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Impact studies, transfer to CMC-Operations, data products, and outreach

S. Bélair, B. Bilodeau, and M. Carrera
Science and Technology Branch, Environment Canada



Second Canadian SMAP Workshop, Montreal, 16-17 November 2010



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IMPACT STUDIES: LIST of APPLICATIONS

(part of this project)

Weather prediction

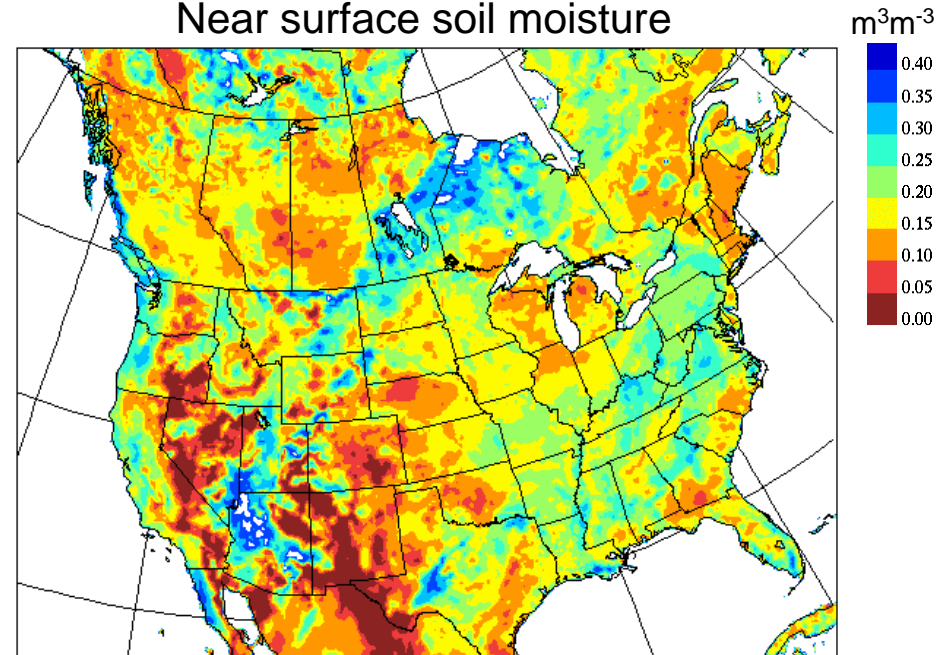
Air quality and emergency response

Hydrological prediction

Crops modeling

Carbon modeling

Near surface soil moisture



(valid at 1200 UTC 22 October 2004)



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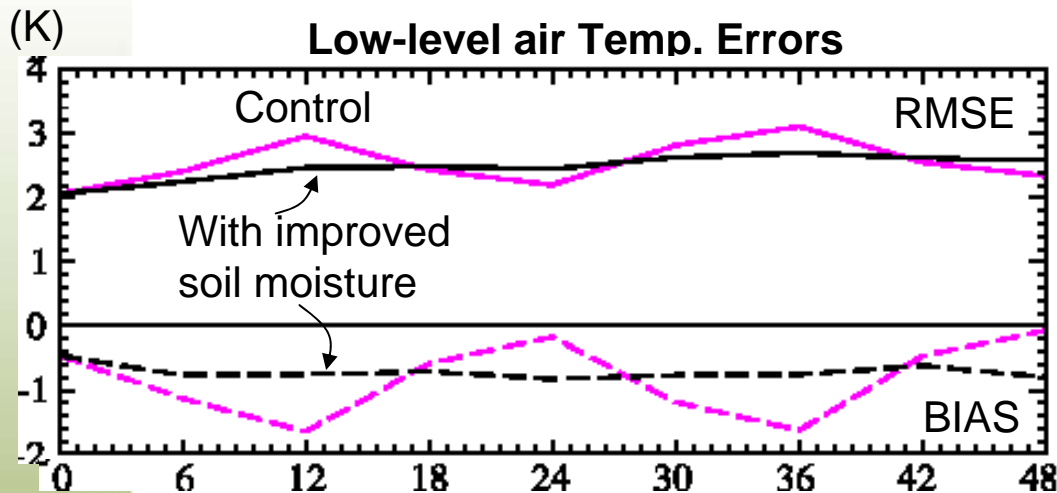
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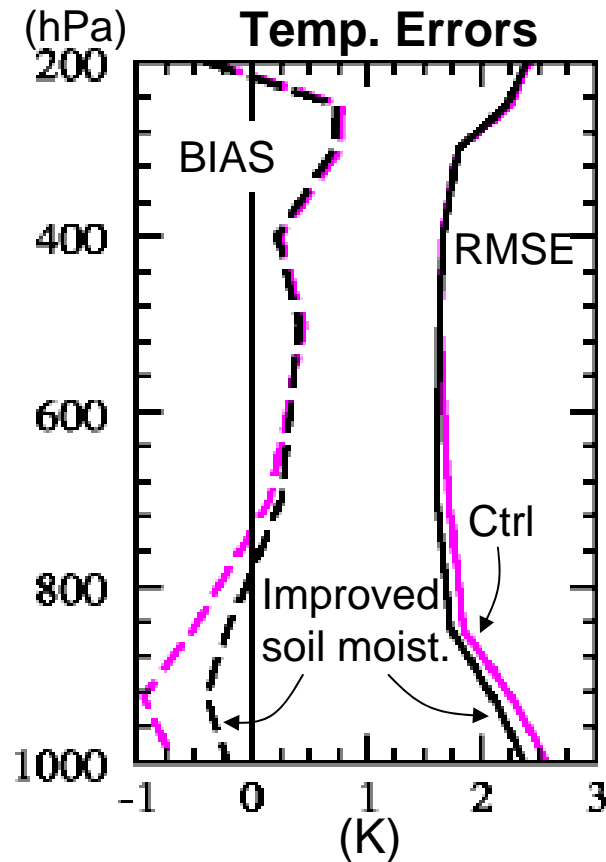
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MOTIVATION for BETTER SOIL MOISTURE in NWP MODELS

