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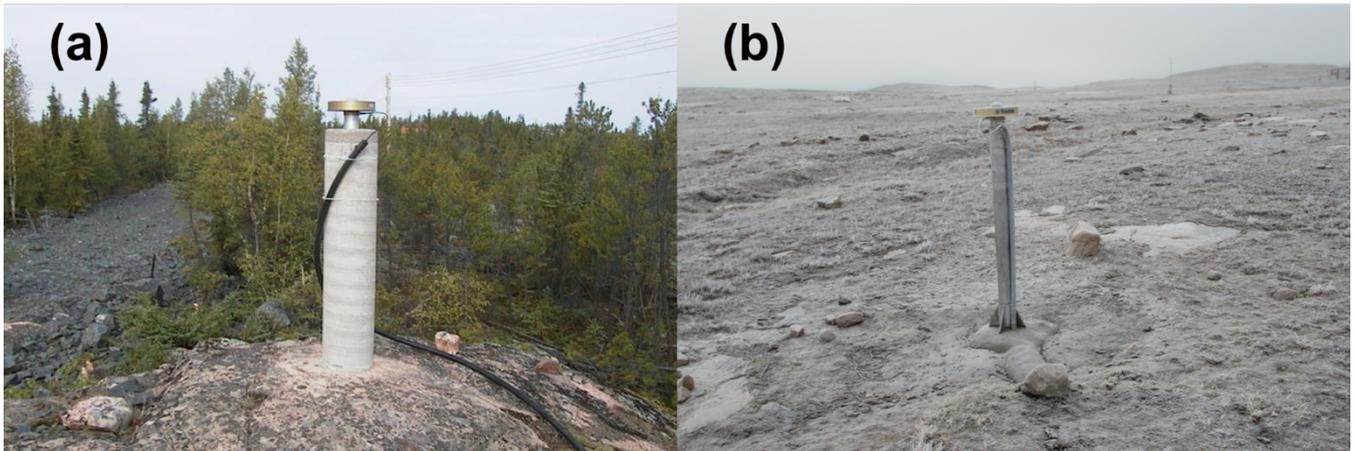
Supplement of

Global Positioning System interferometric reflectometry (GPS-IR) measurements of ground surface elevation changes in permafrost areas in northern Canada

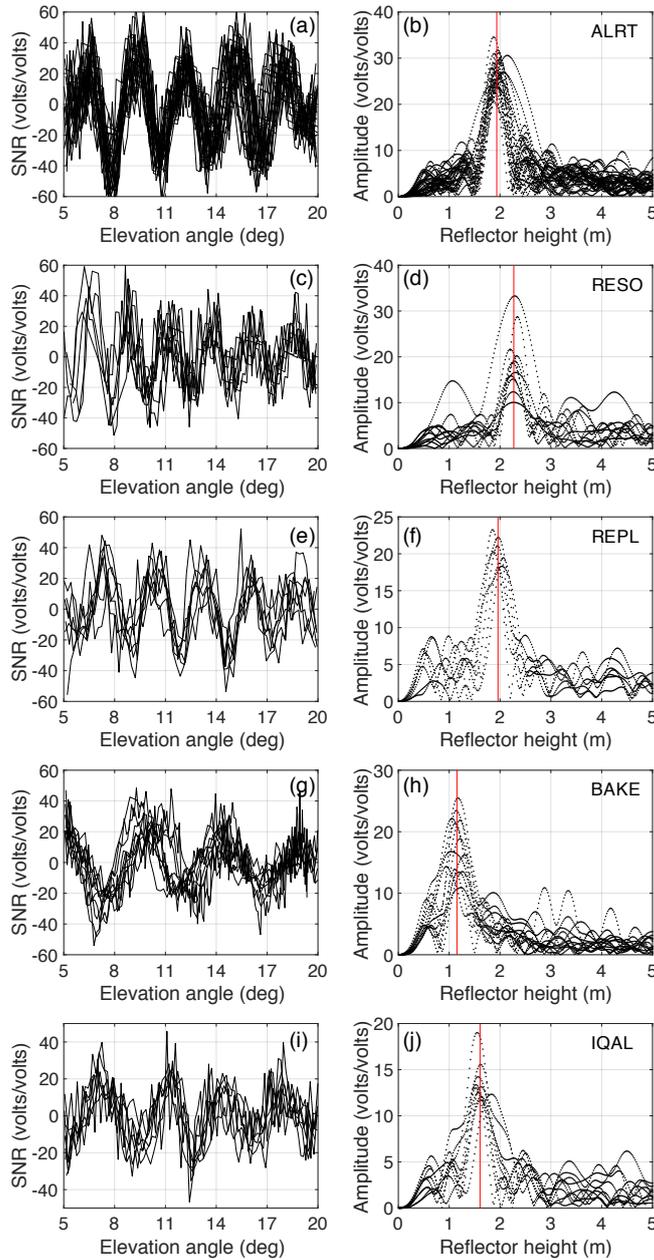
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5 Figure S1: Ground photos of two GPS stations (a) YELL and (b) REPL (source: <https://webapp.geod.nrcan.gc.ca/geod/data-donnees/cacs-scca.php?locale=en>). (a) shows that YELL is located above an undulated and inhomogeneous surface and surrounded by tall shrubs. This is a negative example and no azimuth range can be selected. (b) shows a positive example that surrounding surface of REPL is open, nearly flat, and relatively homogeneous.



