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Scaling-up Estimates for GHG Sinks and Emissions for Canadian Agriculture: Part of a National Inventory Process

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Canada



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Agriculture in Canada



Source: Statistics Canada, *Canadian Agriculture at a Glance*. December 1999.

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National Carbon and Greenhouse Gas Accounting and Verification System (NCGAVS)

- What?

- Soil carbon, changes
- Nitrous oxides

- Why?

- Kyoto
- Indicators of soil health



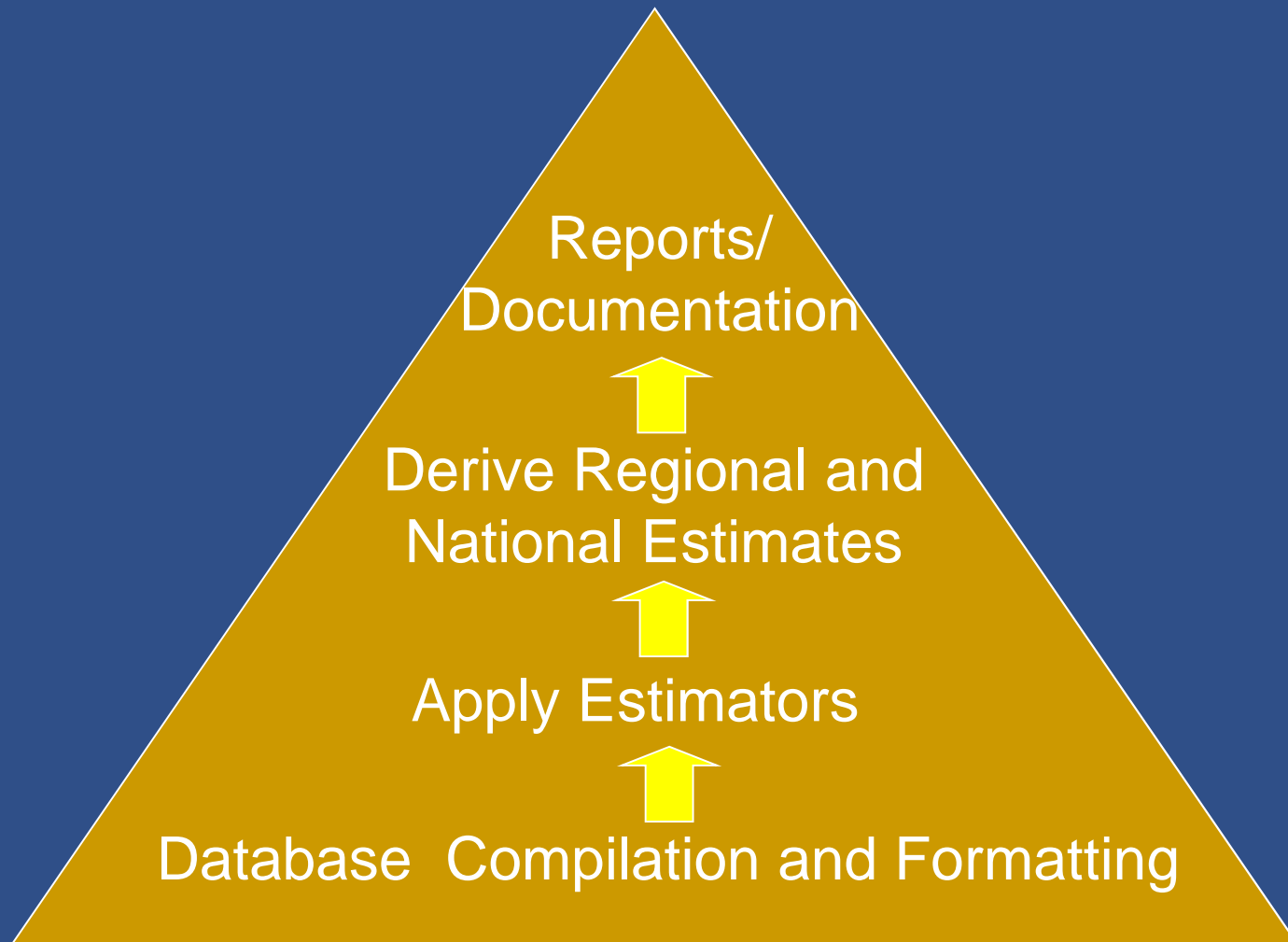
NCGAVS

Objectives

- Develop and use a verifiable and transparent accounting system for reporting changes in soil C stock and GHG emissions
- Establish protocols for measurements
- Develop methodologies to monitor soil C changes and GHG emissions



