

NRCan Velocity Fields & Comparisons to Some Plate Motion Estimates

SNARF Workshop 5



Mike Craymer
Joe Henton
Mike Piraszewski

UNAVCO Science Workshop
Denver, CO
14-16 March 2006

CANADA'S **NATURAL RESOURCES**

NOW AND FOR THE FUTURE

nrcan.gc.ca



Natural Resources
Canada

Ressources naturelles
Canada

Canada



NRCan Velocity Solutions Submitted for SNARF



Made available April 2005

NAREF Solution (NAR_cumu_r02_v0.snx)

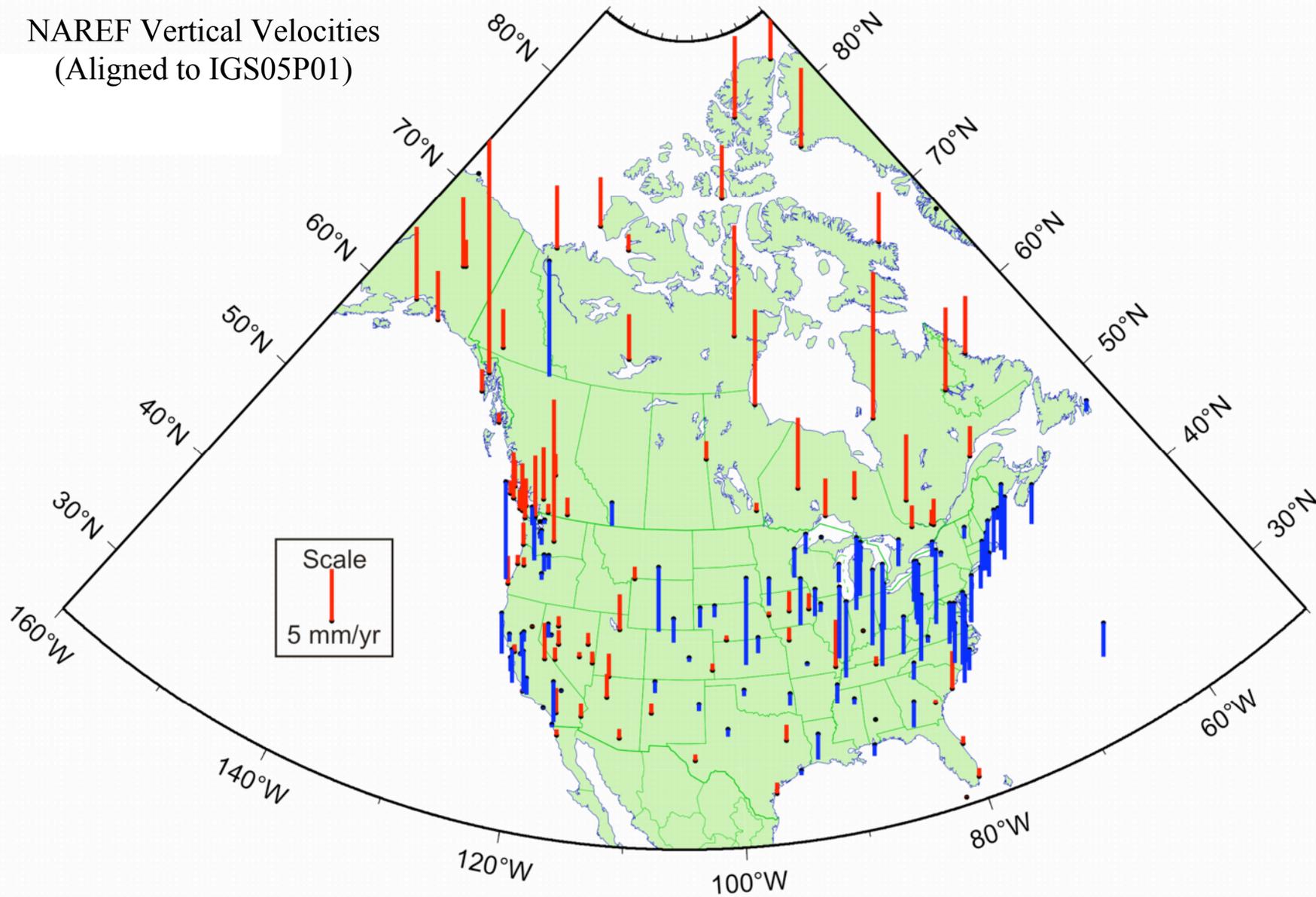
- Based on NAREF weekly combinations 2001-2004
 - GSD Bernese & GIPSY (Canada)
 - NGS PAGES (US CORS)
 - SIO GAMIT (Prelim. PBO)
 - PGC Bernese (WCDA)
- Aligned to IGS05P01.snx
- Reference epoch 2002.0

