Comparision of calculated and measured paleo-sea level using different lower mantle viscosity values and PaleoMIST 1.0

As a supplement to "*A new global ice sheet reconstruction for the past 80 000 years*" by Evan J. Gowan, Xu Zhang, Sara Khosravi, Alessio Rovere, Paolo Stocchi, Anna L. C. Hughes, Richard Gyllencreutz, Jan Mangerud, John-Inge Svendsen & Gerrit Lohmann

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1 Purpose of this document

In this report there is a detailed summary, including plots, of a worldwide compilation of paleo-sea level data, and six ice sheet-Earth models. In this particular report, we compare the standard version of PaleoMIST 1.0 (with 2500 year time steps and using a lower mantle viscosity of 4×10^{22} Pa s), with five other Earth models with viscosity values ranging between 10^{21} and 10^{23}. When developing PaleoMIST 1.0, a variety of lower mantle viscosity values were tested, and it was found that a value approaching 10^{23} Pa s provided the best trade-off between increasing the amount of ice in the center of the Laurentide Ice Sheet and fitting the sea level data. This ended up being true for the Eurasian ice sheets as well. PaleoMIST 1.0 was tuned to an Earth model with a viscosity of 4×10^{22} Pa s, but the comparison shown in this document demonstrate that a slightly higher value of 10^{23} Pa s provides an even better fit.

The accompanying paper is (Gowan et al., 2021).

Update on October 22, 2021:

This document has been updated to include several additional sites at the LGM and MIS 3. It also has fixed an error in the Cairns and Mackay sites caused by incorrectly subtracting half of the depth range rather than adding it. I apologize for this error. For the coral data for Tahiti and Huon Peninsula, it was originally set to be marine limiting, since the living range was tens of meters. We now use the 2-sigma range determined by Hibbert et al. (2016). We include the interpretations of sea level range by Ishiwa et al. (2019) and Yokoyama et al. (2000) for the Bonaparte Gulf shallow marine/estuary/intertidal data in addition to my conservative marine limiting assignment. I also included the interpreted sea level of Huon Peninsula by de Gelder et al. (2021) for MIS 3 to compare with the coral depth range interpretation by Hibbert et al. (2016). Finally, I also recalibrated all the radiocarbon dates using updated calibration curves published in 2020 (Heaton et al., 2020; Hogg et al., 2020; Reimer et al., 2020).

Update on March 14, 2021:

I have included data from the Baltic Sea and North Sea.

2 Summary of ice and Earth models

In order to make the figures compact, I have made shorthand codes for the ice and Earth models. I calculate each ice sheet separately, and the numbers refer to the “run number”, which is a sequential number that I used to distinguish git commits (see `https://github.com/evangowan/icesheet`). The ice model numbering scheme is as follows:

“North America”_“Europe”_“Antarctica”_“Patagonia”

For PaleoMIST 1.0, the minimal MIS 3 configuration reconstruction is 72_73_74_75, while the maximal configuration is 82_83_85_85

For the Earth models, I created a shorthand scheme during my PHD, which I have continued to use. A full explanation can be found on the github page:

`hhttps://github.com/evangowan/icesheet/blob/master/global/earth_model_format_codes.txt`

The full description of each model compared in this document is in this section.

2.1 Ice models

72_73_74_75 - PaleoMIST 1.0 - reduced MIS 3 Laurentide Ice Sheet scenario, with Hudson Bay fully deglaciated

2.2 Earth models

ehgA - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 1×10^{21} Pa s lower mantle

ehgC - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 1.58×10^{21} Pa s lower mantle

ehgG - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 4×10^{21} Pa s lower mantle

ehgk - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 1×10^{22} Pa s lower mantle

ehgK - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 1×10^{23} Pa s lower mantle

ehgr - 120 km thick lithopshere, 4×10^{20} Pa s upper mantle, 4×10^{22} Pa s lower mantle

3 Paleo-sea level compilations

This is a list of paleo-sea level compilations, which served as the basis for this report. We acknowledge the hard work of the people compiling the data, as well as acknowledging those who collected the original data.

3.1 North America

- Canada and Greenland - A.S. Dyke and T.S. James (unpublished, though some of it was summarized in Dyke and Peltier (2000b))
- Eastern Canada - Vacchi et al. (2018)
- Hudson Bay - Simon et al. (2016)
- Hudson Bay and northern mainland Canada - Gowan et al. (2016)

I have made some changes and corrections from the compilations above.

At Churchill, there is a site, denoted with the radiocarbon date S-738, which was originally assigned to be a marine limiting indicator. It was described in Morlan et al. (2000) as "shells enclosed in gravel in a quartzite ridge". It was originally interpreted as being a sea level indicator, with sea level at around 35 m. Using IMCalc (Lorscheid and Rovere, 2019), and a tidal amplitude of 1.6 m based on the tide gauge at Churchill (Ray, 2016), assuming the landform represents a beach ridge, and including a 20% uncertainty on the original 35 m elevation (to account for the lack of information on elevation measurement), the sea level indicator is 32.8$\pm$7 m.

There were many data that refered just to compilations rather than the original sources. I have tried to track down the original sources as much as possible, but in some cases it was not possible, as they were neither listed in the Vacchi compilation nor the Dyke and James compilation.

The compilation of sea level indicators in the eastern United States was done by Engelhart and Horton (2012). Thanks to Simon Engelhart for sending me a copy of the dataset with the reservoir corrections used for marine organisms.

The MIS 3-5 data from the east coast of the United States was compiled by Pico et al. (2017).

3.2 Europe

The Baltic Sea sea level indicators are from (Rosentau et al., 2021). Note that some of the regions that they designated were really large with the gradient of the GIA, so I made smaller regions. This is why the regions in this report do not correspond to theirs in many places. Also note that Rosentau *et al* chose to enter the radiocarbon dates for Ångermanland as pre-calibrated dates. I have not changed them.

Scandinavia sea level indicators are from and unpublished compilation by Jan Mangerud, Kristian Vasskog and Øystein Lohne. Since this compilation is not available yet, the data points are not uploaded to the main Github repository. Some parts of the compilation can be found in:

- Svalbard - Bondevik et al. (1995)
- Northern Europe - Forman et al. (2004)
- Norway - Lohne et al. (2007); Romundset et al. (2010, 2011, 2015, 2018); Vasskog et al. (2019)

The main compilation for the North Sea is by Vink et al. (2007). Though this predates the HOLSEA project, they use the indicative meaning concept and have a rigorous assessment of error, and is compatible with it. For Rotterdam, Netherlands, there is a HOLSEA compilation by Hijma and Cohen (2019). In Langeoog, there is a HOLSEA dataset by Bungenstock et al. (2021). I have also included HOLSEA formatted data from Norderney (Scheder et al., 2022). Western Denmark does not a HOLSEA formatted compilation, so I added data compiled by Gehrels et al. (2006) and Jessen et al. (2019).

3.3 Eurasian Arctic

The sea level indicators for northern Norway and Svalbard are from and unpublished compilation by Jan Mangerud, Kristian Vasskog and Øystein Lohne (see details in Section 3.2).

The compilation of sea level indicators for northern Russia comes from Baranskaya et al. (2018a). Thank you to Alisa V. Baranskaya for sending the references (including translations from Russian) that were missing from the published compilation.

3.4 Southeastern Asia

The sea level indicators from southeastern Asia were compiled by Mann et al. (2019).

3.5 Tropical Corals

Corals from tropical regions were compiled by Hibbert et al. (2016). In this report, we have taken indicators for Huon Peninsula, Vanuatu and French Polynesia from this database.

4 Summary of results

This is a summary of the results of the modelling. There are a total of six models with which are compared. In addition, these tables give how many sea level indicators, number of marine limiting, number of terrestrial limiting, and number of sea level index points.

The sea level is calculated at the location of each data point. To evaluate how well the calculated curve fits the data point, a score is assigned. This metric was originally used by Gowan et al. (2016). The score is the discrepancy, in number of meters, the calculated sea level falls outside of the constraint plus the error bars. A score is zero if the calculated sea level is consistent with the data point. As an example, if the calculated sea level curve is below a terrestrial limiting point, it is given a score of zero. The sum of the scores for each location for each model are shown in the tables. A warning about the scores is that a lower score does not necessarily mean a better fit, as it will depend on the age distribution of the indicators, and the number of indicators of a specific kind. For example, if there are a lot of marine limiting data points, a calculated curve that is over a hundred meters above those indicators may provide a good score, but it is not necessarily a good fit. As a result, it is a good idea to also look at the plotted curves for visual inspection.

4.1 Australia

Table 1: Number of data points and model scores for Northeastern Australia

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	556	54	0	502	2258	2234	2143	1971	1679	1621
Cairns	253	11	0	242	1038	1022	949	837	704	682
Mackay	303	43	0	260	1220	1212	1194	1134	975	939

Table 2: Number of data points and model scores for Northwestern Australia

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	201	106	0	95	698	691	661	627	662	672
Bonaparte Gulf	90	84	0	6	97	96	91	90	116	123
Bonaparte Gulf SLI Yokoyama2000	21	0	0	21	353	350	336	307	284	280
Bonaparte Gulf SLI Ishiwa2019	90	22	0	68	248	245	234	230	262	269

4.2 Caribbean

Table 3: Number of data points and model scores for Lesser Antilles

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	197	0	0	197	814	810	805	815	1182	1392
Barbados	197	0	0	197	814	810	805	815	1182	1392

4.3 East Asia

Table 4: Number of data points and model scores for Ryukyu Islands

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	7	6	1	0	0	0	0	0	0	0
Miyakojima	7	6	1	0	0	0	0	0	0	0

Table 5: Number of data points and model scores for Sea of Japan - East Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	11	5	0	6	264	266	270	265	261	260
Tsushima-Korea Strait	11	5	0	6	264	266	270	265	261	260

4.4 Eurasian Arctic

Table 6: Number of data points and model scores for Franz Josef Land

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	171	22	0	149	989	916	1401	1733	1839	1791
Zemlya Georga	44	4	0	40	210	192	377	489	522	507
Zemlya Zichy	4	3	0	1	73	61	42	33	30	31
Proliv Markama	123	15	0	108	706	663	982	1211	1287	1253

Table 7: Number of data points and model scores for Kara Sea - Novaya Zemlya

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	90	8	19	63	530	438	345	373	390	393
Pechora Sea	5	4	1	0	79	75	85	105	120	124
Yuzhny Island	4	1	3	0	58	41	0	0	0	0
Severny Island West	19	1	0	18	27	4	6	18	23	21
Severny Island North	36	0	0	36	146	98	25	14	10	10
Vaygach Island	3	0	0	3	0	0	0	0	0	0
Baydaratskaya Bay	2	0	2	0	0	0	0	0	0	0
Gulf of Ob	11	0	9	2	0	0	0	1	1	1
Khalmyer Bay	5	0	1	4	219	220	229	235	236	237
Kara Sea shelf	2	2	0	0	1	0	0	0	0	0
Ostrov Sibiryakova	3	0	3	0	0	0	0	0	0	0

Table 8: Number of data points and model scores for Southern Barents Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	54	17	3	34	940	1231	1300	874	534	442
Rolfsoya	5	0	1	4	126	170	184	132	81	65
Norkinn	6	1	1	4	150	202	217	158	103	85
Pechengsky	17	7	0	10	168	247	310	239	164	141
Murmansk	21	8	1	12	323	428	460	306	171	135
Voronya River	5	1	0	4	173	184	129	39	15	16

Table 9: Number of data points and model scores for Svalbard

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	179	26	10	143	2136	2071	2206	2223	2082	2014
Bockfjorden	11	8	0	3	218	158	111	129	177	196
Broggerhalvoya	11	2	1	8	305	261	263	323	402	429
Ytterdalen	11	3	2	6	196	135	82	103	150	169
Sorkapp Land	13	3	2	8	66	64	65	71	107	128
Agardbukta	9	2	0	7	97	73	38	25	18	18
Southern Edgeoya	17	1	1	15	228	263	292	265	210	188
Diskobukta	20	4	1	15	202	182	204	191	138	116
Humla	28	1	1	26	330	430	537	513	415	372
Kapp Ziehen	25	2	2	21	221	255	282	261	184	152
Svartknausflya	20	0	0	20	131	98	136	137	97	76
Kongsoya	14	0	0	14	142	152	196	205	184	170

Table 10: Number of data points and model scores for Western Siberia

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	125	90	23	12	876	896	961	893	754	728
Severnaya Zemlya	16	5	11	0	333	334	327	299	275	271
West Laptev Sea	10	7	1	2	101	105	108	97	89	88
Olenyok Gulf	29	18	11	0	33	35	46	44	32	29
Lena Delta	60	60	0	0	339	350	411	394	309	293
New Siberian Islands	8	0	0	8	2	2	3	6	10	10
Zhokhov Island	2	0	0	2	68	70	66	53	39	37

Table 11: Number of data points and model scores for White Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	177	16	41	120	3363	3459	2895	1777	1050	893
Kandalaksha	8	1	0	7	220	271	281	189	115	97
Lesozavodskiy	13	5	0	8	531	568	489	312	178	144
Rugozerskiy Peninsula	15	1	8	6	146	188	182	90	24	14
Chupa Bay	15	0	3	12	1049	1071	865	528	287	227
Umba	11	2	0	9	570	596	512	326	190	156
Engozero	8	0	1	7	495	515	415	236	103	69
Belomorsk	8	0	7	1	217	210	89	12	0	0
Eastern Kola Peninsula	5	0	5	0	0	0	1	0	0	0
Onega Peninsula	9	3	2	4	24	6	0	3	14	19
Dvina Gulf	82	4	12	66	111	34	61	81	139	167
Kholmogorsky	3	0	3	0	0	0	0	0	0	0

4.5 Europe

Table 12: Number of data points and model scores for Baltic Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	1092	271	473	348	16771	19689	20054	15127	11124	10262
Achterwasser	26	0	6	20	192	138	86	121	162	173
Baltic Southwest	3	3	0	0	0	0	0	0	0	0
Rugen	53	5	8	40	523	354	209	324	457	492
Salt Meadows	43	0	1	42	318	221	131	179	240	258
Arkona Basin East	6	6	0	0	0	0	0	0	0	0
Arkona Basin West	12	8	4	0	6	1	0	2	6	8
Fakse Bugt	4	0	4	0	0	0	0	0	0	0
Lubeck	56	6	36	14	66	50	33	43	54	58
Kieler Bucht	40	12	27	1	36	22	29	25	31	34
Storebaelt	50	10	38	2	103	107	78	17	30	38
Lillebaelt	18	7	11	0	53	31	10	19	32	36
Samso Belt	67	47	8	12	201	57	21	6	38	57
Kattegat	25	25	0	0	0	0	0	0	0	0
Treoa Moellebugt	4	4	0	0	29	4	0	0	1	2
Vendsyssel Thy	56	51	1	4	53	49	78	52	24	26
Laesoe	3	2	0	1	1	0	5	5	4	3
Bohuslan	5	0	0	5	158	196	207	151	96	85
Goteborg	2	0	0	2	113	125	117	86	60	54
Halmstad	1	0	0	1	43	48	45	32	21	18
Asa	5	0	0	5	200	229	220	159	104	92
Sund	77	27	49	1	201	154	186	74	48	53
Havang	54	1	43	10	787	1065	1027	480	128	88
Blekinge	33	2	9	22	491	557	626	404	187	145
Ustka	2	0	2	0	18	27	20	0	0	0
West Gulf Of Gdansk	10	1	9	0	2	9	24	10	7	6
South Vistula	42	1	41	0	9	23	78	47	25	20
Curonian Spit	1	1	0	0	4	0	0	0	1	2
Lithuania	43	25	18	0	527	585	505	313	189	162
Ventspils	5	1	4	0	135	167	164	112	66	55
West Gulf Of Riga	6	3	3	0	105	128	123	83	48	39
Riga	20	7	13	0	314	397	384	236	109	77
Parnu	79	3	66	10	3698	4276	4060	2959	2018	1784
South Saaremaa	7	0	6	1	283	354	375	295	220	202
Hiiumaa	41	7	26	8	632	946	1158	947	720	663
Ostergotland	6	0	0	6	500	547	517	401	307	287
Sodermanland	9	0	0	9	266	340	401	334	265	250
Paldiski	2	0	0	2	13	32	49	42	33	30
Tallinn	13	0	8	5	688	786	768	600	452	417
Lahemaa	3	0	0	3	44	61	74	60	45	41
Narva-Luga	48	6	32	10	895	1279	1381	941	513	398
St Petersburg	1	0	0	1	59	63	50	28	11	7
Virolahti	4	0	0	4	232	272	271	208	151	136
Porvoo	10	0	0	10	243	363	443	360	272	250
Helsinki	9	0	0	9	284	398	470	393	313	292
Salo	18	0	0	18	784	972	1059	876	711	671
Turku	17	0	0	17	629	859	1007	871	740	709
Aland	3	0	0	3	73	118	150	129	106	101
Gastrikland	16	0	0	16	596	754	843	684	533	500
Angermanland	13	0	0	13	388	509	581	424	292	267
Alvsbyn	4	0	0	4	466	492	440	325	239	221
Gunnarsbyn	8	0	0	8	653	747	758	626	509	482
South Lapland	4	0	0	4	175	232	262	219	171	159
Oulu	2	0	0	2	232	257	248	202	163	154
South Ostroboth-nia	1	0	0	1	129	142	139	118	100	96
Satakunta	1	0	0	1	63	80	88	75	63	60
Central Finland	1	0	0	1	58	66	56	30	9	4

Table 13: Number of data points and model scores for North Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	446	22	88	336	1699	1552	1394	1466	1485	1499
Rotterdam	112	0	52	60	430	418	381	408	399	397
Langeoog	36	2	4	30	56	44	28	35	43	46
Netherlands Wadden Sea	51	0	25	26	191	167	135	150	162	166
Belgium	22	0	0	22	175	176	167	170	155	150
Southern Bight	4	0	0	4	2	1	0	0	0	0
Central Netherlands	27	0	0	27	235	222	196	212	217	219
Oyster Ground	2	0	0	2	12	5	2	4	6	7
Dogger Bank	1	0	0	1	1	5	9	8	7	6
Norderney	56	0	0	56	160	138	108	118	129	133
Bremerhaven	51	0	0	51	230	192	150	174	197	204
Elbe	24	0	0	24	54	42	39	48	55	57
German Bight	13	0	0	13	71	49	44	52	66	71
Ho Bugt	20	0	0	20	11	20	47	44	36	33
Limfjord	27	20	7	0	71	73	88	43	13	10

Table 14: Number of data points and model scores for Western Norway

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	103	9	8	86	2086	2282	2047	1342	1055	1035
Stavanger	17	8	3	6	256	242	183	92	57	56
Sotra	41	1	2	38	332	383	316	213	311	349
Torvikbygd	8	0	1	7	82	71	86	106	119	121
Sula	9	0	2	7	302	336	315	214	124	100
Bjugn	17	0	0	17	675	755	694	448	263	236
Frosta	11	0	0	11	439	495	453	269	181	173

4.6 French Polynesia

Table 15: Number of data points and model scores for French Polynesia

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	191	0	0	191	229	226	222	207	190	190
Mururoa	12	0	0	12	166	164	159	151	146	146
Tahiti	179	0	0	179	63	62	63	56	44	44

4.7 Melanesia

Table 16: Number of data points and model scores for Melansia

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	82	11	0	71	22	22	20	21	22	22
Vanuatu	82	11	0	71	22	22	20	21	22	22

4.8 MIS 3 - MIS 4

Table 17: Number of data points and model scores for Eastern United States (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	27	8	15	4	192	170	131	104	90	85
US Mid Atlantic	27	8	15	4	192	170	131	104	90	85

Table 18: Number of data points and model scores for French Polynesia (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	19	0	0	19	304	302	297	289	283	283
Mururoa	2	0	0	2	54	53	52	51	50	50
Tahiti	17	0	0	17	250	249	245	238	233	233

Table 19: Number of data points and model scores for Melanesia (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	6	0	0	6	49	50	51	51	50	49
Vanuatu	6	0	0	6	49	50	51	51	50	49

Table 20: Number of data points and model scores for Northeastern Australia (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	25	13	0	12	431	431	426	415	396	391
Cairns	19	7	0	12	431	431	426	415	396	391
Mackay	6	6	0	0	0	0	0	0	0	0

Table 21: Number of data points and model scores for Papua New Guinea (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	52	0	0	52	194	195	193	192	188	186
Huon Peninsula	40	0	0	40	89	90	90	90	90	90
Huon Peninsula de Gelder	12	0	0	12	105	105	103	102	98	96

Table 22: Number of data points and model scores for Sea of Japan - East Sea (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	6	2	1	3	120	118	113	108	104	105
Tsushima-Korea Strait	6	2	1	3	120	118	113	108	104	105

Table 23: Number of data points and model scores for Sundaland (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	29	14	13	2	239	237	230	228	227	226
Sunda Shelf	11	7	3	1	124	121	114	107	98	97
Vietnam Shelf	1	1	0	0	0	0	0	0	0	0
Strait Of Malacca	11	2	9	0	48	46	40	36	32	31
Mekong Delta	1	1	0	0	10	11	12	14	17	17
Chao Phraya	3	3	0	0	42	43	48	54	61	62
Berhala Strait	2	0	1	1	15	16	16	17	19	19

Table 24: Number of data points and model scores for Yellow Sea (MIS3 - MIS4)

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	11	11	0	0	0	0	0	0	3	3
South Bohai Sea	4	4	0	0	0	0	0	0	3	3
Yellow Sea	7	7	0	0	0	0	0	0	0	0

4.9 North America

Table 25: Number of data points and model scores for Eastern United States

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	357	138	38	181	1469	1701	1566	1277	1310	1385
Outer Delaware	60	5	5	50	329	369	318	272	311	338
Inner Delaware	38	2	8	28	146	175	146	119	147	166
Inner Chesapeake	106	99	0	7	424	418	312	260	300	325
Eastern Shore	28	7	6	15	64	88	91	78	83	88
Northern North Carolina	60	23	6	31	331	388	367	291	274	282
Southern North Carolina	24	2	3	19	29	50	70	56	47	46
Northern South Carolina	18	0	8	10	60	88	104	81	62	60
Southern South Carolina	23	0	2	21	86	125	158	120	86	80

Table 26: Number of data points and model scores for Gulf of St Lawrence

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	108	38	32	38	1270	1287	1283	1014	635	570
Cape Breton	16	4	7	5	36	12	40	44	3	4
Magdalen Islands	22	2	11	9	113	128	147	122	66	48
Prince Edward Island	31	9	6	16	368	285	200	153	133	158
Chaleur Bay	15	10	5	0	10	23	49	30	5	3
Anticosti Island	24	13	3	8	743	839	847	665	428	357

Table 27: Number of data points and model scores for Hudson Bay

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	243	113	68	62	10168	11290	11508	9313	6330	5640
Kivalliq	31	21	5	5	416	507	575	493	343	283
Churchill	23	9	7	7	718	899	968	732	359	231
West James Bay	17	4	10	3	804	928	965	693	324	229
East James Bay	36	20	9	7	1883	2088	2169	1800	1275	1146
Umiujaq	94	34	33	27	5868	6253	6158	5102	3738	3353
Inukjuak	21	11	2	8	271	353	422	370	261	222
Ivujivik	21	14	2	5	208	262	251	123	30	176

Table 28: Number of data points and model scores for Hudson Strait

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	86	65	18	3	1036	1156	1103	809	1219	1619
Sugluk	40	30	10	0	139	203	214	119	582	943
Kangiqsujuaq	14	13	1	0	4	10	14	12	170	293
Western Ungava Bay	21	17	4	0	291	306	271	215	193	182
Southern Ungava Bay	11	5	3	3	602	637	604	463	274	201

Table 29: Number of data points and model scores for Labrador

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	61	16	45	0	539	604	609	431	377	385
Torngat	18	7	11	0	35	46	47	47	253	315
Nain	16	2	14	0	387	413	393	267	88	46
Hamilton Inlet	15	3	12	0	49	64	71	39	1	0
Lake Melville	12	4	8	0	68	81	98	78	35	24

Table 30: Number of data points and model scores for Maritimes

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	207	30	40	137	1547	1338	868	557	388	485
Sable Island	10	1	6	3	60	49	37	20	21	28
Halifax	48	15	4	29	160	109	92	56	52	87
Shelburne	9	0	4	5	26	21	5	4	11	16
Cumberland	112	6	15	91	891	759	426	271	182	251
Passamaquoddy Bay	28	8	11	9	410	400	308	206	122	103

Table 31: Number of data points and model scores for Newfoundland

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	160	53	61	46	1265	1325	1292	1045	795	750
Great Northern Peninsula	56	16	23	17	164	137	78	36	112	161
Notre Dame Bay	29	12	13	4	134	144	129	101	68	60
Avalon Peninsula	13	3	5	5	10	9	4	1	2	4
Bay Of Islands	16	5	3	8	333	379	396	316	194	159
Port Aux Basques	46	17	17	12	624	656	685	591	419	366

Table 32: Number of data points and model scores for Northeastern United States

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	479	51	117	311	3278	2811	1559	1418	2171	2587
Eastern Maine	49	0	4	45	492	390	144	105	188	246
Southern Maine	86	24	6	56	787	568	206	210	470	633
Northern Massachusetts	43	3	16	24	159	136	66	60	99	118
Southern Massachusetts	43	12	14	17	302	249	151	162	240	270
Connecticut	95	0	41	54	181	180	112	95	140	164
Long Island	25	0	6	19	300	263	183	178	227	248
New York	76	6	19	51	691	646	399	347	492	563
New Jersey	62	6	11	45	366	379	298	261	315	345

Table 33: Number of data points and model scores for St Laurence Lowlands

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	218	53	50	115	5458	6525	7374	5247	2584	1972
Rimouski	90	17	15	58	3195	3665	3880	2824	1577	1195
Forestville	59	18	7	34	853	933	1134	900	527	412
Quebec City	69	18	28	23	1410	1927	2360	1523	480	365

4.10 Proxy Based Sea Level

Table 34: Number of data points and model scores for Red Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	175	0	0	175	372	365	334	302	280	278
Red Sea proxy 30ka	175	0	0	175	372	365	334	302	280	278

4.11 South Asia

Table 35: Number of data points and model scores for Bay of Bengal

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	7	5	0	2	98	96	91	86	82	81
Ganges Delta	7	5	0	2	98	96	91	86	82	81

4.12 Southeast Asia

Table 36: Number of data points and model scores for Java Sea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	47	18	2	27	188	188	188	178	195	203
Central Java	6	0	0	6	32	31	30	28	31	32
South Sulawesi	41	18	2	21	156	157	158	150	164	171

Table 37: Number of data points and model scores for Papua New Guinea

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	51	29	0	22	14	14	16	18	28	31
Huon Peninsula	51	29	0	22	14	14	16	18	28	31

Table 38: Number of data points and model scores for Sundaland

Location	number data	marine limiting	terrestrial limiting	index point	72_73_74_75 ehgA	72_73_74_75 ehgC	72_73_74_75 ehgG	72_73_74_75 ehgk	72_73_74_75 ehgr	72_73_74_75 ehgK
Total	404	88	108	208	1058	989	885	844	929	968
Chao Phraya	33	5	9	19	127	117	110	124	160	172
Mekong Delta	71	2	24	45	80	88	95	78	55	56
Strait Of Malacca	137	29	45	63	210	186	168	168	211	229
Sunda Shelf	53	7	7	39	360	342	280	251	239	235
Vietnam Shelf	5	1	0	4	26	26	23	15	10	9
Phuket	40	20	13	7	43	39	36	37	47	50
Thale Noi	3	0	1	2	12	11	11	12	14	15
West Malay Peninsula	2	2	0	0	1	1	1	0	1	1
East Malay Peninsula	4	3	1	0	8	6	5	5	8	8
Southeast Malay Peninsula	13	12	0	1	38	33	28	27	34	36
Belitung Island	25	0	0	25	124	113	102	100	116	121
Ca Na	18	7	8	3	29	27	26	27	34	36

5 Australia

5.1 Northeastern Australia

References for the data used in each location.

Cairns: Yokoyama et al. (2018)

Mackay: Yokoyama et al. (2018)

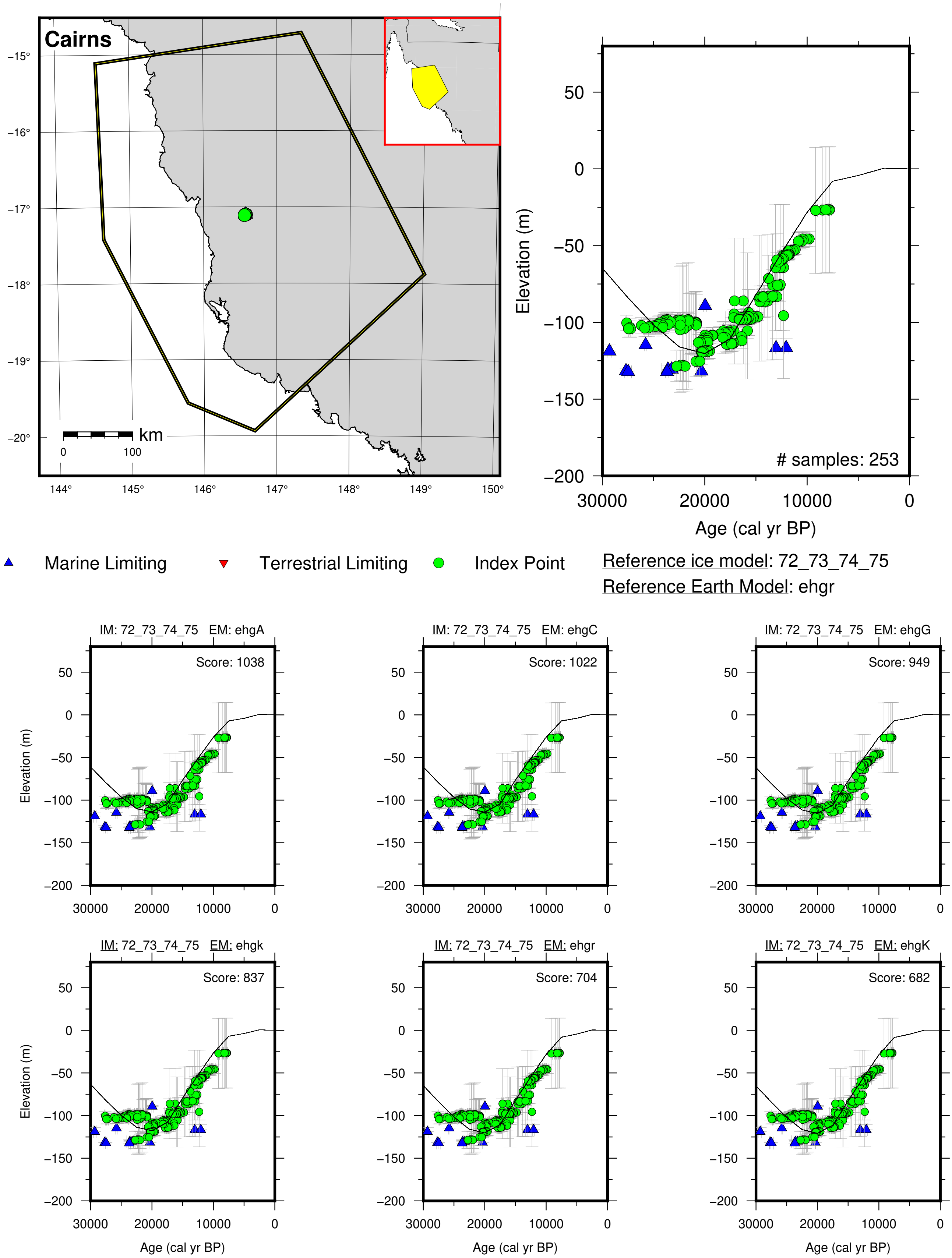


Figure 1: Paleo-sea level and comparison of six models for subregion Northeastern Australia, location Cairns.

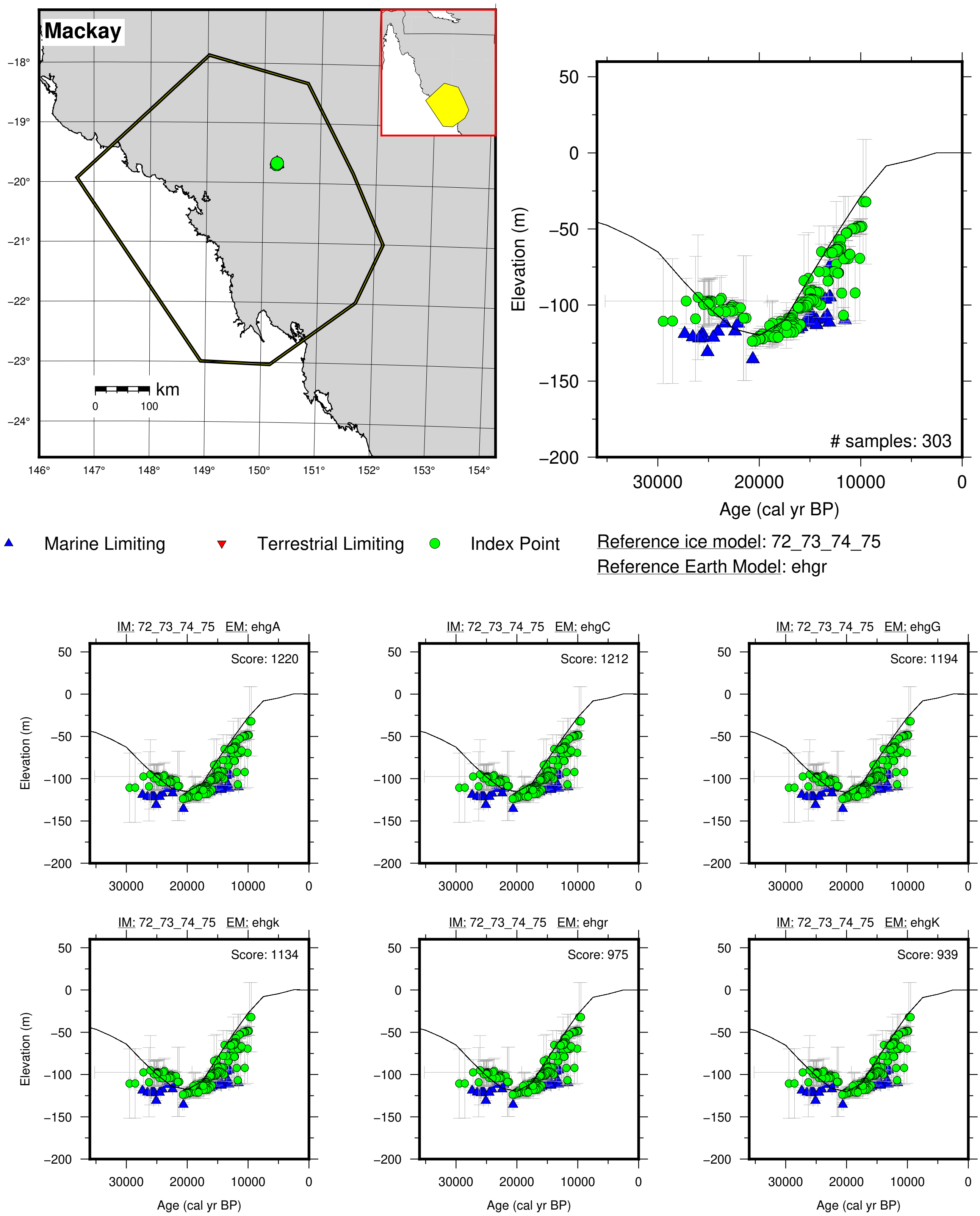


Figure 2: Paleo-sea level and comparison of six models for subregion Northeastern Australia, location Mackay.

5.2 Northwestern Australia

References for the data used in each location.

Bonaparte Gulf: Ishiwa et al. (2019); Yokoyama et al. (2000)

Bonaparte Gulf SLI Yokoyama2000: Yokoyama et al. (2000)

Bonaparte Gulf SLI Ishiwa2019: Ishiwa et al. (2019); Yokoyama et al. (2000)

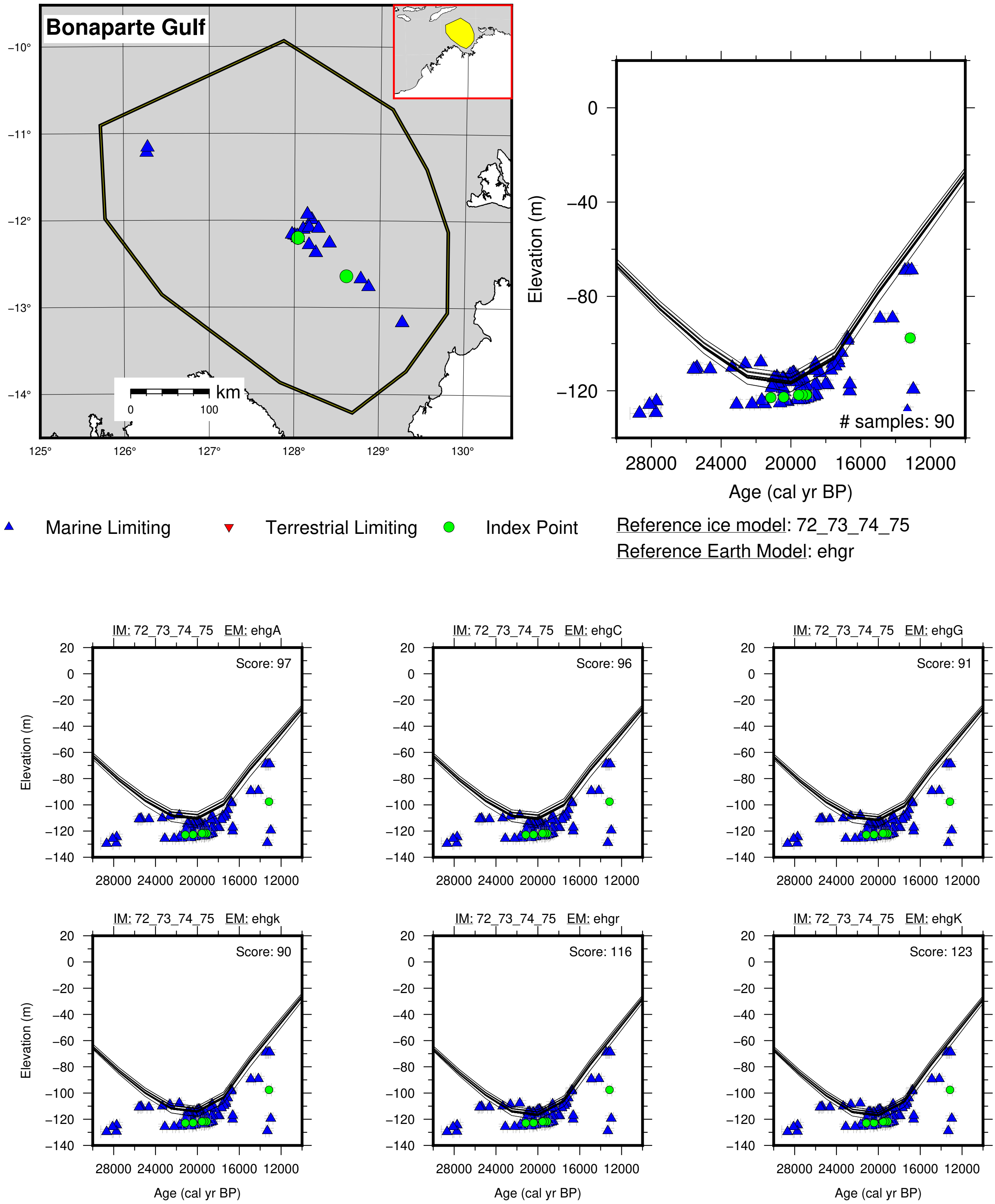


Figure 3: Paleo-sea level and comparison of six models for subregion Northwestern Australia, location Bonaparte Gulf.

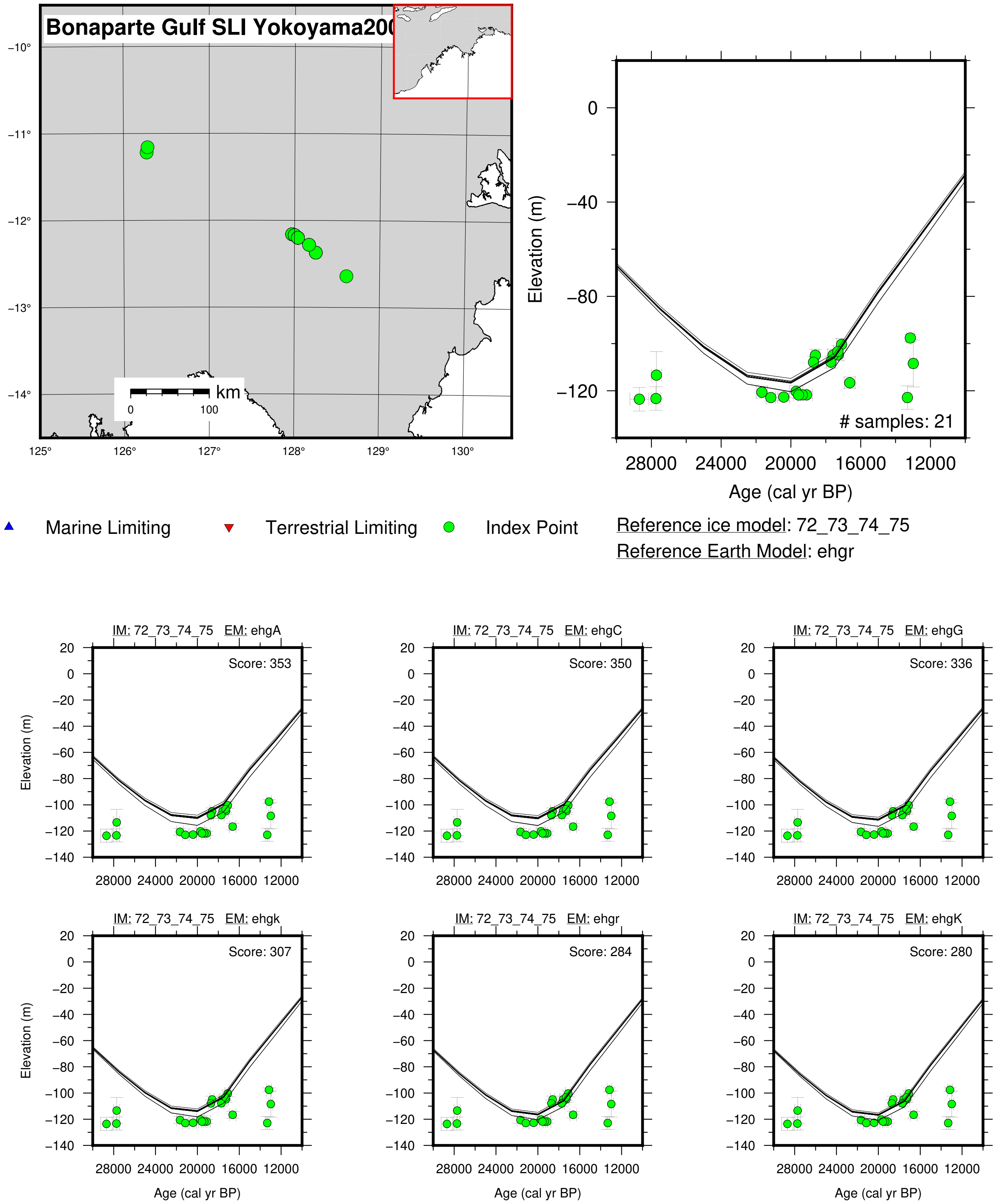


Figure 4: Paleo-sea level and comparison of six models for subregion Northwestern Australia, location Bonaparte Gulf SLI Yokoyama2000.

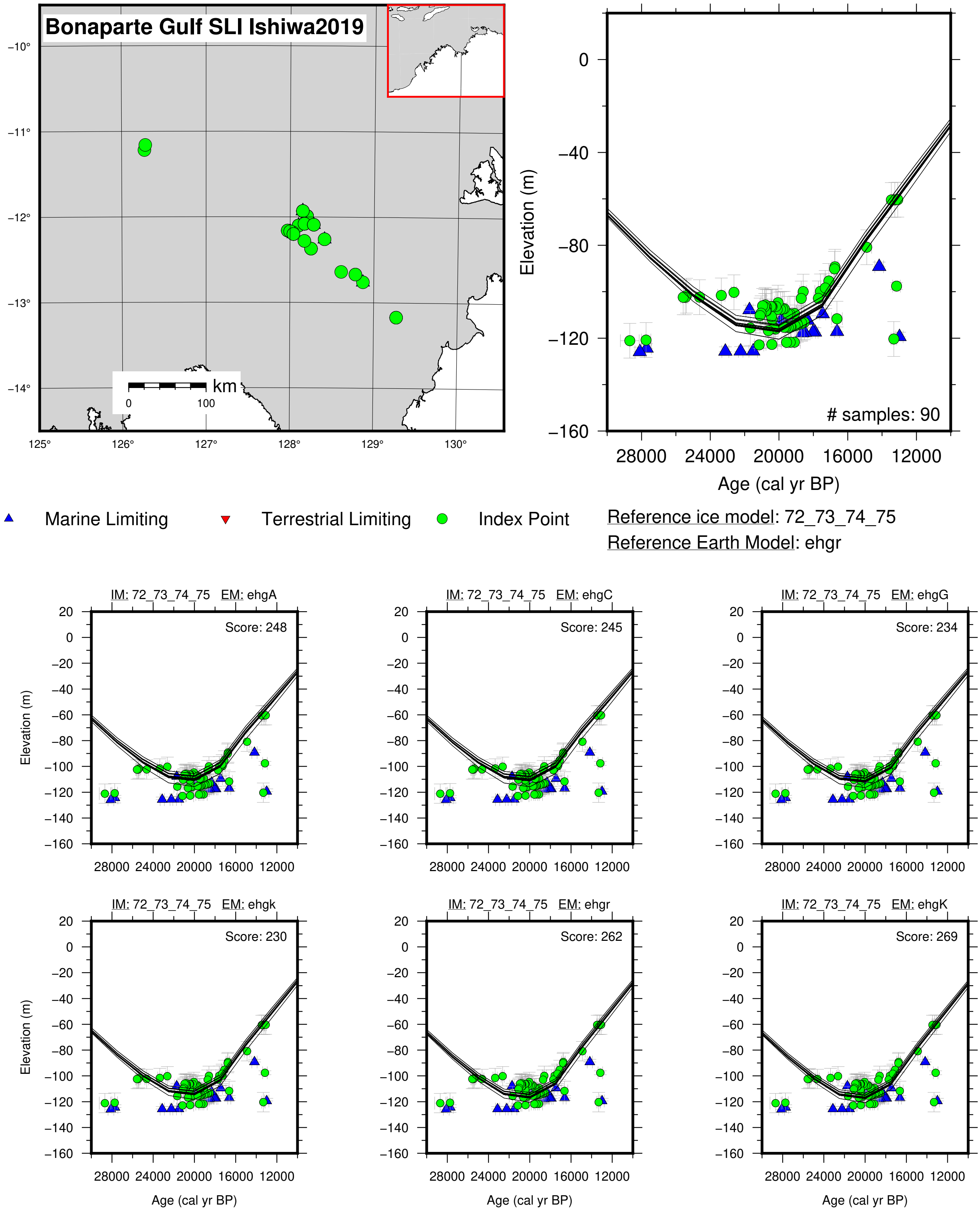


Figure 5: Paleo-sea level and comparison of six models for subregion Northwestern Australia, location Bonaparte Gulf SLI Ishiwa2019.

6 Caribbean

6.1 Lesser Antilles

References for the data used in each location.

Barbados: Abdul et al. (2016); Fairbanks (1988); Peltier and Fairbanks (2006)

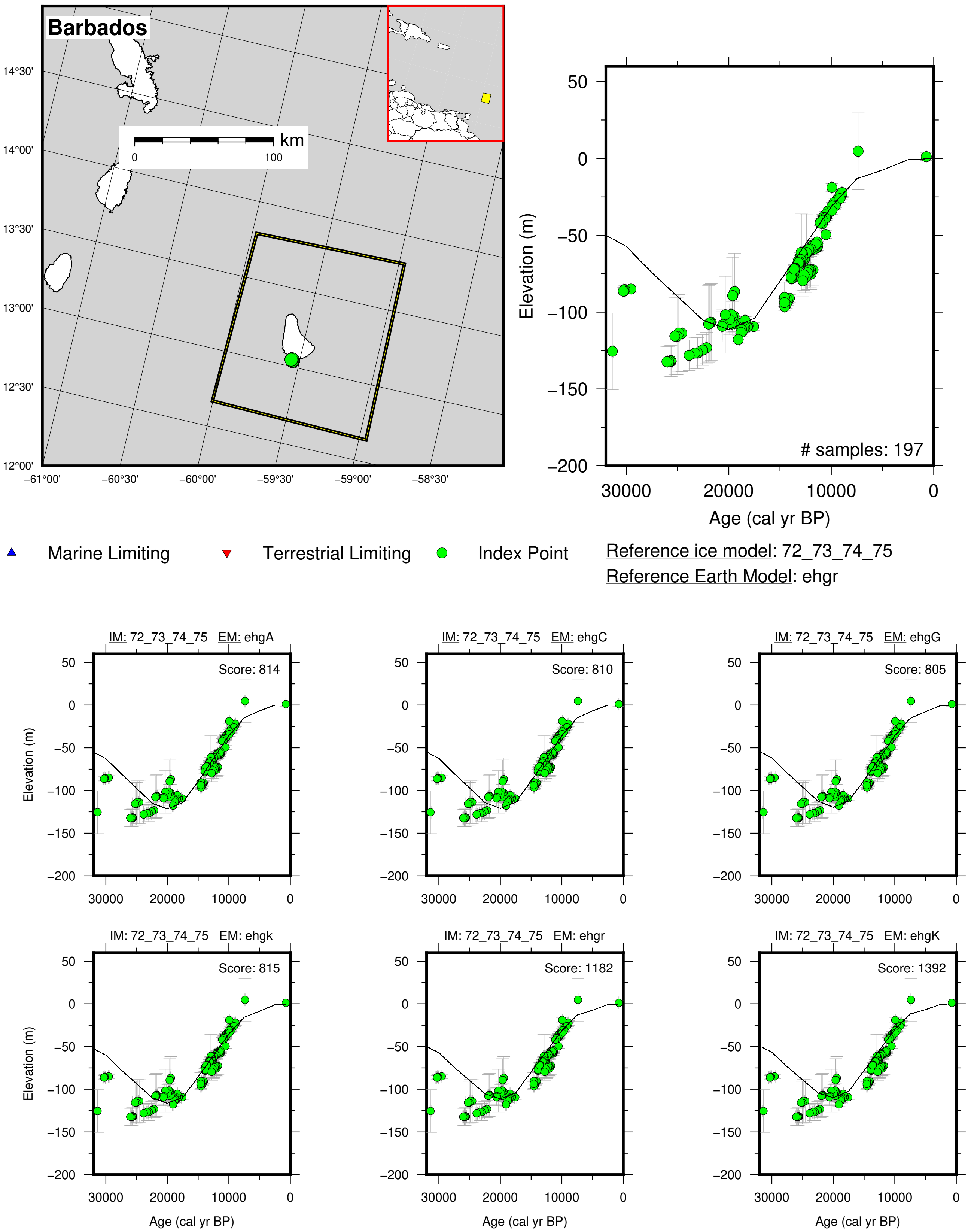


Figure 6: Paleo-sea level and comparison of six models for subregion Lesser Antilles, location Barbados.

7 East Asia

7.1 Ryukyu Islands

References for the data used in each location.

Miyakojima: Sasaki et al. (2006)

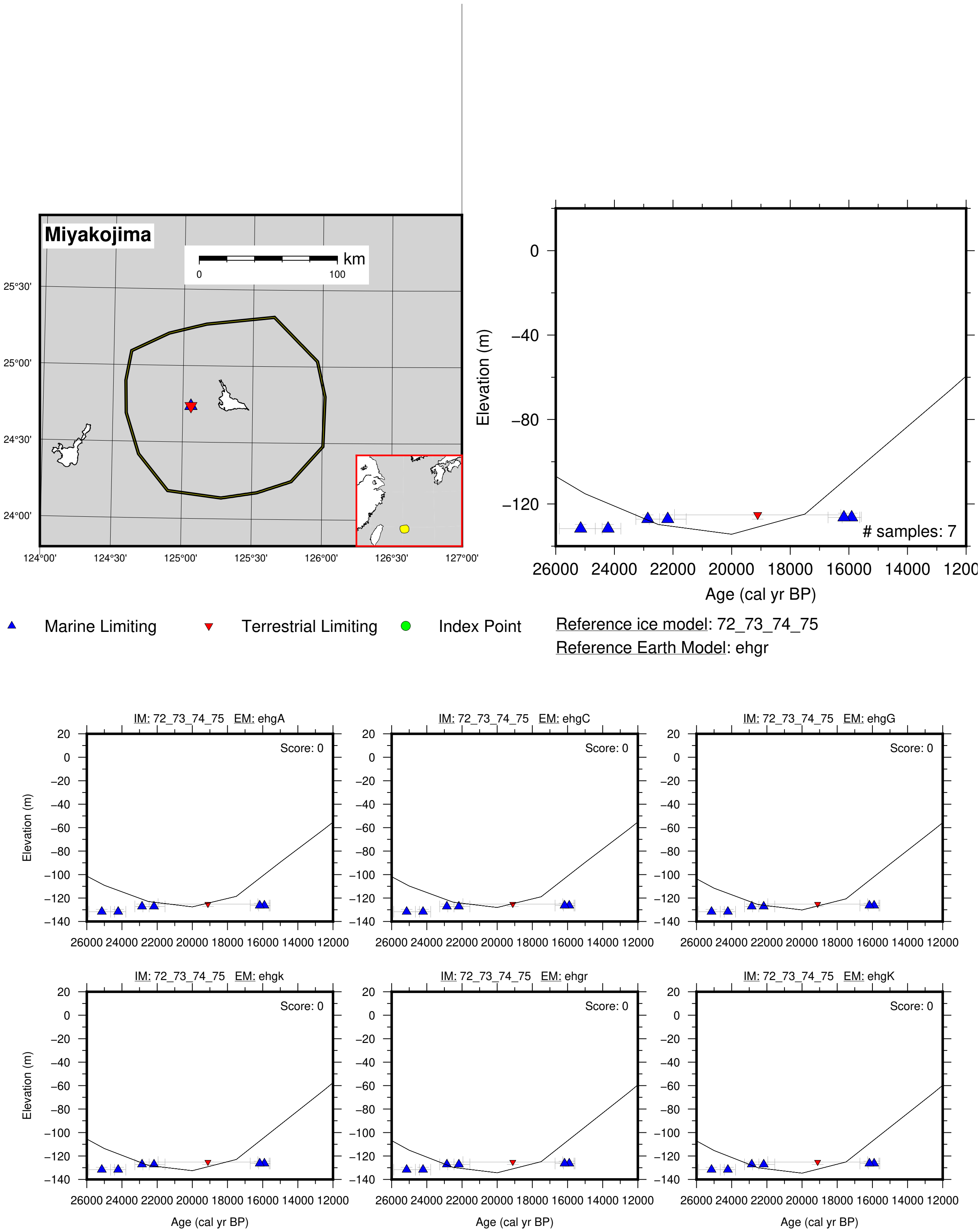


Figure 7: Paleo-sea level and comparison of six models for subregion Ryukyu Islands, location Miyako-jima.

7.2 Sea of Japan - East Sea

References for the data used in each location.

Tsushima-Korea Strait: Park et al. (2000)

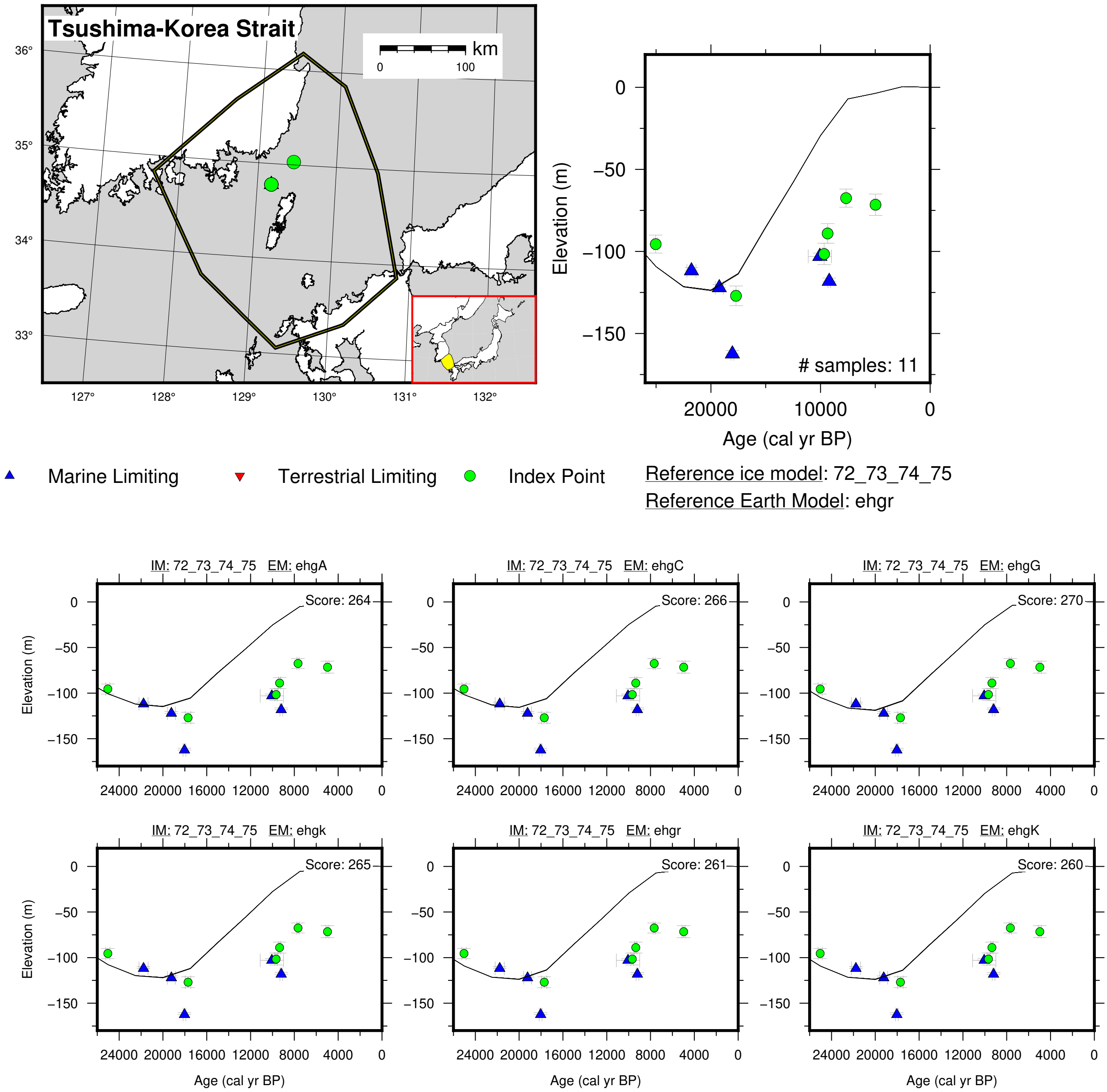


Figure 8: Paleo-sea level and comparison of six models for subregion Sea of Japan - East Sea, location Tsushima-Korea Strait.

8 Eurasian Arctic

8.1 Franz Josef Land

References for the data used in each location.

Zemlya Georga: Bolshiyanov et al. (2009); Dibner (1965); Forman et al. (1996, 2004); Glazovskiy et al. (1992); Grosswald (1973); Kovaleva (1974)

Zemlya Zichy: Bolshiyanov et al. (2009); Gusev et al. (2013b)

Proliv Markama: Bolshiyanov et al. (2009); Forman and Polyak (1997); Forman et al. (1996, 2004); Grosswald (1963, 1973); Gusev et al. (2013b); Kovaleva (1974); Lubinski (1998); Weihe (1996)

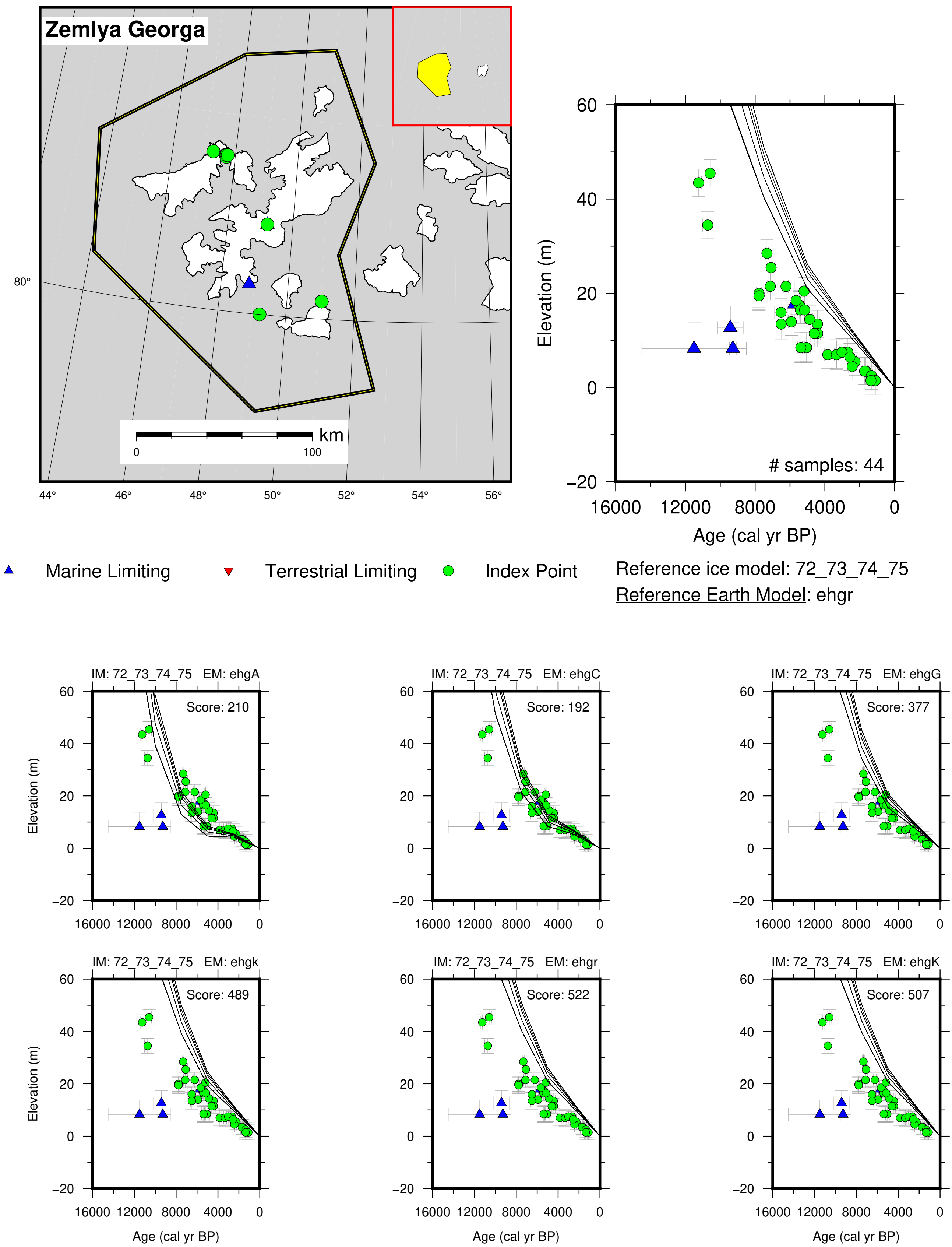


Figure 9: Paleo-sea level and comparison of six models for subregion Franz Josef Land, location Zemlya Georga.

