Summary of NAESI Water Availability Indicators and applications to DRI

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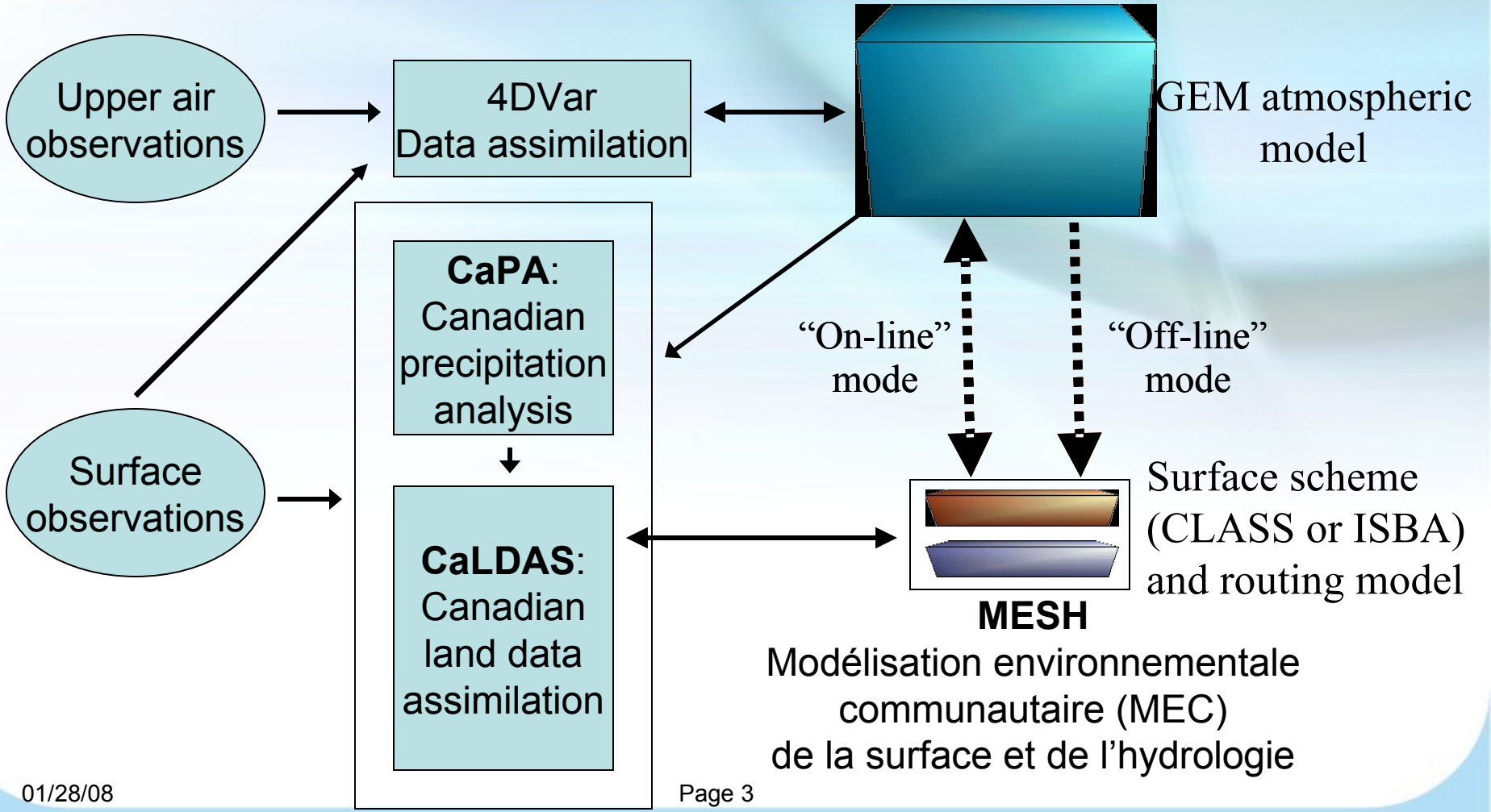
NAESI objectives

The water availability sub-component of the NAESI water theme focuses on

- ***the development and testing of a framework** to predict **available water supplies** in agriculturally-dominated watersheds*
  - Indices include precipitation, SWE, evaporation, runoff and soil moisture
- *current focus is on the South Saskatchewan River Basin*