Overview of NCGAVS





NCGAVS Task Teams

1. Land use / management



2. Scaling-up

3. Modelling

4. Measurements

5. Integration



Scaling-up

Extrapolate site data to broader scales

- soil
- landscape
- climate
- land use
- model output



Hierarchy of Canadian Land Resource Data





Land resource information

- **The soil-landscape model is our basic pedological paradigm**
 - it is the basis for all mapping
- **Soil and landscape are unlinked in our databases**
- **Need to use tacit knowledge to reconstruct the model**



NCGAVS – Scaling-up

Present Approach

- Reporting Unit - Soil Landscapes of Canada (SLC) polygons
- Create representative catenas (or assign identified components to landscape positions) for each reporting unit
- Pilot areas (200 SLC polygons)
- Land use and climate data

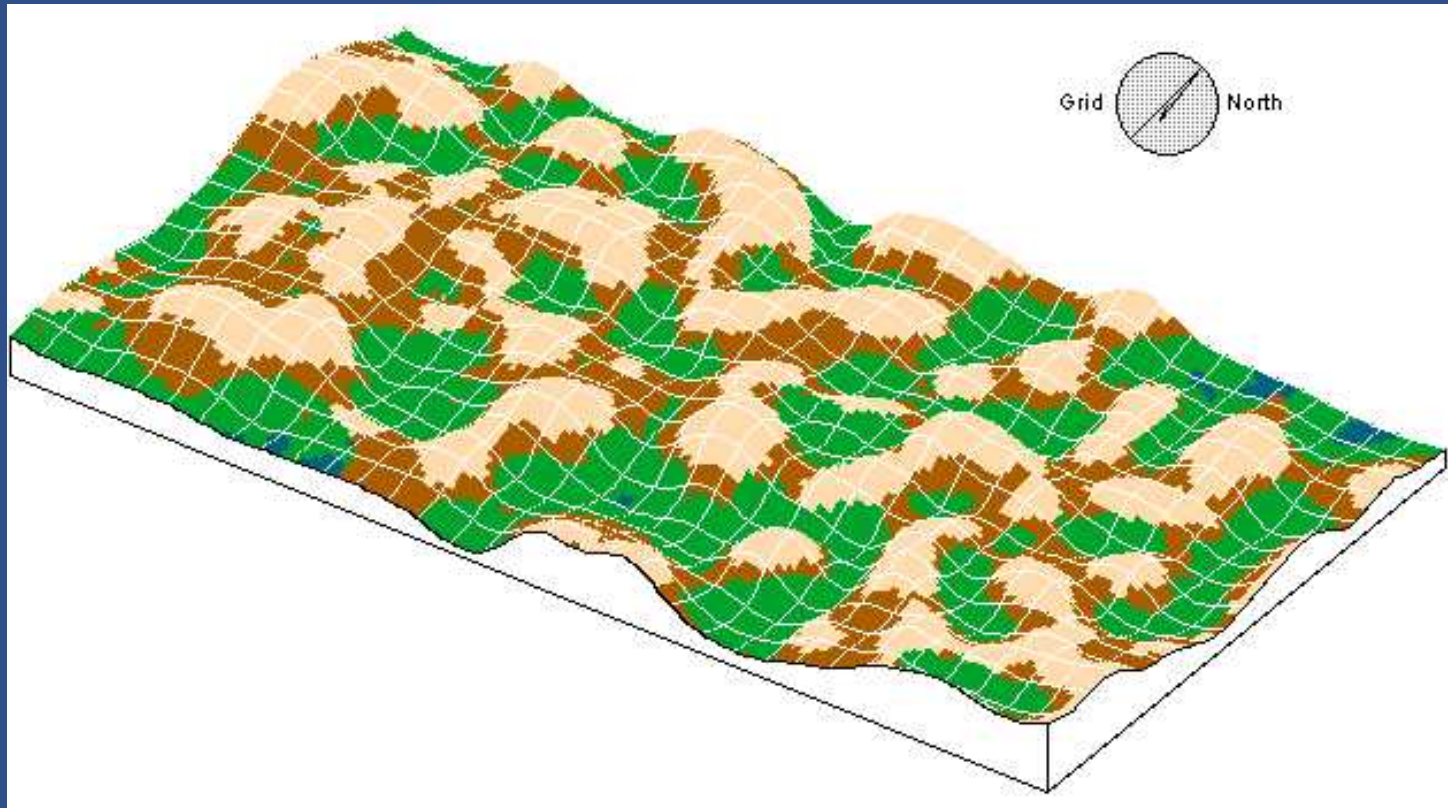


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"Hummocky" Landscape





Segmentation of Selected SLC Landforms

SLC Landform Descriptor		Upper			Mid			Lower			Depressional		
Surface Form	Slope Class	Prop	Slope	S_L	Prop	Slope	S_L	Prop	Slope	S_L	Prop	Slope	S_L
Hummocky	4	30	9	50	35	9	50	25	7	35	10	1	15
	10	30	12	50	35	12	50	25	9	35	10	1	20
	16	35	25	70	30	25	60	25	15	50	10	1	20
Level	1	0	n/a	n/a	45	1	450	45	1	450	10	1	100
Undulating	1	20	2	50	50	2	120	15	2	40	15	0.5	40
	4	25	4	60	45	4	115	20	3	50	10	1	25

