Key questions from a modeling point of view

- Can we relate crystal size to environmental conditions (Temperature, IWC.....)?
- Do we need to worry about crystal shapes, or does D_{eff} (≈ f IWC / PA) take care of this?
- Do we need explicit treatment of the size distribution, or is D_{eff} sufficient?
- Do we need to consider aerosols?
- Are theoretical schemes (GOM, Ray Tracing, ADA, ...) in fair agreement, given D_{eff}, IWC, Temperature?
- Consistency ice optics ↔ fall speeds

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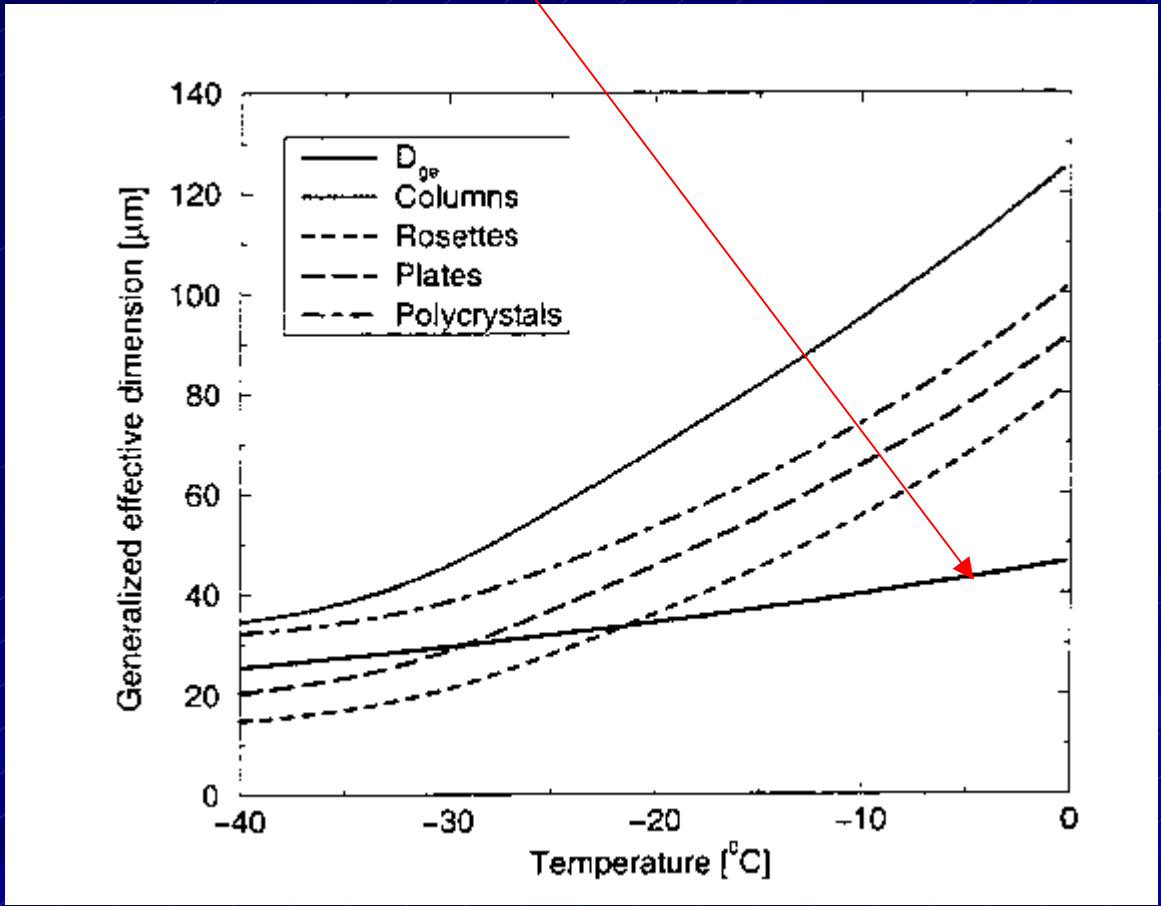
Crystal Size vs. Temperature