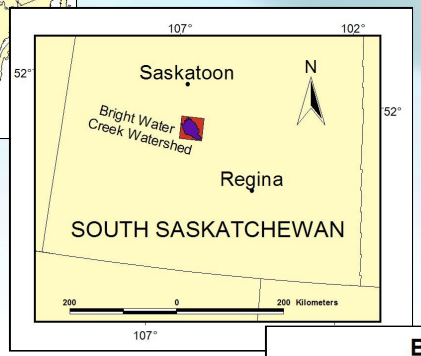
Envisioned Environmental Prediction Framework



Two nested modelling domains

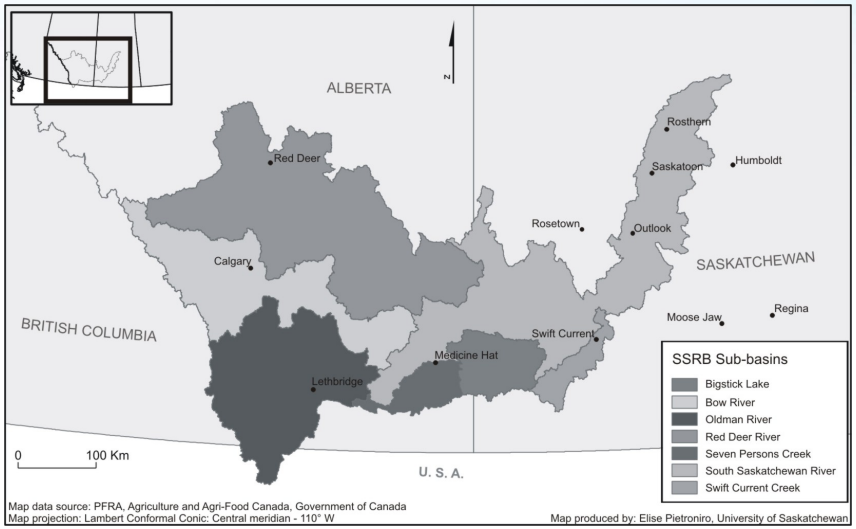
SSRB

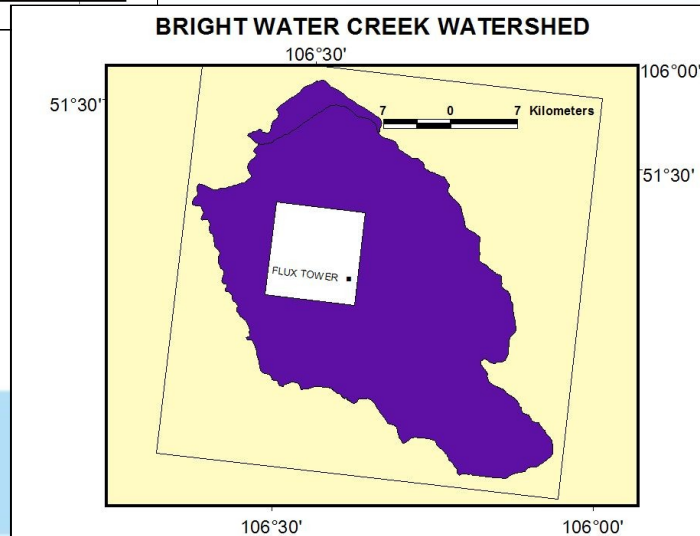
xOrigin	-117.0000
yOrigin	48.0000
xCount	60
yCount	27
xDelta	0.2º
yDelta	0.2º



