Update on projects 2-2 and 2-4

Achievements and ongoing works

F. Anctil and collaborators
Montréal – June 27, 2017

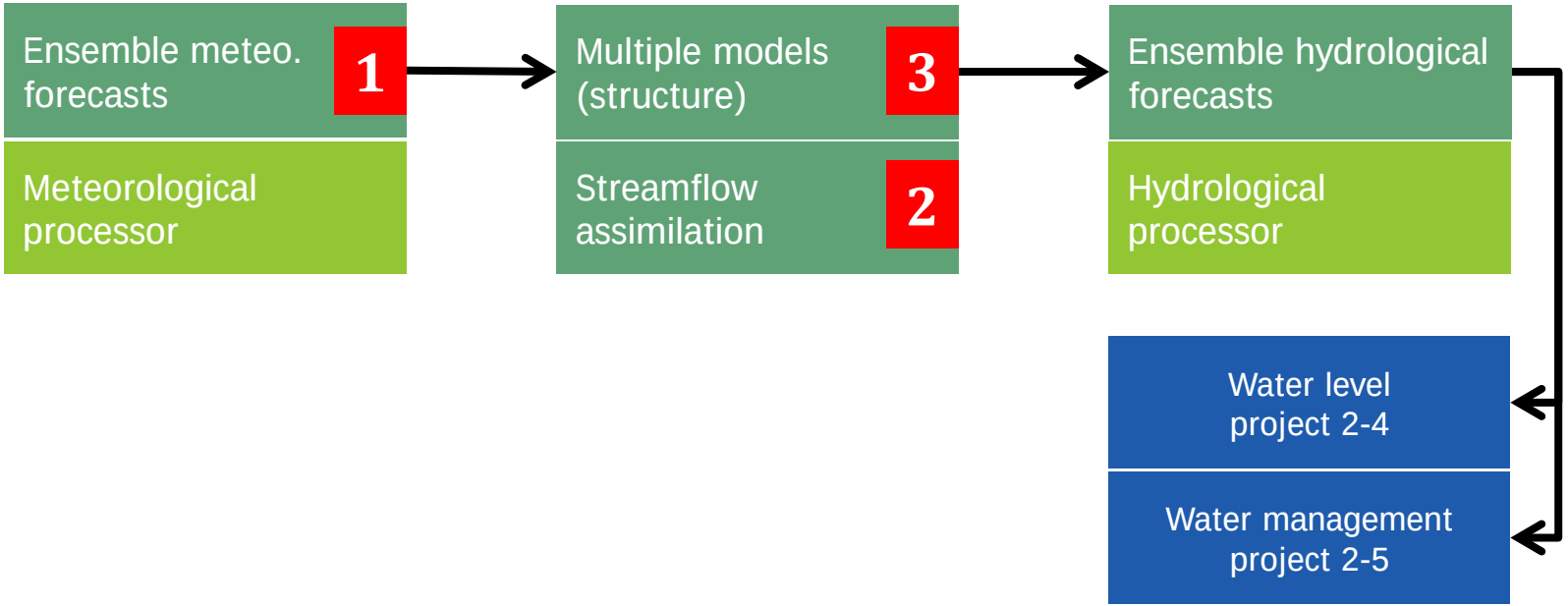
Project 2-2

- Objective
  - Compare the performance and reliability of many probabilistic implementations of operational ensemble streamflow forecasting based on multiple hydrological models

Project 2-2

- Hypotheses
  - There are three main sources of uncertainty
    - Meteorological forcing
    - Initial conditions of the watershed
    - Structure of the hydrological model
  - Accounting for these three sources of uncertainty may eliminate (or at least lessen) the need of hydrological post-processing