CBN Solution (CBN_cumu_r98_v0.snx)

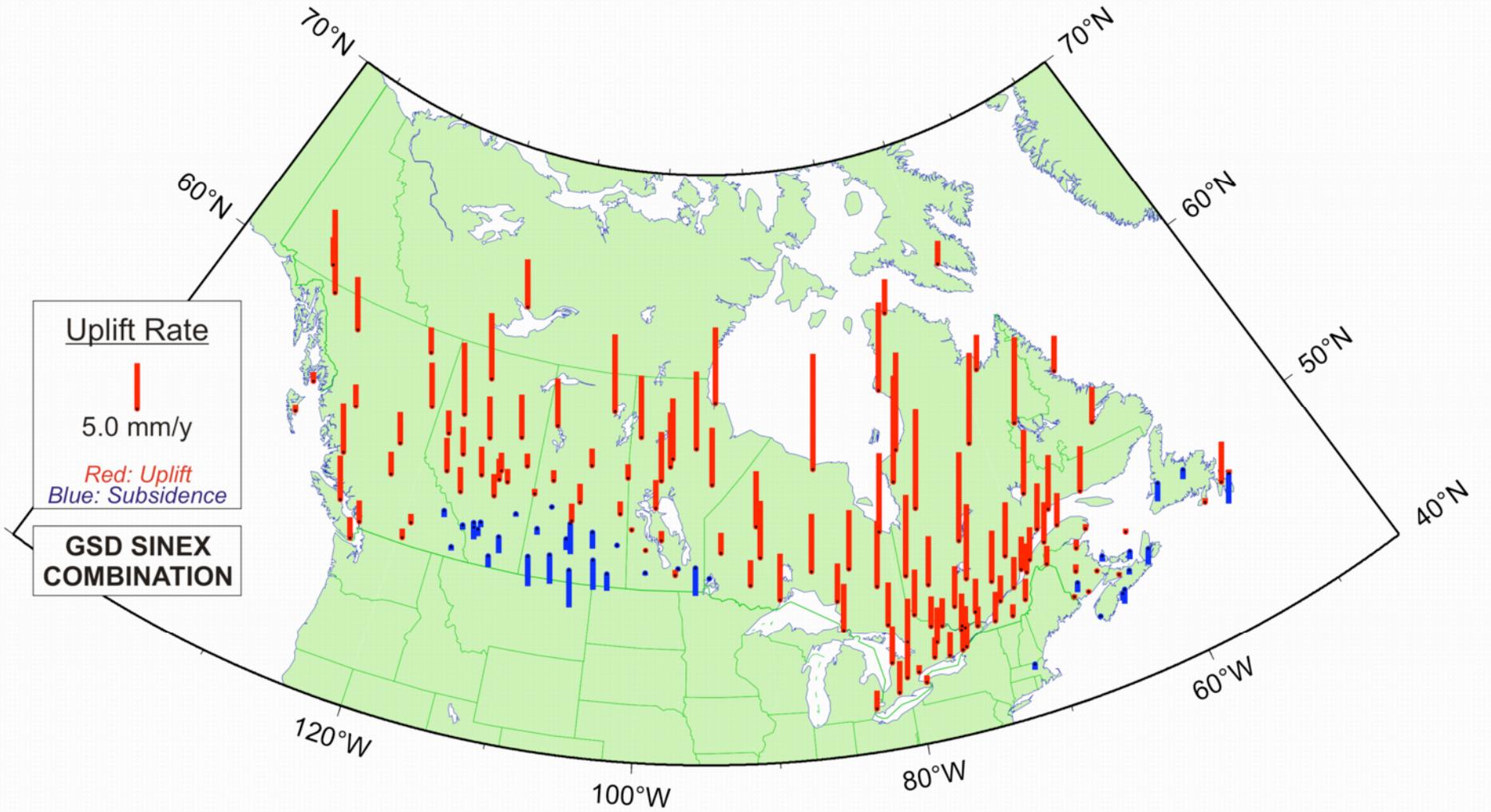
- Based on 28 epoch surveys 1994-2002
- ALGO fixed to IGS05P01 position/velocity
- Reference epoch 1998.0



NAREF Vertical Velocities
(Aligned to IGS05P01)



CBN Vertical Velocities (ALGO fixed to IGS05P01)





NAREF Velocity Bias

Bias in GSD Bernese solution for Canada

- Solid Earth tide error in Bernese GPS Software v4.2
- Corrected software for solutions after GPS week 1275
- Negative offset at week 1275
- Offset larger for stations further from fixed point DRAO
 - Smaller in far north where tides smaller
 - See plots

