

# MESH: A community model for EC

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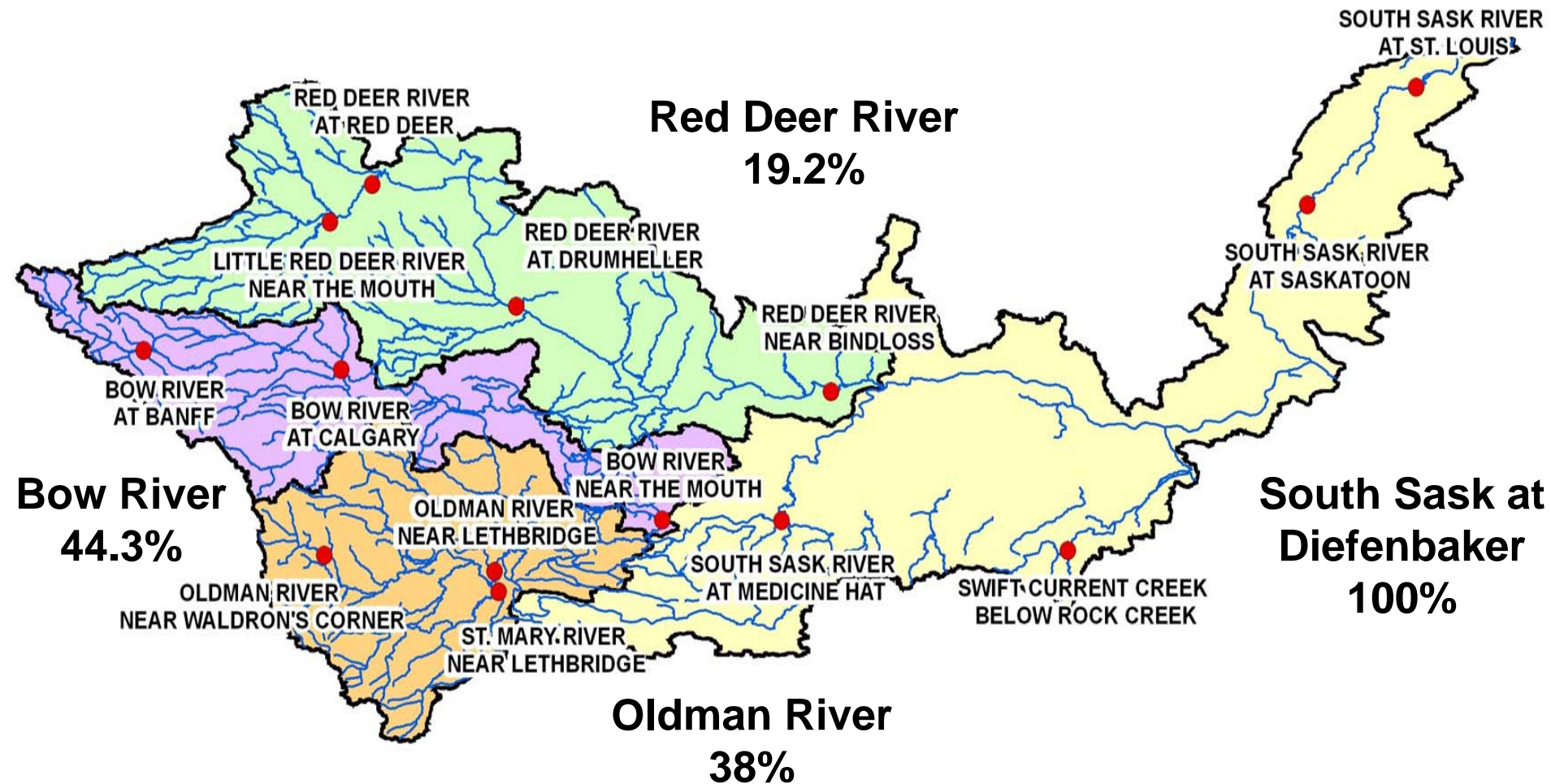
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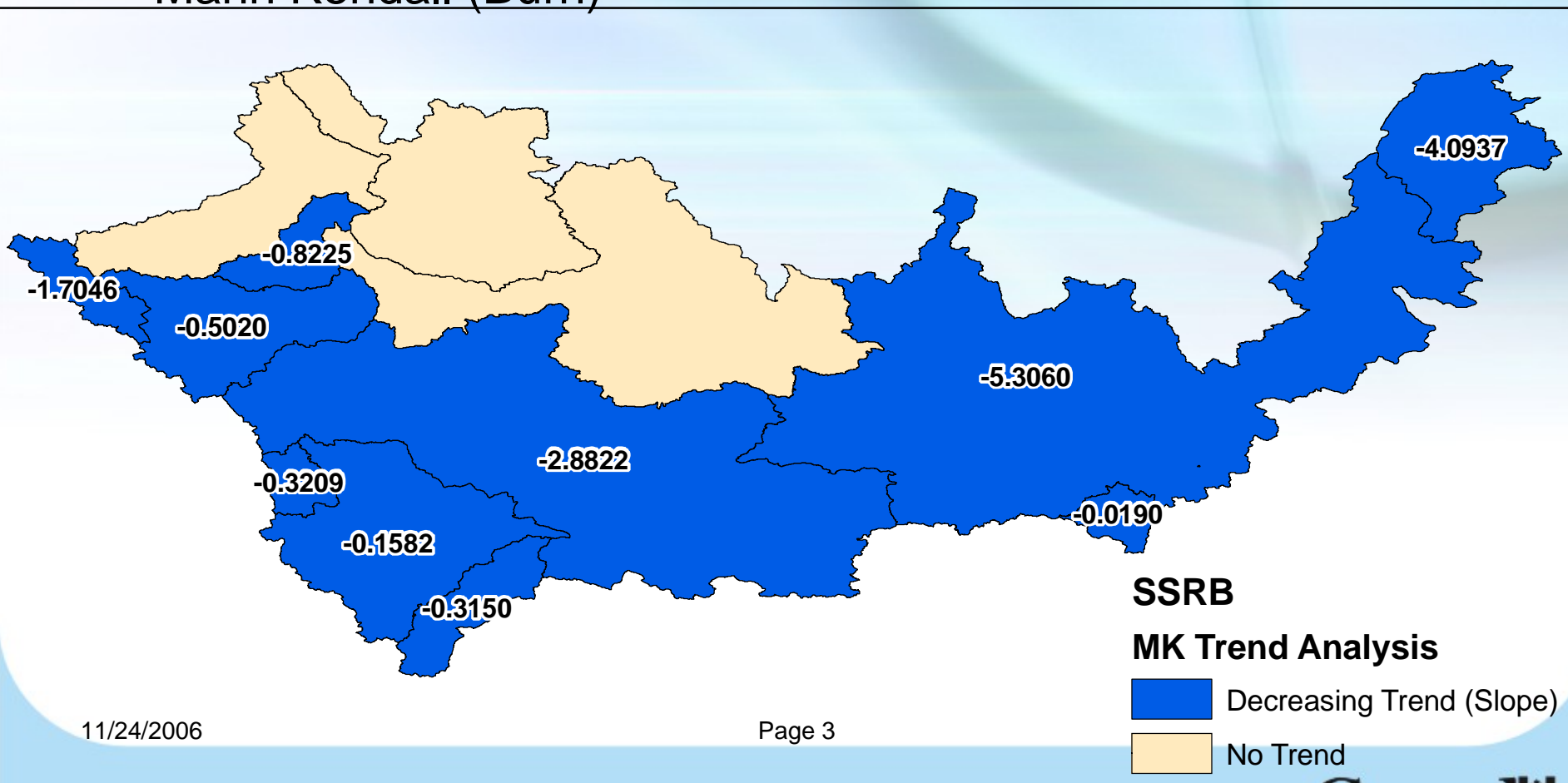
University of Saskatchewan

