

**Supplementary materials for:** Evaluating the performance of the Canadian Land Surface Scheme Including Biogeochemical Cycles (CLASSIC) tailored to the pan-Canadian domain

Salvatore R. Curasi<sup>1,2</sup>,<https://orcid.org/0000-0002-4534-3344>, Joe R. Melton<sup>1</sup>,<https://orcid.org/0000-0002-9414-064X>, Elyn R. Humphreys<sup>2</sup>,<https://orcid.org/0000-0002-5397-2802>, Libo Wang<sup>3</sup>,<https://orcid.org/0000-0002-3751-3390>, Christian Seiler<sup>1</sup>,<https://orcid.org/0000-0002-2092-0168>, Alex J. Cannon<sup>1</sup>,<https://orcid.org/0000-0002-8025-3790>, Ed Chan<sup>3</sup>,<https://orcid.org/0000-0003-1160-1090>, Bo Qu<sup>4</sup>

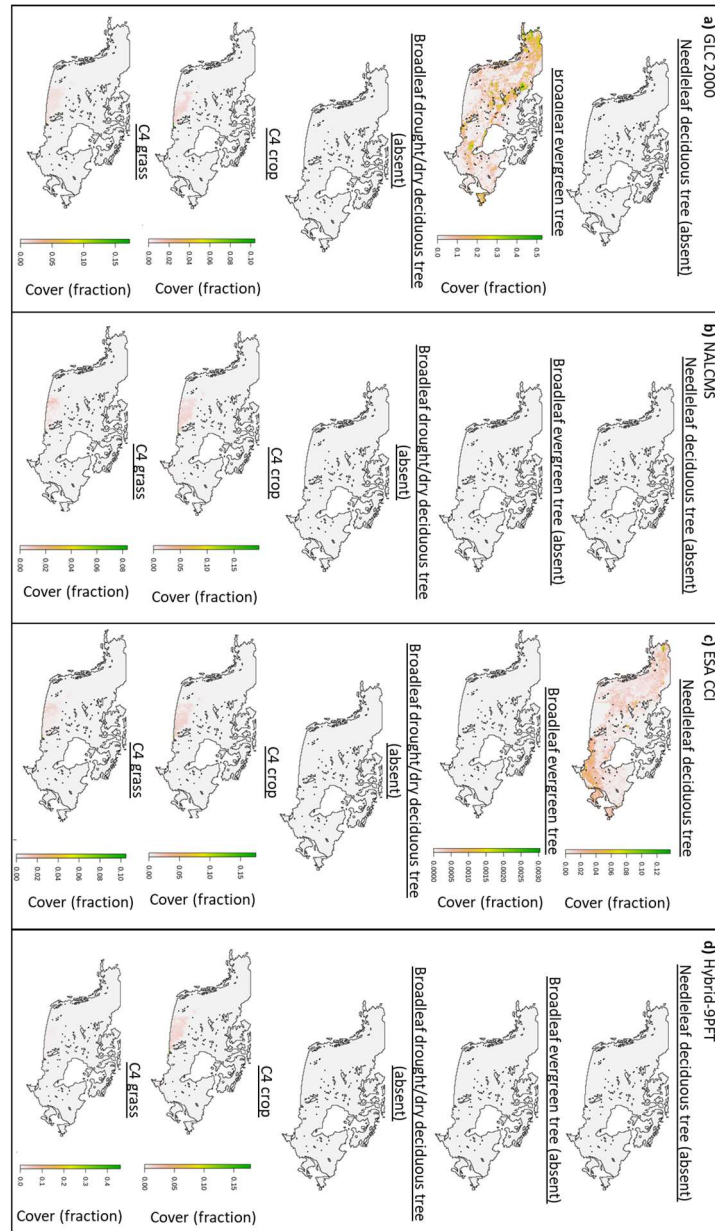
<sup>1</sup>Climate Research Division, Environment, and Climate Change Canada, Victoria, BC;

<sup>2</sup>Department of Geography & Environmental Studies, Carleton University, Ottawa, ON;

