S1: Luminescence properties of offshore sediment samples

Both quartzes and K-feldspars were tested for their applicability. D_e tests using sand-sized MG quartz from both field sites revealed that ~84% of the Dury Voe aliquots and ~80% of the Colgrave Sound aliquots contained depletion ratios smaller than 0.8. Thus, the majority of depletion ratios were outside a range of ± 20% (compared to a ratio of 1.0) which may point to significant K-feldspar contamination of quartzes. In addition, most remaining sand-sized Dury Voe aliquots with acceptable depletion ratios demonstrated dim quartz signals just above background (see blue curve in Fig. S1a). In comparison, some sand-sized aliquots from Colgrave Sound showed appropriate quartz luminescence properties with signals that exceeded more than four times the background (see turquoise curve in Fig. S1a). D_e tests on three silt-sized aliquots also displayed suitable properties in terms of quartz signal sensitivity (see orange curve in Fig S1a). However, fine-grained sediments were only available for a few samples of both cores, and a large number of measurements would have had to be carried out to obtain a sufficiently large sample size using sand-sized quartz. While there are other methods to enhance signal sensitivity of quartzes, such as re-etching or re-sieving, shortage of available sediment prevented the application of such strategies. As D_e tests using MG aliquots of silt-sized polymineralic extracts and sand-sized K-feldspars revealed appropriate signal sensitivities of both the IR_{50} (Fig. S1b) and $pIRIR_{130}$ (Fig. S1c) signal, it was decided to further target those for dating purposes in our study.

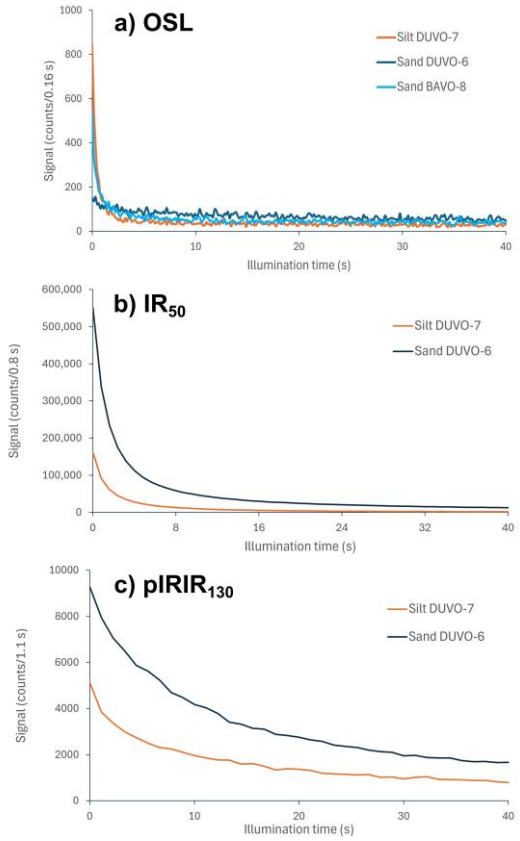

Fig. S1: Luminescence signal properties of quartz (OSL) and K-feldspar (IRSL and pIRIR).
(a) Quartz luminescence signals (OSL) in response to test doses of ~5 Gy. As DUVO-7 solely consists of fine grain material, it was not possible to plot silt- and sand-sized signals of the same sample. For Colgrave Sound, only sand-sized quartz was tested; (b, c) K-feldspar luminescence signals in response to test doses of ~5 Gy using examples from Dury Voe. K-feldspar does not bleach as quickly as quartz, but it is clearly highlighted that the IR_{50} signal (b) bleaches more rapidly than the $pIRIR_{130}$ signal (c). It is further demonstrated that silt-sized polymineralic samples used in this study generally exhibit lower signal counts than coarse-grain K-feldspars. Overall, both signals using K-feldspar show appropriate luminescence properties and suitability for dating.