# Sub-basin contribution to flow naturalized flow in current climate



# Trends in the SSRB

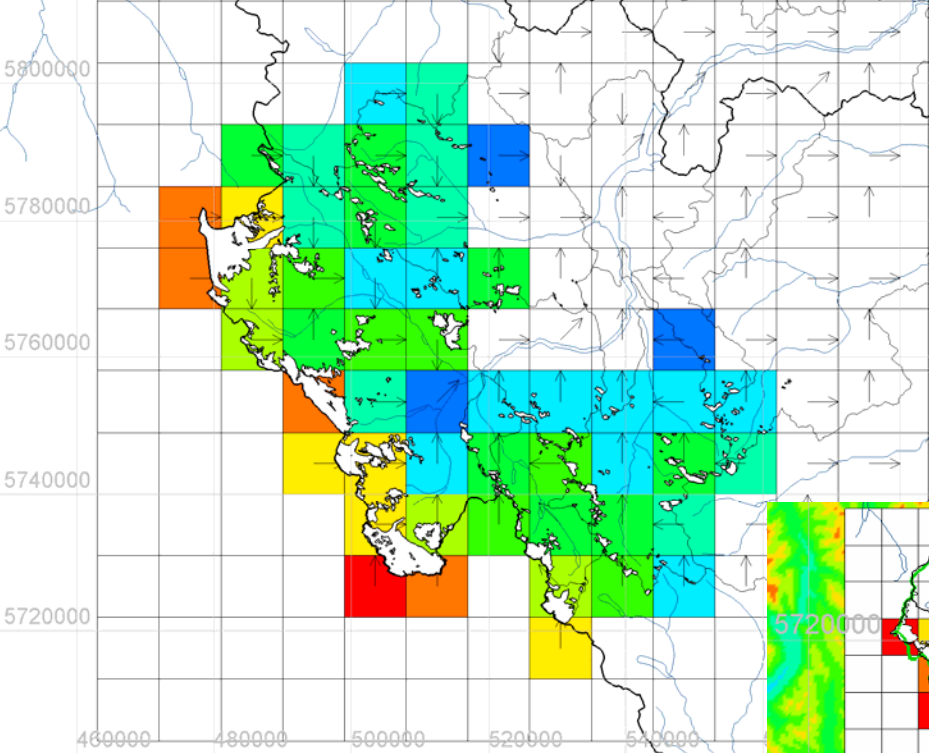
- Mann Kendall (Burn)