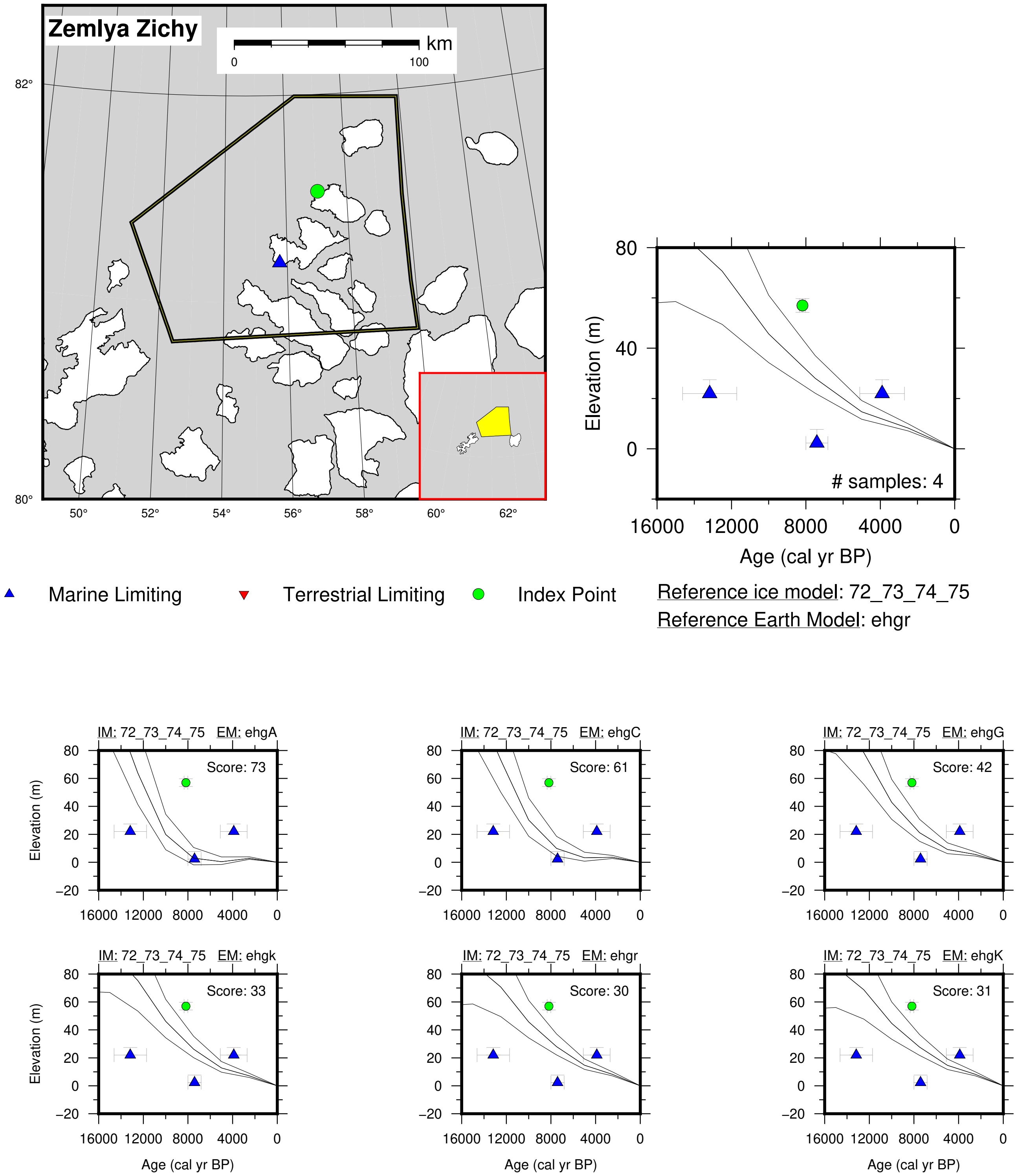


Figure 10: Paleo-sea level and comparison of six models for subregion Franz Josef Land, location Zemlya Zichy.

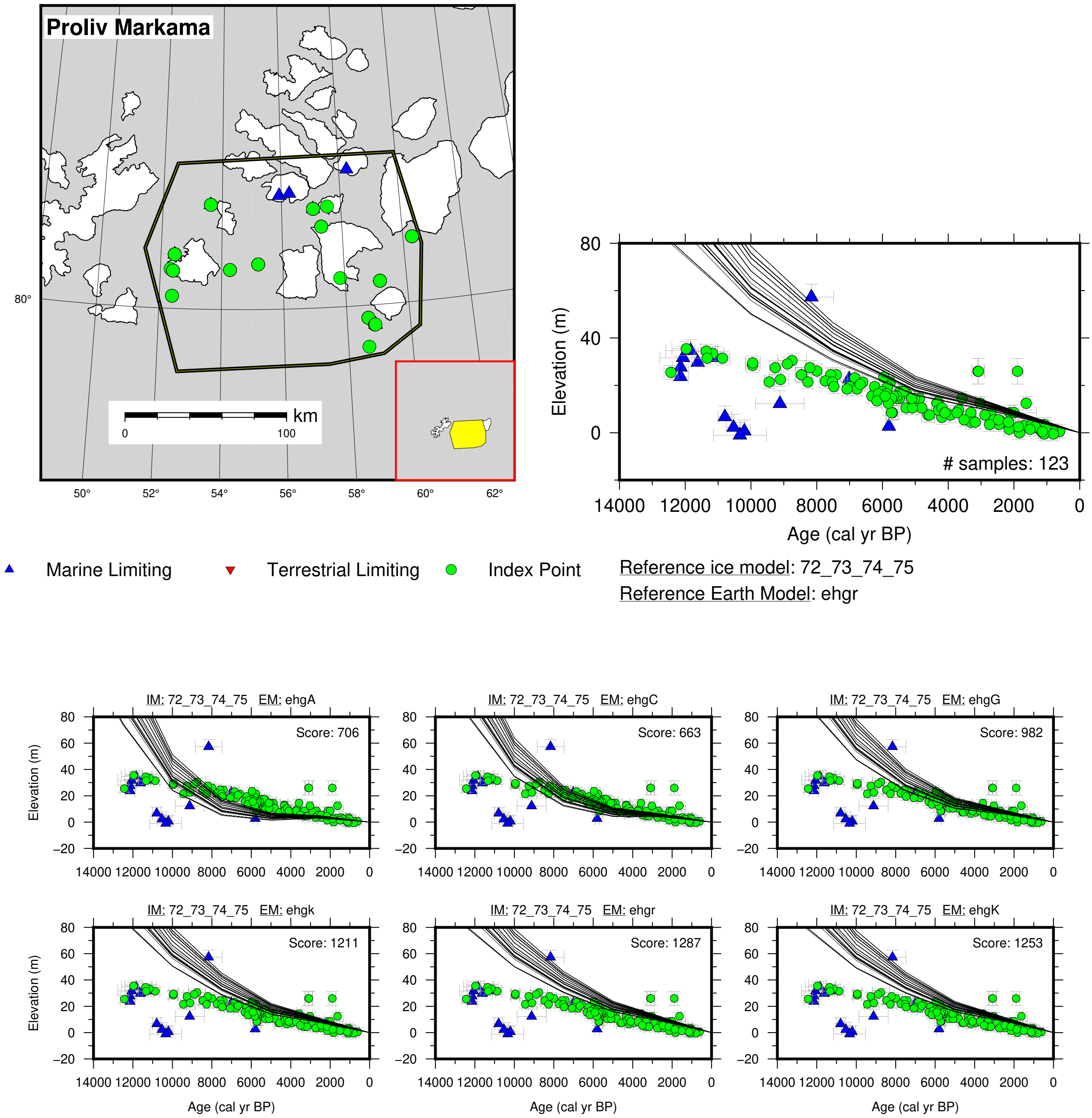


Figure 11: Paleo-sea level and comparison of six models for subregion Franz Josef Land, location Proliv Markama.

8.2 Kara Sea - Novaya Zemlya

References for the data used in each location.

Pechora Sea: Astakhov et al. (2007); Krapivner (2006); Polyak et al. (2000); Zhuravlev et al. (2013)

Yuzhny Island: Bolshiyanov et al. (2006); Mangerud et al. (2008); Zhuravlev et al. (2013)

Severny Island West: Bolshiyanov et al. (2009); Forman et al. (1999, 2004); Zeeberg et al. (2001)

Severny Island North: Forman et al. (1999, 2004); Gawronski and Zeeberg (1997); Zeeberg et al. (2001)

Vaygach Island: Forman et al. (2004); Zeeberg et al. (2001)

Baydaratskaya Bay: Belova (2012); Grigorieva (1987)

Gulf of Ob: Astakhov and Nazarov (2010); Grigorieva (1987); Makeev (1988); Makeev et al. (1988)

Khalmyer Bay: Baranskaya et al. (2018b); Grigorieva (1987); Makeev (1988); Romanenko et al. (2007)

Kara Sea shelf: Levitan et al. (2007); Polyakova and Stein (2004)

Ostrov Sibiryakova: Gusev et al. (2013a)

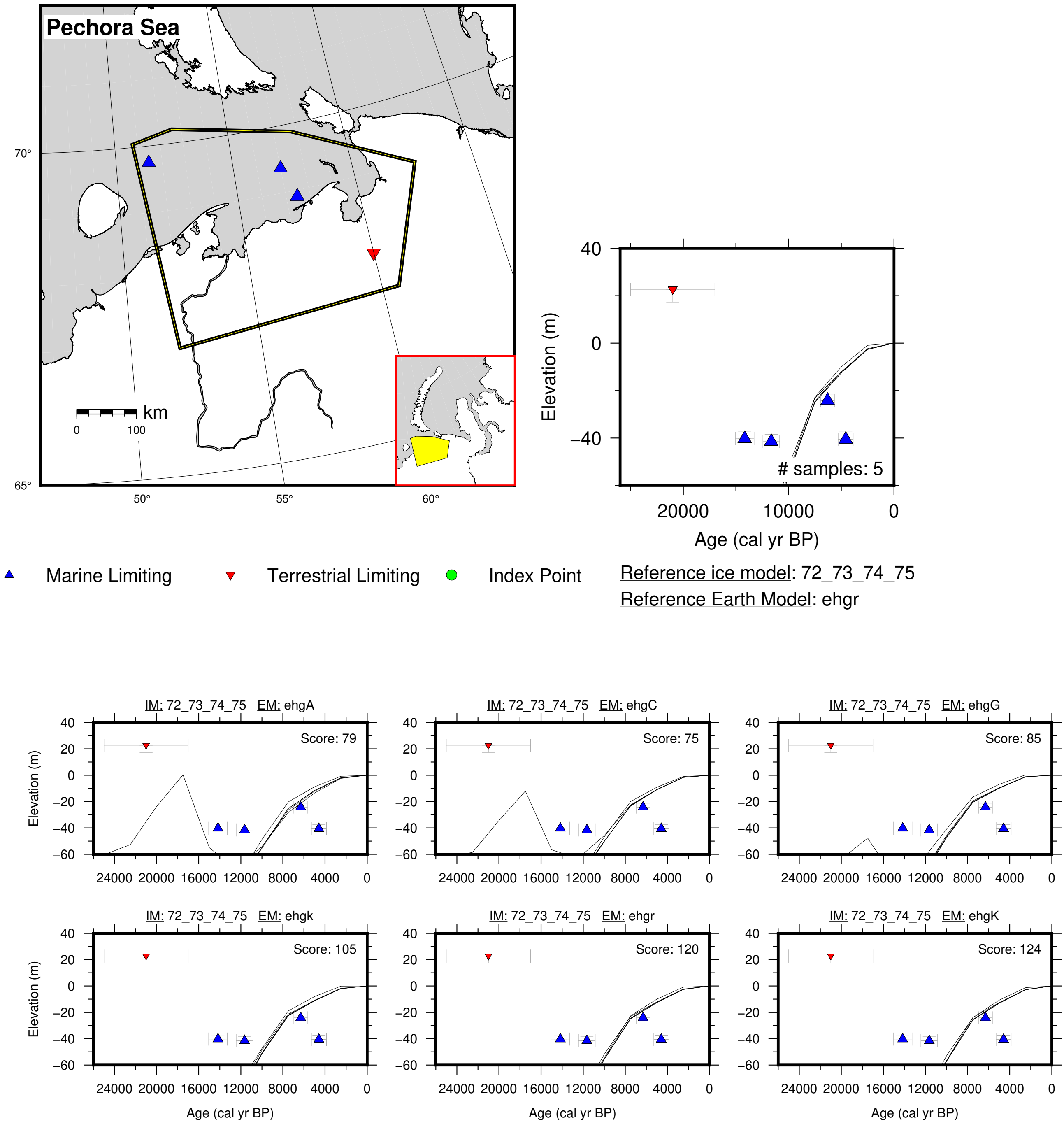


Figure 12: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Pechora Sea.

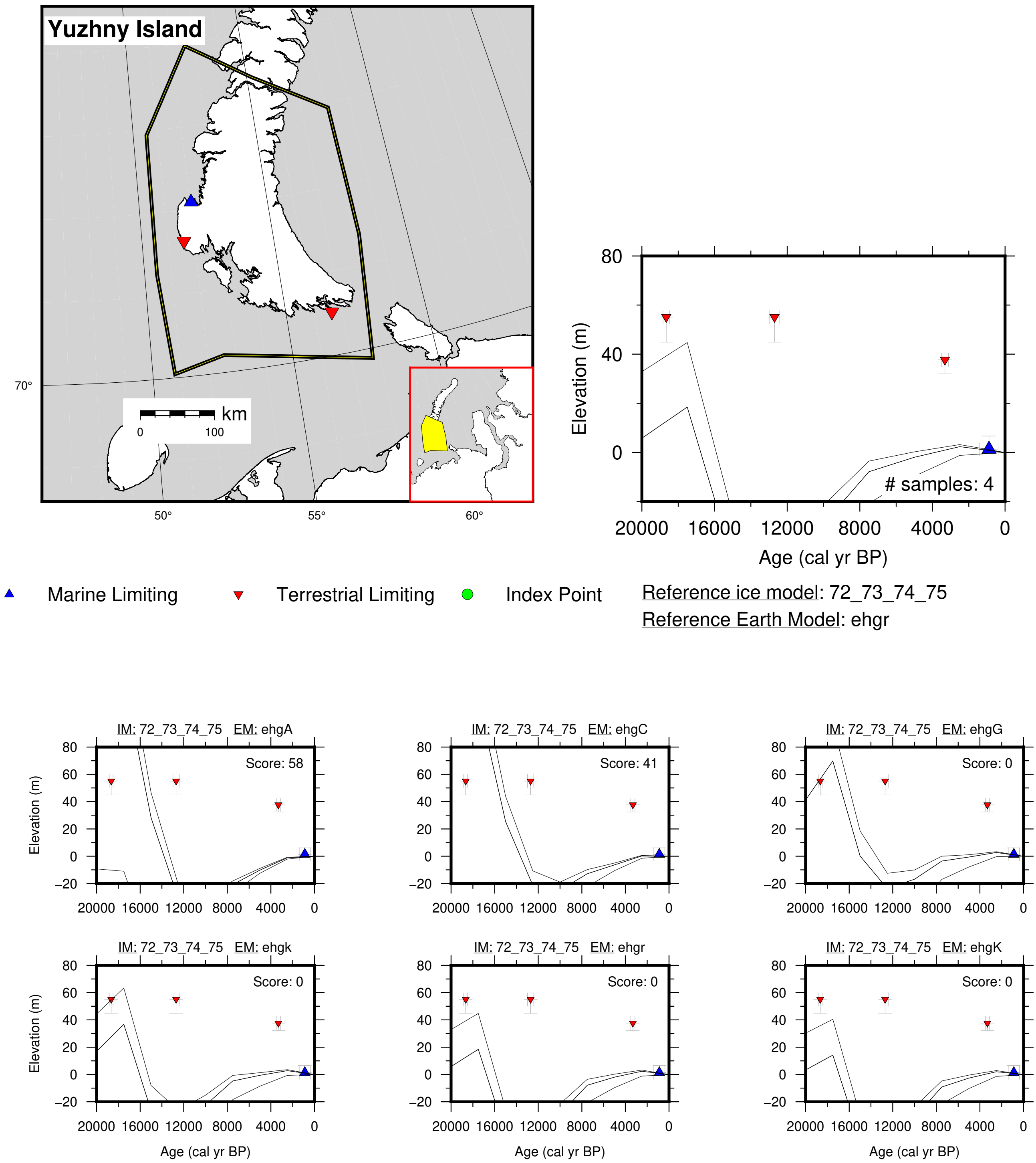


Figure 13: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Yuzhny Island.

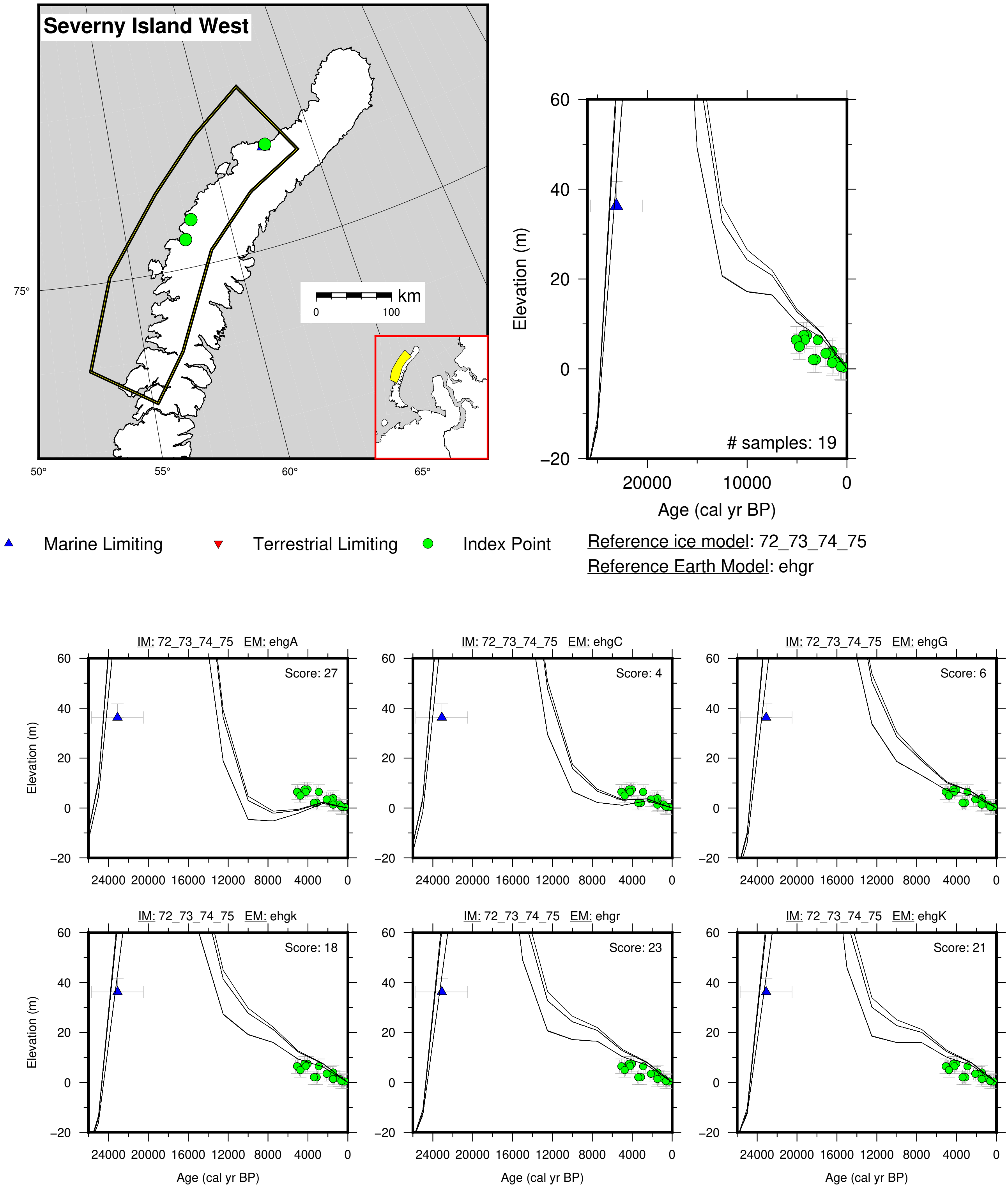


Figure 14: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Severny Island West.

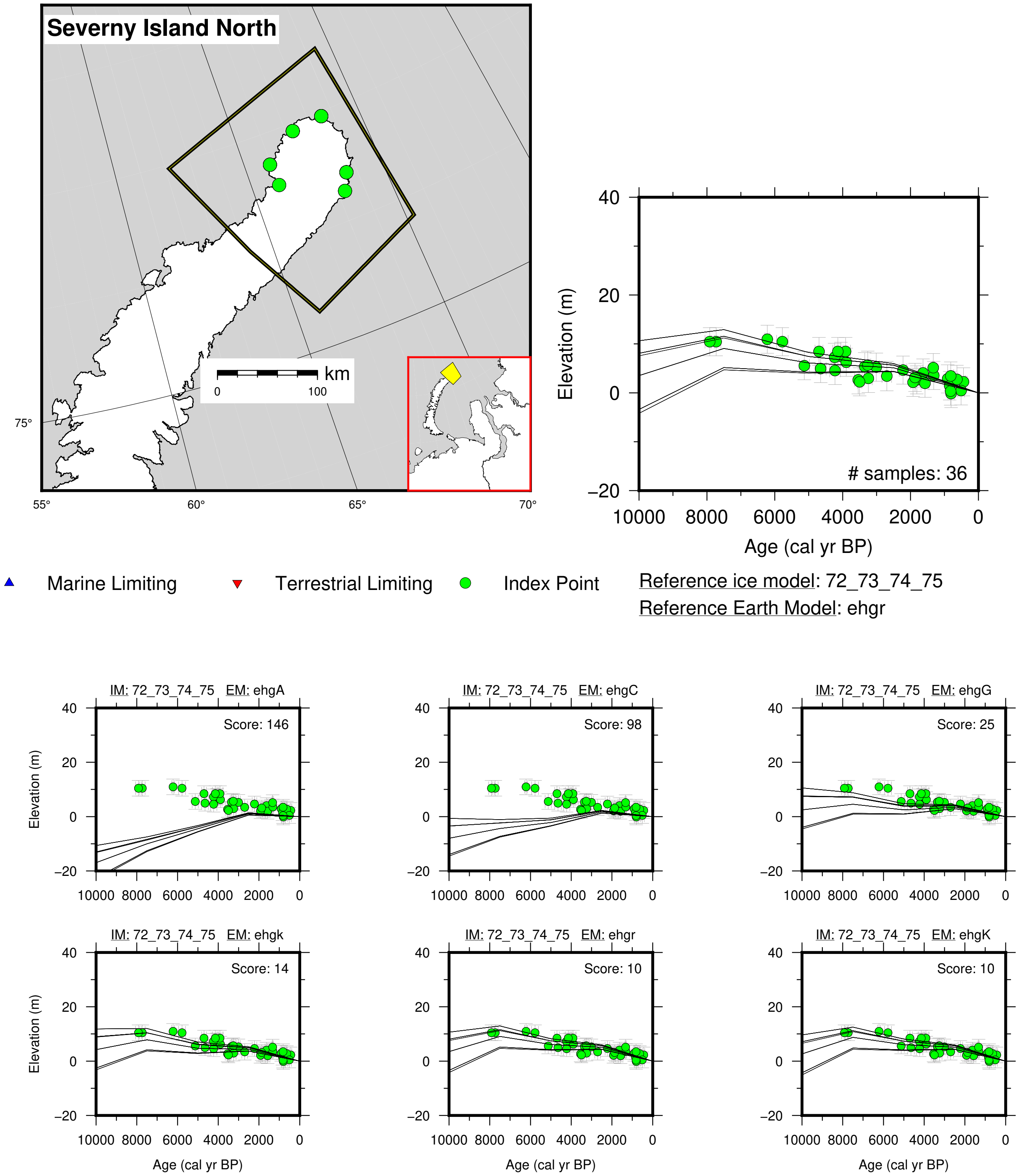


Figure 15: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Severny Island North.

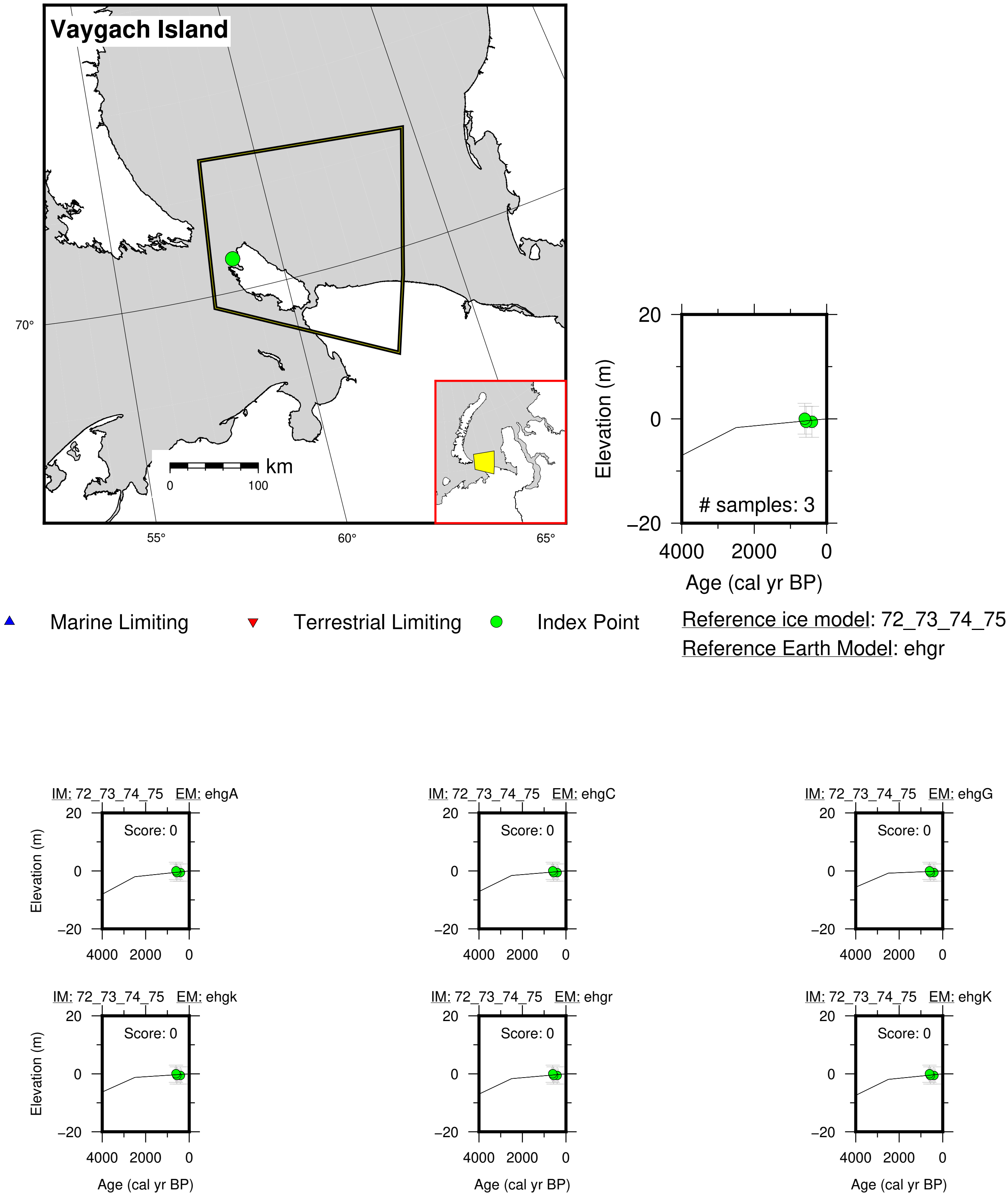


Figure 16: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Vaygach Island.

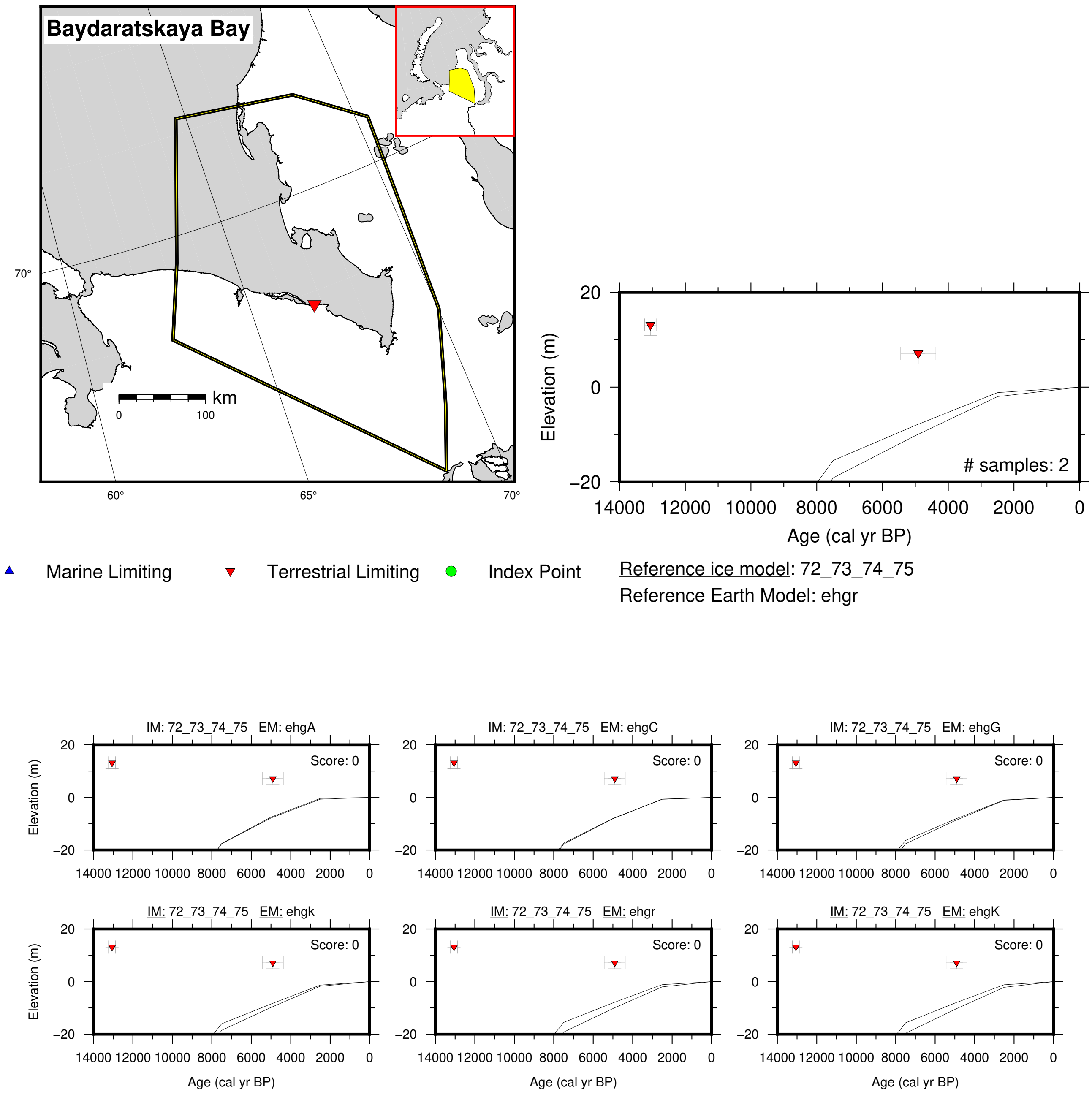


Figure 17: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Baydaratskaya Bay.

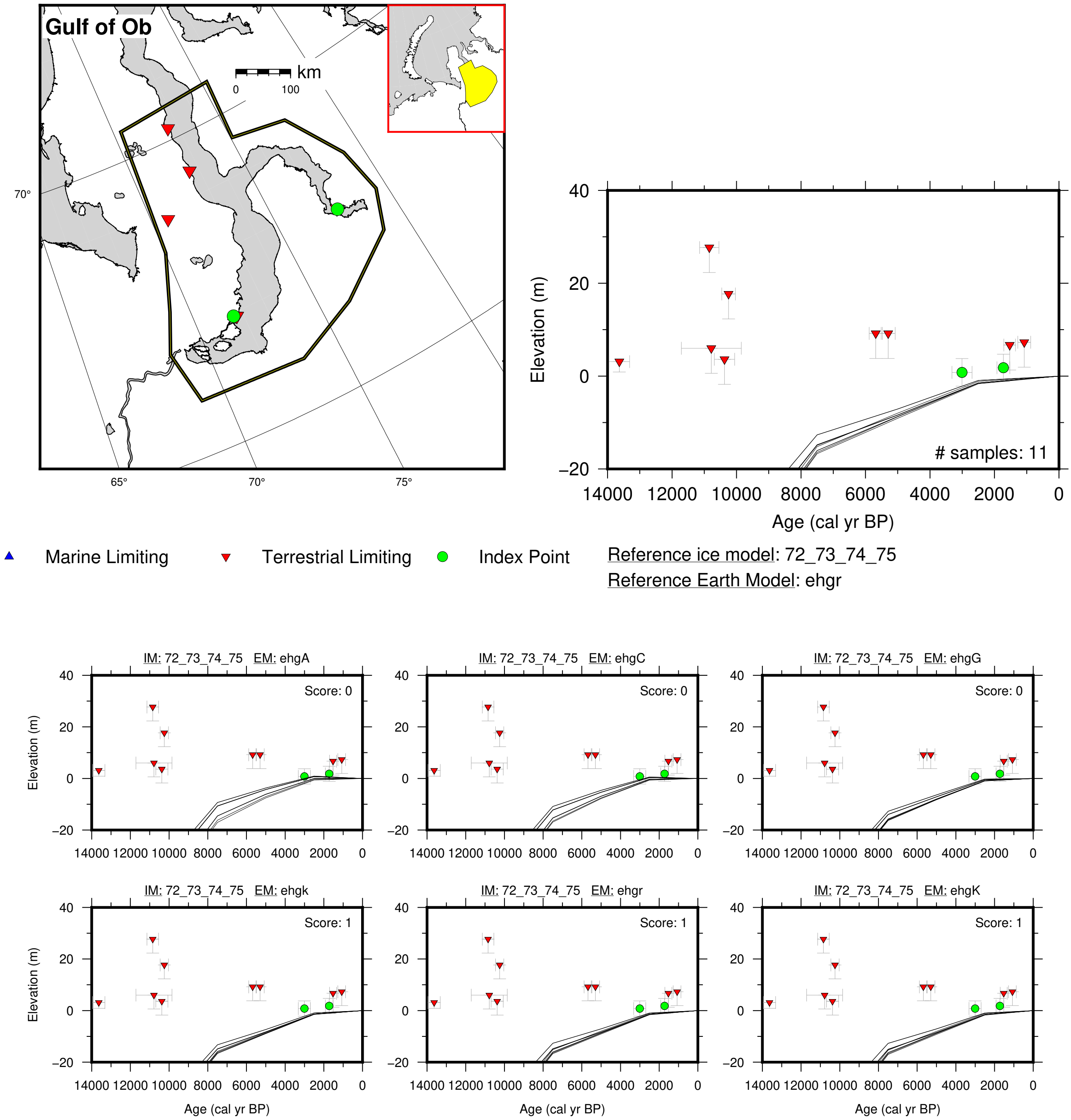


Figure 18: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Gulf of Ob.

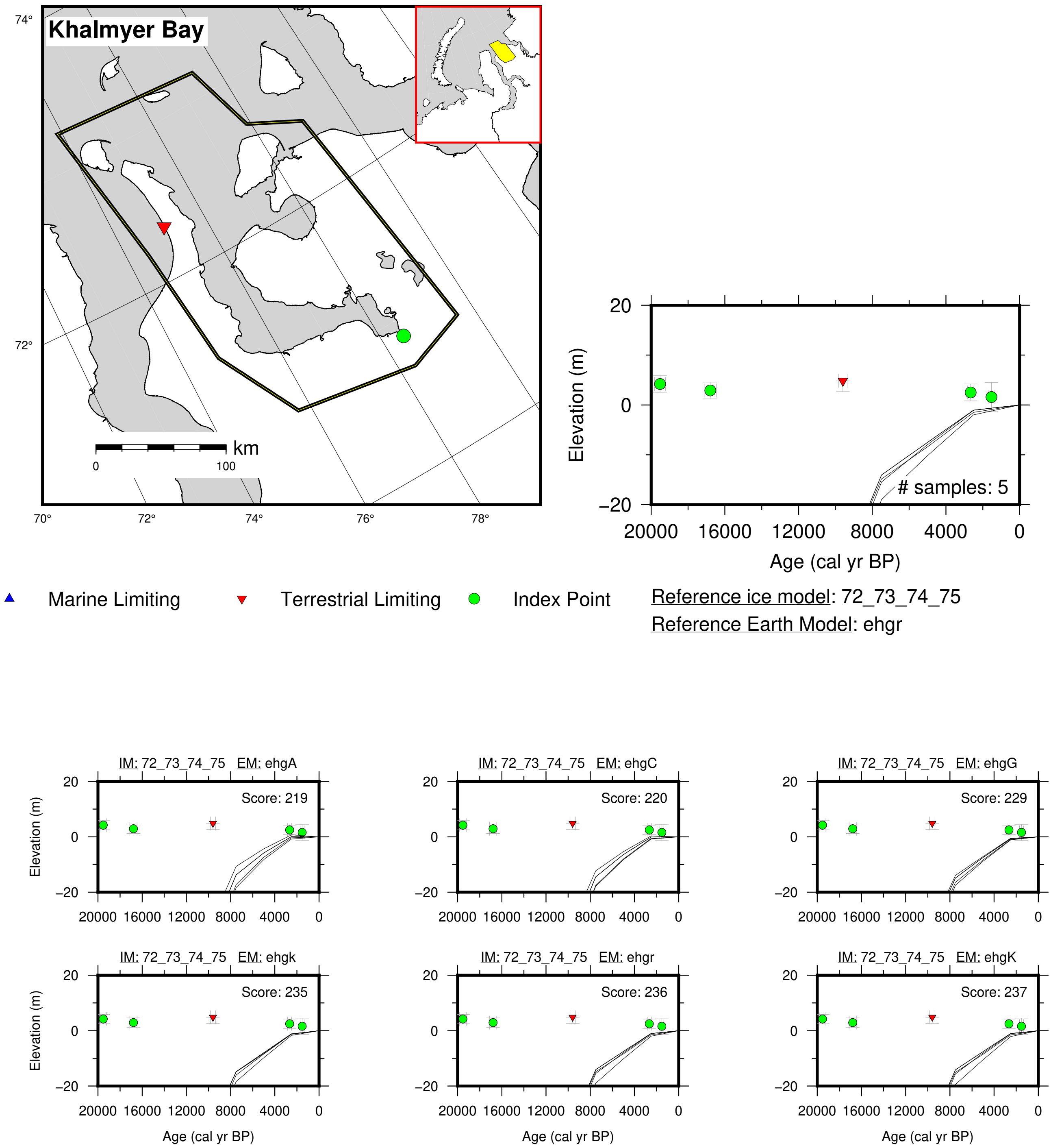


Figure 19: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Khalmyer Bay.

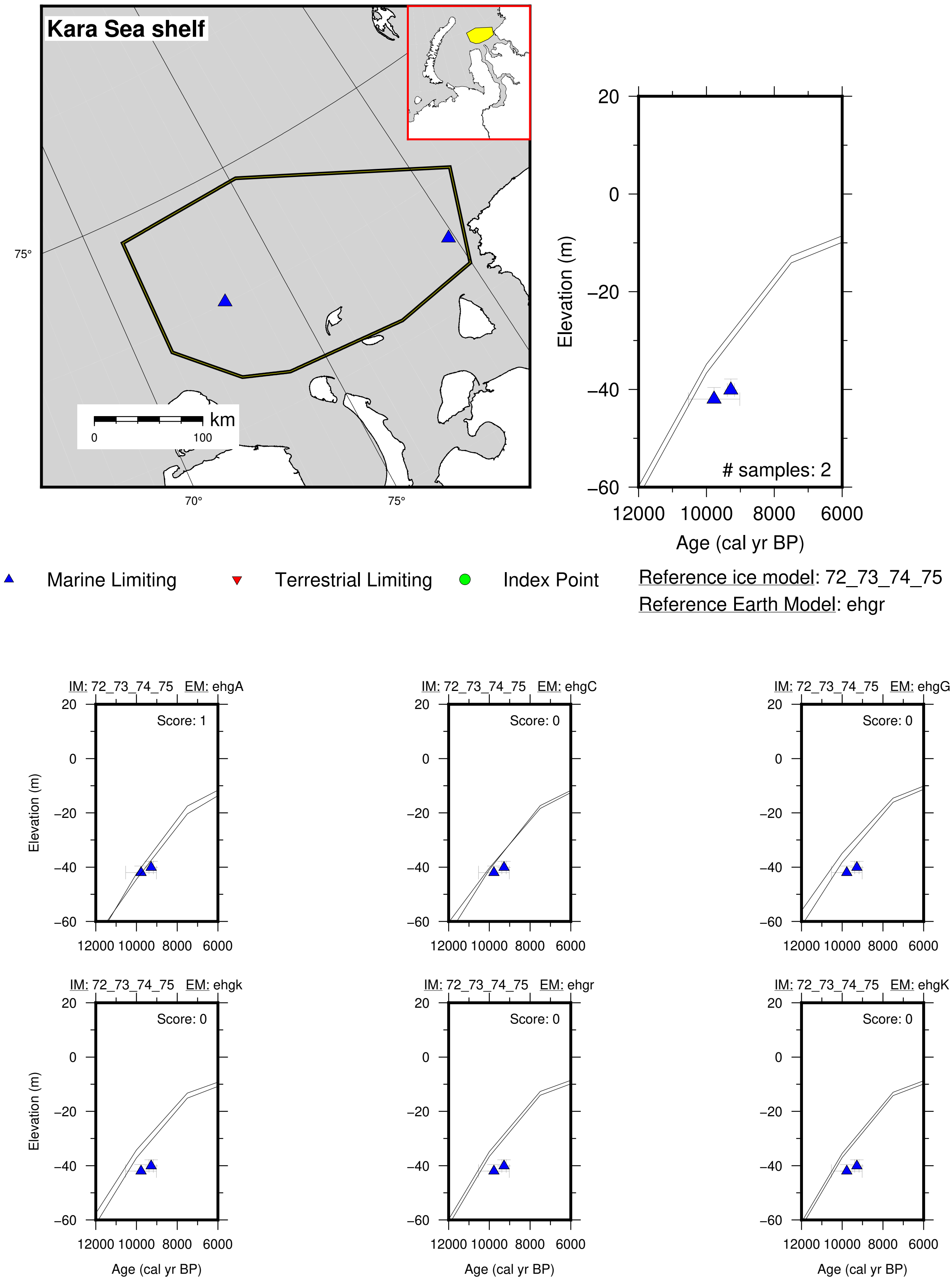


Figure 20: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Kara Sea shelf.

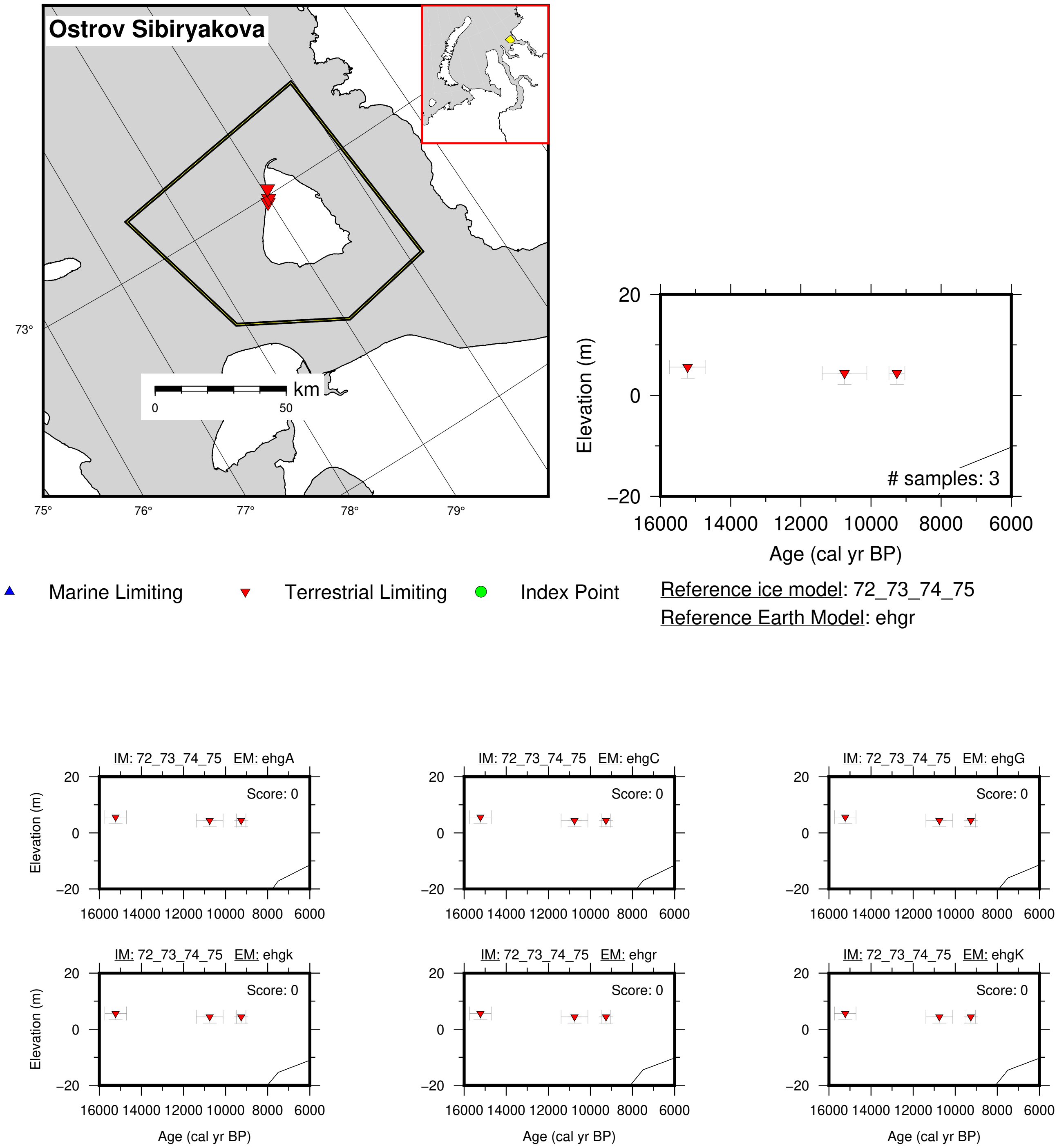


Figure 21: Paleo-sea level and comparison of six models for subregion Kara Sea - Novaya Zemlya, location Ostrov Sibiryakova.

8.3 Southern Barents Sea

References for the data used in each location.

Rolfsoya: Romundset et al. (2011)

Norkinn: Romundset et al. (2011)

Pechengsky: Arslanov et al. (1974); Corner et al. (1999); Koshechkin (1979)

Murmansk: Arslanov et al. (1974); Corner et al. (2001); Gurevich and Liyva (1975); Gurina (1971); Mityaev M. V. (2008); Tanner (1907)

Voronya River: Arslanov et al. (1974); Snyder et al. (1997)

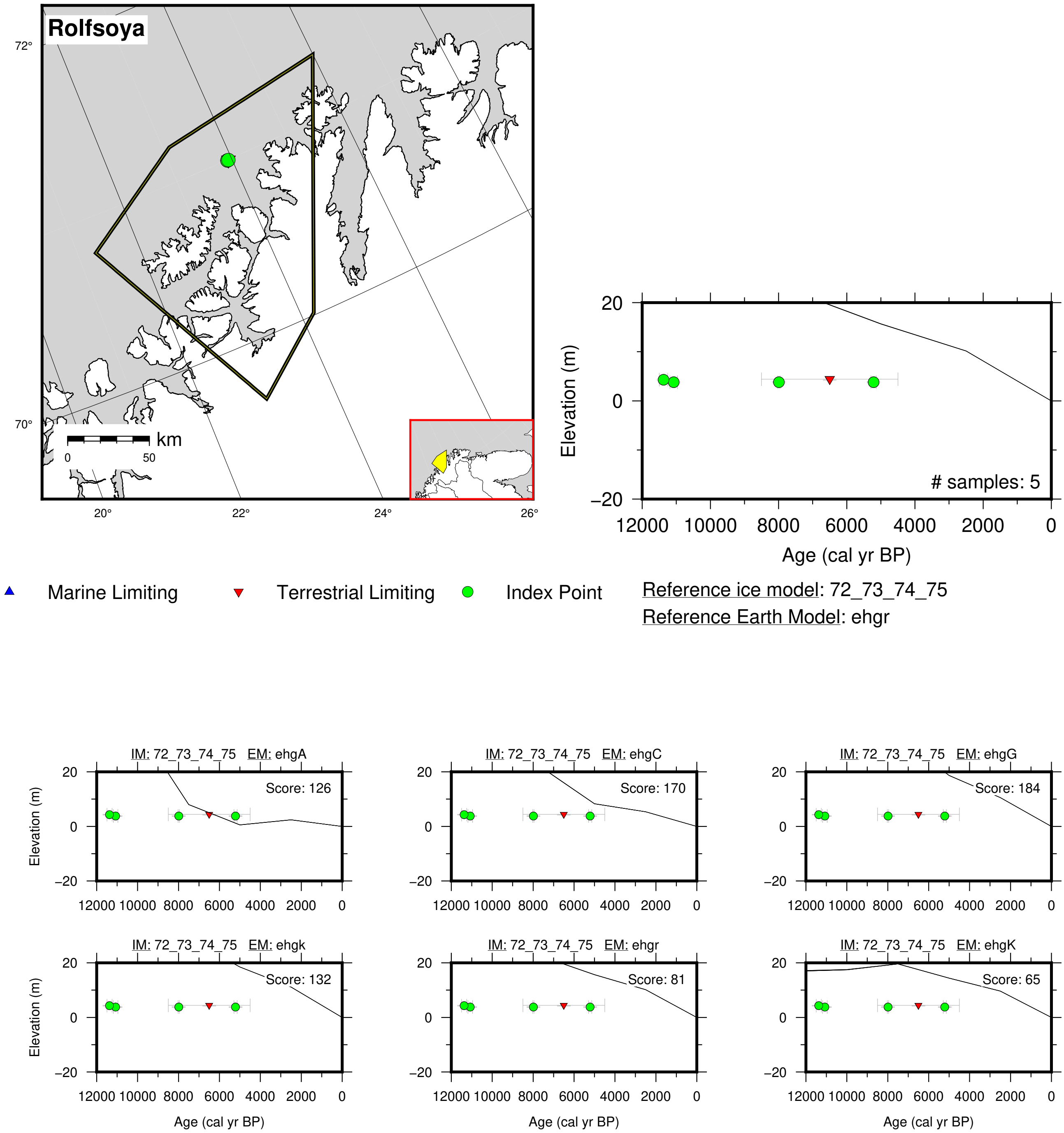


Figure 22: Paleo-sea level and comparison of six models for subregion Southern Barents Sea, location Rolfsoya.

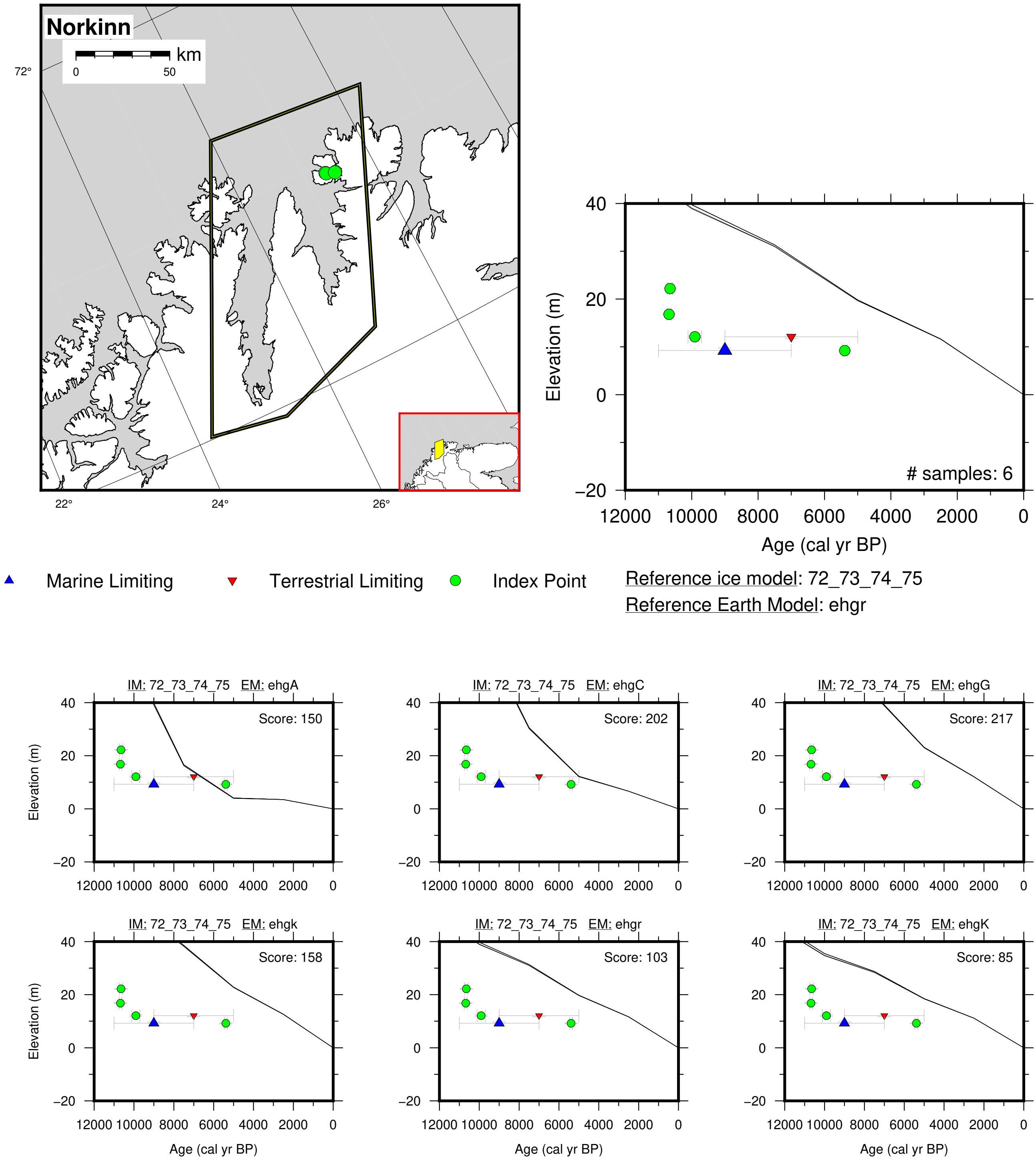


Figure 23: Paleo-sea level and comparison of six models for subregion Southern Barents Sea, location Norkinn.

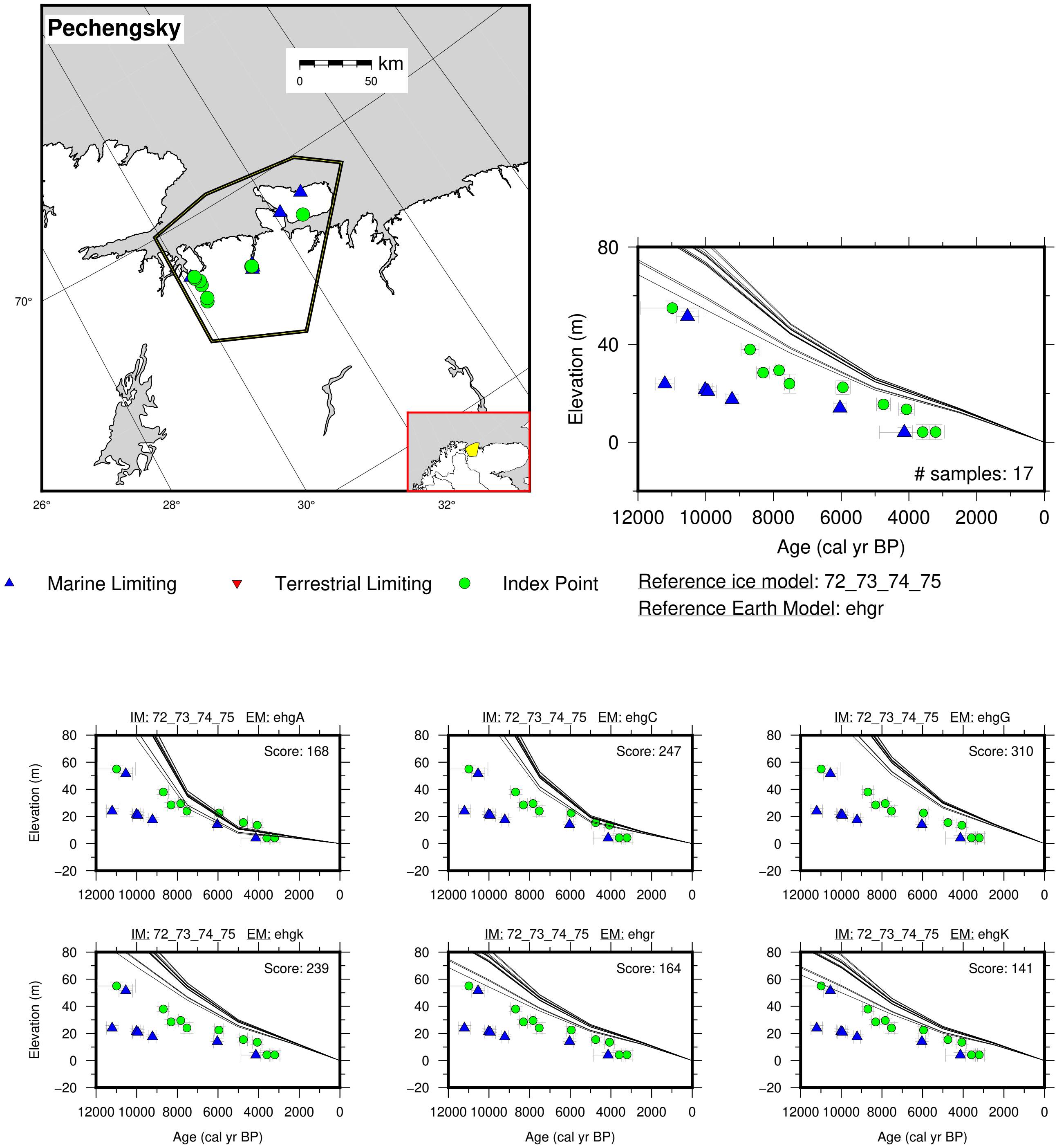


Figure 24: Paleo-sea level and comparison of six models for subregion Southern Barents Sea, location Pechengsky.

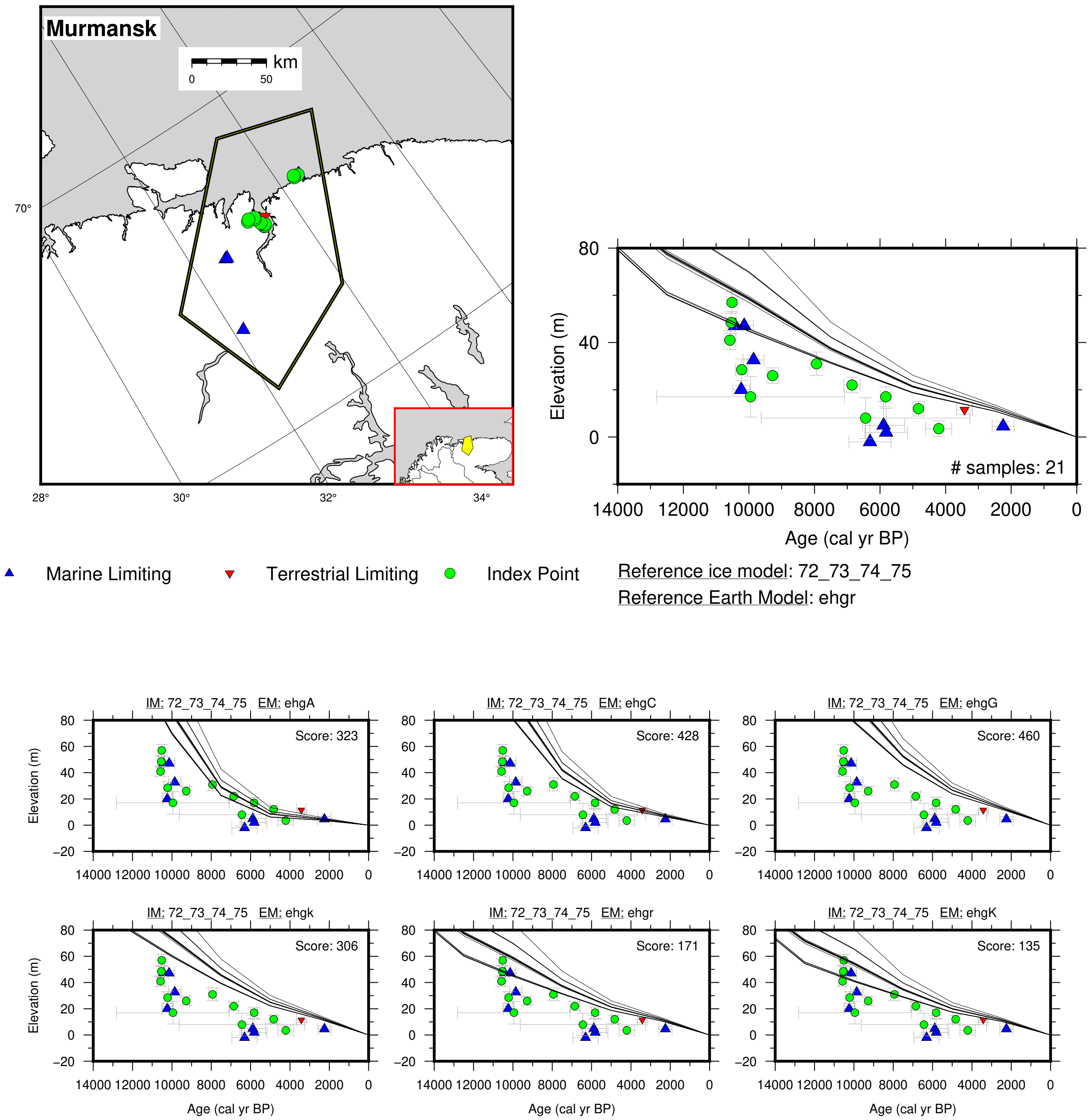


Figure 25: Paleo-sea level and comparison of six models for subregion Southern Barents Sea, location Murmansk.