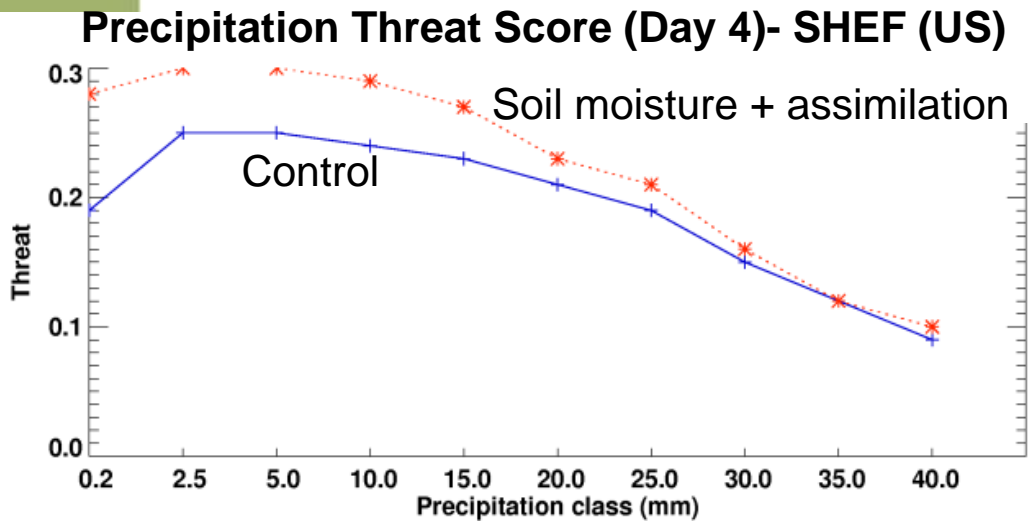
1 NEAR-SURFACE AIR CONDITIONS



2 BOUNDARY-LAYER and MIXING



3 CLOUDS and PRECIPITATION



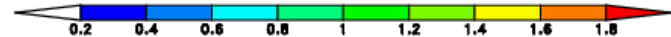
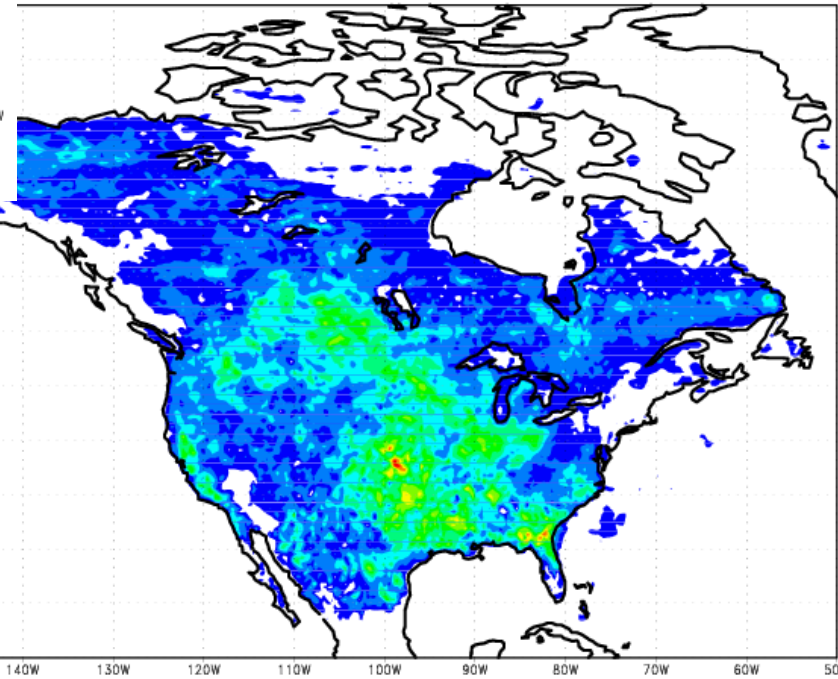
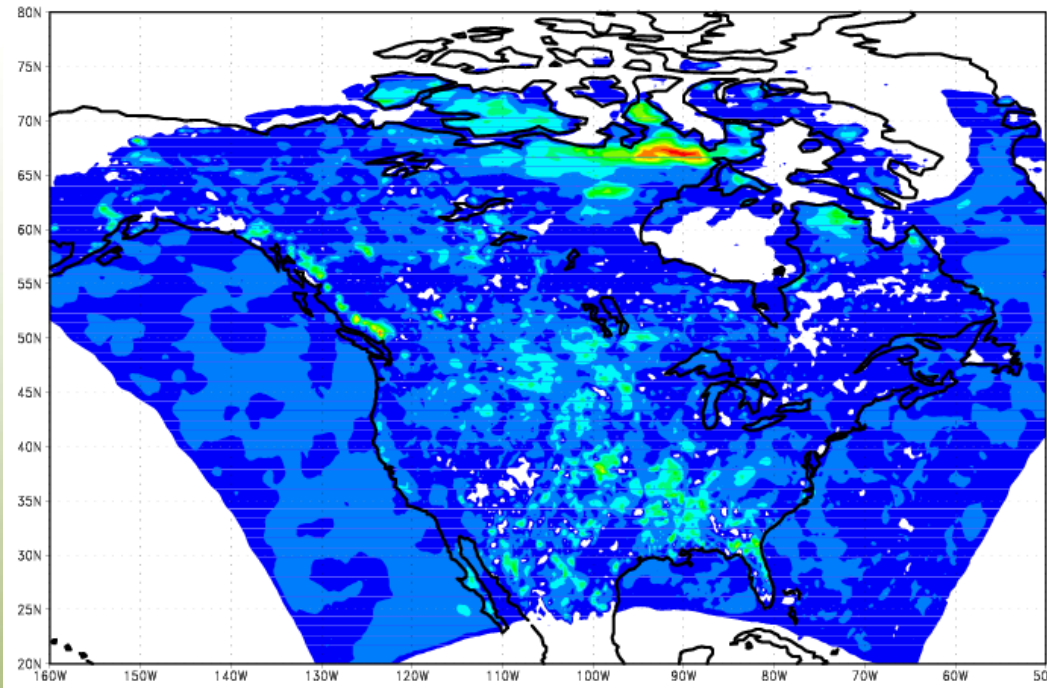
1 and 2: Implementation of short-range regional system in 2001. 48 cases (summertime)