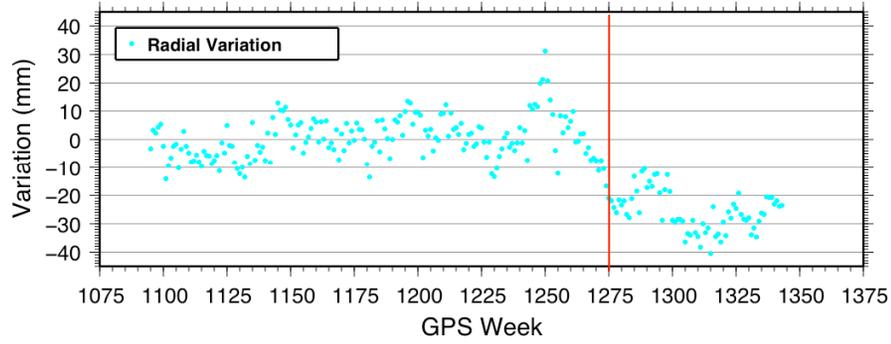
Effect somewhat reduced in NAREF combination

- When other solutions include same sites; eg, GSD GIPSY
- But many sites not common with others
- Bias evident when combined with CBN velocities
 - Obvious discrepancies at co-located NAREF & CBN sites