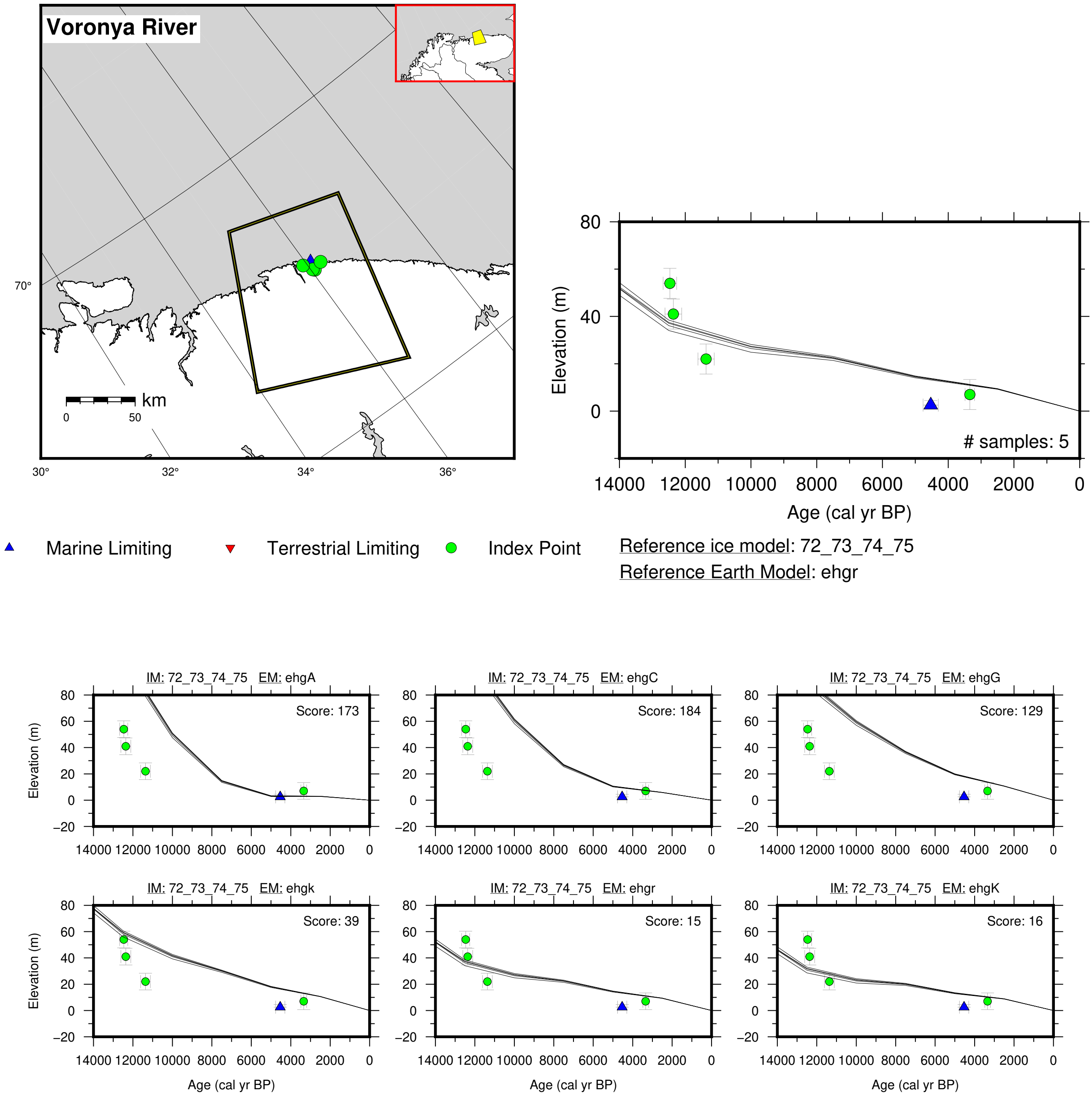


Figure 26: Paleo-sea level and comparison of six models for subregion Southern Barents Sea, location Voronya River.

8.4 Svalbard

References for the data used in each location.

Bockfjorden: Salvigsen and Høgvard (2006)

Broggerhalvoya: Forman et al. (1987, 2004)

Ytterdalen: Landvik et al. (1987)

Sorkapp Land: Salvigsen and Elgersma (1993)

Agardbukta: Salvigsen and Mangerud (1991)

Southern Edgeoya: Bondevik et al. (1995)

Diskobukta: Bondevik et al. (1995)

Humla: Bondevik et al. (1995)

Kapp Ziehen: Bondevik et al. (1995)

Svartknausflya: Salvigsen (1978)

Kongsoya: Salvigsen (1981)

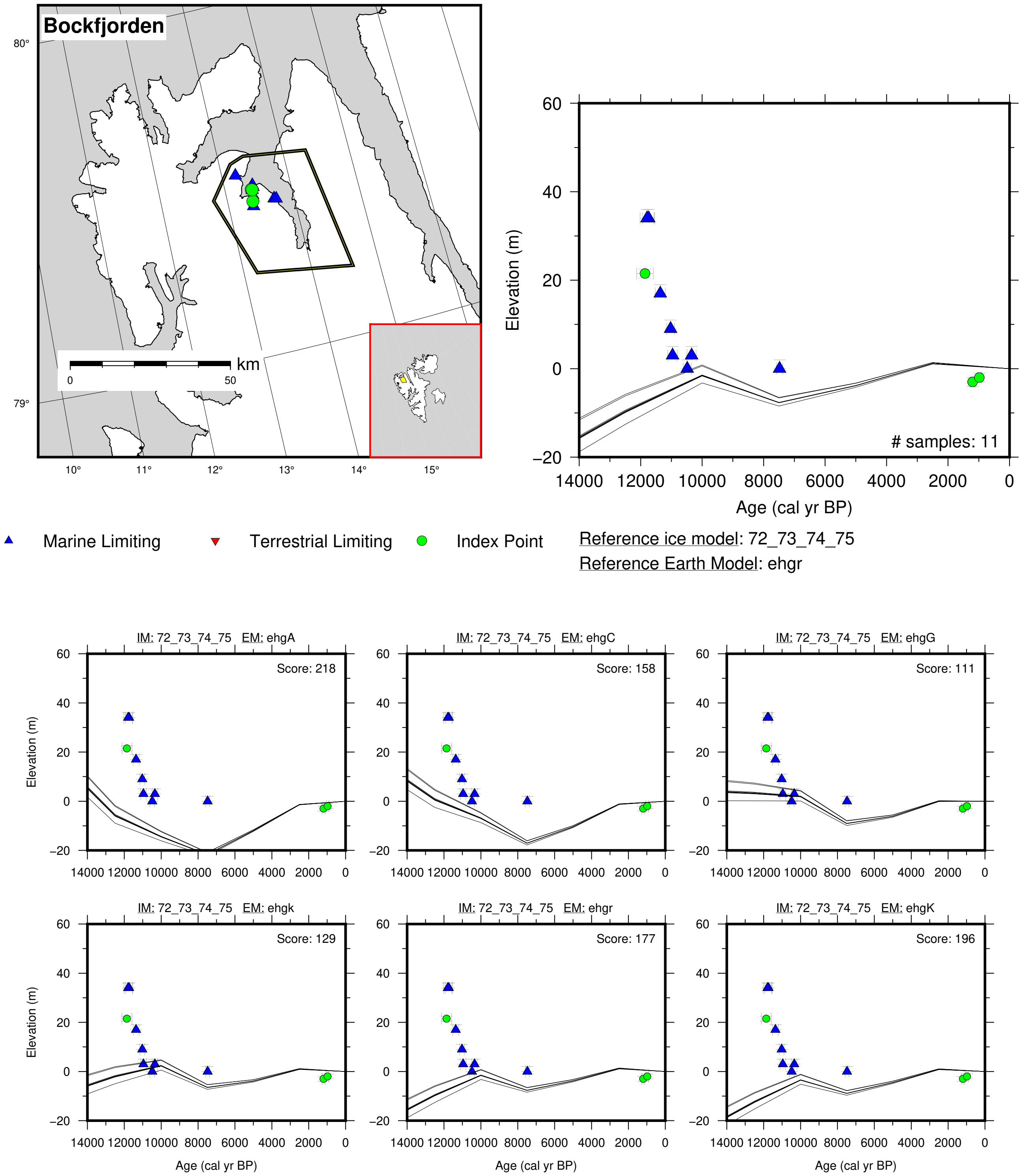


Figure 27: Paleo-sea level and comparison of six models for subregion Svalbard, location Bockfjorden.

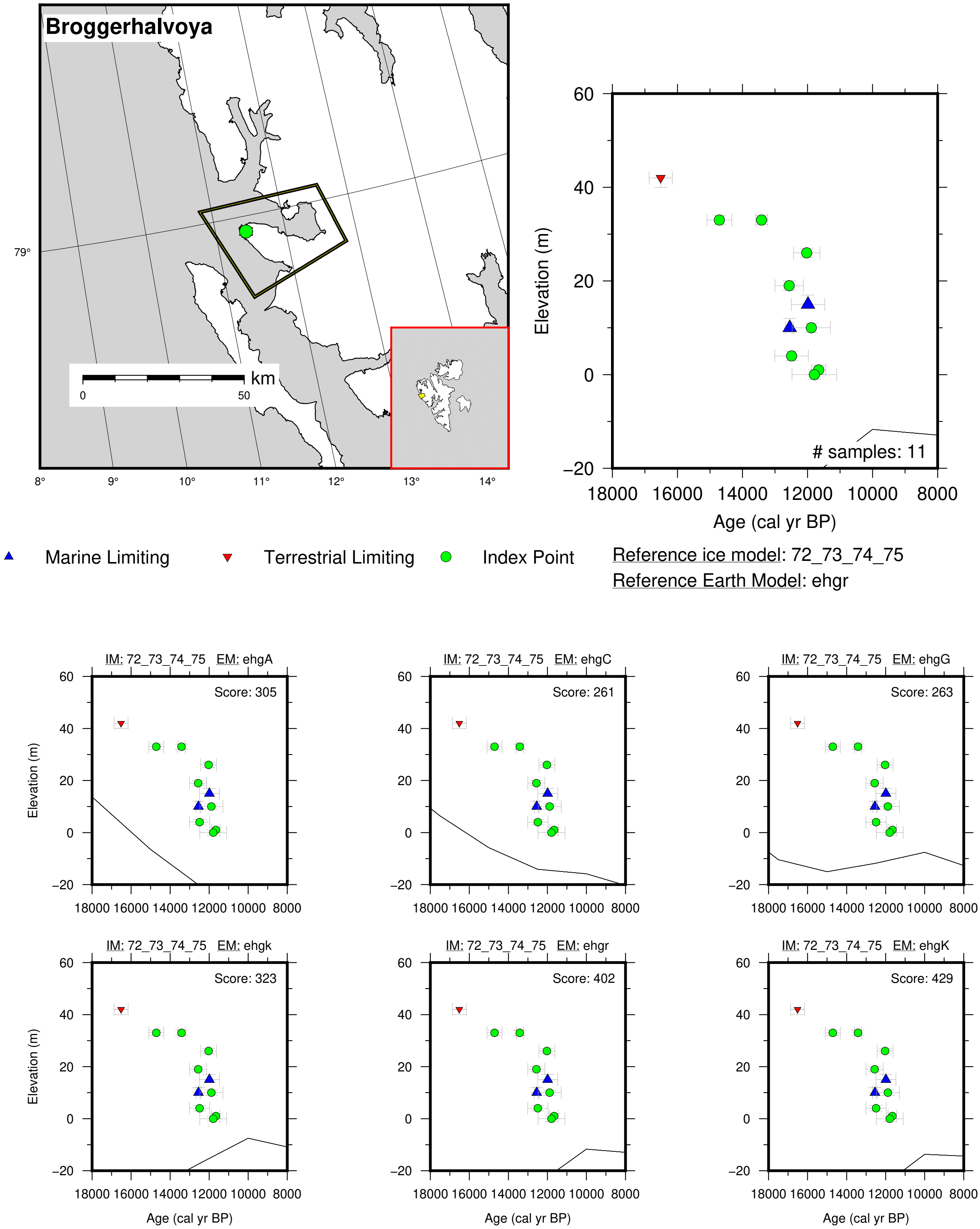


Figure 28: Paleo-sea level and comparison of six models for subregion Svalbard, location Broggerhalvoya.

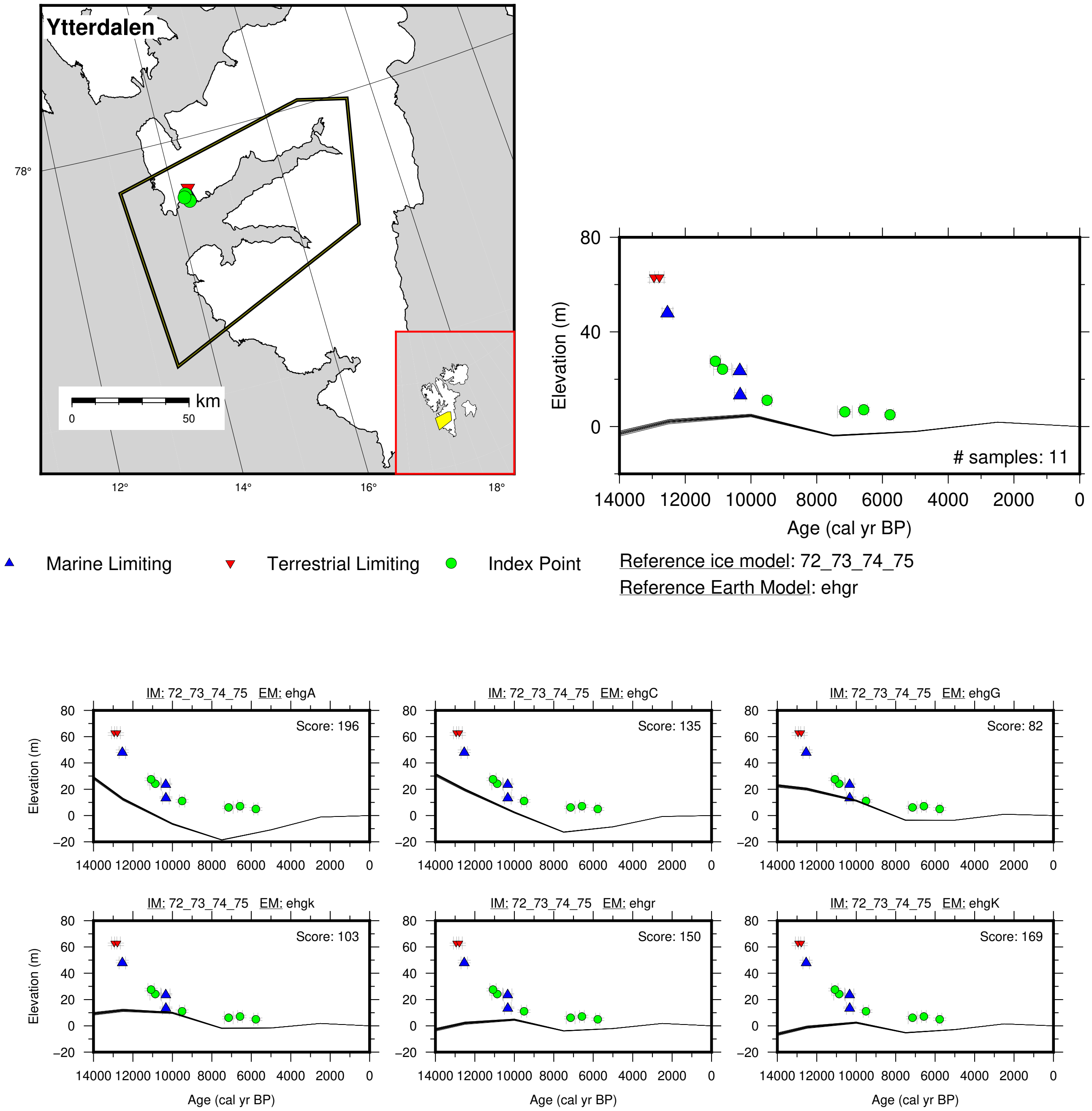


Figure 29: Paleo-sea level and comparison of six models for subregion Svalbard, location Ytterdalen.

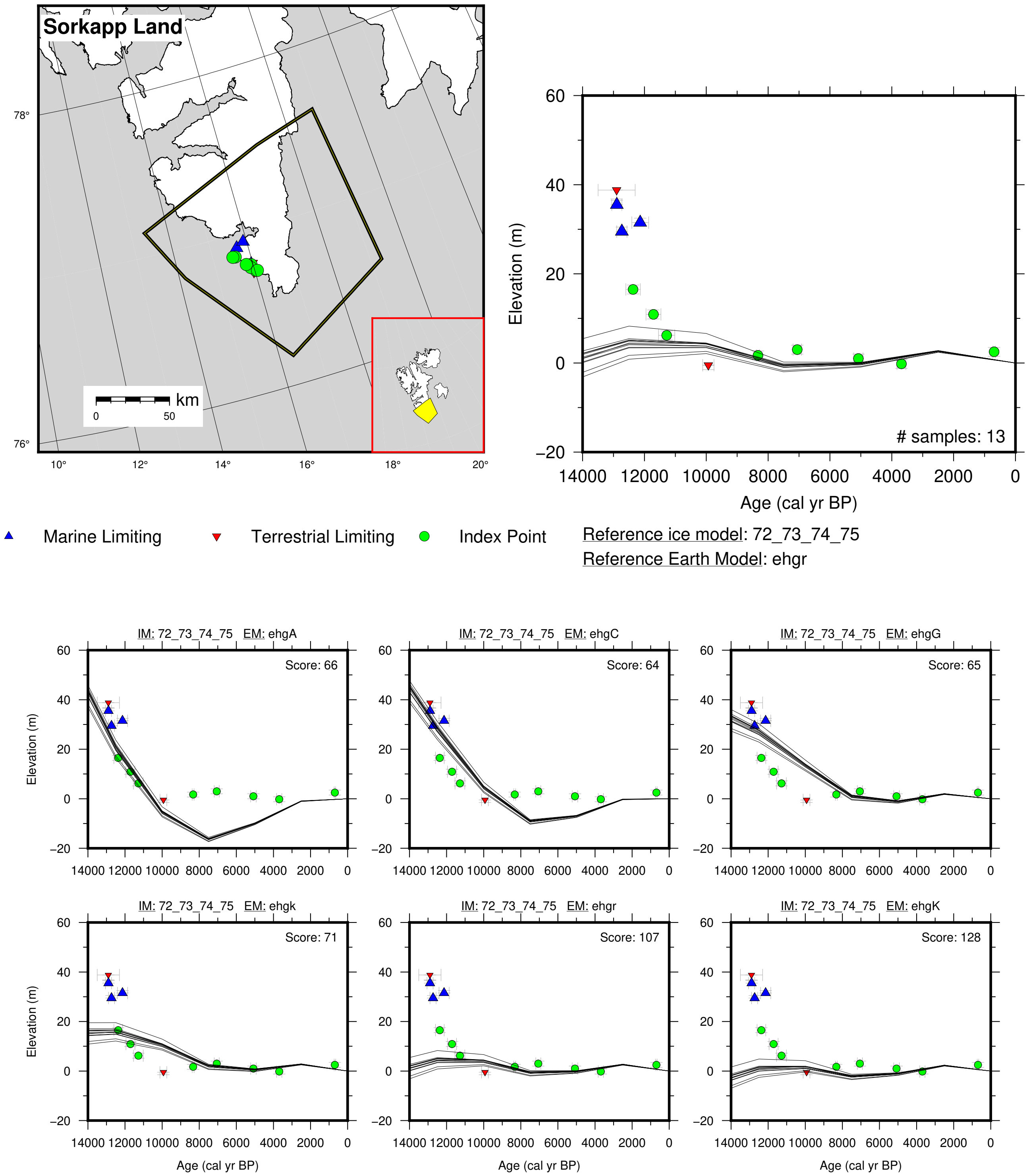


Figure 30: Paleo-sea level and comparison of six models for subregion Svalbard, location Sorkapp Land.

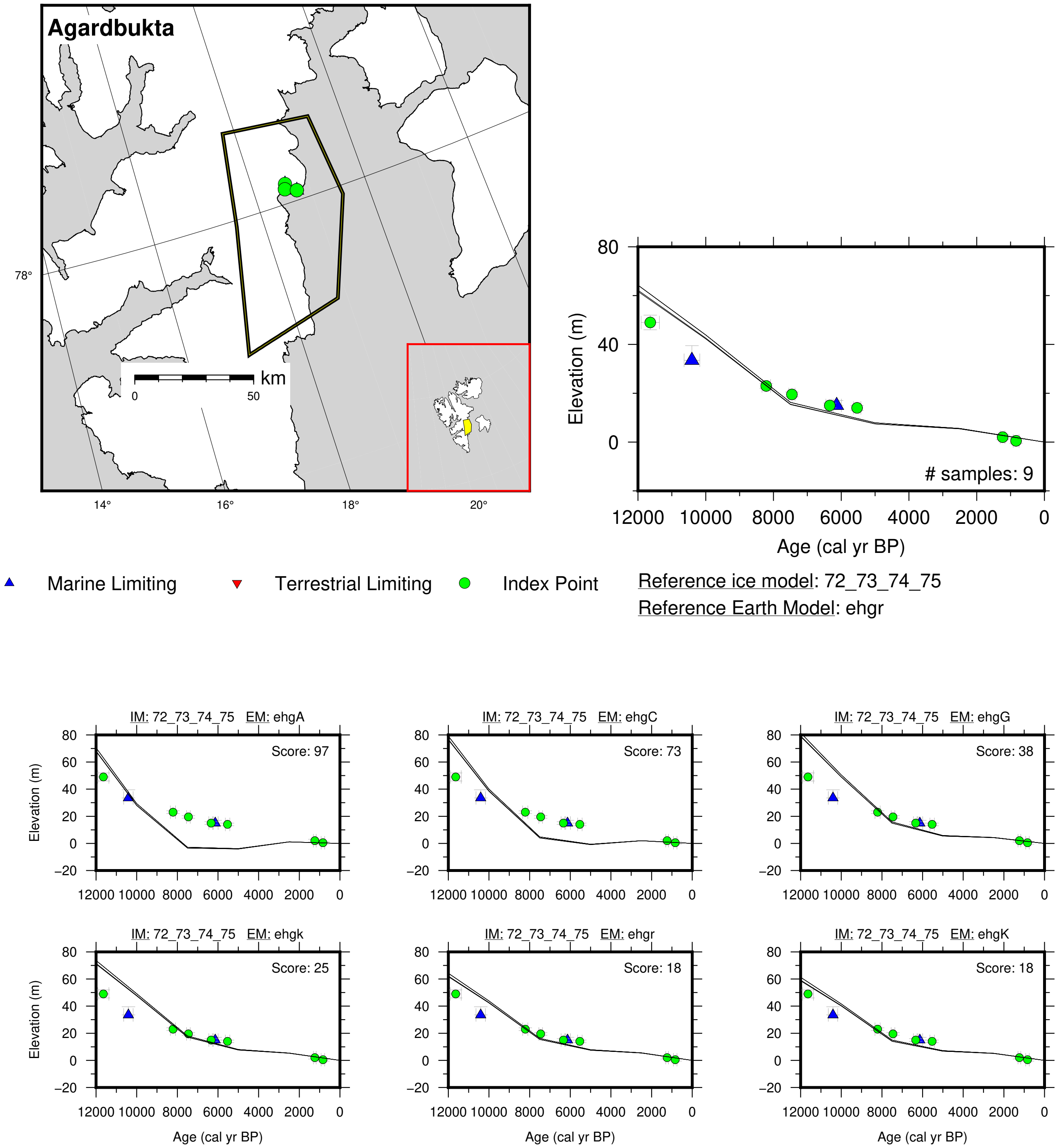


Figure 31: Paleo-sea level and comparison of six models for subregion Svalbard, location Agardbukta.

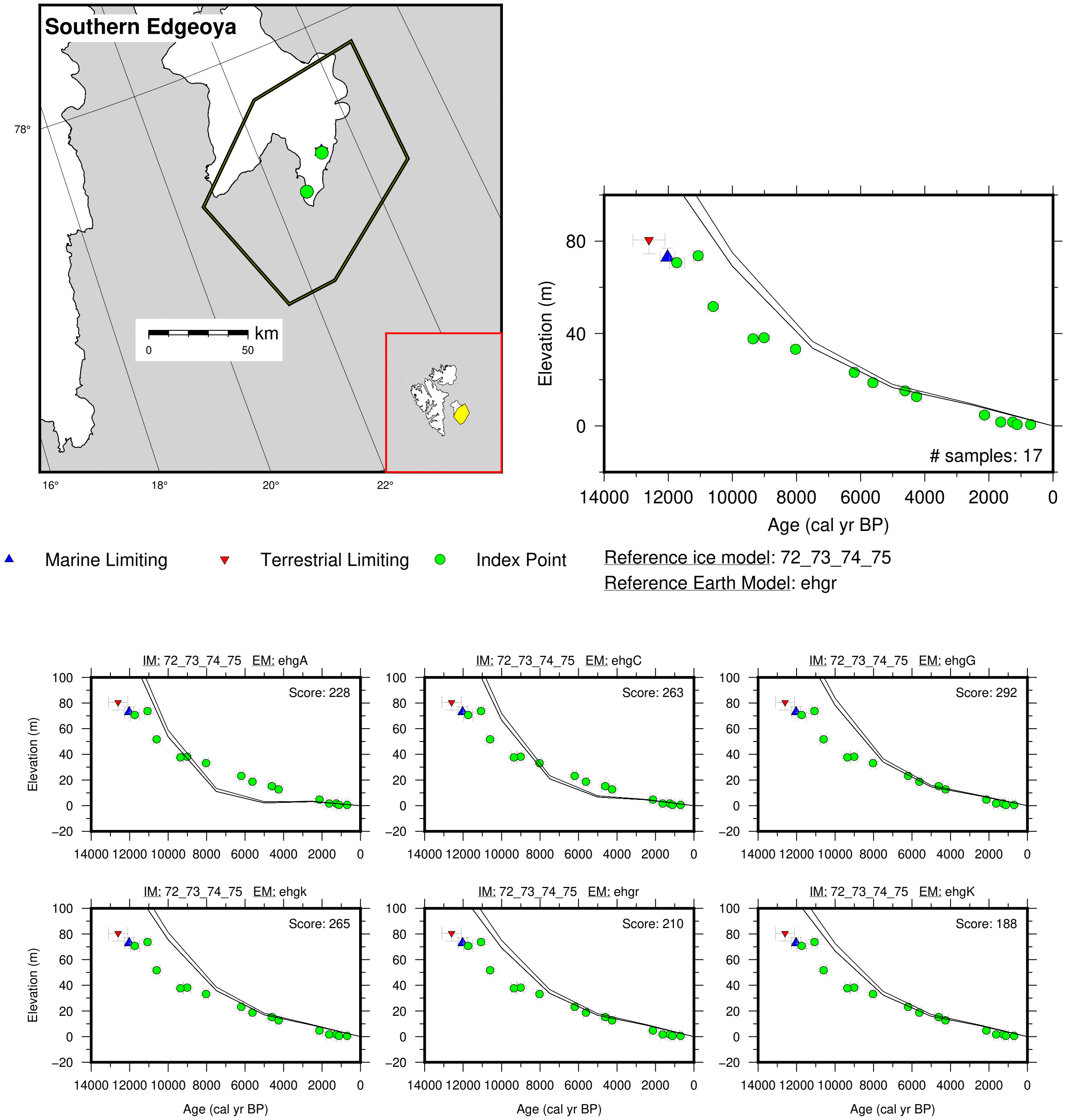


Figure 32: Paleo-sea level and comparison of six models for subregion Svalbard, location Southern Edgeoya.

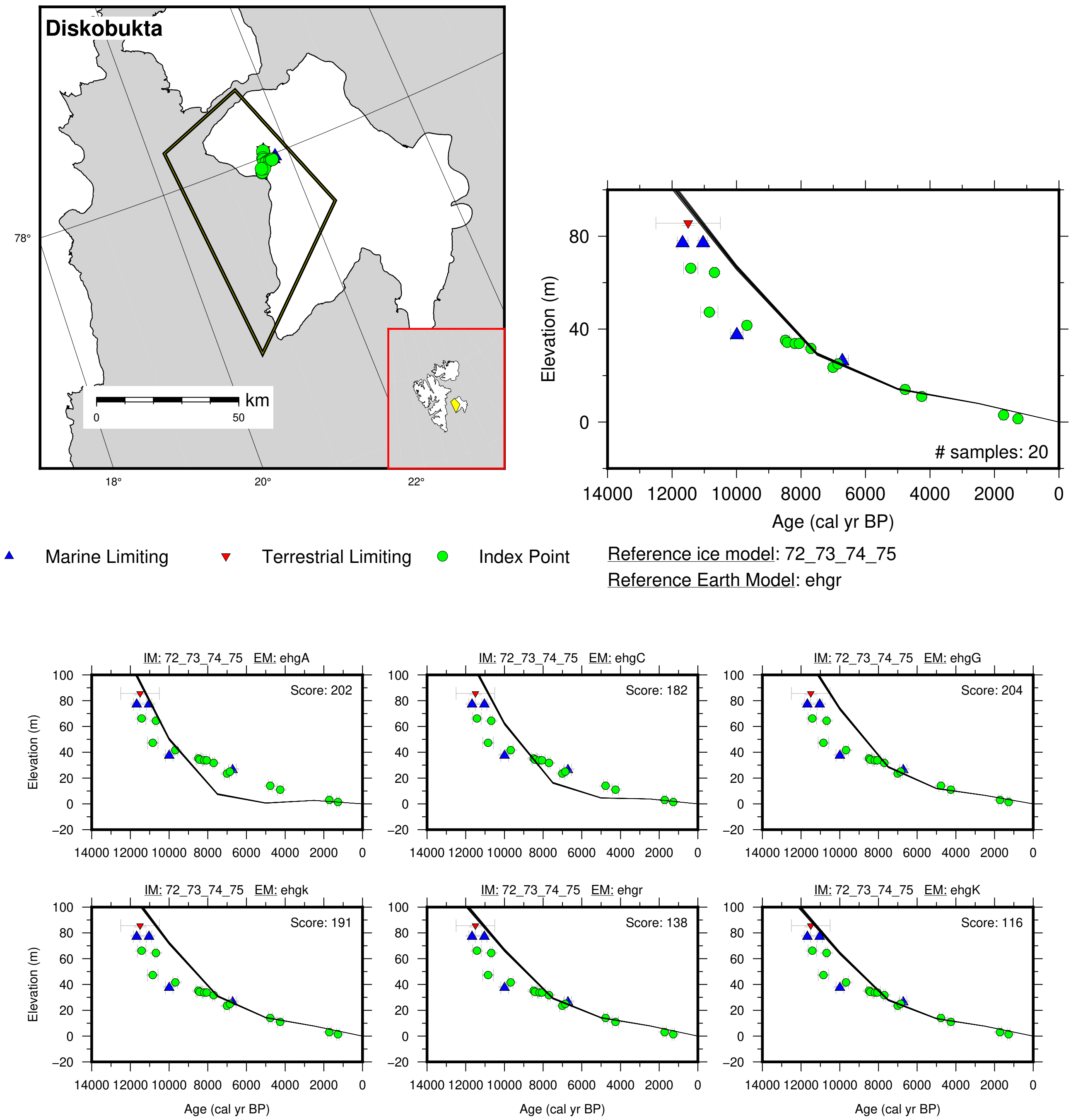


Figure 33: Paleo-sea level and comparison of six models for subregion Svalbard, location Diskobukta.

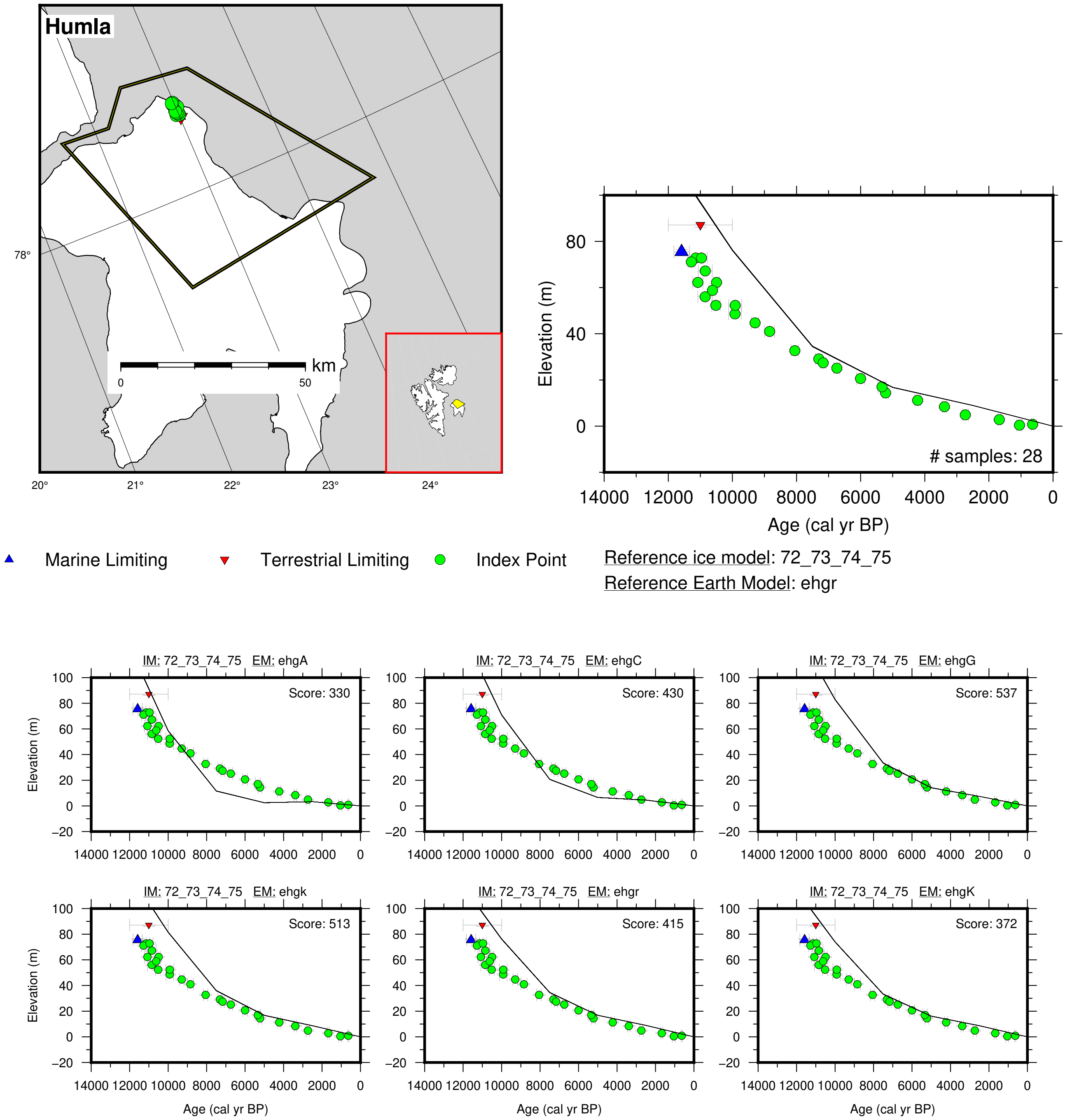


Figure 34: Paleo-sea level and comparison of six models for subregion Svalbard, location Humla.

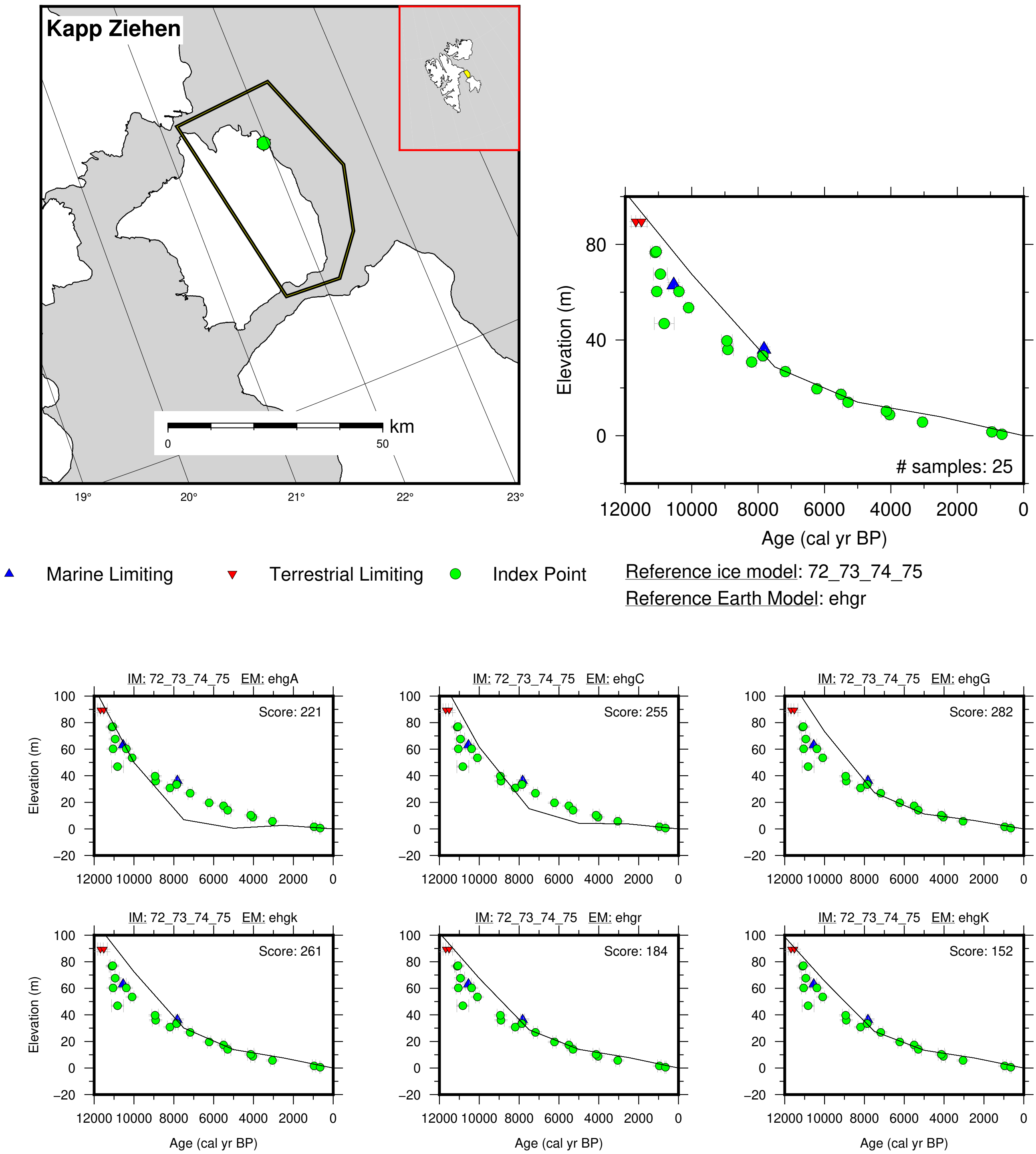


Figure 35: Paleo-sea level and comparison of six models for subregion Svalbard, location Kapp Ziehen.

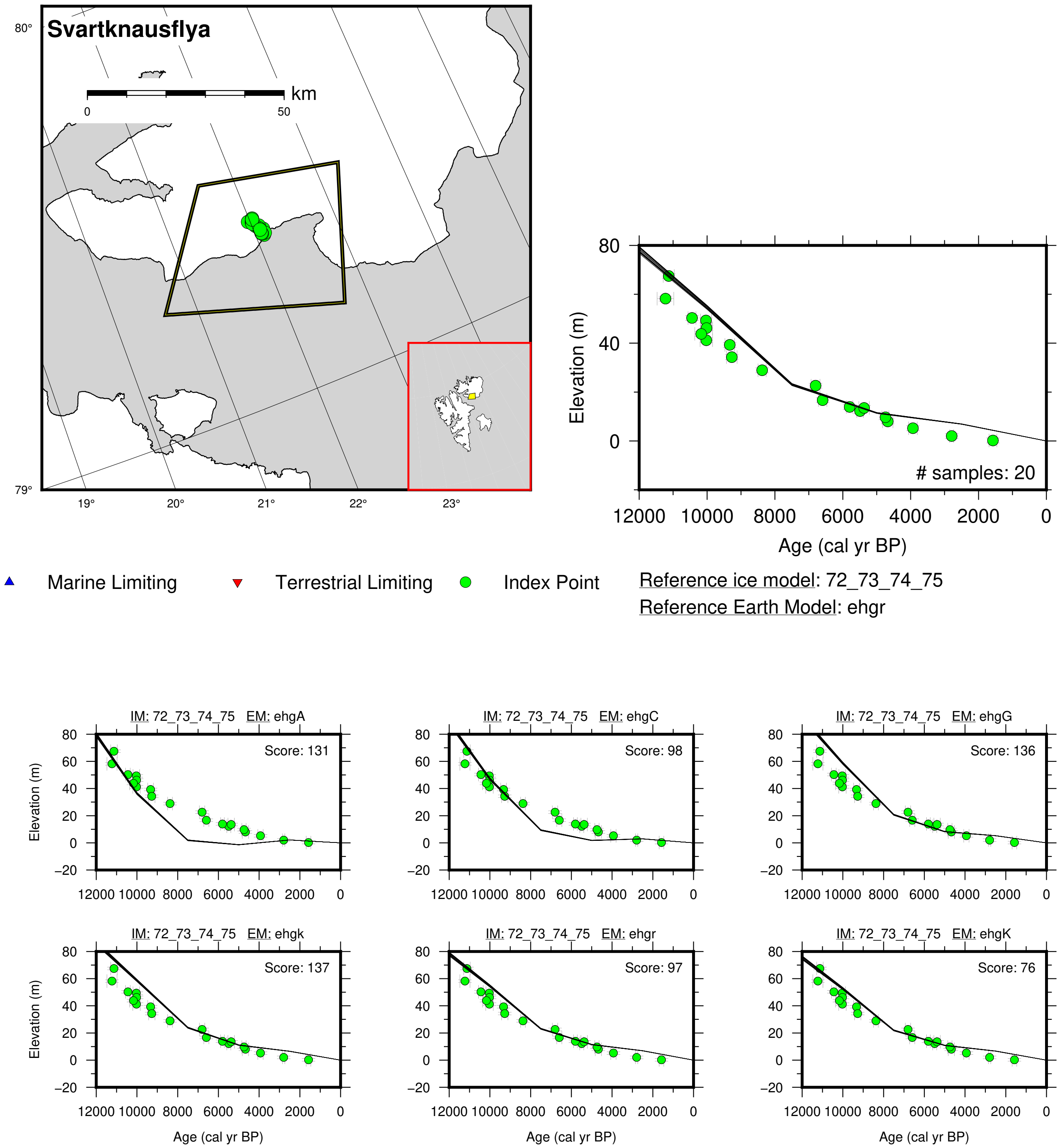


Figure 36: Paleo-sea level and comparison of six models for subregion Svalbard, location Svartknausflya.

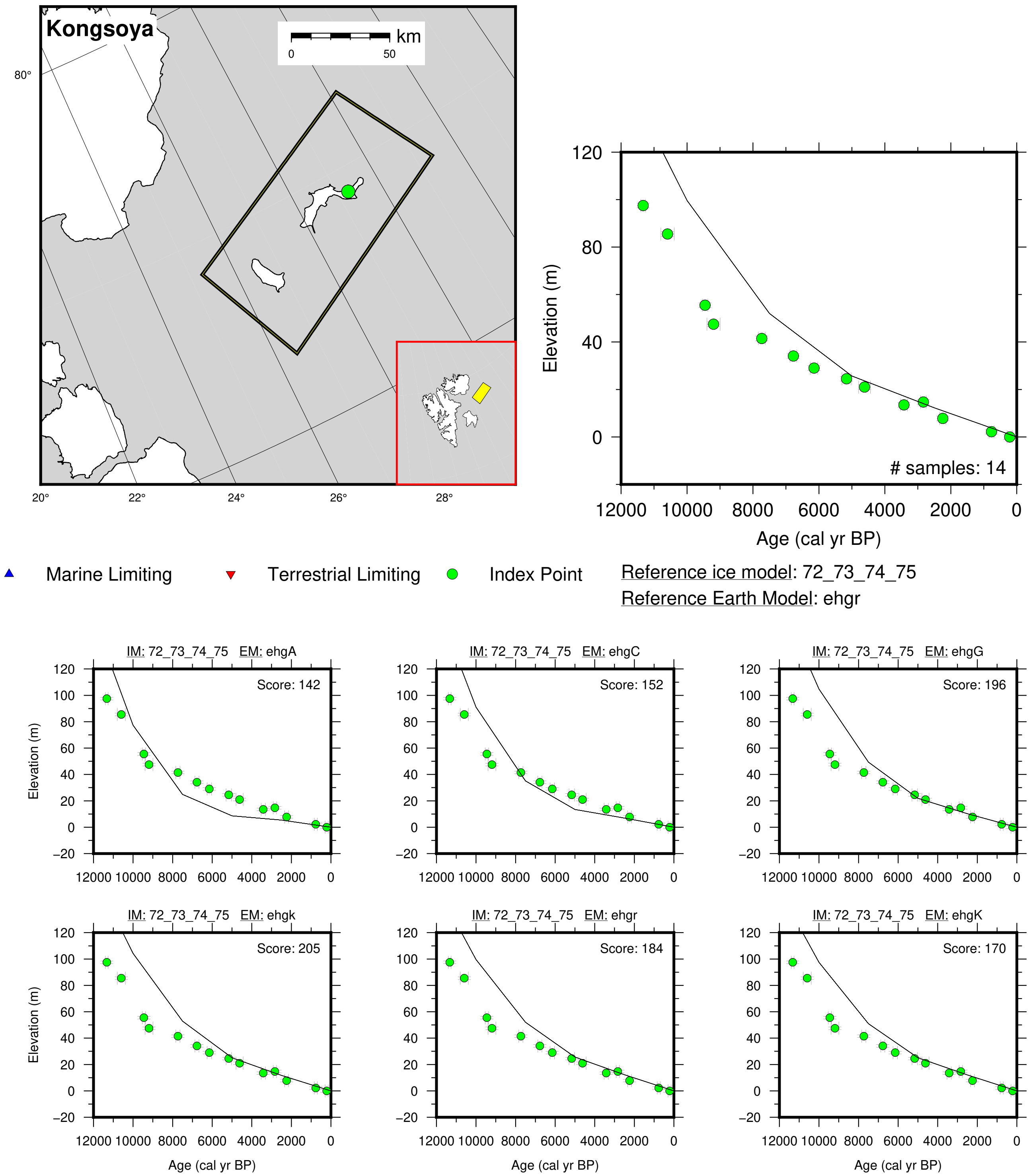


Figure 37: Paleo-sea level and comparison of six models for subregion Svalbard, location Kongsoya.

8.5 Western Siberia

References for the data used in each location.

Severnaya Zemlya: Bolshiyanov and Makeev (1995); Raab et al. (2003)

West Laptev Sea: Bauch et al. (1999); Bolshiyanov et al. (2013); Winterfeld et al. (2011)

Olenyok Gulf: Andreev et al. (2004); Bolshiyanov et al. (2013); Makarov (2009)

Lena Delta: Makarov (2009)

New Siberian Islands: Anisimov et al. (2009a); Bolshiyanov et al. (2013); Polyakova et al. (2005)

Zhokhov Island: Anisimov et al. (2009b)

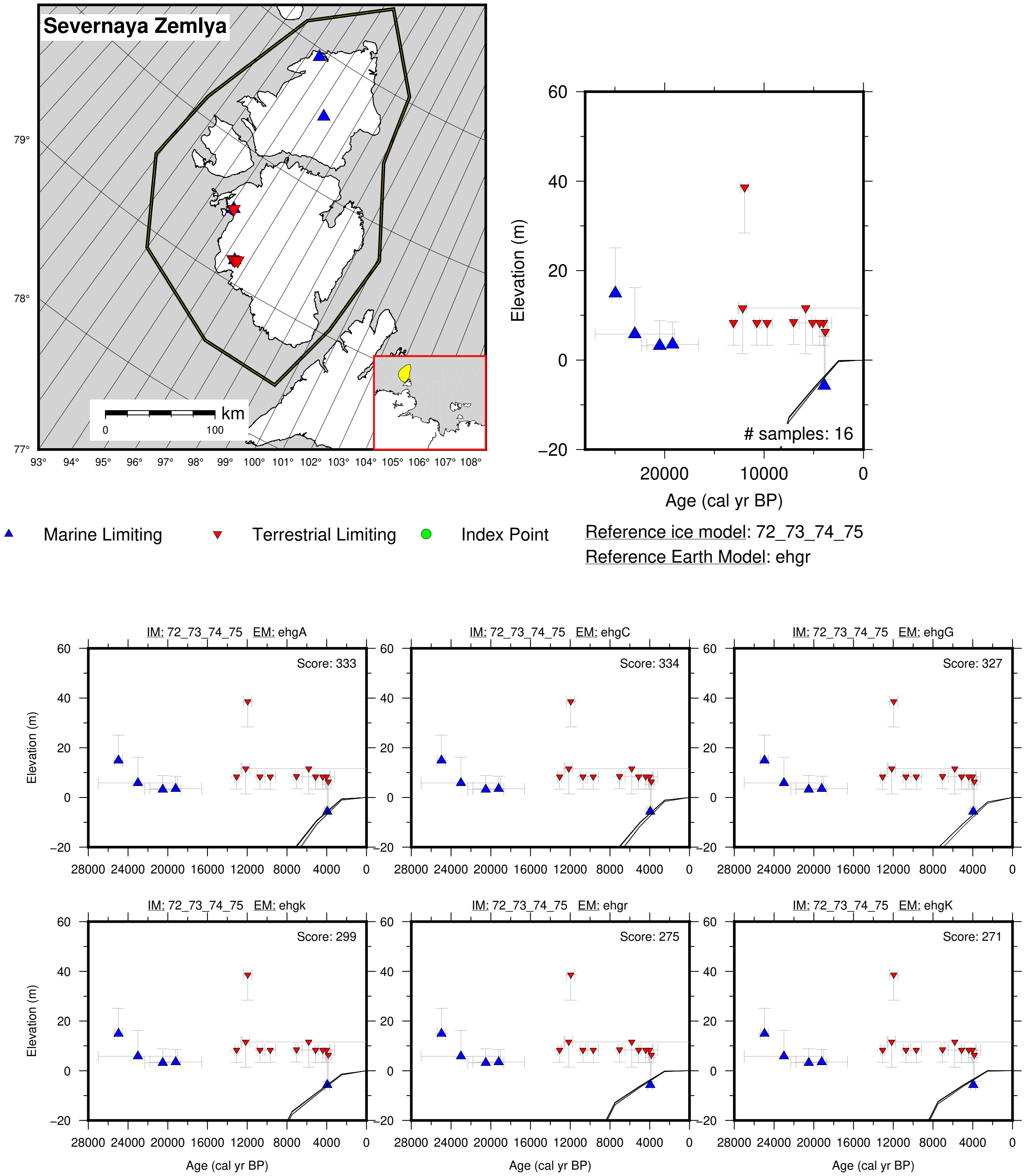


Figure 38: Paleo-sea level and comparison of six models for subregion Western Siberia, location Severnaya Zemlya.

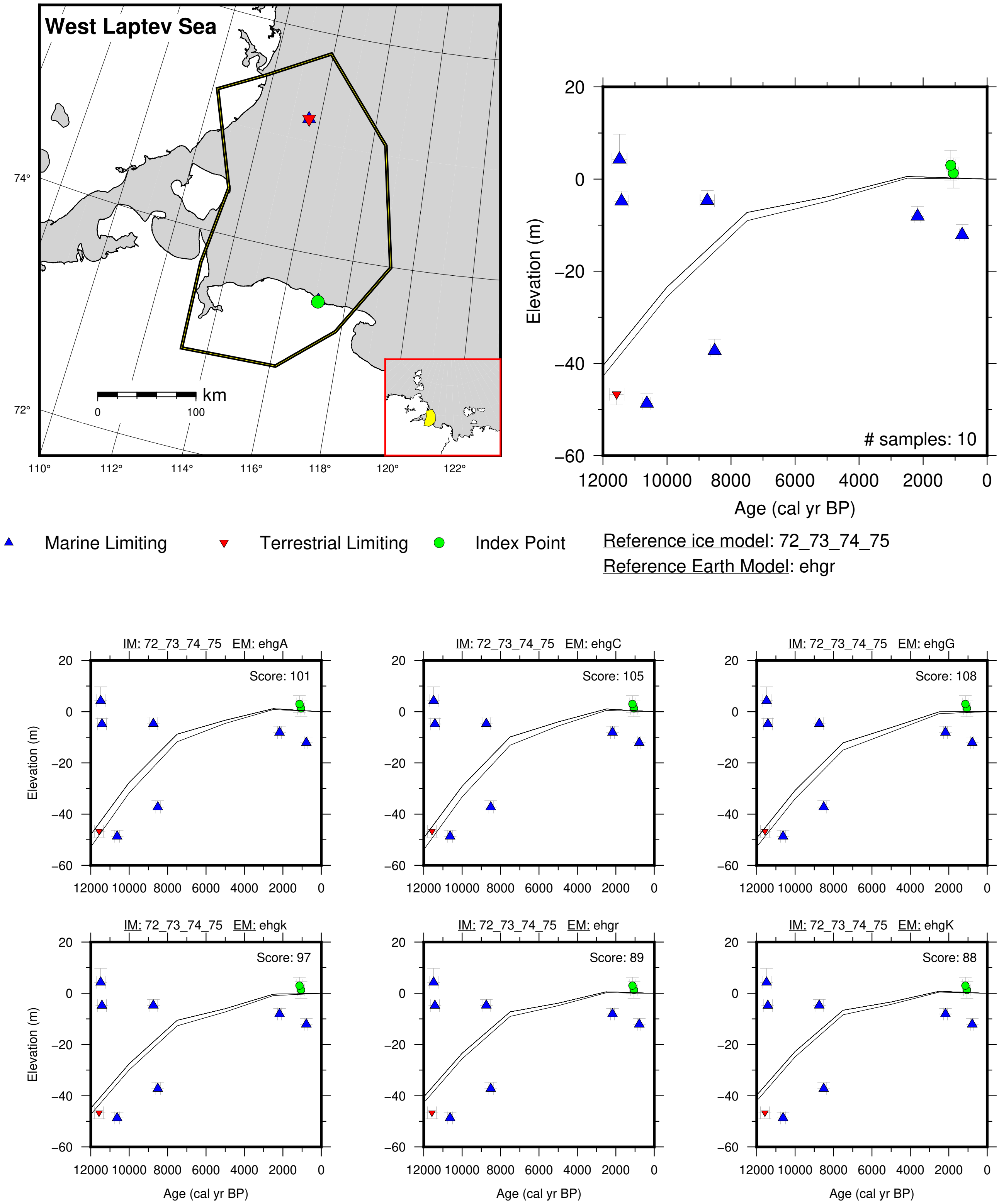


Figure 39: Paleo-sea level and comparison of six models for subregion Western Siberia, location West Laptev Sea.

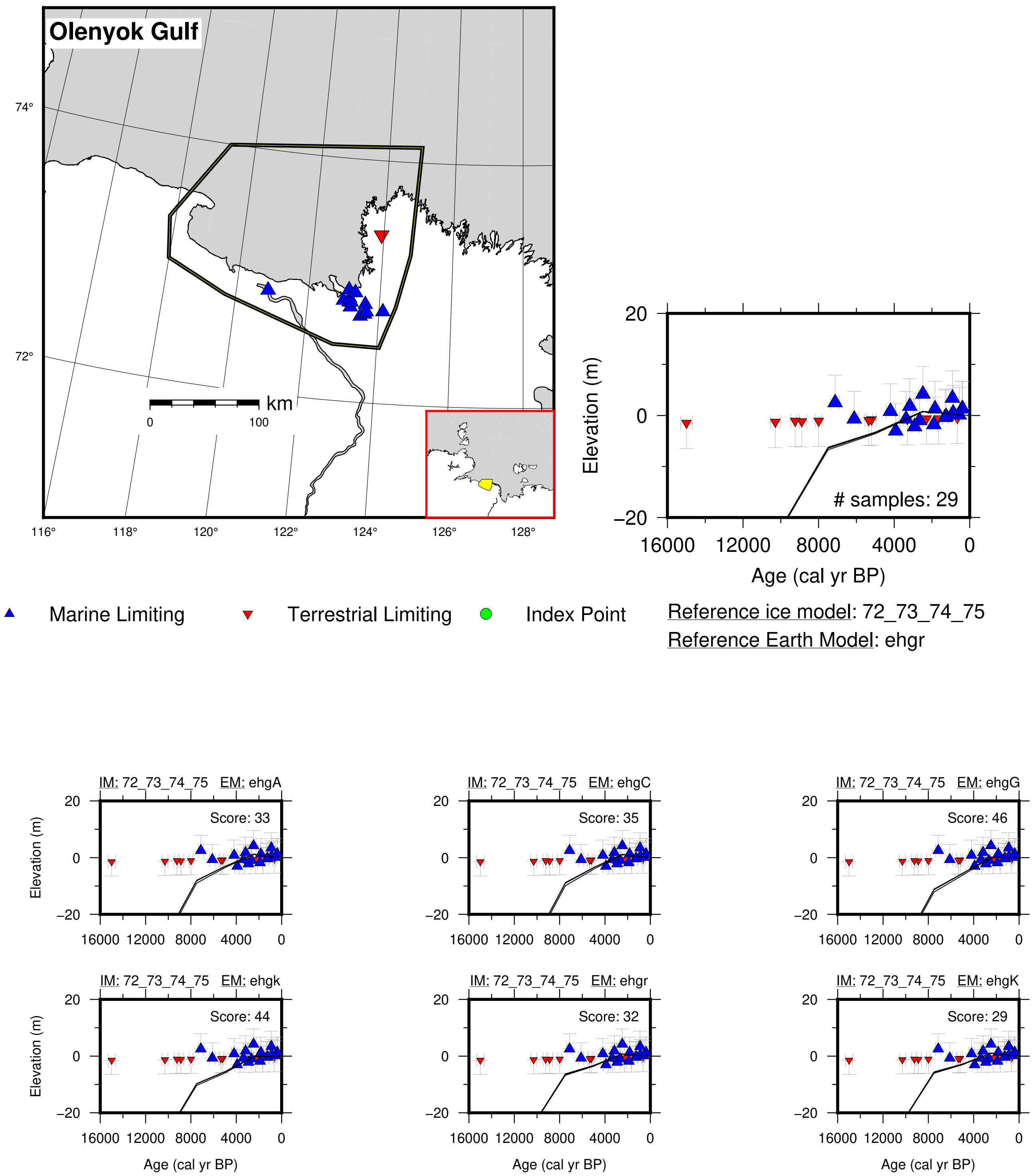


Figure 40: Paleo-sea level and comparison of six models for subregion Western Siberia, location Olenyok Gulf.

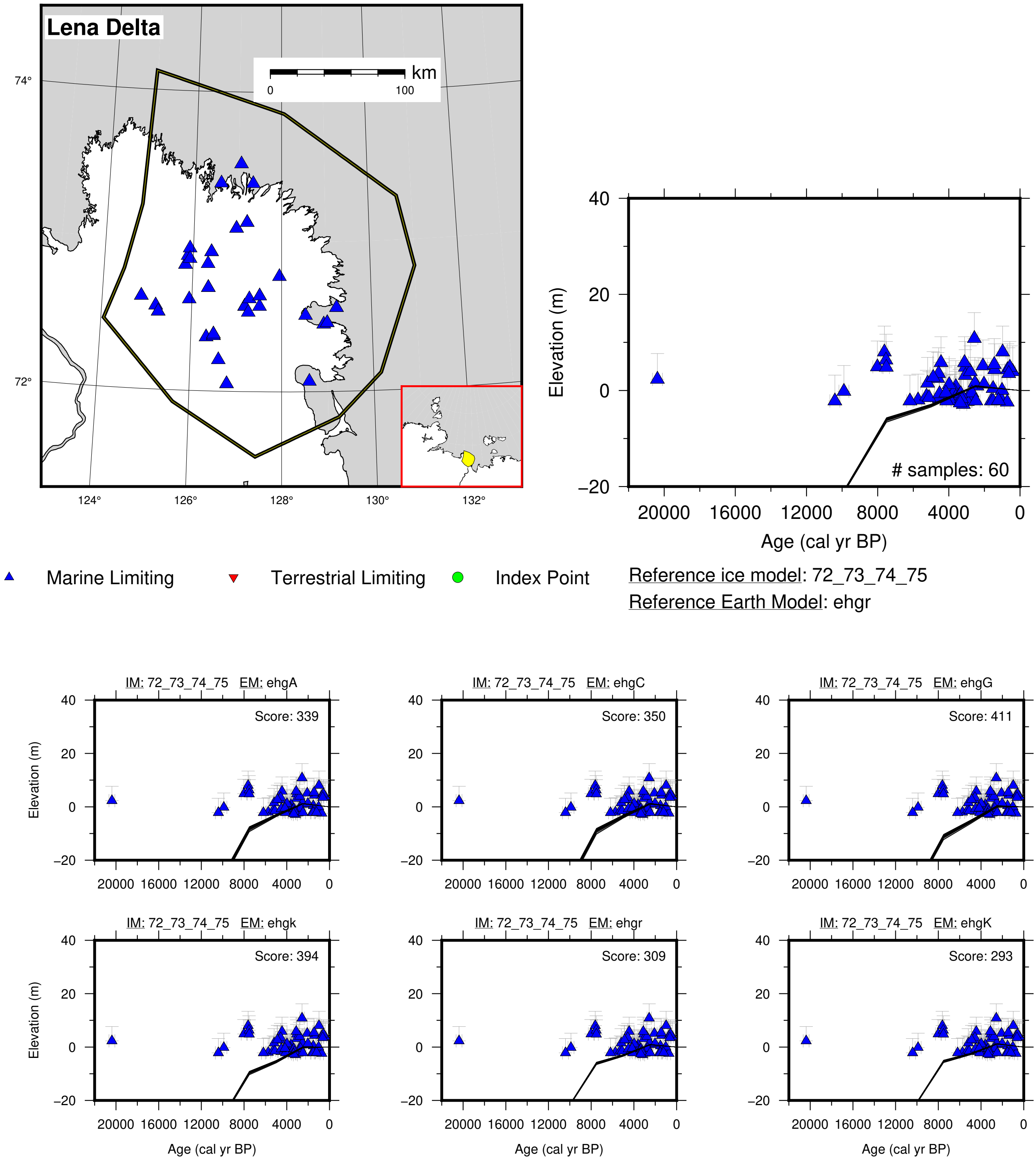


Figure 41: Paleo-sea level and comparison of six models for subregion Western Siberia, location Lena Delta.