Brightwater Creek

xOrigin	-106.6836
yOrigin	51.199
xCount	54
yCount	52
xDelta	800 m
yDelta	800 m





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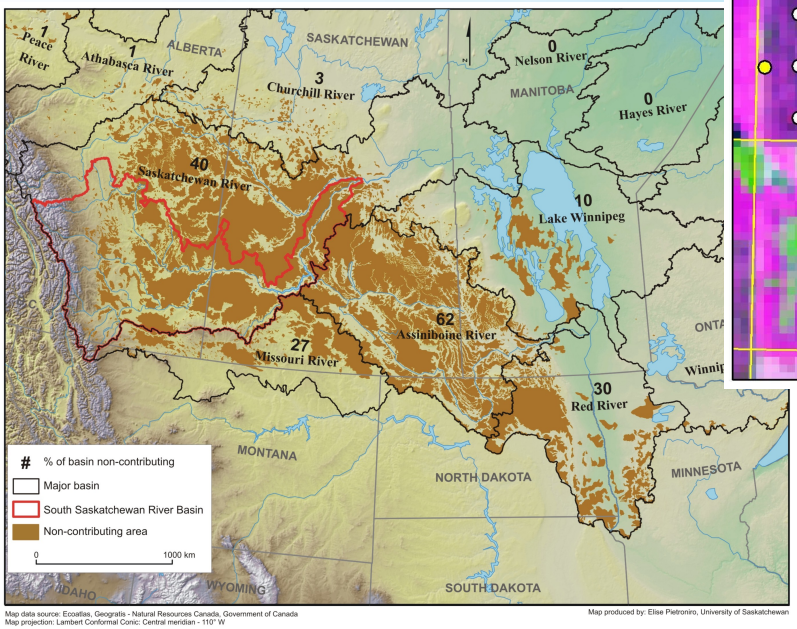
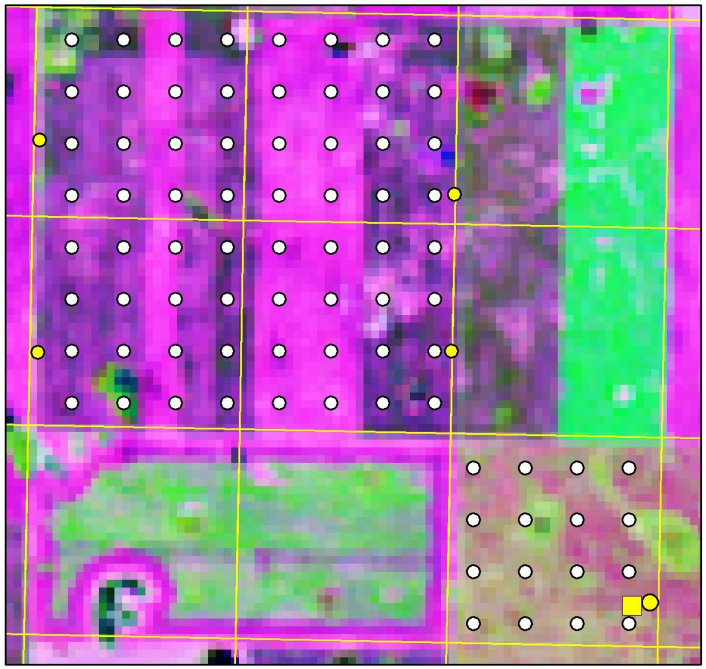
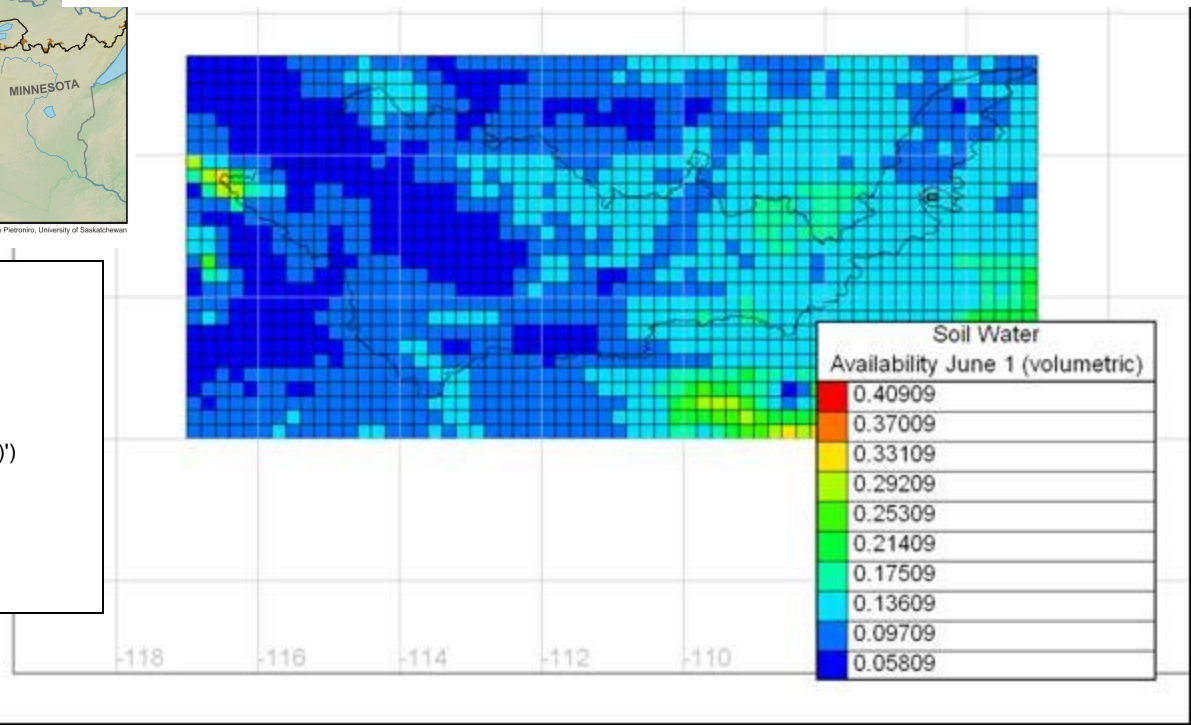
HAL-DRI-NAESI