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Page 3

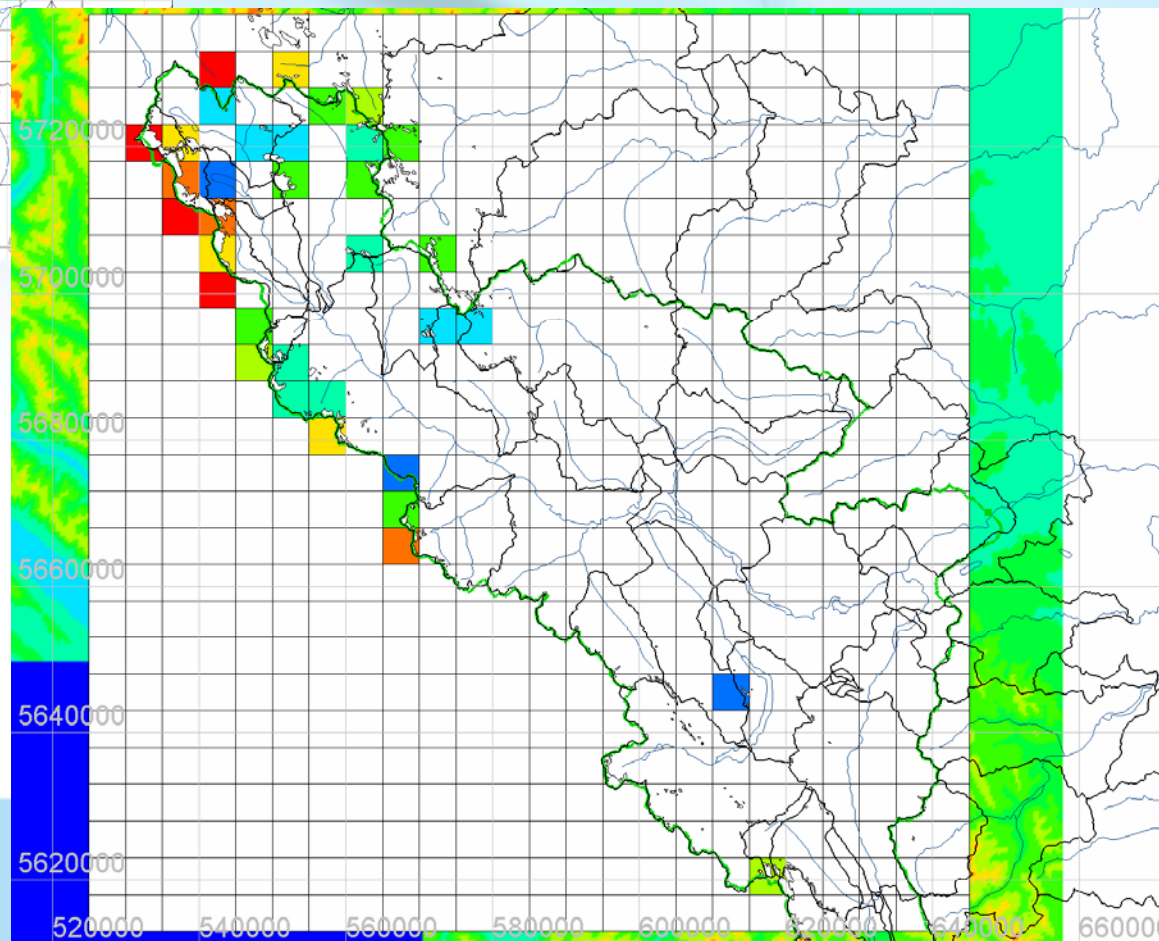




North Saskatchewan basin

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South Saskatchewan basin

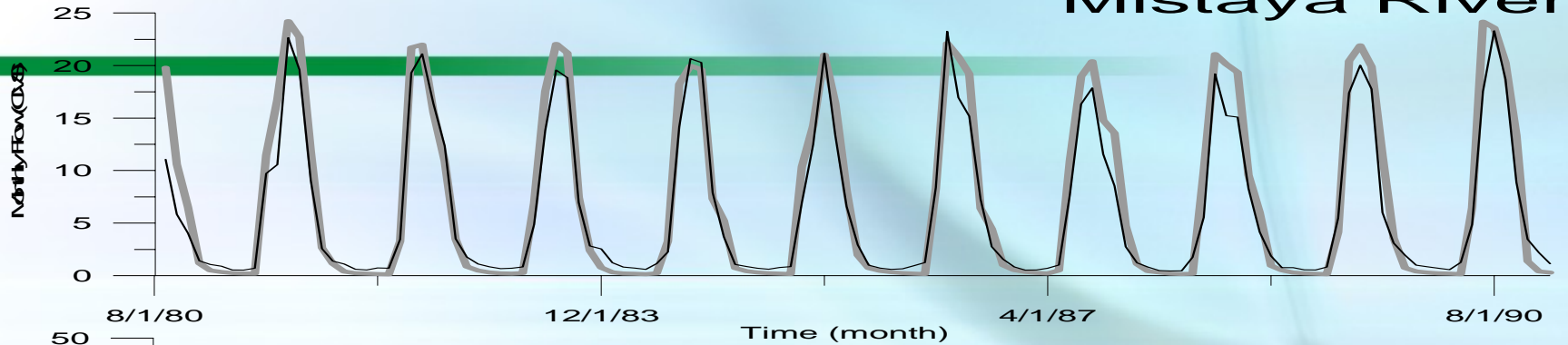


10 year simulation

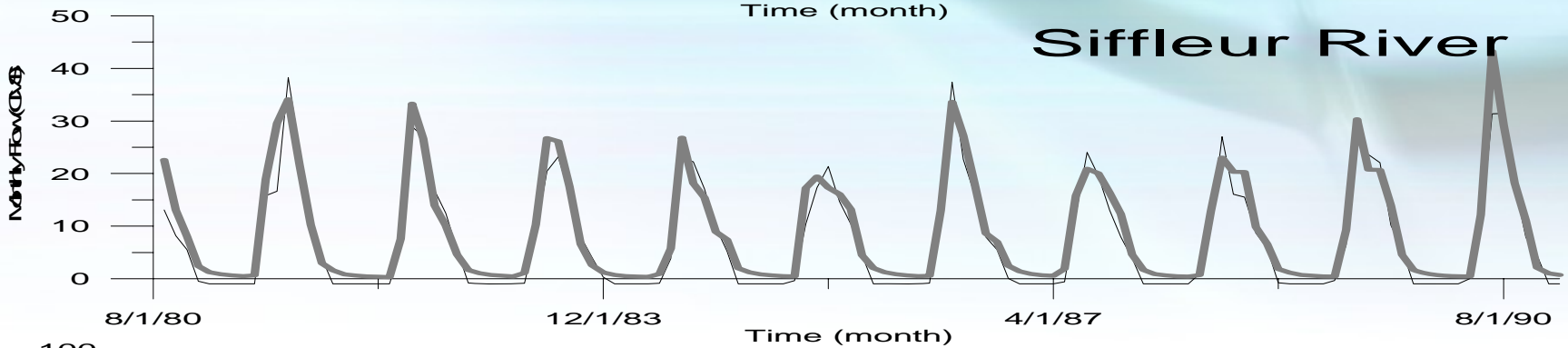
Oct, 1980 – Dec, 1990

Glacier at 1975 extents

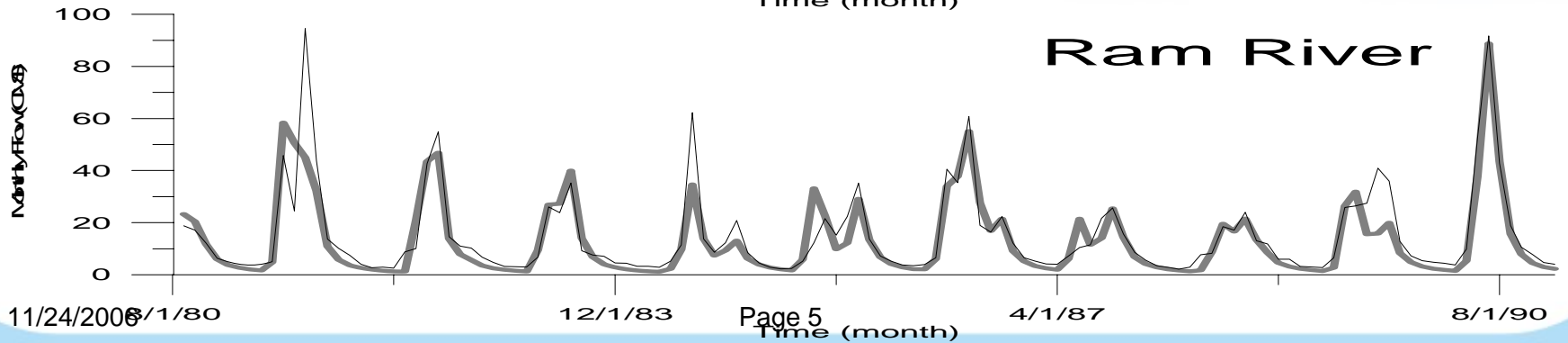
### Mistaya River



### Siffleur River



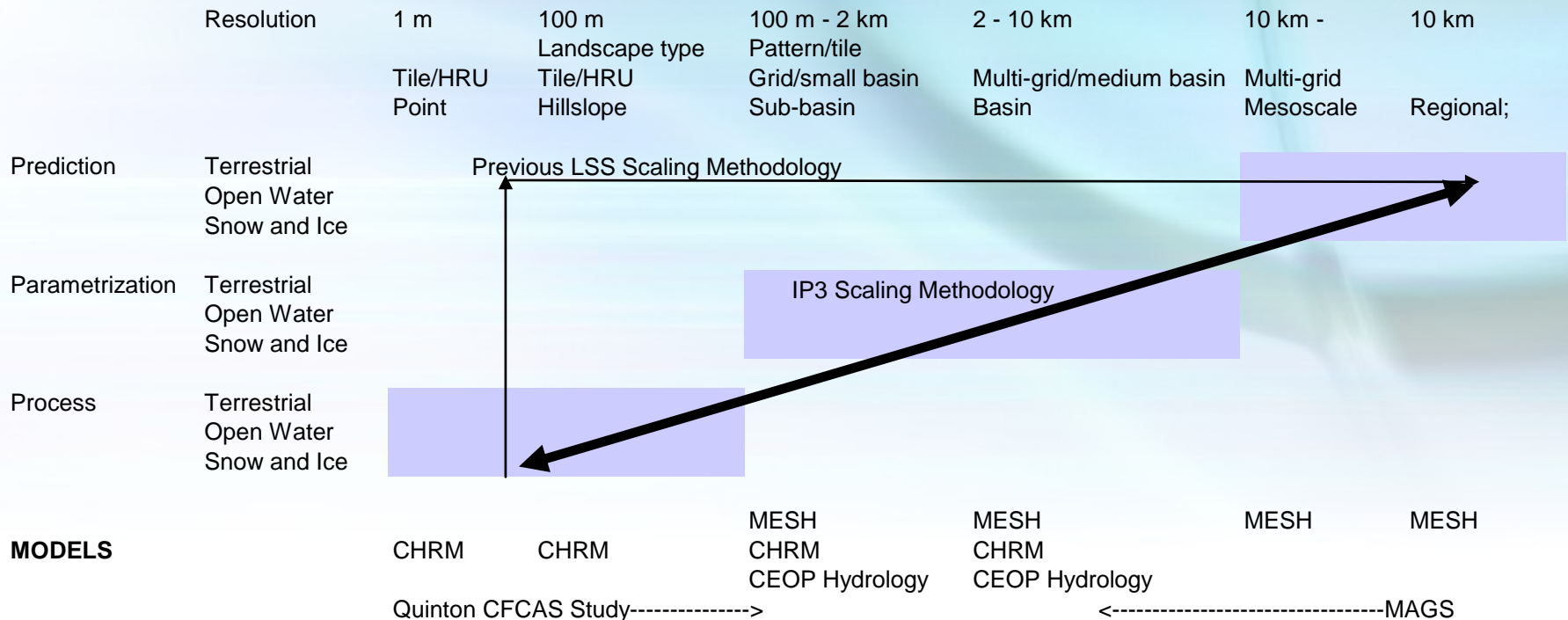
### Ram River



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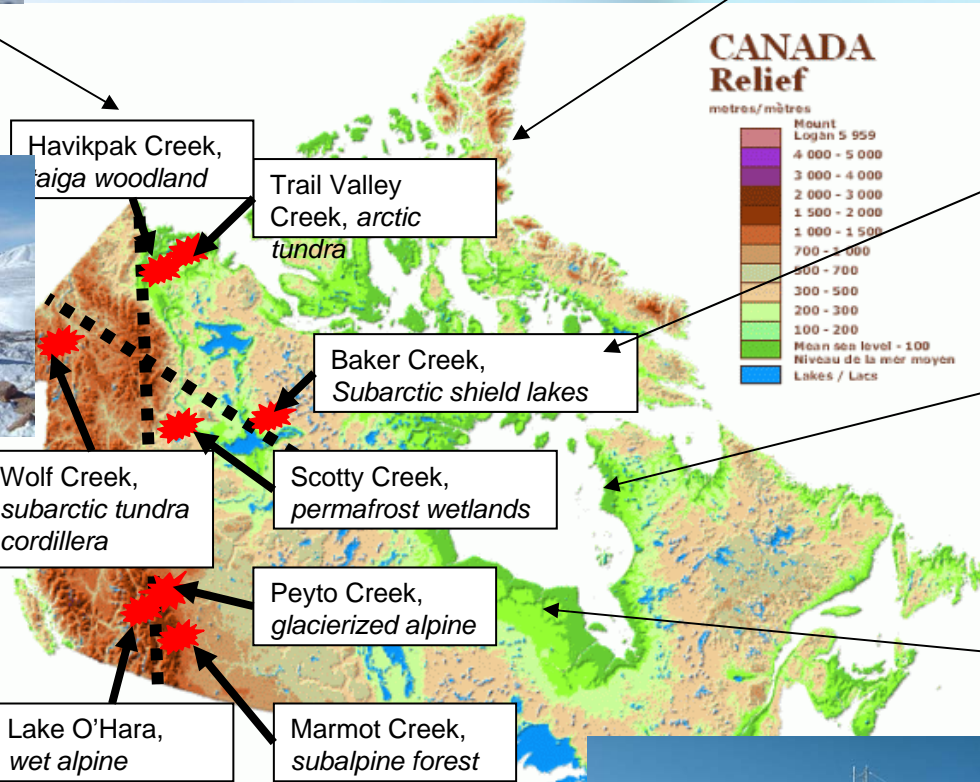
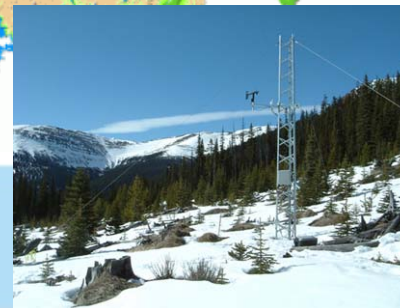
Page 5

# From Measurements to Models



**Modelling and parameterization hierarchy.