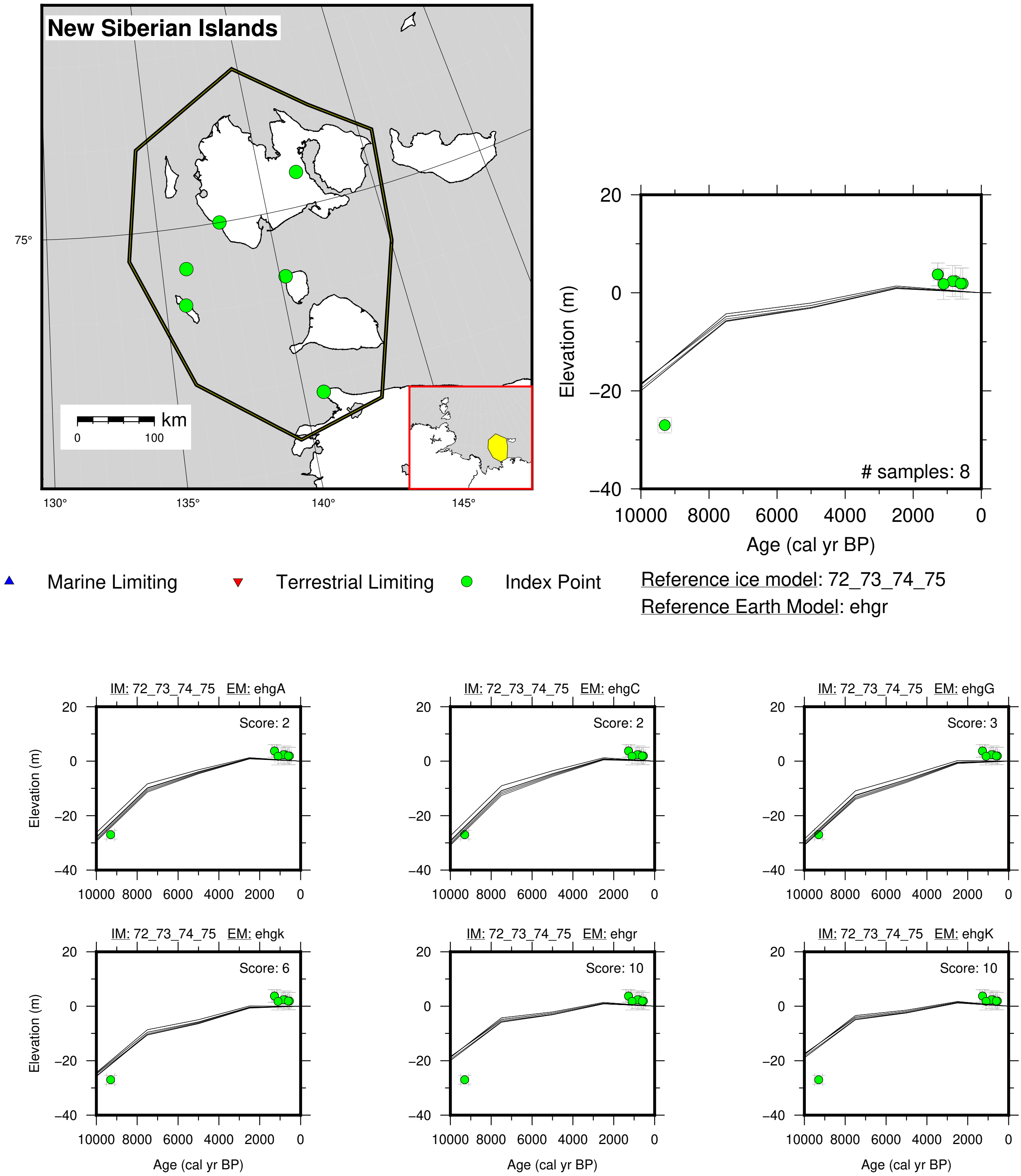


Figure 42: Paleo-sea level and comparison of six models for subregion Western Siberia, location New Siberian Islands.

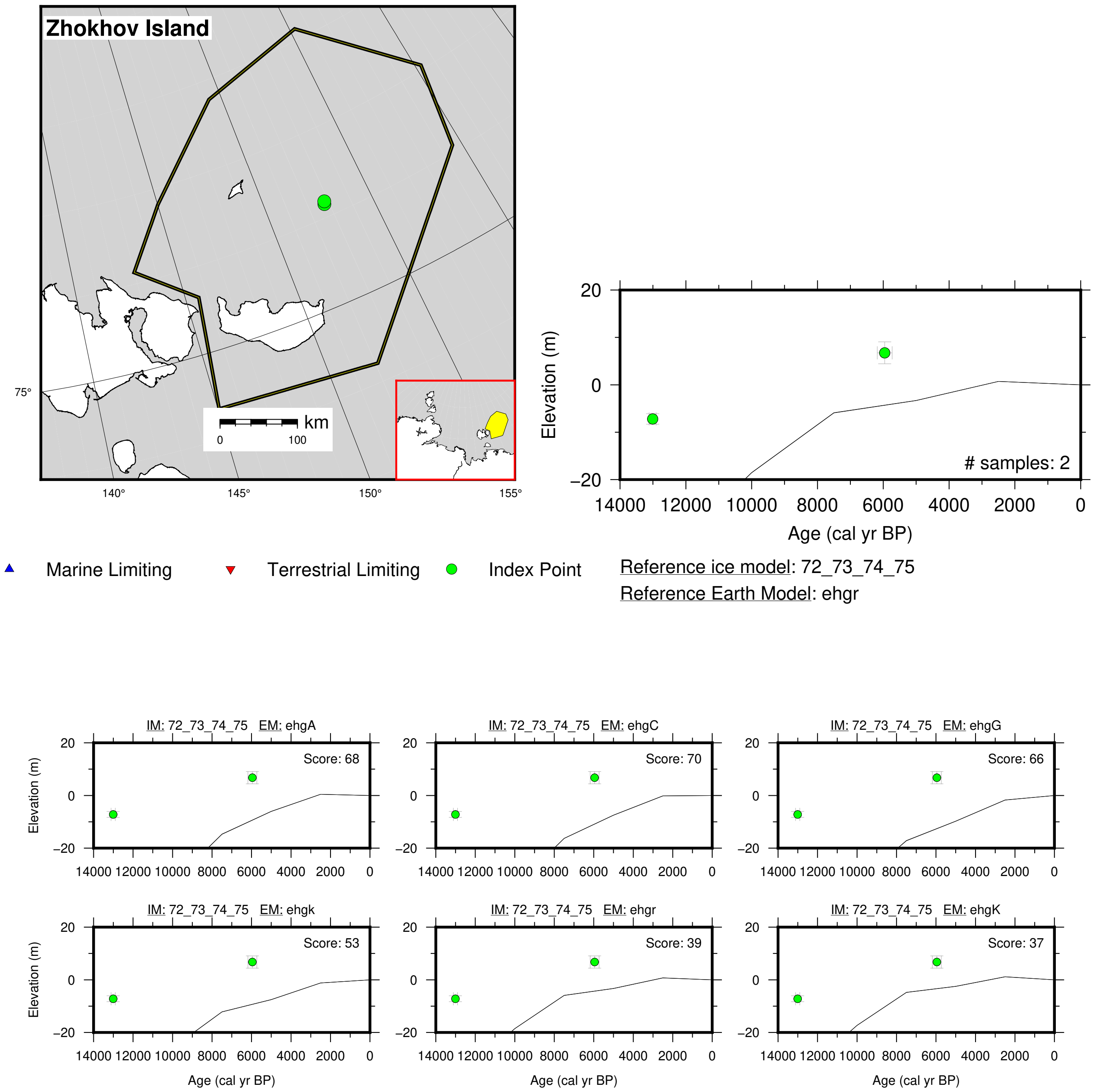


Figure 43: Paleo-sea level and comparison of six models for subregion Western Siberia, location Zhokhov Island.

8.6 White Sea

References for the data used in each location.

Kandalaksha: Arslanov et al. (1974); Kolka and Korsakova (2010); Koshechkin (1979)

Lesozavodskiy: Arslanov et al. (1974); Kolka et al. (2005); Koshechkin et al. (1973)

Rugozerskiy Peninsula: Baranskaya (2015); Repkina and Romanenko (2016); Romanenko and Shilova (2012); Zaretskaya et al. (2013)

Chupa Bay: Baranskaya and Romanenko (2015); Kolka et al. (2015)

Umba: Arslanov et al. (1974); Kolka et al. (2013a); Koshechkin (1979)

Engozero: Kolka et al. (2013b)

Belomorsk: Devyatova and Liyva (1971); Koshechkin (1979); Lunkka et al. (2012)

Eastern Kola Peninsula: Arslanov et al. (1974); Koshechkin (1979)

Onega Peninsula: Boyarskaya et al. (1986); Koshechkin et al. (1973); Repkina et al. (in review)

Dvina Gulf: Koshechkin (1979); Zaretskaya et al. (2011)

Kholmogorsky: Larsen et al. (2006)

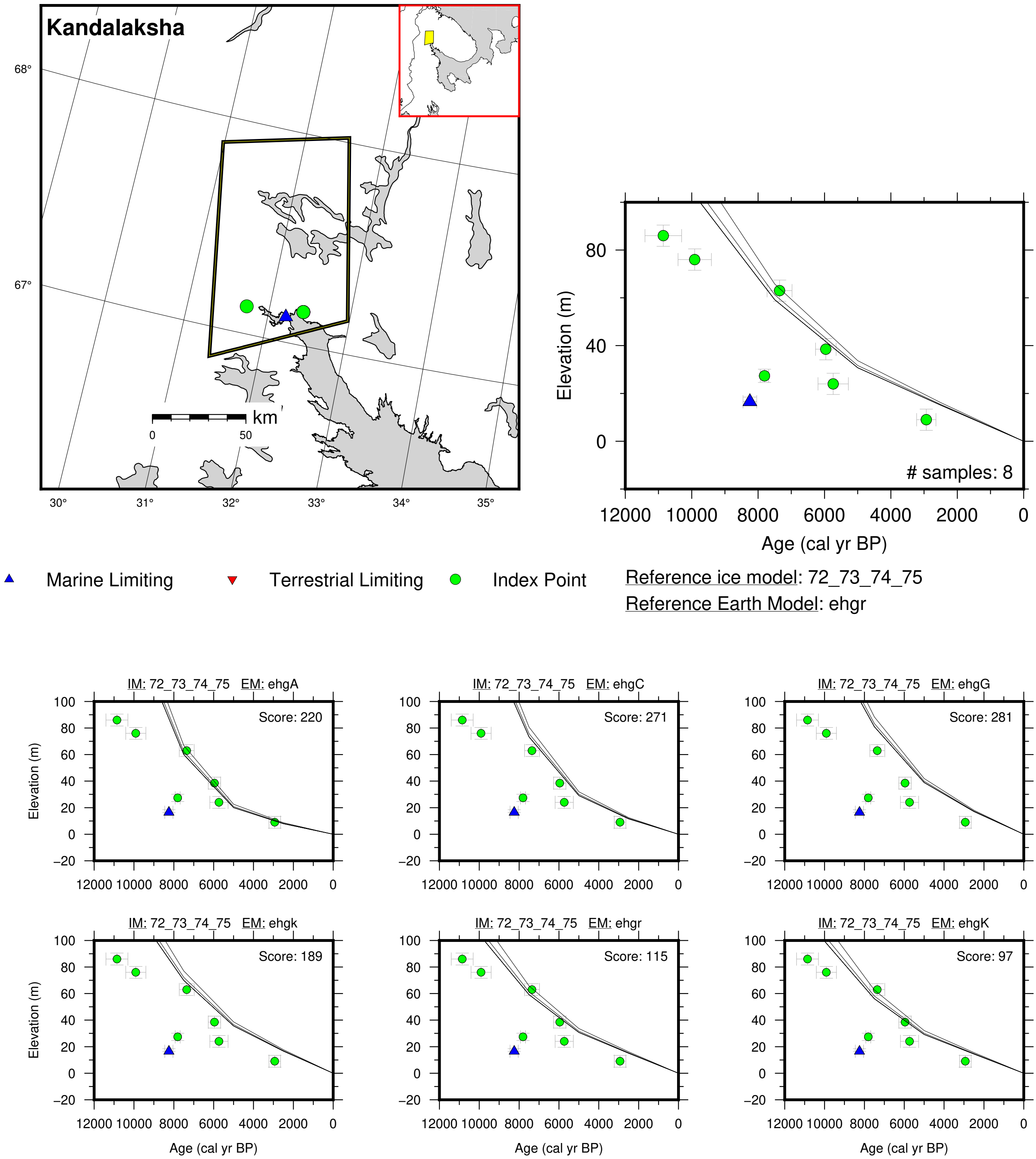


Figure 44: Paleo-sea level and comparison of six models for subregion White Sea, location Kandalaksha.

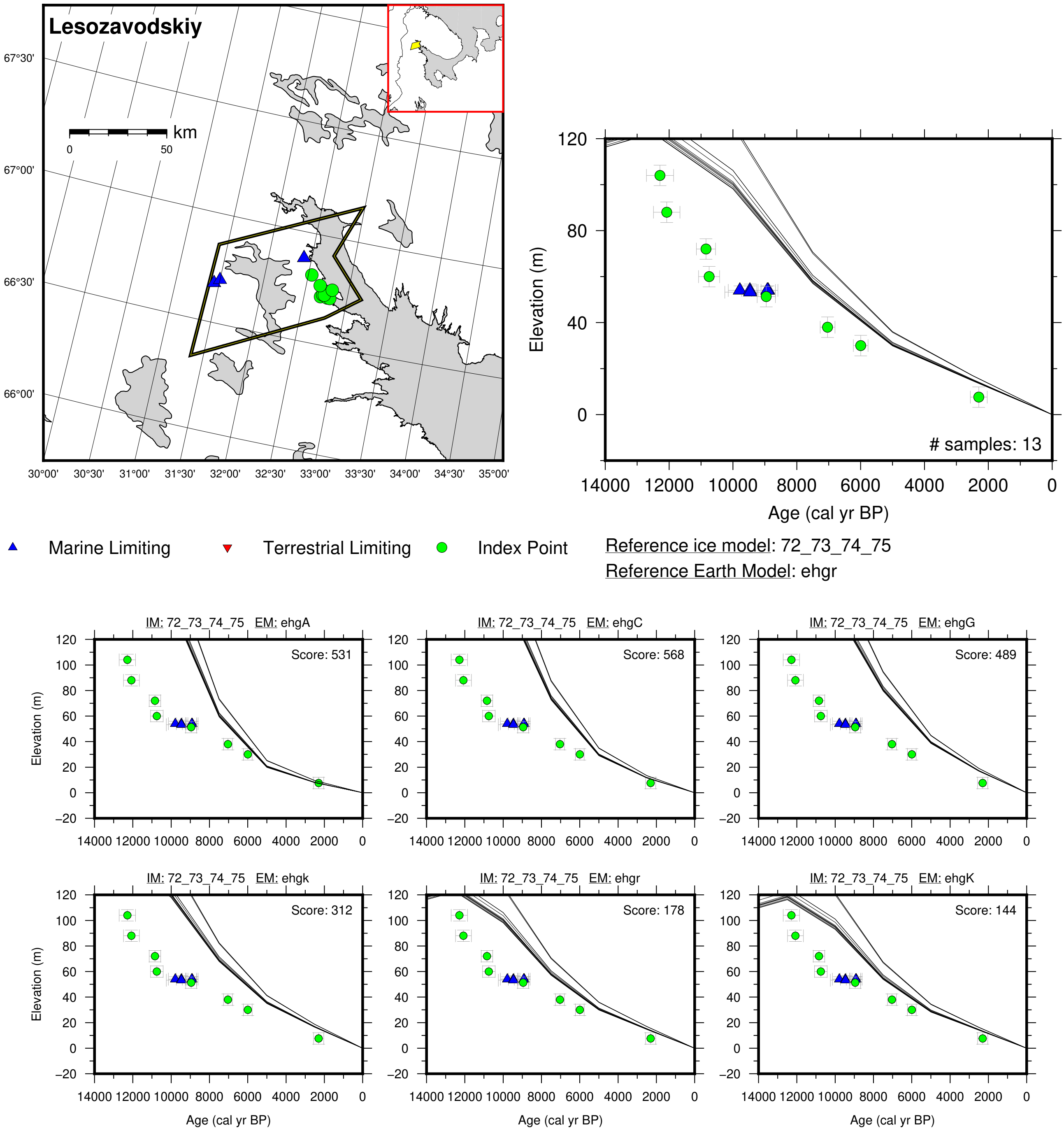


Figure 45: Paleo-sea level and comparison of six models for subregion White Sea, location Lesozavodskiy.

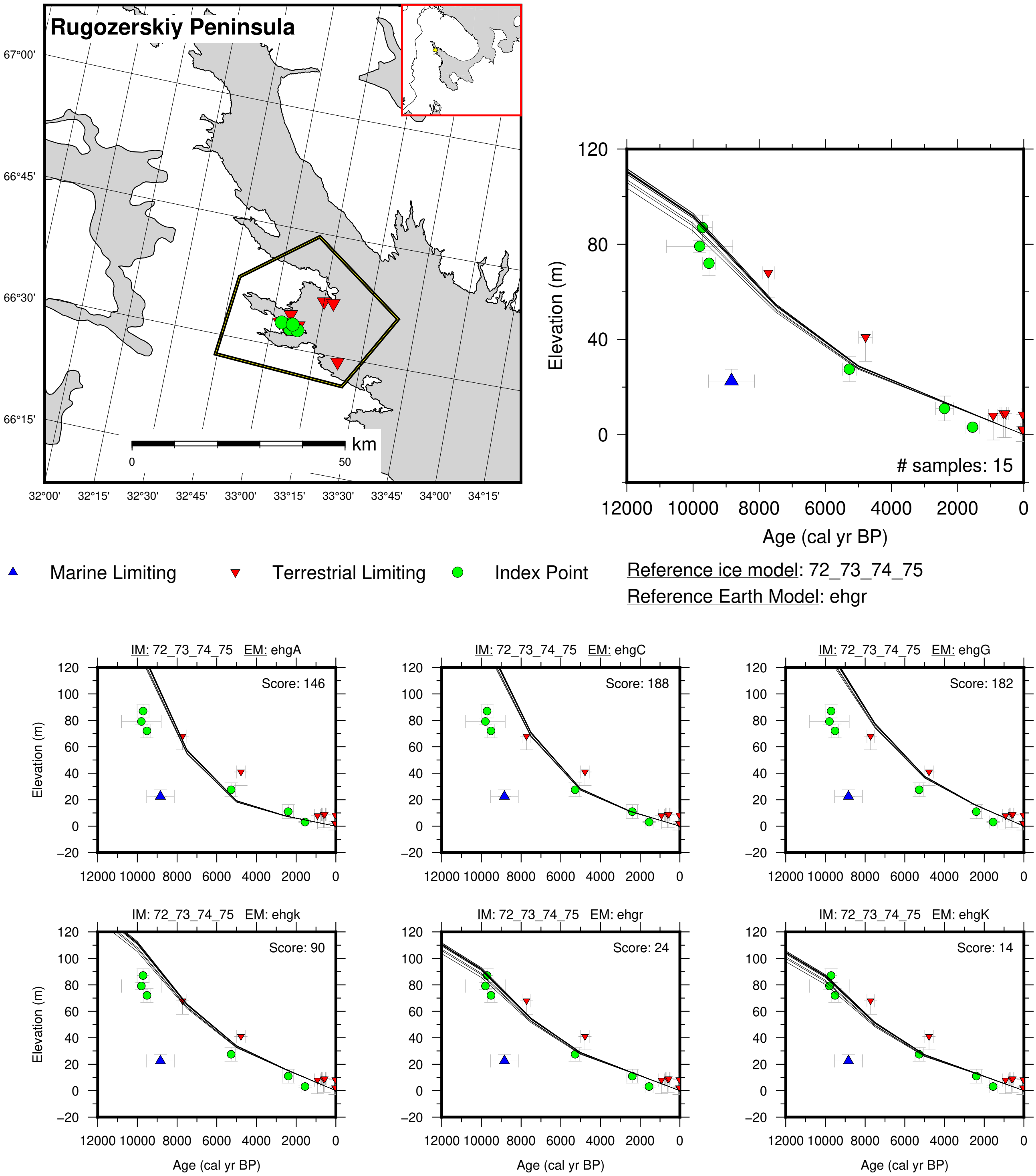


Figure 46: Paleo-sea level and comparison of six models for subregion White Sea, location Rugozerskiy Peninsula.

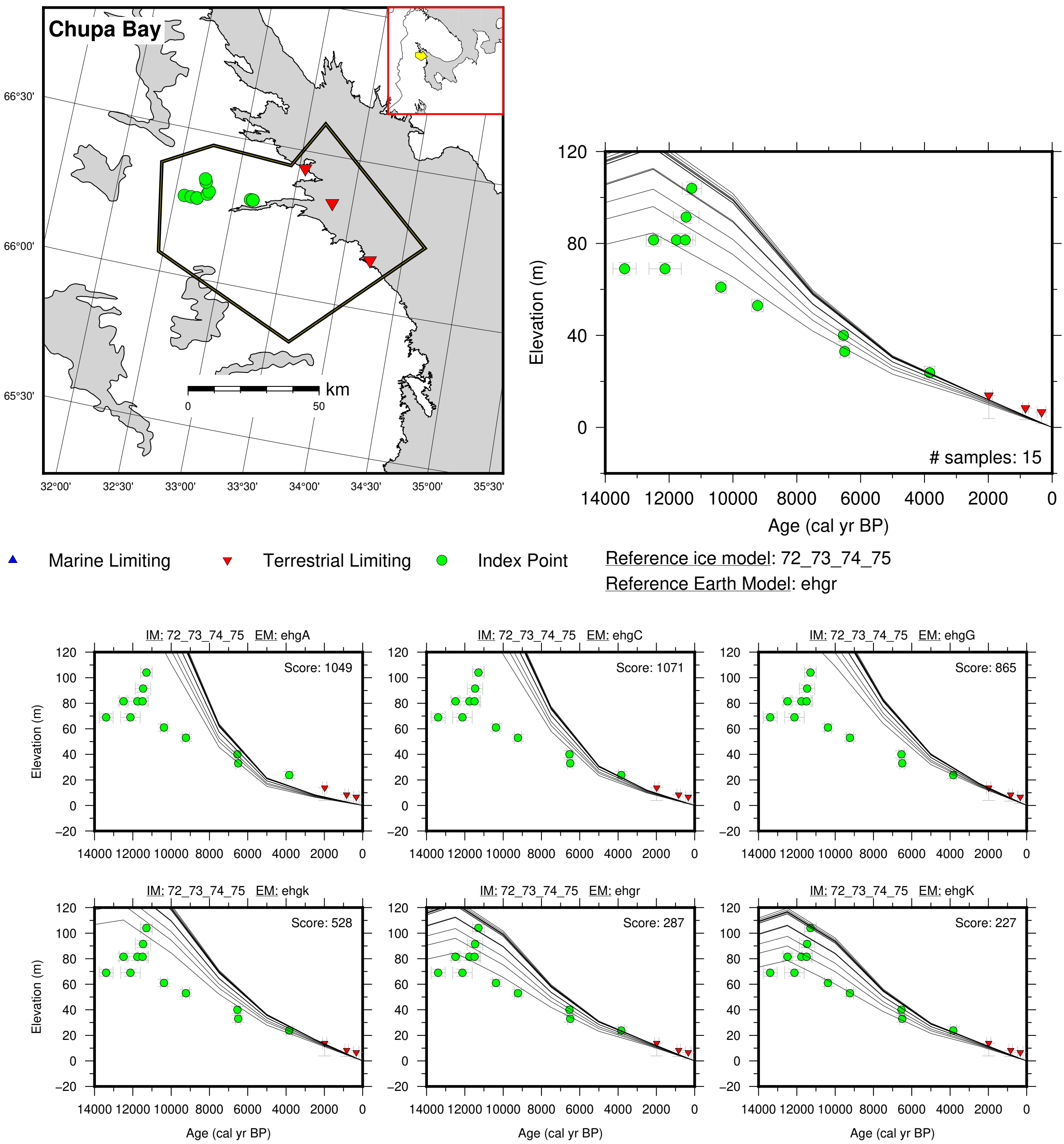


Figure 47: Paleo-sea level and comparison of six models for subregion White Sea, location Chupa Bay.

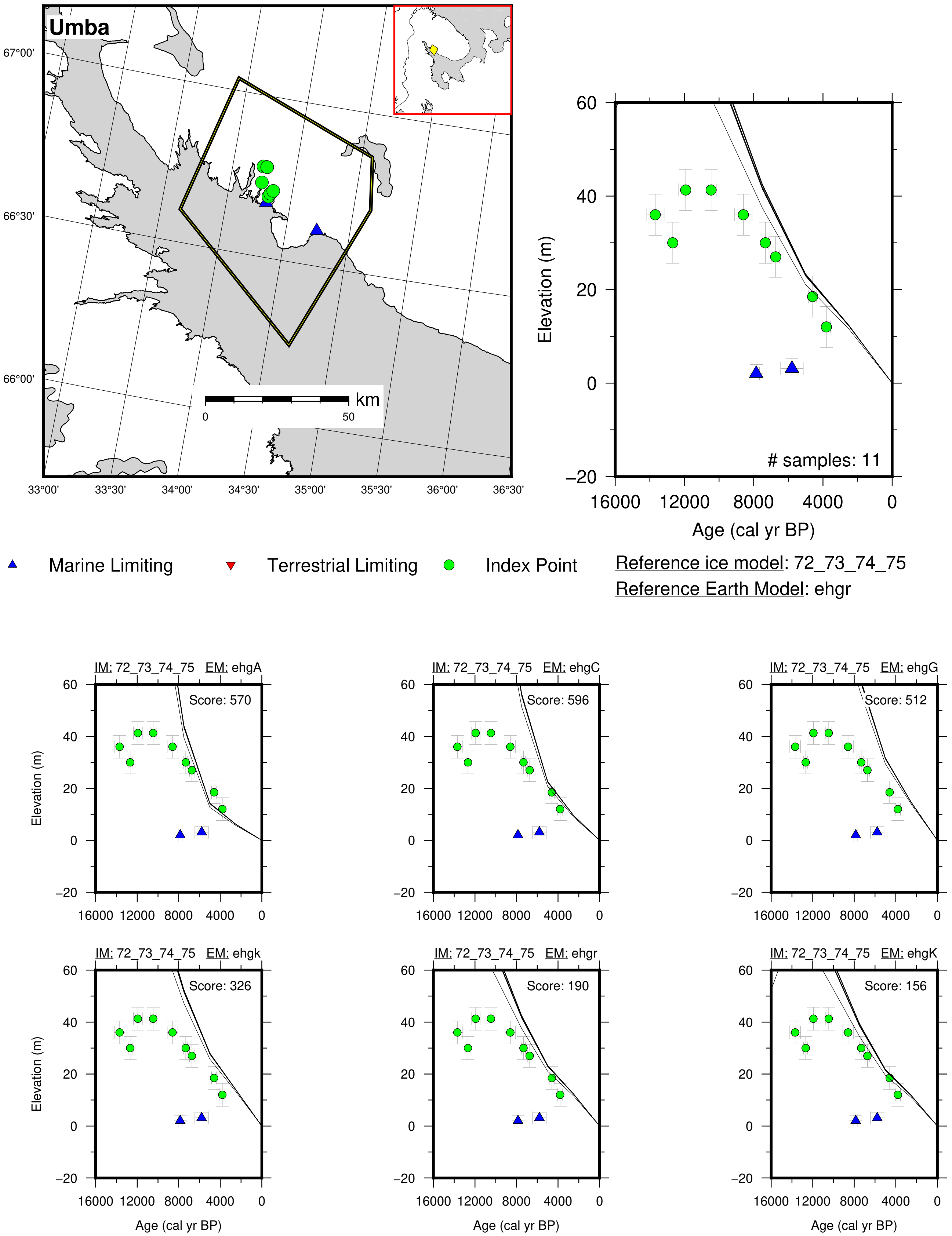


Figure 48: Paleo-sea level and comparison of six models for subregion White Sea, location Umba.

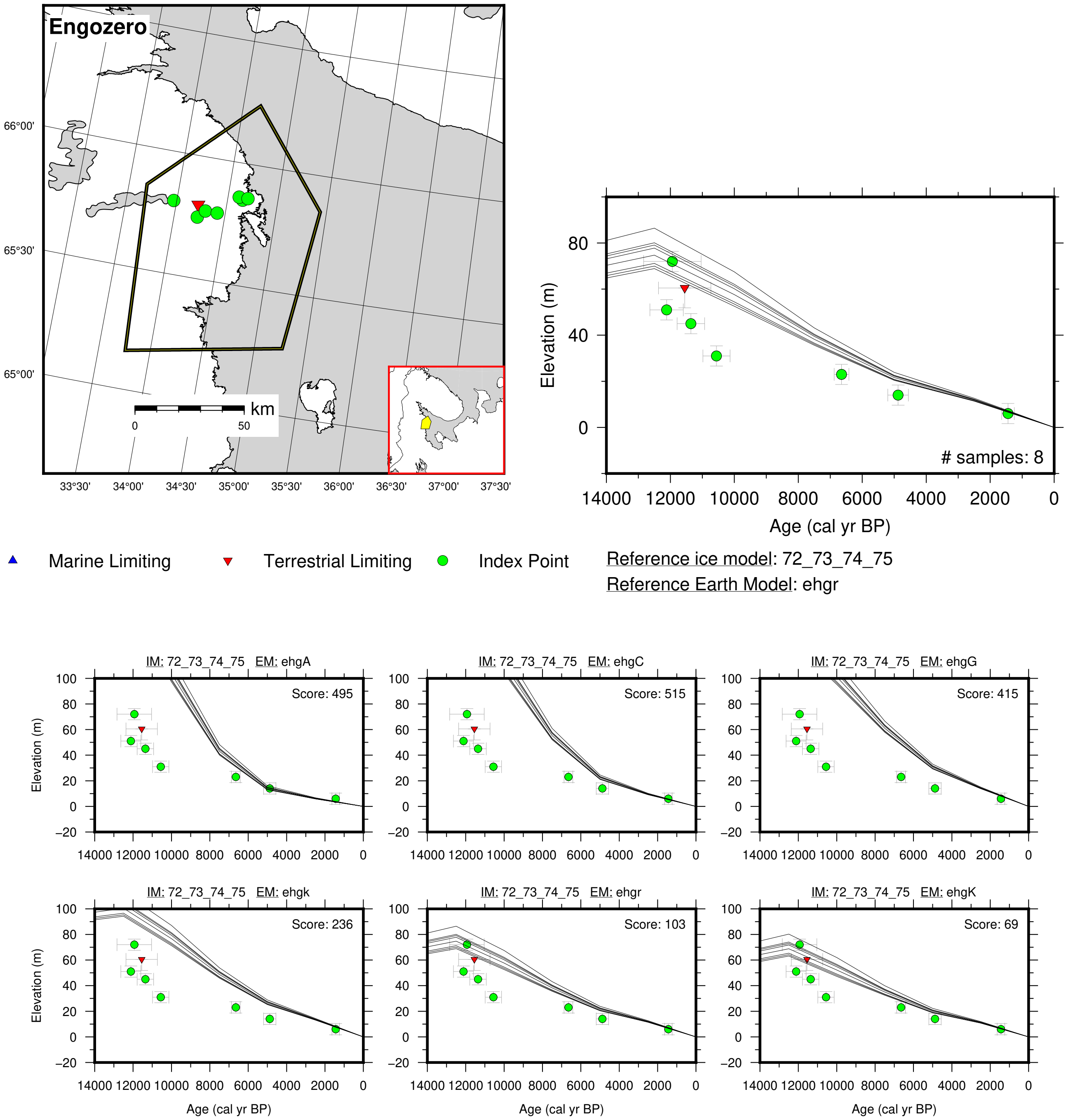


Figure 49: Paleo-sea level and comparison of six models for subregion White Sea, location Engozero.

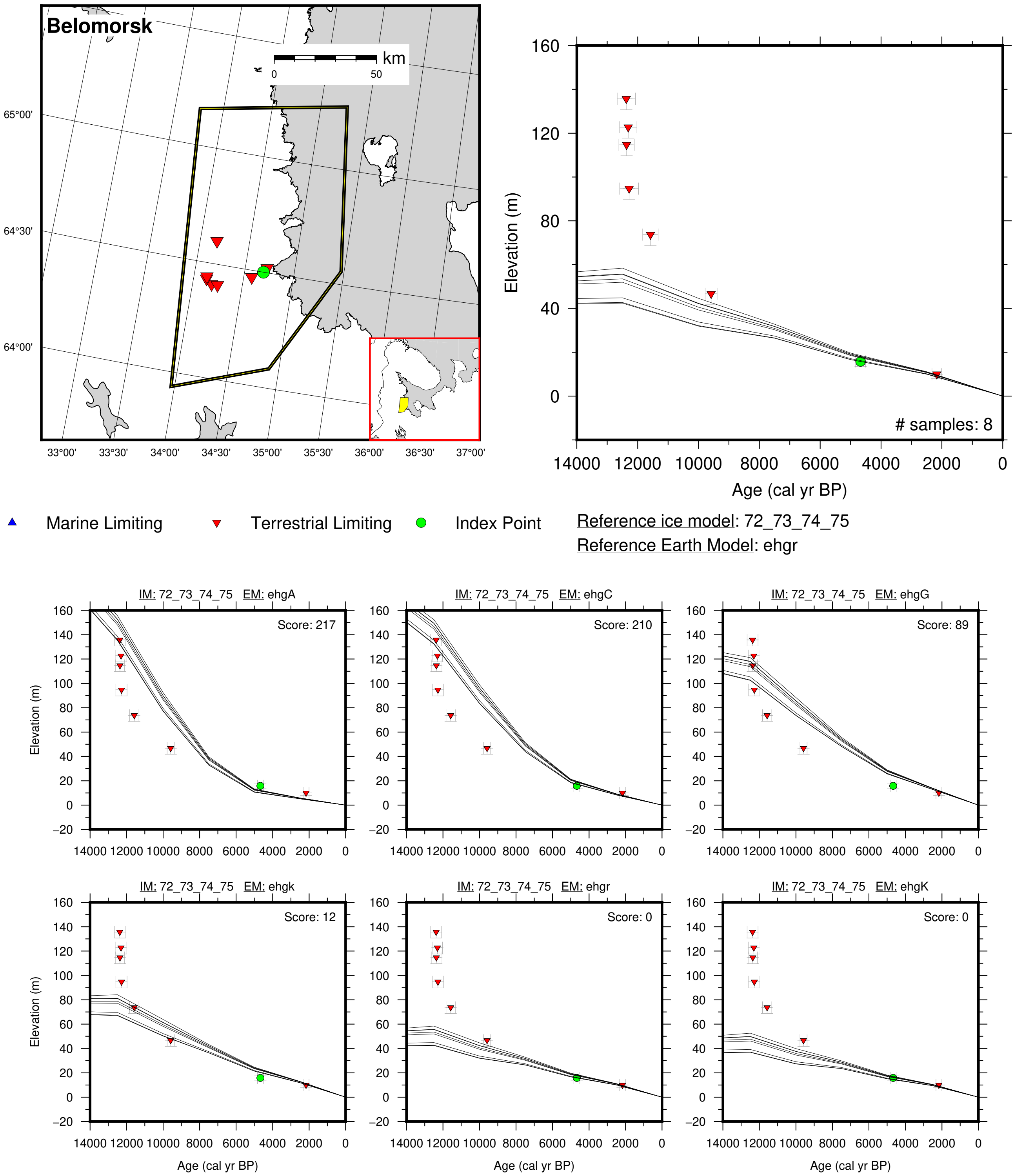


Figure 50: Paleo-sea level and comparison of six models for subregion White Sea, location Belomorsk.

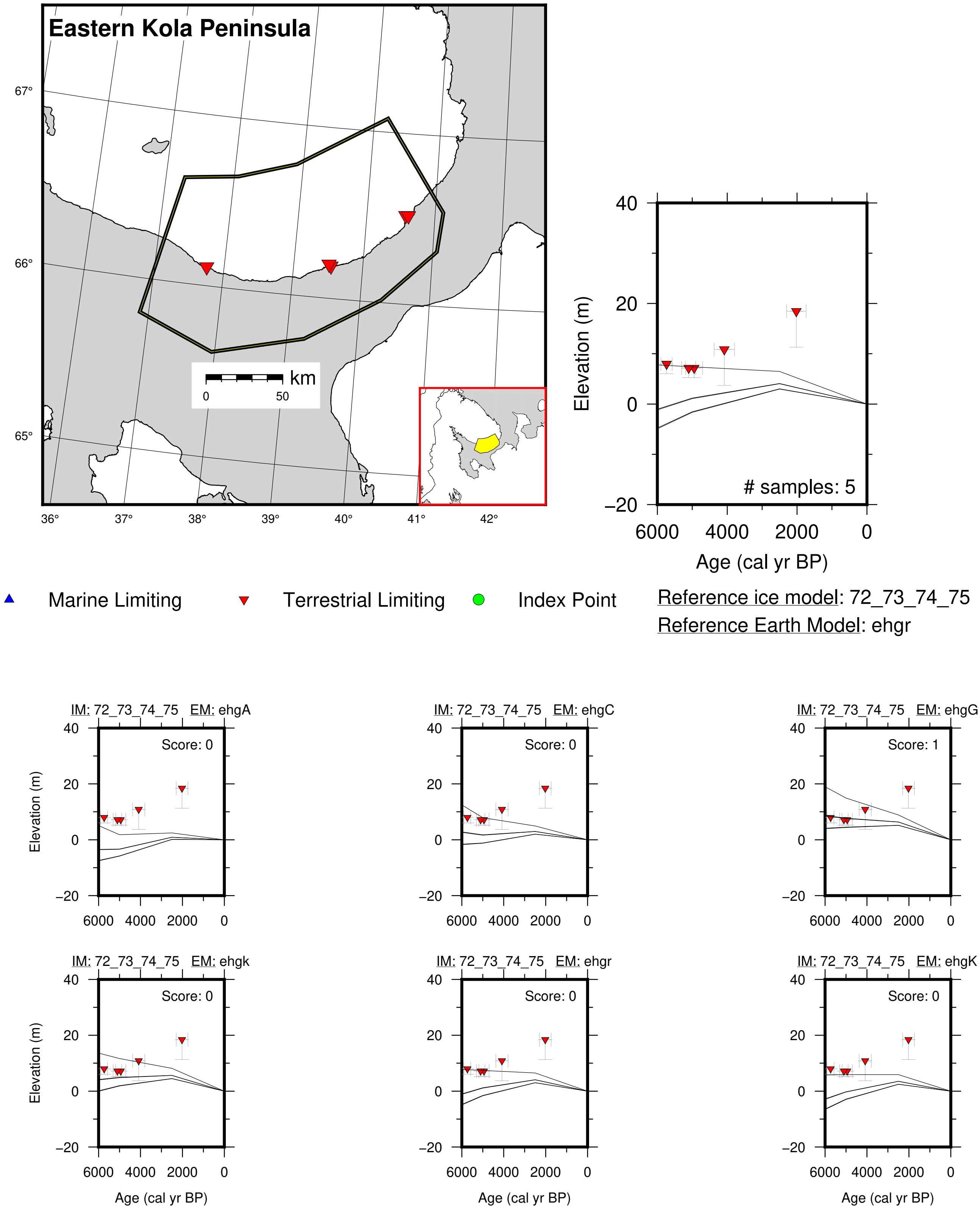


Figure 51: Paleo-sea level and comparison of six models for subregion White Sea, location Eastern Kola Peninsula.

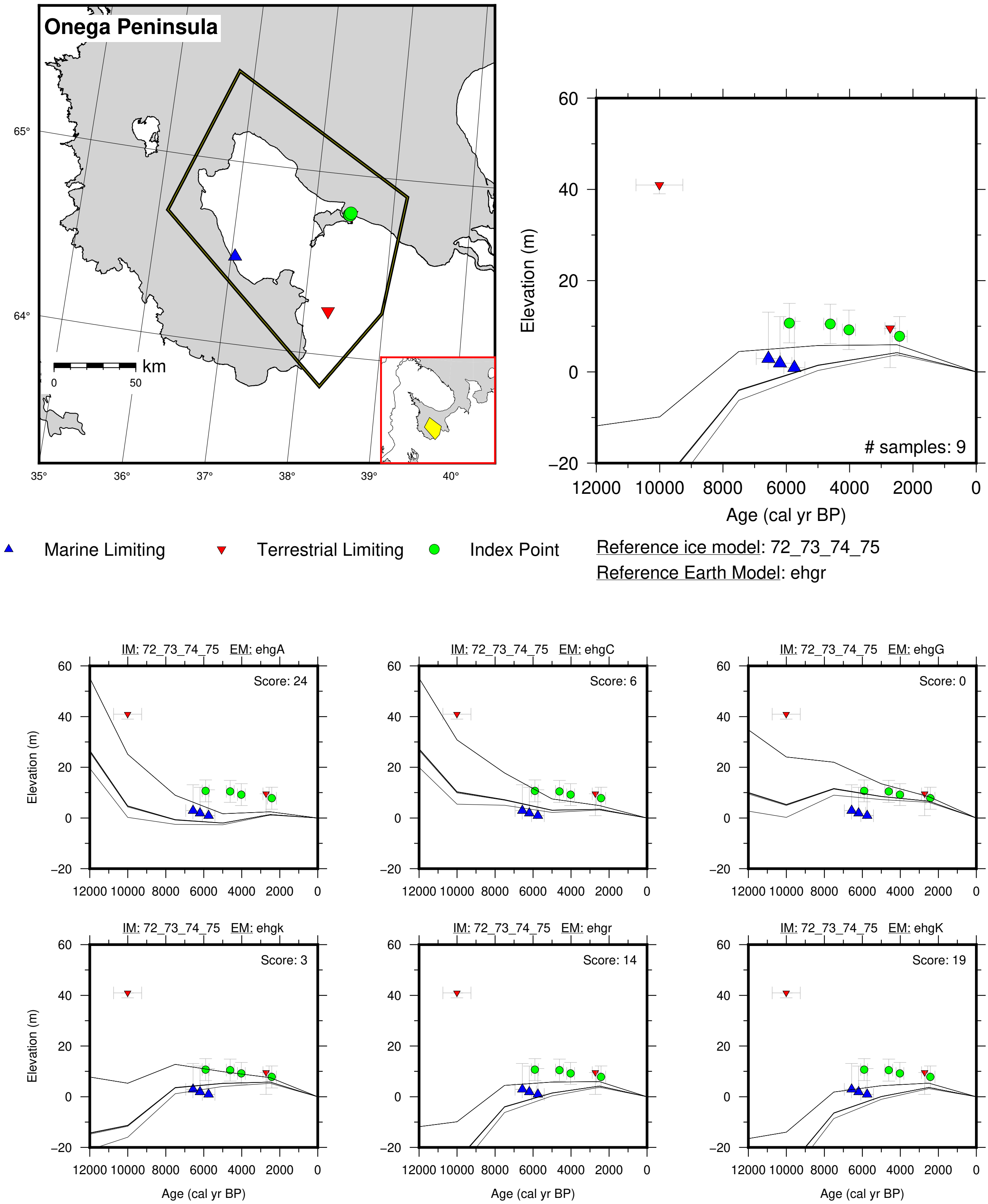


Figure 52: Paleo-sea level and comparison of six models for subregion White Sea, location Onega Peninsula.

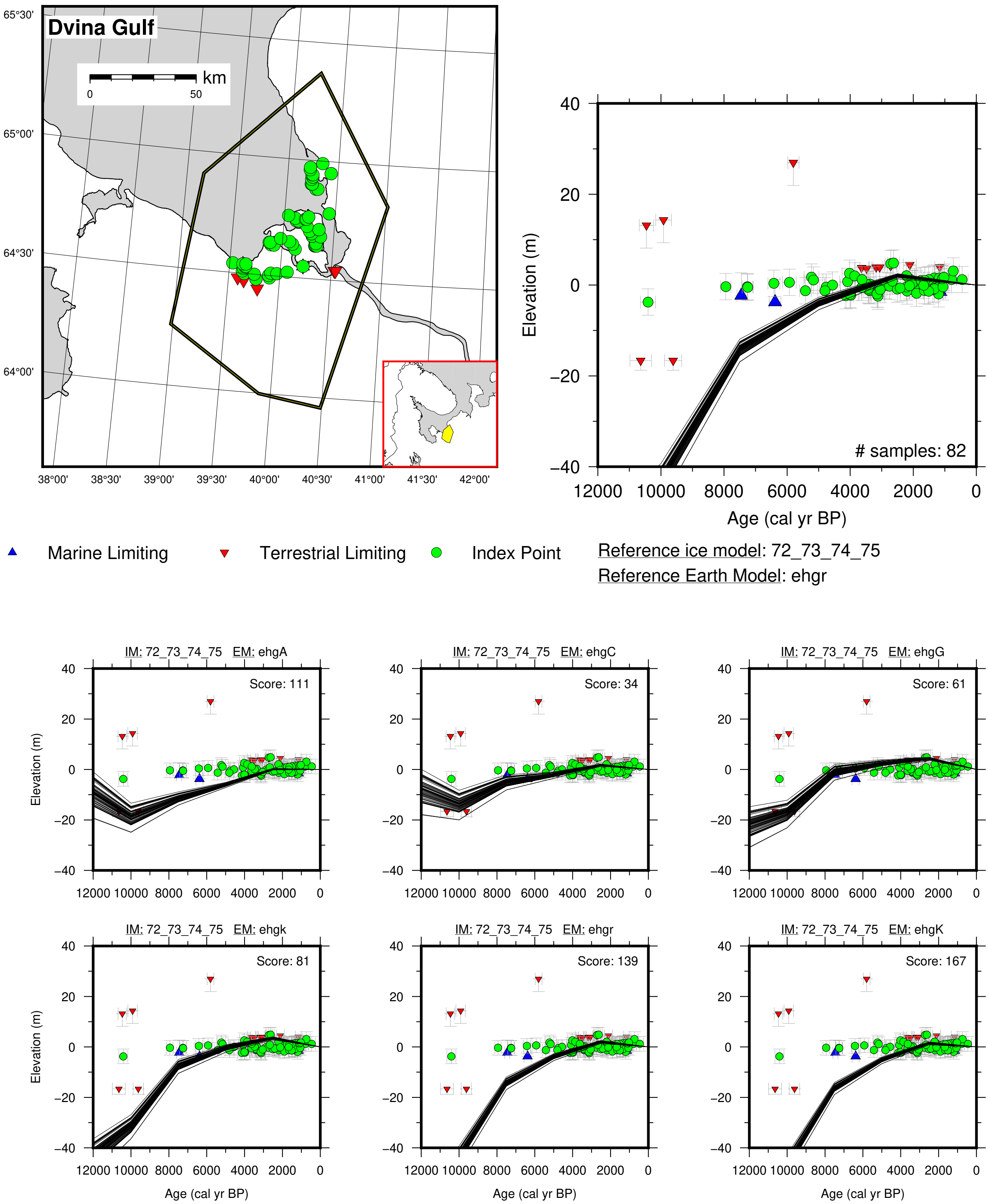


Figure 53: Paleo-sea level and comparison of six models for subregion White Sea, location Dvina Gulf.

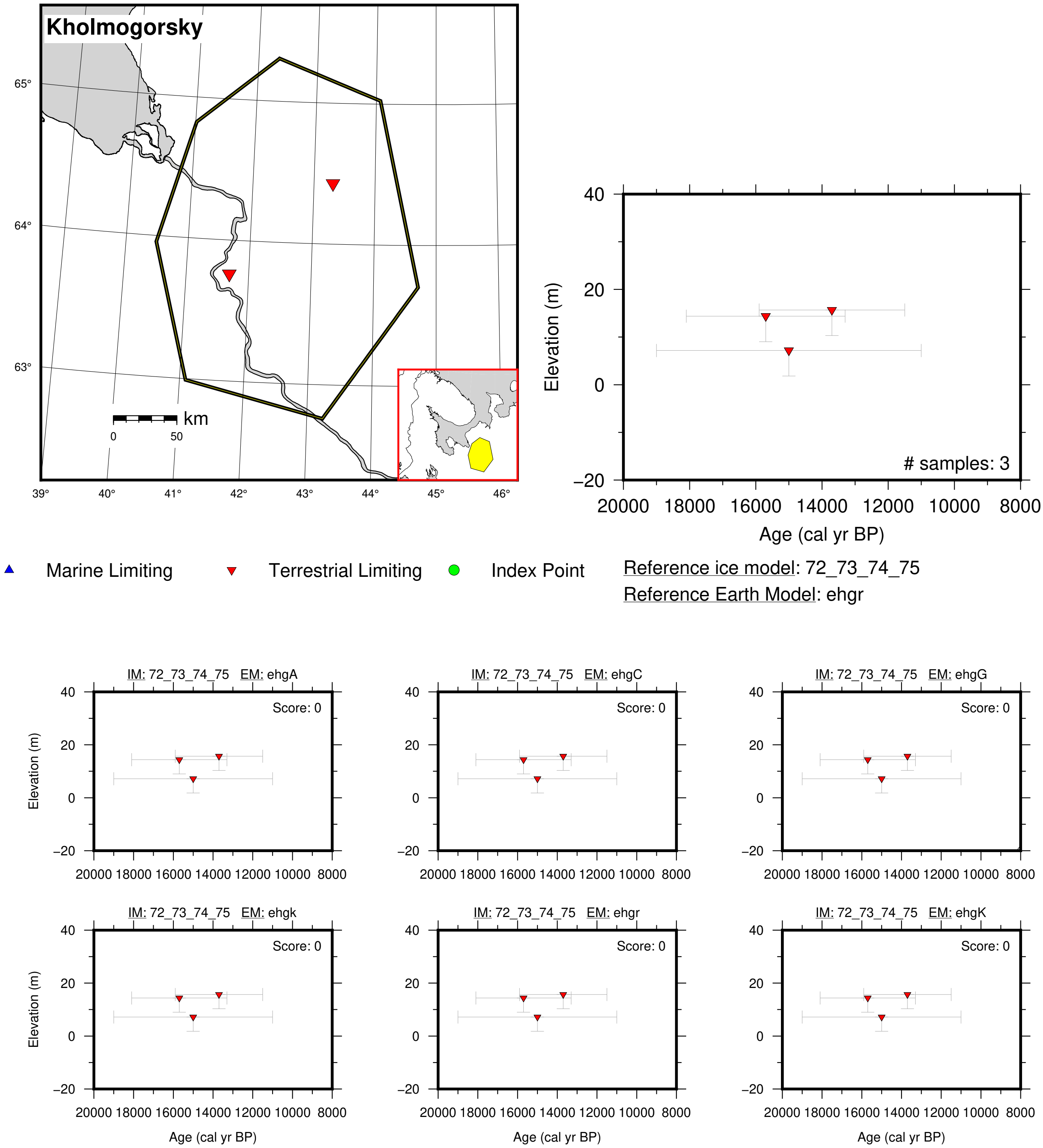


Figure 54: Paleo-sea level and comparison of six models for subregion White Sea, location Kholmogorsky.

9 Europe

9.1 Baltic Sea

References for the data used in each location.

Achterwasser: Hoffmann et al. (2009); Lampe and Janke (2004)

Baltic Southwest: Bennike and Jensen (1998); Nielsen et al. (2004)

Rugen: Hoffmann et al. (2009); Lampe et al. (2010); Naumann and Lampe (2011)

Salt Meadows: Lampe and Janke (2004); Lampe et al. (2010); Naumann and Lampe (2011)

Arkona Basin East: Bennike and Jensen (1998)

Arkona Basin West: Bennike and Jensen (1998); Jensen et al. (1997)

Fakse Bugt: Jensen and Stecher (1992)

Lubeck: Bennike and Jensen (1998); Harders et al. (2005); Heinrich et al. (2018); Jensen et al. (1997); Lampe et al. (2010); Winn et al. (1986)

Kieler Bucht: Bennike and Jensen (1998); Ernst (1974); Feldens and Schwarzer (2012); Winn et al. (1986)

Storebaelt: Bennike et al. (2004); Christensen et al. (1997); Hede (2003); Krog (1979); Petersen (1978); Winn et al. (1986)

Lillebaelt: Andersen (2013); Bennike and Jensen (2011); Krog (1979); Petersen and Rasmussen (1995); Skaarup and Grøn (2004); Tauber (1966)

Samso Belt: Fischer (2005); Hede et al. (2015); Jensen and Bennike (2009); Petersen (1993); Petersen and Rasmussen (1995); Rahbek and Rasmussen (1994); Rasmussen (1995); Sander et al. (2015)

Kattegat: Bendixen et al. (2017); Bennike et al. (2000); Christiansen et al. (1993); Jensen et al. (2002)

Treoa Moellebugt: Petersen and Rasmussen (1995)

Vendsyssel Thy: Aaris-Sørensen and Petersen (1984); Christensen and Nielsen (2008); Knudsen (1978); Krog and Tauber (1974); Petersen (1991); Petersen and Rasmussen (1995); Richardt (1996)

Laesoe: Hansen (1977); Petersen and Rasmussen (1995)

Bohuslan: Persson (1973)

Goteborg: Mörner (1969)

Halmstad: Mörner (1969)

Asa: Mörner (1969)

Sund: Bennike et al. (2012, 2017); Christensen (1982, 2014); Fischer (1993); Rasmussen (1992)

Havang: Berglund (1971); Hansson (2018); Hansson et al. (2018a,b)

Blekinge: Berglund (1964, 1971); Hansson (2018); Hansson et al. (2019); Liljegren (1970); Nylander (1969); Yu et al. (2003, 2005, 2007)

Ustka: Miotk-Szpiganowicz et al. (2009)

West Gulf Of Gdansk: Uścinowicz et al. (2011); Uścinowicz et al. (2013)

South Vistula: Miotk-Szpiganowicz (2016); Miotk-Szpiganowicz and Uścinowicz (2013)

Curonian Spit: Sergeev et al. (2015)

Lithuania: Bitinas et al. (2000, 2001, 2002, 2003, 2017); Damušytė (2011); Gelumbauskaitė (2009); Girininkas and Žulkus (2017); Trimonis et al. (2007); Žulkus and Girininkas (2012)

Ventspils: Bērziņš et al. (2016); Murniece et al. (1999); Veinbergs (1996)

West Gulf Of Riga: Eberhards (2006); Grudzinska (2011); Pujāte (2015); Punning et al. (1973); Veinbergs (1996)

Riga: Eberhards (2008); Grudzinska (2015); Grudzinska et al. (2017)

Parnu: H. (1975); Habicht et al. (2017); Haila and Raukas (1992); Hyvärinen et al. (1992); Ilves et al. (1974); Jaanits and Jaanits (1978); Kessel and Punning (1969a,b, 1974); Kriiska (2001); Kriiska and Lõugas (2009); Kriiska et al. (2002); Nirgi et al. (2020); Orru et al. (1992); Poska and Veski (1999); Punning et al. (1971, 1977); Raukas et al. (1995, 1999); Rosentau et al. (2011); Saarse et al. (2003); Veski (1998); Veski et al. (2005)

South Saaremaa: Reintam et al. (2008); Saarse et al. (2009)

Hiiumaa: Königsson et al. (1998); Kriiska (2002); Kriiska and Lõugas (1999); Kriiska et al. (2005); Liiva et al. (1966); Rosentau et al. (2020); Sarv (1981); Vassiljev et al. (2015)

Ostergotland: Persson (1979)

Sodermanland: Robertsson (1991)

Paldiski: Grudzinska et al. (2013); Muru et al. (2017)

Tallinn: Grudzinska et al. (2014); Heinsalu (2000); Lõugas and Tomek (2013); Muru et al. (2017); Saarse et al. (2003, 2006, 2009); Veski (1998)

Lahemaa: Grudzinska et al. (2013); Muru et al. (2017); Saarse et al. (2009)

Narva-Luga: Jaanits and Liiva (1973); Kessel (1963); Kriiska (1995, 1996); Lepland et al. (1996); Rosentau et al. (2013); Saarse et al. (2003); Sandgren et al. (2004)

St Petersburg: Morozov (2014)

Virolahti: Miettinen (2002)

Porvoo: Donner and Eronen (1981); Eronen (1974); Haila et al. (1991); Jungner and Sonninen (1983); Miettinen et al. (1999)

Helsinki: Alhonen (1972); Alhonen et al. (1978); Hyvärinen (1982, 1984); Hyvärinen (1979); Seppä et al. (2000)

Salo: Eronen (1974); Eronen et al. (1993, 2001); Glückert (1978); Glückert (1976); Leino (1973); Ristaniemi and Glückert (1988); Tolonen and Tolonen (1988)

Turku: Eronen (1974); Eronen et al. (1982, 1995, 2001); Glückert et al. (1992); Glückert (1976)

Aland: Glückert (1978)

Gastrikland: Berglund (2005, 2010, 2012); Hedenström and Risberg (2003)

Angermanland: Berglund (2004, 2008); Wallin (1994)

Alvsbyn: Lindén et al. (2006)

Gunnarsbyn: Lindén et al. (2006)

South Lapland: Eronen (1974); Saarnisto (1981)

Oulu: Eronen (1974)

South Ostrobothnia: Eronen (1974)

Satakunta: Salomaa (1982)

Central Finland: Ristaniemi (1987)

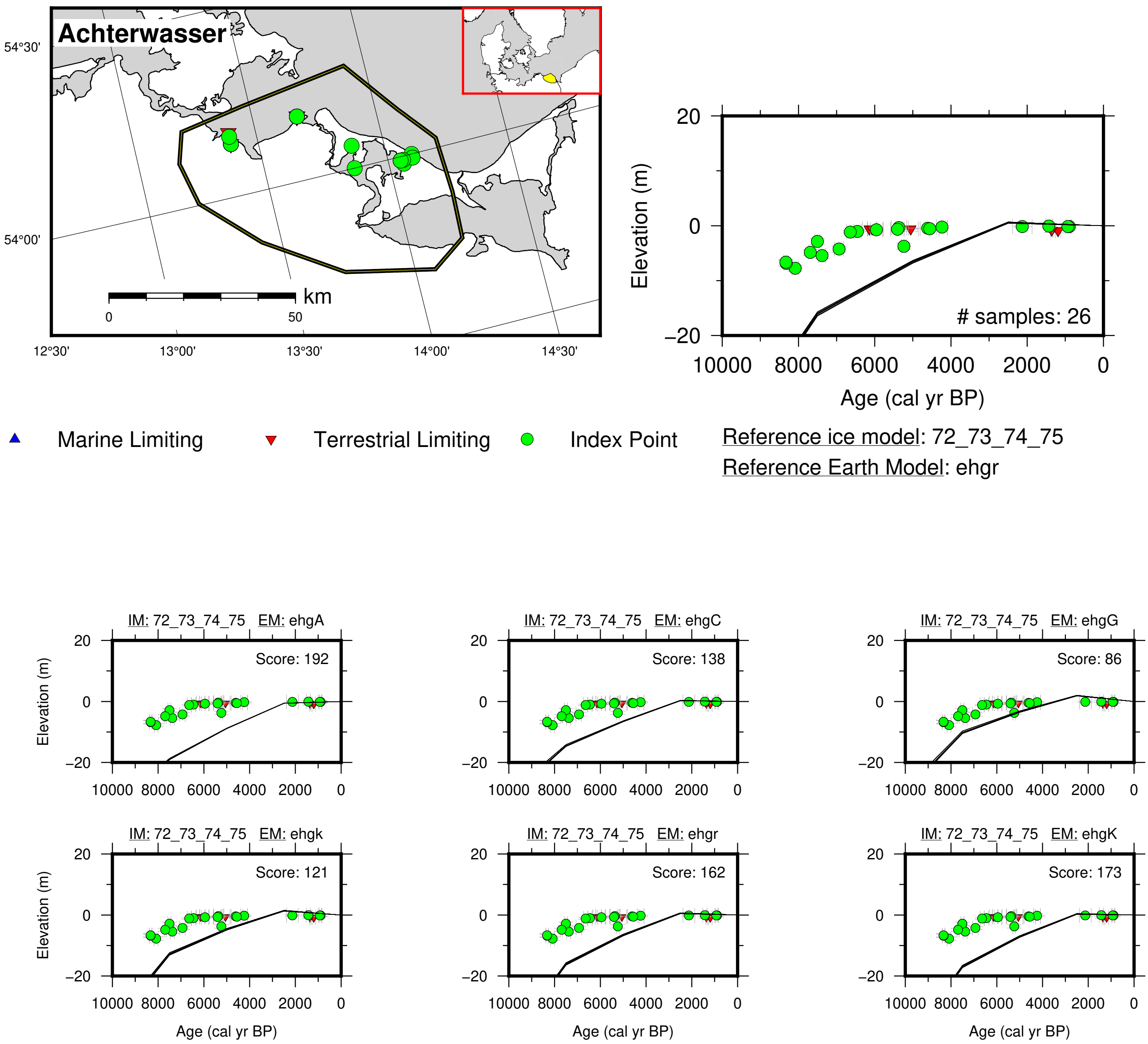


Figure 55: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Achterwasser.

