



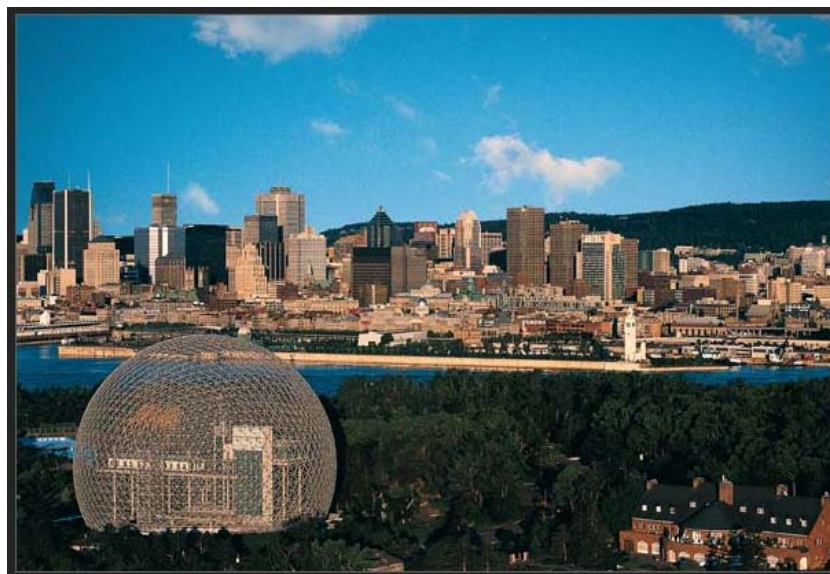
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# ***The Canadian SMAP Science and Applications Plan***

***Stéphane Bélair,***  
*Science and Technology Branch, Environment Canada*



2<sup>nd</sup> Canadian SMAP Workshop, Montreal, 16-17 November 2010



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# **CURRENT STATUS**



***Leadership from EC and CSA***

***First workshop in Montreal on 6-7 October 2009***

***CanEx-SM10 campaign in Saskatchewan in June 2010***

***Document for the plan almost completed (will be by the end of this calendar year – hopefully...)***

***Preliminary budget currently being discussed with CSA***

***Discussion with CSA on how to allocate and transfer funds***



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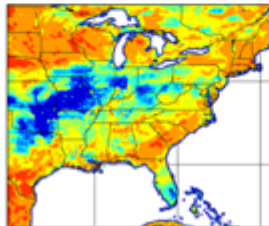
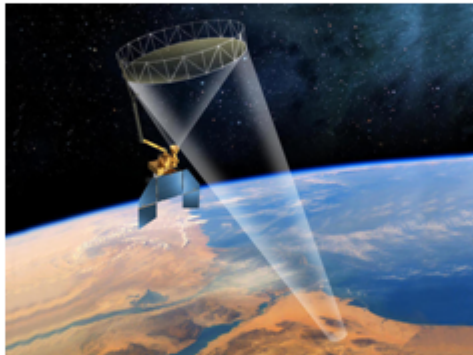
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# OBJECTIVES of the CANADIAN PLAN

## Canadian Science and Applications Plan for the Soil Moisture Active and Passive Mission



November 2010

 Environnement Canada Environment Canada



***Contribute to the calibration / validation of SMAP soil moisture and freeze/thaw products by acquiring and processing experimental data over Canada.***

***Improve the representation of the energy, water, and carbon cycles in Canadian environmental analysis and prediction systems, using SMAP soil moisture and freeze/thaw data.***



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# **COMPONENTS / PARTICIPANTS to the SMAP CANADIAN PLAN**

## **Cal-val soil moisture**

Networks, reference sites

(EC/HAL, Guelph)

Field campaigns

(EC/MRD/CRD/HAL, AAFC, NRC, Guelph, Sherbrooke)

## **Cal-val freeze/thaw and carbon fluxes**

Networks, reference sites

(Fluxnet-Canada, Waterloo?)

Field campaigns

(EC/MRD/CRD, NRC, INRS-ETE)

## **Soil moisture and FT retrievals**

(AAFC, Sherbrooke, Waterloo?)