H-EPS



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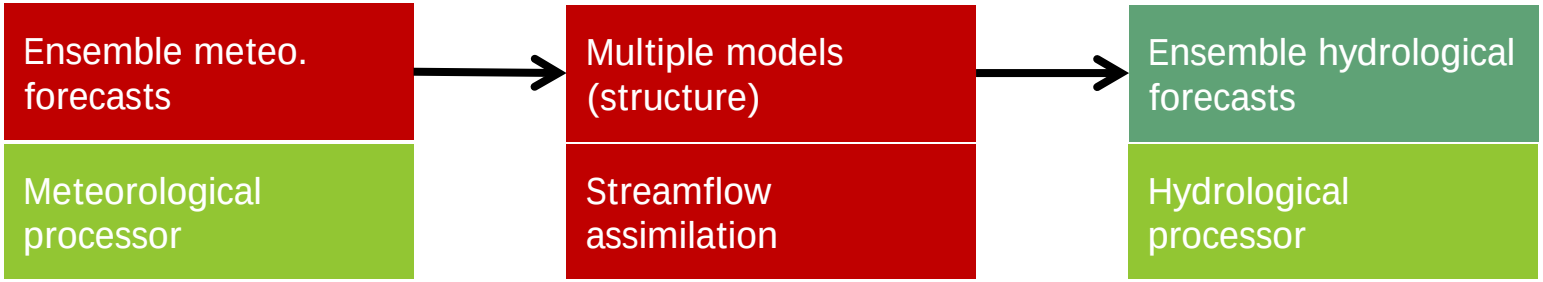
PhD – Antoine Thiboult



Thiboult A, Anctil F, Boucher MA. 2016. Accounting for three sources of uncertainty in ensemble hydrological forecasting. Hydrology and Earth System Sciences 20, 1809-1825.

Thiboult A, Anctil F, Ramos MH. 2017. How does the quantification of uncertainties affects the quality and value of flood early warning systems? Journal of Hydrology 551, 365-373.

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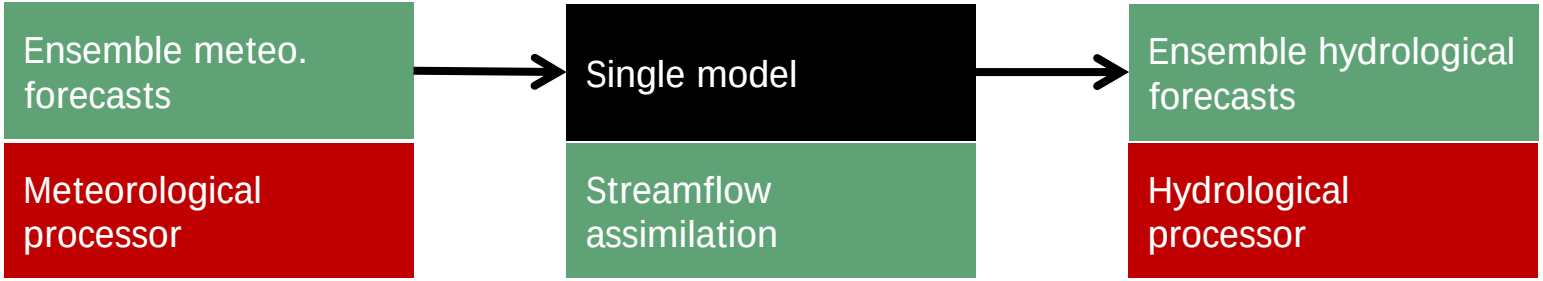
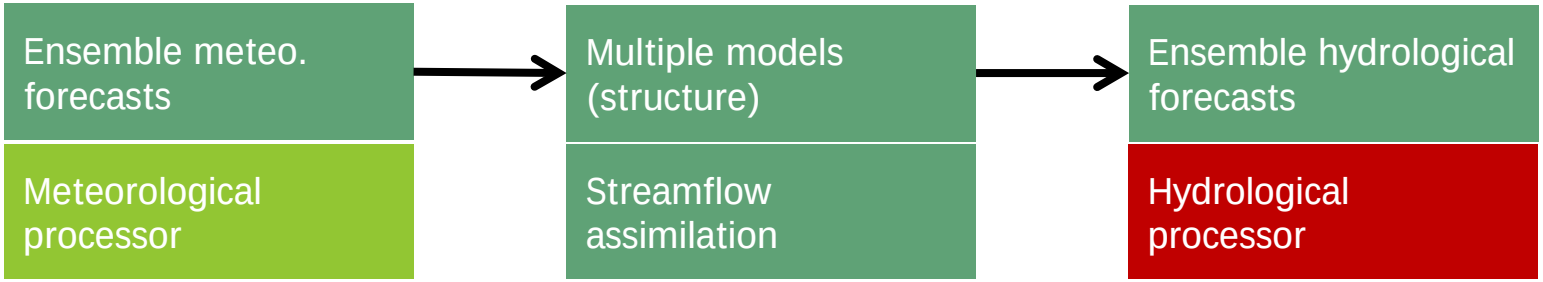
PDF – Mabrouk Abaza



