

Supplementary Information:

Holocene reconfiguration and readvance of the East Antarctic Ice Sheet, Greenwood *et al.*

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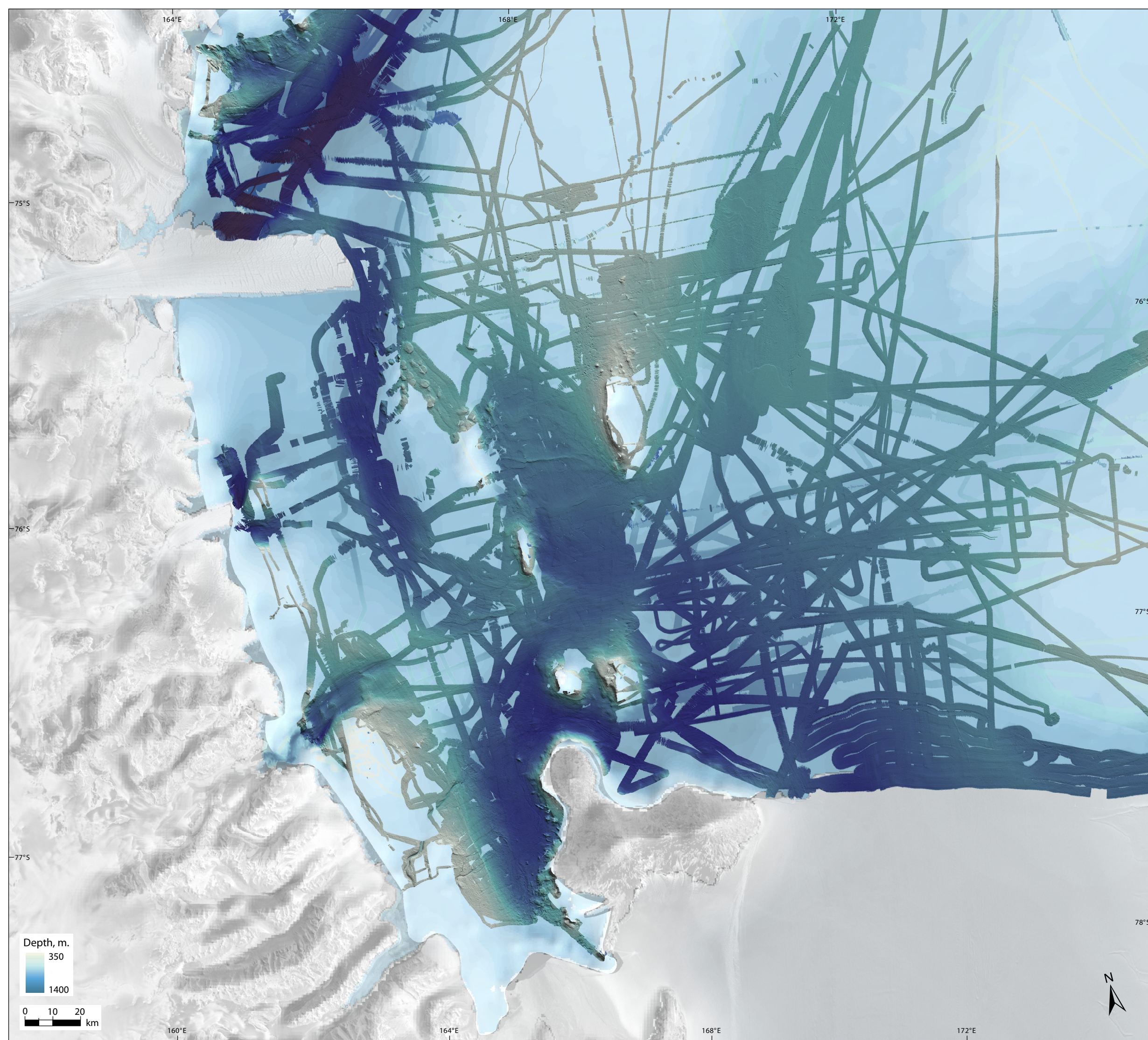
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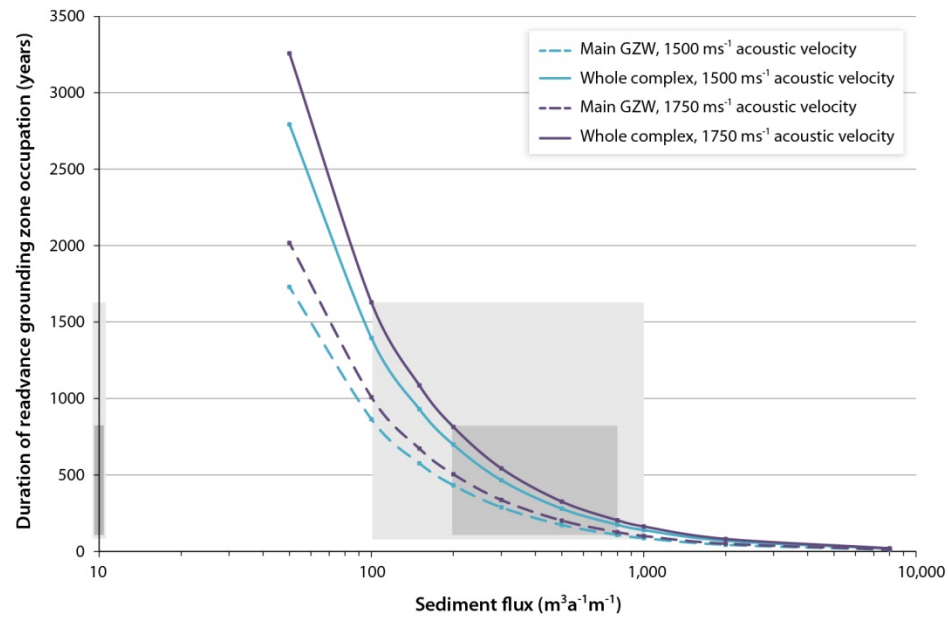
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Supplementary Fig. 1. Compilation of multibeam data in the western Ross Sea. Kongsberg EM120 & 122 data in full colour, visualised with 4x vertical exaggeration and hillshade from the NE; legacy SeaBeam data semi-transparent. Background data from IBCSO¹ and RAMP² ice surface mosaic.