3. Implementation of global medium-range in 2006. 116 cases (summertime)

SENSITIVITY of T2m to ROOT-ZONE SOIL MOISTURE



*Standard deviation
20 members – 33 km
5 cases (summer 2009)
Screen-level temperature (K)
48h integrations*



**All surface parameters
perturbed (veg, LAI,
Albedo, z0, mg, SST,
Slth, Slfract)**

**Only root-zone
SM perturbed**



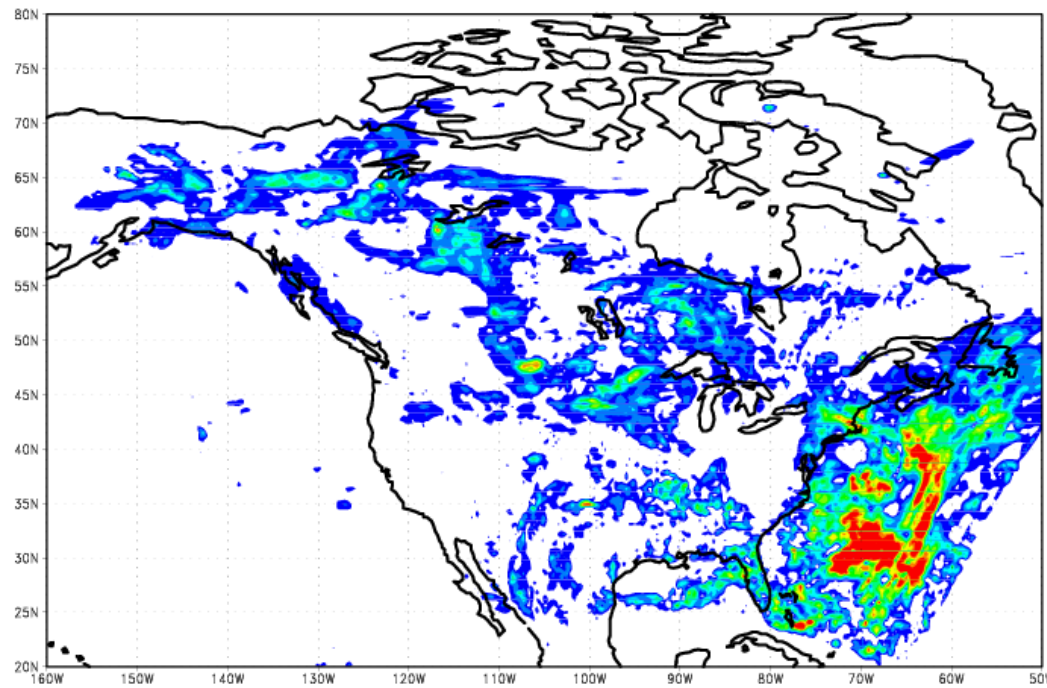
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SENSITIVITY of PRECIPITATION to ROOT-ZONE SM