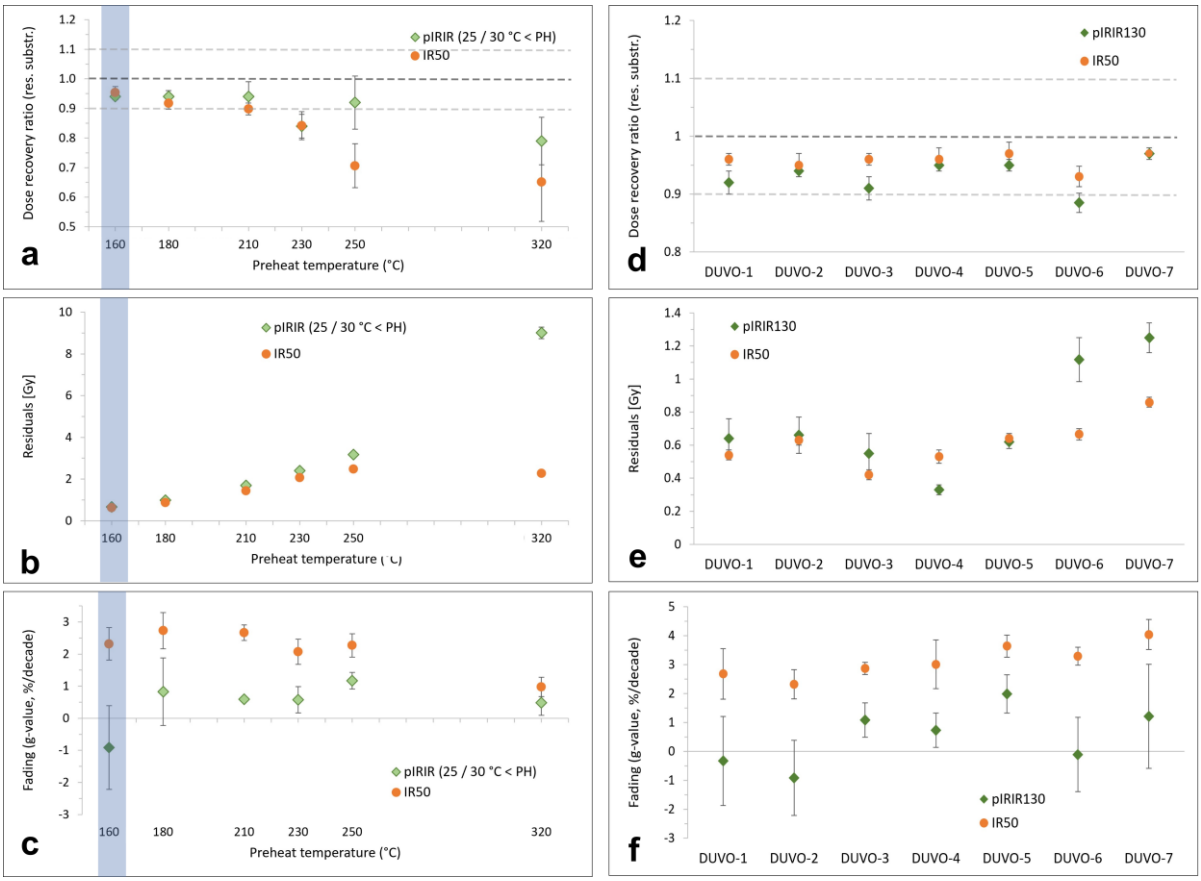

Fig. S2: K-feldspar test measurements conducted for protocol selection of the Dury Voe core.
Results of (a) a dose recovery preheat plateau test of DUVO-2; (b) a residual dose preheat plateau test of DUVO-2; (c) a Fading-preheat plateau test of DUVO-2; (d) a dose recovery test for all DUVO samples using a $pIRIR_{130}$ protocol; (e) laboratory residuals for all DUVO samples using a $pIRIR_{130}$ protocol; (f) fading rates for all DUVO samples using a $pIRIR_{130}$ protocol.

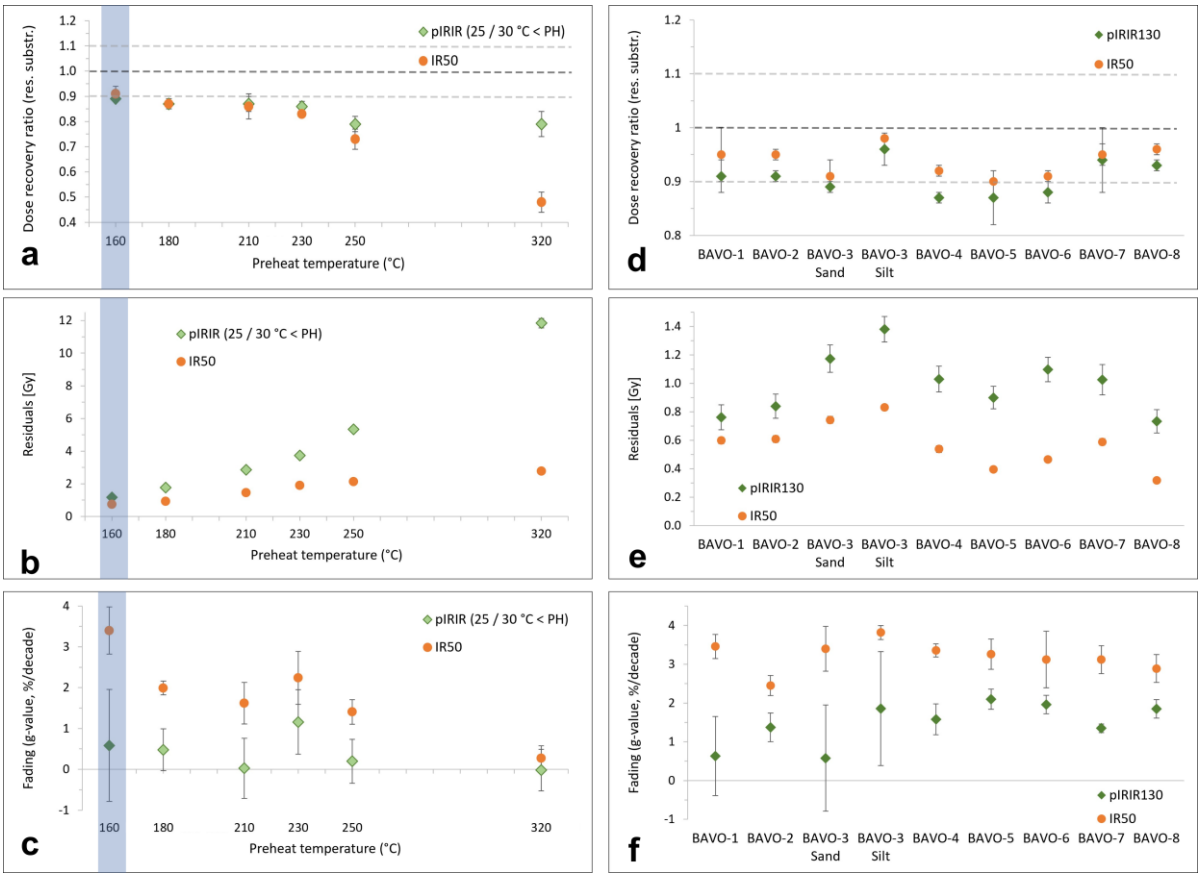

Fig. S3: K-feldspar test measurements conducted for protocol selection of the Colgrave Sound core. Results of (a) a dose recovery preheat plateau test of BAVO-3; (b) a residual dose preheat plateau test of BAVO-3; (c) a fading-preheat plateau test of BAVO-3; (d) a dose recovery test for all BAVO samples using a $pIRIR_{130}$ protocol; (e) residuals for all BAVO samples using a $pIRIR_{130}$ protocol; (f) fading rates for all BAVO samples using a $pIRIR_{130}$ protocol.