- 16-Point Survey Grid
- Soil Moisture & Rain Stations
- Flux & Met. Station
- Quarter Section Grid (800x800m)




```
CALDAT,k,my_month,my_day,my_year
IF (my_year MOD 4) GT 0 THEN days_in_mont
                h[1]=28 ELSE days_in_month[1]=29

IF (my_month LT 10 ) THEN mm='0'+STRING(my_month,
                FORMAT='(I1)')
                ELSE mm=STRING(my_month,FORMAT='(I2)')
IF (my_day LT 10 ) THEN dd='0'+STRING(my_day,
                FORMAT='(I1)')
ELSE dd=STRING(my_day,FORMAT='(I2)')

dum_y=STRING(my_year,FORMAT='(I4)')
yy= STRMID(dum_y,2)
```

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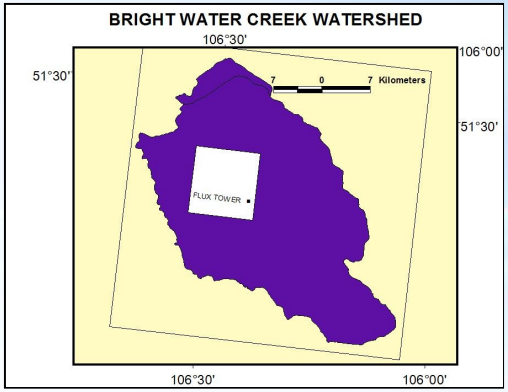
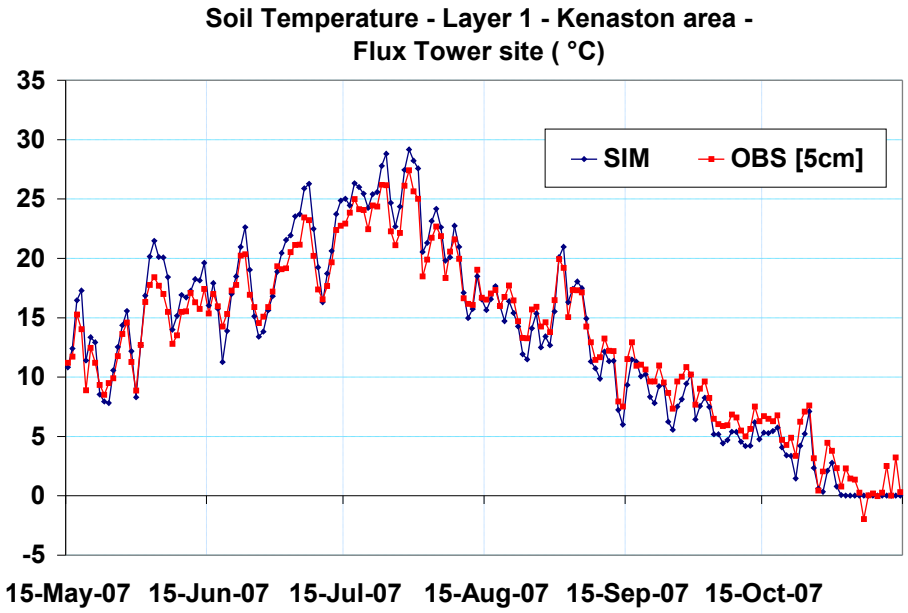
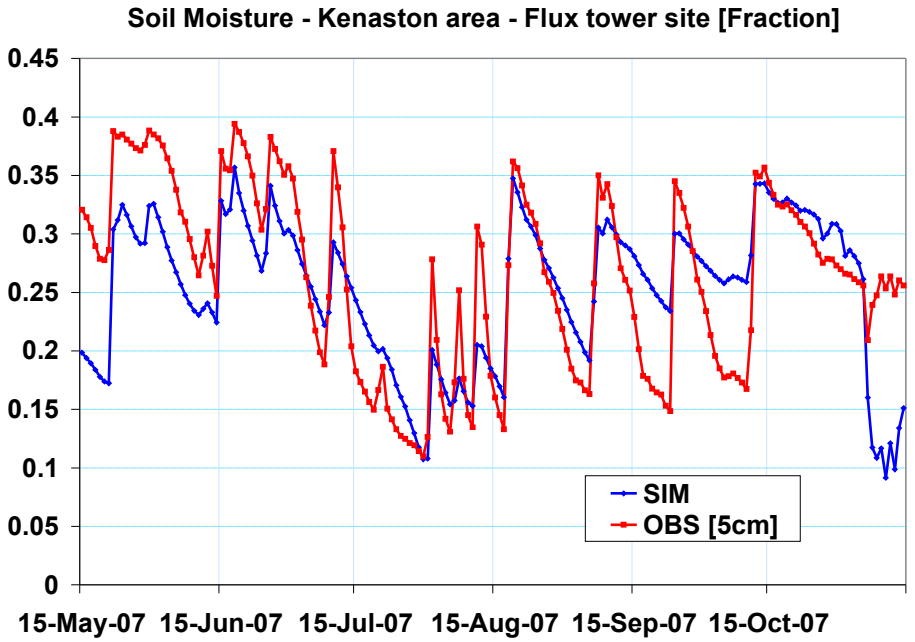
Stand alone MESH