<sup>3</sup>Climate Research Division, Environment, and Climate Change Canada, Toronto, ON;

<sup>4</sup>Département de géographie, Université de Montréal, Montréal, QC, Canada



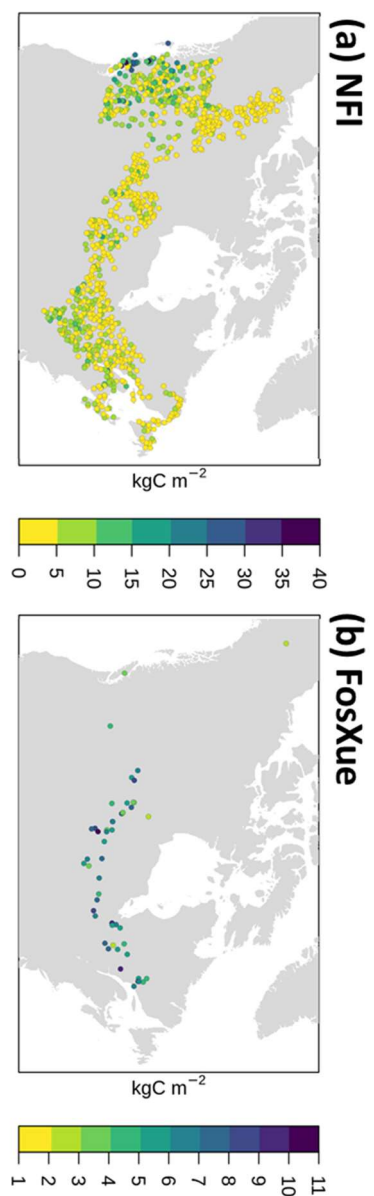


**Figure S1:** Additional maps of plant function type (PFT) cover across Canada for the lower areal coverage PFTs from **a) GLC 2000**, **b) NALCMS**, **c) ESA CCI** and **d) Hybrid-9PFT** vegetation cover products. For plant functional types that are absent, a note is included in the title line, and the scale bar is omitted.