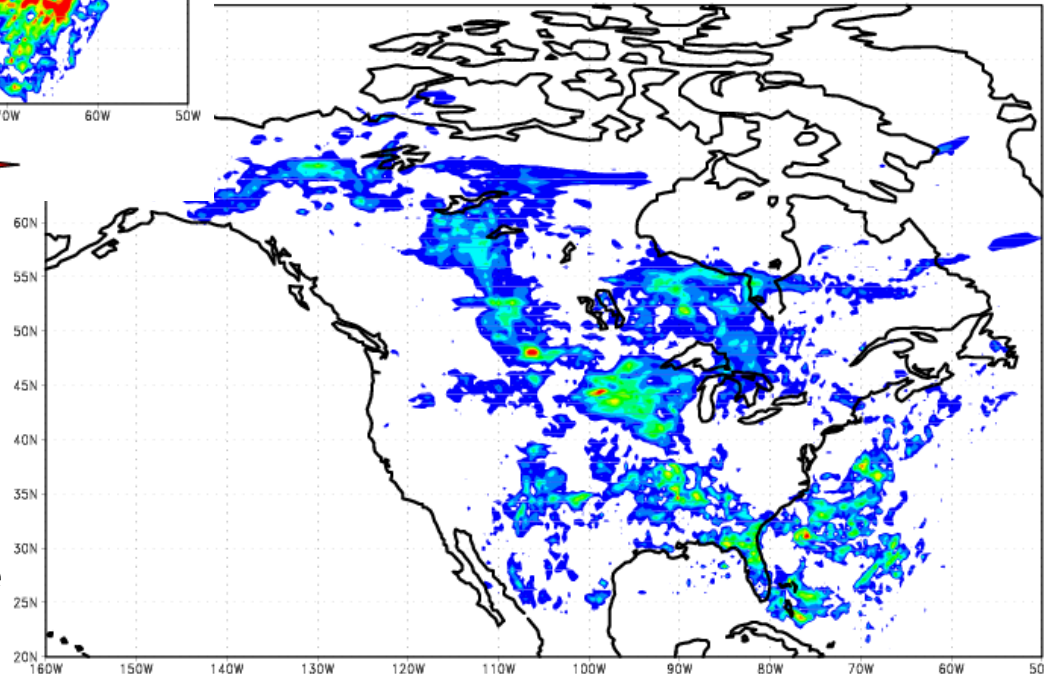


**Standard deviation
20 members – 33 km
5 cases (summer 2009)
Pr(48h)-Pr(36h) (mm)
48h integrations**



**All surface parameters
perturbed (veg, LAI,
Albedo, z0, mg, SST,
Slth, Slfract)**

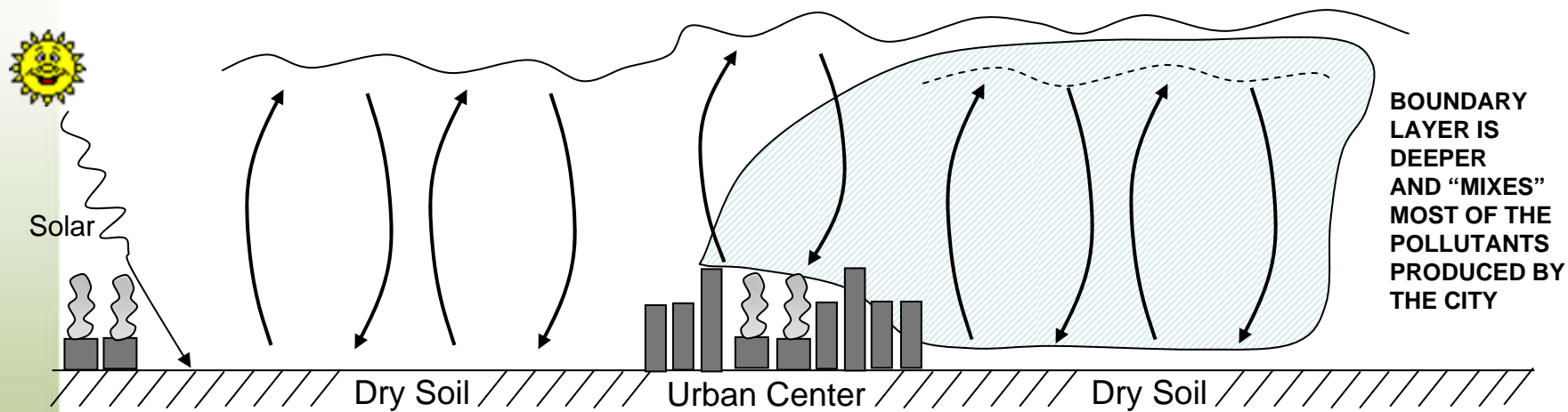
**Only root-zone
SM perturbed**



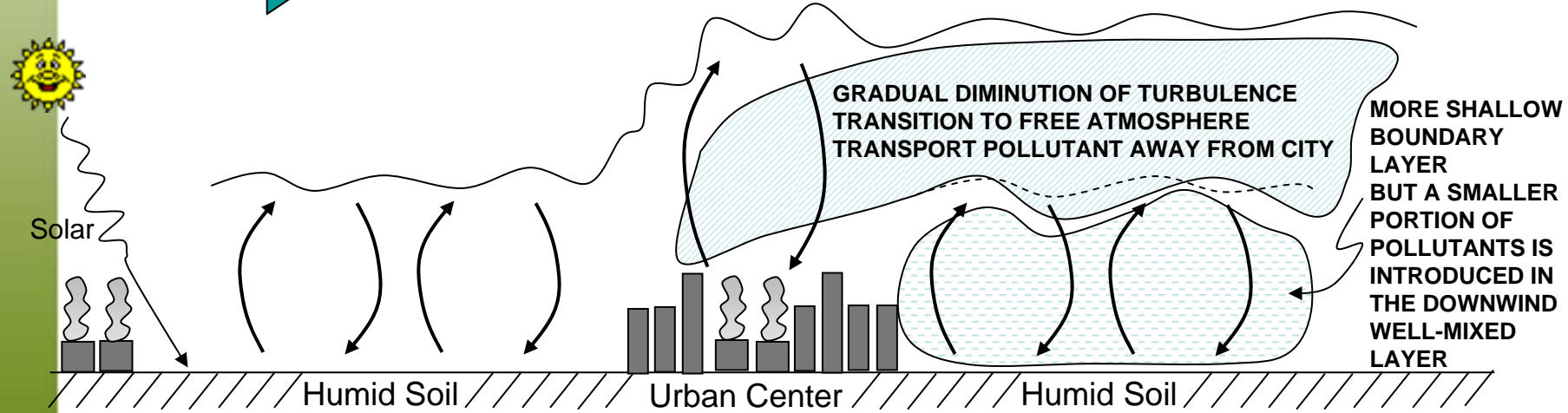