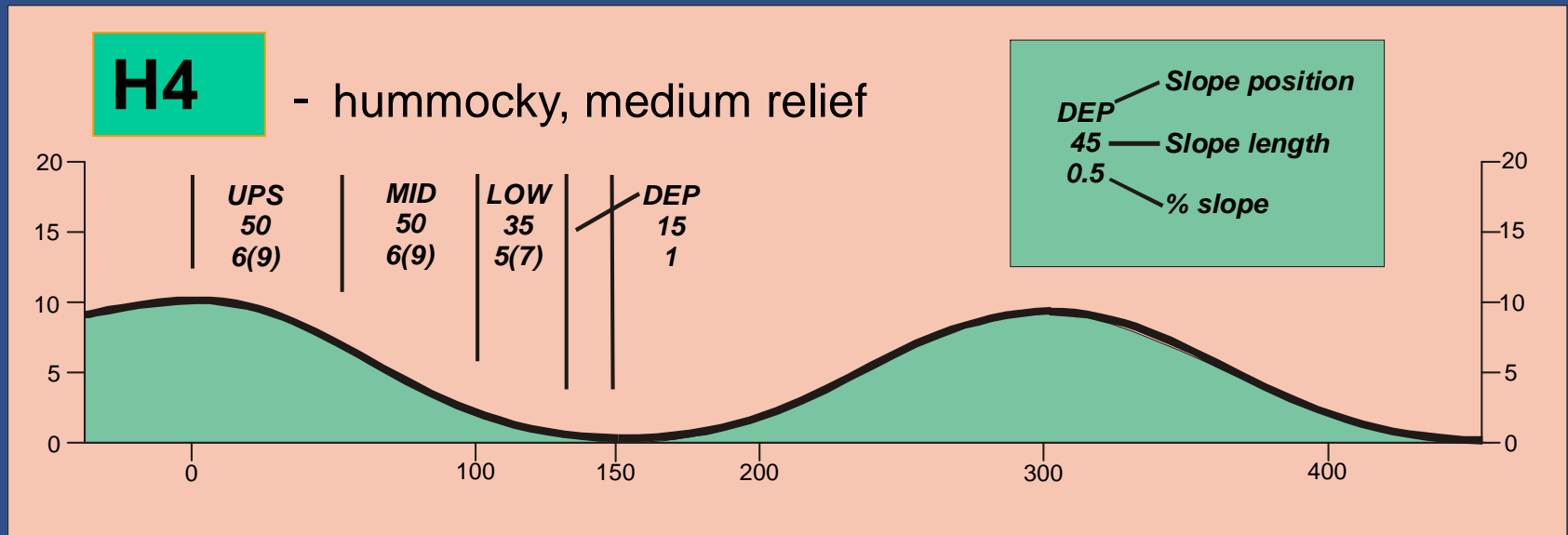


Allocating Soil Types to Landform Segments

Extent of Segments



Orthic soils Areal extent - 60%
 Eroded soils 20%
 Wet soils 20%



Allocation of Soils

Eroded

Orthic

Wet



Example SLC Attribute File

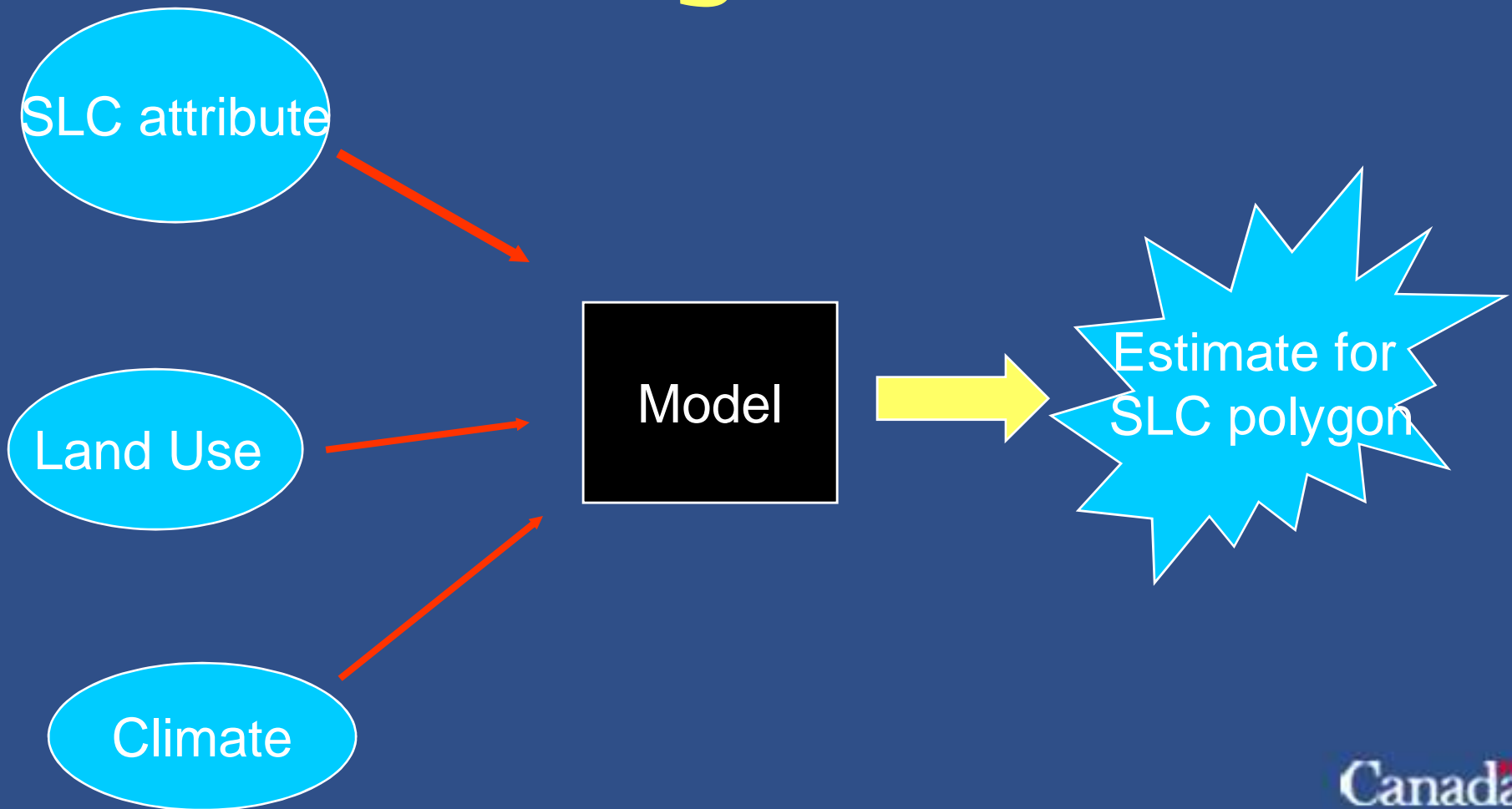
SL30	CMP	SOIL_CODE	MOD	SLOPE	STONE	AREAL_EXT	SLOPE_POS	SLOPE_LEI	AG_CAP	B_ECODIS	SLC_MAPSYI	REP_MU
482281	1	LPN		2	N	20	U	50	G	737	CIm/Lu1	PED2/U1h
482281	2	PED		2	N	5	U	50	G			
482281	3	PED		2	N	45	M	120	G			
482281	4	PED		2	N	10	L	40	G			
482281	5	ZGW		2	N	10	L	40	P			
482281	6	ZGW		0.5	N	10	D	40	P			

National Soil Database

Climate Data



Integration





Summary of NCGAVS Scaling –up Activities

- **Testing the procedure on pilot areas**
- **Evaluate the process**
- **Revise and apply to all SLCs within the agricultural region of Canada**