Supplementary Table 1: Estimates bracketing likely duration of Grounding Zone Wedge construction.

<i>Acoustic velocity through sediment</i>		GZW1		Whole GZW complex	
		<i>1500 m s⁻¹</i>	<i>1750 m s⁻¹</i>	<i>1500 m s⁻¹</i>	<i>1750 m s⁻¹</i>
Grounding line length (km)		34.5		--	
GZW area (km ²)		679.42		1062.08	
Mean GZW thickness (m)		4.39	5.12	3.35	3.91
GZW volume (km ³)		2.98	3.48	4.06	4.74
Duration of GZW stillstand (years)					
- flux:	100 m ³ a ⁻¹ m ⁻¹	865	1009	1396	1628
	500 m ³ a ⁻¹ m ⁻¹	173	202	280	326
	1000 m ³ a ⁻¹ m ⁻¹	86	101	140	163



Supplementary Fig. 2: Duration of Grounding Zone Wedge construction for varying grounding line sediment fluxes. Light grey envelope denotes fluxes of 100-1000 m³a⁻¹m⁻¹, consistent with most literature reported values³⁻⁹, yielding event durations of c. 80-1000 years; a slightly narrower range of fluxes (200-800 m³a⁻¹m⁻¹; dark grey envelope) yields durations of c. 100-800 years.

Supplementary Table 2: Estimated ice volume discharged by the southern JOIDES readvance event (Fig. 4G, 7A), using an event duration of 100-1600 years (Supplementary Table 1, Supplementary Fig. 2) and potential ice flow velocities bracketed by 200 and 800 m a⁻¹.