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SOIL MOISTURE and AIR QUALITY / DISPERSION



MEAN FLOW →



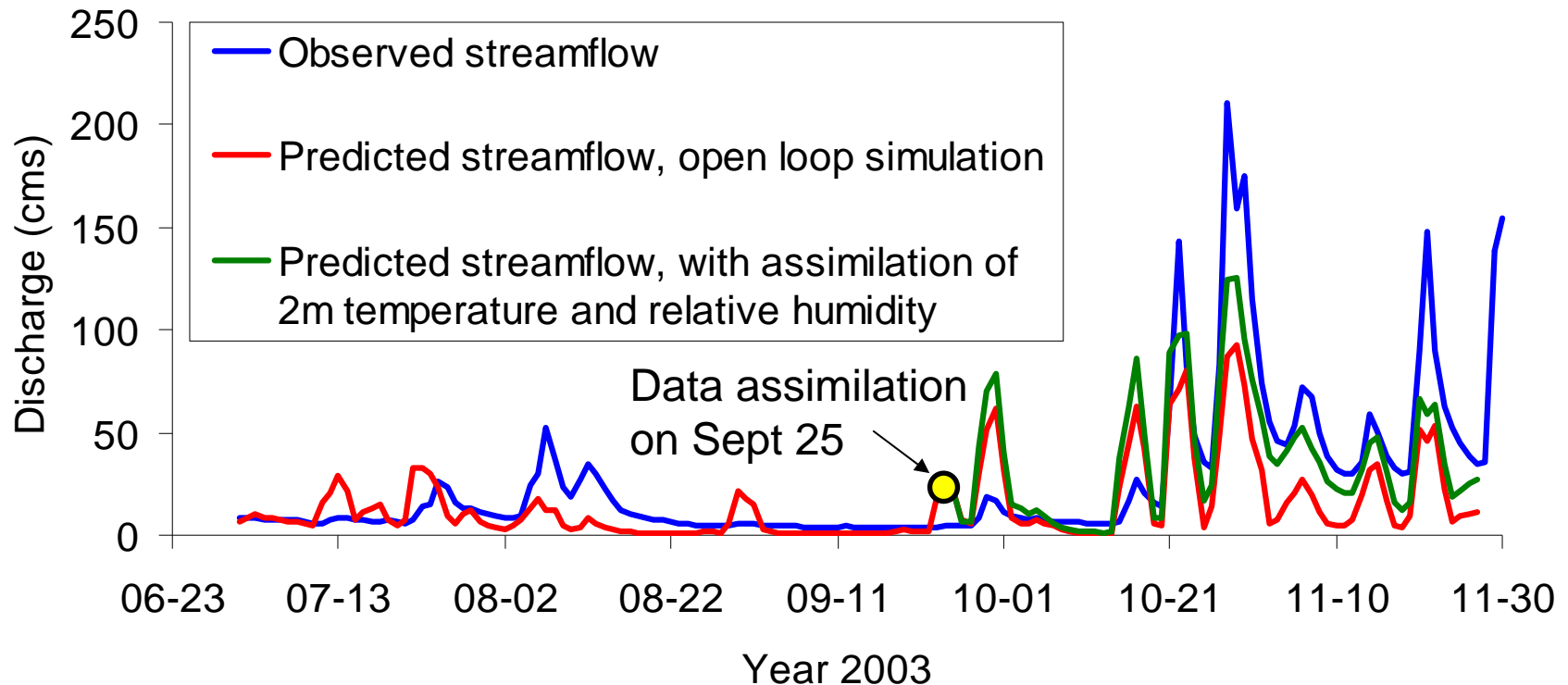
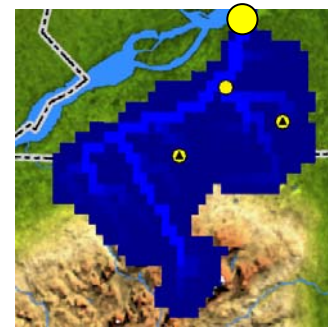
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IMPACT on HYDROLOGY

- Châteauguay River
 - Data assimilation improves simulation of base flow
 - Peak flow still underestimated