Abaza M, Anctil F, Fortin V, Perreault L. 2017. Hydrological evaluation of the Canadian meteorological ensemble reforecast product. Atmosphere-Ocean. In press.

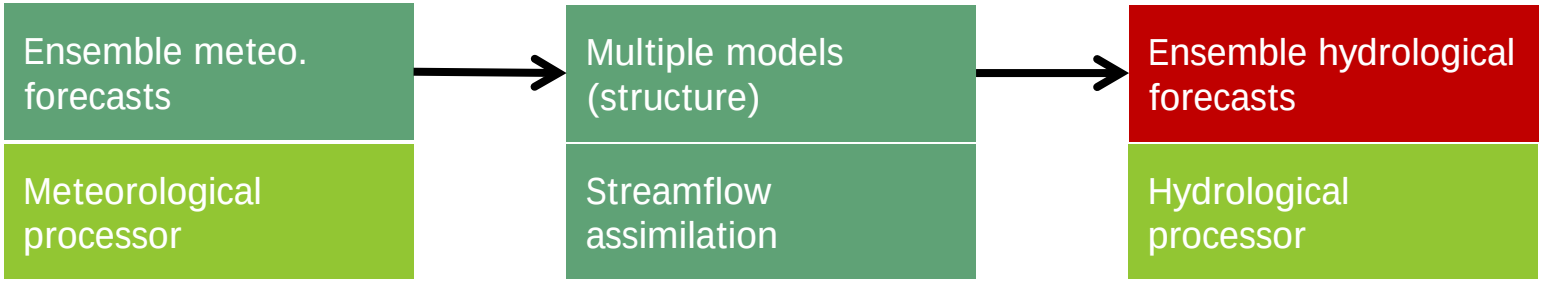
Abaza M, Anctil F, Fortin V, Perreault L. An experiment on the incidence of meteorological and hydrological processors on the resolution and reliability of hydrological ensemble forecasts. Journal of Hydrology. Submitted.

PhD – Jing Xu



Will present next

MSc – Emixi Valdez



Produce ensembles for project 2-5
LWCB

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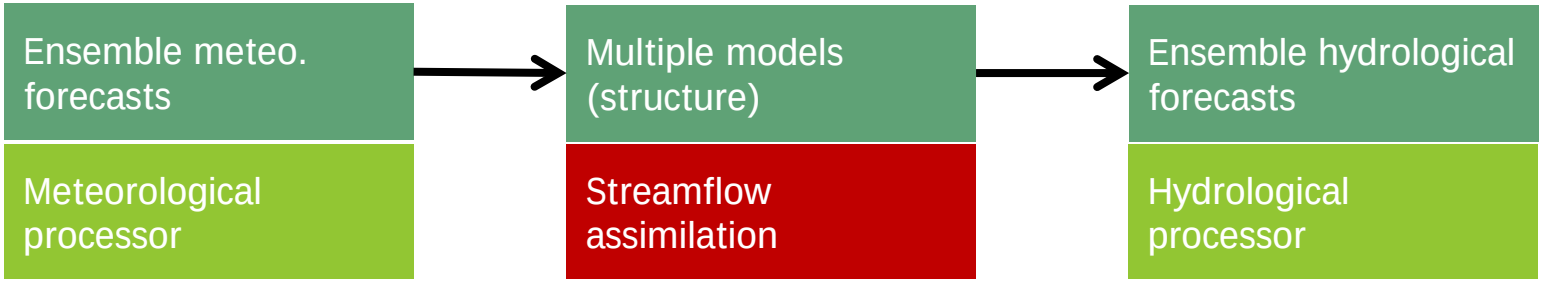
PhD – Philippe Richard