** Previous LSS scaling methodology refers to projects that parameterized and evaluated predictions of processes at a point and then applied directly to regional scales. IP3 scaling methodology involves step-wise transfer of upscaled processes to basin-scale parameterizations and then to regional scales

# Research Basin



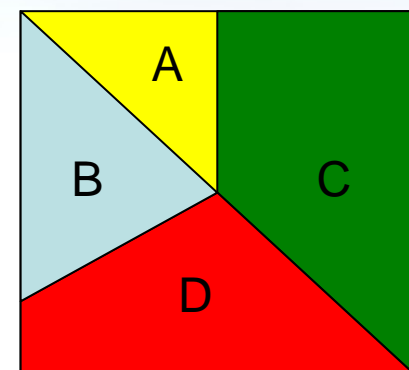
ement

# MESH: A MEC surface/hydrology configuration designed for regional hydrological modeling

- Designed for a regular grid at a 1-15 km resolution
- Each grid divided into grouped response units (GRU or tiles) to deal with subgrid heterogeneity
  - based on WATFLOOD

Sub-grid Heterogeneity (land cover, soil type, slope, aspect, altitude)

B	C	C	C	A
C	B	B	A	A
D	C	B	C	C
D	C	B	B	C
D	D	D	D	B



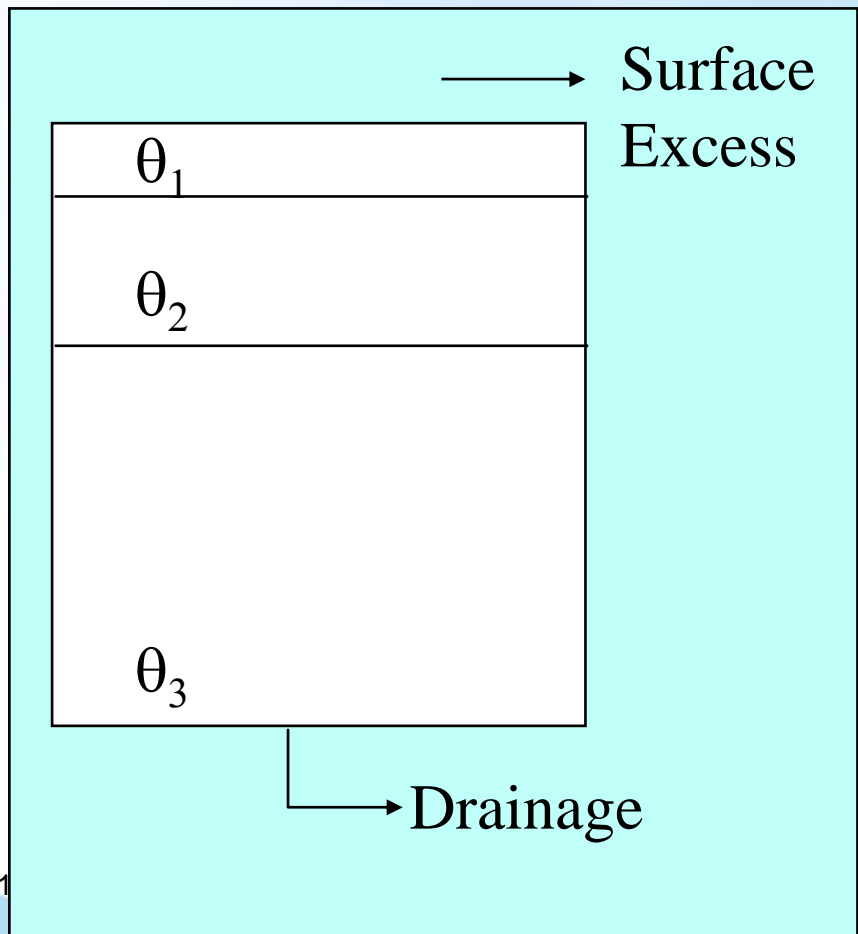
A relatively small number of classes are kept, only the % of coverage for each class is kept

- Scalable ?

