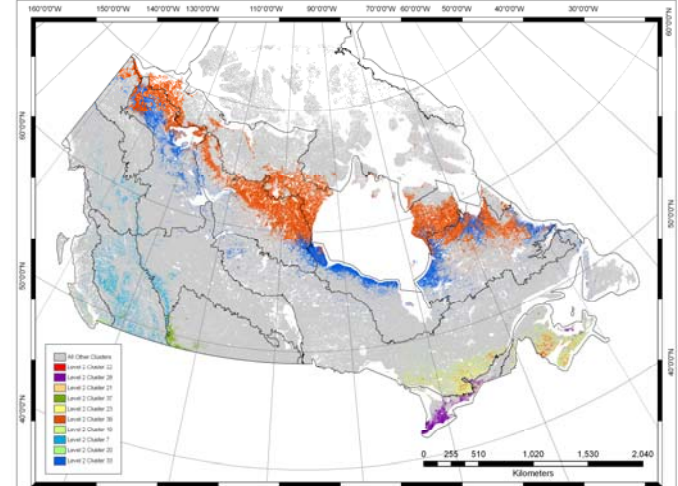
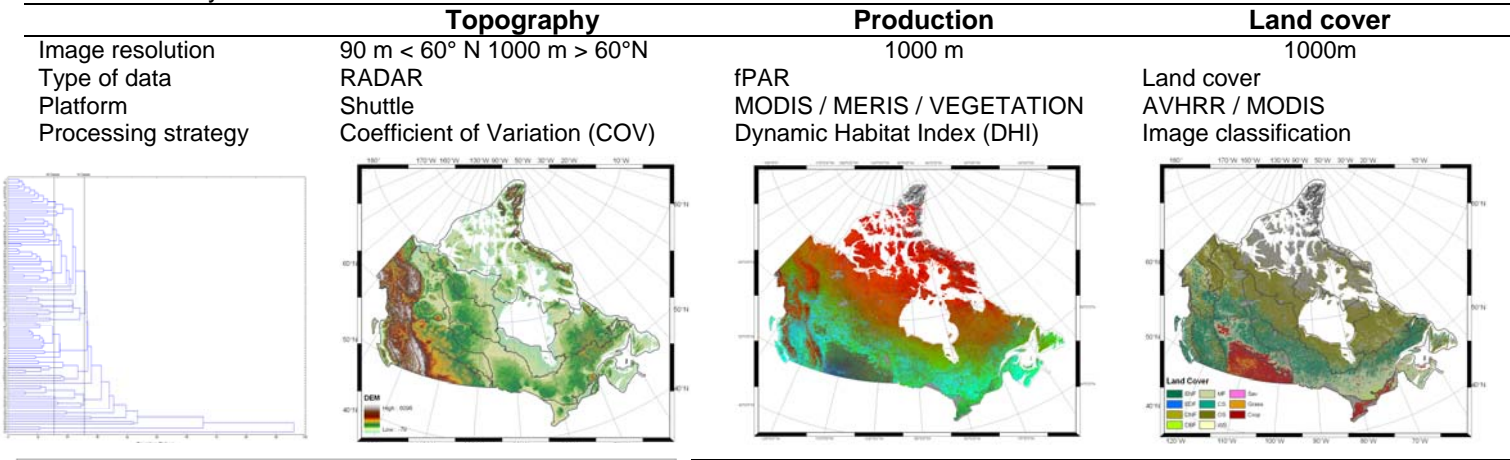


B I O S P A C E

Ecosystem based approaches to biodiversity management are becoming increasingly utilised tools for sustainable management. Critical to their success is the underlying classification that identifies areas with similar ecological features. With increases in computing power, and the availability of spatially explicit environmental layers the potential to develop quantitative rather than qualitative models has increased. In a recent review of the potential explanatory indicators for biodiversity we proposed broad datasets which describe the physical environment itself, indicators of available energy and habitat suitability such as land cover.

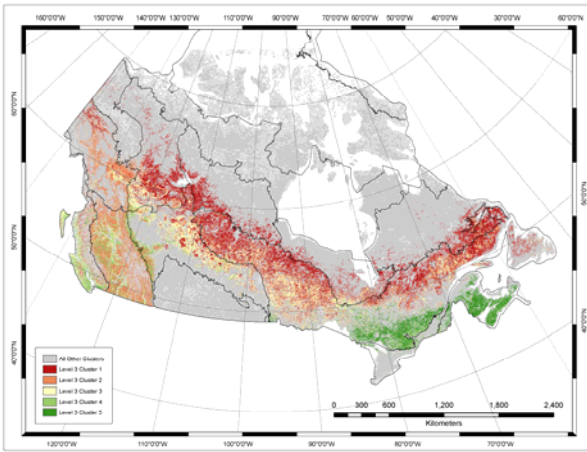


All three sets of data were assembled and the 18 million cells were clustered using a two-step algorithm which allows for both continuous and categorical data. We first developed a large number of initial classes (100) then grouped into two levels of organisation; The first, 40 clusters allowing identification of the most dissimilar areas of the country and a second level (14 classes) indicative of the current ecozone stratification (Dendrogram above). Once the 40 clusters were formed the log-likelihood distance was computed and the 10 most unique clusters extracted (left). The most unique cluster occurs in the Mixedwood plain ecozone, in Southern Ontario and is highly productive, low seasonality, high minimum cover and relatively flat. The second most unique cluster occurs in Southern Ontario around Lake Erie lowland and south of the Frontenac Axis.

The third set of unique clusters covers South Ontario / West Quebec with a land cover mosaic of low seasonality, high minimum cover and high production. The other unique areas include SW Alberta foothills, S. Arctic, N. Boreal in particular south of Hudson bay, and Labrador.