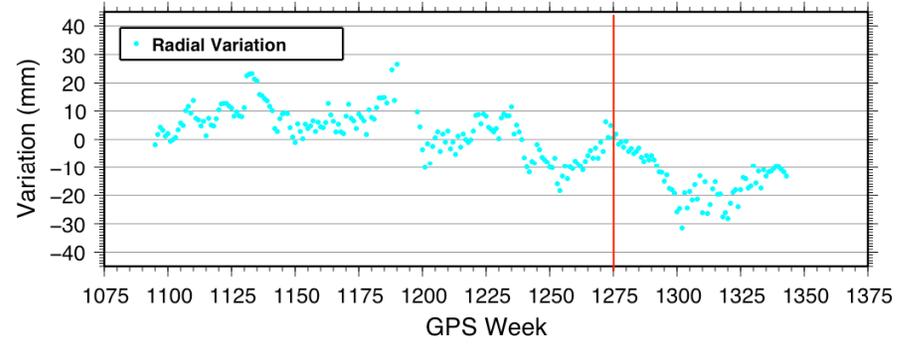


GSD Bernese Time Series

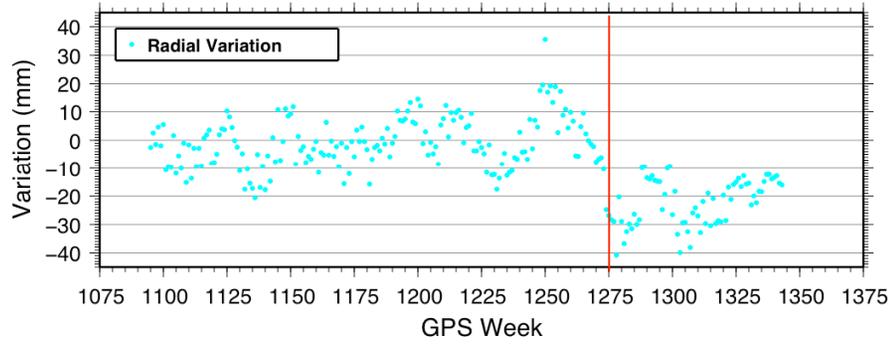
DUBO



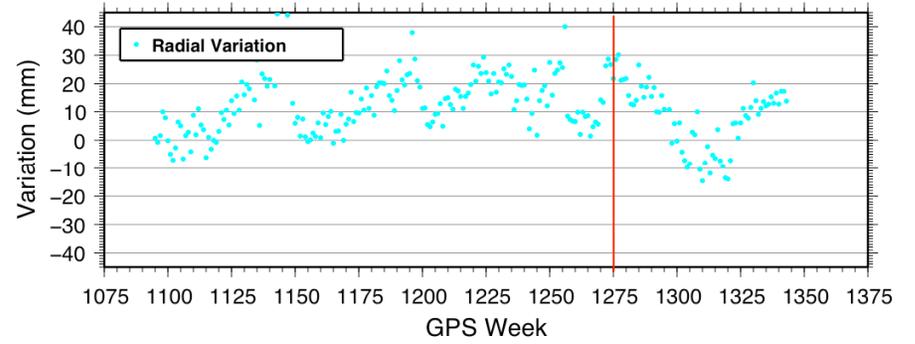
NANO



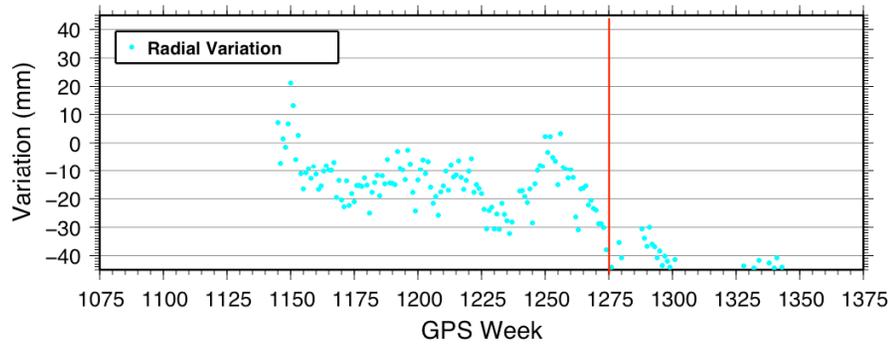
ALGO



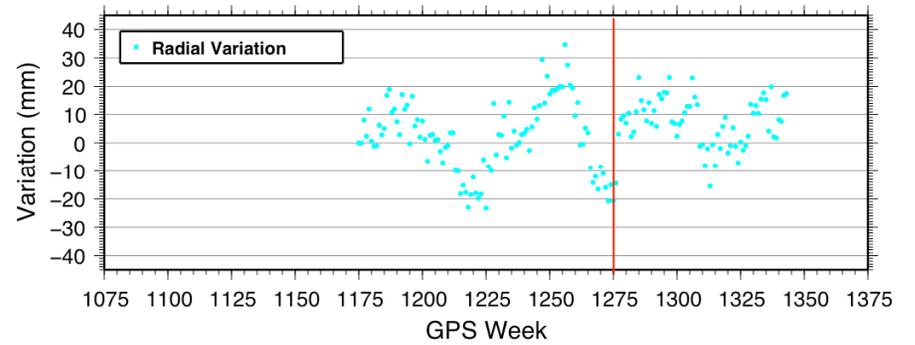
WHIT



HLFX



ALRT





New NAREF Solutions



Reprocessing all Canadian data with Bernese v5.0

- Back to 2001 (beginning of new regional sites in Canada)
- Will include 2005 data
- Should be finished in a month or two

Updating NAREF weekly combinations & velocities

- Will recombine Bernese v5.0 solutions with others
- **Will start adding official PBO solutions to combo**
- Should improve new version of SNARF
- Planning for semi-annual velocity solutions

Possibility of SIO updating “PBO” weekly solutions?

- Add as many other N.A. stations as possible since 2001
- To provide more redundant checks during combination
- Especially for CORS (most only in NGS solution)





CBN Velocity Solutions



No Bernese bias

- Processed using Bernese v4.2 with error, but...
- No solutions processed with corrected software
- All solutions affected equally -- no apparent offset in time series
- Vertical velocities agree better with GIA models