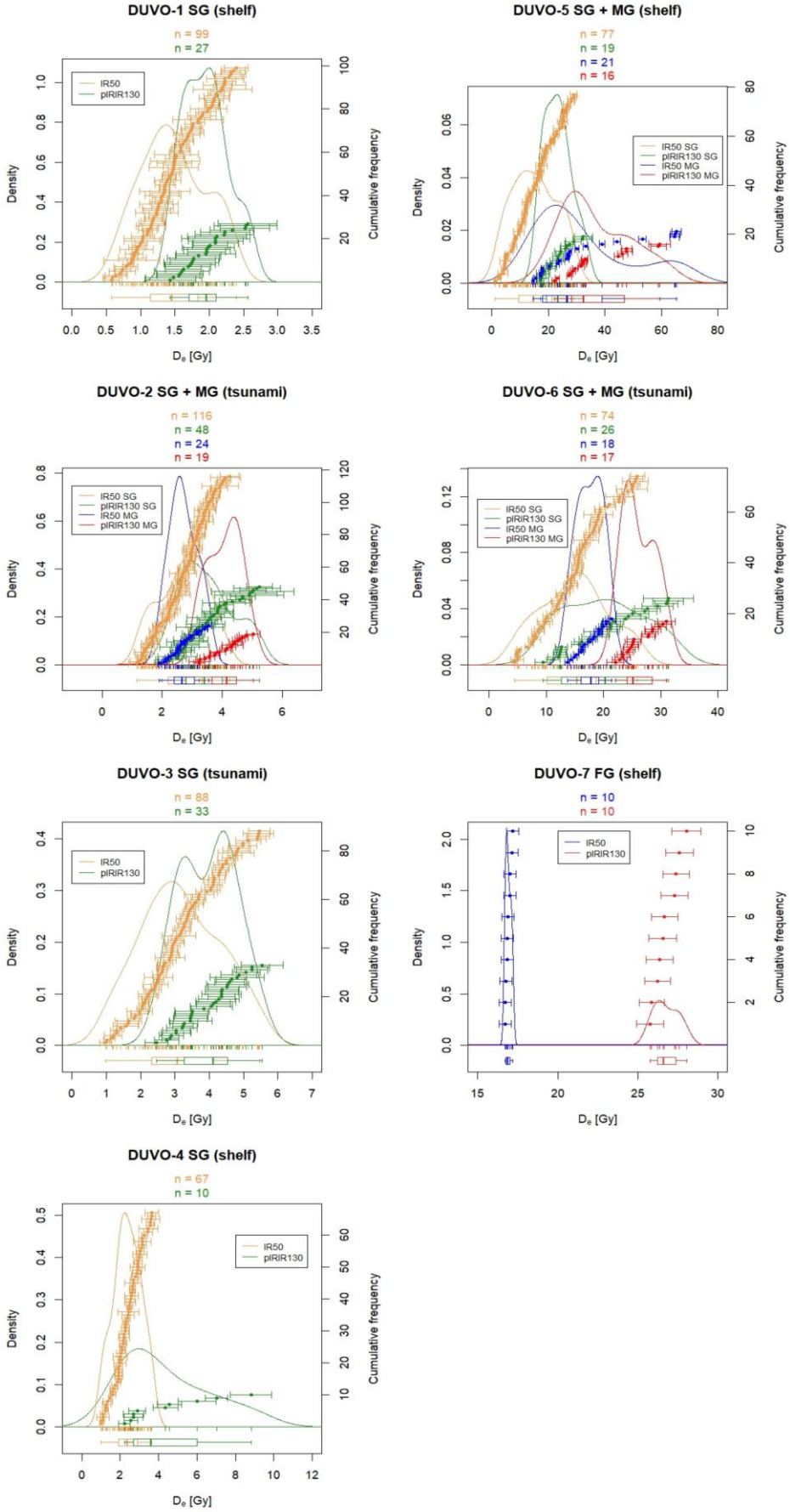

Fig. S4: Equivalent dose distributions as kernel density estimation (KDE) plots of IR_{50} and $pIRIR_{130}$ signals of the Dury Voe SG and MG measurements.