Role of the forecaster → in, out, or over the loop
MDDELCC

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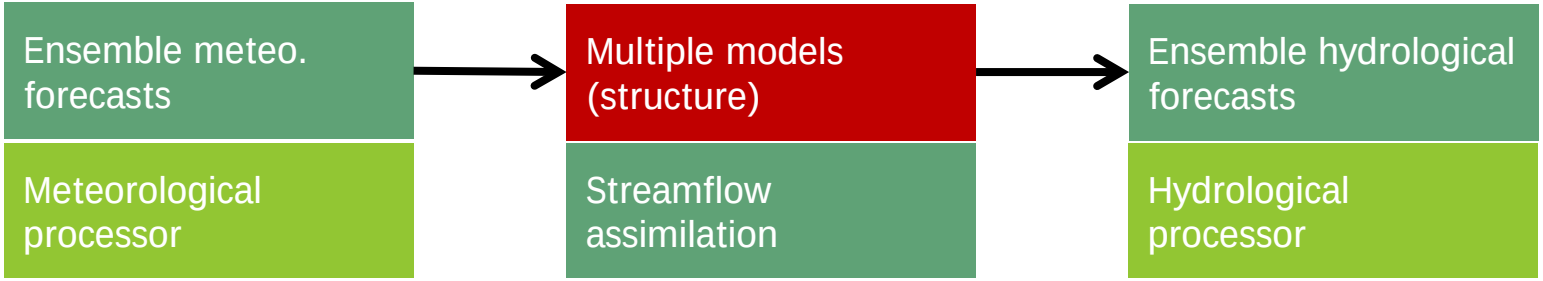
MSc – Charles Malenfant



Malenfant C, Seiller G, Anctil F. Sensitivity analysis of a hydrologic multimodel. In prep.

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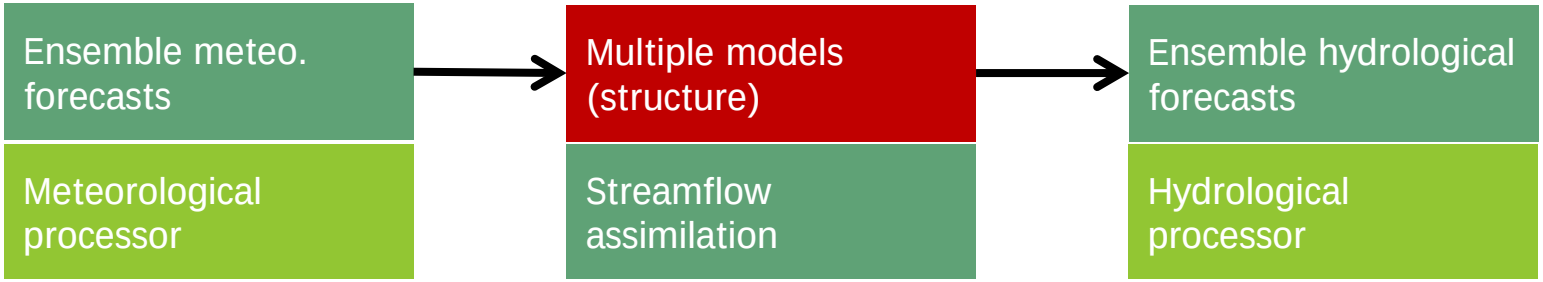
PDF – Grégory Seiller



Seiller G, Anctil F, Roy R. 2017. Design and experimentation of an empirical multistructure framework for accurate, sharp and reliable hydrological ensembles. Journal of Hydrology. Revised.