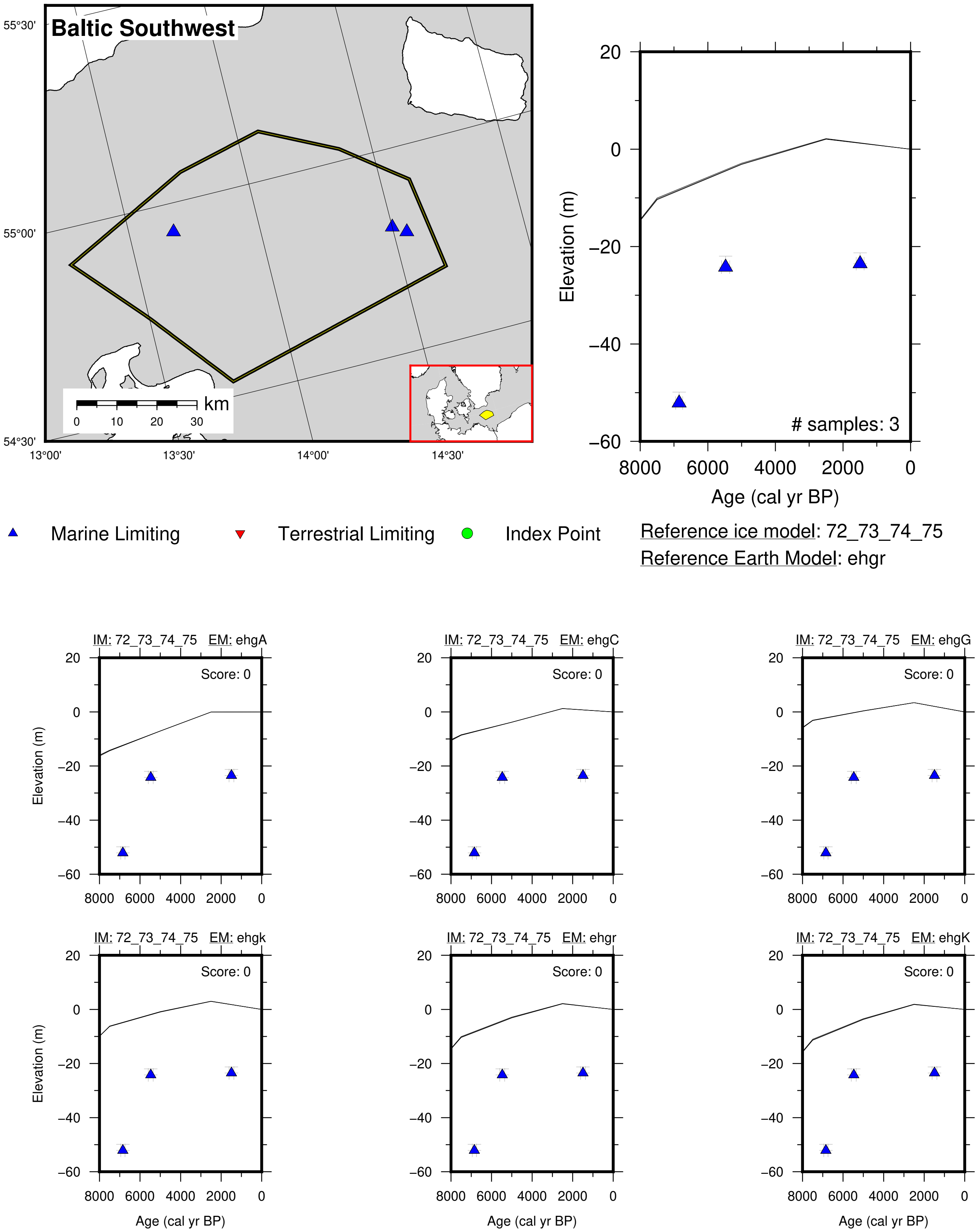


Figure 56: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Baltic Southwest.

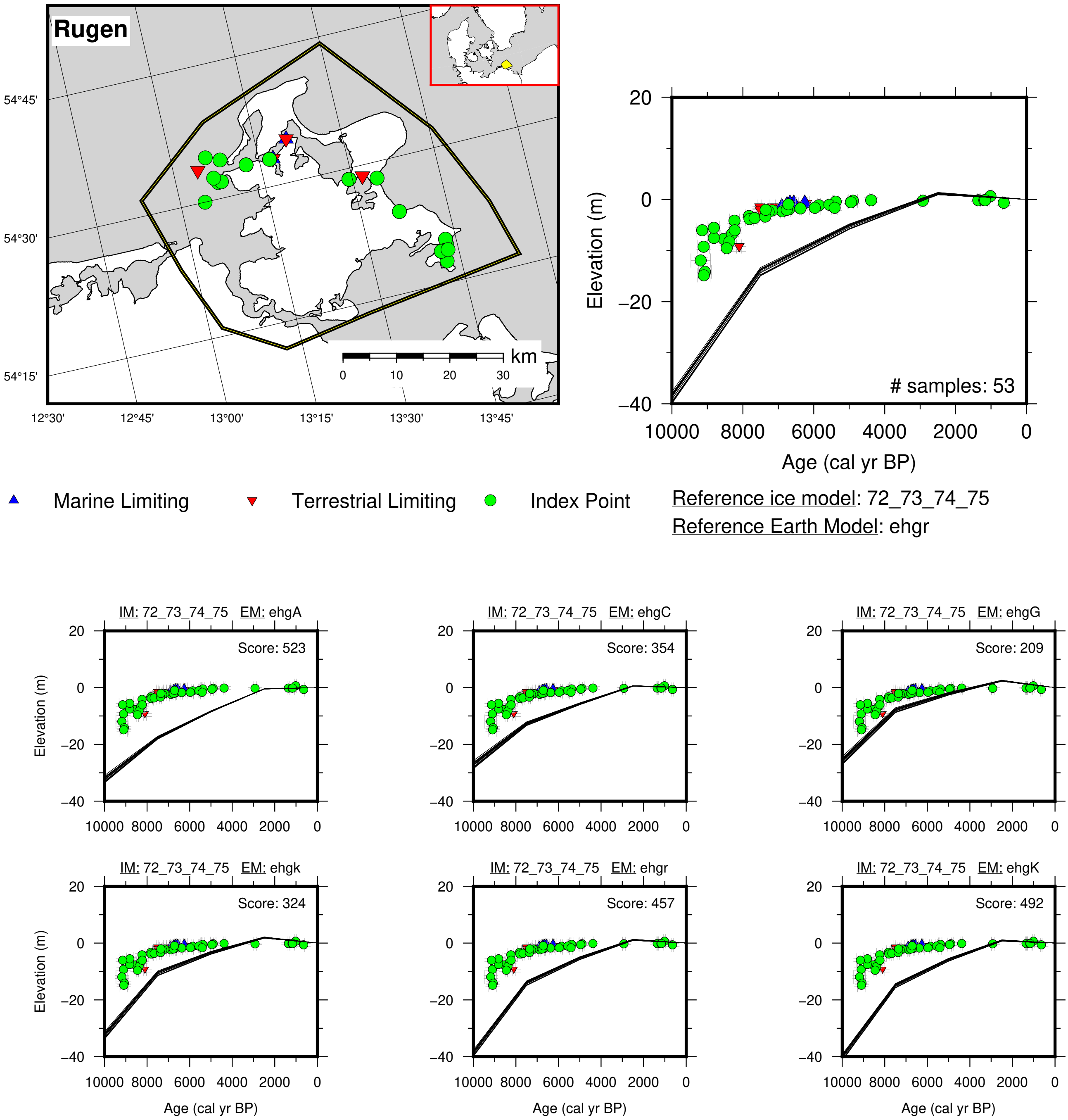


Figure 57: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Rugen.

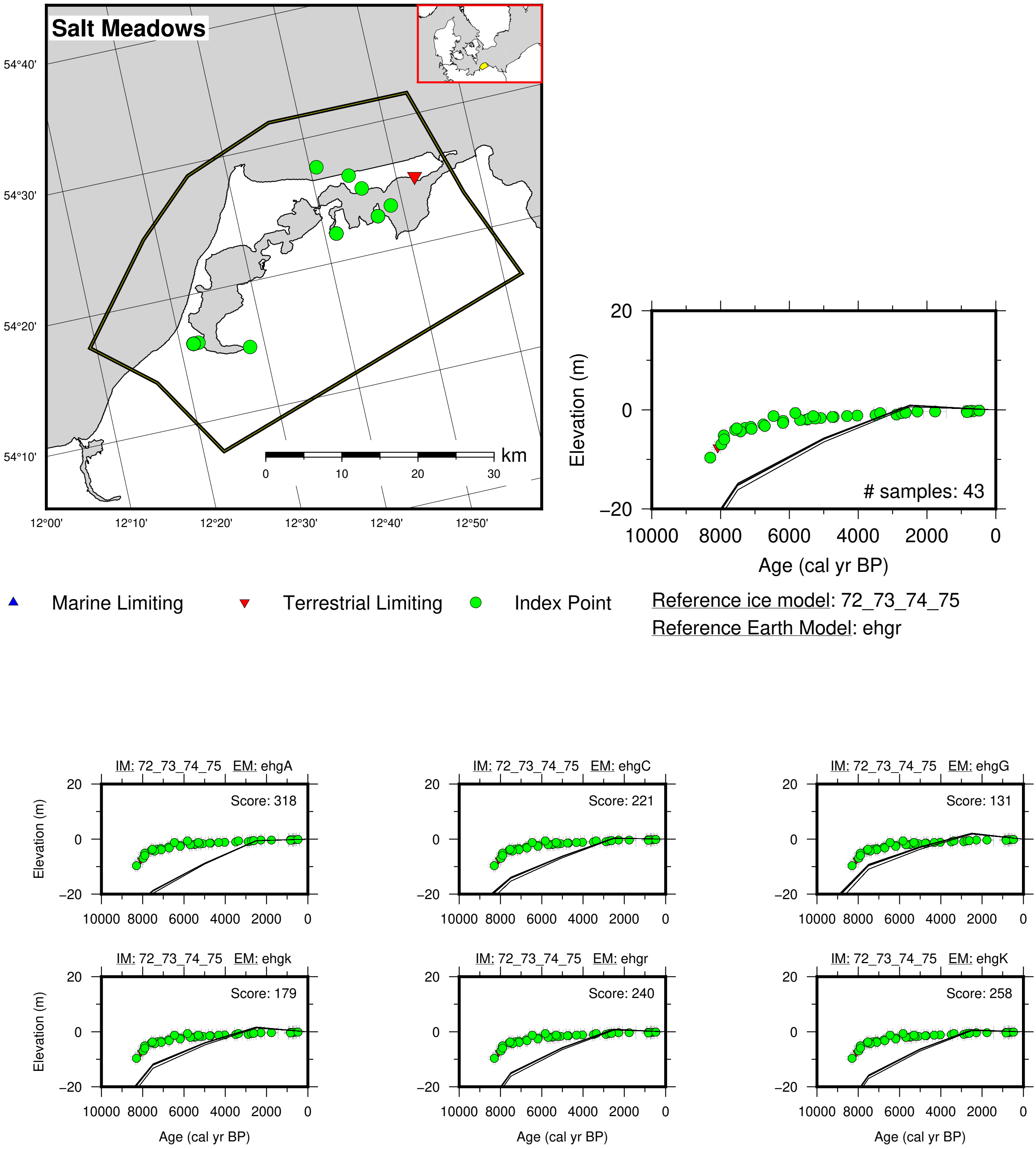


Figure 58: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Salt Meadows.

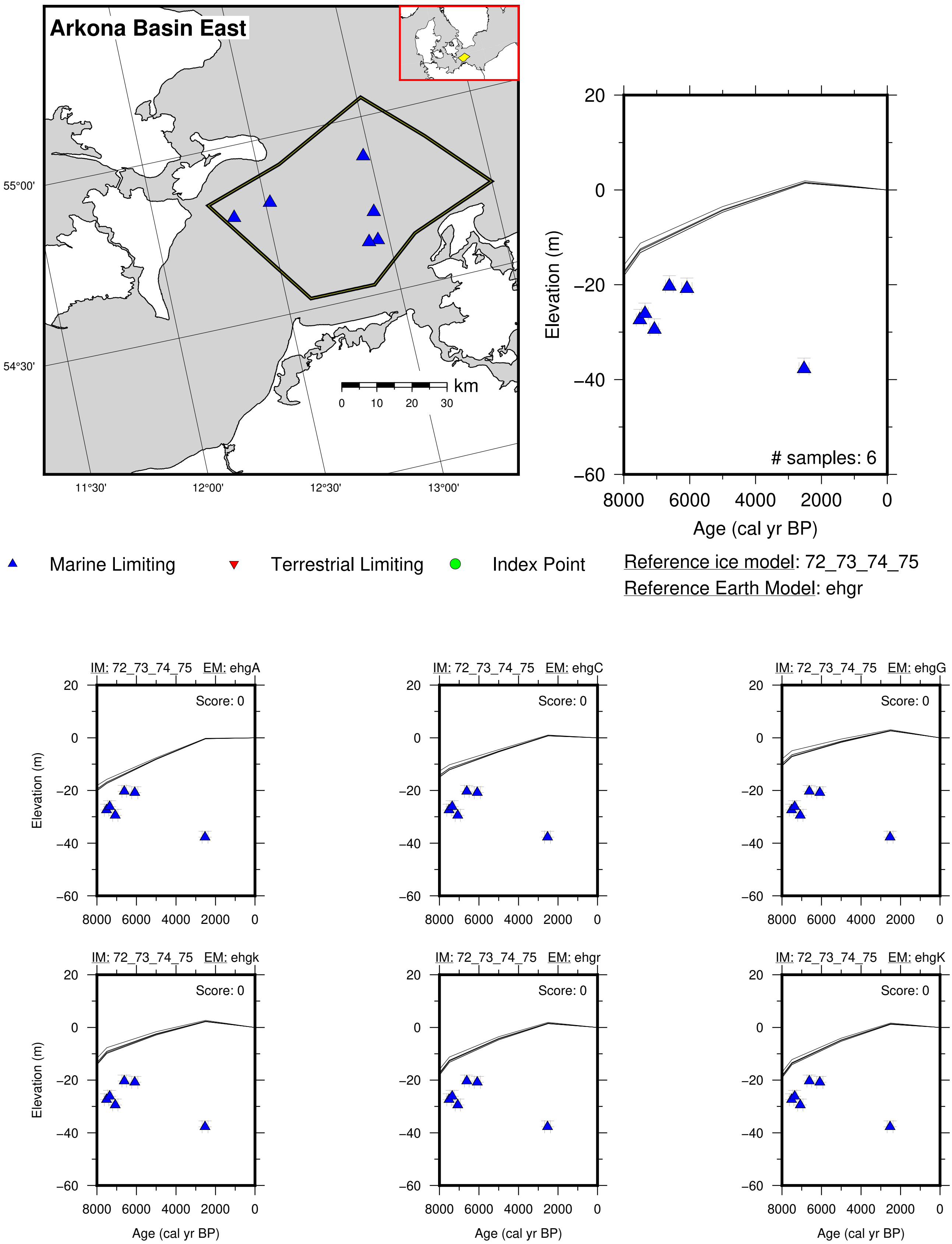
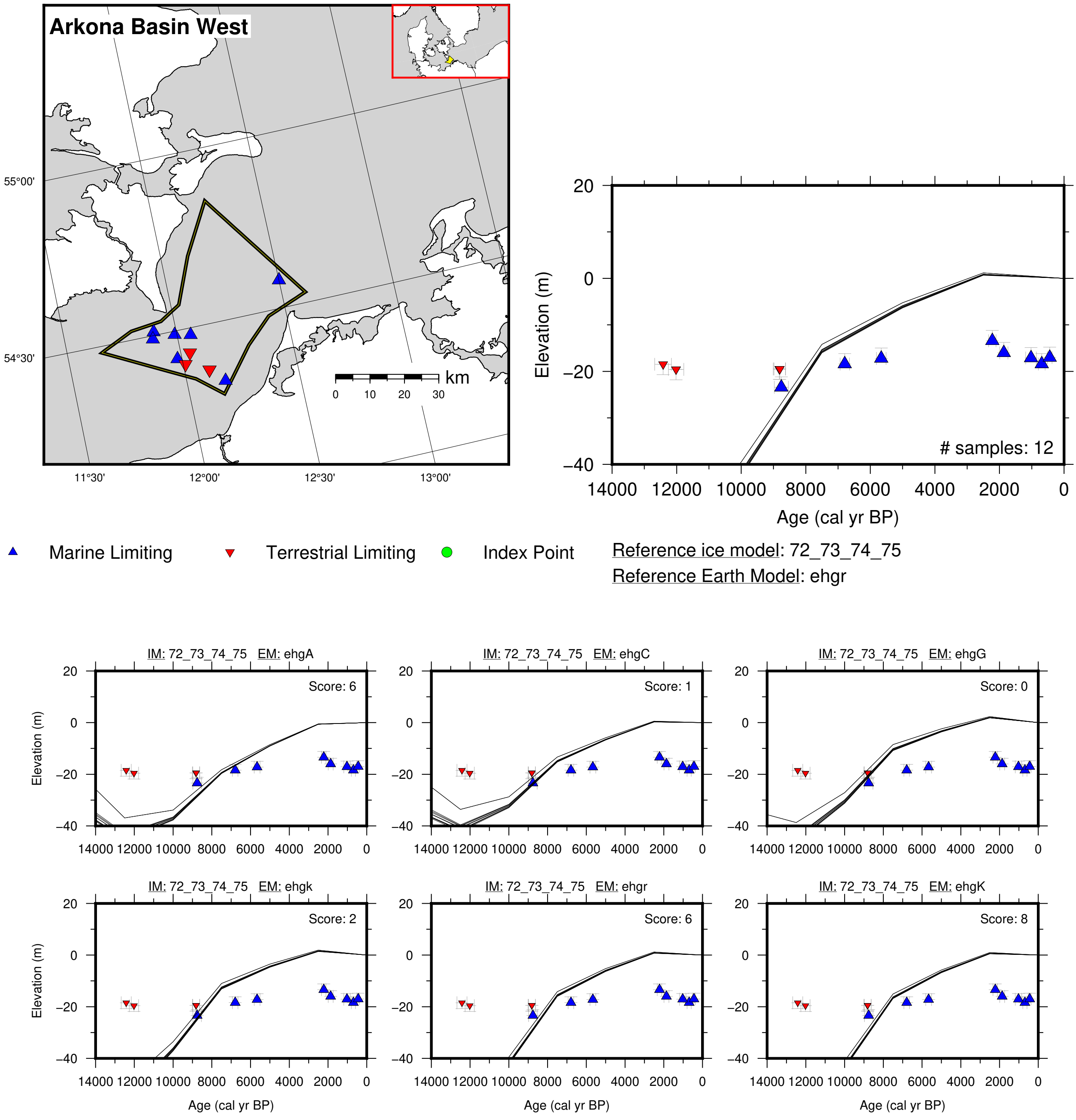


Figure 59: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Arkona Basin East.



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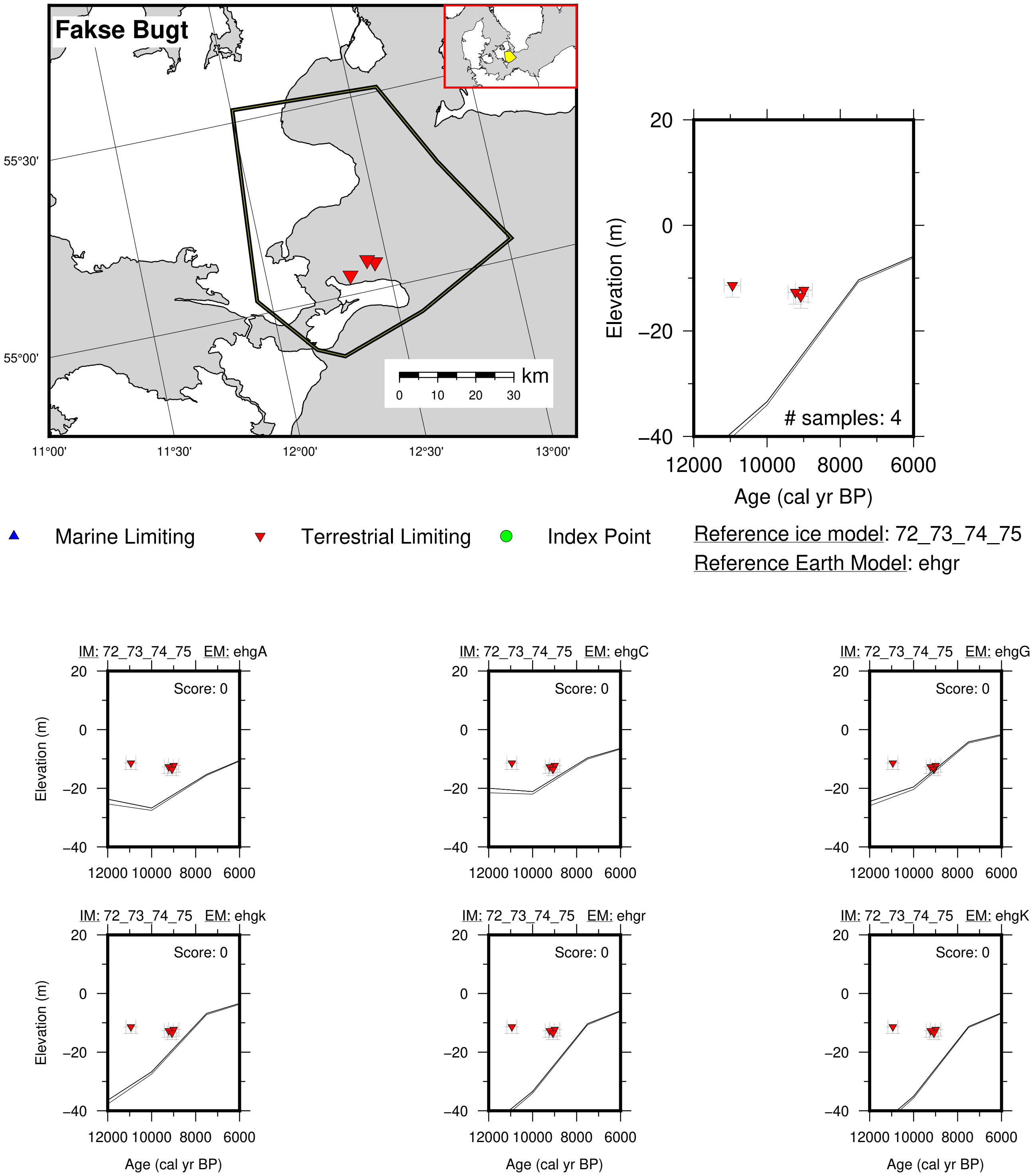


Figure 61: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Fakse Bugt.

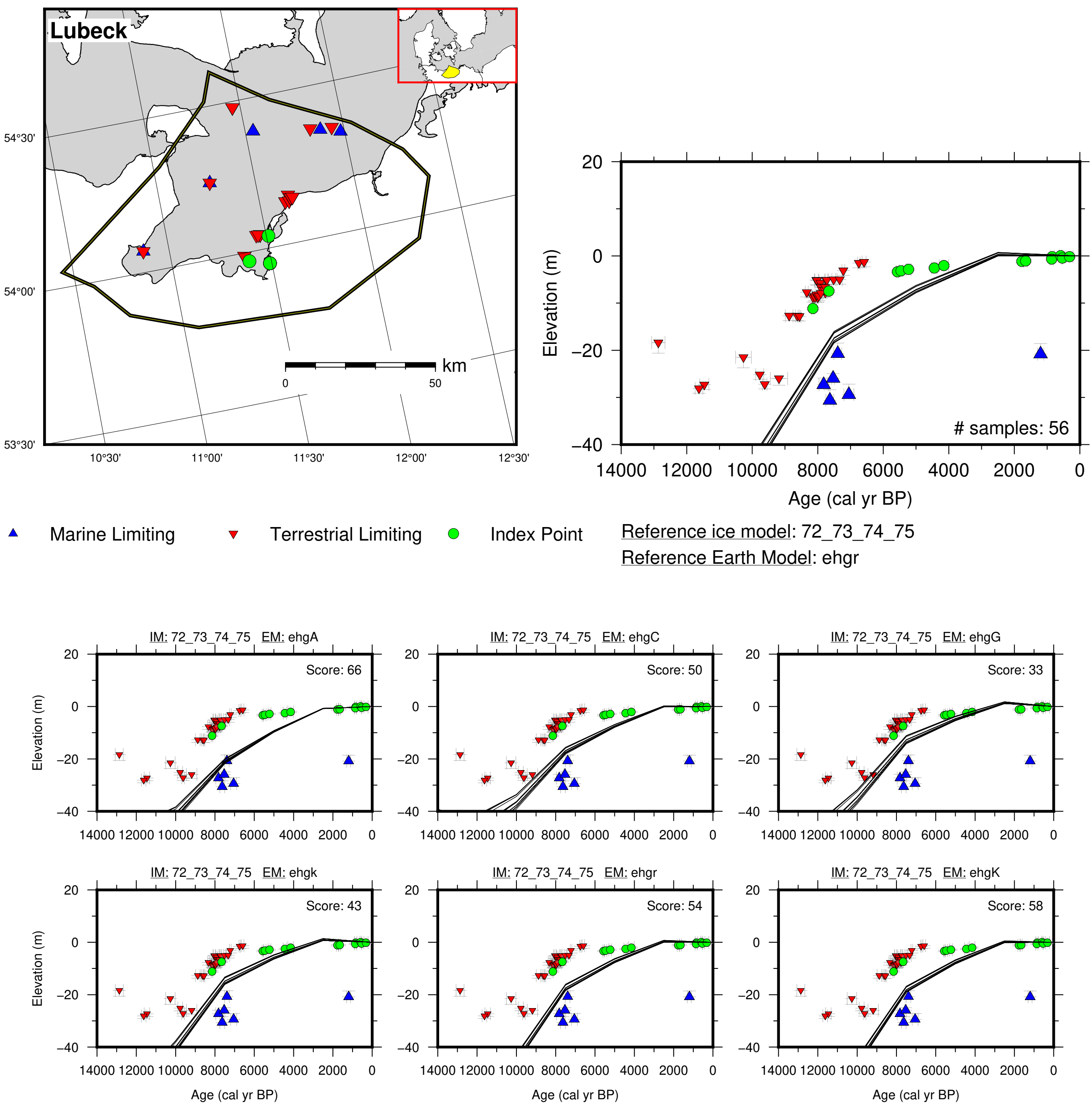


Figure 62: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Lubeck.

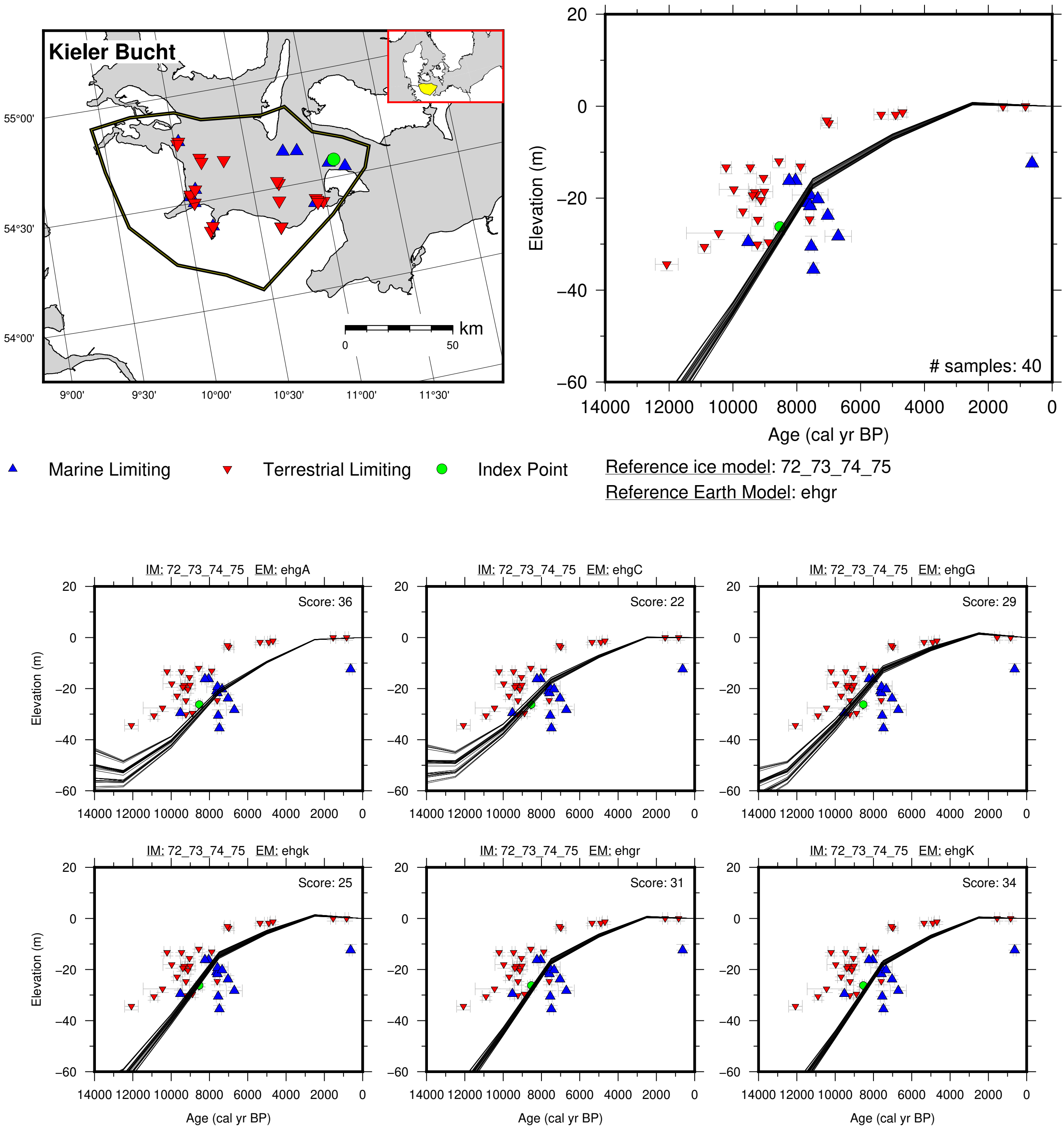
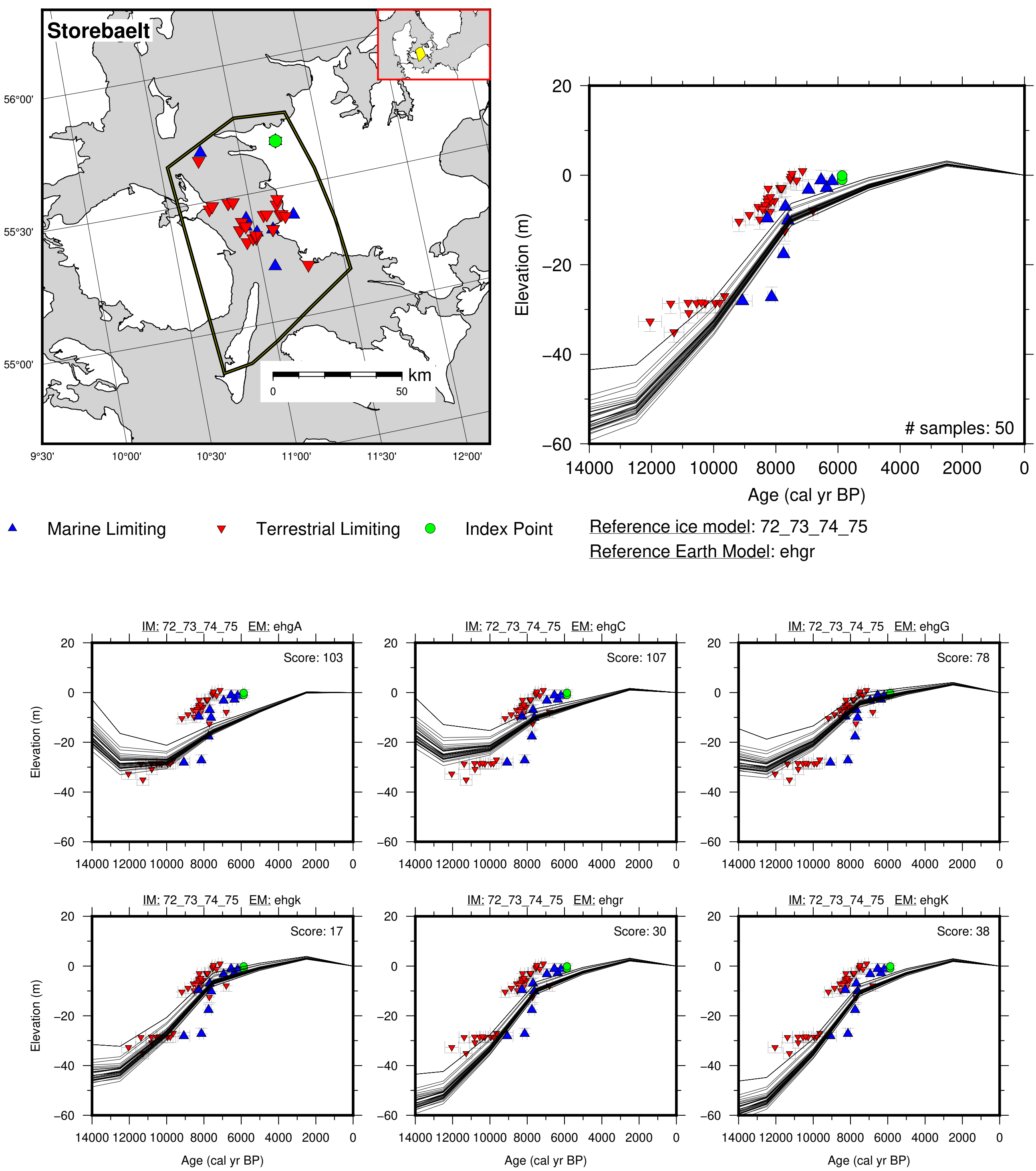


Figure 63: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Kieler Bucht.



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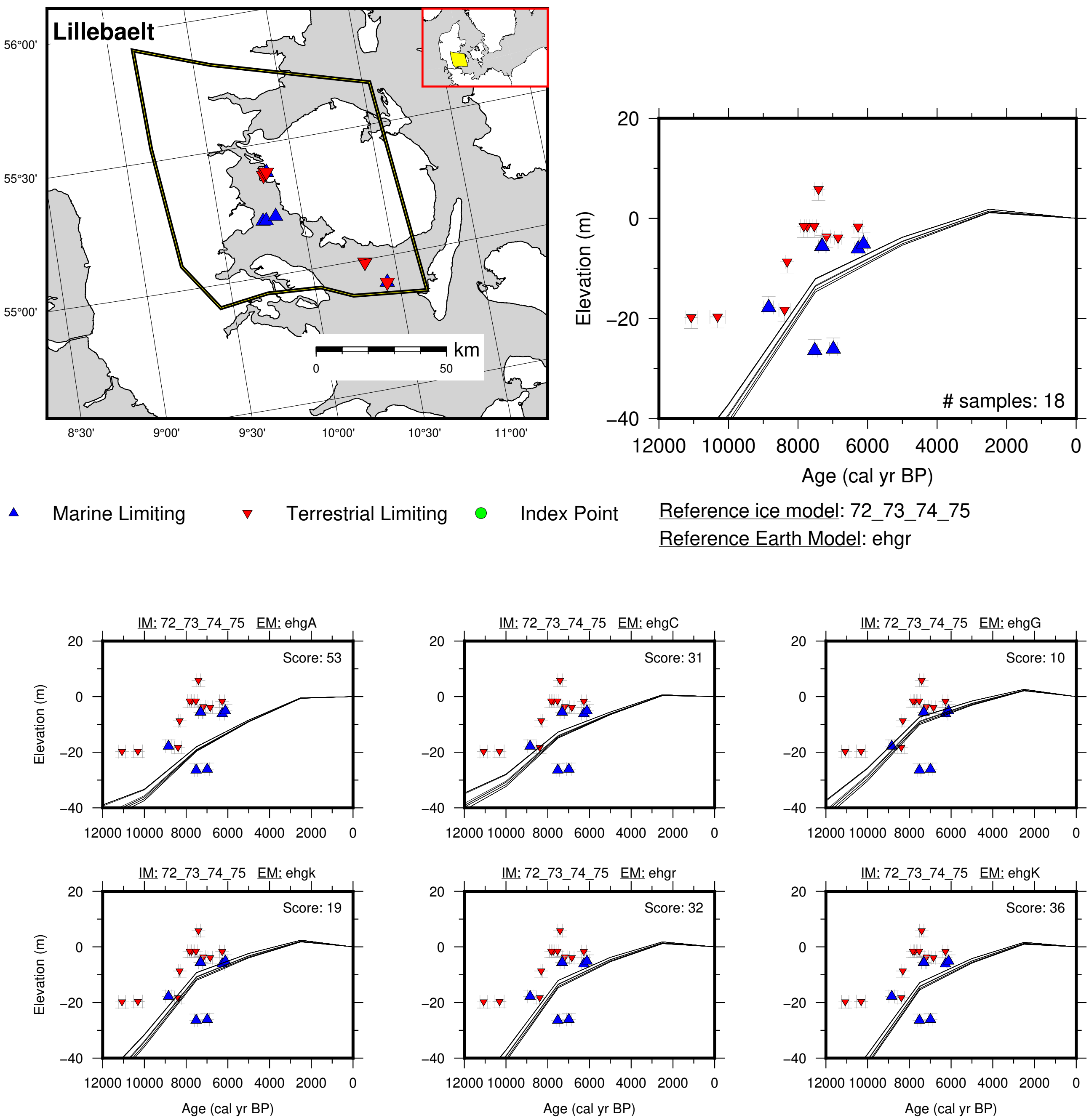


Figure 65: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Lillebaelt.

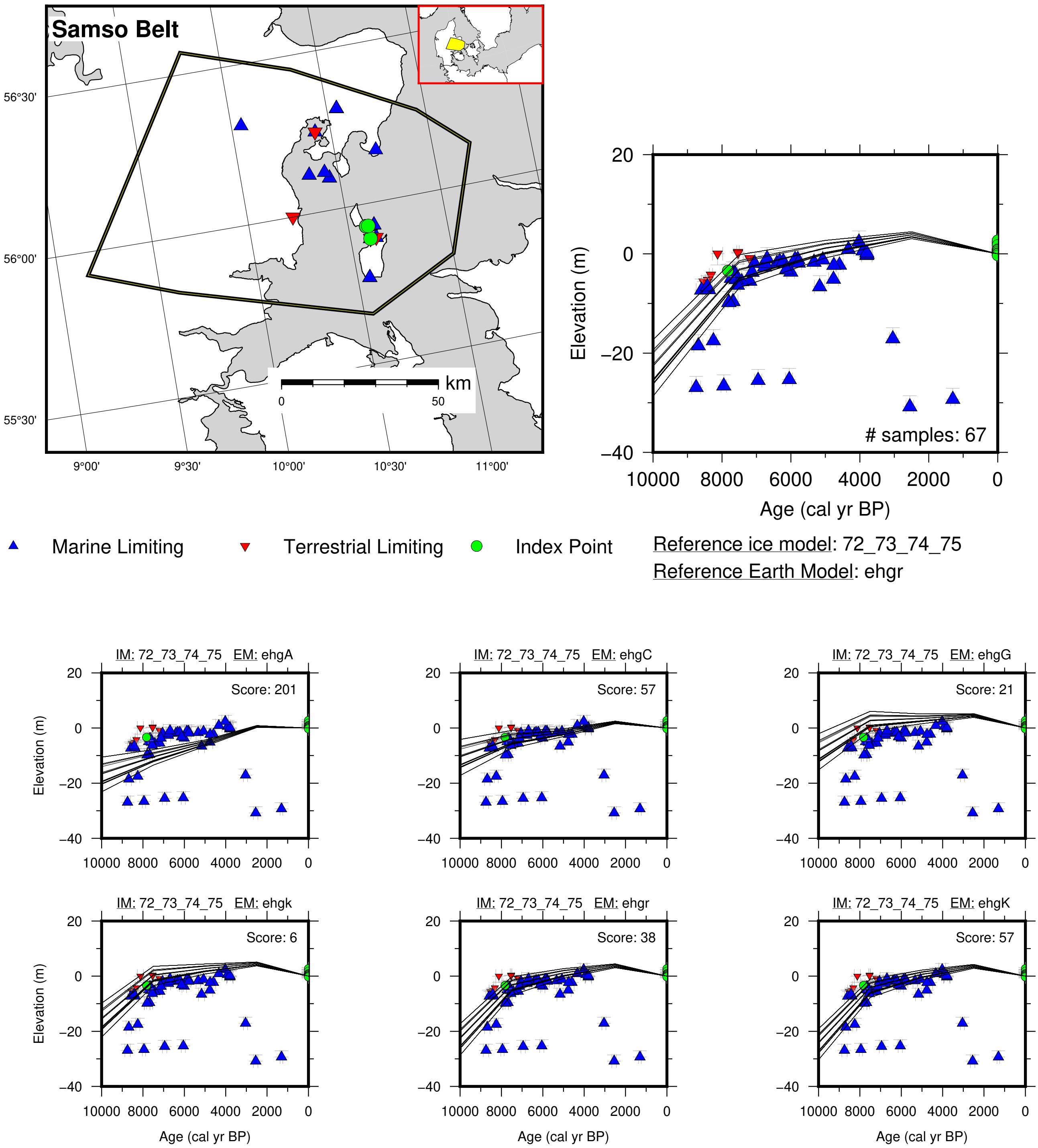
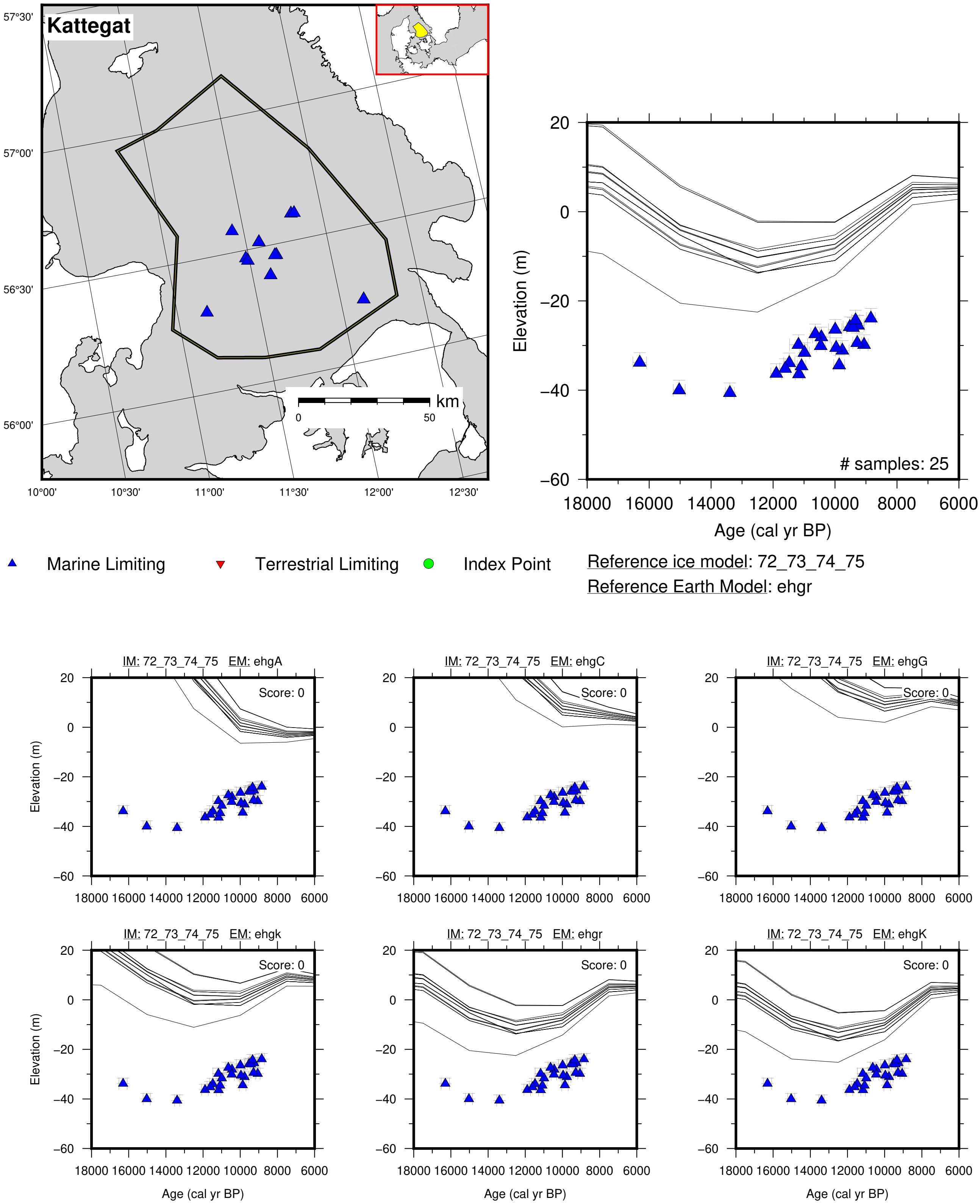


Figure 66: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Samso Belt.



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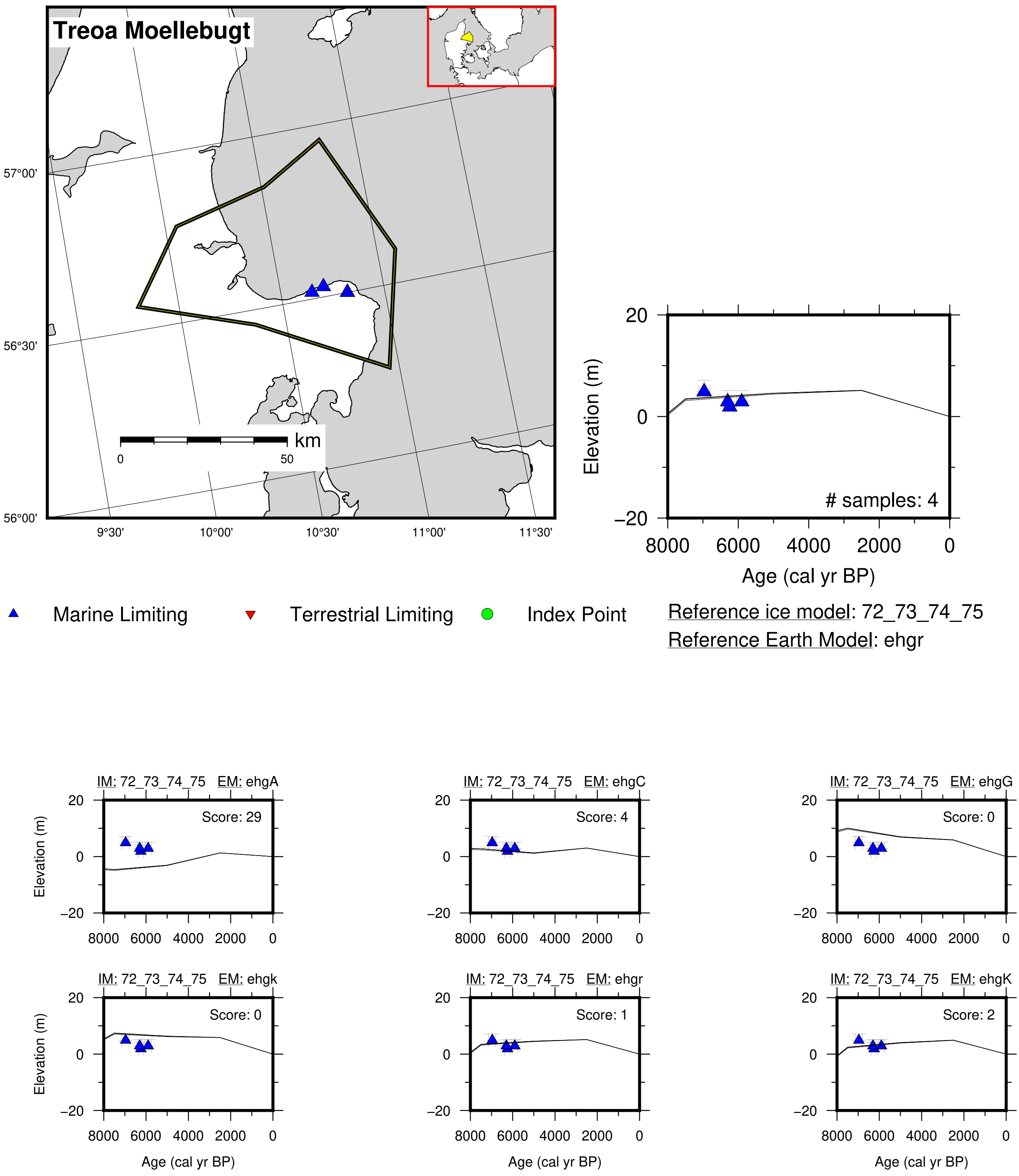

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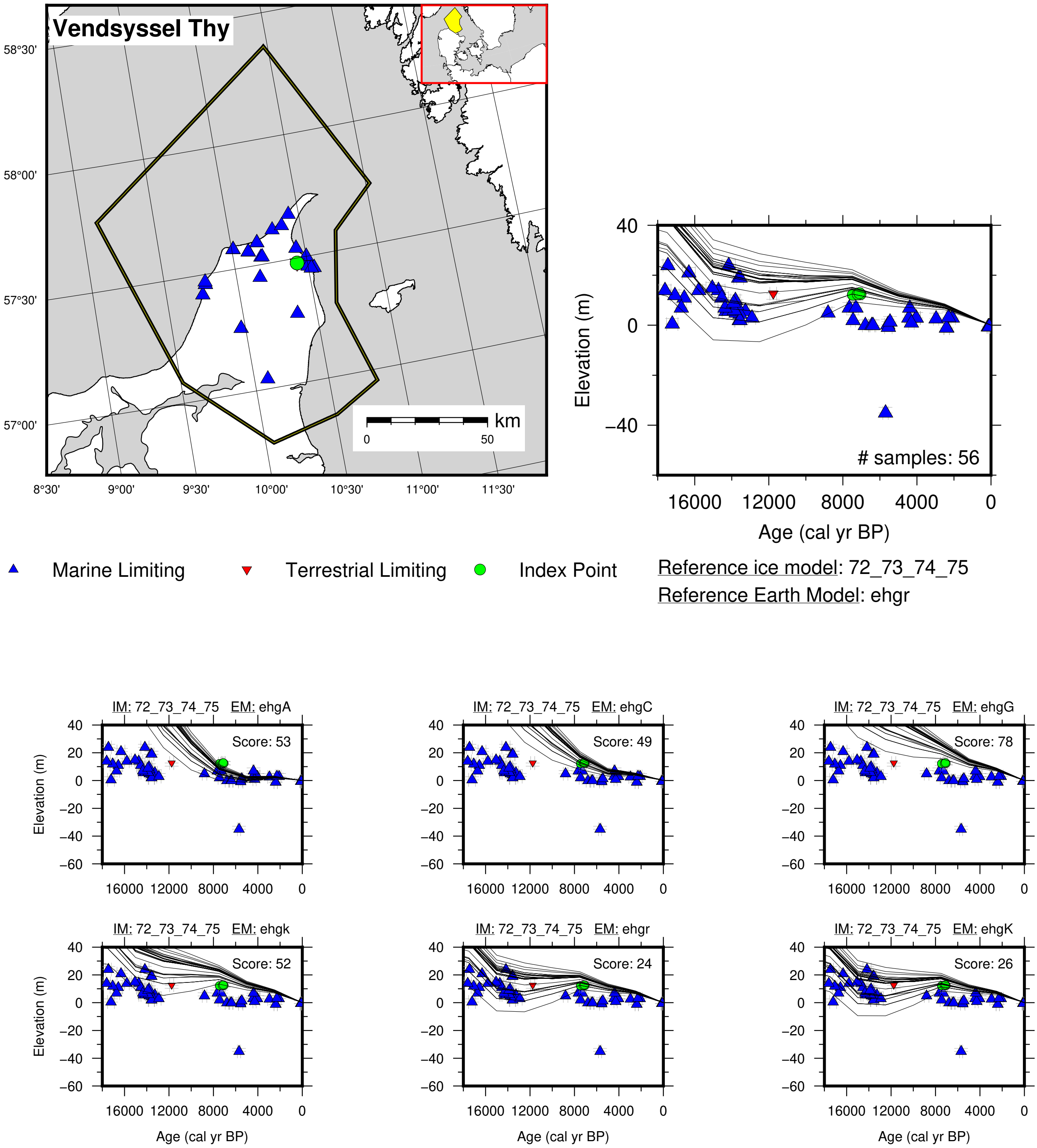
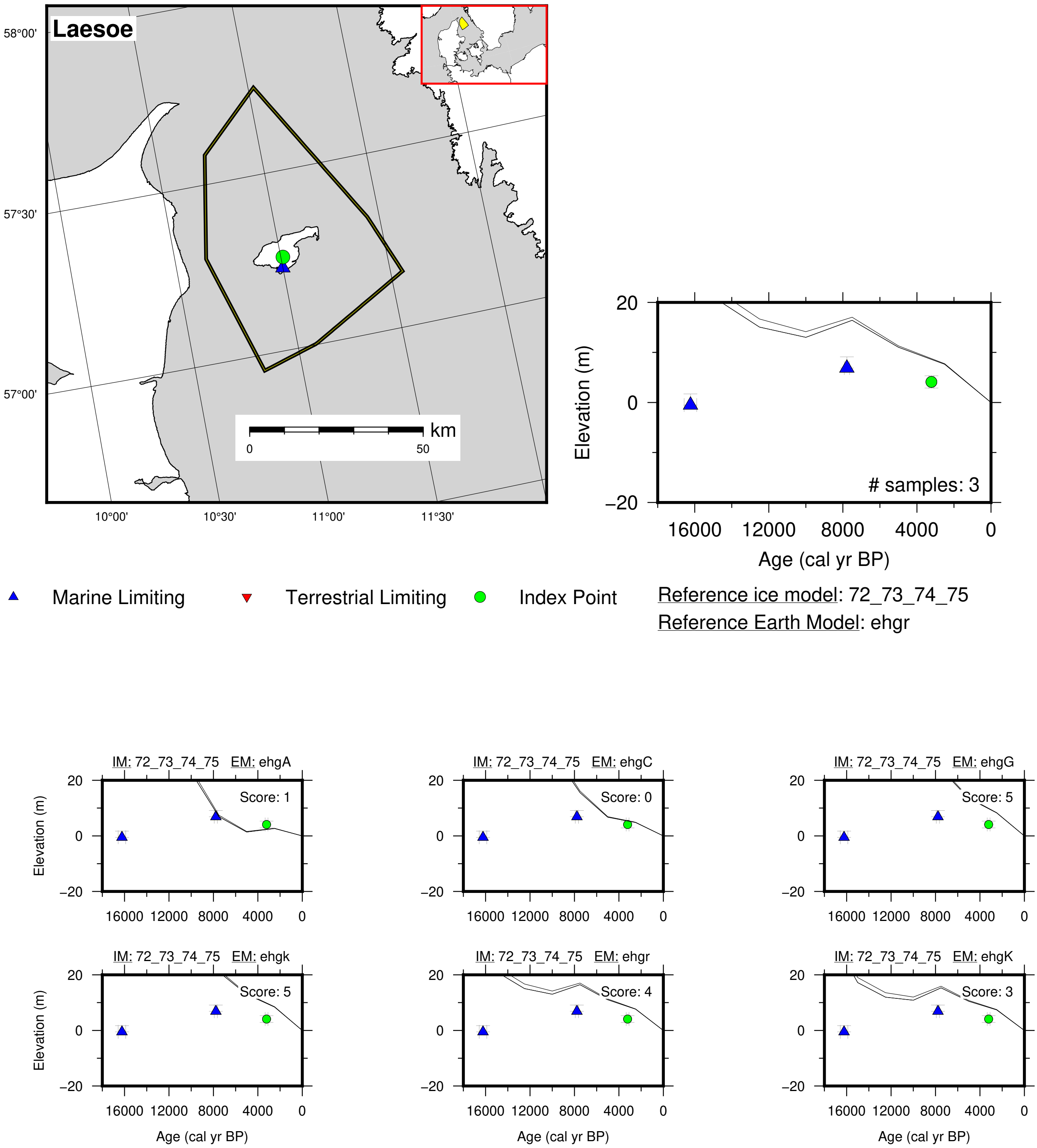


Figure 69: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Vendsyssel Thy.



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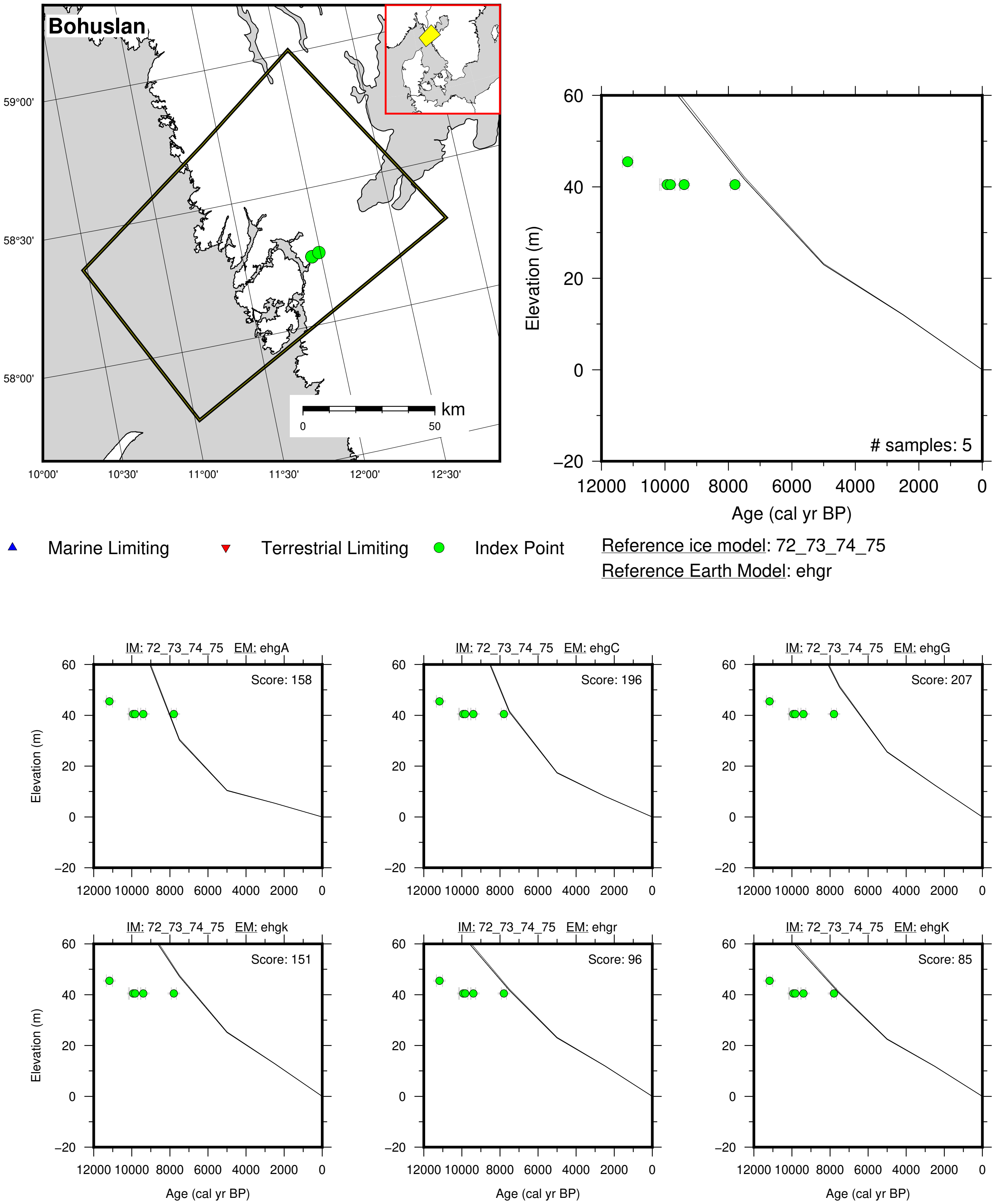
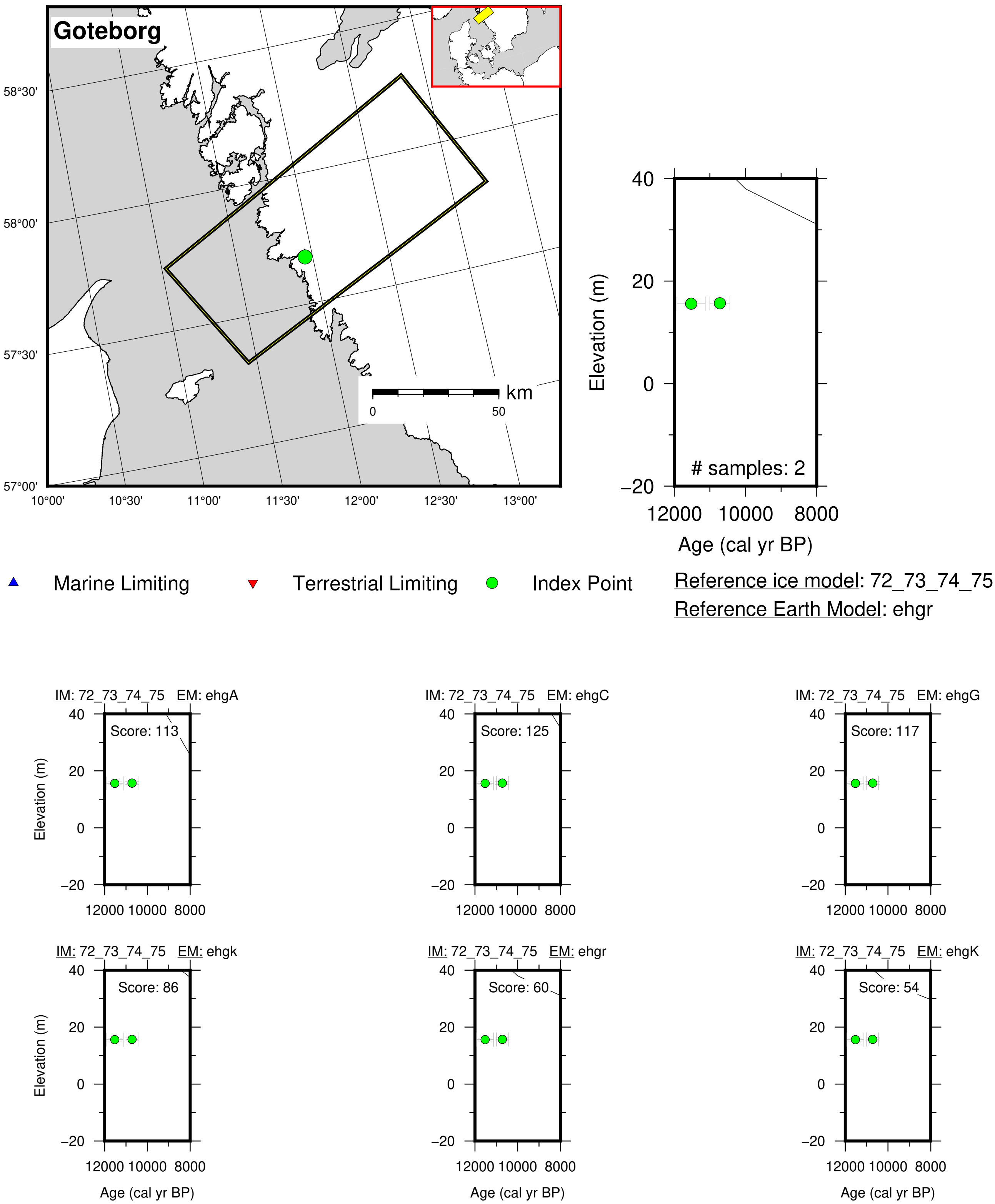


Figure 71: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Bohuslan.