New (3rd) measurement epoch

- Eastern half in 2005
- Western half in 2006

Reprocessing all CBN epochs with Bernese v5.0

- For consistency with reprocessed NAREF solutions
- Will begin this Summer





CBN vs Some Plate Motion Models



CBN velocities in ITRF

- ALGO constrained (weighted) to IGS05P05.snx

Removed various plate motion estimates

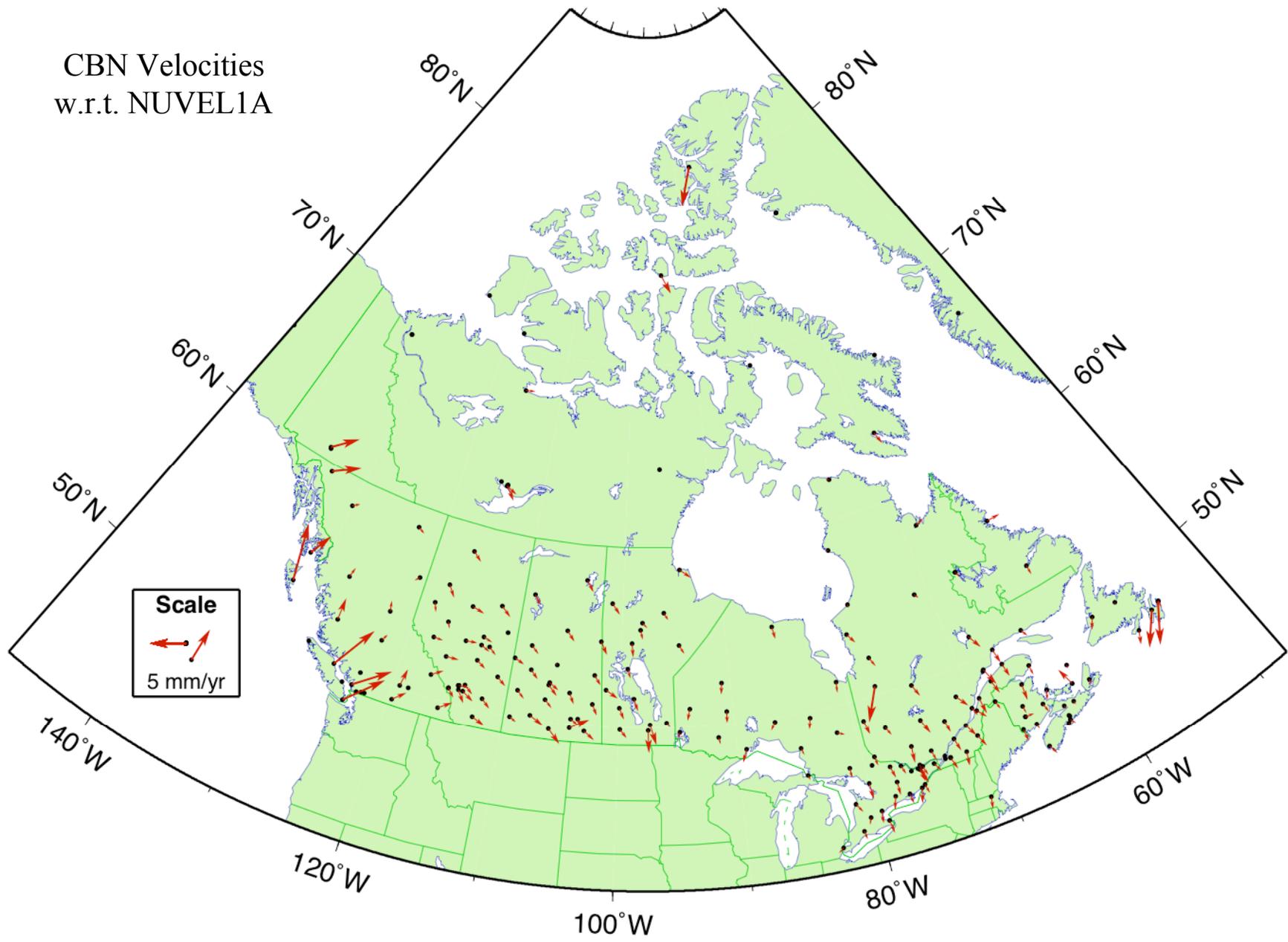
- NNR-NUVEL1A
- REVEL
- ITRF2000
- Prelim. SNARF
- SNARF 1.0