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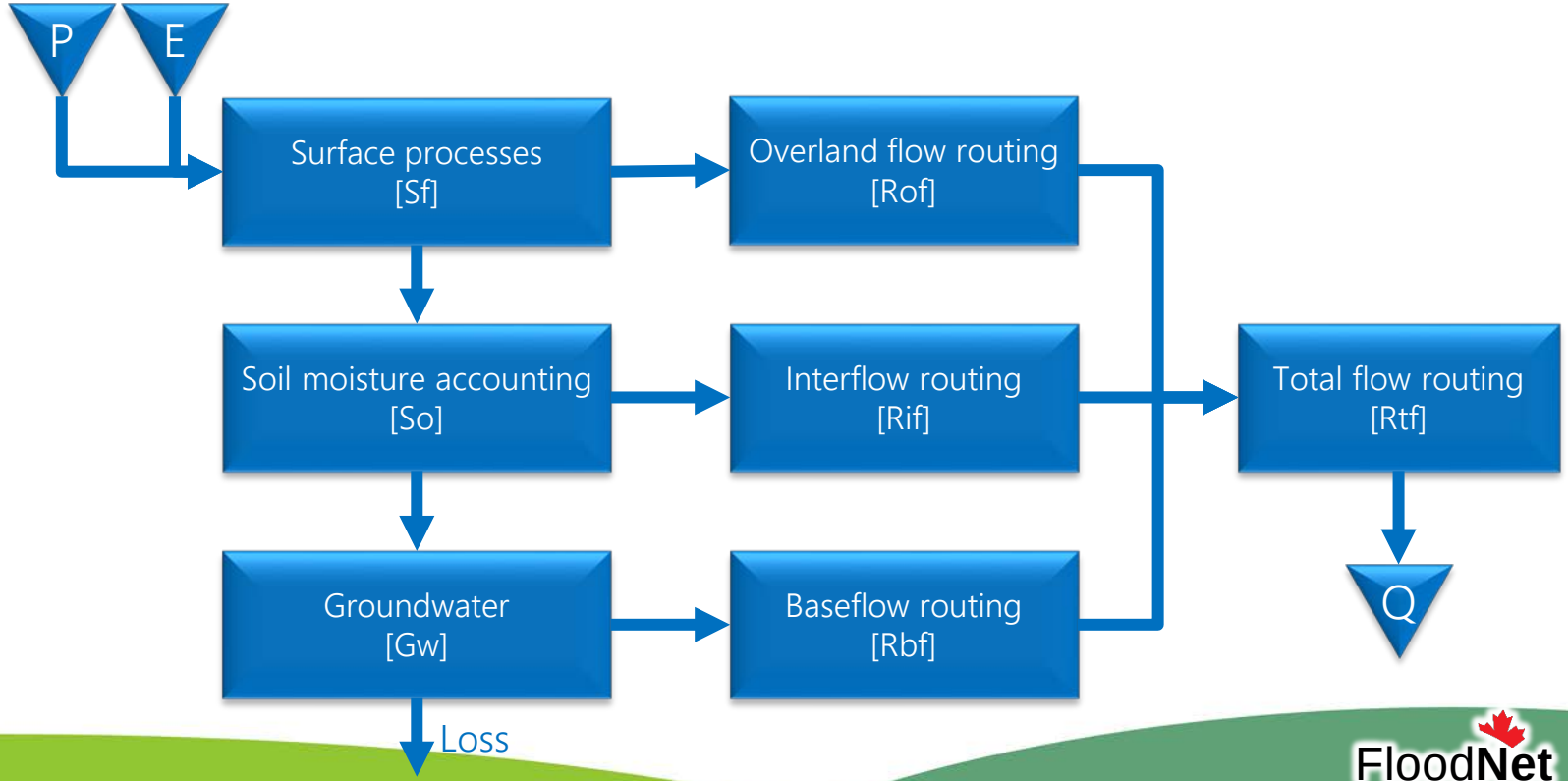
12 dissimilar lumped models