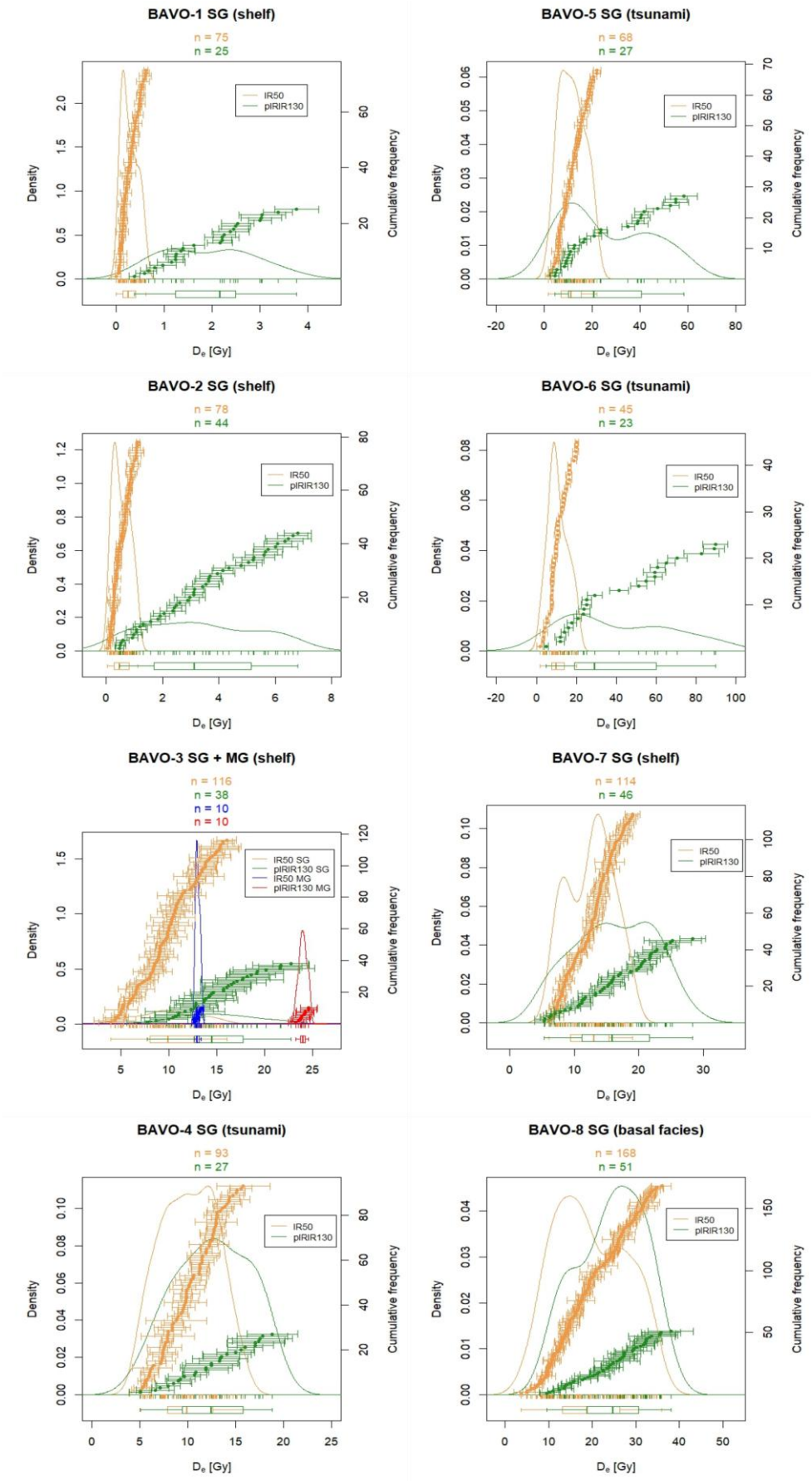

Fig. S5: Equivalent dose distributions as KDE plots of IR_{50} and $pIRIR_{130}$ signals of the Colgrave Sound SG and MG measurements.

Table S1: Geographical information for cores SH23-02C (Dury Voe) and SH23-08C (Colgrave Sound).

Embayment	Sediment core	Latitude °N	Longitude °W	Water depth
Dury Voe	SH23-02C	60°20.684	001°09.592	36 m
Colgrave Sound	SH23-08C	60°33.445	000°56.396	81 m

Table S2: Summary of dosimeters measured for the different samples. Shaded lines indicate event layers.

Core	Luminescence sample	Sampling depth [cm]	K-Feldspar		Polymineral
			Sand – SG	Sand – MG	Silt
Dury Voe (SH23-02C)	DUVO-1	39–40	X	-	-
	DUVO-2	47–48	-	X	-
	DUVO-3	53–54	X	-	-
	DUVO-4	58–59	X	-	-
	DUVO-5	217–218	X	X	-
	DUVO-6	225–226	X	X	-
	DUVO-7	232–233	-	-	X
Colgrave Sound (SH23-08C)	BAVO-1	10–13	X	-	-
	BAVO-2	18–22	X	-	-
	BAVO-3	100–102	X	-	X
	BAVO-4	103–105	X	-	-
	BAVO-5	106–108	X	-	-
	BAVO-6	114–116	X	-	-
	BAVO-7	117–119	X	-	-
	BAVO-8	160–165	X	-	-

Table S3: Measurement protocol applied to K-feldspar/polyminerals (R1–R4 = regeneration doses; RR = recycling ratio (= R1); R0 = zero dose (recuperation)).

Step	Treatment	Signal
1	Dose (natural signal, R0, R1–R4, R0, RR)	
2	Preheat (160 °C for 60 s)	
3	IR LEDs (50 °C for 200 s) for MG IR laser (50 °C for 2 s) for SG	Lx (IR_{50})
4	IR LEDs (130 °C for 300 s (Dury Voe) / 500 s (Colgrave Sound)) for MG IR laser (130 °C for 2 s) for SG	Lx (pIR_{130})
5	Test dose	
6	Preheat (160 °C for 60 s)	
7	IR LEDs (50 °C for 200 s) for MG IR laser (50 °C for 2 s) for SG	Tx (IR_{50})
8	IR LEDs (130 °C for 300 s (Dury Voe) / 500 s (Colgrave Sound)) for MG IR laser (130 °C for 2 s) for SG	Tx (pIR_{130})

Table S4: Dosimetry information for all samples used in this study.