## **Soil moisture and FT data assimilation**

(EC/MRD)

## **Carbon cycle analysis**

(EC/MRD/CRD, Laval, U. Toronto)

## **Impact studies, products generation, and transfer to Operations**

(EC/MRD, CMC)



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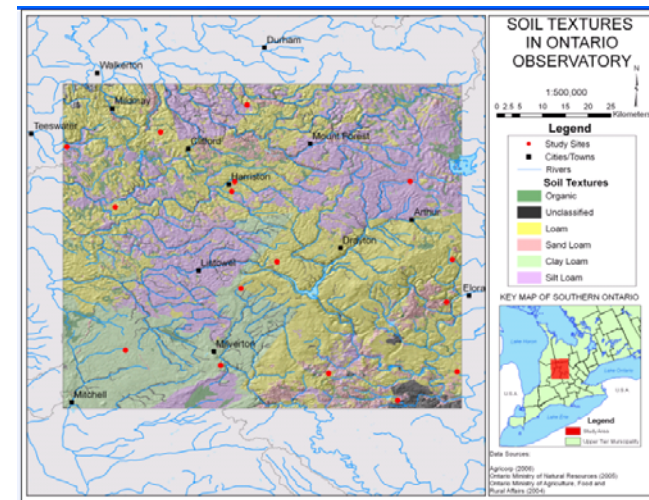
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# CORE SITES (I)

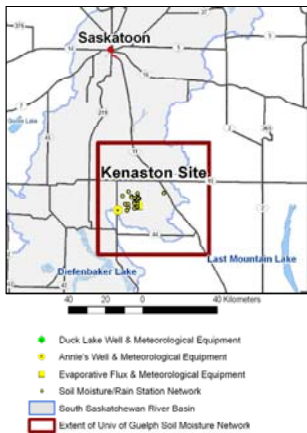
## Southern Ontario agricultural SM network

*University of Guelph (A. Berg)*  
*15 stations, 60km x 60km area*  
*Soil moisture at 5, 20, and 50cm*



## Saskatchewan low and high-density SM networks

*University of Guelph (A. Berg) and EC (B. Toth)*  
*16 stations, 60km x 60km area for low-res*  
*24 stations, 10km x 10km area for high-res*  
*Soil moisture at 5, 25, and 50cm*



## Red River SM network



*Incremental implementation by AAFC*  
*Brunkild sub-watershed selected (60km x 10km)*  
*One of GEO JECAM international super sites*  
*Installation of 10 stations in spring 2011*  
*Each station with 12 Hydra Probes*  
*3 replicates and 4 depths (5, 20, 50, and 100cm)*

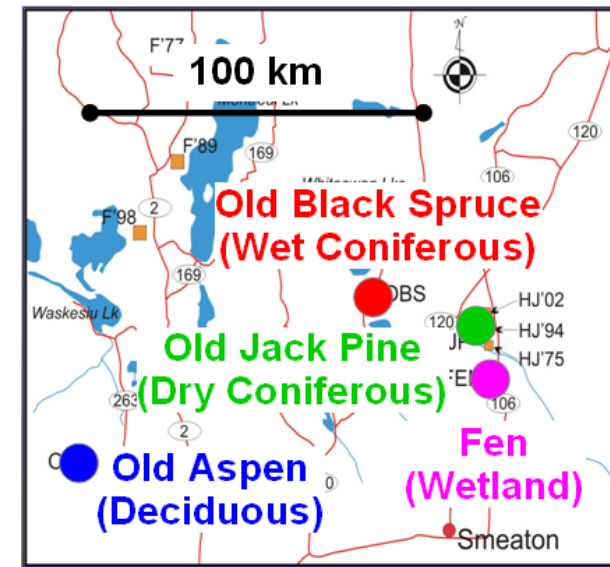


# CORE SITES / NETWORKS (II)

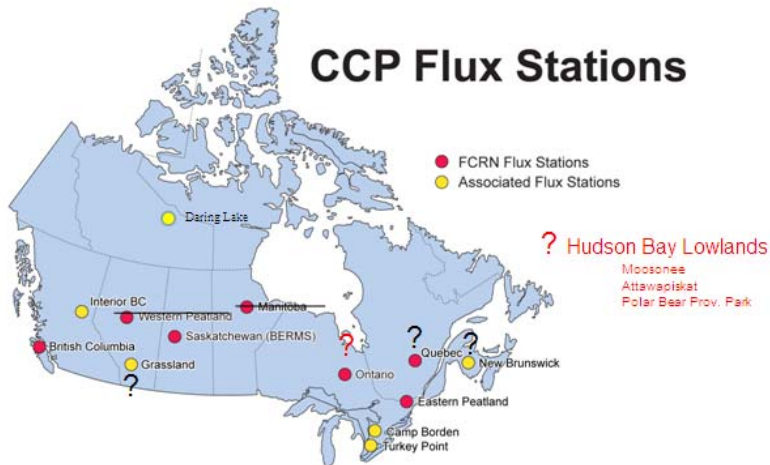
## Boreal forest sites in Saskatchewan (BERMS)