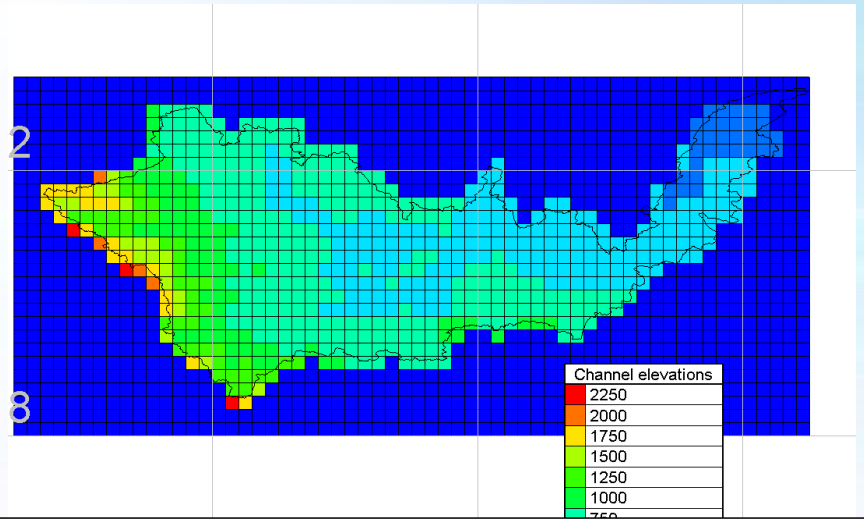


- MESH model physics (CLASS LSS)
  - with added routing based on Watroute
- Forcing with met tower data
  - Temp, precip, station pressure, specific humidty, wind, lw and sw radiation
- May 15 to November, 2007, half hourly

