The Cryosphere

Supplement of

Inter-comparison of snow depth over Arctic sea ice from reanalysis reconstructions and satellite retrieval

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Table S1 Information of CRREL and AWI buoys used in validation of snow products

Buoy	Buoy number/date
CRREL	2002A, 2003A, 2003C, 2003D, 2004A, 2004B, 2004C, 2004D, 2005F, 2006C, 2006D, 2006E, 2007B, 2007C, 2007D, 2008B, 2008C, 2008 E, 2009A, 2010A, 2010B, 2010C, 2010F, 2010G, 2010H, 2011B, 2011C, 2011E, 2011J, 2011K, 2011L, 2012A, 2012 B, 2012G, 2012H, 2012I, 2012J, 2012L, 2012M, 2013A, 2013B, 2013D, 2013F, 2013G, 2013H, 2013I, 2014B, 2014C, 2014D, 2014F, 2014I, 2015A, 2015B, 2015C, 2015D, 2015F, 2015G, 2015J
AWI	2013S3, 2013S4, 2014S13, 2014S14, 2014S15, 2014S25, 2015S16, 2015S20, 2015S21, 2015S22, 2015S23, 2015S26, 2015S27, 2015S28, 2015S29, 2015S30, 2015S32, 2015S33, 2015S35, 2016S36, 2016S44, 2016S45, 2016S46, 2016S50, 2017S43, 2017S51, 2017S52, 2017S53

Table S2: Correlation of means snow depth in April among reanalysis-based products

Correlation	SnowModel-LG	NESOISM	UW	CPOM
SnowModel-LG	-	0.83	0.53	0.40
NESOSIM	-	-	0.78	0.69
UW	-	-	-	0.73
CPOM	-	-	-	-

Table S3: R^2(in bold), RMSE (left in bracket, units: cm) and normalized RMSE (right in bracket) in comparison with four OIB products using the snow product's native spatio-temporal resolution

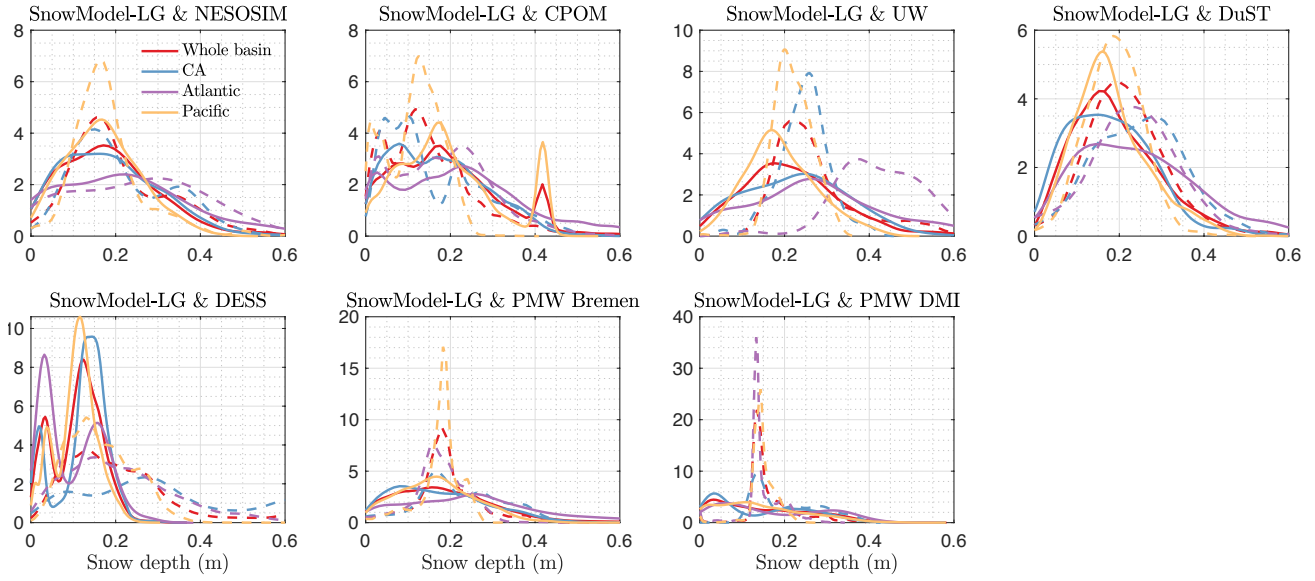| OIB Product	SnowModel-LG	NESOSIM	CPOM	UW	DuST	DESS	PMW Bremen	PMW DMI
Quicklook	**0.19**	**0.28**	**0.42**	**0.03**	**0.25**	**0.34**	**0.51**	**0.53**
	(11.2,0.23)	(9.6,0.23)	(7.3,0.15)	(3.3,0.15)	(5.5,0.14)	(15.1,0.41)	(5.1,0.11)	(4.3,0.10)
GSFC	**0.21**	**0.41**	**0.30**	**0.22**	**0.21**	**0.41**	**0.54**	**0.38**
	(11.2,0.23)	(8.6,0.22)	(8.6,0.19)	(3.5,0.14)	(6.2,0.14)	(14.8,0.34)	(5.1,0.12)	(5.3,0.13)
JPL	**0.33**	**0.41**	**0.55**	**0.29**	**0.26**	**0.46**	**0.61**	**0.52**
	(10.4,0.15)	(8.6,0.15)	(7.0,0.13)	(3.4,0.10)	(6.1,0.13)	(14.2,0.35)	(4.8,0.10)	(4.7,0.08)
SRLD	**0.35**	**0.42**	**0.52**	**0.19**	**0.15**	**0.50**	**0.56**	**0.37**
	(10.4,0.10)	(8.6,0.10)	(7.1,0.10)	(3.6,0.06)	(6.5,0.11)	(13.7,0.23)	(5.1,0.08)	(5.3,0.06)