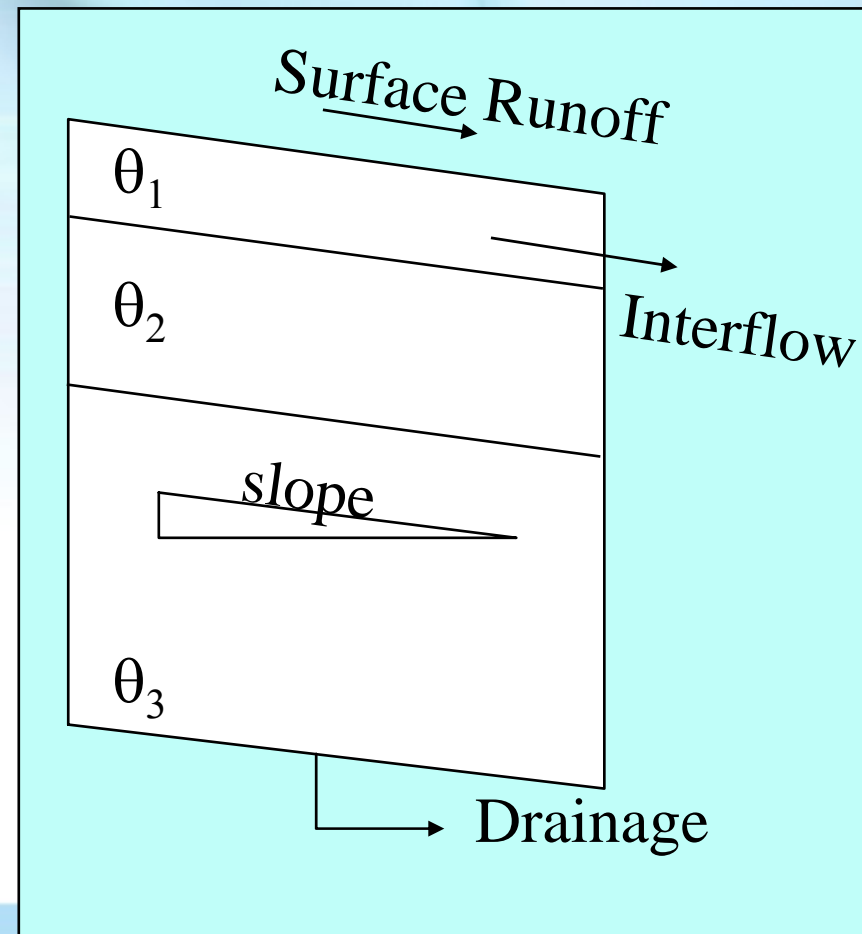


# Improved Soil Water Balance

## CLASS 2.7 Model

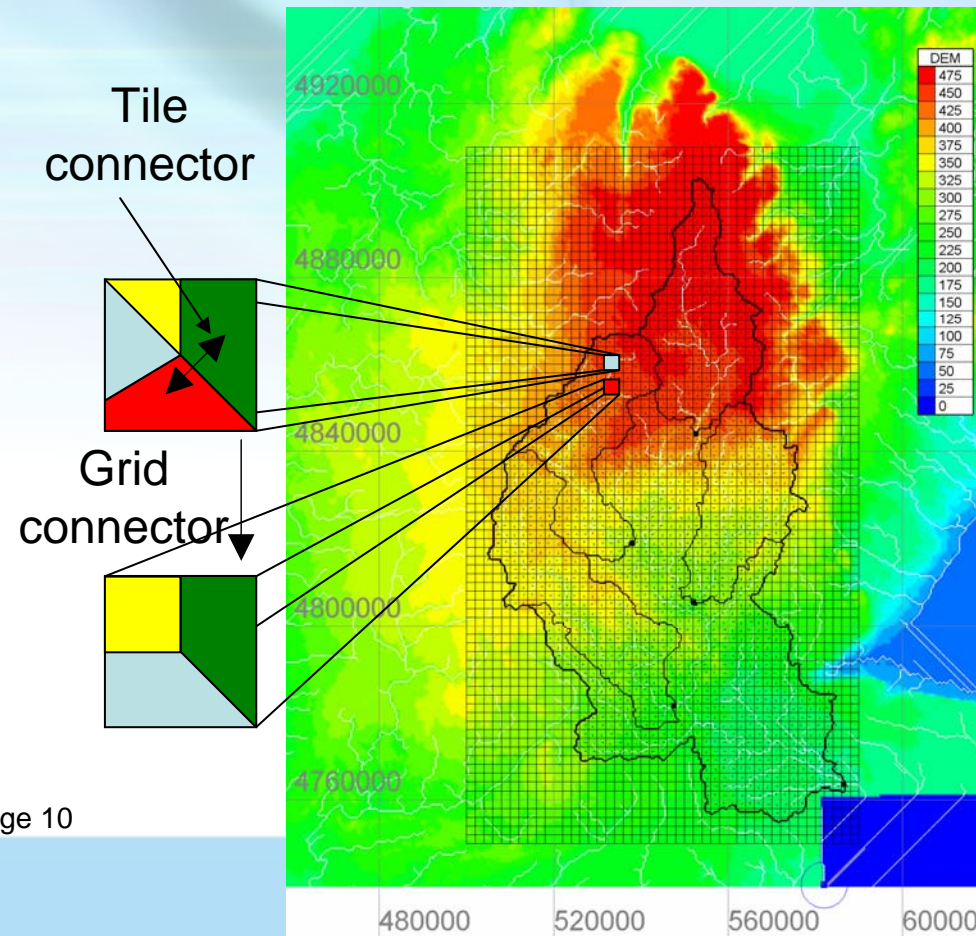


## MESH (class 3.2)



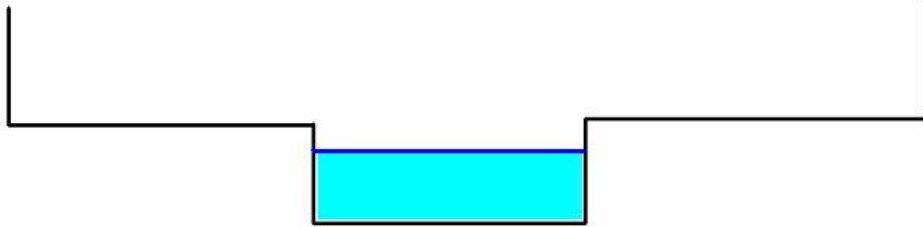
# MESH: A MEC surface/hydrology configuration designed for regional hydrological modeling