10 **Figure S2: Examples of SNR series (left) and their frequency spectrum (right, expressed as reflector height in the x-axis) at the identified CACS sites. The 2-order polynomial fits of SNR series have been removed. The frequencies have been converted to reflector height by equation (3) in Sect. 2. Each vertical red line in the right panels marks the dominant reflector height.**

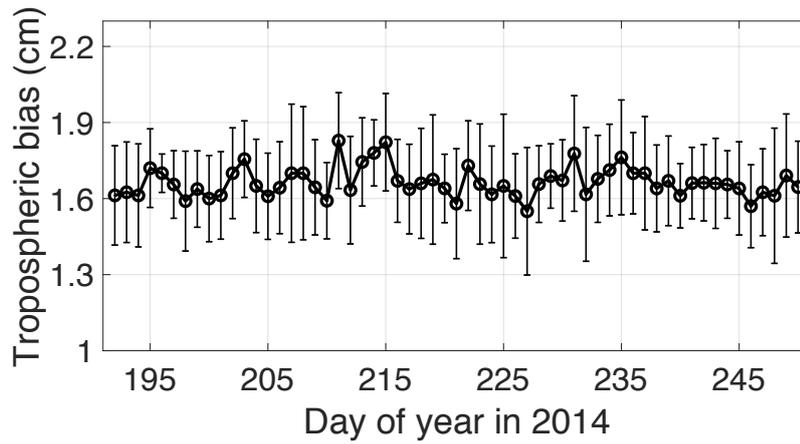


Figure S3: Time series of tropospheric biases in the estimated reflector height in Resolute Bay in the thaw season (i.e., DOY 192–
15 250) of 2014. They are the mean values of the tropospheric biases of all satellite tracks, and their standard deviations are indicated
by error bars.

Table S1. Receiver and antenna types of the identified GPS stations

ID	Receiver type	Antenna model	Radome	Data time span	Source
ALRT	ASHTECH UZ-12	ASH701945D_M	NONE	2012–2018	https://webapp.geod.nrcan.gc.ca/geod/datadonnees/ca/csscca.php?locale=en
RESO	ASHTECH UZ-12	ASH700936A_M	NONE	2003–2014	
REPL	TRIMBLE NETR9	TRM59800.00	NONE	2014–2019	
BAKE	TPS NETG3 (before 2013/07/11) TPS NET-G3A	TPSCR.G3	NONE	2010–2017	
IQAL	TPS NETG3 (before 2011/09/12) TPS NET-G3A	TPSCR.G3	NONE	2010–2019	
PONC	NOVATEL GSV4004	NOV702GG	NONE	2008–2018	
HALC	NOVATEL GSV4004	NOV702GG	NONE	2008–2018	
IQAC	NOVATEL GSV4004	NOV702GG	NONE	2008–2018	
RANC	SEPT POLARXS	POLANT+_GG	NONE	2014–2018	
FSIC	SEPT POLARXS	POLANT+_GG	NONE	2014–2018	
FSMC	SEPT POLARXS	POLANT+_GG	NONE	2014–2018	
SANC	NOVATEL GSV4004	NOV702GG	NONE	2008–2018	