Figure S1: Comparison in distribution of snow depth in spring (March-April) 2015 (units: m) over different regions. Solid lines are from MERRA2-based SnowModel-LG while dashed lines are from corresponding product. The analysis is made based on the common spatial coverage of the different products and SnowModel-LG.
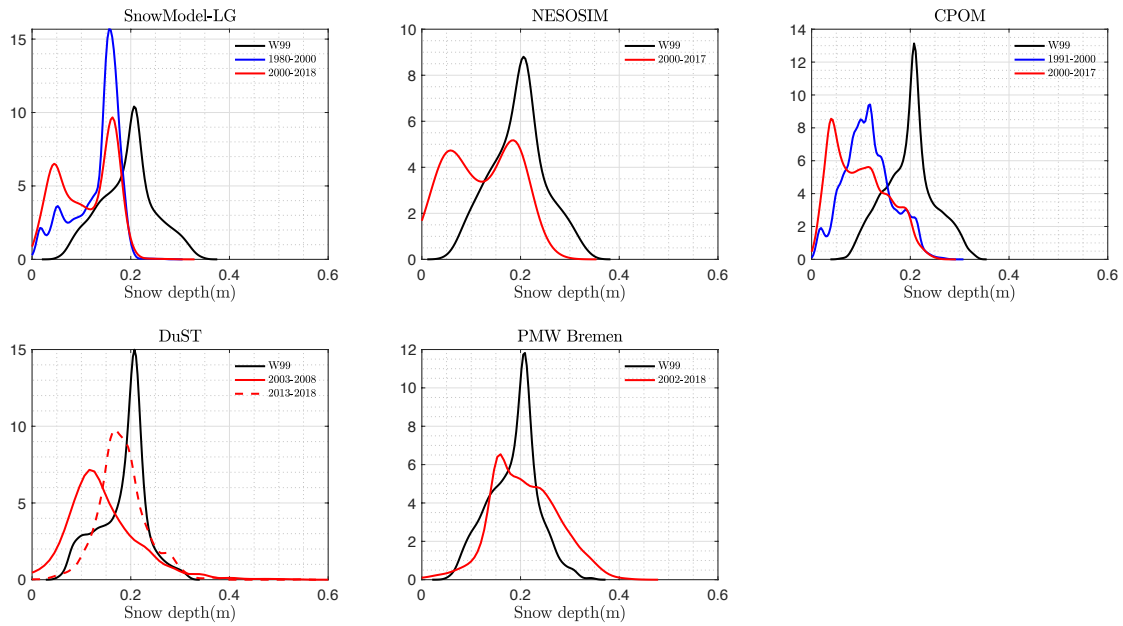

