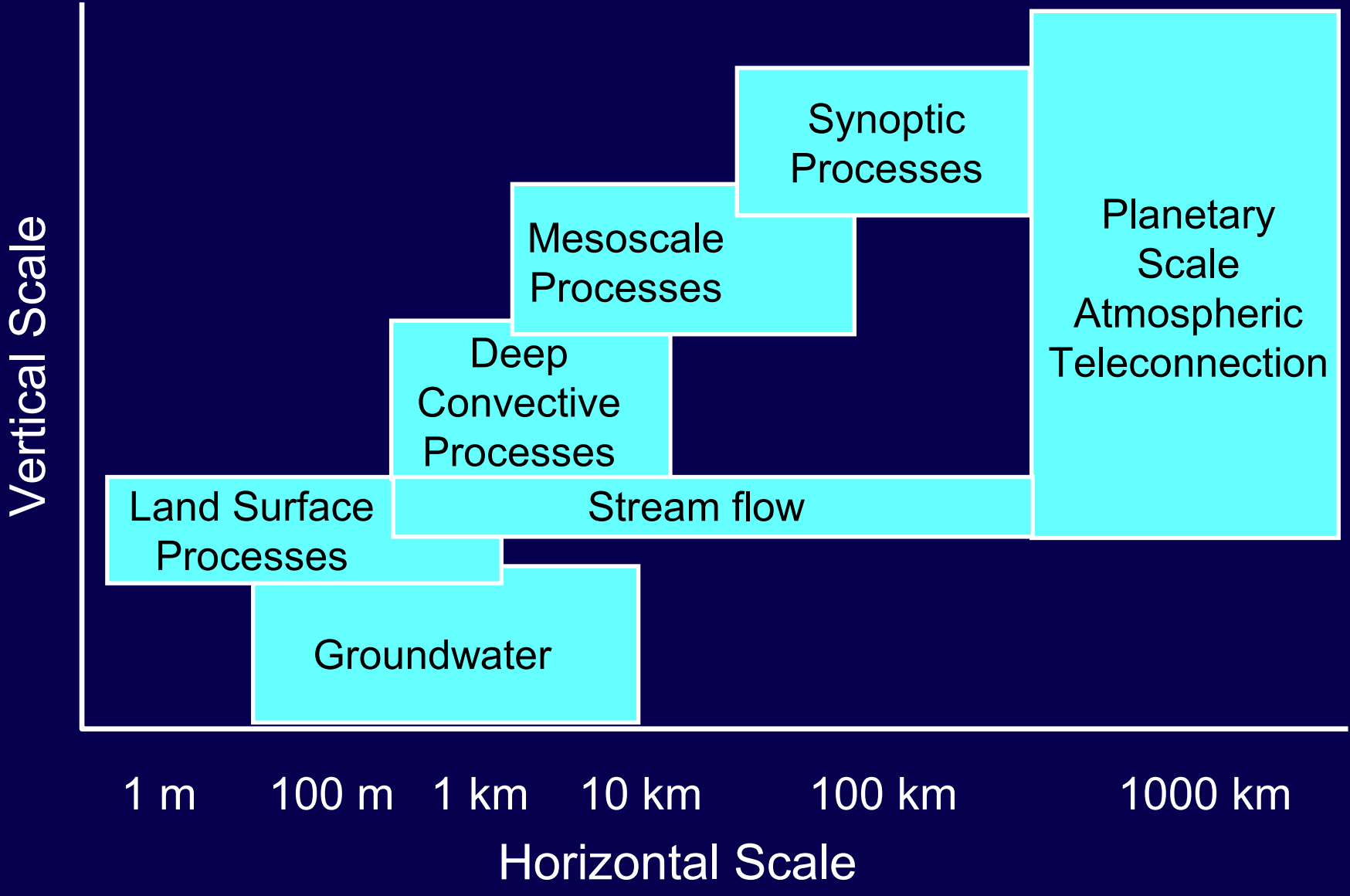
# DRI Theme 2

## Improve the Understanding of Processes and Feedbacks Associated with the Recent Canadian Prairie Drought

1. What processes and feedbacks were responsible for the onset of the recent drought?
2. What contributed to the drought's evolution, persistence, and spatial structure?
3. What controlled the termination of this drought?

# Spatial Scale of Processes and Feedbacks



# Theme 2 Milestones for Years 3-4

1. Continuation of enhanced observation of:
   - Atmospheric processes
   - Surface hydrological processes
   - Groundwater processes
2. Data acquisition from collaborating agencies
3. Data rescue from previous observations
4. Selection of numerical models
5. Initial model evaluations with simple scenarios
6. Hypothesis testing and new hypothesis generation
7. Model sensitivity experiments

# “Action Items” from Breakout Session in 2008

1. What caused the development of “ridge” in BC?
   - Need to understand cause-effect relation rather than statistical correlation
   - Adiabatic lapses or orographic uplift?

2. Inter-seasonal feedbacks from the land-surface.
   - Soil moisture is the key factor
   - Role of spring cold lows to initiate soil moisture feedback
   - Warm & dry vs. cold & dry. What are the differences?
   - Will large-scale modelling be useful?