Name	Free parameters	Storages	Derived from
A	6	3	BUCKET (Thornthwaite and Mather, 1955)
B	6	3	CREC (Cormary and Guilbot, 1973)
C	6	3	GARDENIA (Thiery, 1982)
D	4	2	GR4J (Perrin et al., 2003)
E	7	4	MARTINE (Mazenc et al., 1984)
F	7	2	MOHYSE (Fortin and Turcotte, 2006)
G	6	4	MORDOR (Garçon, 1999)
H	9	5	SACRAMENTO (Burnash et al., 1973)
I	8	3	SIMHYD (Chiew et al., 2002)
J	7	4	TANK (Sugarawa, 1979)
K	8	3	WAGENINGEN (Warmerdam et al., 1997)
L	8	4	XINANJIANG (Zhao et al., 1980)

Isolate their functional components



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39 functional components

Name	Sf	So	Gw	Rof	Rif	Rbf	Rtf
A	■	■		■	■		■
H	■	■	■	■			■
E	■	■	■	■			■
B	■	■	■				■
C	■	■	■				■
J	■	■	■				■
K		■			■	■	■
L	■	■			■	■	■
D	■	■					■
F	■	■	■				■
G	■	■	■				■
I	■	■	■				■
	11+0	12	6+0	2+0	2+0	1+0	5

108 852 potential models

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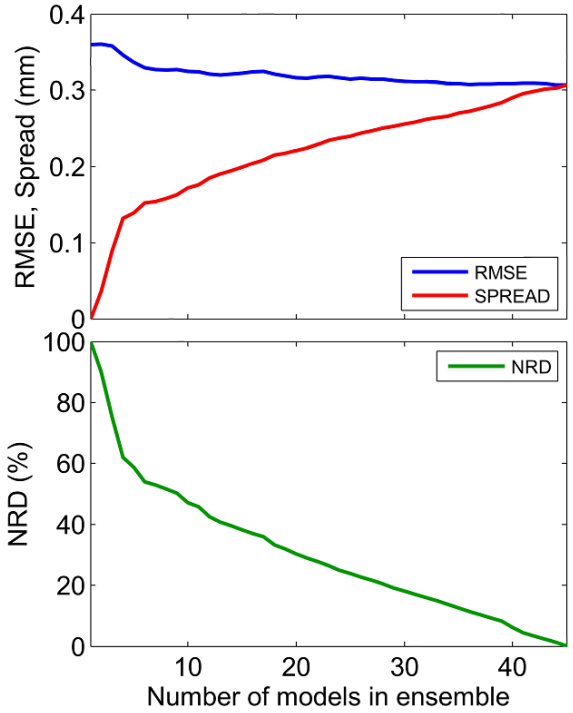
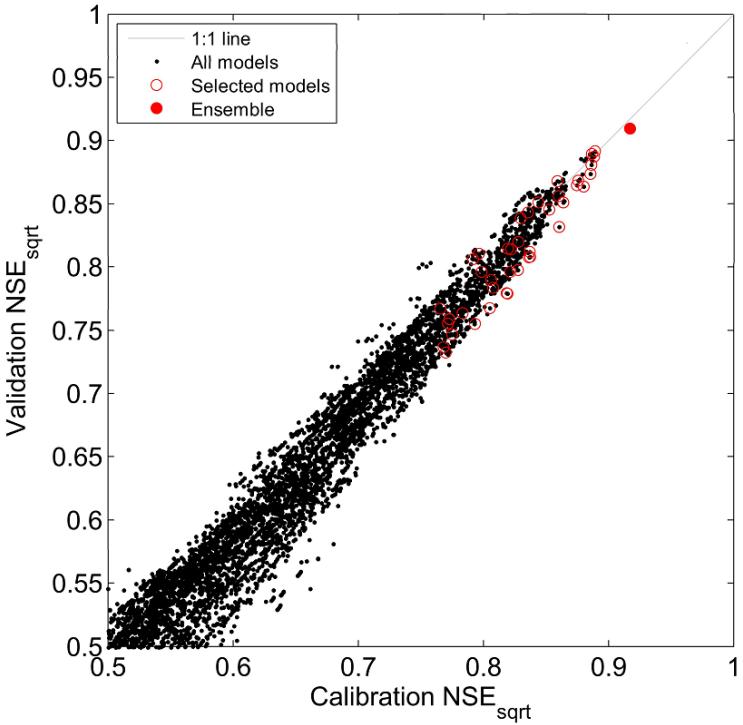
Child selection process