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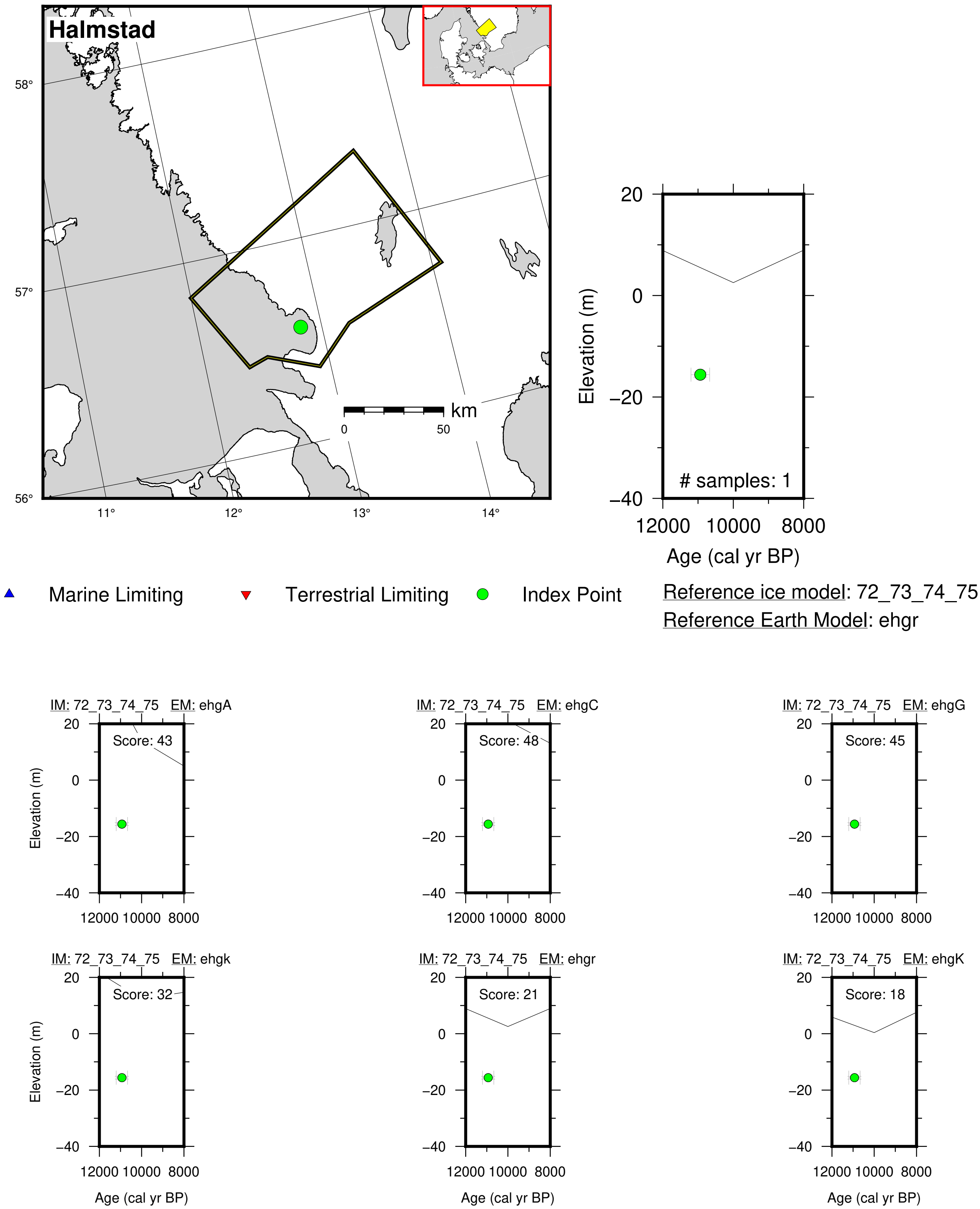
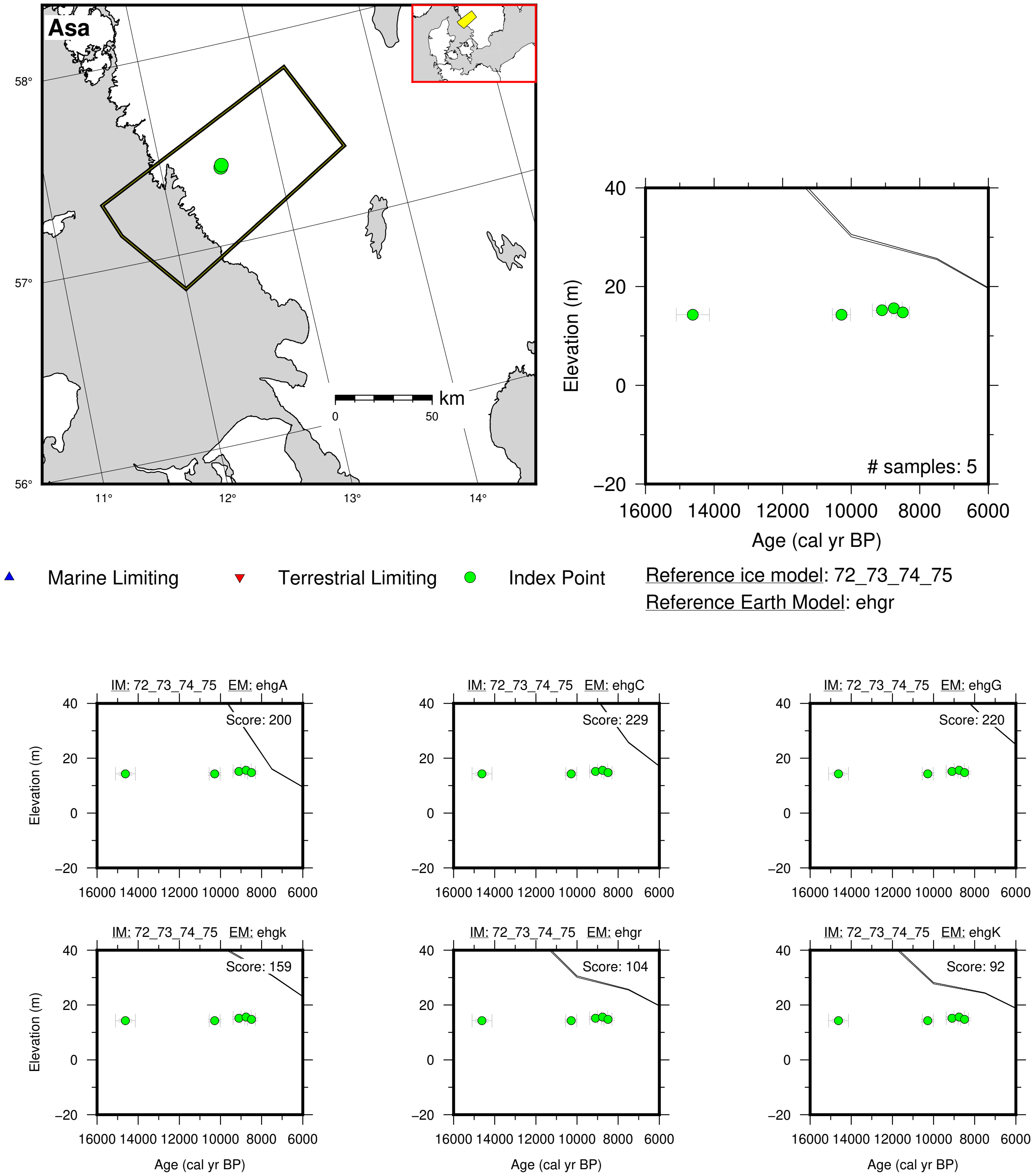


Figure 73: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Halmstad.



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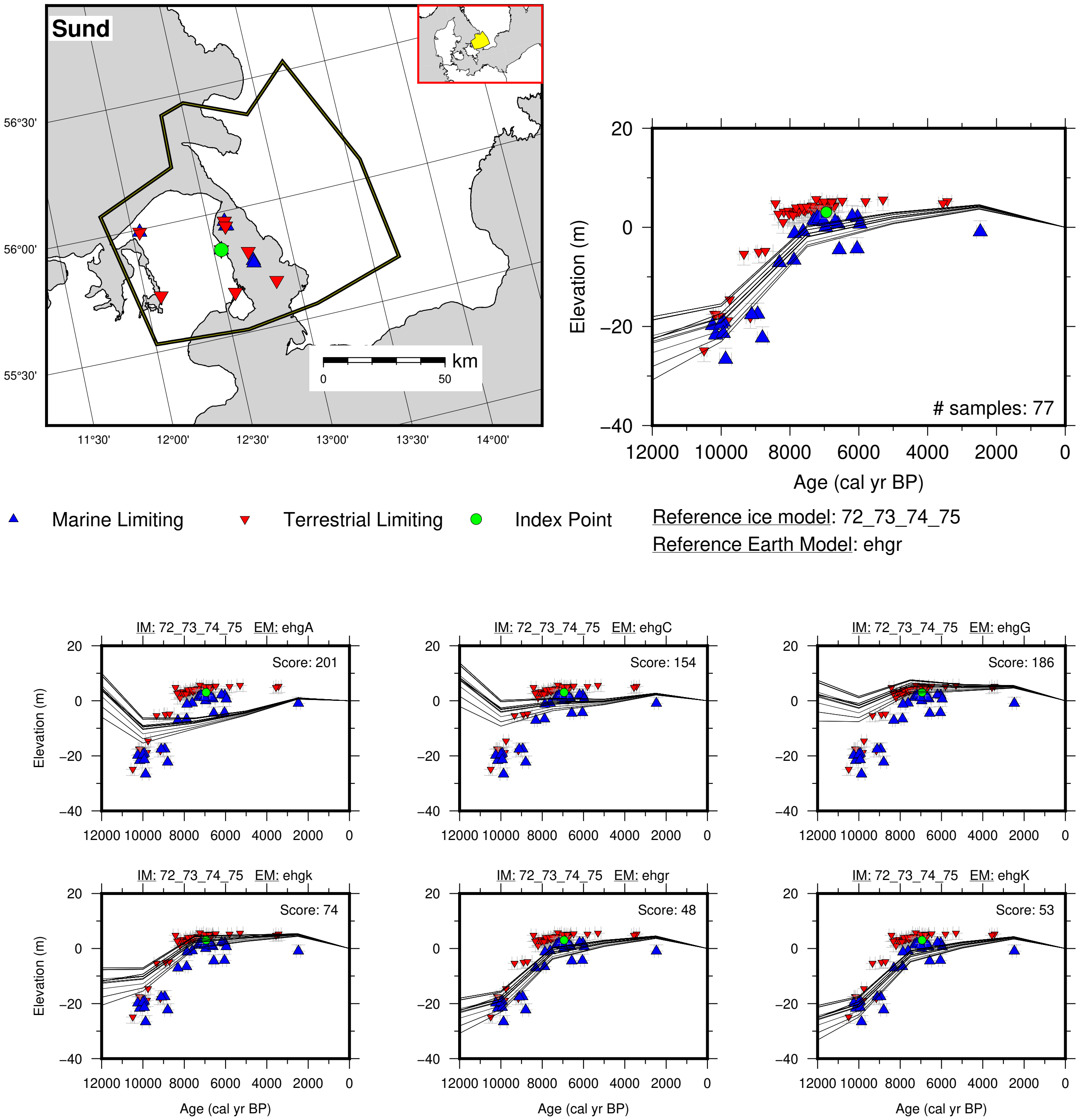

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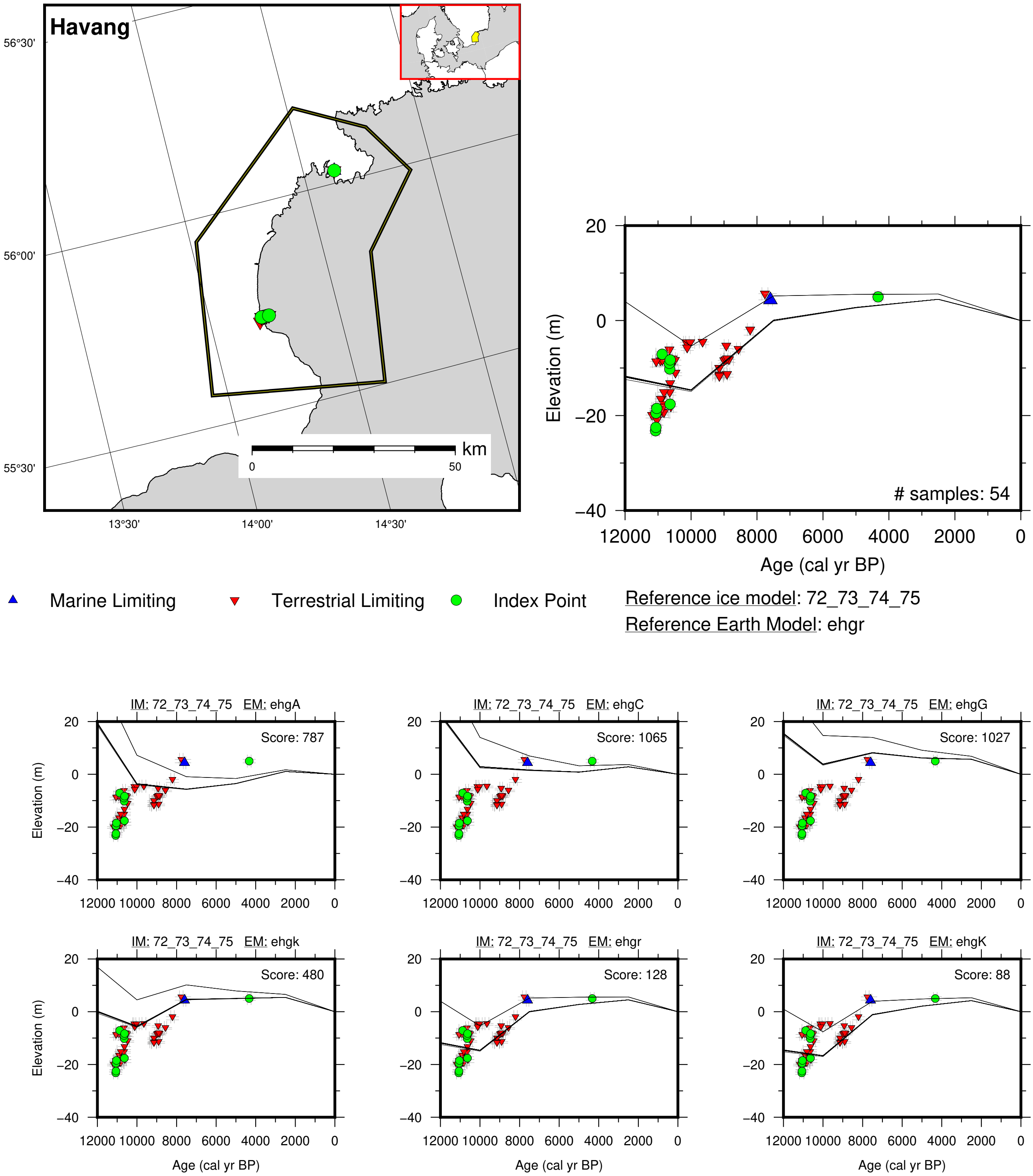


Figure 76: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Havang.

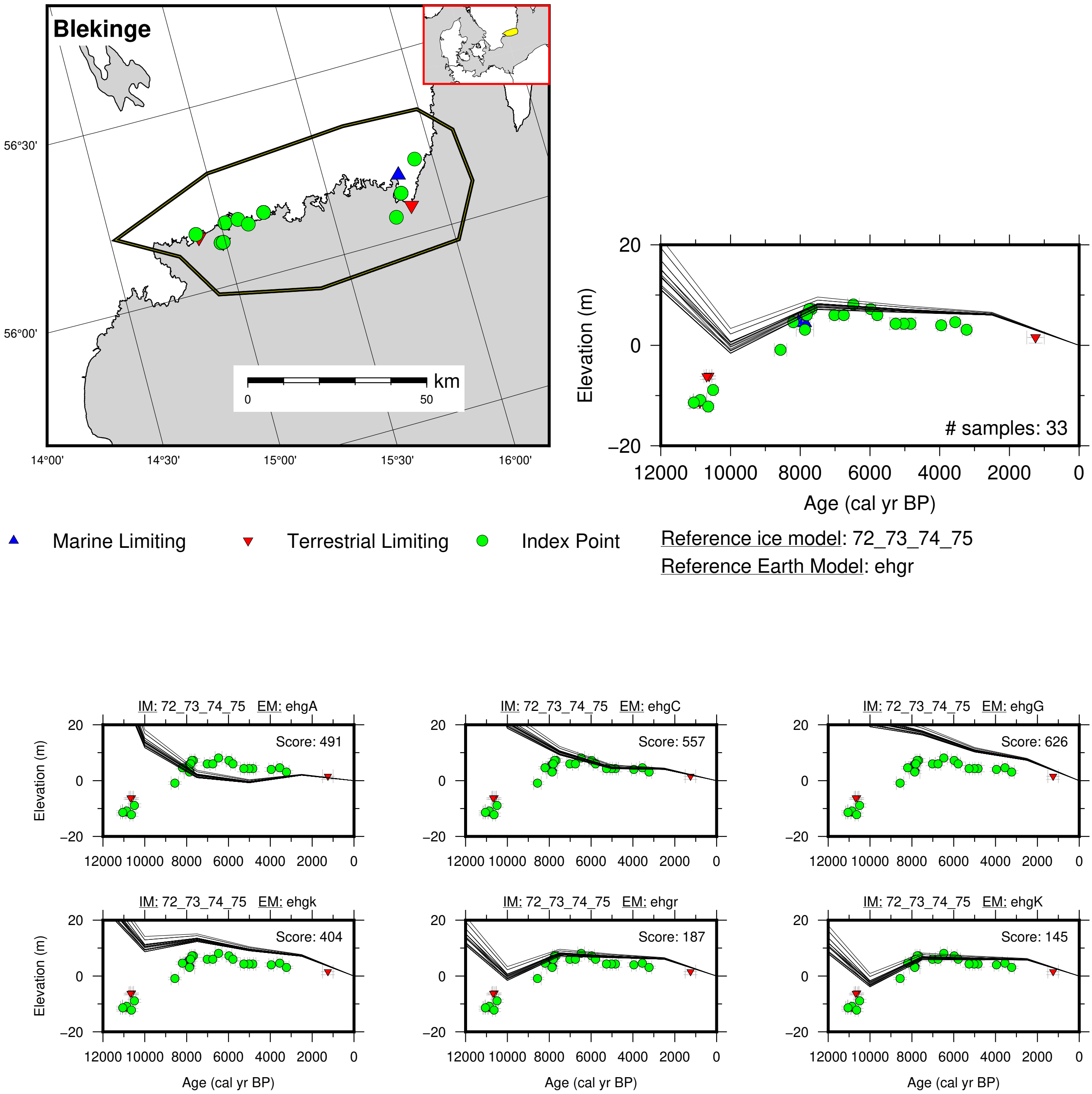
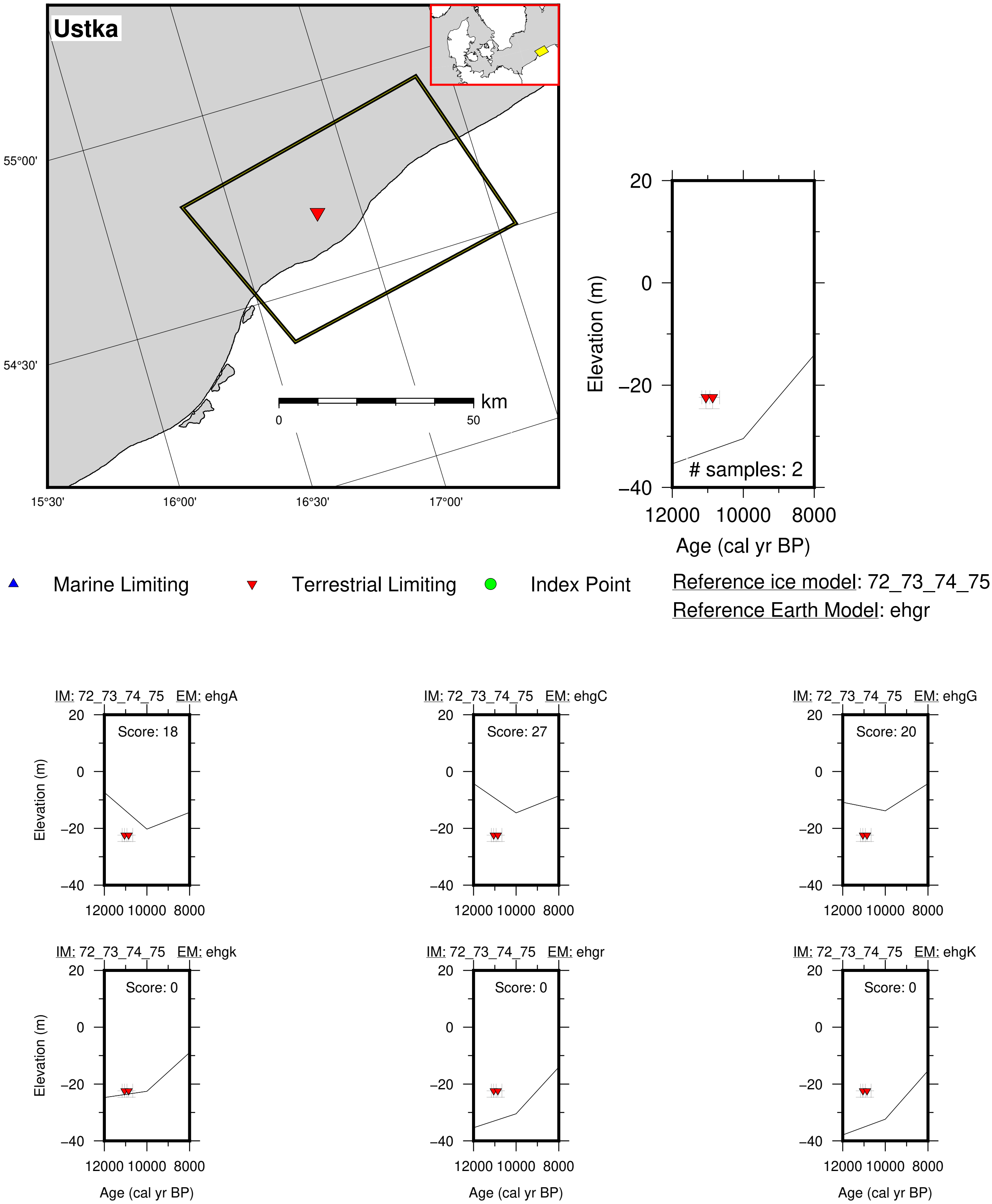


Figure 77: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Blekinge.



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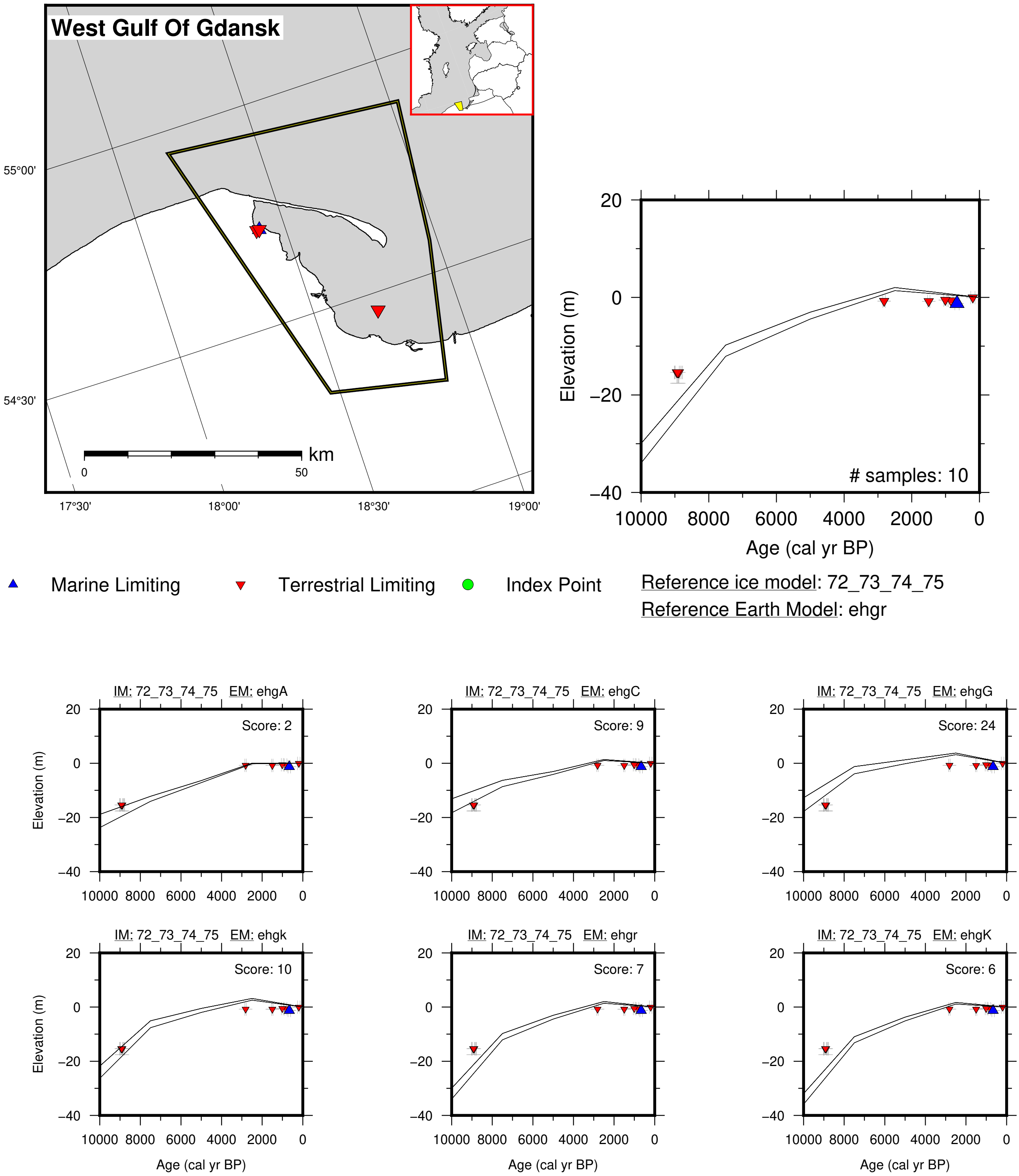
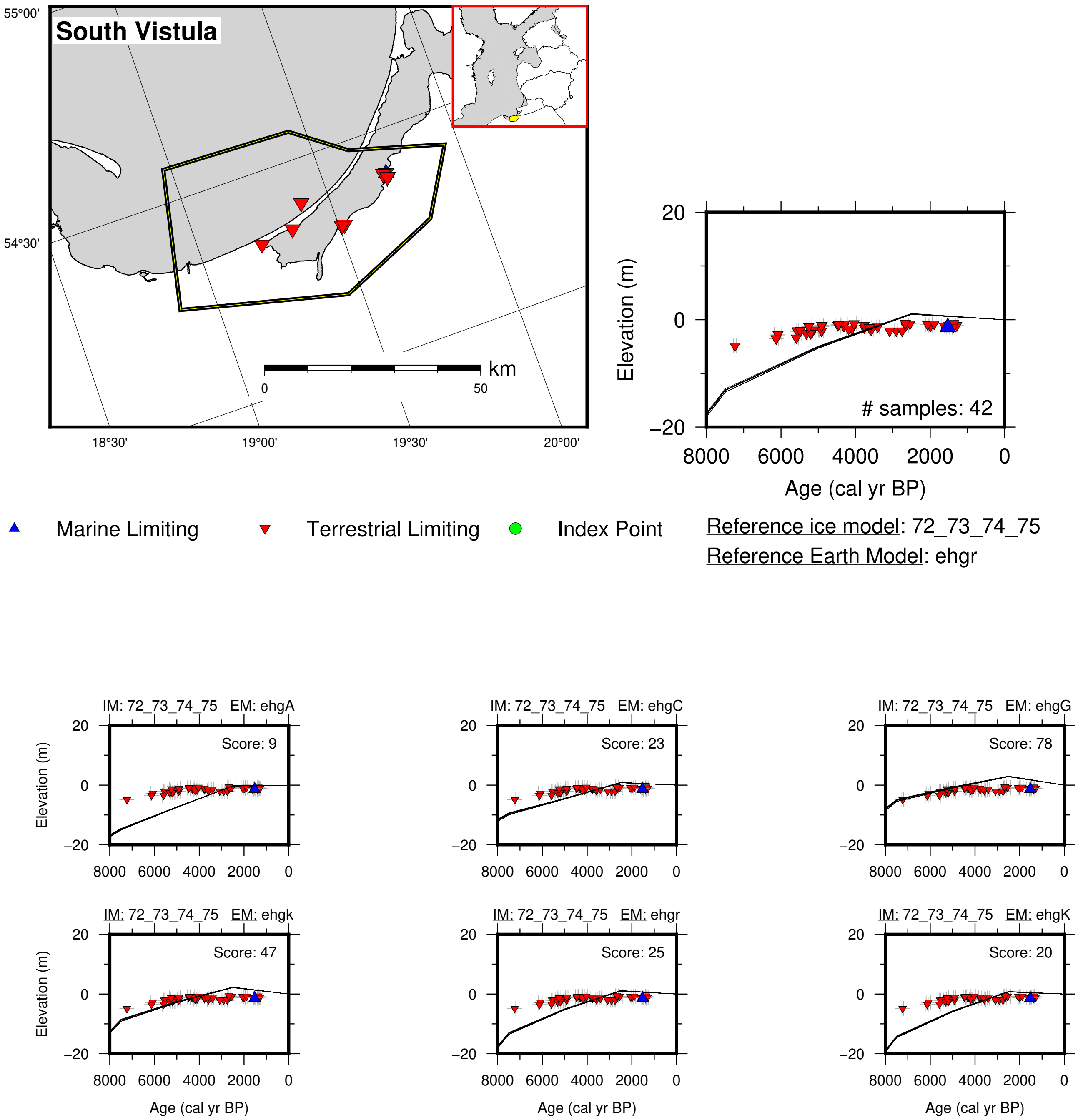


Figure 79: Paleo-sea level and comparison of six models for subregion Baltic Sea, location West Gulf Of Gdansk.



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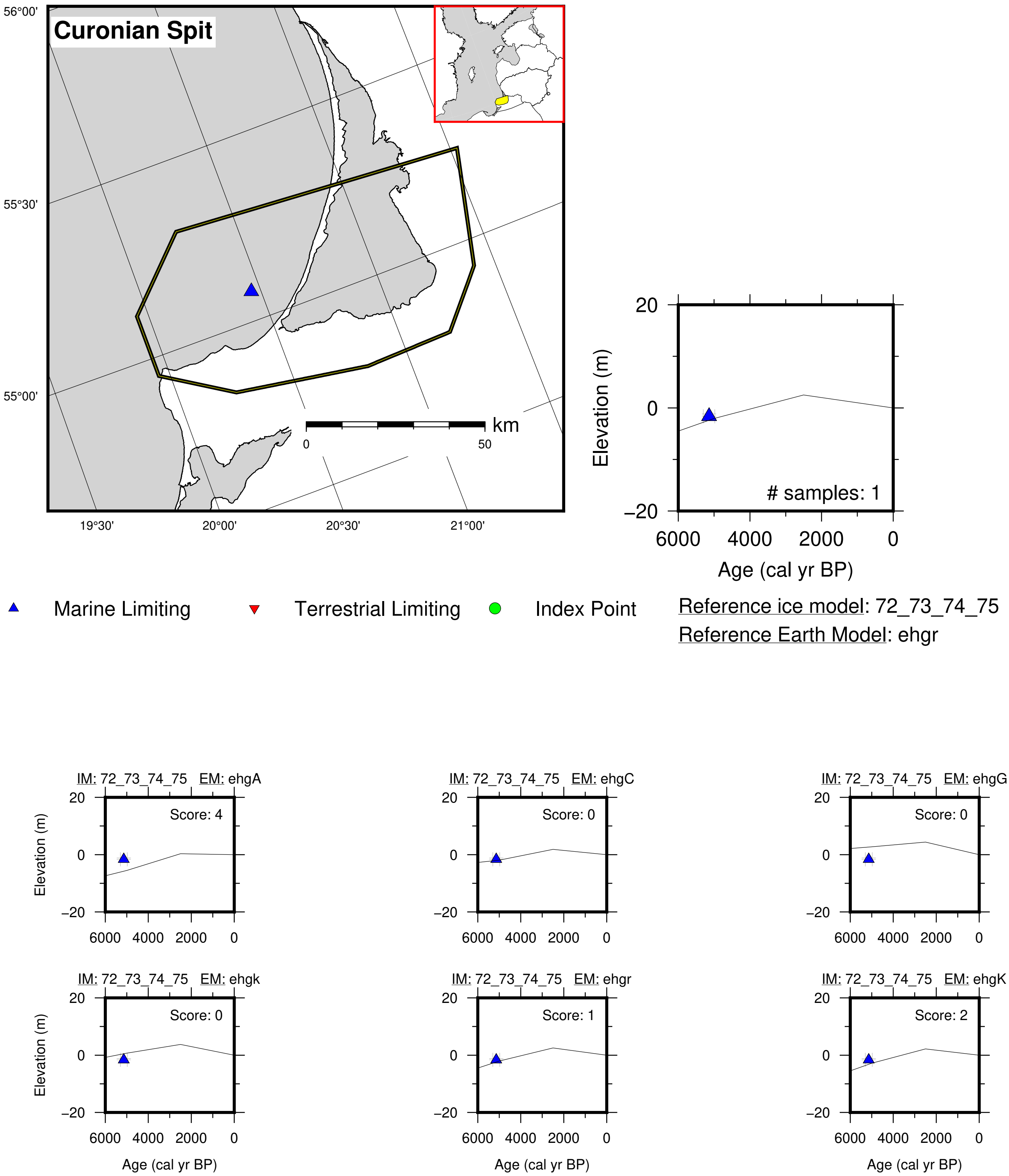


Figure 81: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Curonian Spit.

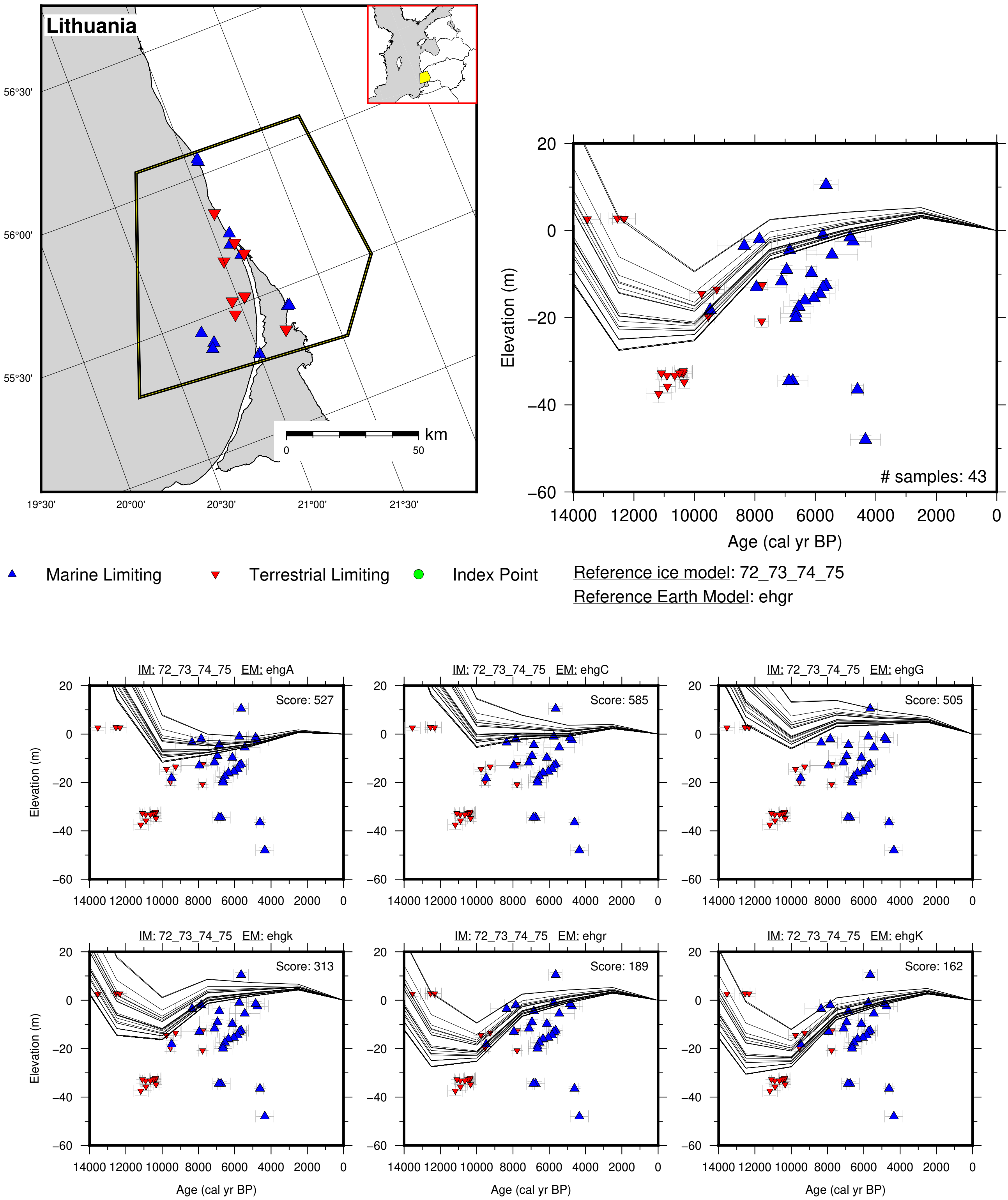


Figure 82: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Lithuania.

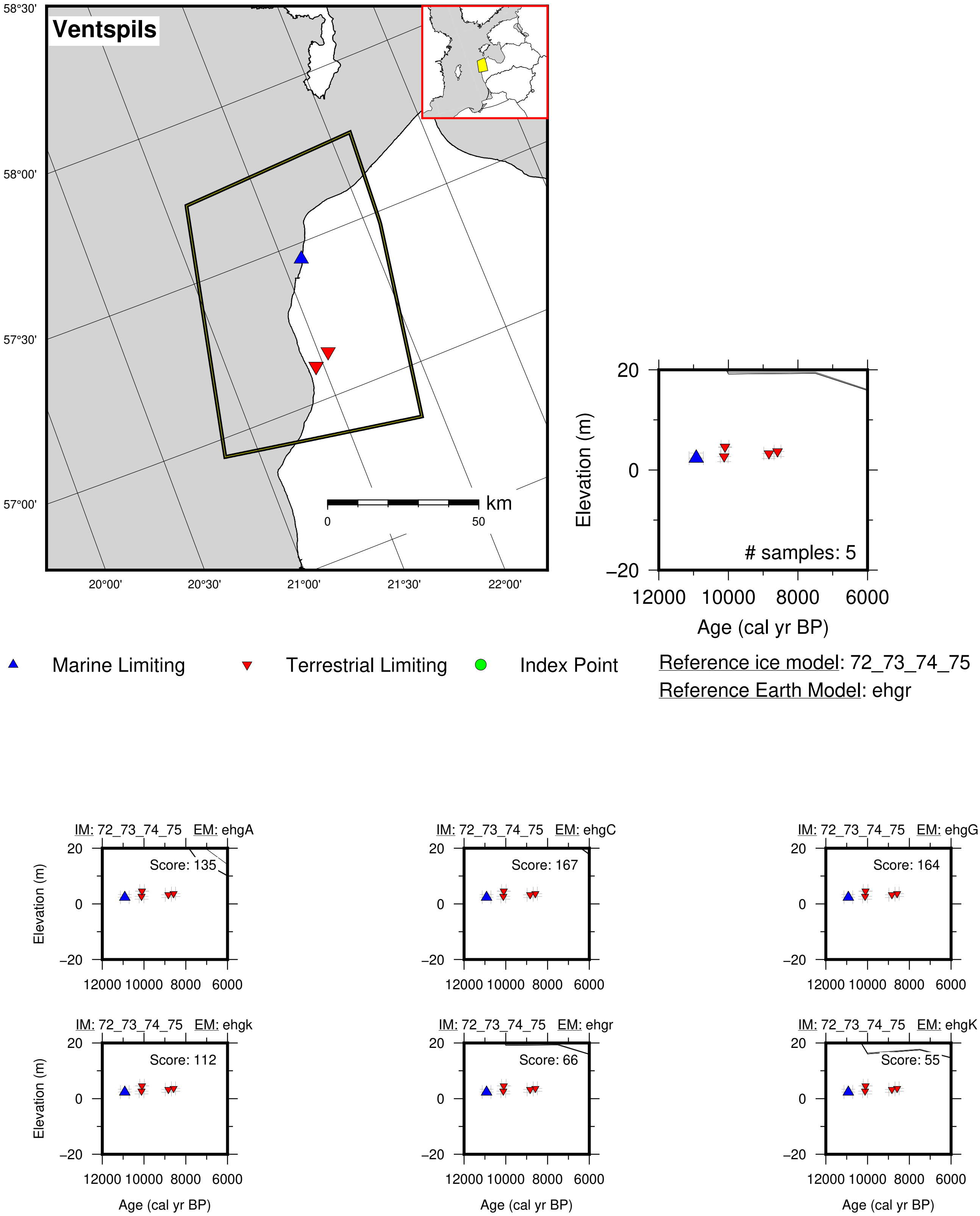


Figure 83: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Ventspils.

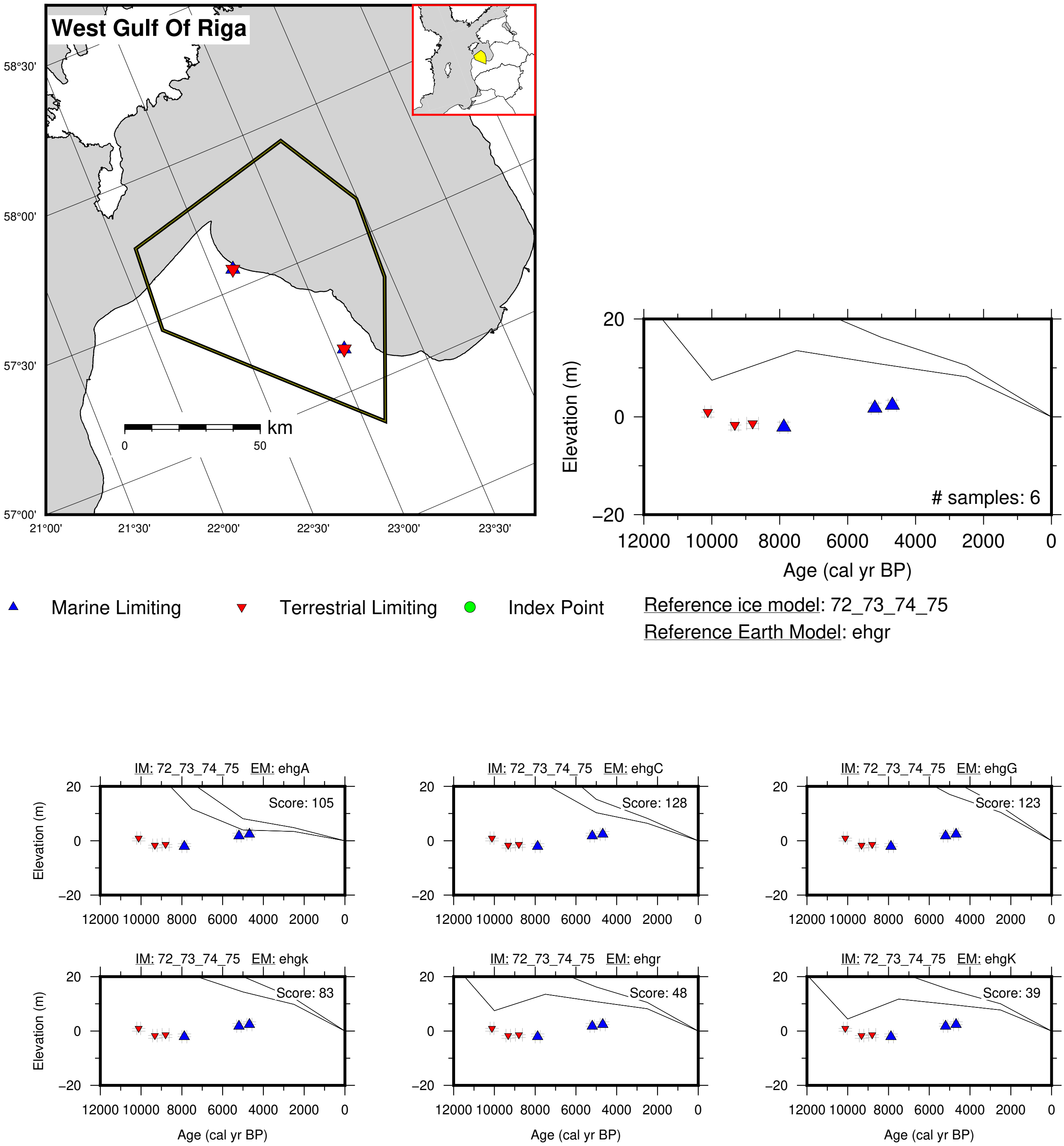


Figure 84: Paleo-sea level and comparison of six models for subregion Baltic Sea, location West Gulf Of Riga.

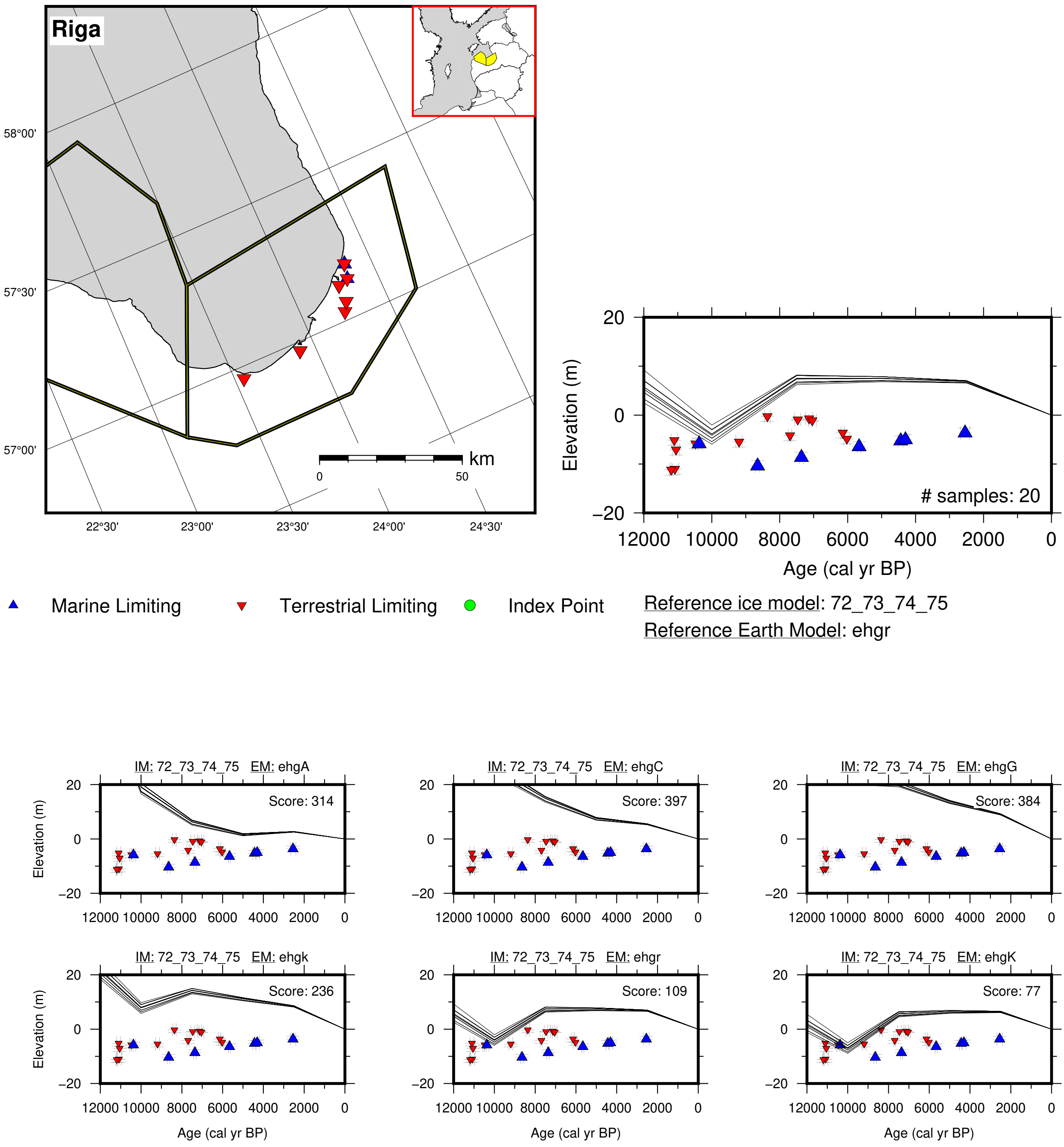


Figure 85: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Riga.

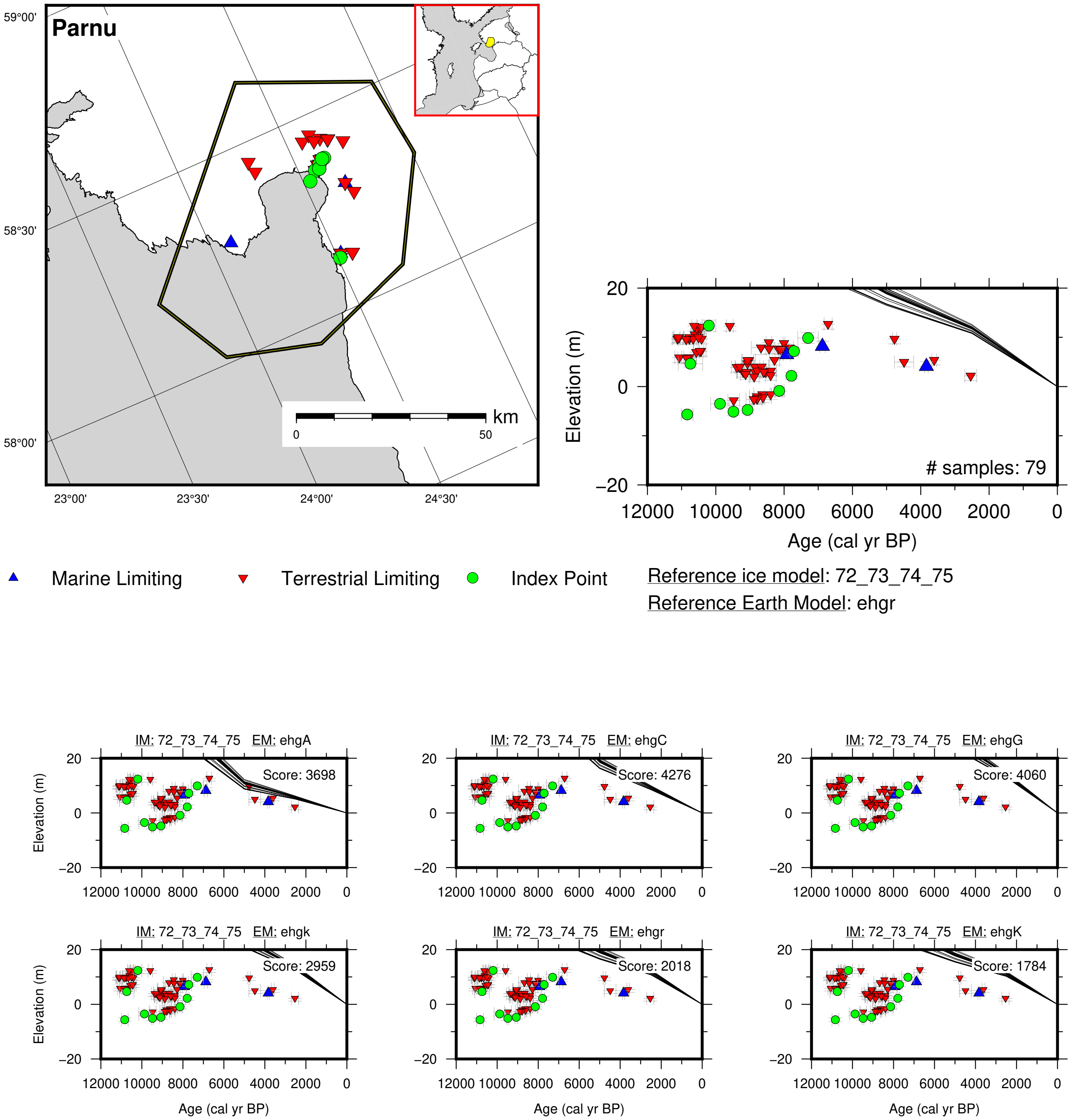


Figure 86: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Parnu.

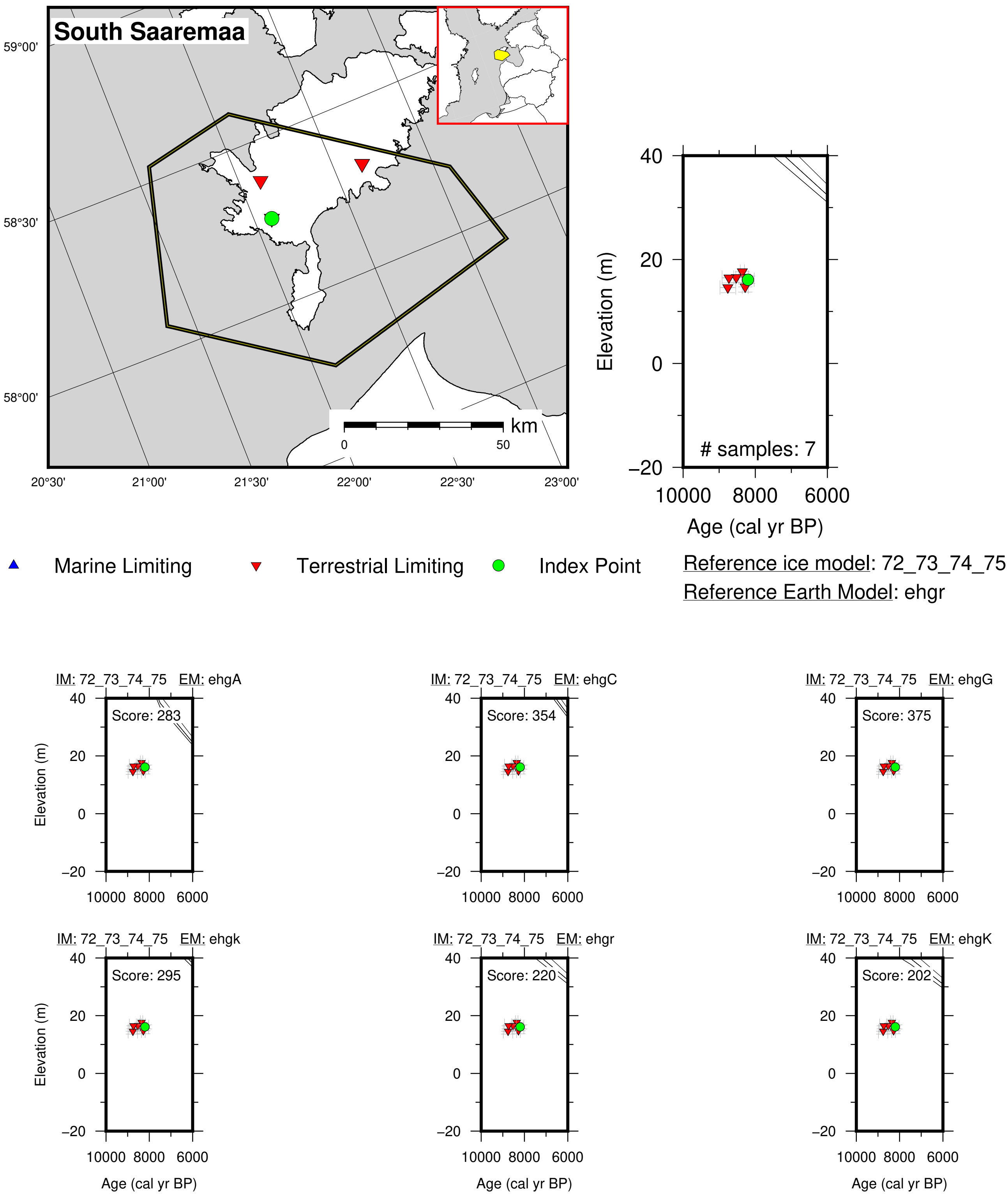


Figure 87: Paleo-sea level and comparison of six models for subregion Baltic Sea, location South Saaremaa.

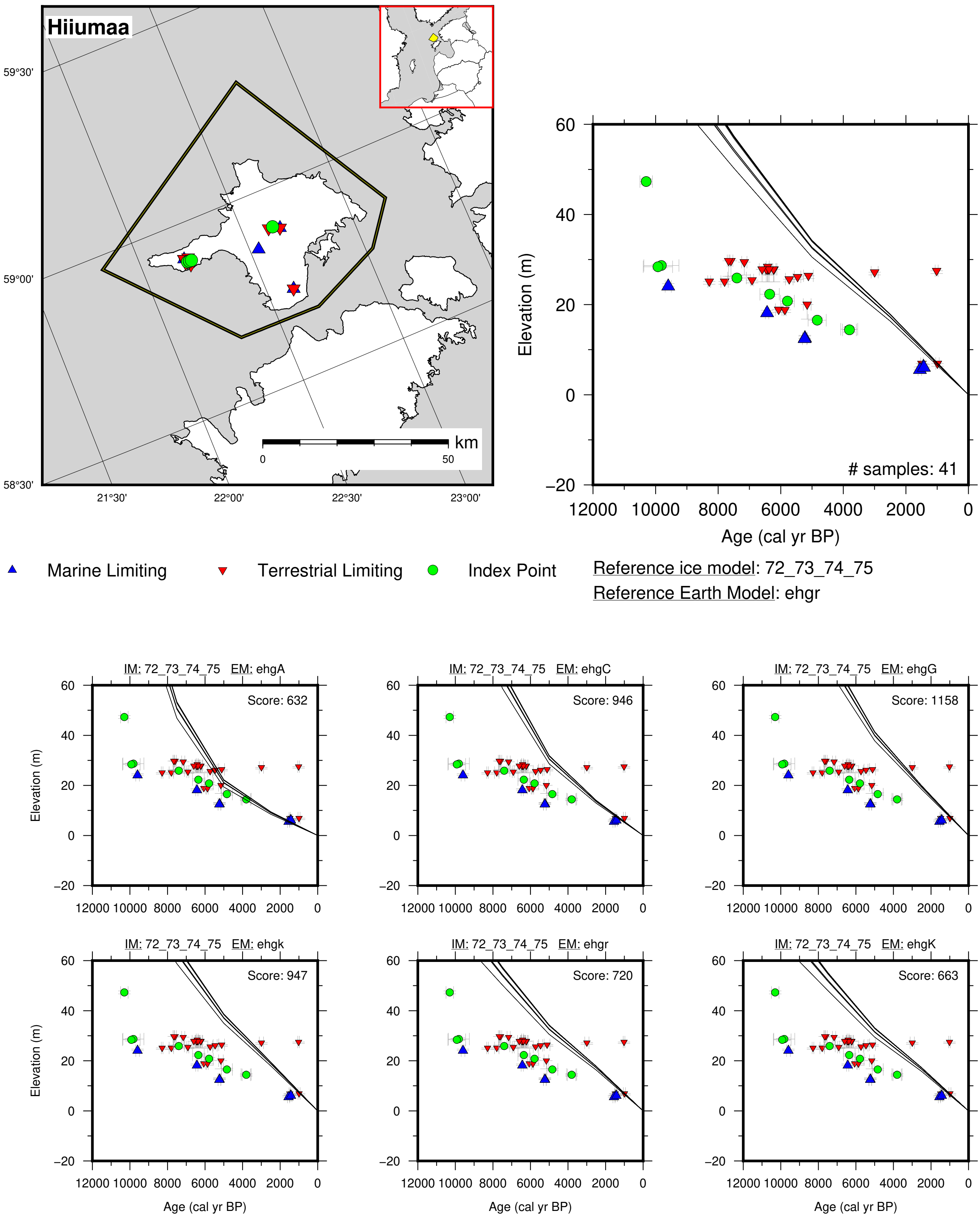


Figure 88: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Hiiumaa.

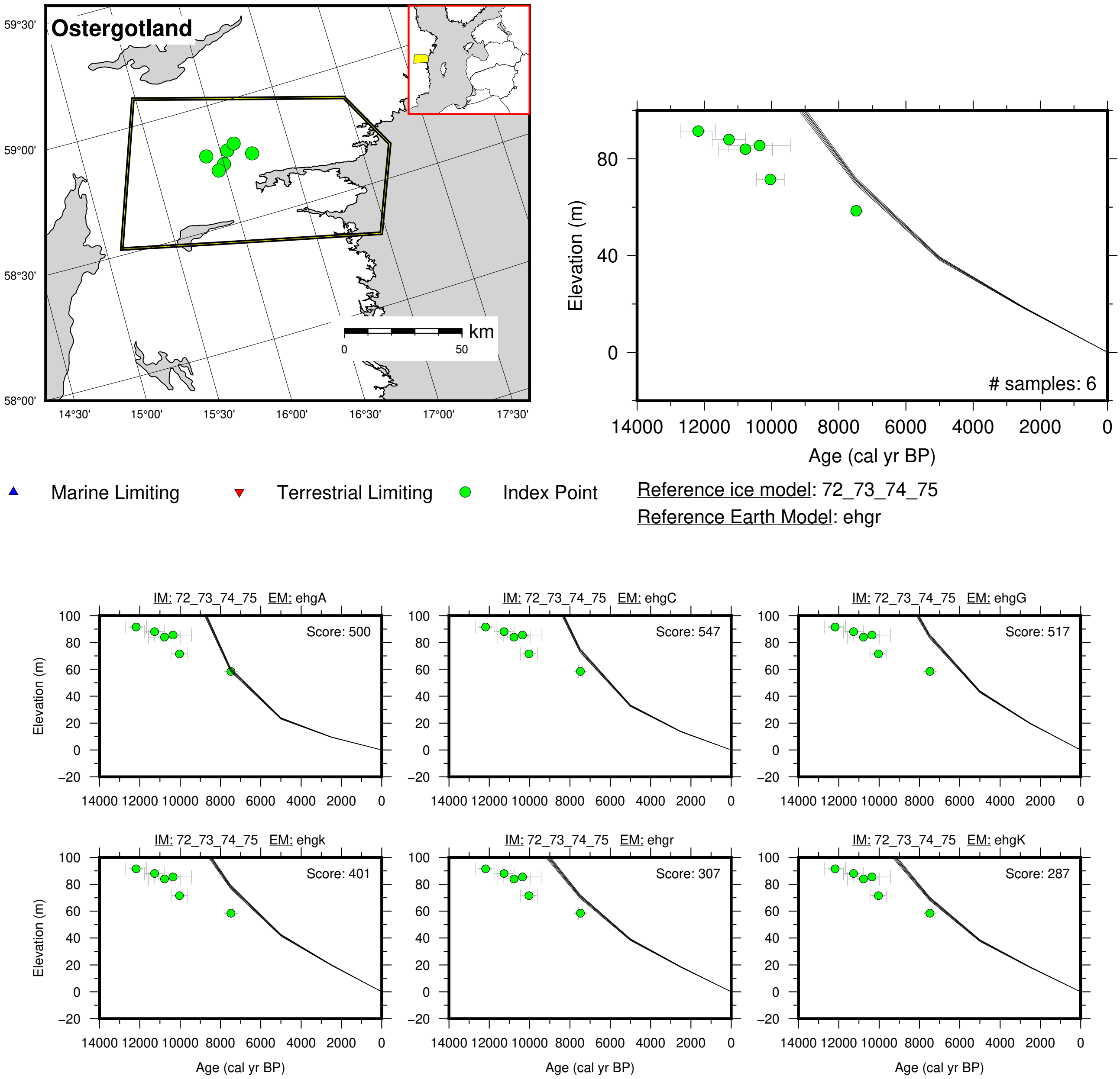


Figure 89: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Ostergotland.