*Cooperative venture between EC, CFS, and Parks Canada.*

*Useful for SM, FT, and carbon fluxes (towers).*



## CCP Flux Stations



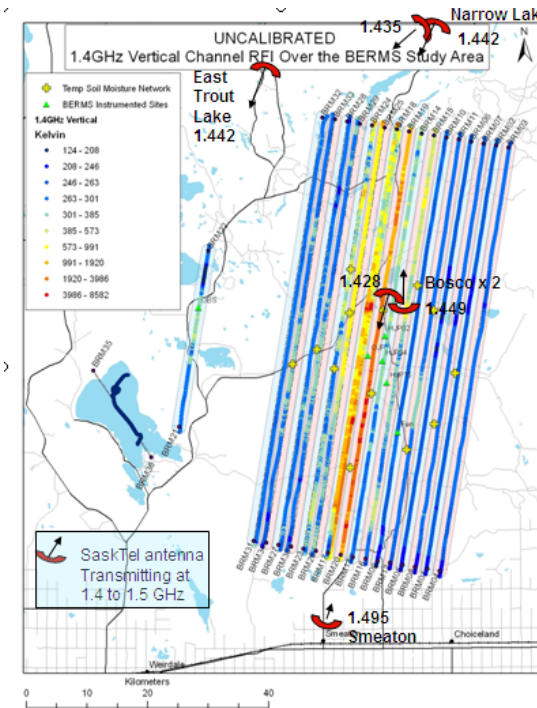
## Canadian Carbon Program Fluxnet Canada

*BERMS is one of these sites  
Funding for Canadian Fluxnet  
uncertain...*

# FIELD EXPERIMENTS for SM and FT

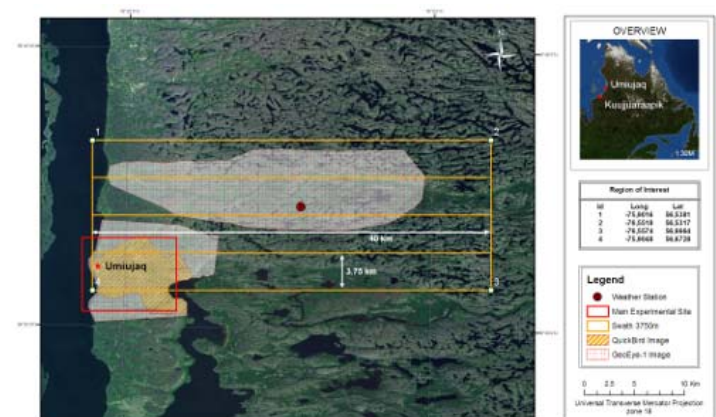
## CanEx-SM10

*Took place in Saskatchewan, 2 to 17 June 2010*  
*Joint effort for SMOS validation and SMAP cal/val*  
*Agricultural (Kenaston) and boreal forest (BERMS)*  
*Surface networks (low and high density at KEN and BERMS) + additional ground support*  
*UAVSAR + EC radiometers*



## CanEx-FT

*Objective to cal/val FT transition in spring and/or fall conditions (fall 2011)*  
*In Northern Quebec, possibly involving UAVSAR and EC's radiometers (Twin Otter)*  
*Science plan, design, and budget being prepared*



## CanEx-SM15 (post-launch)

*Part of the plan that will be submitted to CSA – part of SMAPVEX15?*



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# Cal-Val PART of the WORKSHOP

The Guelph networks (Aaron Berg)

The EC networks (Brenda Toth)

The BERMS site (Anne Walker)

AAFC's Red River test bed (Heather McNairn)

The CanEx-SM10 field campaign  
(Ramata Magagi)

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The Churchill site and research at  
Waterloo (Claude Duguay)

Fluxnet-Canada (Jing Chen)

The CanEx-FT11 field experiment  
(Monique Bernier)

## For core sites and networks:

Contribute to SMAP cal-val  
objectives

Meet requirements and standards

Sustained through the cal-val period  
(with help?)

## For field campaigns

Scientific questions to be addressed

Coordination / collaboration with  
SMAP project

Timing with other field campaigns

Useful for all participants



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# **QUESTIONS / ISSUES for the Cal-VaI COMPONENT**

Funding for CanEx-FT11 (coming rapidly in 2011)

One or two field campaigns for FT?

CanEx-FT11: proceed with design and organization of the campaign; questions regarding the availability of PALS.

Participation to SMAPVEX12?

Post-launch in 2015 with US?

Use of Sherbrooke's ground-based microwave (including L-band) scatterometer.