- Kristjánsson et al. (2000):
  $D_l = 1030.7 \exp(0.05522 (T - 279.5))$

- Boudala et al. (2002):
  $D_{ge} = 46.4 \exp(0.015 T)$

Boudala et al. (2002): $D_e = 46.4 \exp(0.015\ T)$



Fu + Boudala

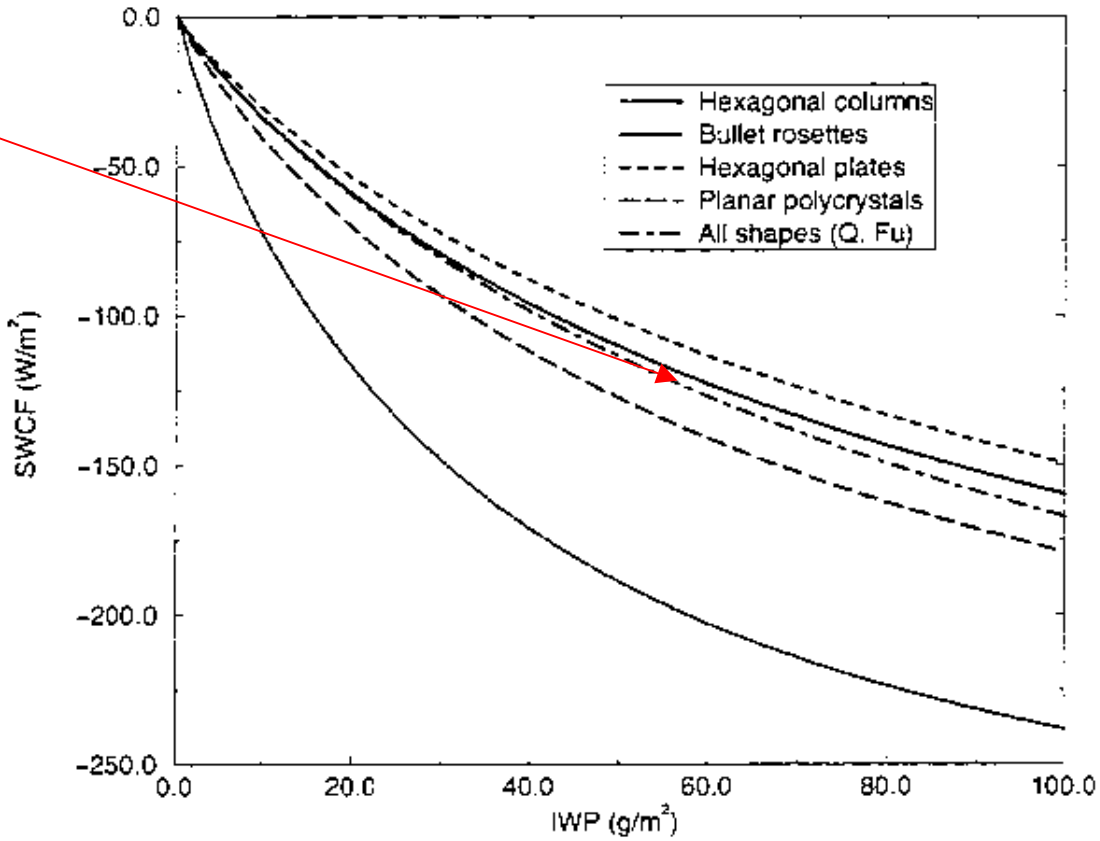


Figure 4.18: Shortwave cloud forcing for the ice crystal shapes indicated.