- The tile connector (1D, scalable) redistributes mass and energy between tiles in a grid cell
  - e.g. snow drift
- The grid connector (2D) is responsible for routing runoff
  - can still be parallelized by grouping grid cells by subwatershed

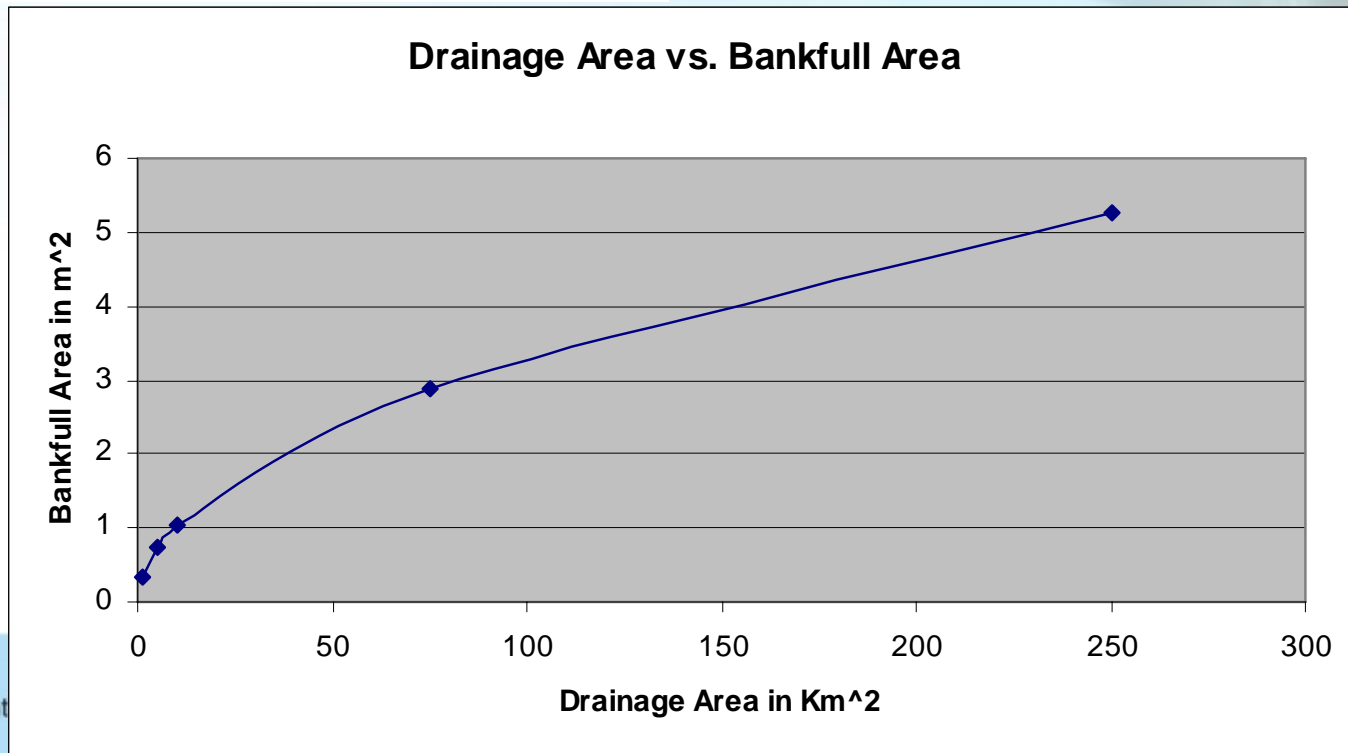


# WATROUTE

**Channel flow only**  
**Low storage & smooth**

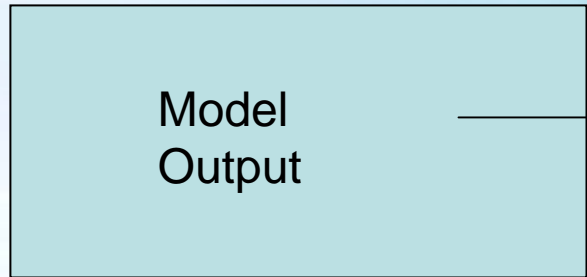


**Channel + overbank flow**  
**high storage & rough**

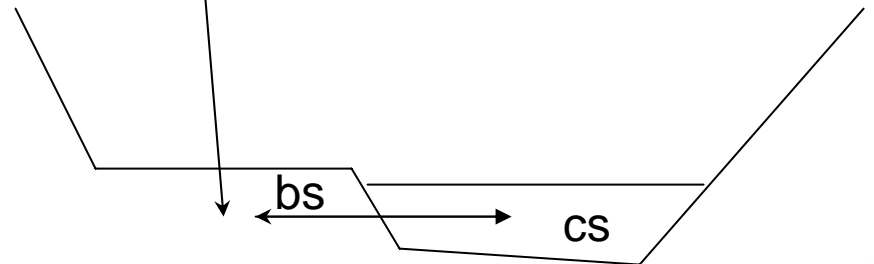


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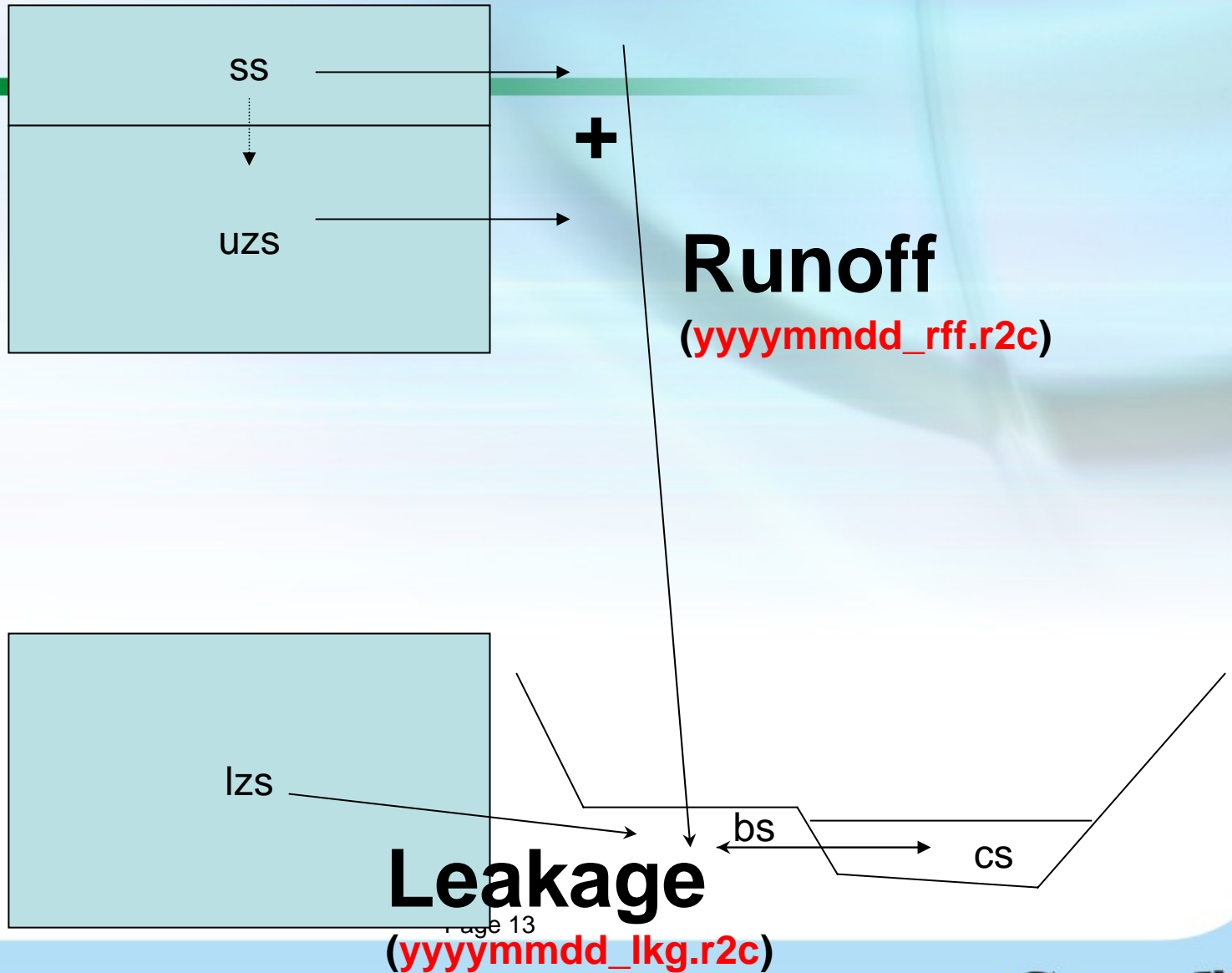
# Mode = "i" - one channel inflow file