Plotted residual horizontal velocities

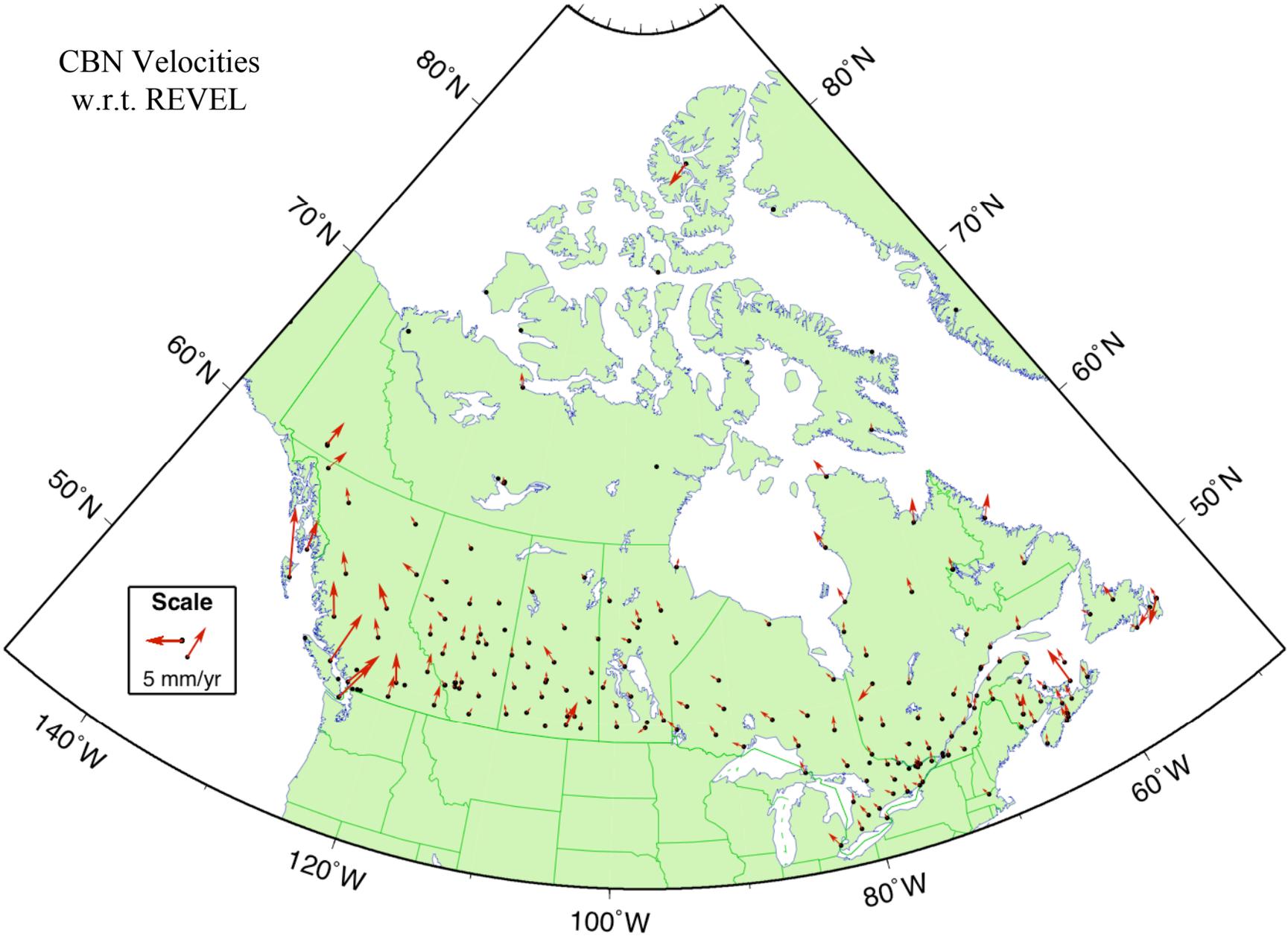
- Velocities relative to plate model



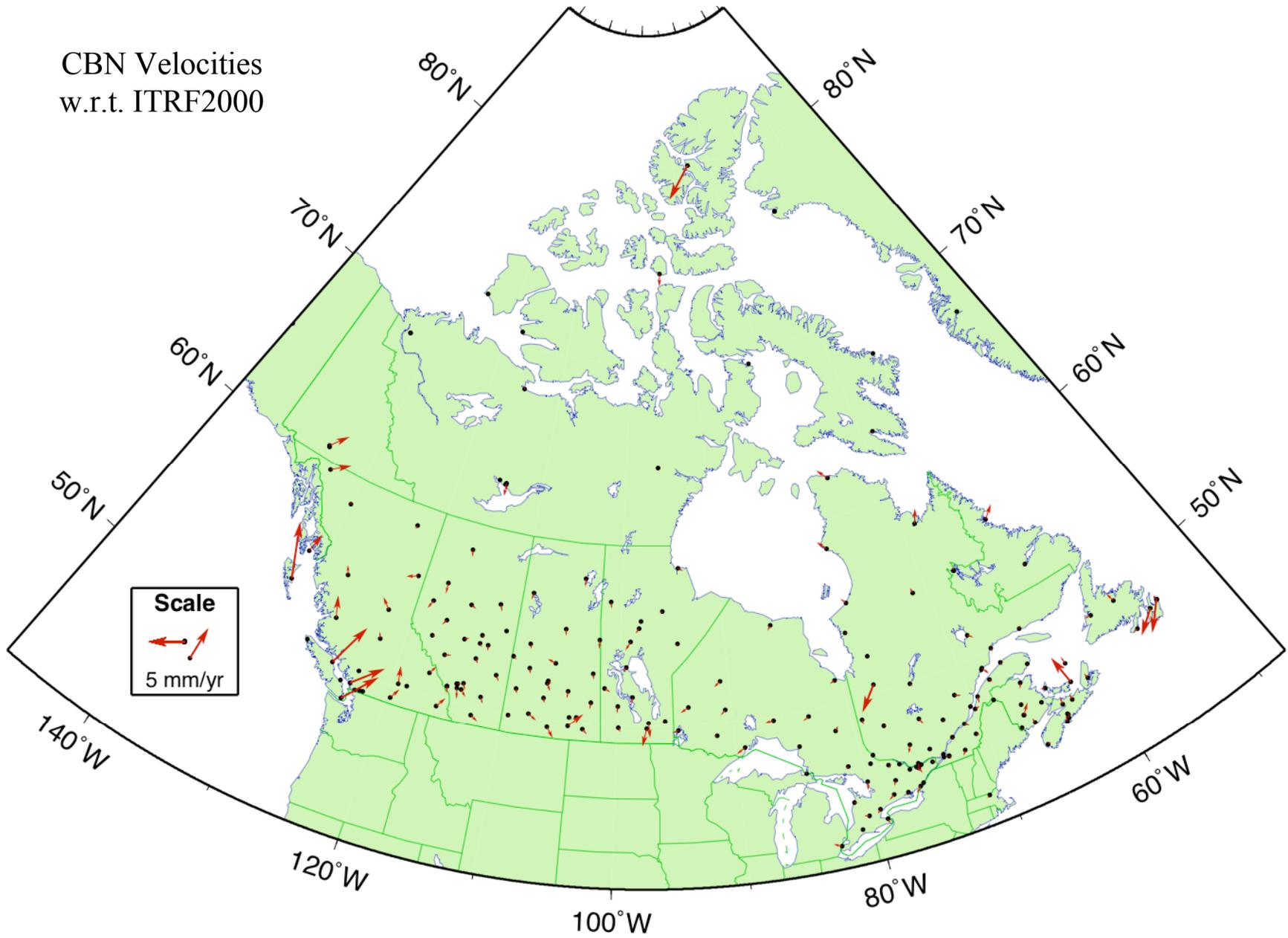