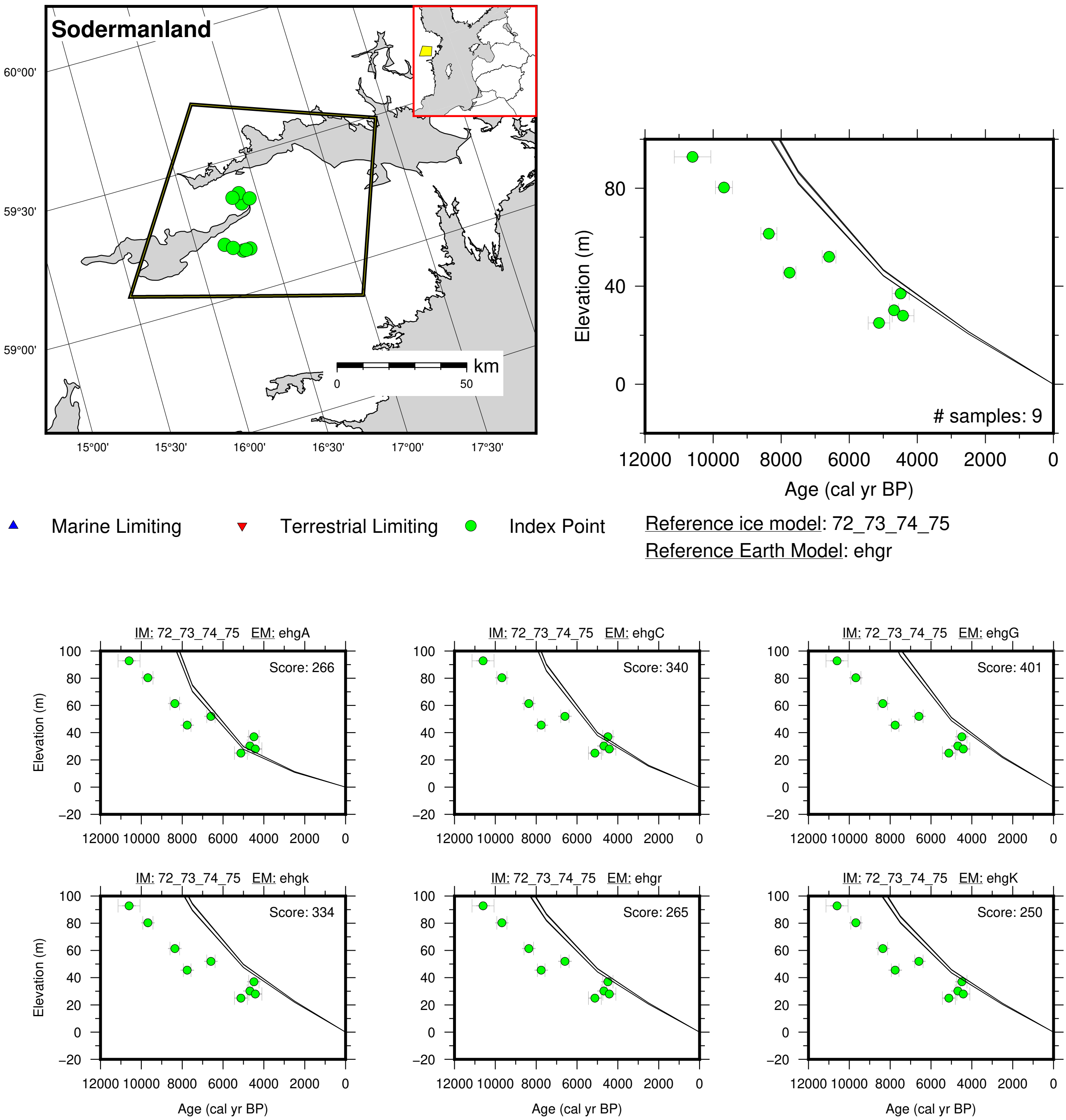


Figure 90: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Sodermanland.

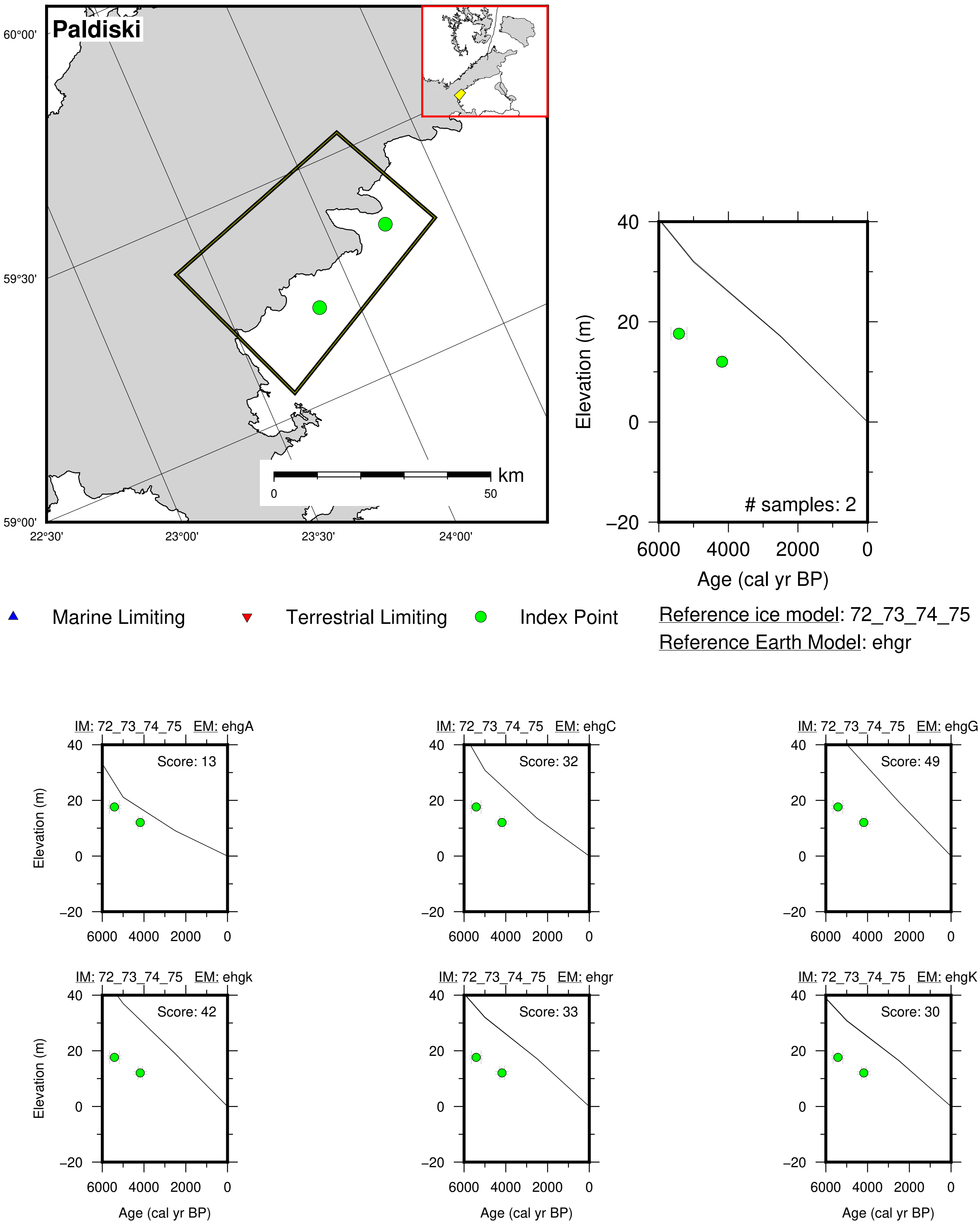


Figure 91: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Paldiski.

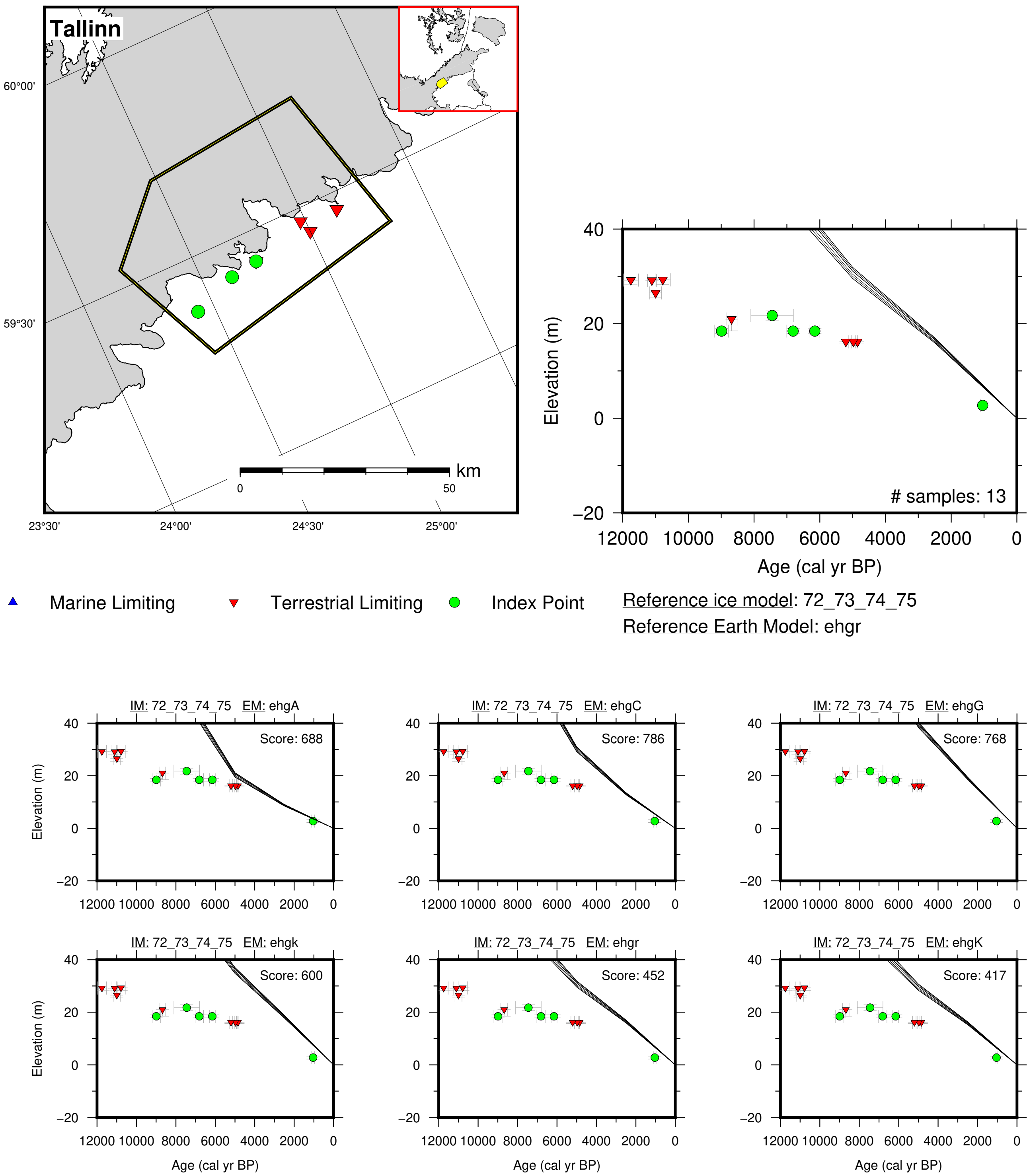


Figure 92: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Tallinn.

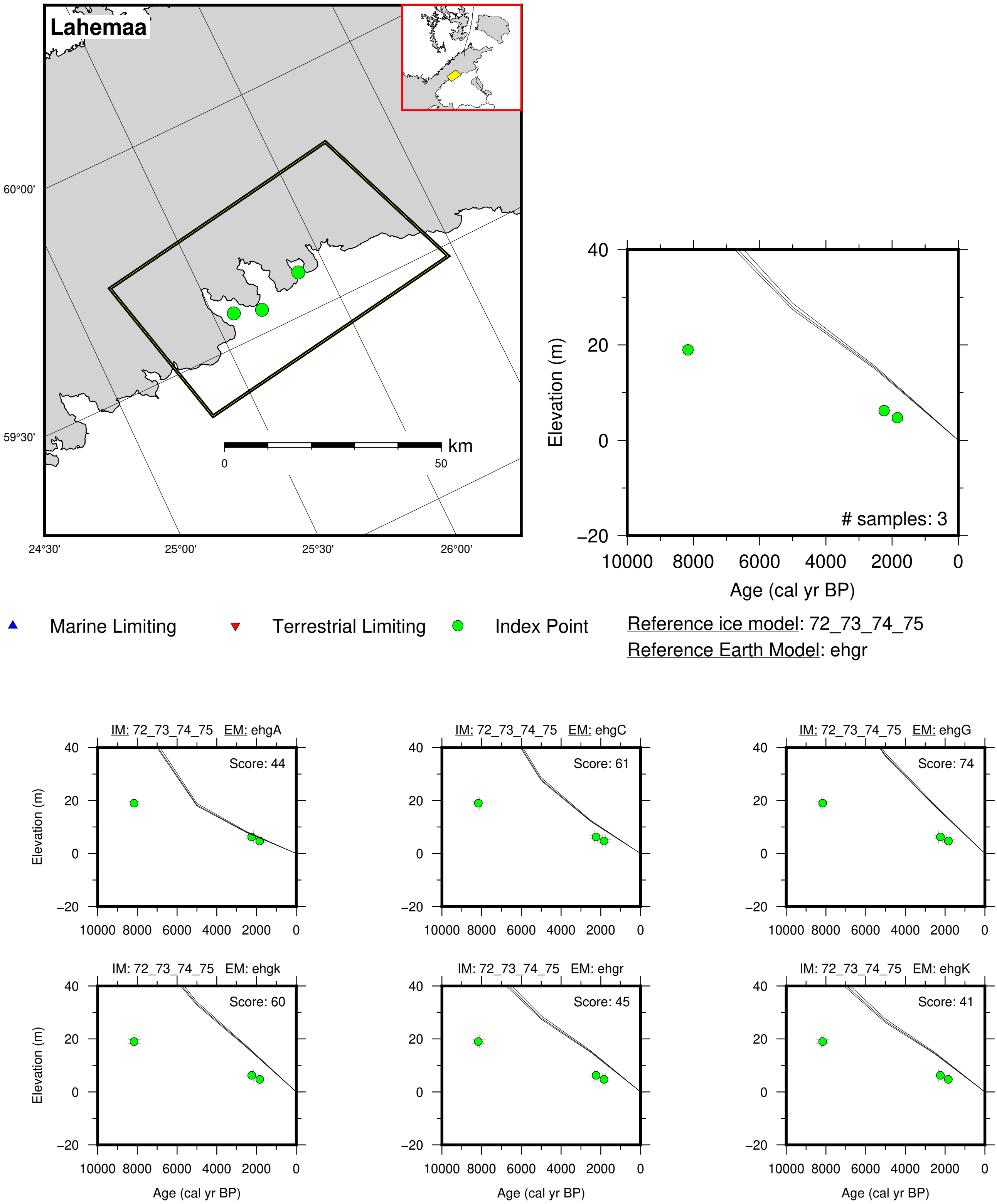


Figure 93: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Lahemaa.

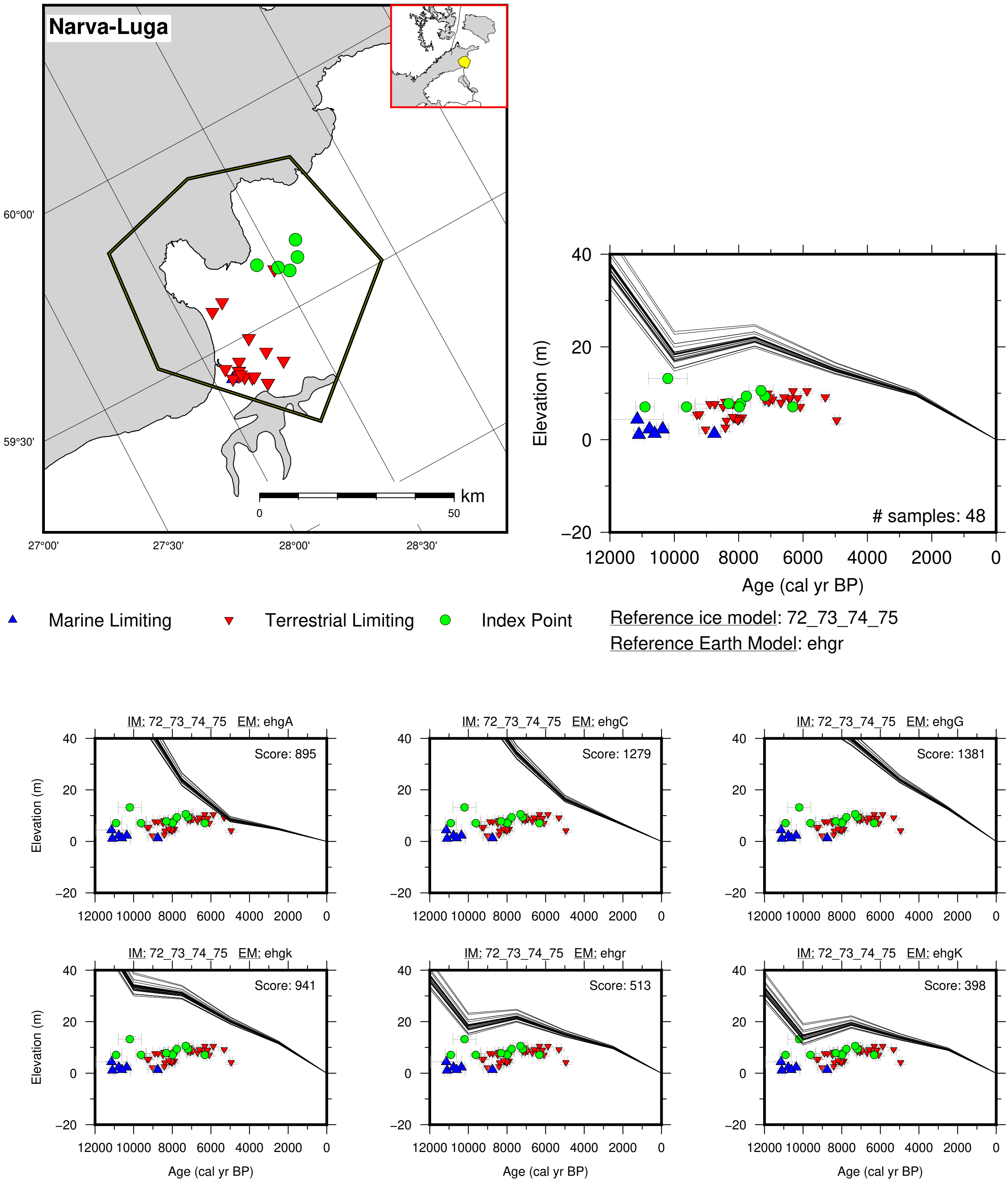


Figure 94: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Narva-Luga.

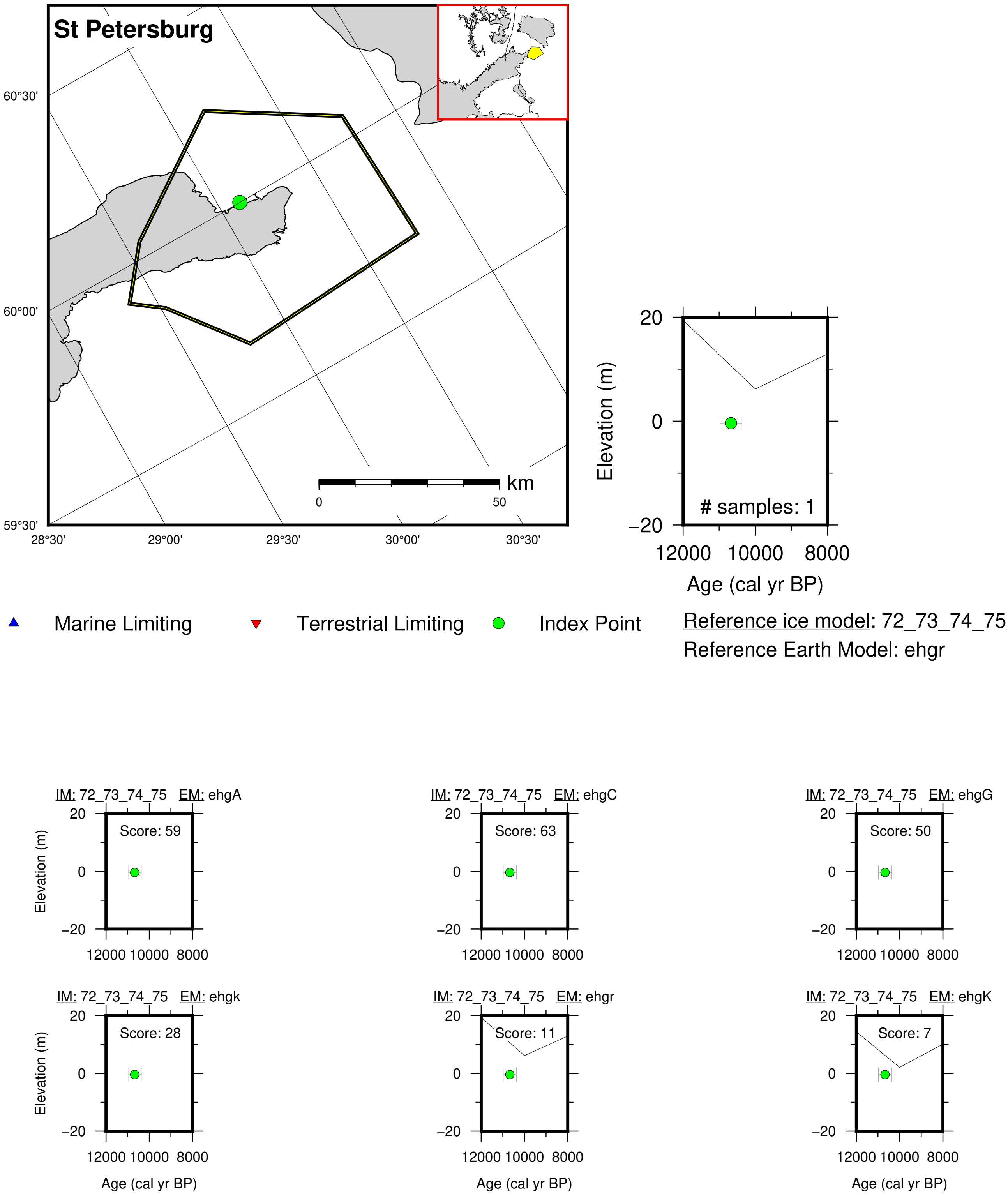


Figure 95: Paleo-sea level and comparison of six models for subregion Baltic Sea, location St Petersburg.

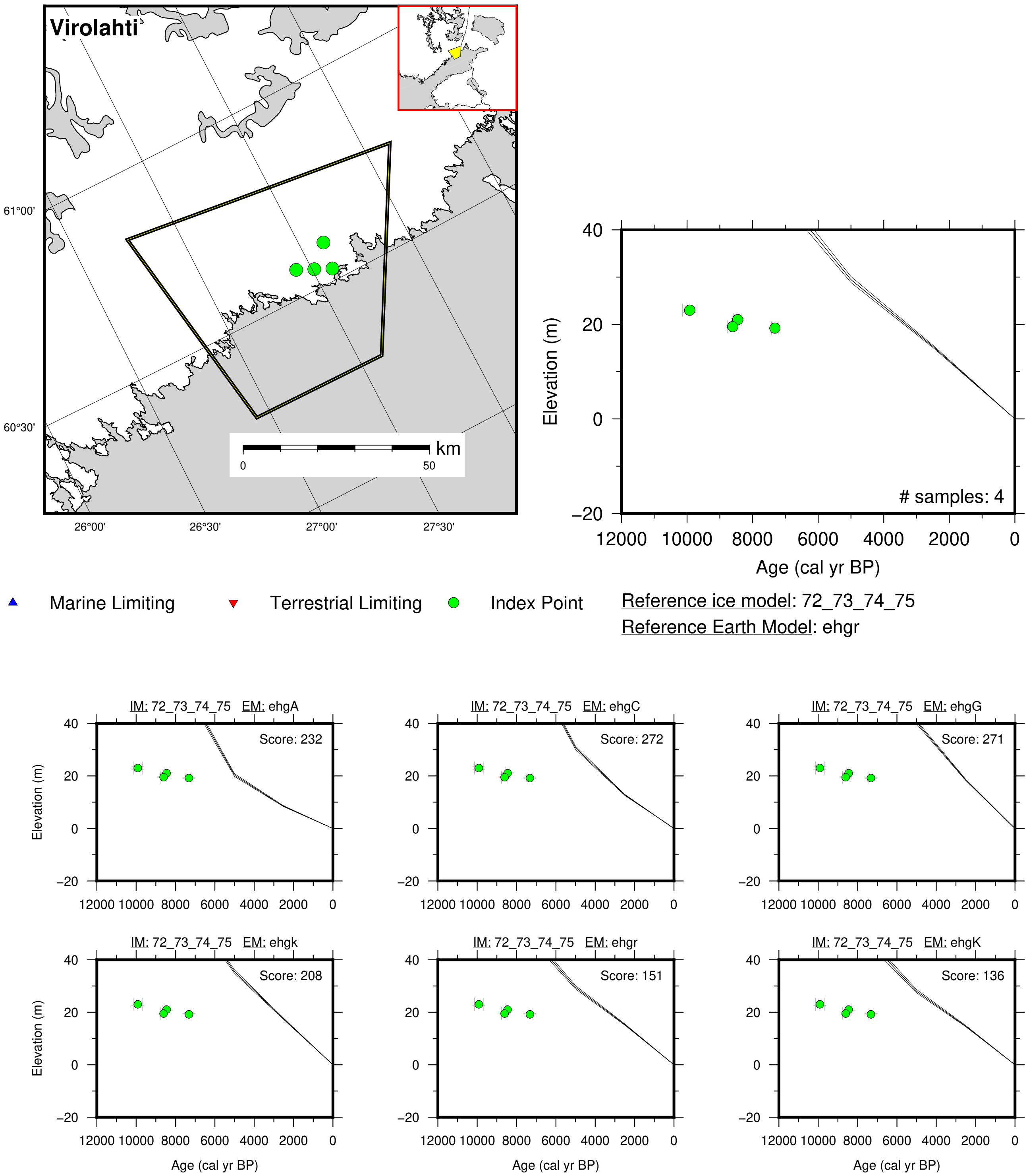


Figure 96: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Virolahti.

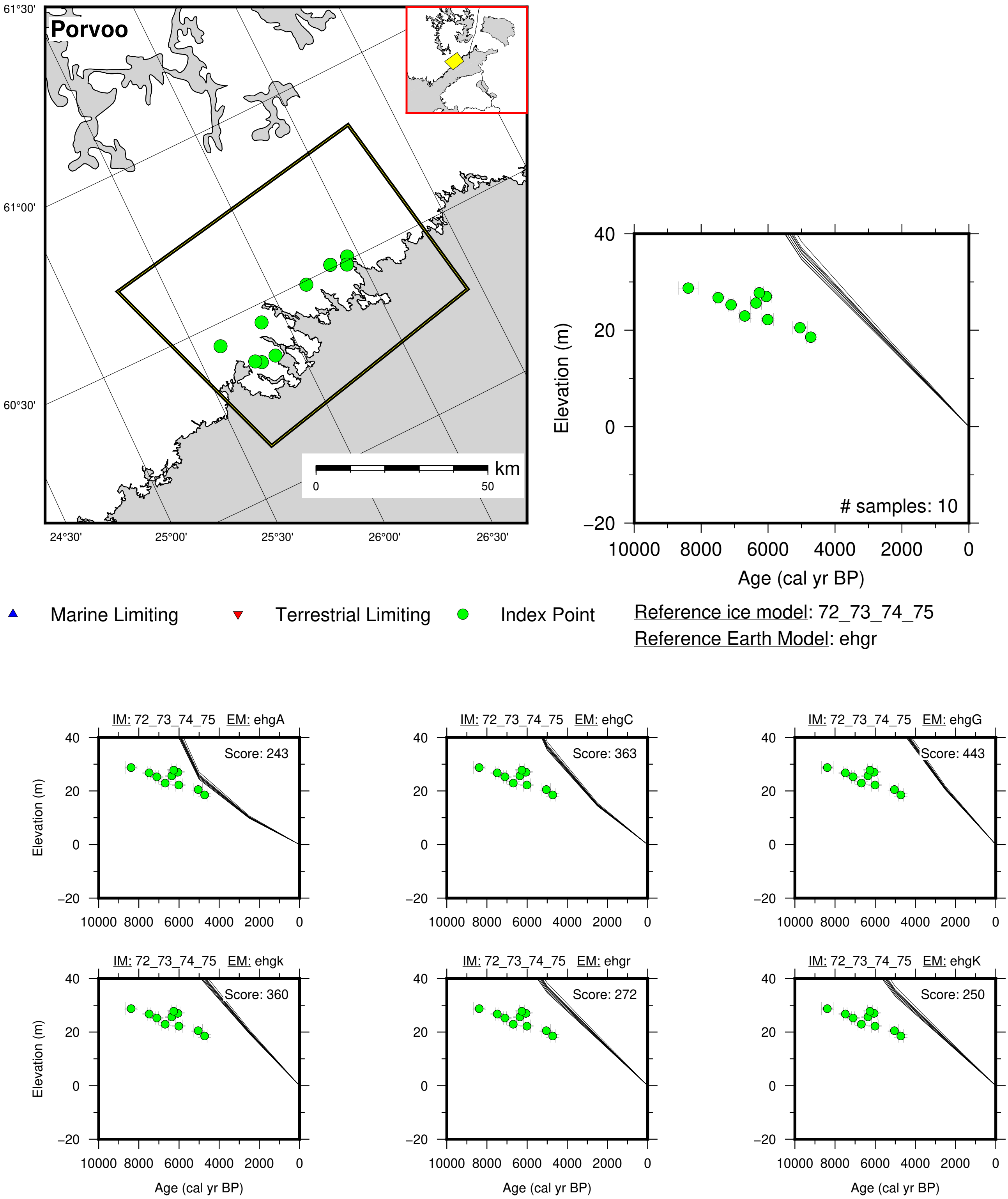


Figure 97: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Porvoo.

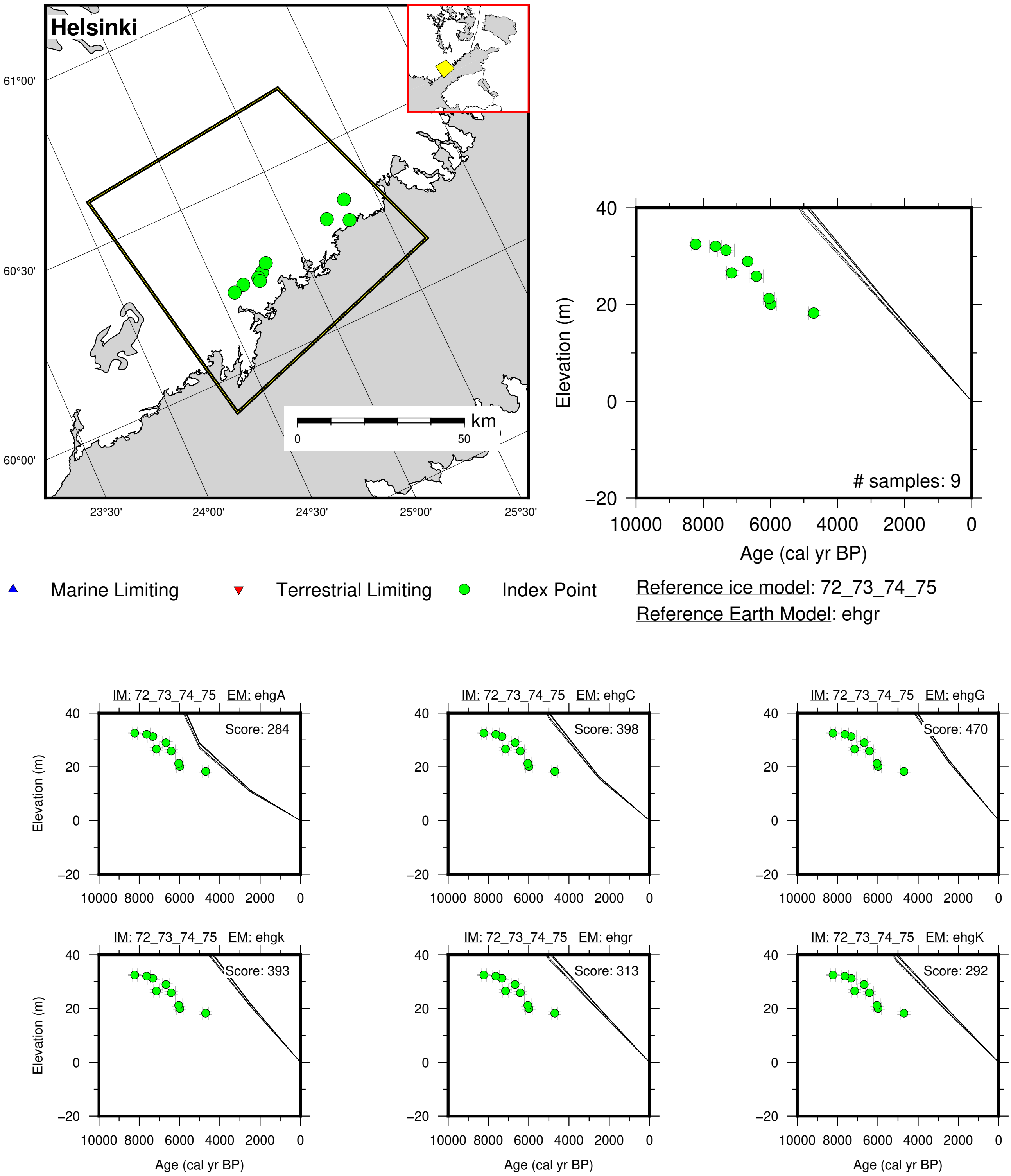


Figure 98: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Helsinki.

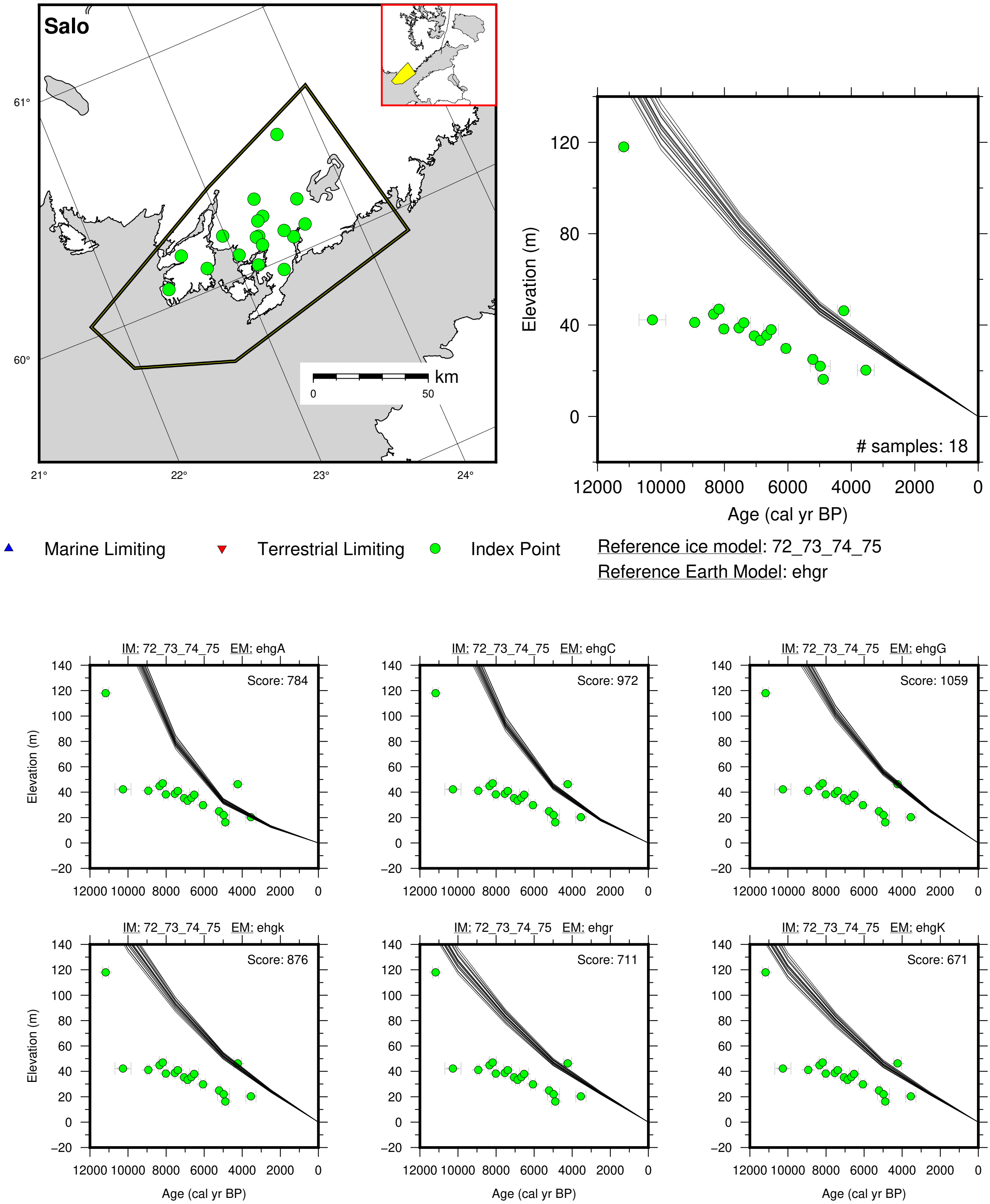


Figure 99: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Salo.

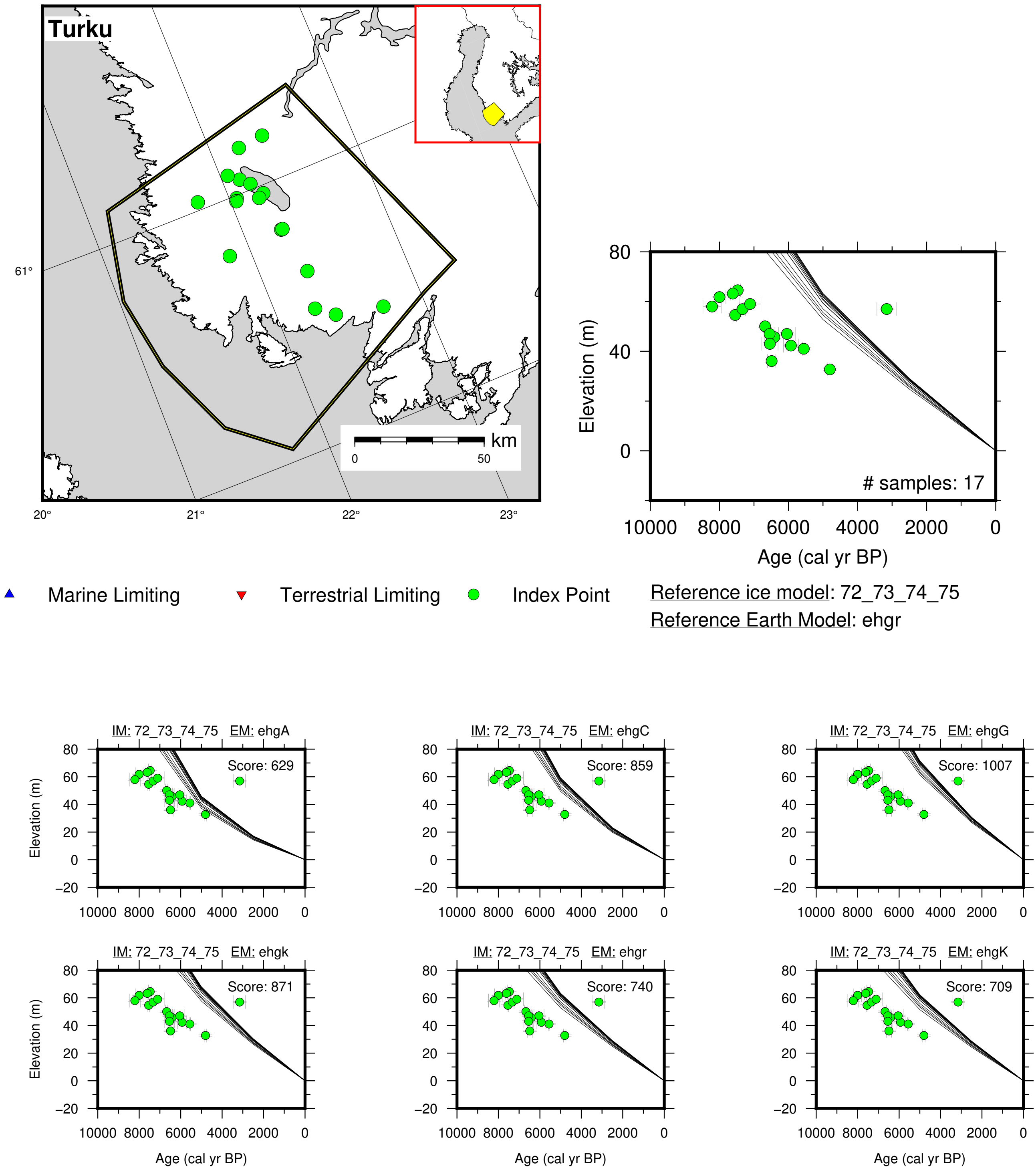


Figure 100: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Turku.

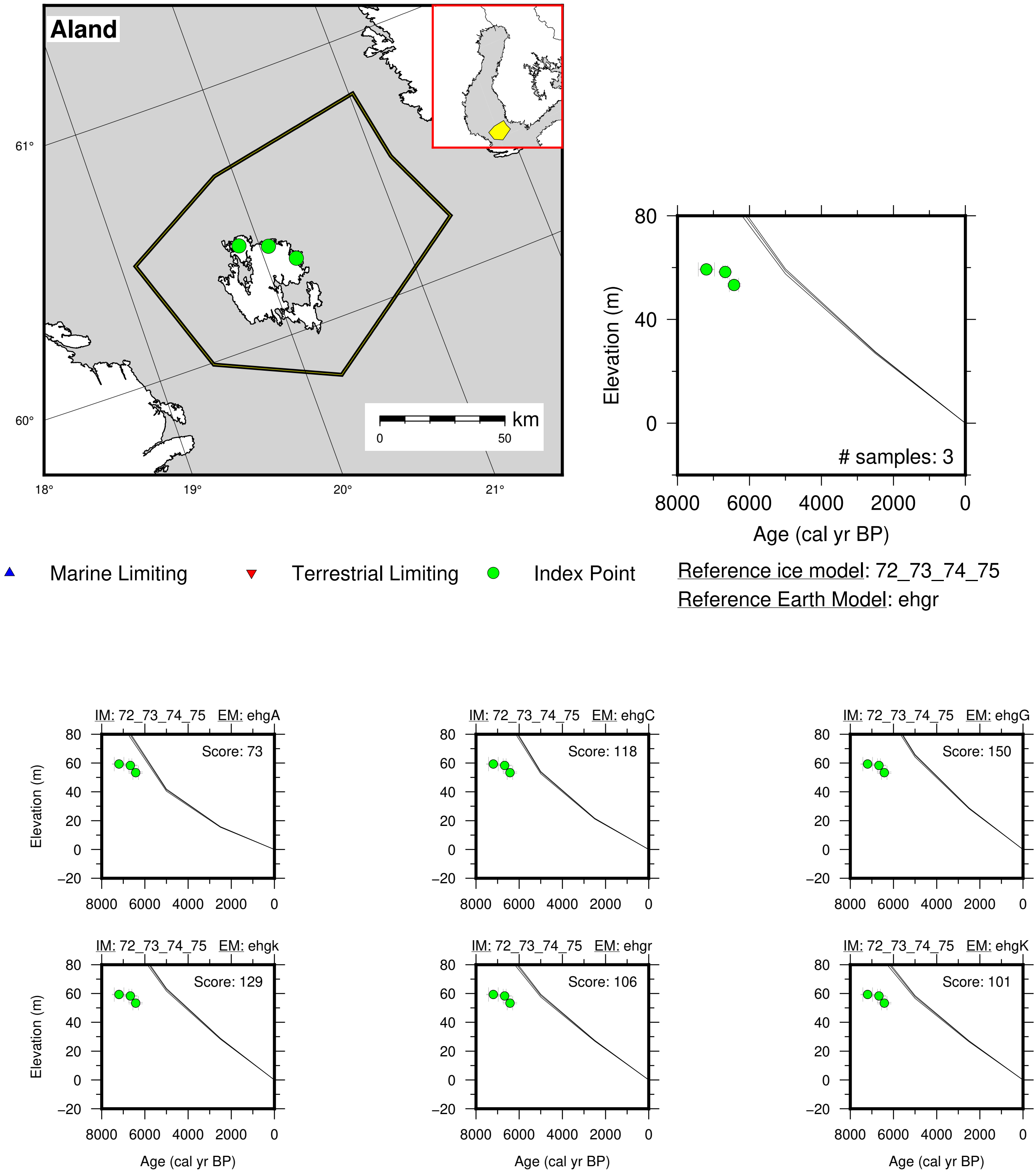


Figure 101: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Aland.

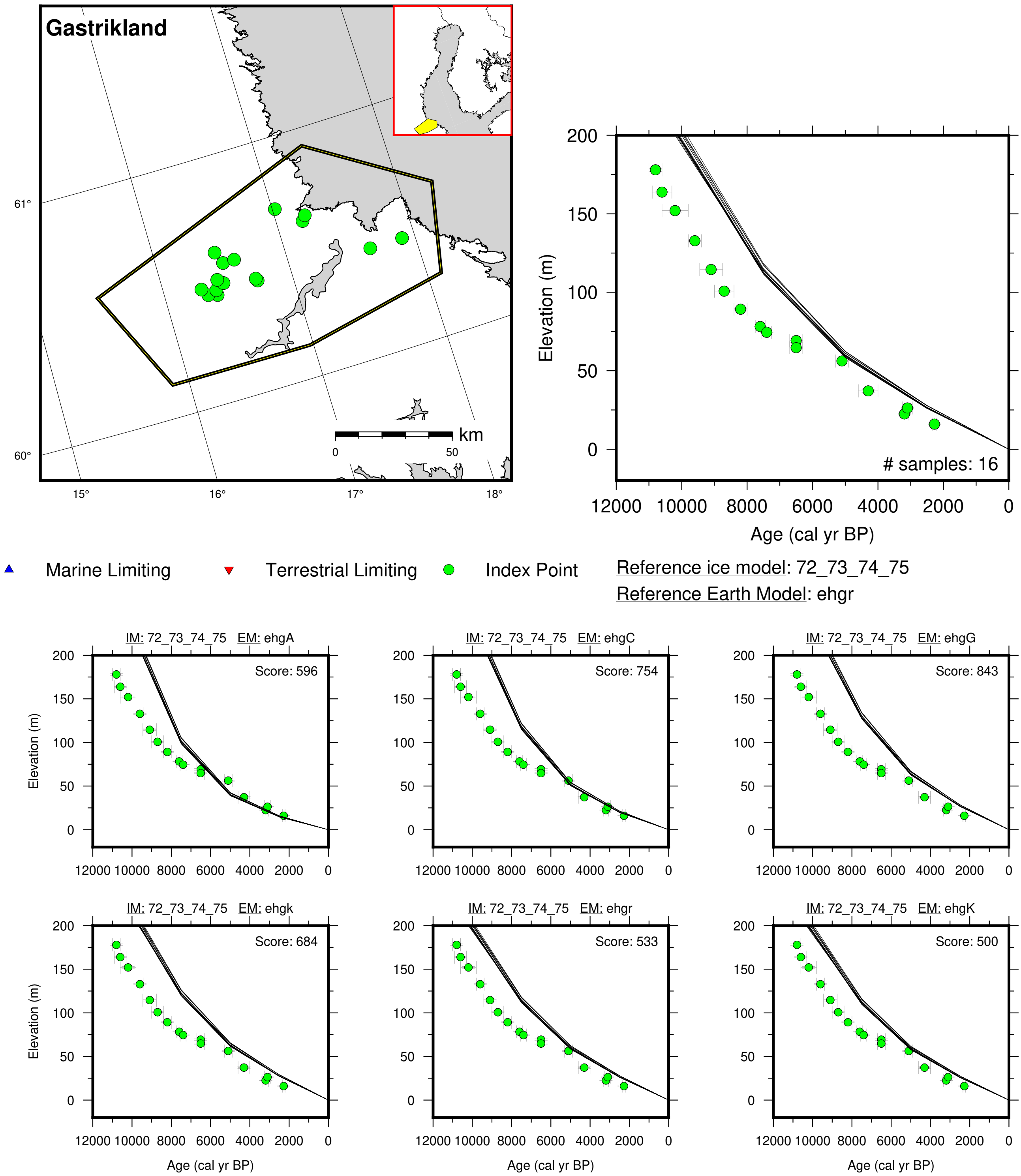


Figure 102: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Gastrikland.

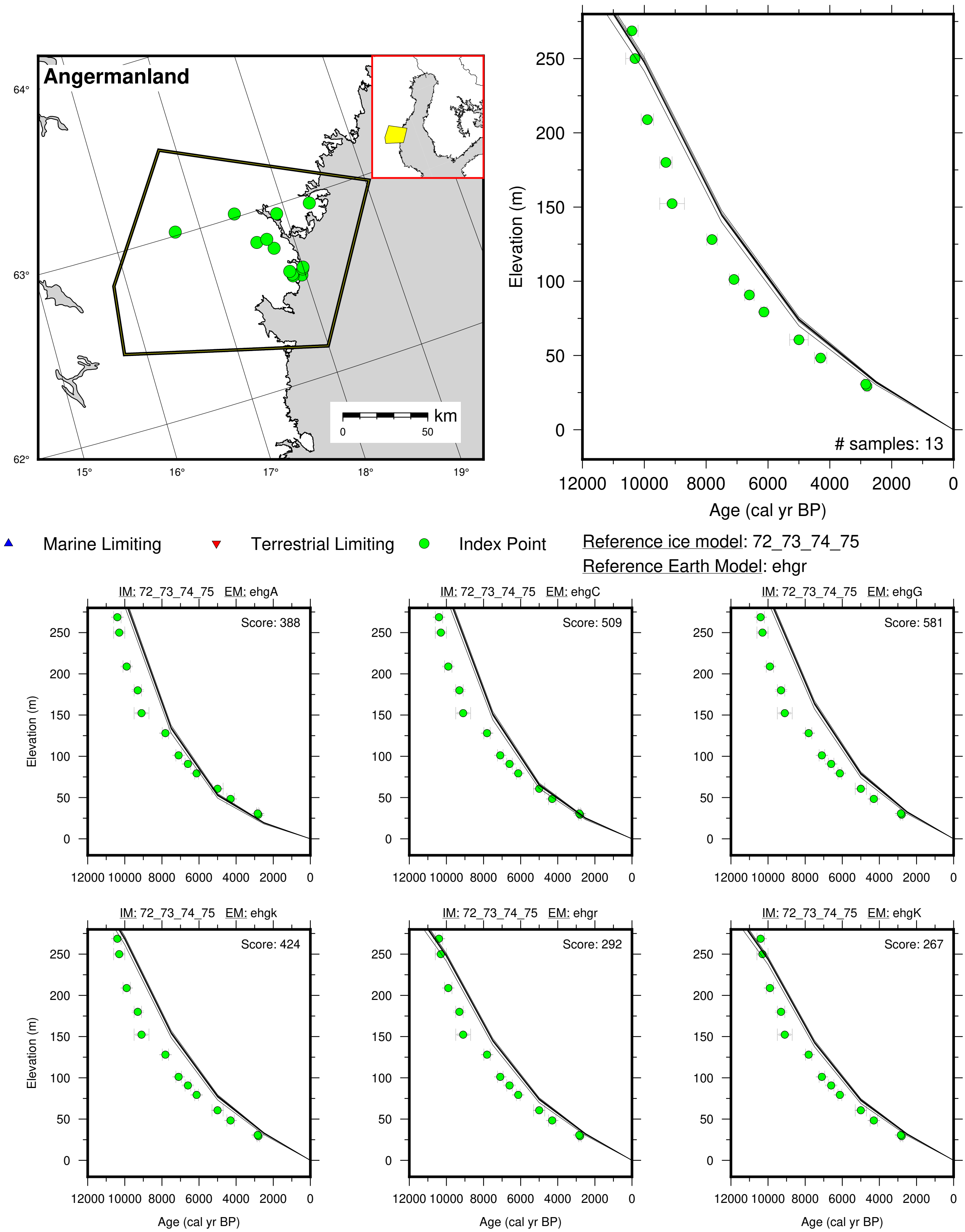


Figure 103: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Angermanland.

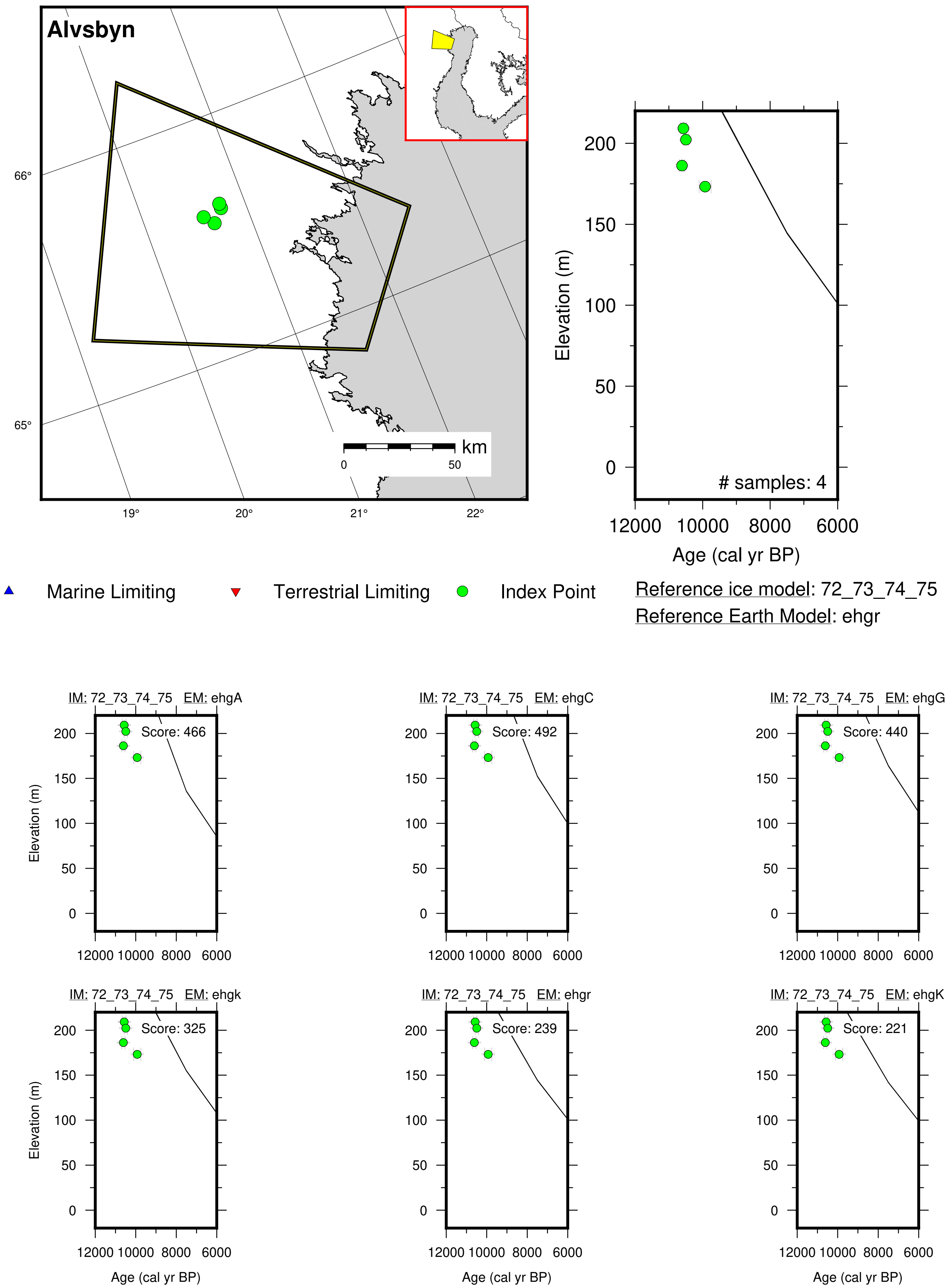


Figure 104: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Alvsbyn.

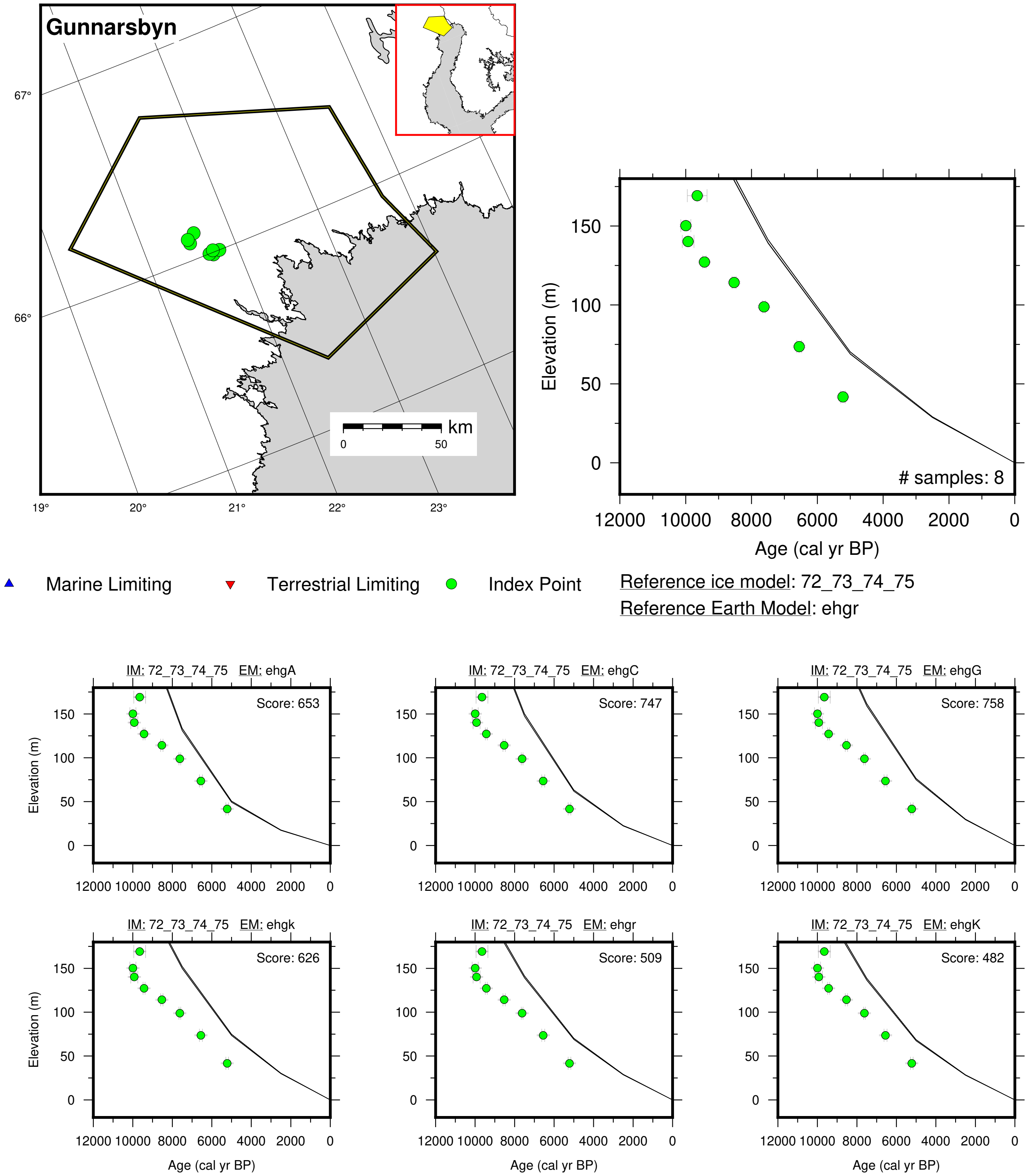


Figure 105: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Gunnarsbyn.

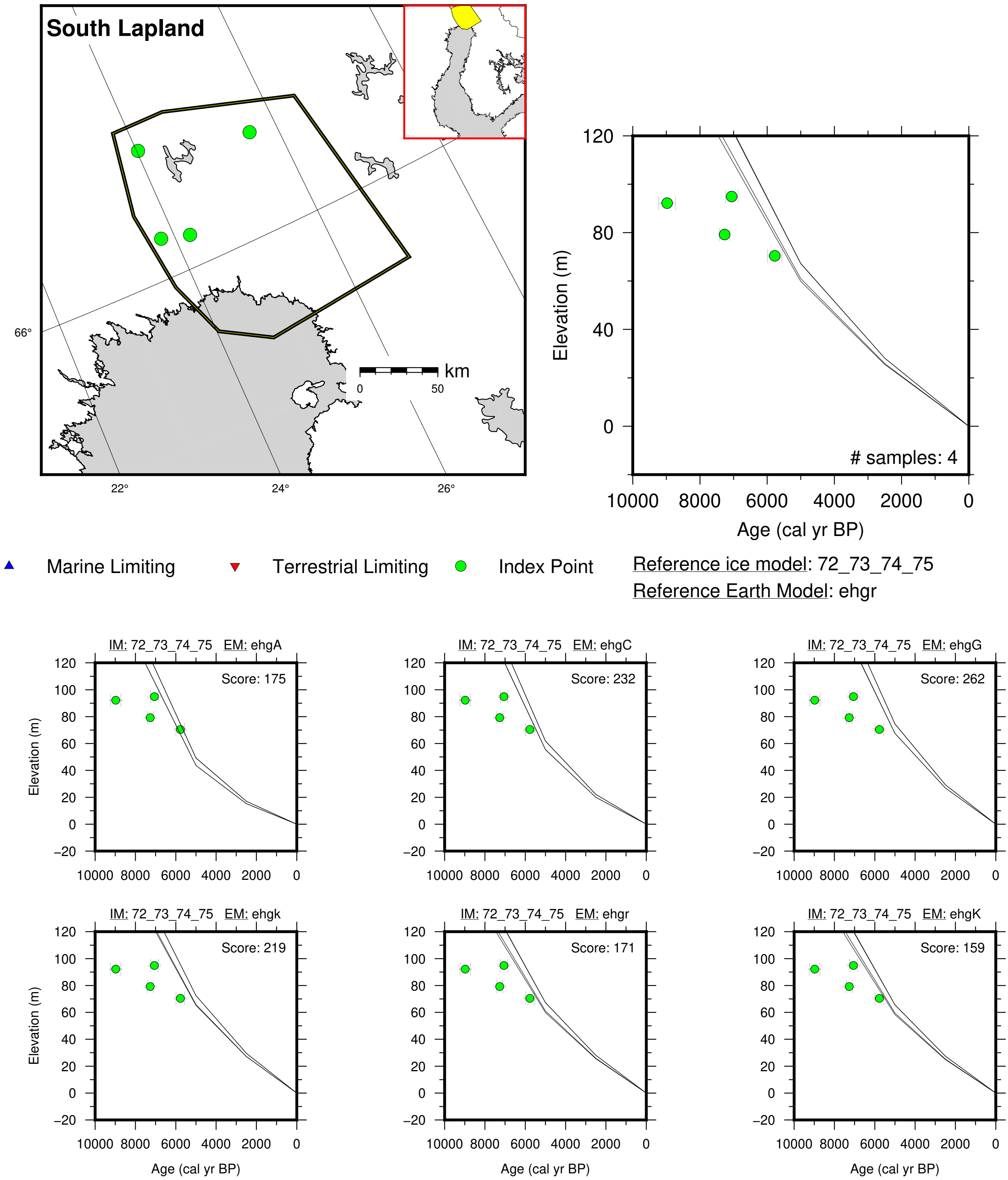


Figure 106: Paleo-sea level and comparison of six models for subregion Baltic Sea, location South Lapland.