Sustainability of Fluxnet-Canada (other than BERMS)



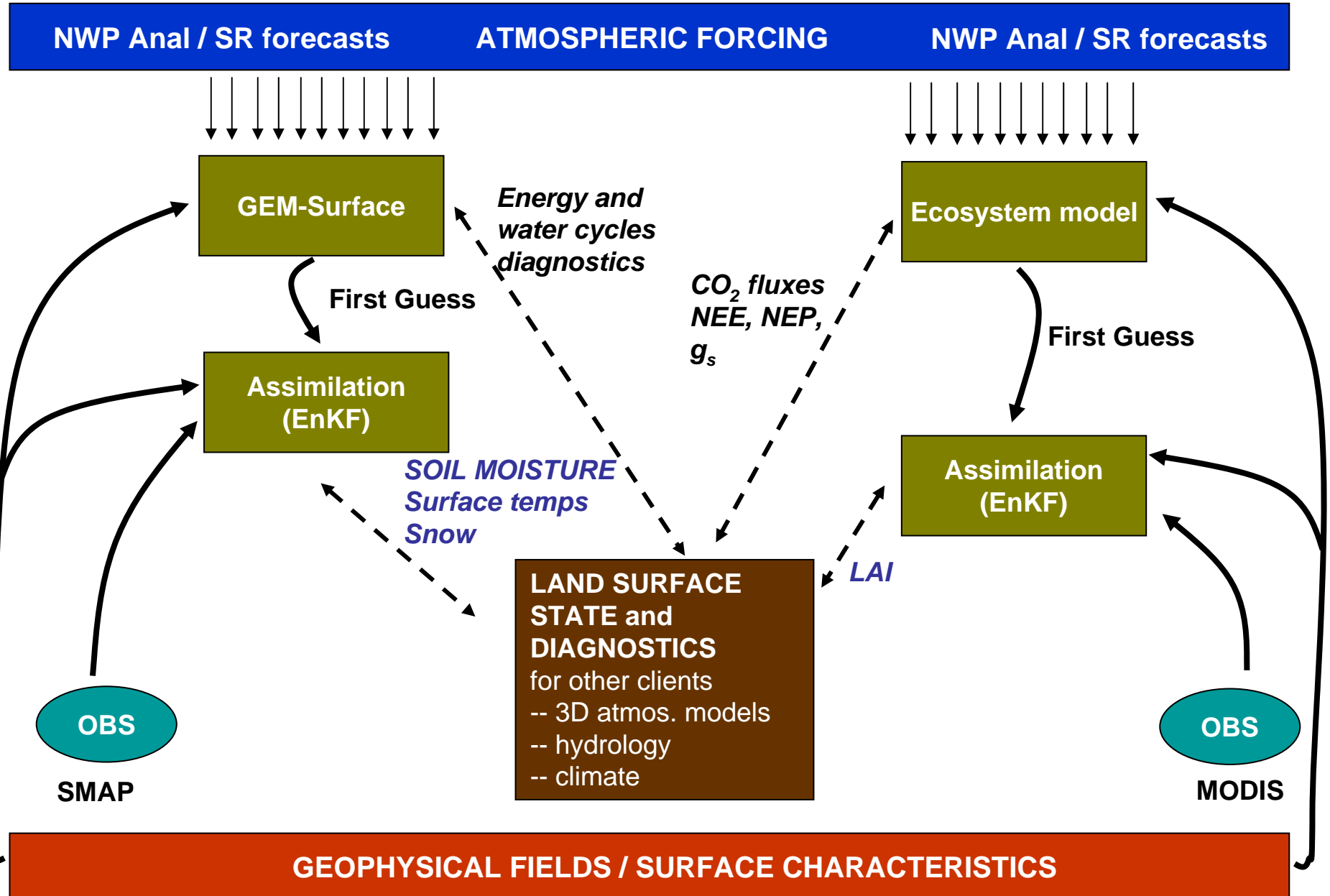
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# RESEARCH, DEVELOPMENT, APPLICATIONS, PRODUCTS





# RDAP PART of the WORKSHOP

AAFC's research plan for soil moisture retrieval (Heather McNairn)

Sherbrooke's research plan for soil moisture retrieval (Ramata Magagi)

Soil moisture data assimilation in CaLDAS (Marco Carrera)

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Terrestrial ecosystem and carbon modeling at UofT (Jing Chen)

Terrestrial ecosystem modeling and assimilation at EC/CRD (Douglas Chan)

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Impact studies and Canadian products (Stephane Belair)

***Need to show how each sub-project contributes to new and / or improved water, energy, and carbon products***

***... in addition of scientific interest for each participant***

***Transferability of algorithms / databases to EC or AAFC***

***Formation of highly-qualified persons***



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# QUESTIONS / ISSUES for the RDAP COMPONENT

Transfer to CMC-Operations (need someone at CMC)

Any work on FT retrievals?

