British Columbia Geological Survey Open File 2016-04
Geological Survey of Canada Open File 8083

# Ice-flow indicator compilation, British Columbia and Yukon

**H. Arnold, T. Ferbey, and A.S. Hickin**

Scale 1:1,750,000

0 200
Kilometres

## Ice-flow indicators

### Generalized regional ice-flow

- Ice-flow direction derived from unidirectional indicators
- Ice-flow direction derived from bidirectional indicators

### Unidirectional indicators

- Crag-and-tail
- Drumlin
- Fluted bedrock
- Striation

### Bidirectional indicators

- Drumlinoid or fluting
- Fluted bedrock
- Striation or groove

### Ice sheets during 18 ka to 13 ka (modified from Dyke et al., 2003)

- Extent of North American ice sheets (Cordilleran and Laurentide)
- Unglaciated areas
- Political boundaries
- Modern ice fields

A better understanding of the Cordilleran ice sheet flow history is important for designing, implementing, and interpreting geochemical and mineralogical data from drift prospecting surveys. Building on ice-flow indicator compilations for British Columbia by Ferbey et al. (2013) and Yukon Territory (Lipovsky and Bond, 2014), this map and database illustrate major ice-flow directions for the Canadian sector of Cordilleran ice sheet during the Late Pleistocene.

The data were derived from published and unpublished surficial geology, terrain, and glacial features maps. Because field data are sparse in the area ~ 300 km south of the British Columbia-Yukon border, new data were generated using digital stereo airphotos, digital-derived stereo orthophoto mosaics, and digital-derived stereo Satellite Pour l'Observation de la Terre (SPOT) imagery. The raw data are integrated into a single database; no attempt was made to reconcile cases where data from different sources conflicted. Given areas of high density data, line data are not included in this map. The complete data set is, however, included in the digital database. Generalized ice-flow indicators were generated from the database to show regional ice-flow trends (Fig. 1).

The integrated database may be downloaded from http://www.empr.gov.bc.ca/Mining/Geoscience/PublicationsCatalogue/OpenFiles/2016/Pages/2016-4.aspx

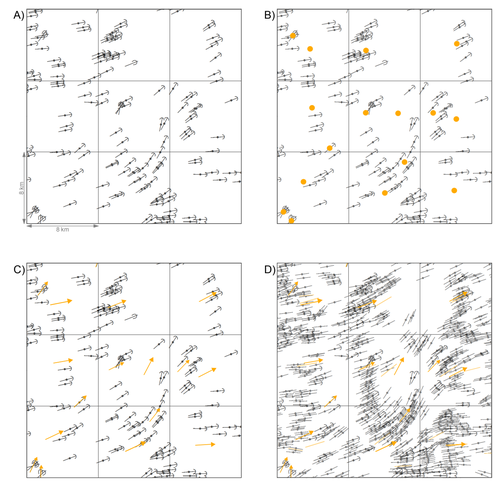


Fig. 1. Construction of generalized regional ice-flow directions. A) An example of unidirectional ice flow indicators overlain by a 8 km grid created for British Columbia and Yukon. B) Cluster analysis used to classify similar data into clusters. New data points created for each cluster in it's data-density-centre and populated with mean azimuth of that cluster of data (orange points); repeated for each cluster in each 8 km grid cell. C) Summary symbol size of generalized regional unidirectional ice flow is proportional to the number of unidirectional ice flow indicators in each cluster within the grid cell (orange arrows). D) The same method used to produce generalized regional unidirectional ice flow was used to produce generalized regional bidirectional ice flow indicators (orange bars).

**Acknowledgements**

This project was partly funded by the Geological Survey of Canada Geo-mapping for Energy and Minerals phase 2 (GEM 2) program.

We thank Panya Lipovsky and Jeff Bond (Yukon Geological Survey) for providing the ice-flow indicator data for Yukon. We appreciate the valuable input Yao Cui (British Columbia Geological Survey) and Alain Plouffe (Geological Survey of Canada) provided. We also thank Daniel Kerr (Geological Survey of Canada) and the Geological Survey of Canada for their partnership and financial support.

**References:**

Dyke, A.S., Moore, A., and Robertson, L., 2003. Deglaciation of North America; Geological Survey of Canada, Open File 1574, CDROM.

Ferbey, T., Arnold, H., and Hickin, A.S., 2013. Ice-flow indicator compilation, British Columbia; British Columbia Ministry of Energy and Mines, British Columbia Geological Survey Open File 2013-06, 1:1 650 000 scale.

Lipovsky, P.S., and Bond, J.D., 2014. Yukon surficial geology compilation; digital release 1, 08-Apr-2014. Yukon Geological Survey.

North American Datum 1983
British Columbia Albers
Canadian Digital Elevation Model, 1 arc second (30 metres) resolution
Global Multi-resolution Terrain Elevation Data 2010