SMAP DATA PRODUCTS

Product	Short Description	Resolution	Latency	
L1A_S0	Radar raw data in time order	–	12 hours	Instrument Data
L1A_TB	Radiometer raw data in time order	–	12 hours	
L1B_S0_LoRes	Low resolution radar σ_o in time order	5x30 km	12 hours	
L1B_TB	Radiometer T_B in time order	36x47 km	12 hours	
L1C_S0_HiRes	High resolution radar σ_o	1-3 km	12 hours	
L1C_TB	Radiometer T_B	36 km	12 hours	
L2_SM_A	Soil moisture (radar)	3 km	24 hours	Science Data (Half-Orbit)
L2_SM_P	Soil moisture (radiometer)	36 km	24 hours	
L2_SM_A/P	Soil moisture (radar/radiometer)	9 km	24 hours	
L3_F/T_A	Freeze/thaw state (radar)	3 km	36 hours	Science Data (Daily Composite)
L3_SM_P	Soil moisture (radiometer)	36 km	36 hours	
L3_SM_A/P	Soil moisture (radar/radiometer)	9 km	36 hours	
L4_SM	Soil moisture (surface & root zone)	9 km	7 days	Science Value-Added
L4_C	Carbon net ecosystem exchange (NEE)	9 km	14 days	



CANADIAN SMAP DATA PRODUCTS (DELIVERABLES)

DATA ASSIMILATION / MODELING PRODUCTS

Product	Domain	Resolution	Frequency	Latency
Soil moisture (near surface and root zone)	Canada*	10 km (1 km)	Hourly	24h (6h)
FT state	Canada*	3 km (1 km)	Hourly	24h (6h)
Vegetation (LAI, biomass)	Canada*	10 km (1 km)	Daily (Hourly)	24h (6h)
Net ecosystem exchange	Canada*	10 km (1 km)	Daily (Hourly)	24h (6h)

*) Global products will also be generated

Baseline
(target)



