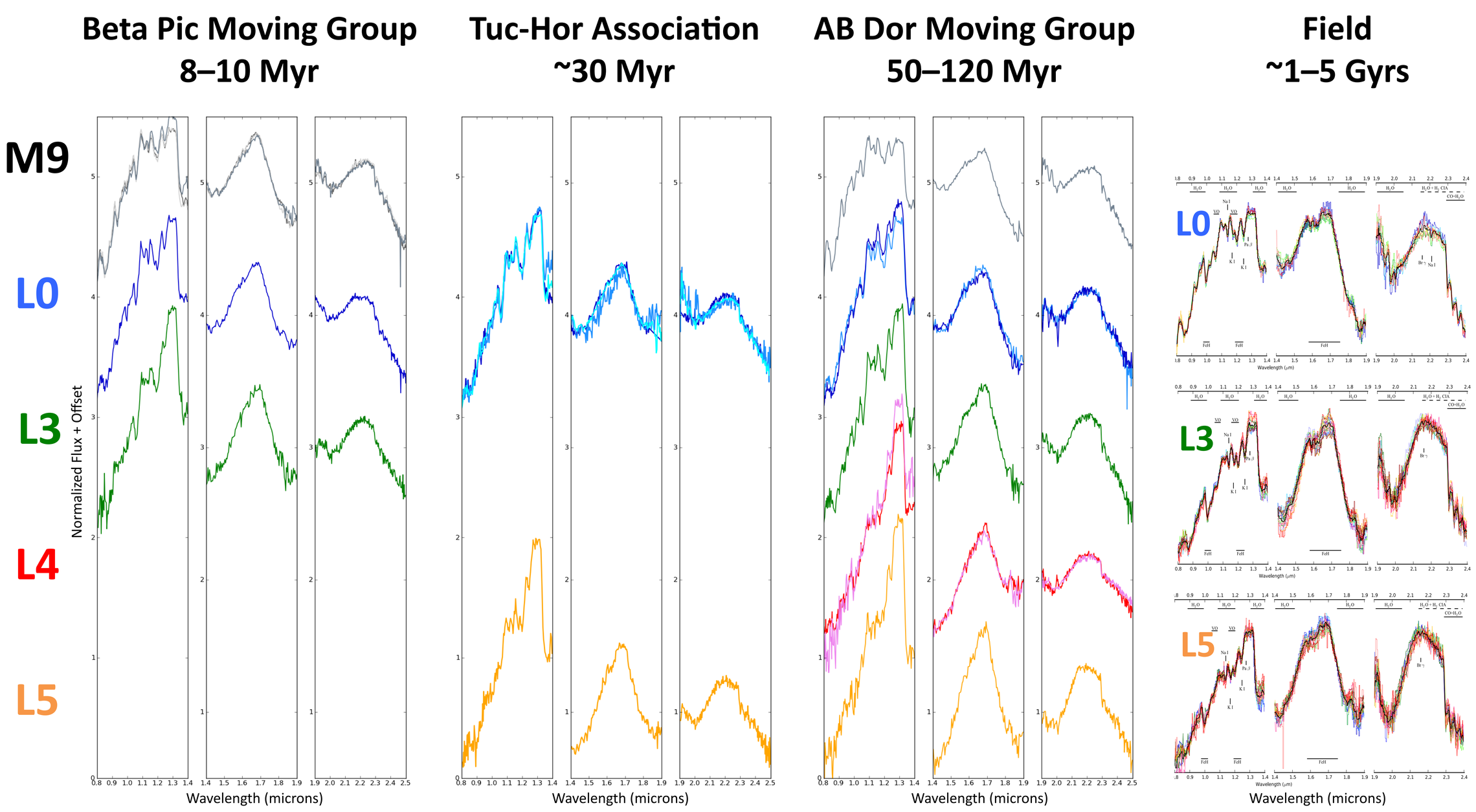
Late-M and L Dwarf Age & Spectral Sequences

- Young L dwarfs have markedly different low-resolution NIR spectra than field L dwarfs, especially in J and H bands.
- These features are displayed in the late-M and L dwarf members of three young kinematic associations (*shown below*).
- Triangular H-band shape, weak FeH absorption, strong VO absorption are evident in the young objects.
- Hallmarks of youth remain prominent up to ~120 My



Reddening Possibly Due to Dust Haze of Small Grains

- We hypothesize that reddening of L dwarf spectra is caused by a "dust haze" (green) above the normal cloud deck.
- We compare normal and red L dwarf spectra to infer the haze spectrum.
- Mie theory is used to reproduce the observed reddening and constrain the properties of the dust haze.

See Hiranaka Poster 2K001 for more details

Best Normalization Method for NIR Spectra

New normalization method for NIR L Dwarf spectra:

- Normalize J, H, and K bands separately using the entire band.
- **Minimizes** reddening effects of **gravity**-sensitive **clouds.**
- **Reveals** effects due to **temperature, metallicity,** and **binarity.**

Old Way

New Way

NIR spectra for 15 normal L1 dwarfs normalized at the 1.28–1.32 micron (top, old way) and the same objects normalized in each NIR band separately (bottom, new way).