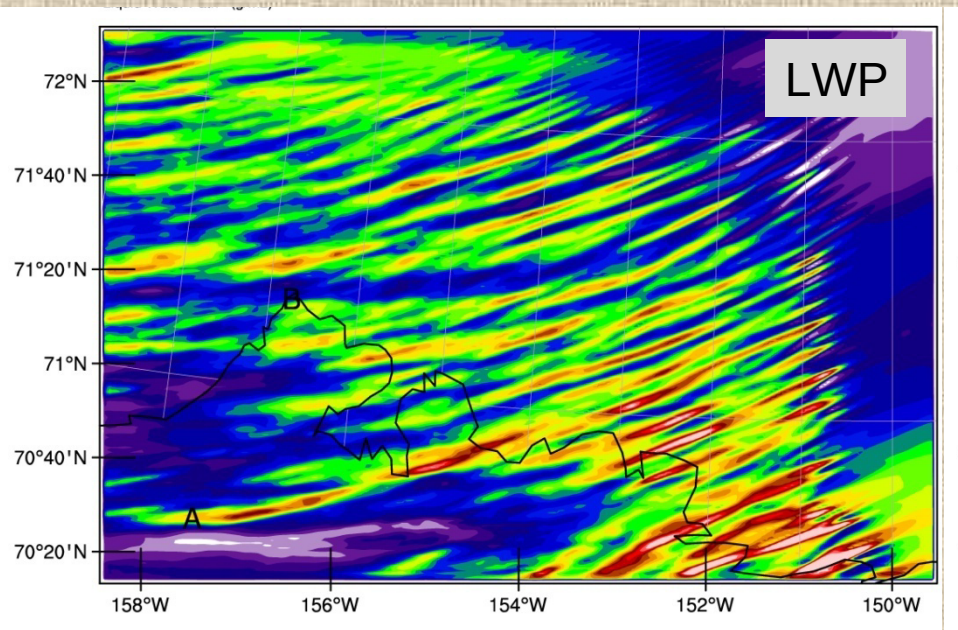
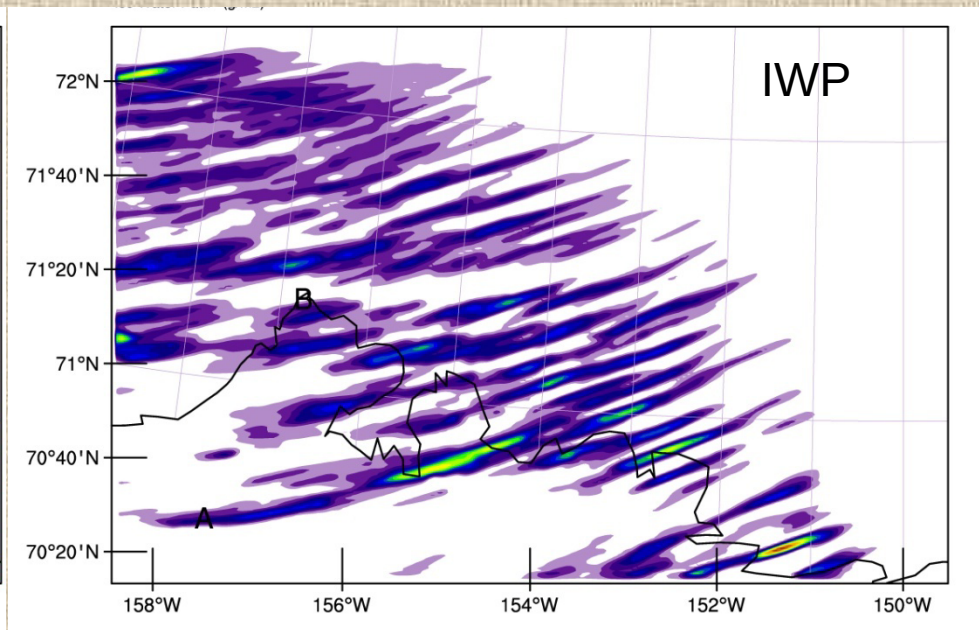
ARM Science Plan Topic:
Understanding cloud phase partitioning and its defining processes





WRF simulation of 9 Oct 2004 MPACE case

Why is phase partitioning important?

- Bears heavily on cloud radiative properties, cloud longetivity, and hydrology
- Links with other important topics such as dynamics at many scales and cloud-aerosol interactions
- Has clear pertinence to Polar and cold cloud properties and processes
- A primary difficulty for models at all scales

Continue and Enhance Existing Efforts

- Microphysical characterization (observations and retrievals)
- Vertical velocity sub-group and efforts
- Aerosol-cloud interactions (MPACE, ISDAC, etc)
- Model studies at appropriate scales and complexity. Need to be able to “resolve” processes that are responsible for phase partitioning.
- BBHRP “testbed” system, so that retrieval efforts can have a continual metric for progress

New Initiatives

(May require new instruments, methods, campaigns)

- Profiling liquid water in all cases!
  - •Clean Doppler spectra
  - •Multi-wavelength radar?
  - •Constrained, profiling microwave radiometer?
- Routine Aircraft Measurements! RISCAM was supported and then cut. We need such a program to build statistics and verify retrieval methods.
- Improved understanding of ice nuclei (IN) concentrations and processes
- Source of particles to cloud layer
  - •Aerosol profiles, what is the value of surface measurements?
  - •Role of entrainment?
- Ice crystal habits, to understand processes and constrain retrievals