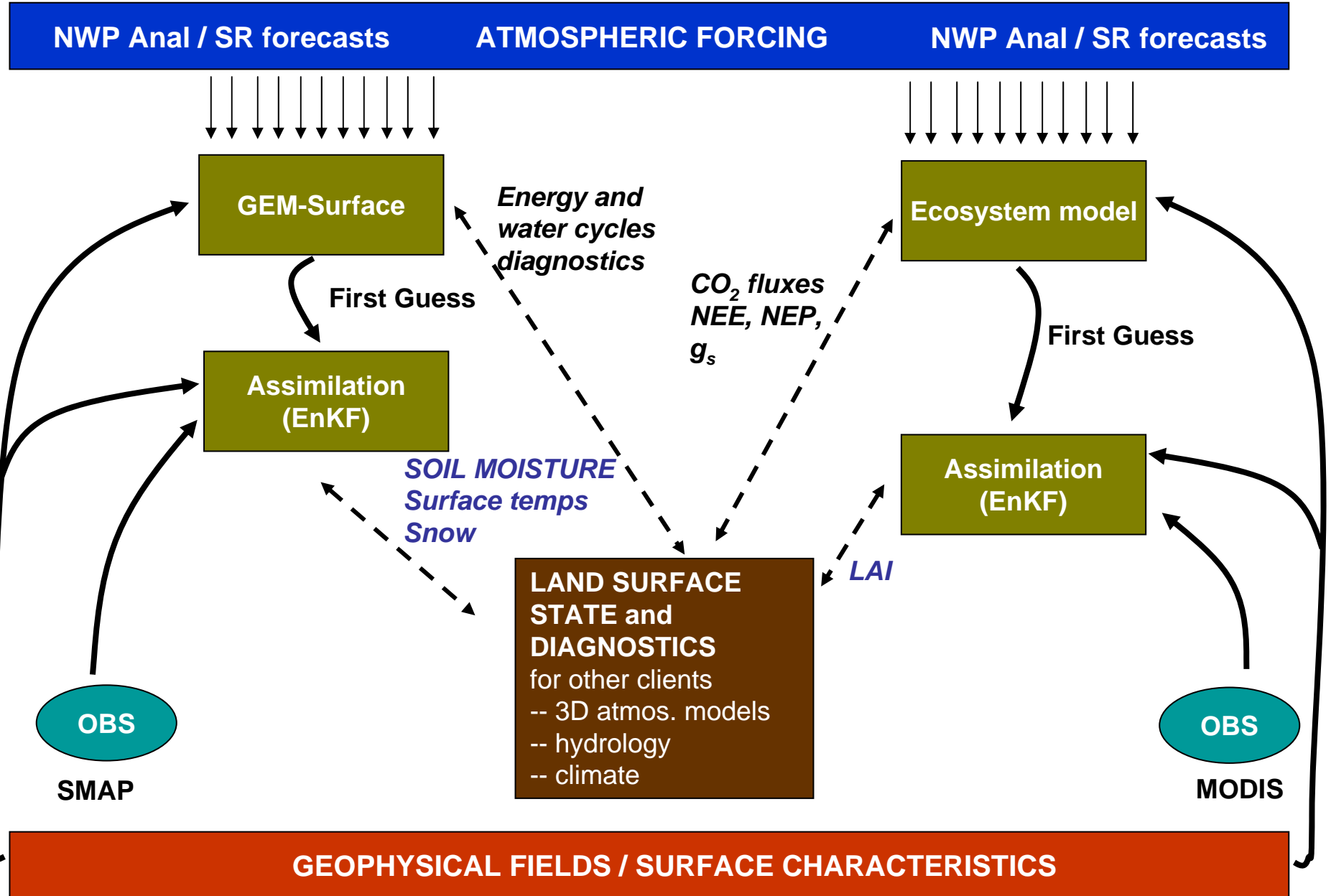
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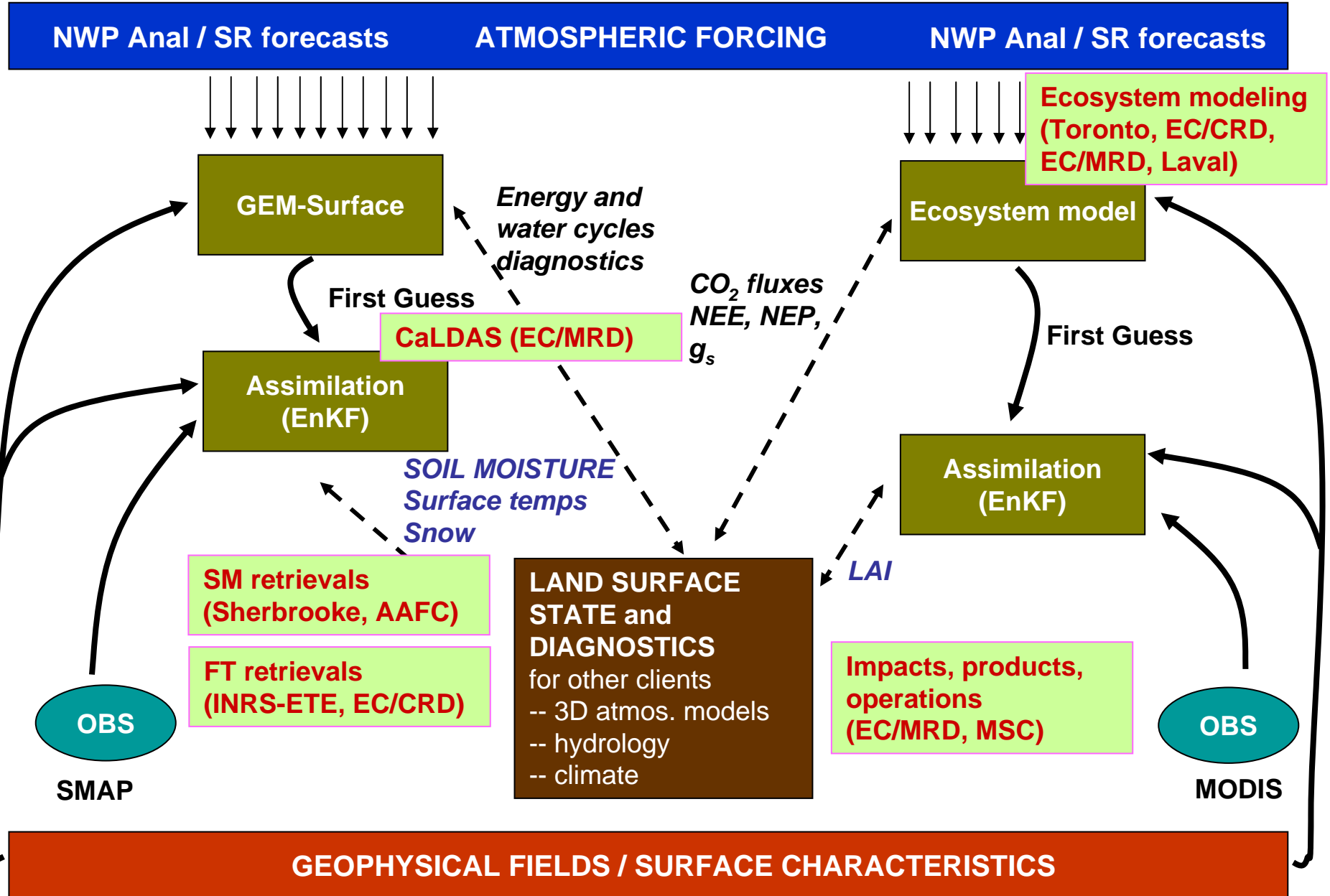