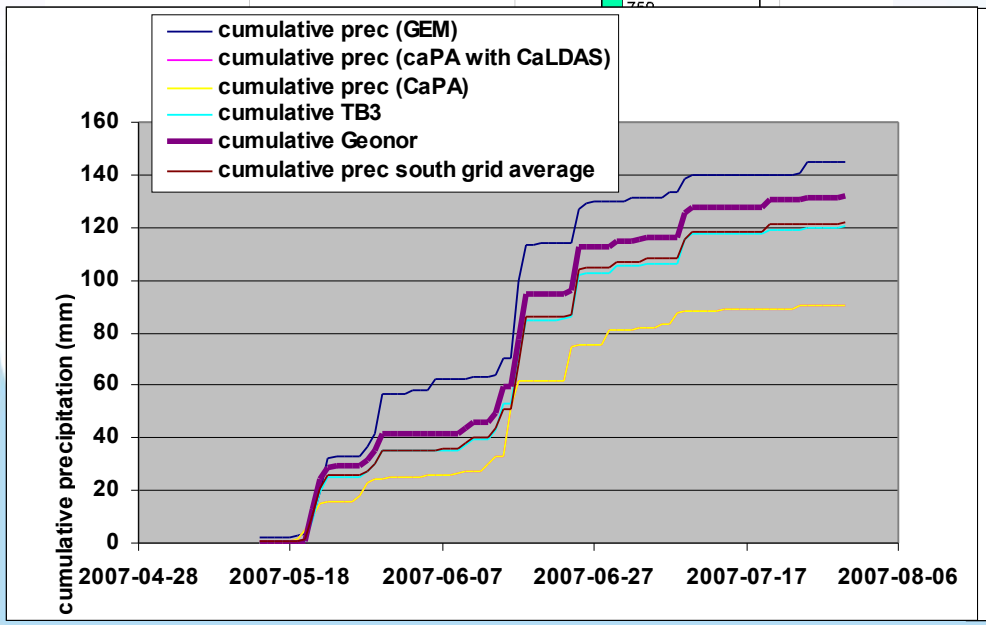


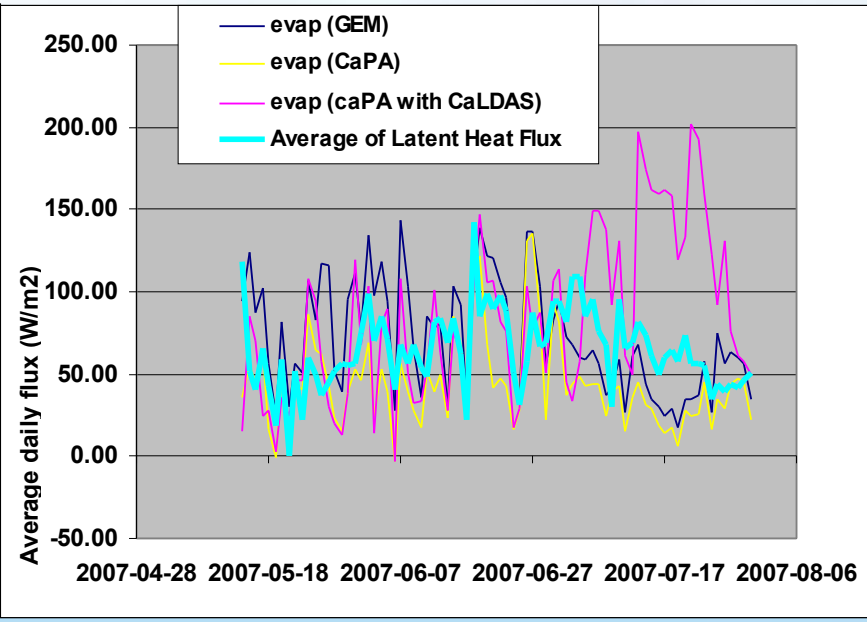


MEC/MESH with data assimilation

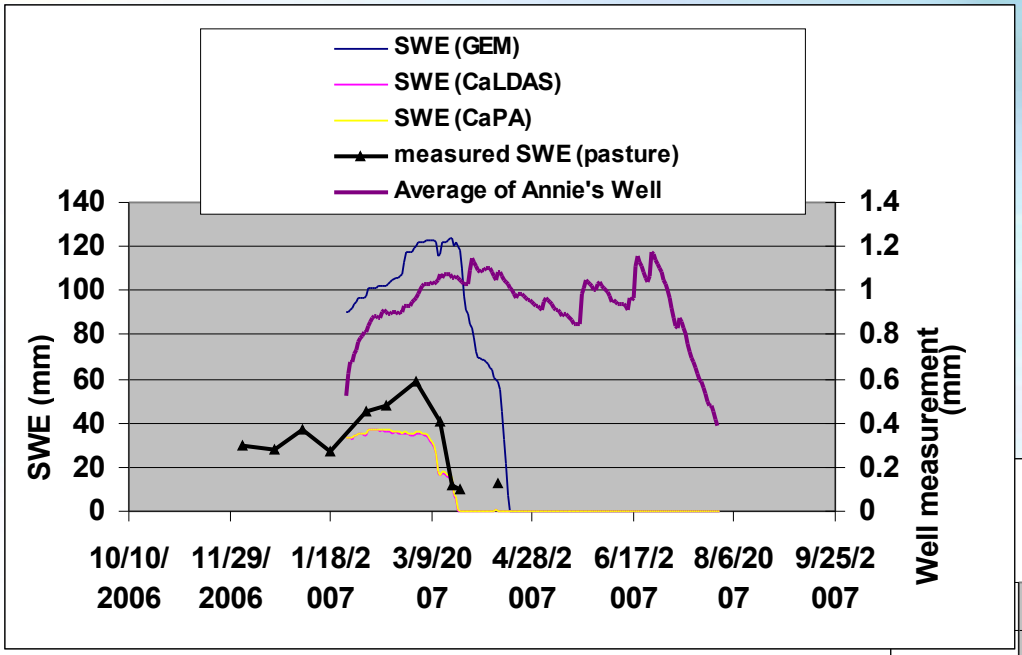


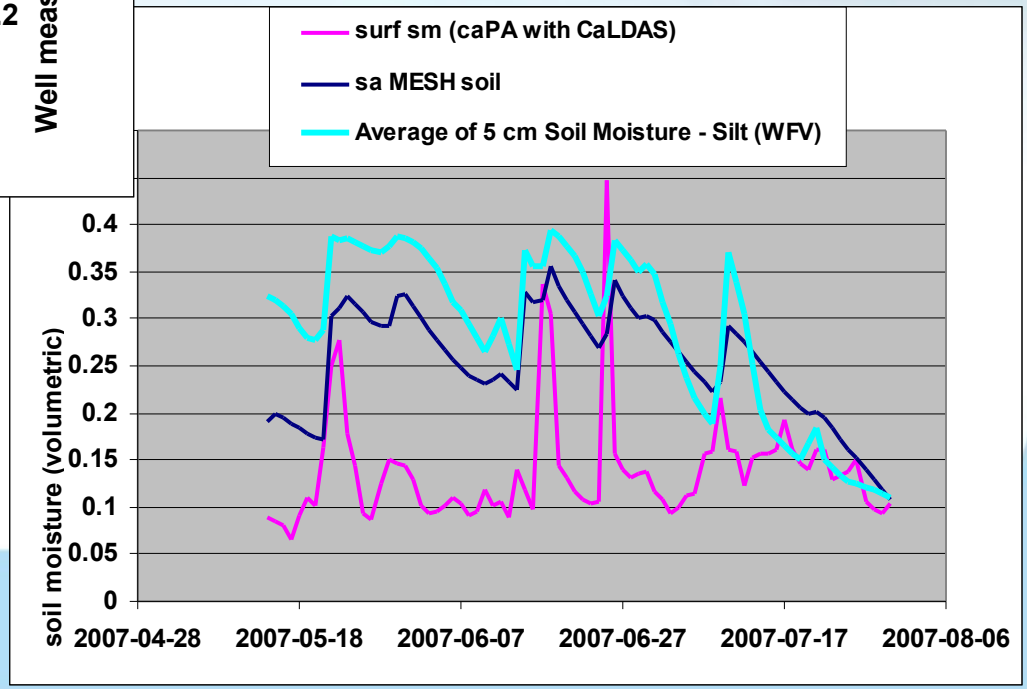
- MESH model physics (ISBA LSS, migrating to CLASS LSS in future)
  - with added routing based on Watroute
- Model forcing is archived GEM model output conditioned by precipitation reanalysis (CaPA) and land data assimilation (CaLDAS)
- August 1, 2006 to July 31, 2007