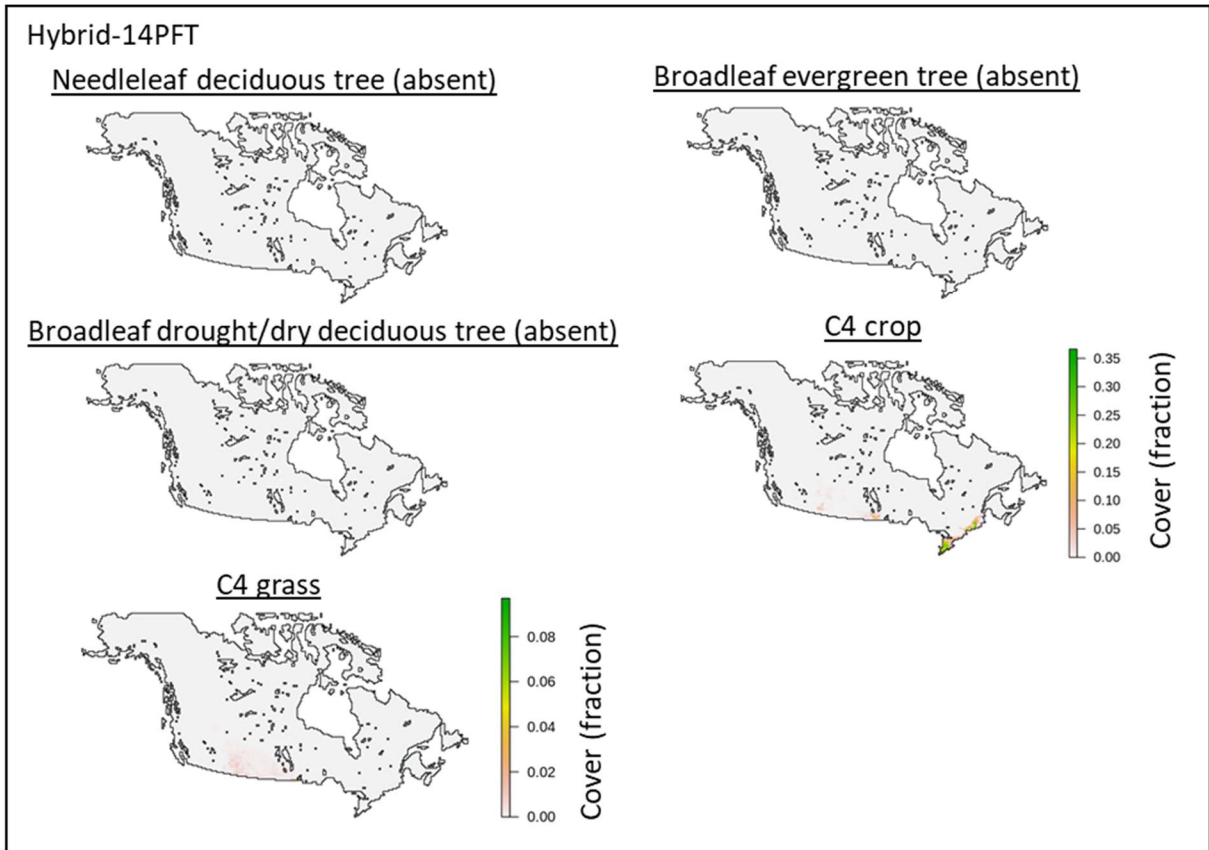






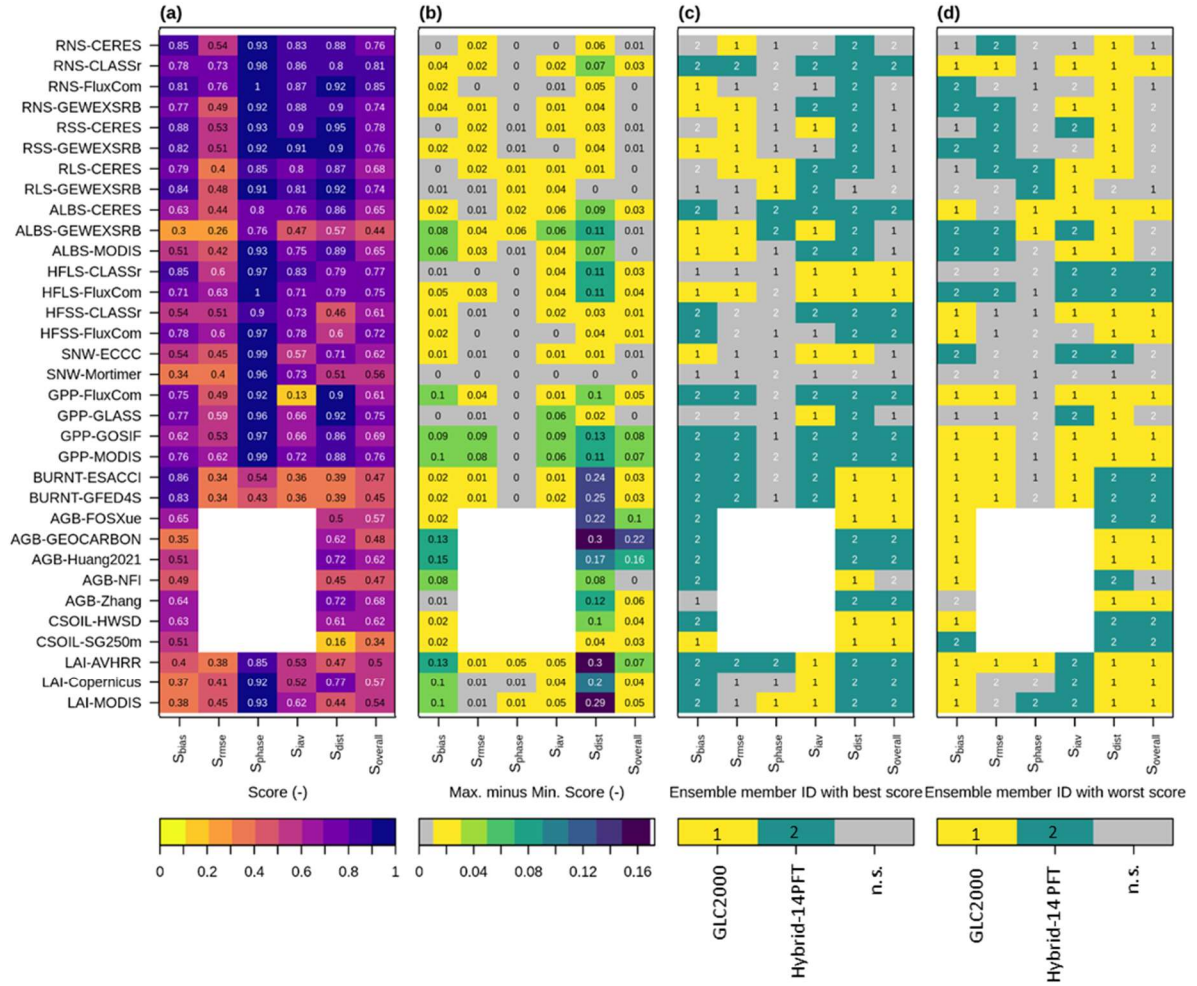
**Figure S3:** Mean site level above ground living biomass from **a)** Canada's National Forest Inventory (NFI) and, **b)** Schepaschenko et al., (2019) and Xue et al., (2017) (FosXue).