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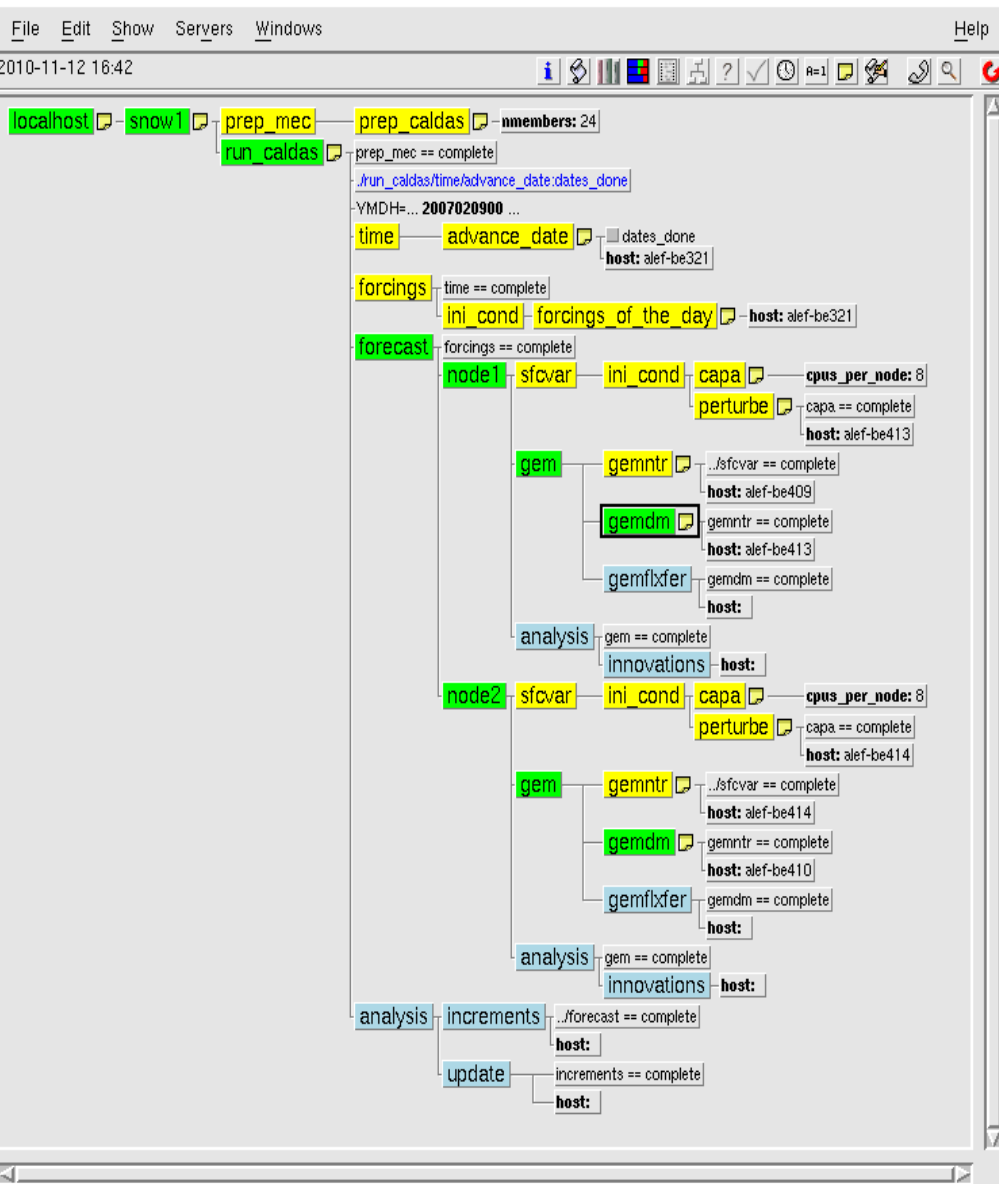
ASSIMILATION and MODELING SYSTEMS



ASSIMILATION and MODELING SYSTEMS - COLLABORATIONS



TRANSFER to CMC-OPERATIONS



Geophysical databases

Connection with atmospheric systems

Data reception / quality control

Operational task sequencer (Maestro)

Demonstration impact (objective evaluation)

Monitoring / display system

Transfer to all project partners

Availability to all Canadians

Outreach / applications in OGD and in NGO / special products



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OUTREACH / OTHER APPLICATIONS

Forestry

Seasonal climate prediction

Drought monitoring and prediction

Flood monitoring and prediction

Human health

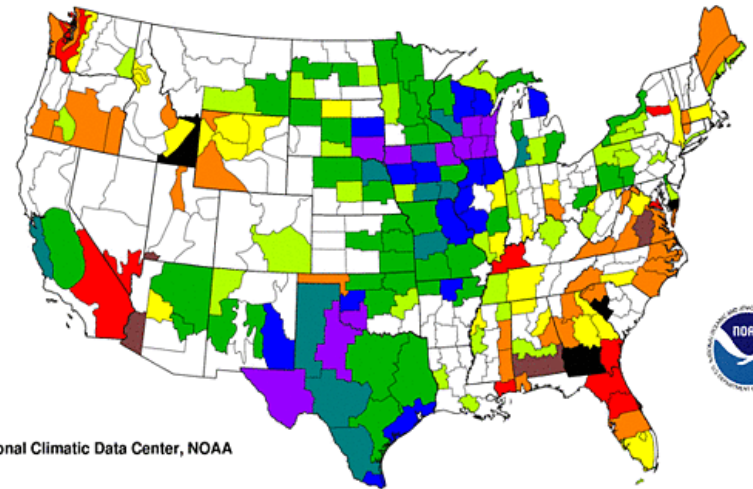
Mobility

Sea ice monitoring

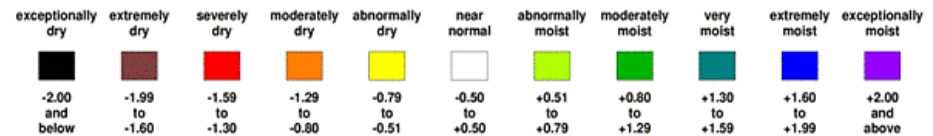
Insurance sector

Standardized Precipitation Index
One Month

July 2010



National Climatic Data Center, NOAA



The Standardized Precipitation Index (SPI) for July 2010.



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