Core	Dosimetry sample	Unit	Sampling depth [cm]	Uranium		Radium		Thorium	Potassium
				U [ppm]	U [Bq/kg]	Ra [ppm]	Ra [Bq/kg]	Th [ppm]	K [%]
Dury Voe (SH23-02C)	DUVO-I	1	8–18	1.35±0.11	16.81±1.31	4.03±0.12	52.09±1.51	5.40±0.40	1.34±0.04
	DUVO-II	2	32–34	1.34±0.09	16.66±1.17	2.90±0.11	37.49±1.38	5.38±0.38	1.33±0.03
	DUVO-III	3	46–50	1.59±0.11	19.82±1.42	2.95±0.09	38.07±1.20	6.45±0.46	1.64±0.04
	DUVO-IV	4	52–55.5	1.55±0.11	19.26±1.39	2.07±0.09	26.71±1.20	5.80±0.42	1.75±0.05
	DUVO-V	5	70–83	1.55±0.11	19.30±1.33	3.52±0.10	45.50±1.32	7.02±0.49	1.47±0.04
	DUVO-VI	5	205–217	2.44±0.17	30.35±2.07	3.22±0.11	41.55±1.38	10.34±0.72	2.22±0.06
	DUVO-VII	6	222–228	2.38±0.17	29.54±2.07	2.92±0.12	37.77±1.52	9.65±0.68	1.98±0.05
	DUVO-VIII	7	238–248	2.67±0.18	33.21±2.27	3.38±0.10	43.62±1.24	10.84±0.75	2.32±0.06
Colgrave Sound (SH23-08C)	BAVO-I	1	1–10	0.50±0.04	6.20±0.47	0.66±0.06	8.51±0.72	1.81±0.13	0.77±0.02
	BAVO-II	2	14–17	0.50±0.04	6.18±0.54	0.62±0.06	7.96±0.80	1.72±0.14	0.72±0.02
	BAVO-III	3	22–31	0.72±0.05	8.96±0.65	1.12±0.06	14.44±0.82	3.28±0.23	0.89±0.02
	BAVO-IV	4	91–100	1.17±0.08	14.54±1.00	1.96±0.07	25.29±0.96	4.84±0.34	1.66±0.04
	BAVO-V	5	105–113	0.68±0.05	8.50±0.61	1.05±0.07	13.62±0.85	2.43±0.18	0.93±0.02
	BAVO-VI	6	119–126	1.48±0.10	18.38±1.27	1.93±0.07	24.98±0.85	5.24±0.37	1.37±0.04
	BAVO-VII	6+7	155–167	1.38±0.09	17.11±1.18	1.69±0.09	21.85±1.10	5.44±0.38	1.56±0.04

Table S5: Dosimetry information from gamma-ray spectrometry and radiochemistry information from alpha spectrometry (^{230}Th and $^{233/234}$U) and ICP-MS (^{238}U) for replicate measurements (DUVO-IV, DUVO-V, and BAVO-IV) conducted at VKTA – Strahlenschutz, Analytik & Entsorgung Rossendorf e.V.

Core	**Dosimetry sample**	**Sampling depth [cm]**	**Gamma-ray spectrometry**							**Alpha spectrometry**		
			^{238}U [Bq/kg]	**^{226}Ra [Bq/kg]**	**^{210}Pb [Bq/kg]**	**^{228}Ra [Bq/kg]**	**^{228}Th [Bq/kg]**	**Th [ppm]**	**K [%]**	**^{230}Th [Bq/kg]**	**$^{233/234}$U [Bq/kg]**	**^{238}U [Bq/kg]**
Dury Voe (SH23-02C)	DUVO-IV	52–55.5	43±5	18.7±1.4	18±4	24.2±2.0	23.0±1.1	5.8±0.30	1.91±0.13	19±3	50±8	48±7
	DUVO-V	70–83	80±7	18.4±1.3	17±3	25.9±1.9	25.1±1.1	6.3±0.30	1.42±0.10	22±3	98±15	89±14
Colgrave Sound (SH23-08C)	BAVO-IV	91–100	40±4	15.5±1.1	18±3	19.4±1.5	19.5±1.0	4.8±0.21	1.72±0.13	17±3	50±8	45±7

Table S6: Water content information for all samples used in this study.

Core	Luminescence sample	Unit	Sampling depth [cm]	Gravimetric water content [%]	Saturation water content [%]
Dury Voe (SH23-02C)	DUVO-1	2	39–40	60±10	62±10
	DUVO-2	3	47–48	10±10	30±10
	DUVO-3	4	53–54	30±10	30±10
	DUVO-4	5	58–59	30±10	62±10
	DUVO-5	5	217–218	15±10	66±10
	DUVO-6	6	225–226	20±10	66±10
	DUVO-7	7	232–233	30±10	66±10
Colgrave Sound (SH23-08C)	BAVO-1	1	10–13	20±10	40±10
	BAVO-2	3	18–22	30±10	50±10
	BAVO-3	4	100–102	35±10	50±10
	BAVO-4	5	103–105	35±10	30±10
	BAVO-5	5	106–108	30±10	30±10
	BAVO-6	5	114–116	25±10	30±10
	BAVO-7	6	117–119	25±10	50±10
	BAVO-8	7	160–165	20±10	40±10

Table S7: Internal K content information for all samples used in this study.

Core	Luminescence sample	Unit	Sampling depth [cm]	Internal K content [%] – beta counting	Internal K content [%] – SEM-EDX	Internal K content [%] - dating
Dury Voe (SH23-02C)	DUVO-1	2	39–40	7.1	-	7.0±2.0
	DUVO-2	3	47–48	7.1	-	7.0±2.0
	DUVO-3	4	53–54	7.1	8.7	7.0±2.0
	DUVO-4	5	58–59	7.1	-	7.0±2.0
	DUVO-5	5	217–218	6.7	7.0	7.0±2.0
	DUVO-6	6	225–226	6.6	-	7.0±2.0
	DUVO-7	7	232–233	-	-	7.0±2.0
Colgrave Sound (SH23-08C)	BAVO-1	1	10–13	5.1	-	5.3±2.0
	BAVO-2	3	18–22	5.4	-	5.3±2.0
	BAVO-3	4	100–102	6.0	9.0	7.0±2.0
	BAVO-4	5	103–105	5.1	-	7.0±2.0
	BAVO-5	5	106–108	7.3	-	7.0±2.0
	BAVO-6	5	114–116	7.4	8.8	7.0±2.0
	BAVO-7	6	117–119	6.2	-	7.0±2.0
	BAVO-8	7	160–165	9.9	-	10.0±2.0

Table S8: Dose rate information for all samples used in this study. Shaded column indicates dose rates used for dating (DR_{mod}).