Any link with atmospheric data assimilation of carbon (EC/CRD)

Multi-models approach for carbon modeling?

Operational needs from AAFC?

CCRS?



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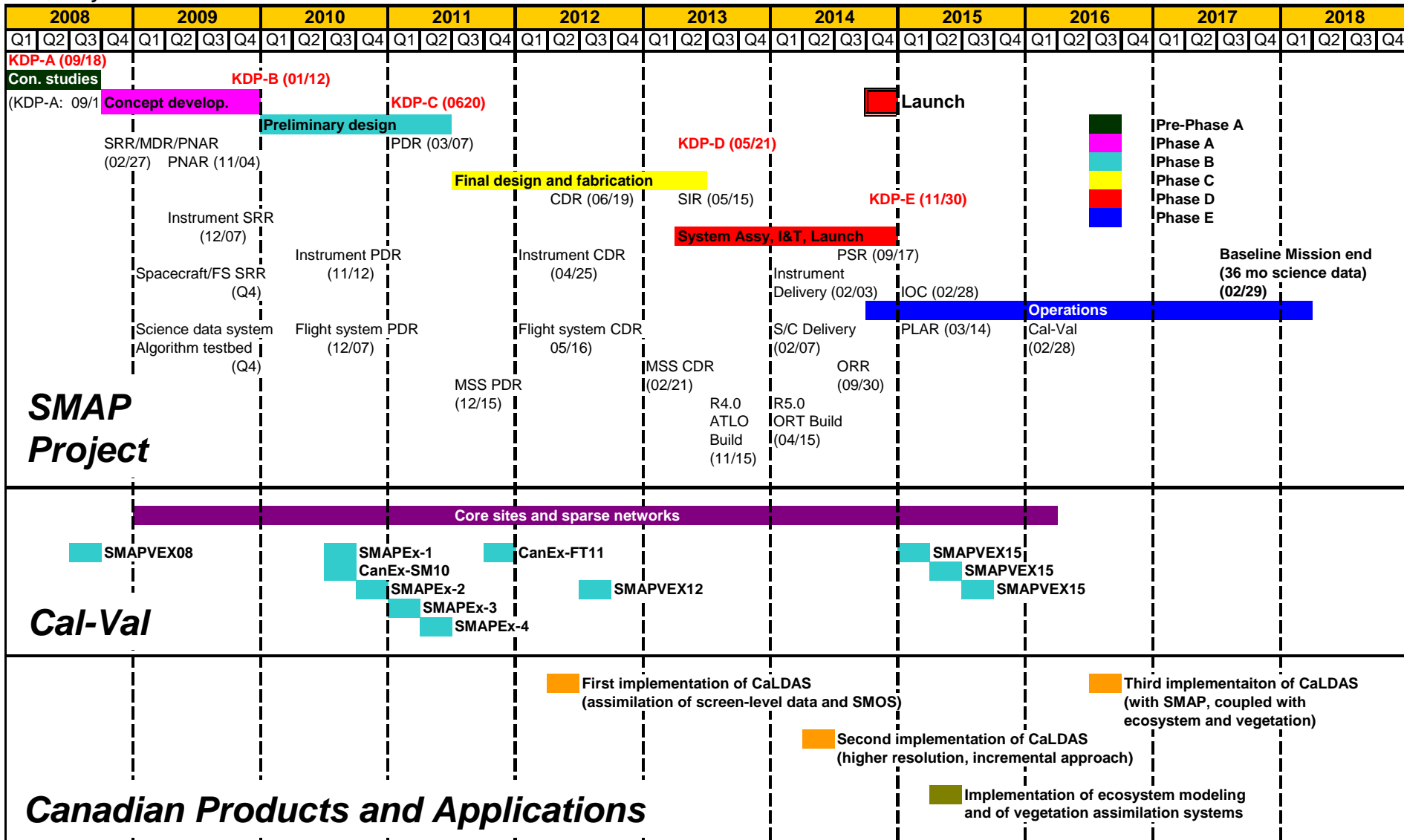
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# PROJECT CALENDAR

## Calendar years



# OTHER ASPECTS and FINAL THOUGHTS...

Outreach / applications / provinces / ...

Funding from other sources

First two years of funding ...

Data reception in Canada



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