1 446 potential models

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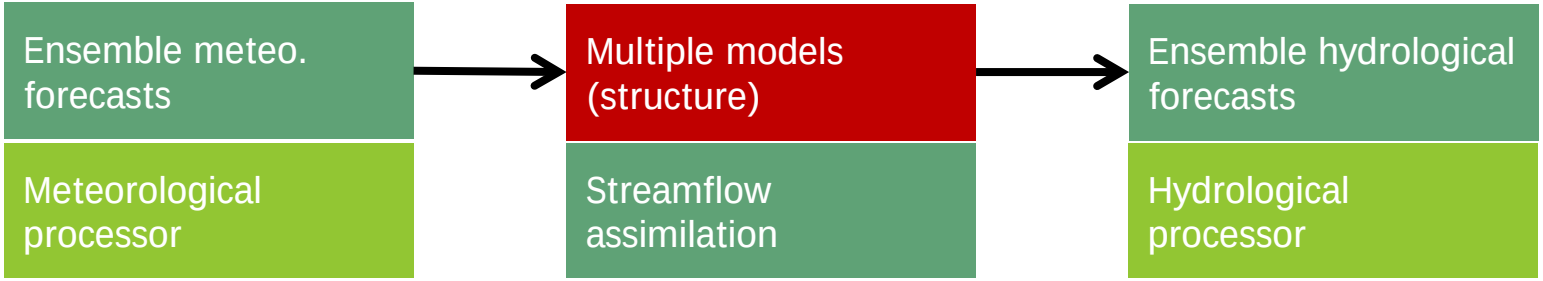
PDF – Carine Poncelet



Explore the incidence of the multiple model selection
3h time step

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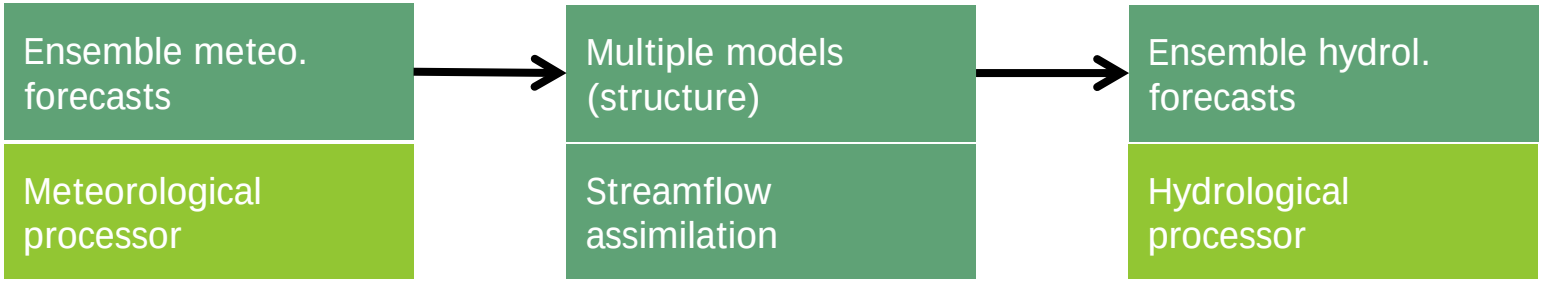
Project 2-4