Duration (years)	Velocity (m a ⁻¹)	Flowline length passing across readvance maximum grounding line (km)	Method: parabola with no isostatic correction	Ice volume (km ³)	Annual discharge (Gt)
100	200	20 -> too short	--	--	
100	500	50	c = 2.0	3560	32.6
100	800	80	c = 2.0	7591	69.6
600	200	120	c = 2.0	10119	15.5
600	500	300	c = 2.0	26461	40.4
600	800	480	c = 2.0	42196	64.5
1600	200	320	c = 2.0	26894	15.4
100	500	50	c = 2.5	3831	35.1
100	800	80	c = 2.5	8254	75.7
600	200	120	c = 2.5	11073	16.9
600	500	300	c = 2.5	30814	47.1
600	800	480	c = 2.5	54002	82.5
1600	200	320	c = 2.5	31678	18.2
1600	500	800 -> catchment uncertain	volume scaled up	~87000	49.9
1600	800	1280 -> catchment uncertain	volume scaled up	~152000	87.1
100	500	50	c = 3.0	4103	37.6
100	800	80	c = 3.0	8918	81.8
600	200	120	c = 3.0	12026	18.4
600	500	300	c = 3.0	35300	53.9
600	800	480	c = 3.0	66413	101.5
1600	200	320	c = 3.0	36701	21.0
		Grounding line advance (km)	Method: parabola with no isostatic correction	Total discharge (Gt)	
		50	c = 2.0	3265	
		50	c = 2.5	3513	
		50	c = 3.0	3762	

Supplementary Table 3: Multibeam data compiled from archives (www.marine-geo.org and oden.geo.su.se).

*Newly acquired.

Cruise	System	PI	doi	Cruise	System	PI	doi
NBP9407	SeaBeam2112	Bartek	10.1594/IEDA/100366	NBP0409	EM120	Anderson	10.1594/IEDA/100323
NBP9501	SeaBeam2112	Anderson	10.1594/IEDA/100328	NBP0501	EM120	Gordon	10.1594/IEDA/100391
NBP9601	SeaBeam2112	Luyendyk, Bartek	10.1594/IEDA/100376	NBP0602	EM120	Stock, Cande	10.1594/IEDA/100287
NBP9602	SeaBeam2112	Cande	10.1594/IEDA/100285	NBP0701	EM120	Cande	10.1594/IEDA/100374
NBP9702	SeaBeam2112	Cande	10.1594/IEDA/100337	NBP0702	EM120	Nitsche	10.1594/IEDA/100372
NBP9801	SeaBeam2112	Anderson	10.1594/IEDA/100346	NBP0801	EM120	Caron	10.1594/IEDA/100383
NBP9902	SeaBeam2112	Anderson	10.1594/IEDA/100355	NBP1005	EM120	Yager	10.1594/IEDA/100400
NBP0001	SeaBeam2112	Jacobs	10.1594/IEDA/100296	NBP1101	EM120	Kohut	10.1594/IEDA/317589
NBP0209	EM120	Cande	10.1594/IEDA/100314	NBP1201	EM120	McGillycuddy	10.1594/IEDA/319324
NBP0301	EM120	Luyendyk	10.1594/IEDA/100315	NBP1210	EM120	Halanych	10.1594/IEDA/320750
NBP0301A	EM120	Bart	10.1594/IEDA/100316	NBP1302	EM120	Hansell	10.1594/IEDA/320074
NBP0301B	EM120	Smith	10.1594/IEDA/100317	NBP1502A*	EM122	Anderson	10.1594/IEDA/321969
NBP0302	EM120	Gordon	10.1594/IEDA/100318	OSO0708	EM120	Swedish Polar Research Secretariat	--
NBP0305A	EM120	Smith	10.1594/IEDA/100288	OSO0910	EM122	Anderson, Jakobsson	--
NBP0306	EM120	Luyendyk, Bartek	10.1594/IEDA/100289	OSO1011	EM122	Swedish Polar Research Secretariat	--
NBP0401	EM120	Wilson	10.1594/IEDA/100381	Araon2013	EM122	Lee	10.1594/IEDA/323884
NBP0402	EM120	Visbeck	10.1594/IEDA/100368	Araon2015	EM122	Lee	10.1594/IEDA/323884

Supplementary References

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