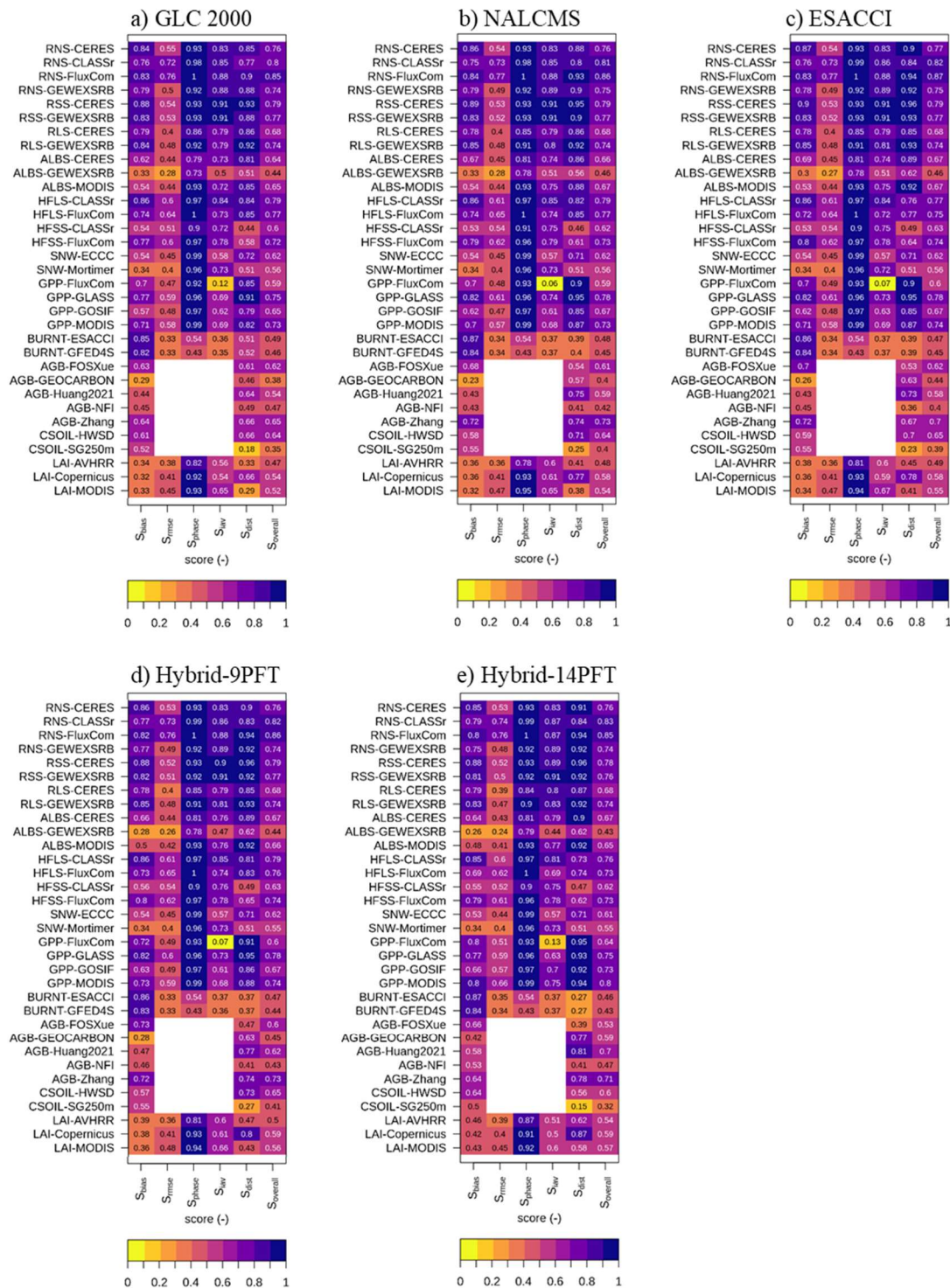
**Figure S4:** Additional maps of the low areal coverage plant function type (PFT) cover across Canada for Hybrid-14PFT. For plant functional types that are absent, a note is included in the title line, and the scale bar is omitted.