Figure S2: Snow distribution comparison between W99 and snow products in autumn (October/November).
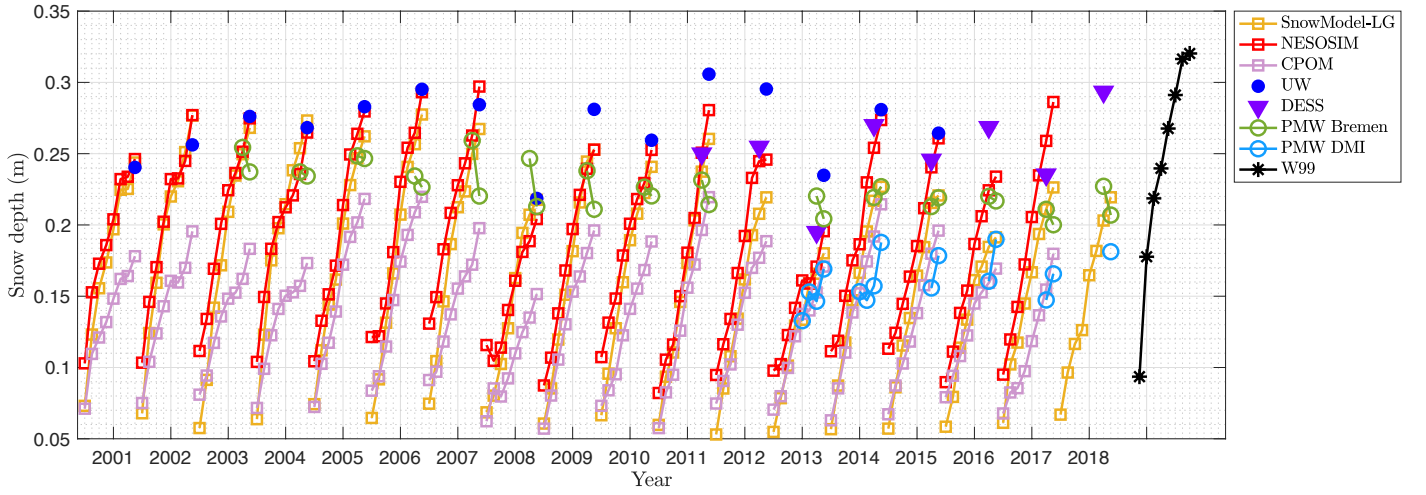
Figure S3: Same with Figure 7 but for common coverage up to 87.5°N (without DuST)
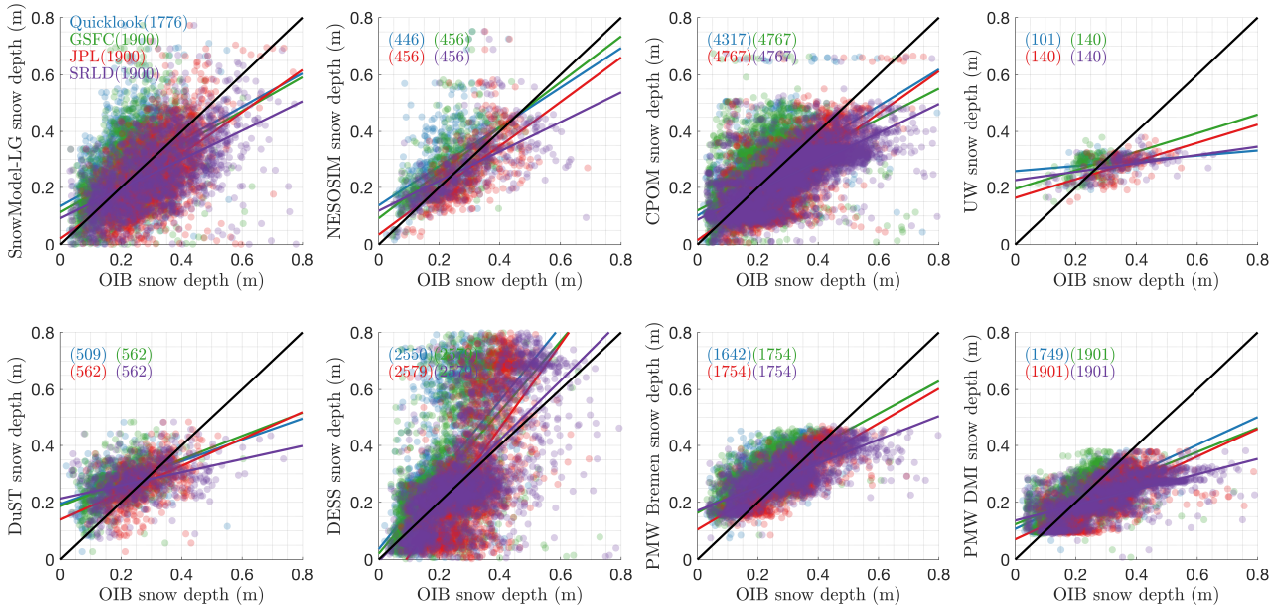

Figure S4: Same as Figure 12, but comparisons with four OIB products using the native spatio-temporal resolution of the snow products
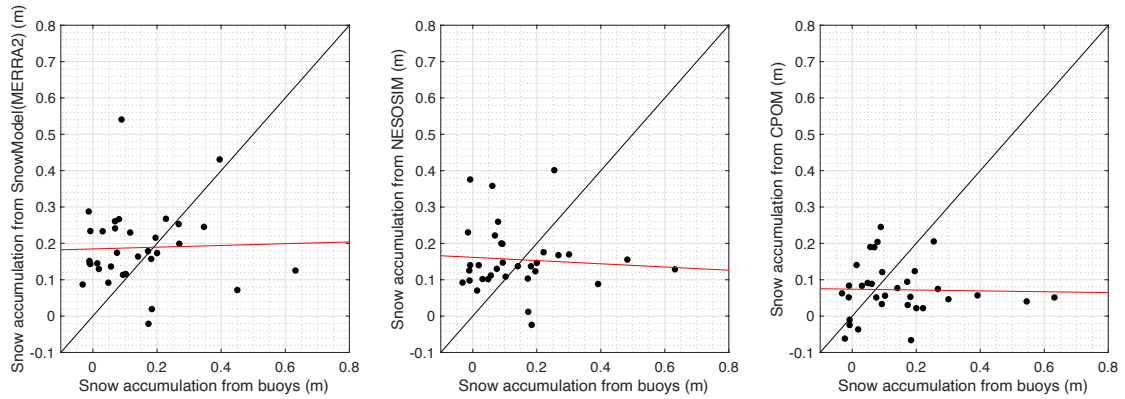

Figure S5: Comparison of total winter snow accumulation (starts from early winter to the next year) between buoys and three snow products based on daily snow products.