# Examples of Theme 2 Activities

- Theoretical study of atmospheric “blocking” using the National Centers for Environmental Prediction (NCEP) data.
- Examination of correlation between cloud properties and precipitation using satellite data.
- Detailed examination of a major storm during the drought in 2002.
- Convective processes in Alberta foothills during UNSTABLE experiment.
- Focussed study on evaporation by several DRI investigators.

# Dynamical Mechanisms of the Synoptic-Scale

## Gyakum / Atallah

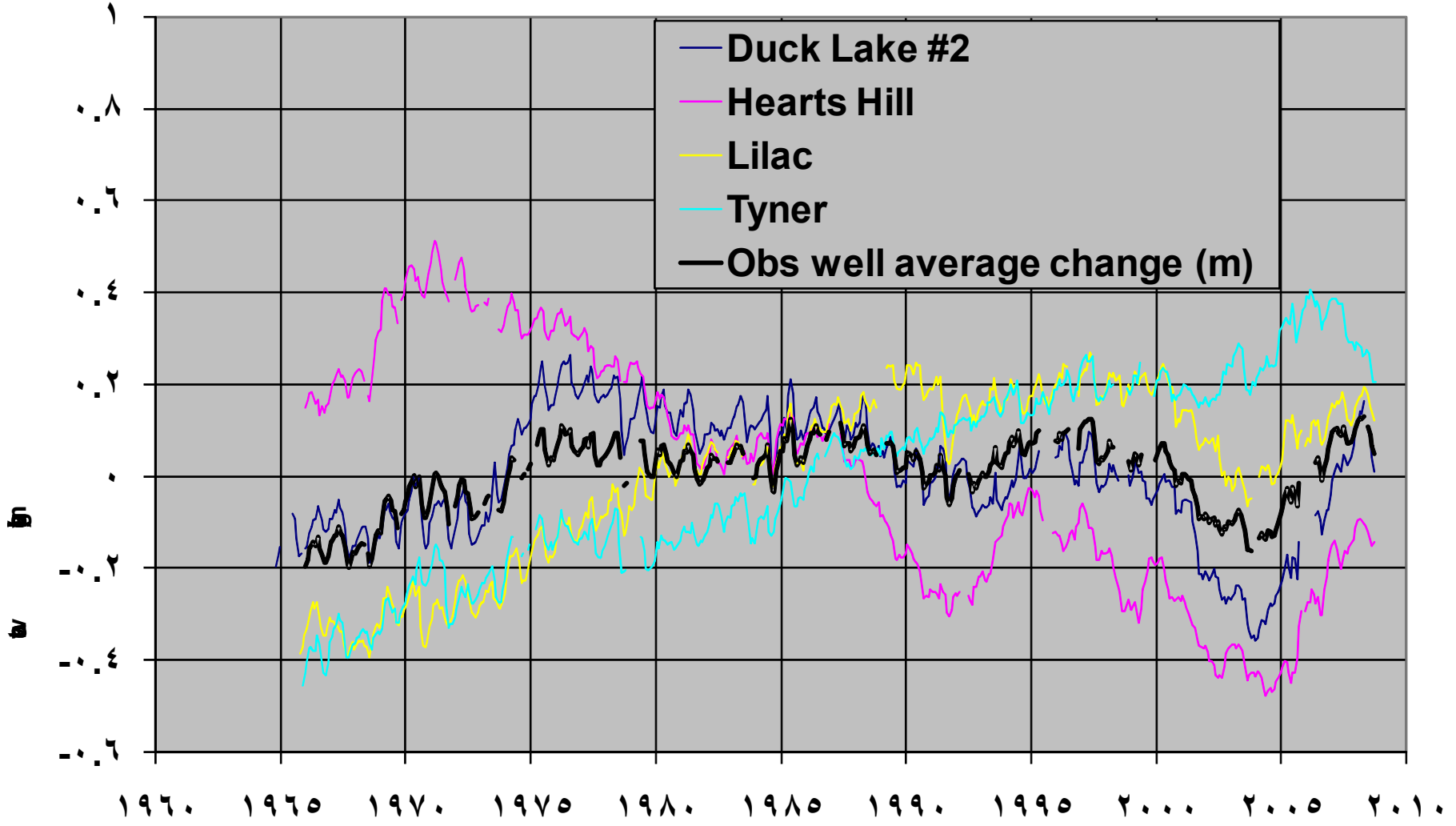
- No single synoptic-scale pattern can be used to typify the recent Prairies drought.
- Multi-year drought cannot be blamed on a single index such as the SOI and/or PNA.
- Drought conditions can be accompanied by either warm or cold temperatures.
- A large range of dynamical mechanisms for subsidence was observed during this multi-year drought.

# Evaporation and Soil-Atmosphere Interaction

John Hanesiak and Masaki Hayashi

# Groundwater Storage Monitoring with Geological Weighing Lysimeter

Garth van der Kamp



# Theme 2 Challenges

1. Data validation (e.g. CanGrid) and integration.
2. Challenges within each process (e.g. soil-plant feedback relation for evaporation).
3. Linking individual process studies.

# Expectation for Breakout Session

1. Critical research gaps and challenges discussed in an integrated framework (all scales and processes).
2. Priority research areas for 2009/10 identified.