- Objective
  - Explore flood warning based on a hydraulic model with assimilation and hydrological ensemble forecasts, extending the hydrological ensemble prediction system tested in Project 2-2, with an additional vertical component

H-EPS



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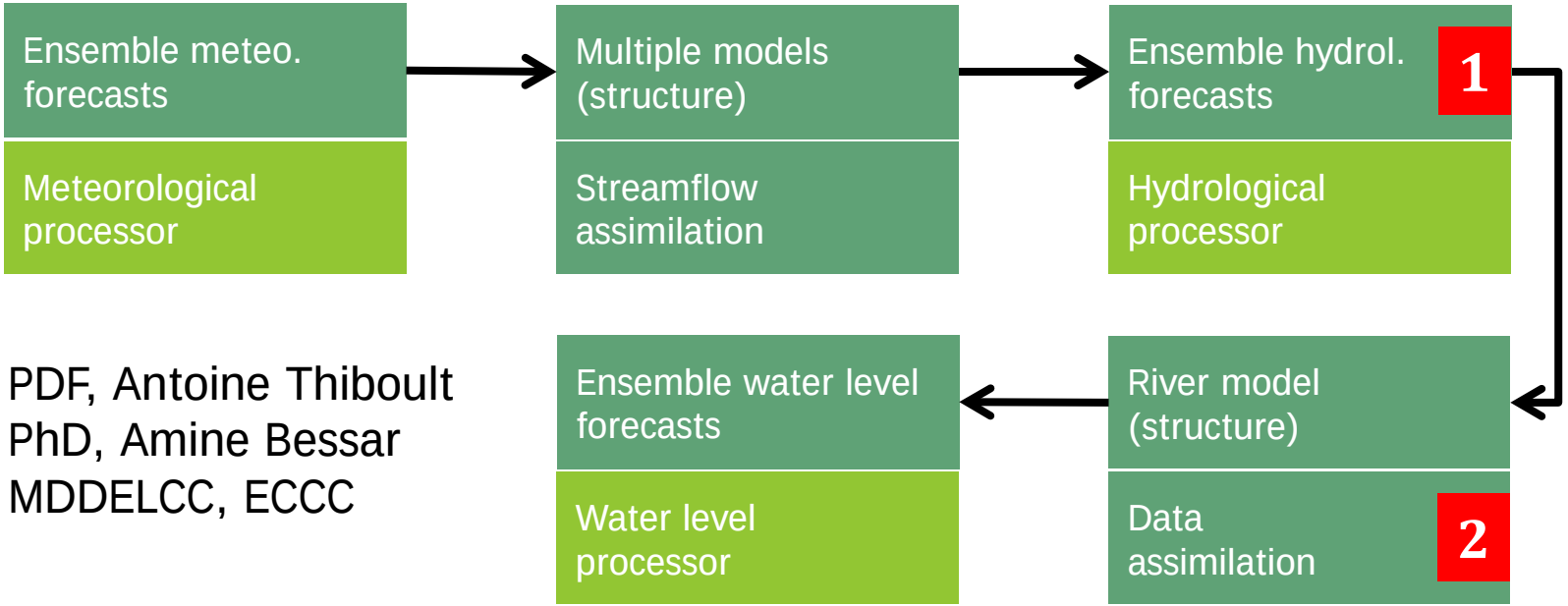
WL-EPS



PDF, Antoine Thiboult
PhD, Amine Bessar
MDDELCC, ECCC

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Update on projects 2-2 and 2-4

Thank you