**Figure S5: a)** Mean ensemble score, **b)** maximum score difference among ensemble members, and ensemble members with the **c)** highest and **d)** lowest score for historical model runs using GLC2000 (1) and Hybrid-14PFT (2). Comparisons are grayed out in panels b-d when the difference between the maximum and minimum scores is less than 0.01.





**Figure S6:** Summaries of the score values for all 5 model runs: a) GLC 2000, b) NALCMS, c) ESA CCI, d) Hybrid-9PFT, e) Hybrid-14PFT.



44 **Table S1:** Cross-walking table for the Hybrid land cover with 12 CLASSIC PFTs. The Hybrid  
 45 land cover class is given along with the fractional coverage of the CLASSIC PFTs that  
 46 correspond to that class.

ID	map description	1 NLE	2 NLD	3 BLE	4+5 BCD,BDD	6+7 C3C,C4C	8+9 C3G,C4G	10 Sedge	11 SBE	12 SBD	Urban	Lake	Bare
2	Sub-polar taiga needleleaf forest	0.15					0.15	0.20	0.10	0.20			0.20
11	Sub-polar or polar shrubland-lichen-moss							0.20	0.15	0.30			0.35
12	Sub-polar or polar grassland-lichen-moss							0.25	0.10	0.10			0.55
13	Sub-polar or polar barren-lichen-moss							0.10					0.90
15	Cropland					1.0							
16	Barren lands												1.0
17	Urban										1.0		
20	Water											1.0	
31	Snow_ice												1.0
32	Rock_rubble												1.0
50	Shrubland						0.10	0.10		0.60			0.20
80	Wetland						0.10	0.35	0.20	0.25			0.10
81	Wetland-treed	0.50			0.05		0.05	0.10	0.10	0.15			0.05
100	Herbs						0.65		0.05	0.10			0.20
210	Coniferous	1.0											
220	Broadleaf				1.0								
230	Mixedwood	0.50			0.50								
ID	map description	1 NLE	2 NLD	3 BLE	4+5 BCD,BDD	6+7 C3C,C4C	8+9 C3G,C4G	10 Sedge	11 SBE	12 SBD	Urban	Lake	Bare