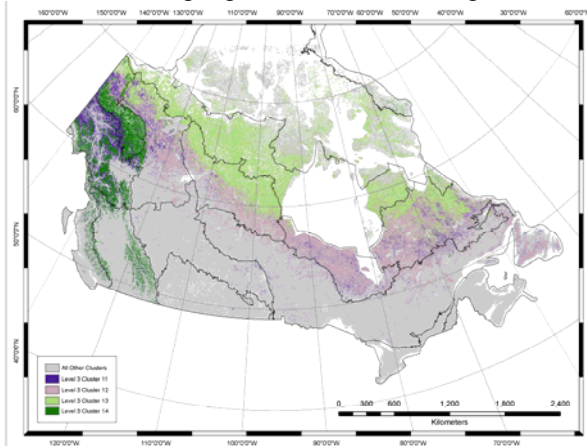
Rank	ID	% Total Area	Minimum Cover	Seasonality	Productivity	Terrain	General Location
1	22	0.15	1	40	1	39	Central On / SW QB
2	28	0.40	15	30	9	36	Southern Ontario
3	21	0.52	4	37	3	29	Central ON / SW QB
4	37	0.22	25	22	18	11	SW Alberta Foothills
5	23	0.24	8	33	8	31	Central ON / SW QB
6	39	8.38	33	6	38	27	Southern Arctic
7	19	0.35	3	39	2	34	Central On / SW QB
8	7	1.21	13	26	16	9	Rockies
9	20	0.66	6	35	5	26	Central ON / SW QB
10	33	3.73	28	11	33	37	Northern Boreal

WHERE IS CANADA UNIQUE ?

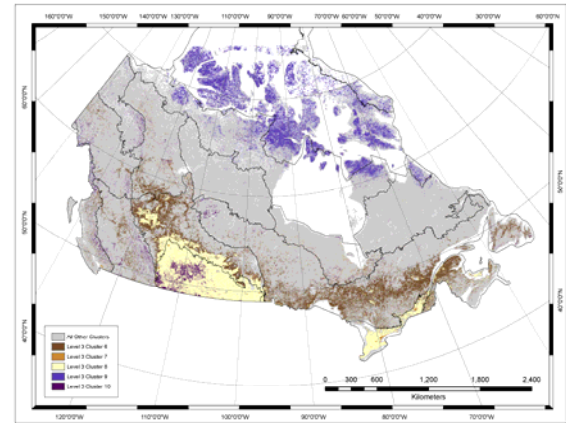


Merging the clusters at the 14 class level, commensurate with the existing ecozone classification undertaken by Environment Canada, allows the new clusters, based on current vegetation condition, topography and land cover to be compared to each other (table below) across the country as well as to the existing ecoregion classification. The first cluster encompasses much of the evergreen broadleaf boreal forest, which is moderate in terms of its productivity, seasonality, minimum levels of cover and terrain. As the clusters move to west to the Rockies, cluster two covers higher terrain with very similar vegetation conditions. Clusters 3 and 4 cover the highly productivity, low seasonality, evergreen needle leaf forests of the West coast and Vancouver Island.

Clusters 6 and 7 cover the moderately productive and seasonal mixed and deciduous mixed forest in Eastern Canada as well as scattered forest throughout the Boreal forest respectively. Cluster 8 encompasses the dominant cropland of the Prairies and cluster 9 the barren and sparse vegetation of the Arctic typified by low productivity and high seasonality. Cluster 10 highlights more natural vegetation and grassland within portions of



the Prairies and in also in north Canada. Clusters 11 cover the woody savanna in the transition zone between the southern Arctic and Northern Boreal forests, and cluster 12 covers the relatively unique region highlighted previously, south of Hudson bay with a more open shrub land with moderate productive seasonality and terrain. Cluster 13 cover the more dense vegetation in the southern Arctic with low productivity, high seasonality, and the final cluster (14) covers the same vegetation dynamics but at higher terrain in the western Yukon, adjacent to Alaska.



Cluster	% of Total	Minimum Cover	Productivity	Seasonality	Terrain	Dominant Land Cover	Dominant Landcover
1	11.70	Moderate	Moderate	Moderate	Moderate	Evergreen Needle Leaf	100.00
2	4.80	Moderate	Moderate	Moderate	High	Evergreen Needle Leaf	100.00
3	7.50	High	High	Low	Moderate	Evergreen Needle Leaf	100.00
4	2.80	High	High	Low	Moderate	Evergreen Needle Leaf	78.49
5	2.70	High	High	Low	Low	Evergreen Needle Leaf	99.97
6	10.30	Moderate	Moderate	Moderate	Moderate	Mixed Forest	100.00
7	0.80	Moderate	Moderate	Moderate	Moderate	Deciduous Needle Leaf	42.51
8	8.00	Moderate	Moderate	Moderate	Moderate	Cropland	100.00
9	8.60	Low	Low	High	Low	Barren/Sparse Vegetation	100.00
10	2.40	Moderate	Moderate	Moderate	High	Grasslands	86.24
11	4.80	Moderate	Moderate	Moderate	Moderate	Woody Savanna	100.00
12	14.50	Moderate	Moderate	Moderate	Moderate	Open Shrubland	100.00
13	16.60	Low	Low	High	Low	Open Shrubland	100.00
14	4.40	Low	Low	High	High	Open Shrubland	100.00

This research has been described in: Coops, N.C., Wulder, M.A., Iwanicka, D. (2008) An Environmental Domain Classification of Canada using Earth Observation data for Biodiversity Assessment. *Ecography*. (in prep)

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Natural Resources
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