**Runoff**  
(**yyyymmdd\_rff.r2c**)



Mode = "I" runoff file + leakage file (inflows added)

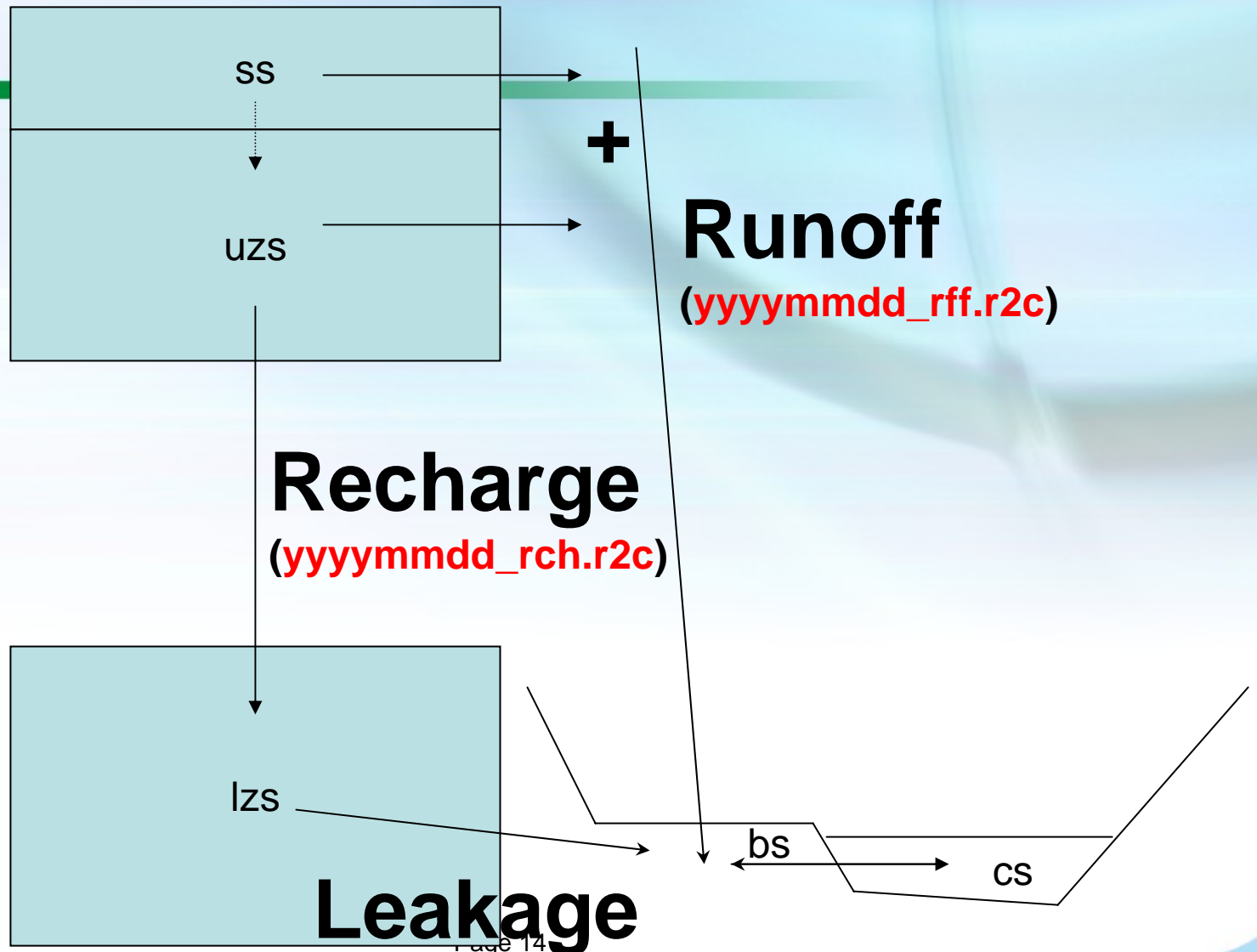


11/24/2006

Page 13



Mode = "r" runoff file + recharge file (sr added to routed recharge)