Luminescence sample	Grain size fraction [µm]	Signal	Saturation water content [%]	Internal K content [%]	DR_{min} [Gy/ka]	DR_{max} [Gy/ka]	DR_{mod} [Gy/ka]
DUVO-1	150–200	IR_{50}	62±10	7.0±2.0	1.58±0.15	1.81±0.16	1.75±0.16
		$pIRIR_{130}$			1.60±0.15	1.83±0.16	1.78±0.16
DUVO-2	200–250	IR_{50}	30±10	7.0±2.0	2.19±0.22	2.43±0.22	2.34±0.22
		$pIRIR_{130}$			2.21±0.23	2.46±0.23	2.37±0.23
	150–200	IR_{50}			2.12±0.20	2.37±0.20	2.28±0.20
		$pIRIR_{130}$			2.15±0.25	2.41±0.27	2.31±0.26
DUVO-3	200–250	IR_{50}	30±10	7.0±2.0	2.28±0.24	2.43±0.24	2.39±0.24
		$pIRIR_{130}$			2.30±0.23	2.45±0.24	2.41±0.24
DUVO-4	100–150	IR_{50}	62±10	7.0±2.0	1.71±0.14	2.00±0.15	1.90±0.14
		$pIRIR_{130}$			1.74±0.21	2.05±0.23	1.94±0.22
DUVO-5	200–250	IR_{50}	66±10	7.0±2.0	2.43±0.23	2.55±0.24	2.51±0.23
		$pIRIR_{130}$			2.45±0.22	2.58±0.23	2.54±0.23
	150–200	IR_{50}			2.37±0.36	2.49±0.37	2.45±0.37
		$pIRIR_{130}$			2.40±0.23	2.53±0.24	2.49±0.24
DUVO-6	150–200	IR_{50}	66±10	7.0±2.0	2.24±0.20	2.34±0.20	2.31±0.20
		$pIRIR_{130}$			2.27±0.22	2.37±0.23	2.34±0.23
	200–250	IR_{50}			2.31±0.20	2.40±0.20	2.38±0.20
		$pIRIR_{130}$			2.33±0.20	2.43±0.20	2.40±0.20
DUVO-7	4–11	IR_{50}	66±10	7.0±2.0	2.65±0.12	2.84±0.12	2.78±0.12
		$pIRIR_{130}$			2.92±0.12	3.15±0.13	3.07±0.12
BAVO-1	200–250	IR_{50}	40±10	5.3±2.0	1.02±0.16	1.06±0.16	1.04±0.16
		$pIRIR_{130}$			1.03±0.17	1.06±0.17	1.06±0.17
BAVO-2	200–250	IR_{50}	50±10	5.3±2.0	1.13±0.15	1.20±0.15	1.17±0.15
		$pIRIR_{130}$			1.14±0.19	1.21±0.19	1.18±0.19
BAVO-3	150–200	IR_{50}	50±10	7.0±2.0	1.73±0.13	1.86±0.13	1.82±0.13
		$pIRIR_{130}$			1.75±0.14	1.89±0.14	1.84±0.14
	4–11	IR_{50}			1.68±0.05	1.90±0.06	1.82±0.05
		$pIRIR_{130}$			1.82±0.05	2.08±0.06	1.99±0.06
BAVO-4	150–200	IR_{50}	30±10	7.0±2.0	1.36±0.12	1.45±0.12	1.42±0.12
		$pIRIR_{130}$			1.37±0.14	1.46±0.14	1.44±0.14
BAVO-5	200–250	IR_{50}	30±10	7.0±2.0	1.43±0.16	1.51±0.17	1.49±0.16
		$pIRIR_{130}$			1.44±0.21	1.52±0.22	1.50±0.22
BAVO-6	200–250	IR_{50}	30±10	7.0±2.0	1.44±0.17	1.52±0.17	1.50±0.17
		$pIRIR_{130}$			1.45±0.31	1.53±0.32	1.51±0.32
BAVO-7	150–200	IR_{50}	50±10	7.0±2.0	1.61±0.13	1.70±0.13	1.67±0.13
		$pIRIR_{130}$			1.63±0.15	1.71±0.16	1.69±0.16
BAVO-8	200–250	IR_{50}	40±10	10.0±2.0	2.16±0.17	2.23±0.17	2.21±0.21
		$pIRIR_{130}$			2.18±0.18	2.24±0.19	2.22±0.22

Table S9: Sensitivity of DR_{mod} (including saturation water content and measured internal K content) against using gravimetric water content and literature internal K content. Shaded column indicate dose rates used for dating (DR_{mod}).