CBN Velocities
w.r.t. NUVEL1A



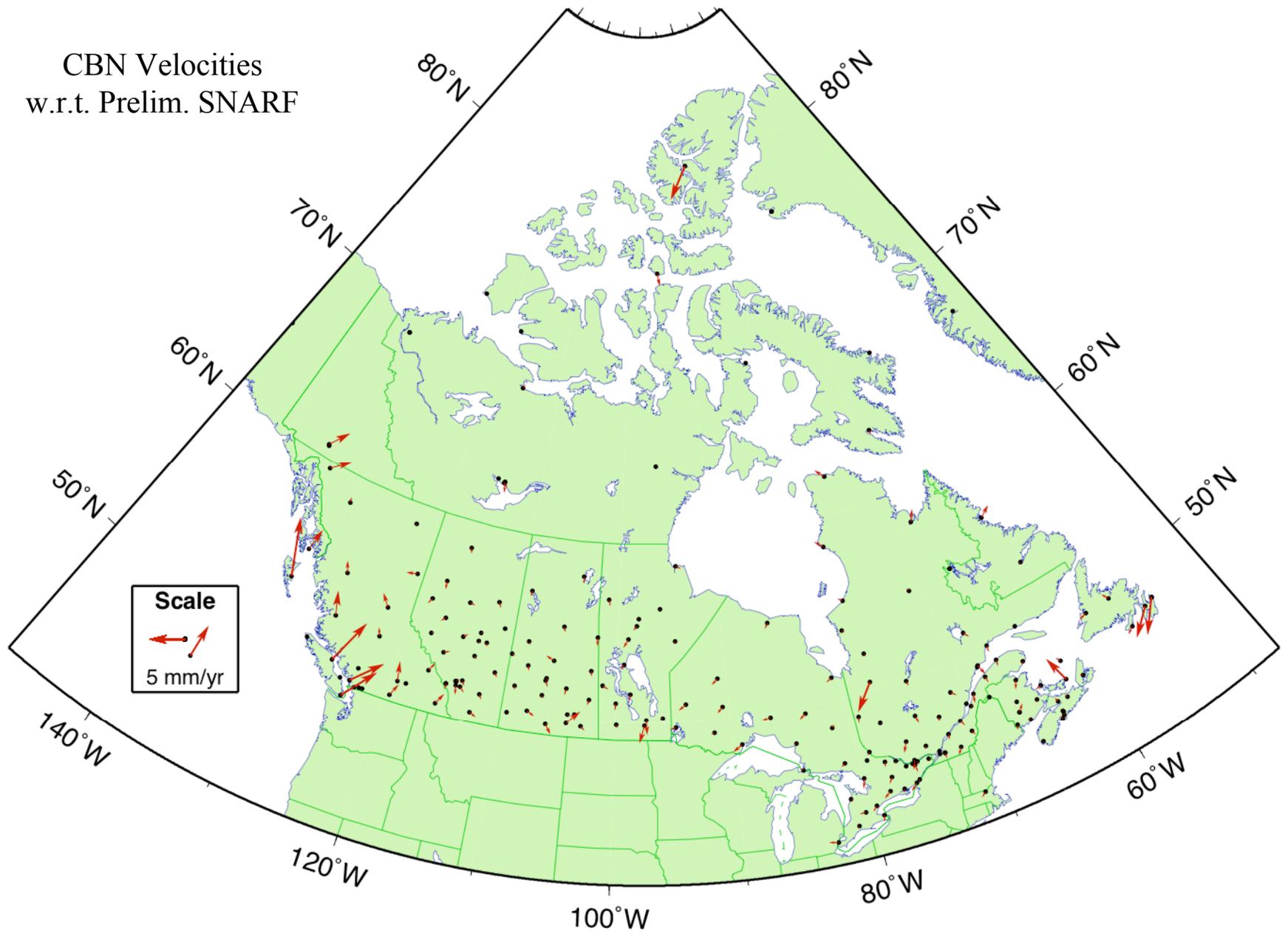
CBN Velocities
w.r.t. REVEL



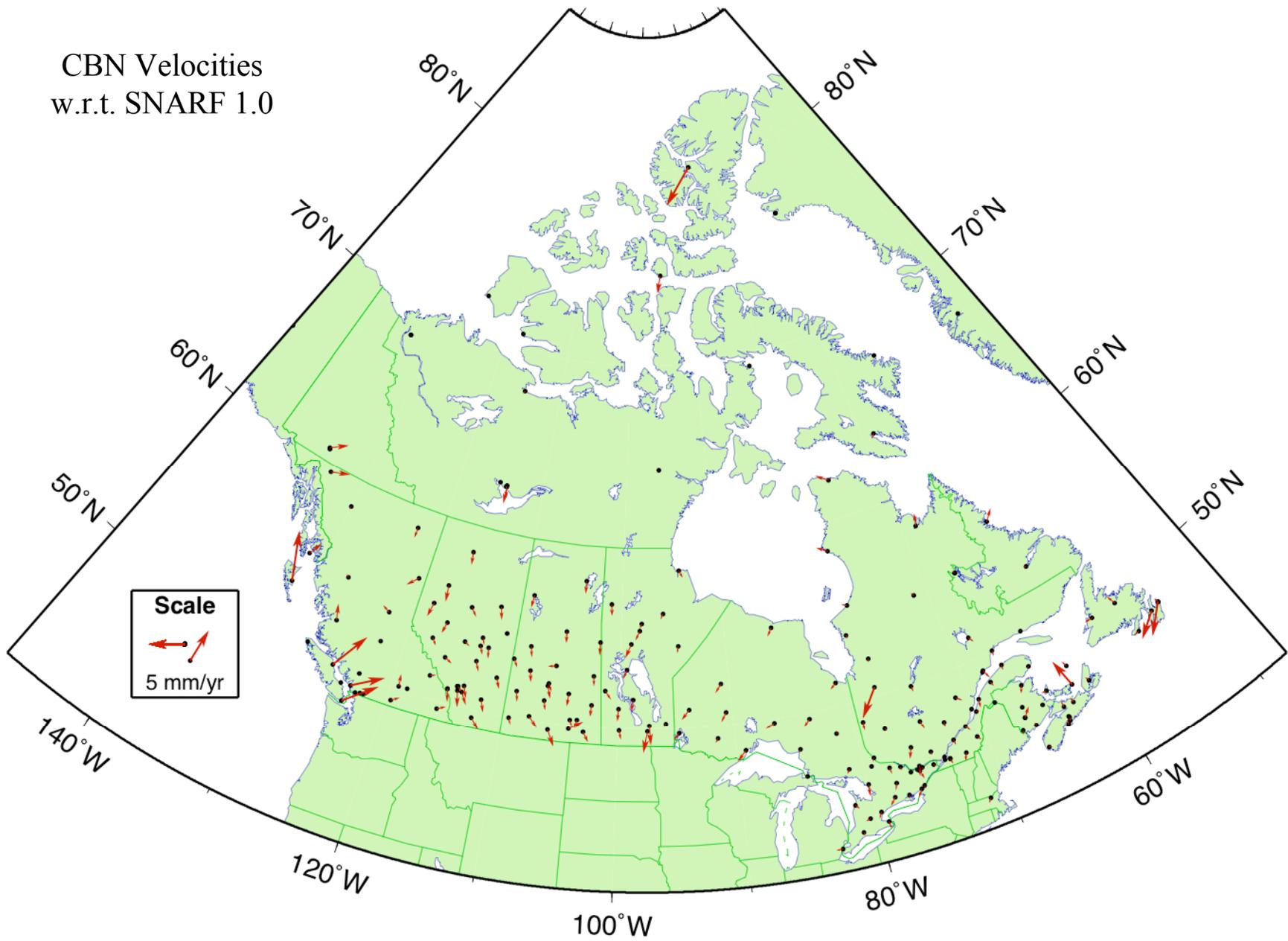
CBN Velocities
w.r.t. ITRF2000



CBN Velocities
w.r.t. Prelim. SNARF



CBN Velocities
w.r.t. SNARF 1.0





End



CBN+NAREF
Vertical Velocities