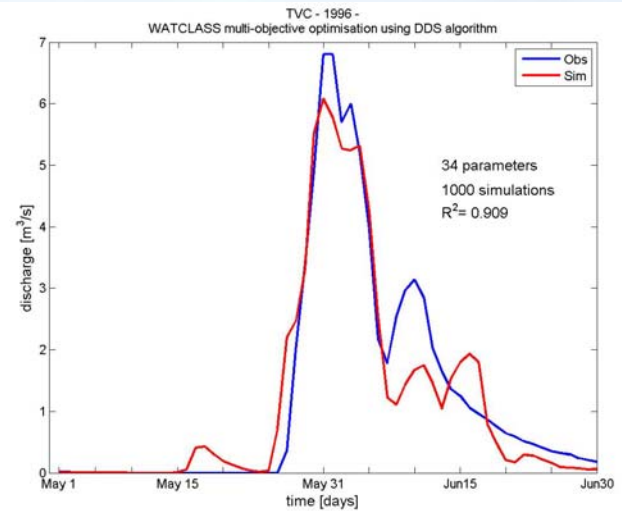
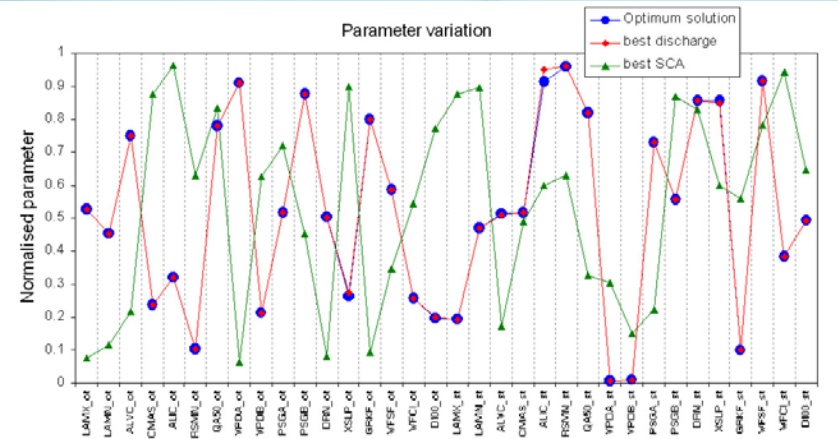
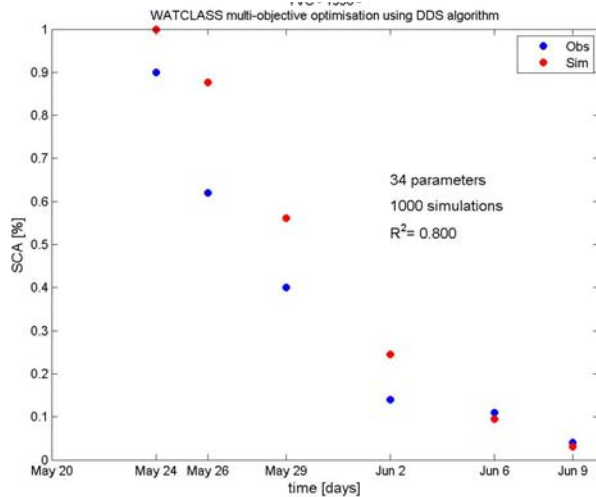
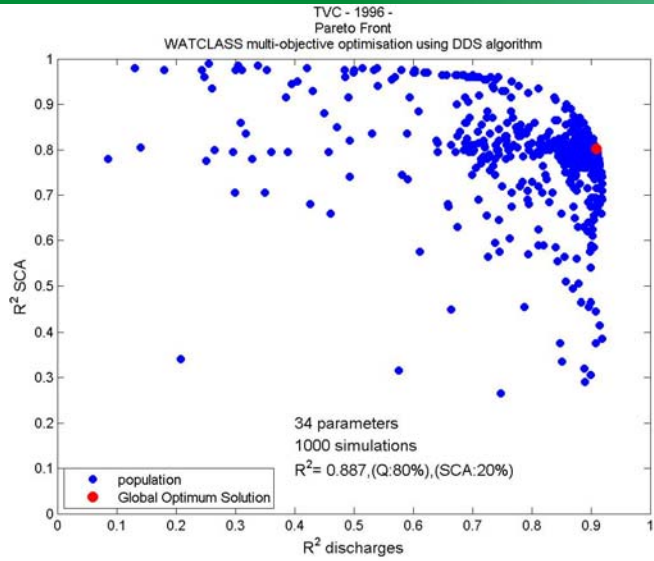
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Page 14

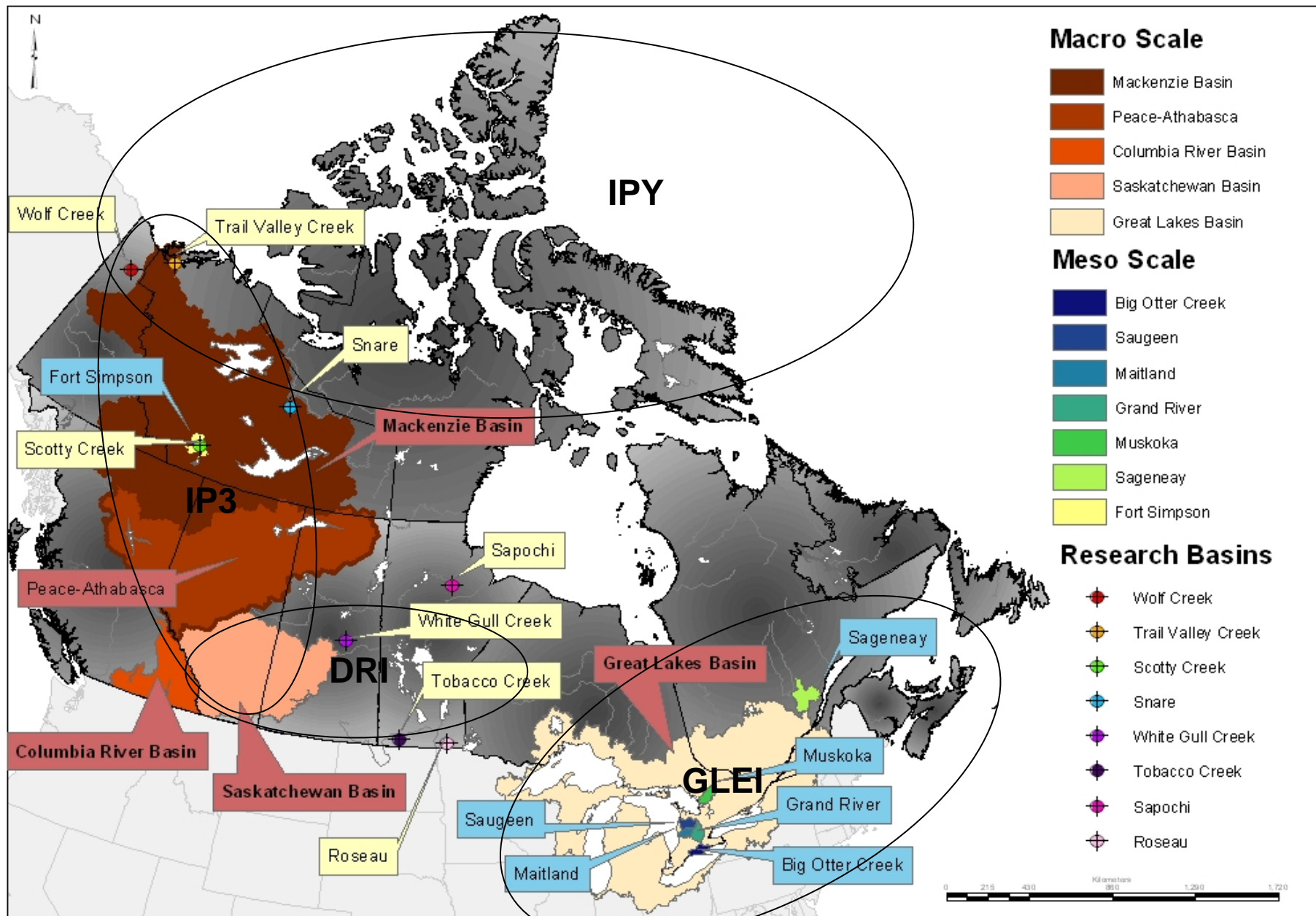
# Modeling strategy

- Incorporate result of diagnostic modelling (CHRM, others)
- Sensitivity of new physics into MESH ?
  - Major flux boundaries (ET, streamflow)
- Test parameterization
  - Multi-objective ?
- Basin segmentation ?
  - Forcings ?
  - Physics ?
  - Parameters ?
- Is the GRU scalable ?

# Trail Valley







Map created by Jackie Bronson

**Thank you!**