Luminescence sample	Grain size fraction [µm]	Signal	DR_{mod} [Gy/ka]	DR_{mod} with applying gravimetric water content		DR_{mod} with applying literature K content (10 ± 2 %)	
				[Gy/ka]	Dev [%]	[Gy/ka]	Dev [%]
DUVO-1	150–200	IR_{50}	1.75±0.16	1.79±0.16	+2.3	1.90±0.16	+8.6
		$pIRIR_{130}$	1.78±0.16	1.82±0.16	+2.2	1.92±0.16	+7.9
DUVO-2	200–250	IR_{50}	2.34±0.22	2.66±0.26	+13.7	2.54±0.22	+8.5
		$pIRIR_{130}$	2.37±0.23	2.69±0.27	+13.5	2.56±0.23	+8.0
	150–200	IR_{50}	2.28±0.20	2.60±0.24	+14.0	2.43±0.20	+6.6
		$pIRIR_{130}$	2.31±0.26	2.64±0.31	+14.3	2.46±0.27	+6.5
DUVO-3	200–250	IR_{50}	2.39±0.24	2.49±0.24	+4.2	2.59±0.25	+8.4
		$pIRIR_{130}$	2.41±0.24	2.51±0.24	+4.1	2.61±0.24	+8.3
DUVO-4	100–150	IR_{50}	1.90±0.14	2.30±0.18	+21.1	2.01±0.14	+5.8
		$pIRIR_{130}$	1.94±0.22	2.35±0.27	+21.1	2.05±0.23	+5.7
DUVO-5	200–250	IR_{50}	2.51±0.23	3.55±0.33	+41.4	2.71±0.24	+8.0
		$pIRIR_{130}$	2.54±0.23	3.59±0.32	+41.3	2.73±0.23	+7.5
	150–200	IR_{50}	2.45±0.37	3.51±0.53	+43.3	2.60±0.38	+6.1
		$pIRIR_{130}$	2.49±0.24	3.56±0.35	+43.0	2.63±0.24	+5.6
DUVO-6	150–200	IR_{50}	2.31±0.20	3.17±0.27	+37.2	2.46±0.20	+6.5
		$pIRIR_{130}$	2.34±0.23	3.22±0.32	+37.6	2.49±0.23	+6.4
	200–250	IR_{50}	2.38±0.20	3.22±0.27	+35.3	2.57±0.20	+8.0
		$pIRIR_{130}$	2.40±0.20	3.26±0.26	+35.8	2.59±0.20	+7.9
DUVO-7	4–11	IR_{50}	2.78±0.12	3.69±0.18	+32.7	-	-
		$pIRIR_{130}$	3.07±0.12	4.09±0.19	+33.2	-	-
BAVO-1	200–250	IR_{50}	1.04±0.16	1.17±0.19	+12.5	1.35±0.17	+29.8
		$pIRIR_{130}$	1.06±0.17	1.18±0.21	+11.3	1.36±0.19	+28.3
BAVO-2	200–250	IR_{50}	1.17±0.15	1.30±0.19	+11.1	1.48±0.16	+26.5
		$pIRIR_{130}$	1.18±0.19	1.32±0.23	+11.9	1.48±0.22	+25.4
BAVO-3	150–200	IR_{50}	1.82±0.13	1.99±0.19	+9.3	1.97±0.13	+8.2
		$pIRIR_{130}$	1.84±0.14	2.01±0.20	+9.2	1.99±0.14	+8.2
	4–11	IR_{50}	1.82±0.05	2.04±0.10	+12.1	-	-
		$pIRIR_{130}$	1.99±0.06	2.23±0.11	+12.1	-	-
BAVO-4	150–200	IR_{50}	1.42±0.12	1.41±0.15	-0.7	1.60±0.12	+12.7
		$pIRIR_{130}$	1.44±0.14	1.42±0.17	-1.4	1.61±0.15	+11.8
BAVO-5	200–250	IR_{50}	1.49±0.16	1.50±0.19	+0.7	1.68±0.17	+12.8
		$pIRIR_{130}$	1.50±0.22	1.51±0.24	+0.7	1.69±0.23	+12.7
BAVO-6	200–250	IR_{50}	1.50±0.17	1.58±0.21	+5.3	1.69±0.18	+12.7
		$pIRIR_{130}$	1.51±0.32	1.59±0.35	+5.3	1.70±0.35	+12.6
BAVO-7	150–200	IR_{50}	1.67±0.13	1.94±0.19	+16.2	1.82±0.13	+9.0
		$pIRIR_{130}$	1.69±0.16	1.96±0.21	16.0	1.84±0.16	+8.9
BAVO-8	200–250	IR_{50}	2.21±0.21	2.51±0.24	+13.6	-	-
		$pIRIR_{130}$	2.22±0.22	2.53±0.26	+14.0	-	-

Table S10: Summary of information used for IR_{50}/pIR_{130} age determination. OD = over-dispersion, CAM = central age model, MAM = minimum age model, FMM = finite mixture model. Blue shaded boxes indicate samples from event layers. Green shaded boxes indicate paleodoses used for dating.

Sample	Dosi-meter	Signal	n	CAM			MAM		FMM	
				De ± σ [Gy]	OD [%]	σb	De ± σ [Gy]	p0 [%]	De ± σ [Gy]	% of grains
DUVO-1	SG	IR_{50}	99	1.43±0.05	31±3	-	-	-	-	-
		$pIRIR_{130}$	27	1.98±0.07	0	-	-	-	-	-
DUVO-2	SG	IR_{50}	116	2.62±0.07	29±2	-	-	-	-	-
		$pIRIR_{130}$	48	3.41±0.12	21±3	-	-	-	-	-
	MG	IR_{50}	24	2.67±0.09	16±2	-	-	-	-	-
		$pIRIR_{130}$	19	4.06±0.12	12±2	0.1	-	-	3.57±0.29	33
DUVO-3	SG	IR_{50}	88	2.97±0.13	39±3	-	-	-	-	-
		$pIRIR_{130}$	33	3.92±0.15	18±3	-	-	-	-	-
DUVO-4	SG	IR_{50}	67	2.29±0.09	30±3	-	-	-	-	-
		$pIRIR_{130}$	10	3.97±0.58	44±11	0.1	-	-	2.61±0.25	51
DUVO-5	SG	IR_{50}	77	12.99±0.93	62±5	0.3	-	-	17.35±0.87	75
		$pIRIR_{130}$	19	22.96±1.00	17±4	-	-	-	-	-
	MG	IR_{50}	21	28.37±2.93	47±7	0.1	16.47±2.18	16	-	-
		$pIRIR_{130}$	16	35.30±2.66	30±5	0.1	24.17±1.62	3	-	-
DUVO-6	SG	IR_{50}	74	13.70±0.71	44±4	0.3	-	-	16.20±0.80	81
		$pIRIR_{130}$	26	19.10±1.31	33±5	-	-	-	-	-
	MG	IR_{50}	18	17.47±0.54	13±2	-	-	-	-	-
		$pIRIR_{130}$	17	26.11±0.64	9±2	-	-	-	-	-
DUVO-7	MG-Poly	IR_{50}	10	16.91±0.12	0	-	-	-	-	-
		$pIRIR_{130}$	10	26.78±0.27	0	-	-	-	-	-
BAVO-1	SG	IR_{50}	75	0.28±0.02	55±7	-	-	-	-	-
		$pIRIR_{130}$	25	1.71±0.19	52±8	0.2	-	-	1.03±0.10	44
BAVO-2	SG	IR_{50}	78	0.53±0.03	51±6	-	-	-	-	-
		$pIRIR_{130}$	44	2.76±0.30	70±8	0.2	-	-	1.15±0.13	31
BAVO-3	SG	IR_{50}	116	9.66±0.29	30±2	-	-	-	-	-
		$pIRIR_{130}$	38	15.15±0.63	20±4	-	-	-	-	-
	MG-Poly	IR_{50}	10	13.02±0.09	0	-	-	-	-	-
		$pIRIR_{130}$	10	24.00±0.27	0	-	-	-	-	-
BAVO-4	SG	IR_{50}	93	9.86±0.30	27±2	-	-	-	-	-
		$pIRIR_{130}$	27	12.18±0.76	27±5	-	-	-	-	-
BAVO-5	SG	IR_{50}	68	10.74±0.62	46±4	-	-	-	-	-
		$pIRIR_{130}$	27	20.47±3.05	75±11	0.2	-	-	11.53±1.28	52
BAVO-6	SG	IR_{50}	45	10.10±0.68	43±5	-	-	-	-	-
		$pIRIR_{130}$	23	32.55±5.09	74±11	0.2	15.57±2.93	9	-	-
BAVO-7	SG	IR_{50}	114	12.18±0.34	28±2	-	-	-	-	-
		$pIRIR_{130}$	46	15.33±0.91	38±4	-	-	-	-	-
BAVO-8	SG	IR_{50}	168	18.00±0.64	45±3	-	-	-	-	-
		$pIRIR_{130}$	51	23.22±1.12	32±4	-	-	-	-	-