Stand alone MESH and MEC/MESH with field validation





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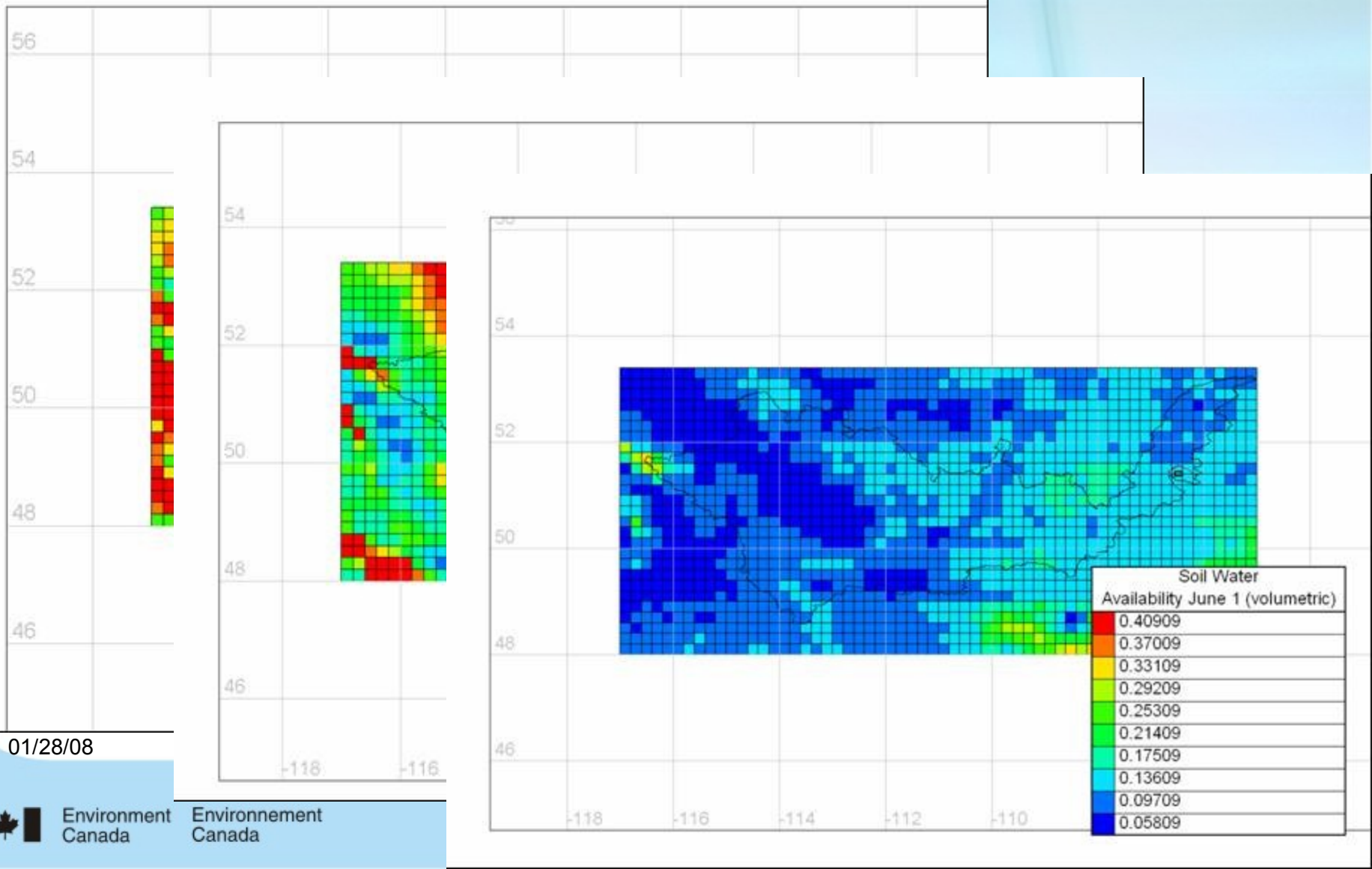
Water Availability Indicators



Summary and future considerations

- Stand alone MESH demonstrates that it is possible to reasonably replicate some water availability parameters
- MEC system is moving towards the same internal representation of the behavior of the land surface (MESH) and has the added benefit of the use of land surface data assimilation
  - geophysical fields
  - previously problematic bounding and initial conditions such as SWE and soil moisture
  - Incorporate CLASS 3.3. into operational MEC
- The goal is to provide calibration and verification from MEC stand-alone and evaluate the system in an operation mode.
  - Further evaluation over the next 2 years.
  - Expand domain to SSRB
  - Parameterizations and other changes to stand-alone MEC will be incorporated into the operational model.
- Force MESH standalone with RCM output

DRI community involvement

- Collaborative research in the area of land surface modelling
- Availability of NAESI datasets and model output to DRI researchers, online archive
- Support for Ph.D student (Dean Shaw - Variable contributing area)
- Support for PDF (Saul Marin – MESH modelling)