nary of approach

Representing Impact of Complex Topography on Atmospheric Forcing of Surface Fluxes*

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- Classify grid-squares according to degree of complexity needed to be treated (4 categories) & so determine the number of tiles included on grid-square (10 to 100), e.g. at T85, 6% of land has r.m.s. of > 500 m – needs maximum tiles.
- Use model 8-nearest neighbor monthly statistics to determine how T,q,u, at lowest model level and incident radiation, change with elevation, e.g., T_i for any tile:

$$T_i = [T] + a\,\Delta z$$

  - log (q) better for large excursions
  - improve by also including correlations with w (vertical velocity).
  - include distribution of rain versus snow.
  - more work needed to catch up with Ghan/Leung subgrid precipitation

*A contribution to the CCPP project: “Improving the Processes of Land-Atmosphere Interaction through Higher Resolution and Better Sub-grid Scaling”

Conclusions from Graphics:

- Quite a few grid-squares have elevation rms of 0.3 to 1km, but fewer with higher resolution.
- This metric useful to determine how much topographic subgrid detail needed.
- Economical representation
- Can be a range of 40K over most complex grid-square; lapse rate smaller in summer than winter.
- May nearly double CPU cost at lower resolution (T-42) but smaller fractional increase at higher.