Fu + Boudala

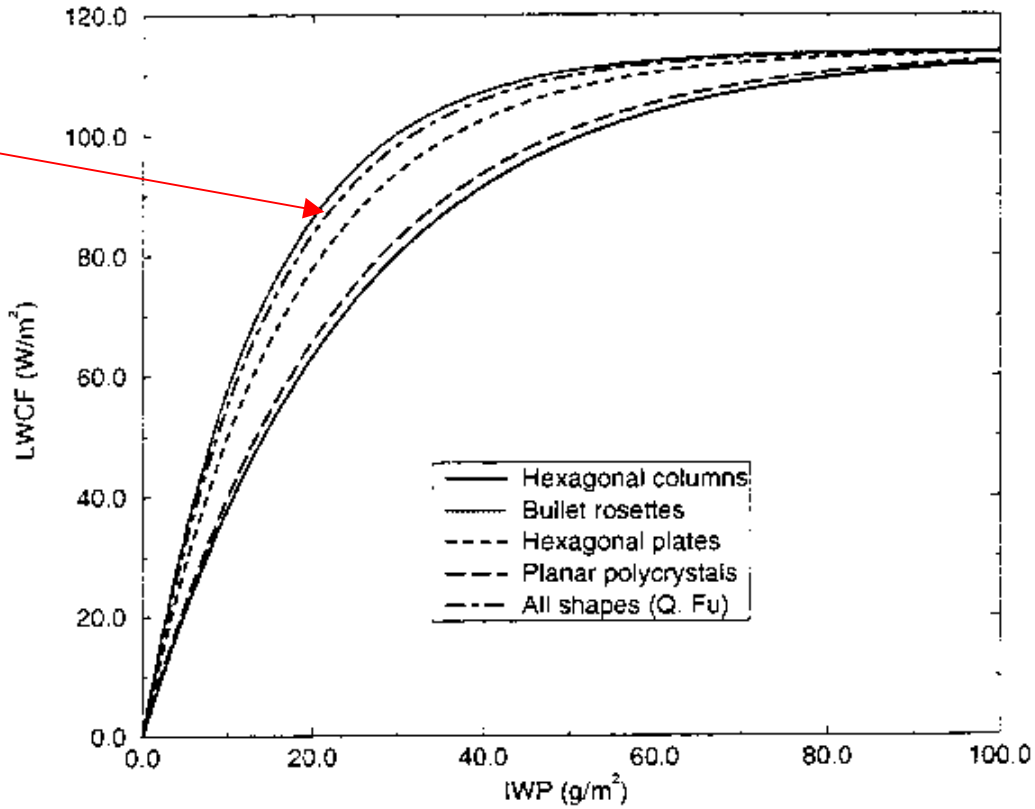


Figure 4.17: Longwave cloud radiative forcing for the ice crystal shapes indicated.

Fu + Boudala

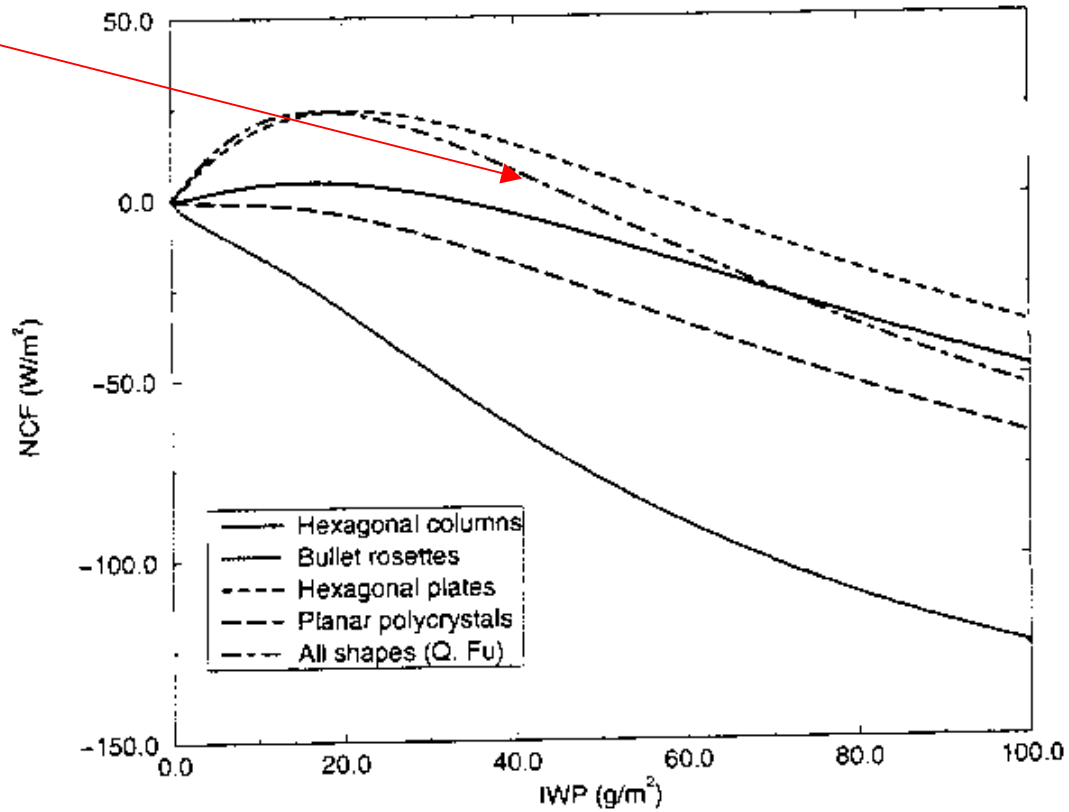


Figure 4.16: Net cloud radiative forcing for the ice crystal shapes indicated.