Table S11: OxCal scripts.

Dury Voe (SH23-02C)	Colgrave Sound (SH23-08C)

Options()
{
SD1=TRUE;
};
Plot()
{
P_Sequence("DUVO", 1, 0.1)
{
Boundary("Bottom")
{
z=283;
};
C_Date("DUVO-7_FK_IR50", 2023-8830, 690)
{
z = 233;
};
C_Date("DUVO-7_FK_pIRIR130", 2023-8720, 350)
{
z = 233;
};
// DV-2 (221-228 cm)
Boundary("Base_DV-2")
{
z = 228;
};
Phase("DV-2")
{
C_Date("DUVO-6_GK_SG_IR50", 2023-9120, 1080)
{
z = 228;
};
C_Date("DUVO-6_GK_SG_pIRIR130", 2023-8160, 980)
{
z = 228;
};
};
Boundary("Top_DV-2")
{
z = 221;
};
C_Date("DUVO-5_GK_SG_IR50", 2023-8990, 1090)
{
z = 218;
};
C_Date("DUVO-5_GK_SG_pIRIR130", 2023-9040, 910)
{
z = 218;
};
C_Date("DUVO-4_GK_SG_IR50", 2023-1530, 150)
{
z = 59;
};
C_Date("DUVO-4_GK_SG_pIRIR130", 2023-1350, 200)
{
z = 59;
};
// DV-1 (45-56.5cm)
Boundary("Base_DV-1")
{
z = 56.5;
	Options()
	{
	SD1=TRUE;
	};
	Plot()
	{
	P_Sequence("BAVO", 1, 0.1)
	{
	Boundary("Bottom")
	{
	z = 167;
	};
	C_Date("BAVO-8_GK_IR50", 2023-10790, 1200)
	{
	z = 162;
	};
	C_Date("BAVO-7_GK_IR50", 2023-9640, 910)
	{
	z = 118;
	};
	Boundary("End_Hiatus")
	{
	z = 117.5;
	};
	Boundary("Start_Hiatus")
	{
	z = 117.5;
	};
	// --- BV-2 (102-117cm) ---
	Boundary("Base_BV-2")
	{
	z = 117;
	};
	Phase("BV-2")
	{
	C_Date("BAVO-6_GK_IR50", 2023-8890, 1270)
	{
	z = 117;
	};
	C_Date("BAVO-5_GK_IR50", 2023-9530, 1260)
	{
	z = 117;
	};
	C_Date("BAVO-4_GK_IR50", 2023-9170, 950)
	{
	z = 117;
	};
	};
	Boundary("Top_BV-2")
	{
	z = 102;
	};
	C_Date("BAVO-3_GK_IR50", 2023-6980, 640)
	{
	z = 101;
	};
	Boundary("ChangeBackgroundSedimentation")
	{
	z = 59;
	};
	C_Date("BAVO-2_GK_IR50", 2023-570, 80)
	{
	z = 20;

```
  };
  Phase("DV-1")
  {
   C_Date("DUVO-3_GK_SG_IR50", 2023-1570, 190)
   {
    z = 56.5;
   };
   C_Date("DUVO-3_GK_SG_pIRIR130", 2023-1630,
170)
   {
    z = 56.5;
   };
   C_Date("DUVO-2_GK_SG_IR50", 2023-1420, 160)
   {
    z = 56.5;
   };
   C_Date("DUVO-2_GK_SG_pIRIR130", 2023-1440,
150)
   {
    z = 56.5;
   };
  };
  Boundary("Top_DV-1")
  {
   z = 45;
  };
  C_Date("DUVO-1_GK_SG_IR50", 2023-1020, 110)
  {
   z = 40;
  };
  C_Date("DUVO-1_GK_SG_pIRIR130", 2023-1110,
110)
  {
   z = 40;
  };
  Boundary("Surface")
  {
   C_Date(2023-0, 0);
   z=0;
  };
 };
};};
```

```
};
// --- BV-1 (14-17cm) ---
Boundary("Base_BV-1")
{
z = 17;
};
Phase("BV-1")
{
Date("BV-1_ModeledAge")
{
z = 17;
};
Boundary("Top_BV-1")
{
z = 14;
};
C_Date("BAVO-1_GK_IR50", 2023-340, 50)
{
z = 12;
};
Boundary("Surface")
{
C_Date("Top", 2023-0, 0);
z = 0;
};
};
};
};
```