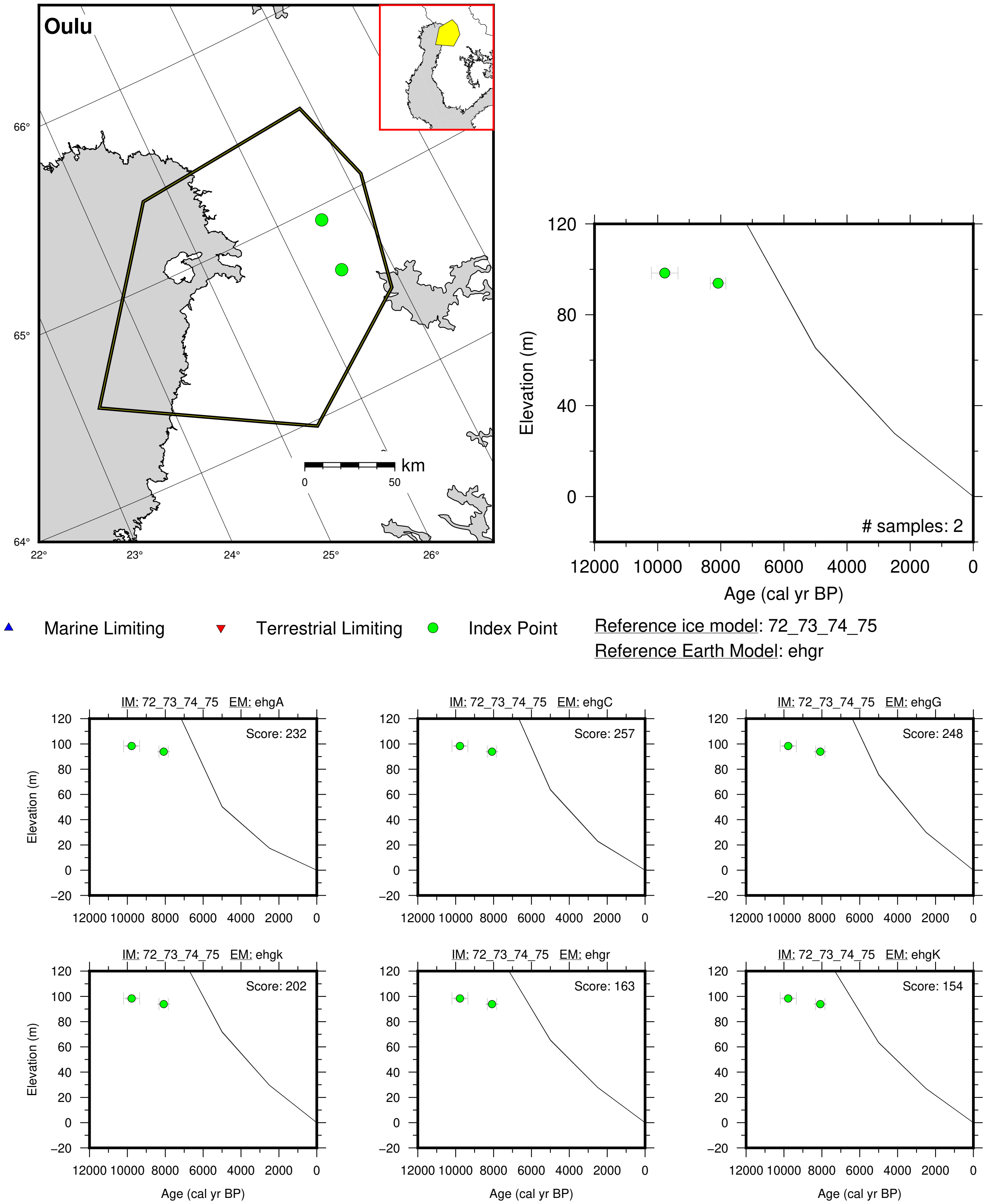


Figure 107: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Oulu.

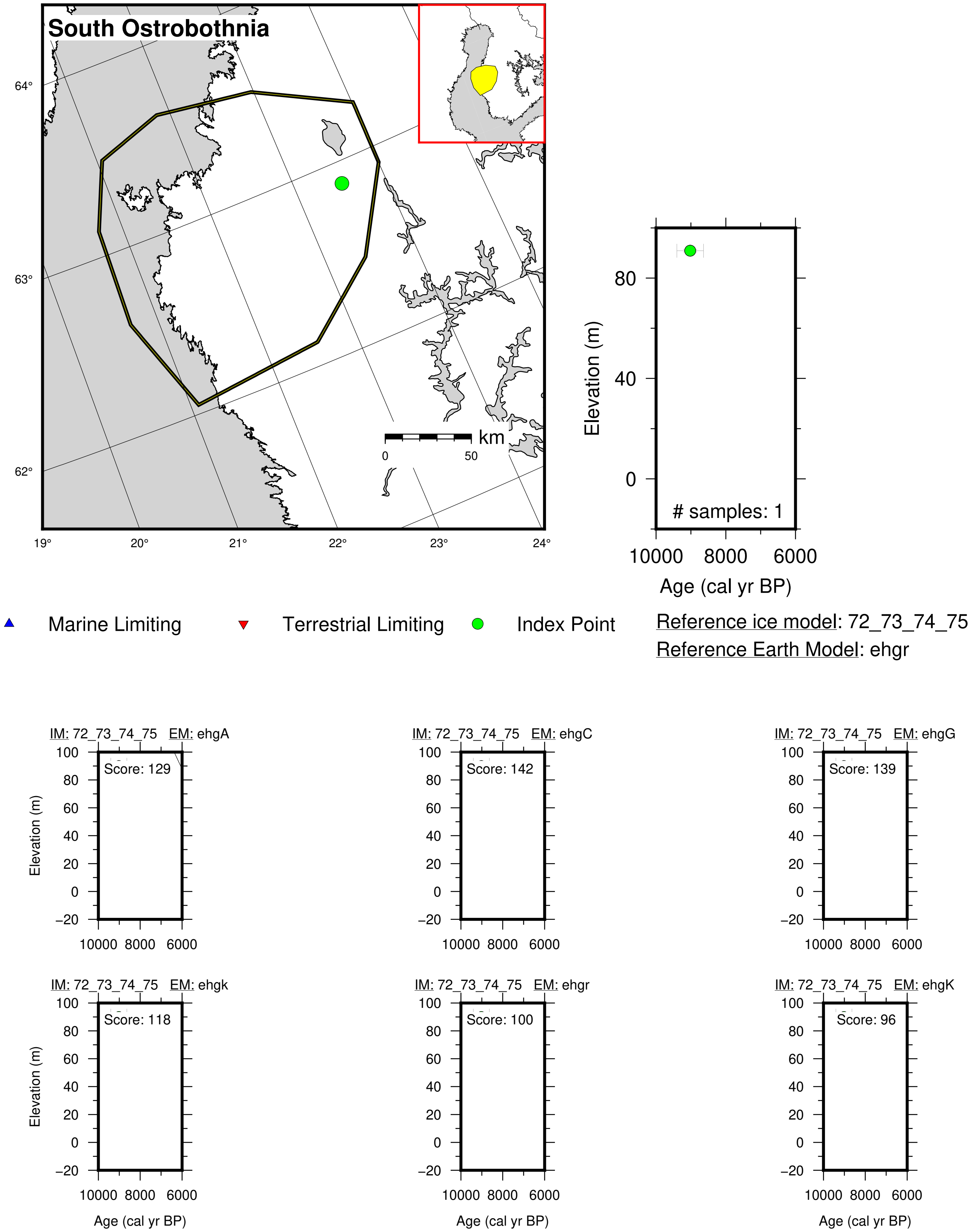


Figure 108: Paleo-sea level and comparison of six models for subregion Baltic Sea, location South Ostrobothnia.

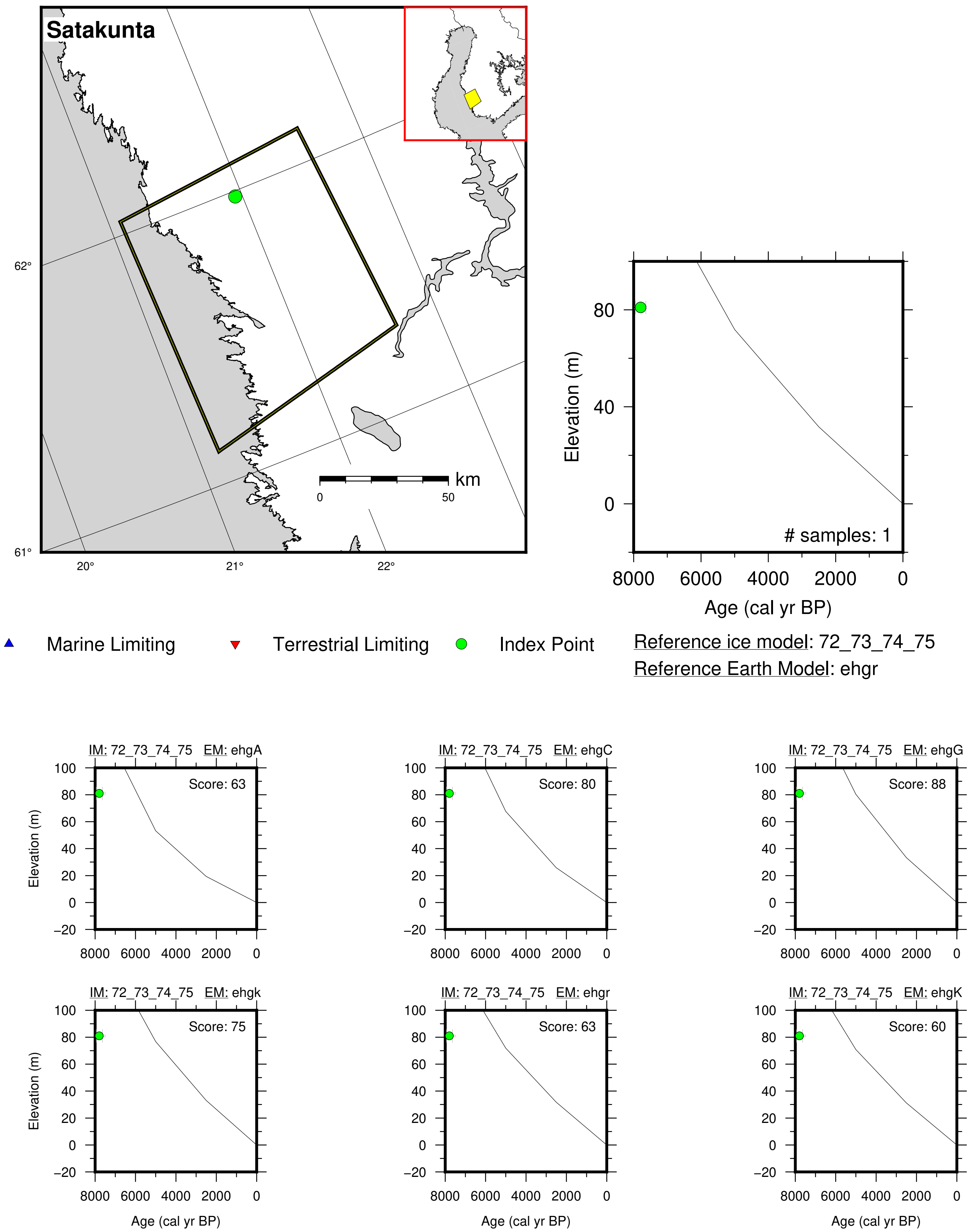


Figure 109: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Satakunta.

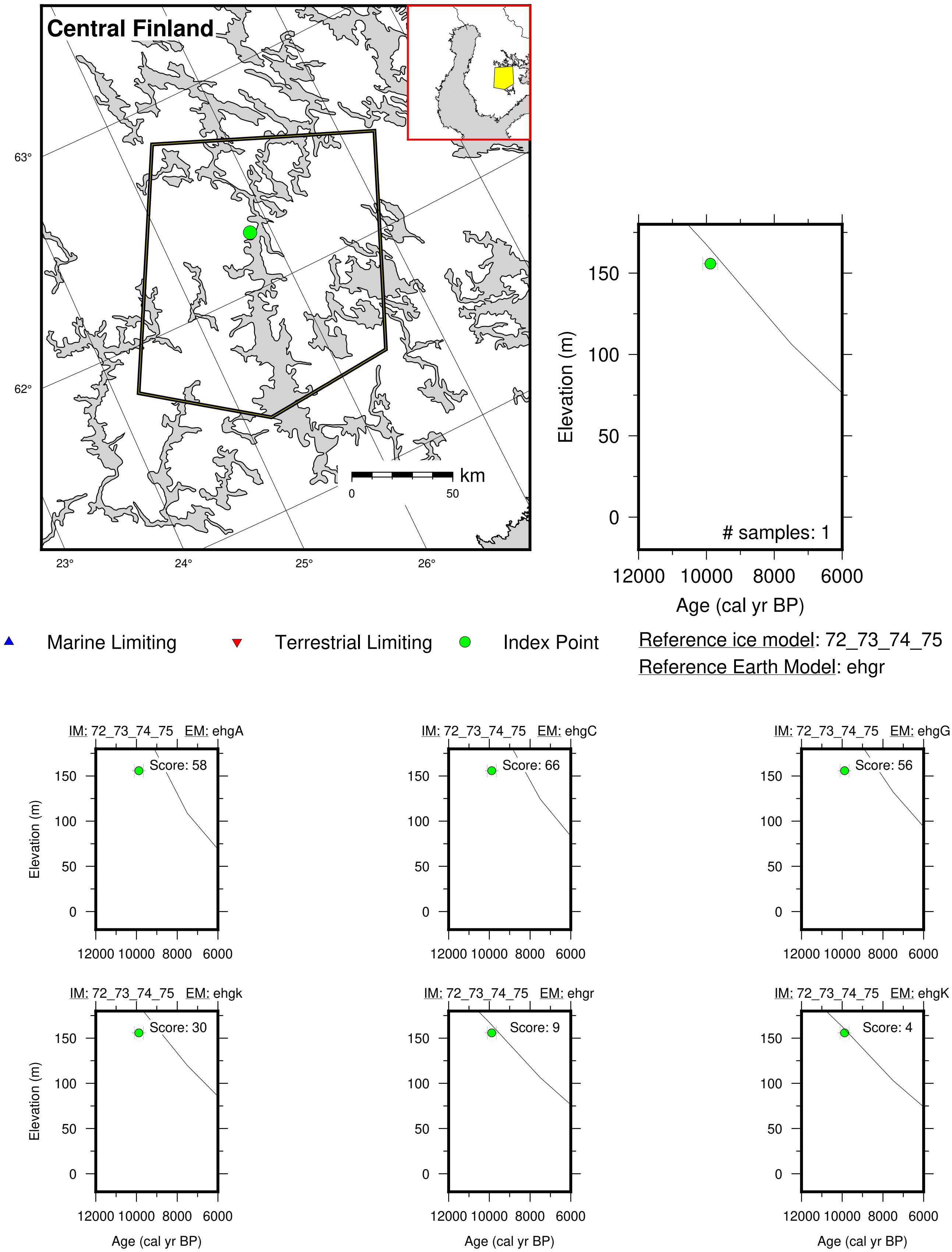


Figure 110: Paleo-sea level and comparison of six models for subregion Baltic Sea, location Central Finland.

9.2 North Sea

References for the data used in each location.

Rotterdam: Berendsen et al. (2007); Hijma and Cohen (2010, 2019); Hijma et al. (2009); Jelgersma (1961); Kiden (1989, 1995); Slupik et al. (2013); van de Plassche (1982, 1995); van de Plassche et al. (2010); van Heteren et al. (2002); Vink et al. (2007); Vos (1992, 2013); Vos and Cohen (2014); Vos et al. (2010, 2011, 2015)

Langeoog: Barckhausen (1969); Bungenstock (2005); Bungenstock et al. (2021); Mauz and Bungenstock (2007); NIBIS® Map Server (2014)

Netherlands Wadden Sea: Bakker (1992); De Groot et al. (1996); De Jong (1984); Griede (1978); Jelgersma (1961); Kiden and Vos (2012); Meijles et al. (2018); van der Spek (1994); Woldring et al. (2005)

Belgium: Denys and Baeteman (1995); Vink et al. (2007)

Southern Bight: Jelgersma (1961); Kiden et al. (2002); Vink et al. (2007)

Central Netherlands: Bennema (1954); Jelgersma (1961); Louwe Kooijmans (1976); Makaske et al. (2003); Roeleveld and Gotjé (1993); van de Plassche (1982); van de Plassche et al. (2005); Vink et al. (2007)

Oyster Ground: Behre and Irion (1984); Behre (2003); Jelgersma (1979); Kiden et al. (2002); Vink et al. (2007)

Dogger Bank: Behre (2003, 2007); Behre and Menke (1969); Vink et al. (2007)

Norderney: Barckhausen (1984); Behre (1970, 2003, 2007); Brandt (1980); Freund and Streif (2000); Haarnagel (1957, 1969, 1980); Reinhardt (1965); Scheder et al. (2019, 2022); Streif (1986); Vink et al. (2007)

Bremerhaven: Behre et al. (1975); Behre (2003, 2007); Behre and Kučan (1999); Brandt (1980, 1991); Ey (1995); Haarnagel (1979); Hanisch (1980); Körber-Grohne (1967); Ludwig et al. (1981); Preuss (1979); Schmid (1994); Schütte (1939); Sindowski (1969); Strahl (2002a,b); Streif (1981, 1984, 1985, 1986); Vink et al. (2007)

Elbe: Bantelmann (1960, 1966, 1975); Bantelmann et al. (1984); Behre (2003, 2007); Behre et al. (1979); Brandt (1980); Higelke et al. (1984); Linke (1982); Meier (2001a,b); Menke (1976, 1988); Rohde (1975); Vink et al. (2007)

German Bight: Behre (2003, 2007); Ludwig et al. (1979); Menke (1996); Streif et al. (1983); Vink et al. (2007)

Ho Bugt: Gehrels et al. (2006)

Limfjord: Jessen et al. (2019); Nielsen (2010, 2013); Petersen (1975, 1981, 1985, 1998); Petersen and von Platen-Hallermund (2018)

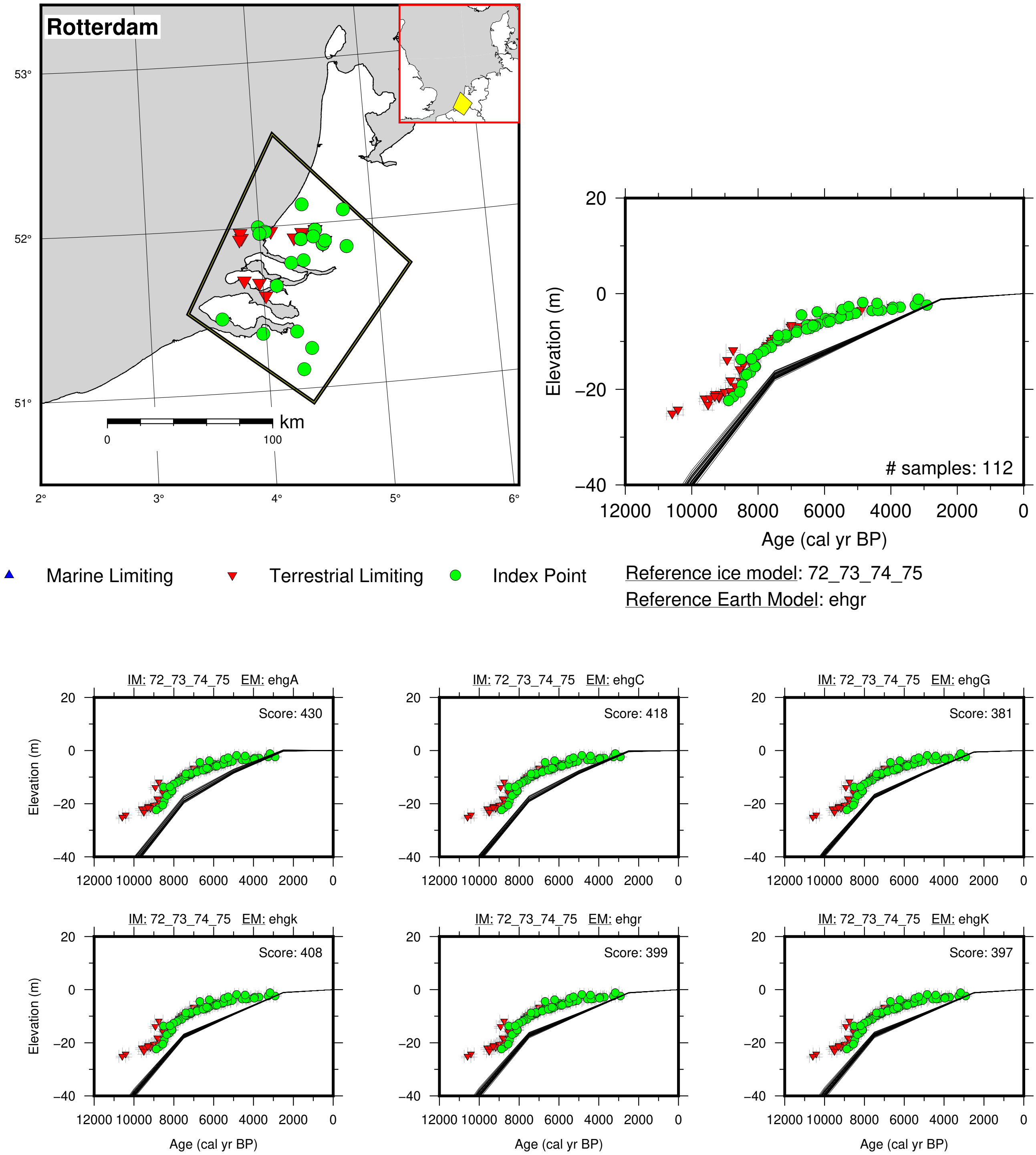


Figure 111: Paleo-sea level and comparison of six models for subregion North Sea, location Rotterdam.

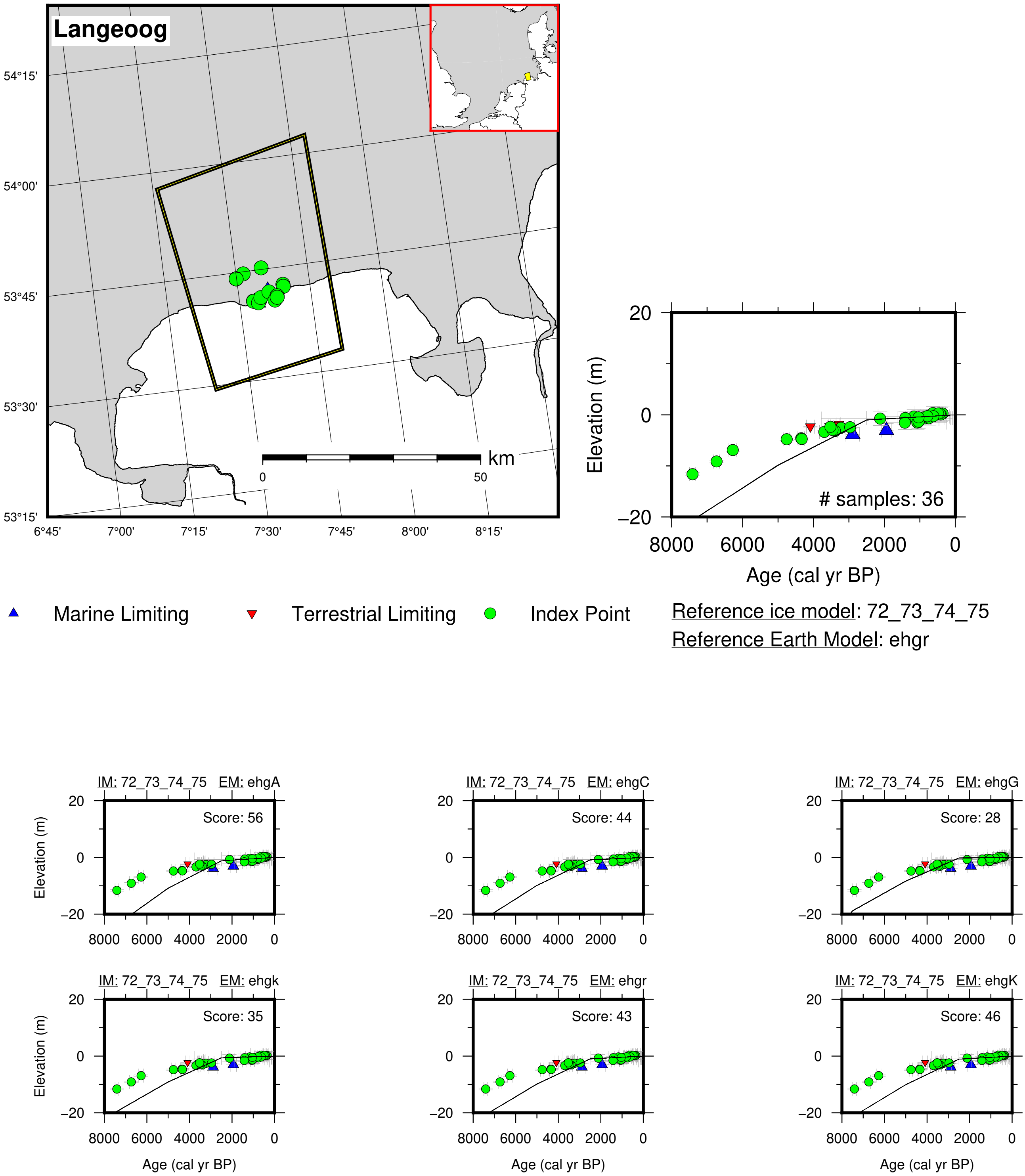
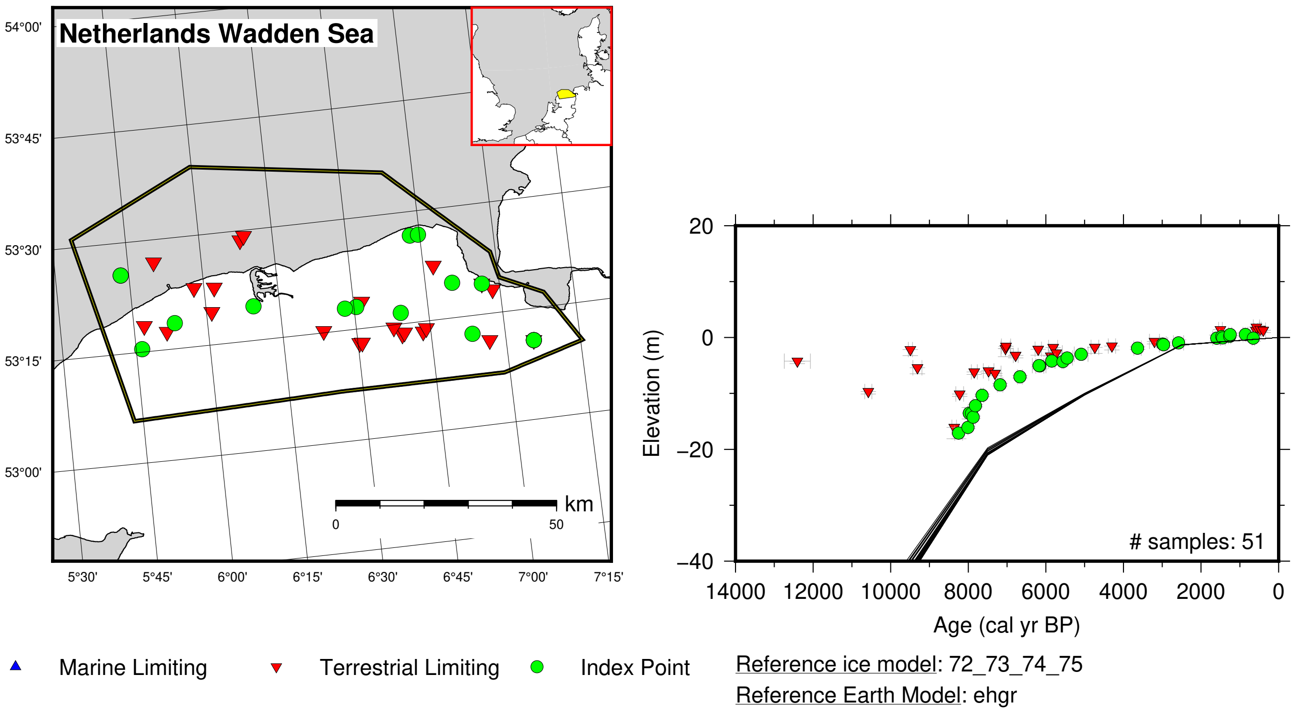


Figure 112: Paleo-sea level and comparison of six models for subregion North Sea, location Langeoog.



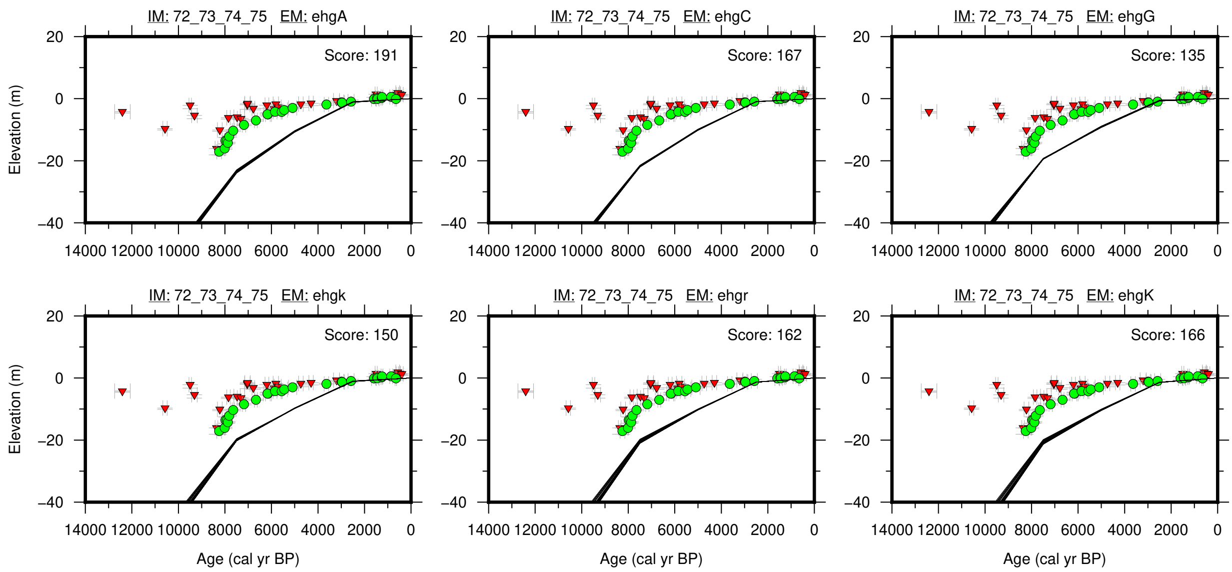


Figure 113: Paleo-sea level and comparison of six models for subregion North Sea, location Netherlands Wadden Sea.

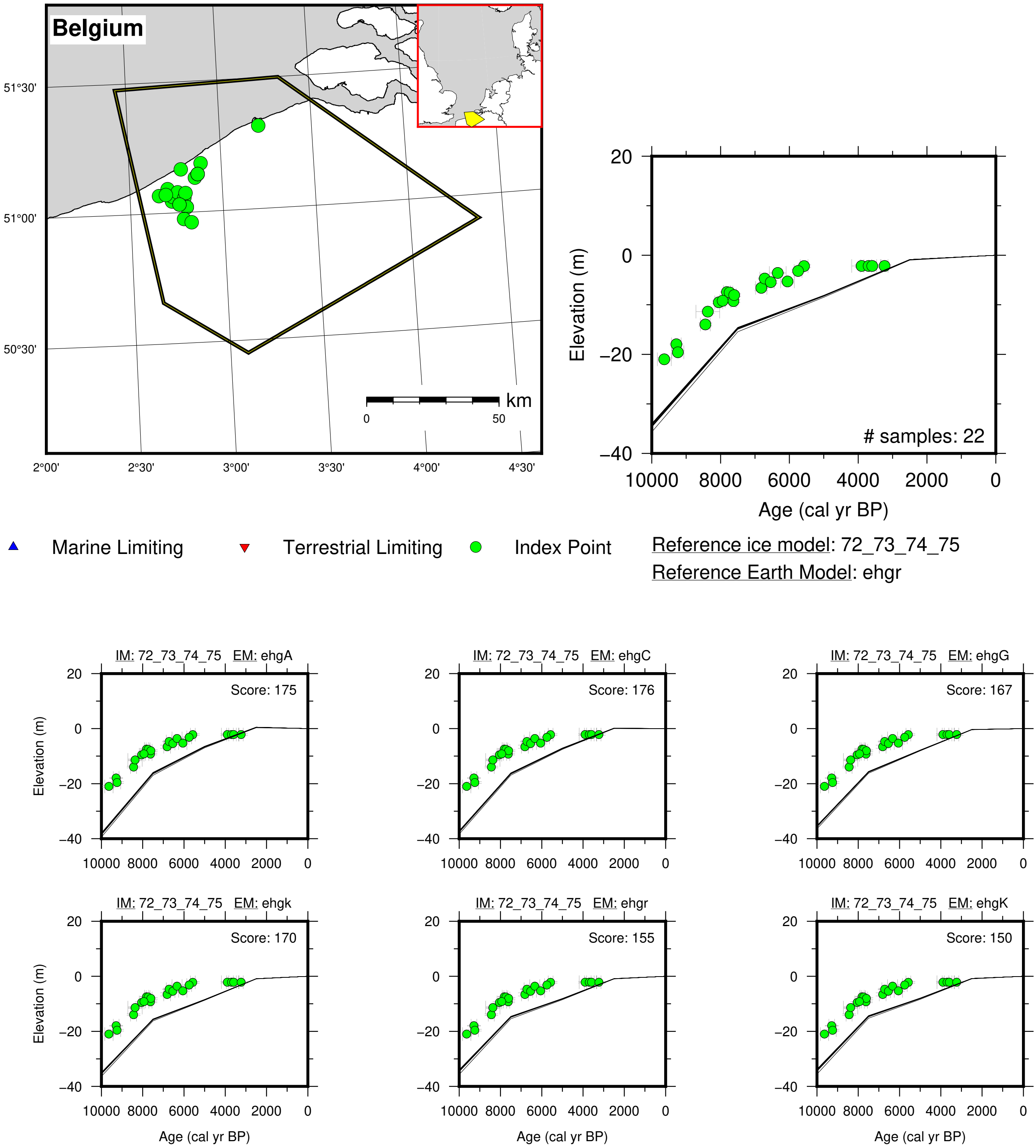


Figure 114: Paleo-sea level and comparison of six models for subregion North Sea, location Belgium.

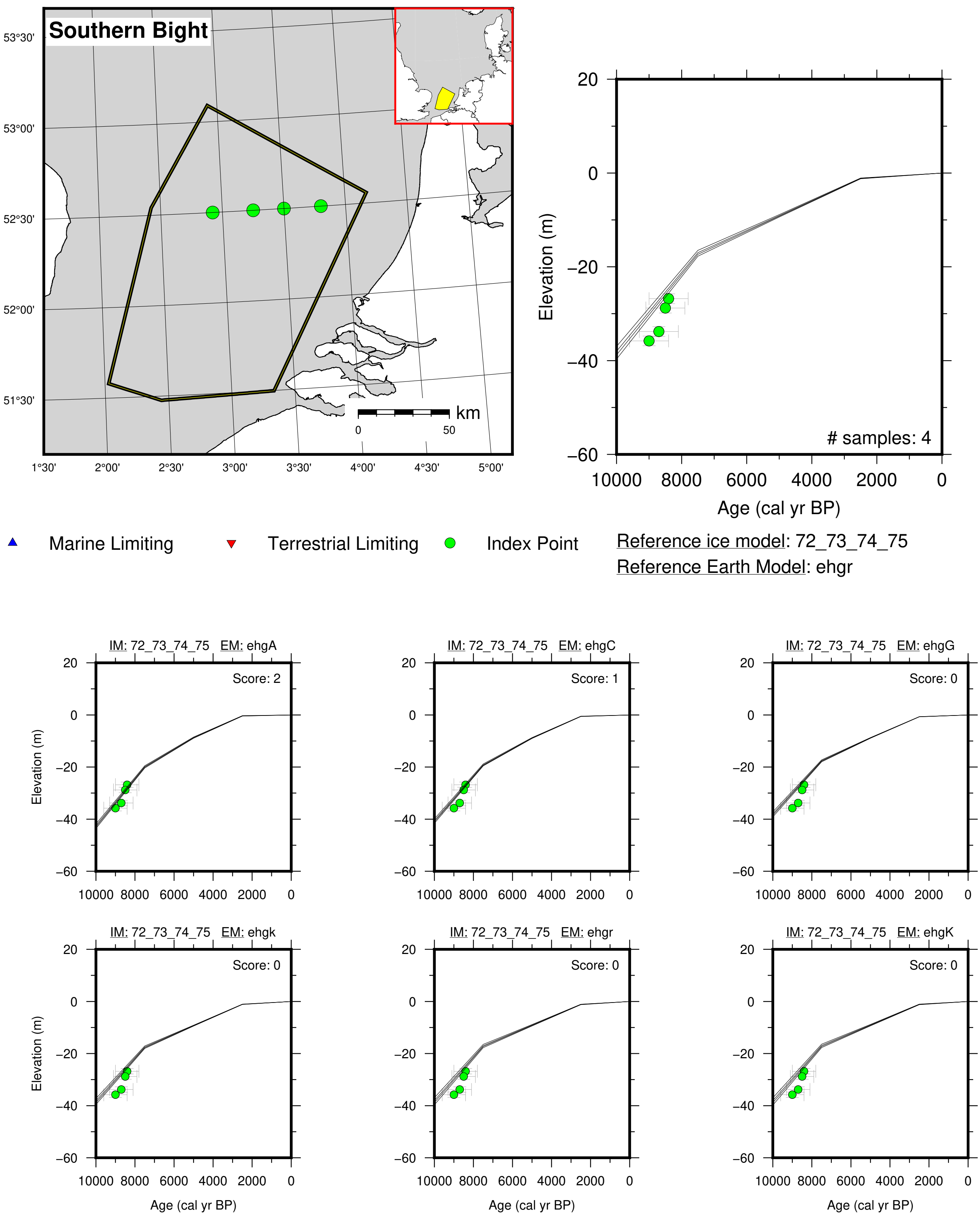


Figure 115: Paleo-sea level and comparison of six models for subregion North Sea, location Southern Bight.

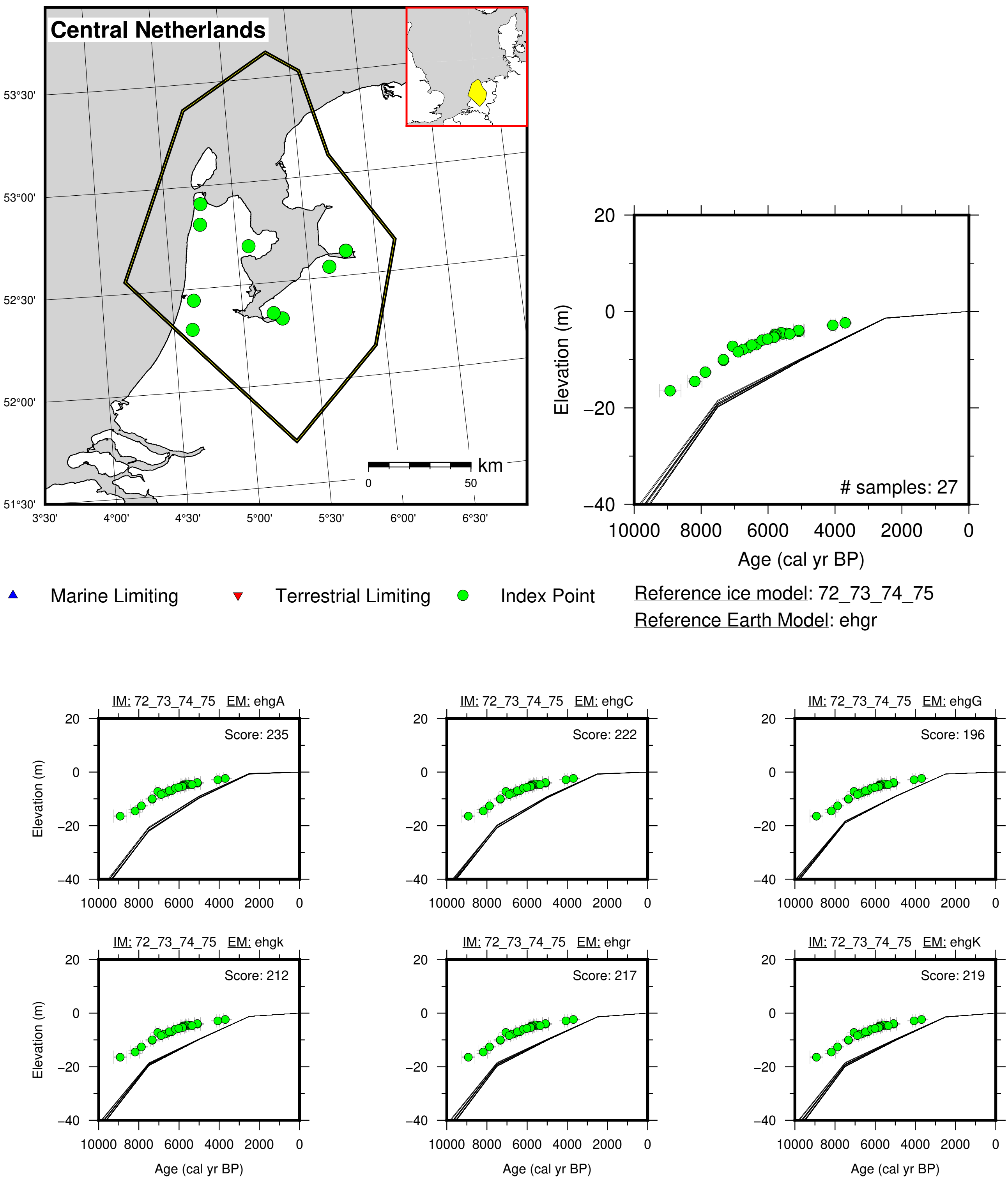


Figure 116: Paleo-sea level and comparison of six models for subregion North Sea, location Central Netherlands.

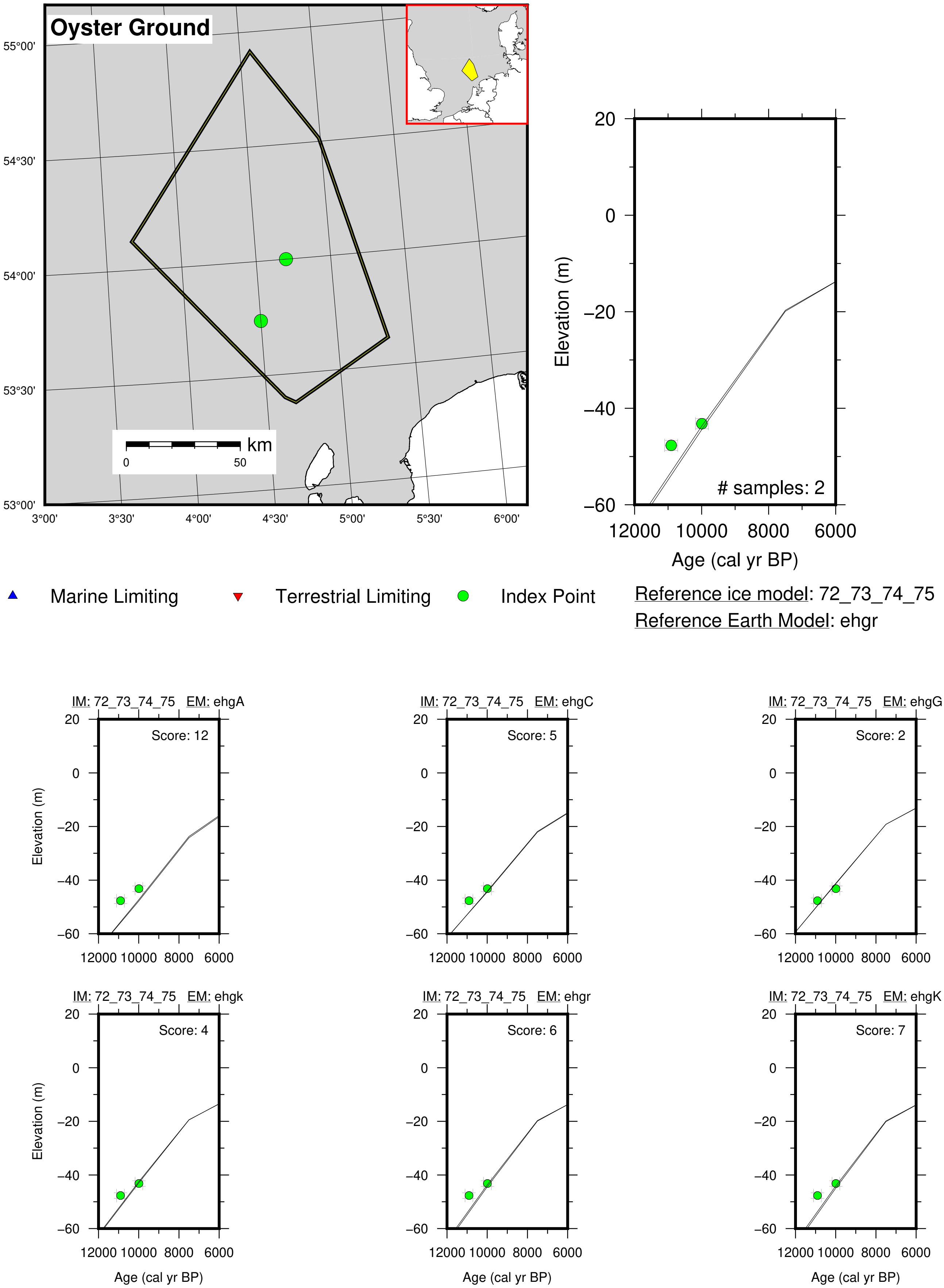


Figure 117: Paleo-sea level and comparison of six models for subregion North Sea, location Oyster Ground.

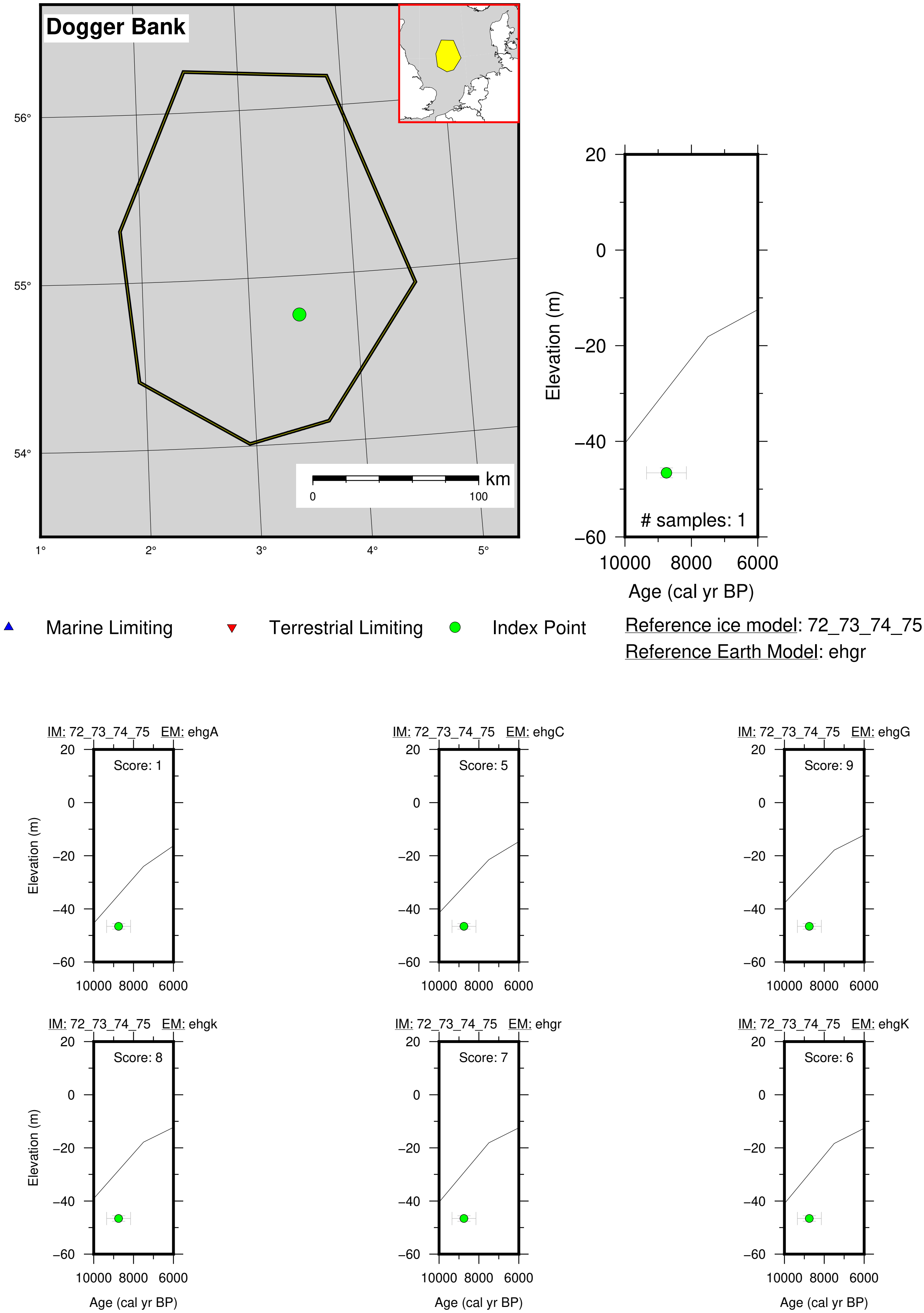


Figure 118: Paleo-sea level and comparison of six models for subregion North Sea, location Dogger Bank.

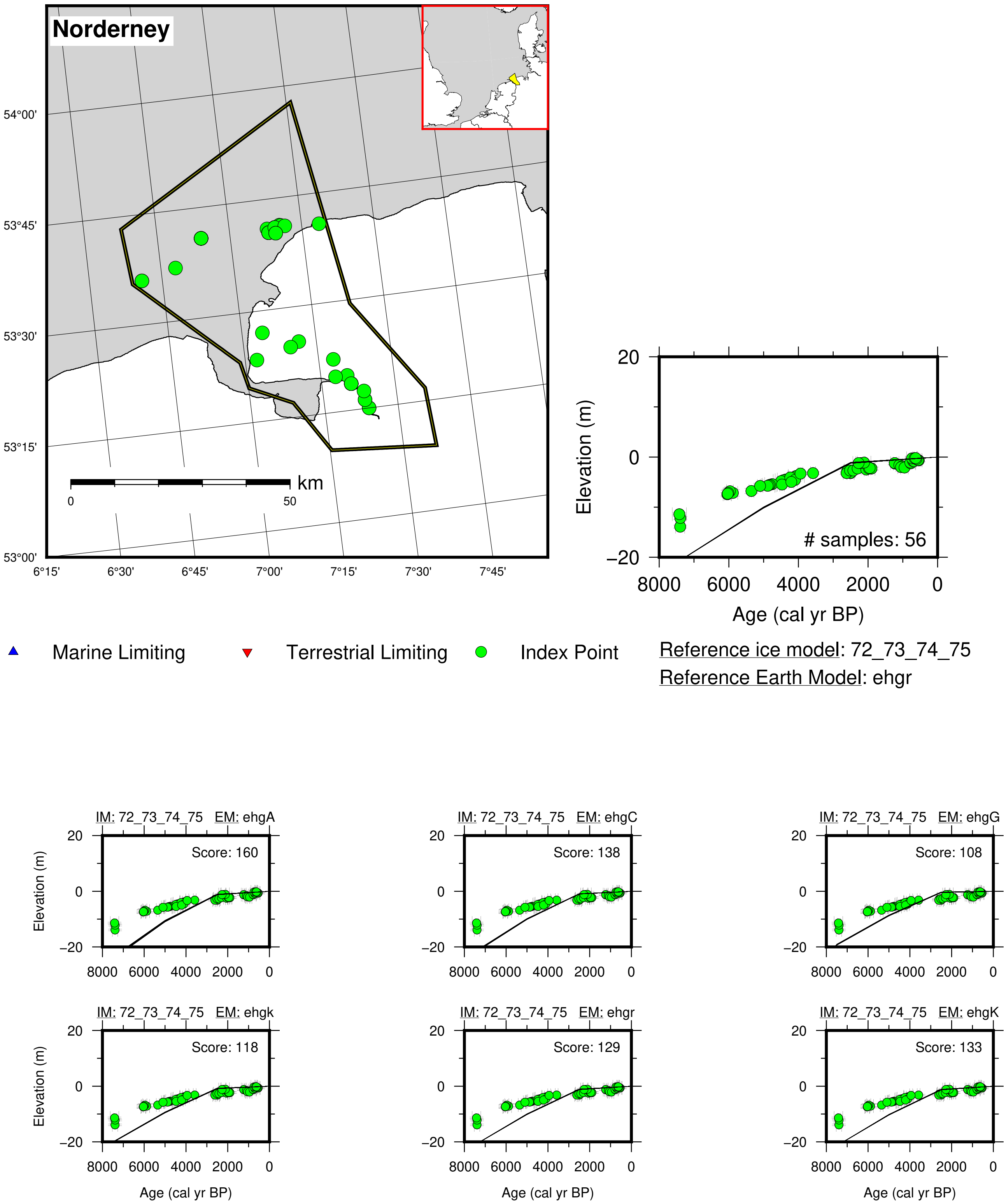


Figure 119: Paleo-sea level and comparison of six models for subregion North Sea, location Norderney.

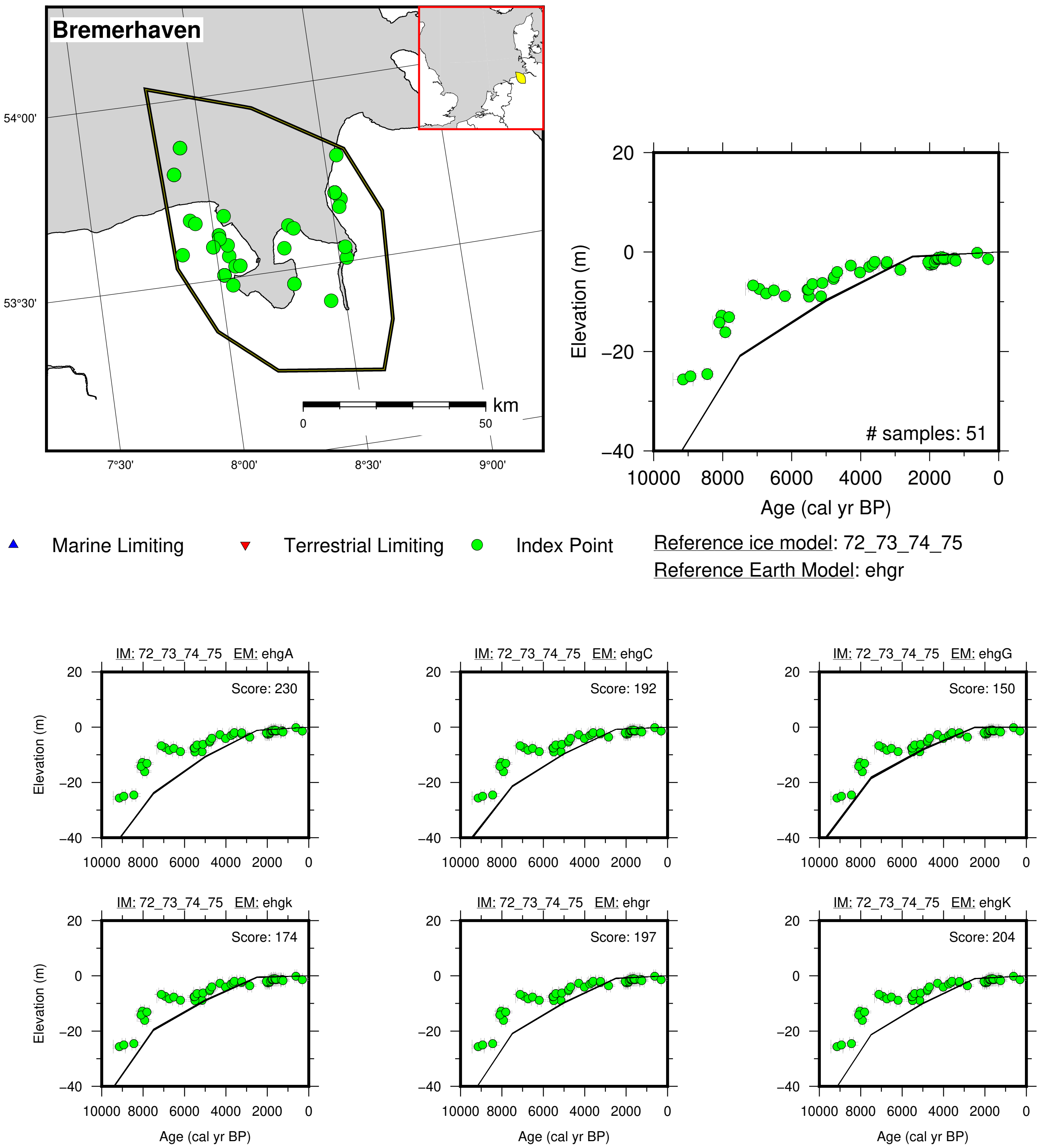


Figure 120: Paleo-sea level and comparison of six models for subregion North Sea, location Bremerhaven.

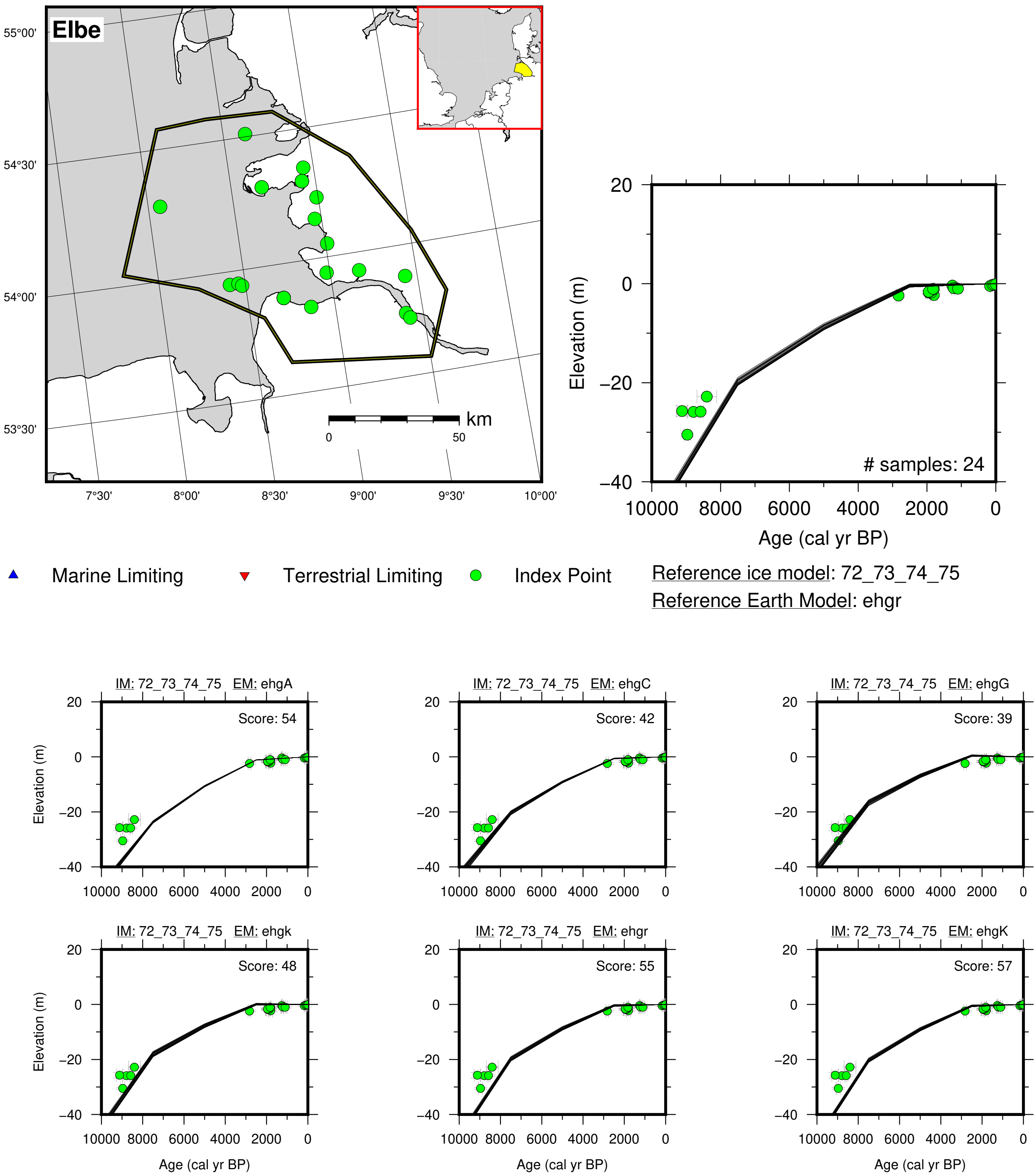


Figure 121: Paleo-sea level and comparison of six models for subregion North Sea, location Elbe.

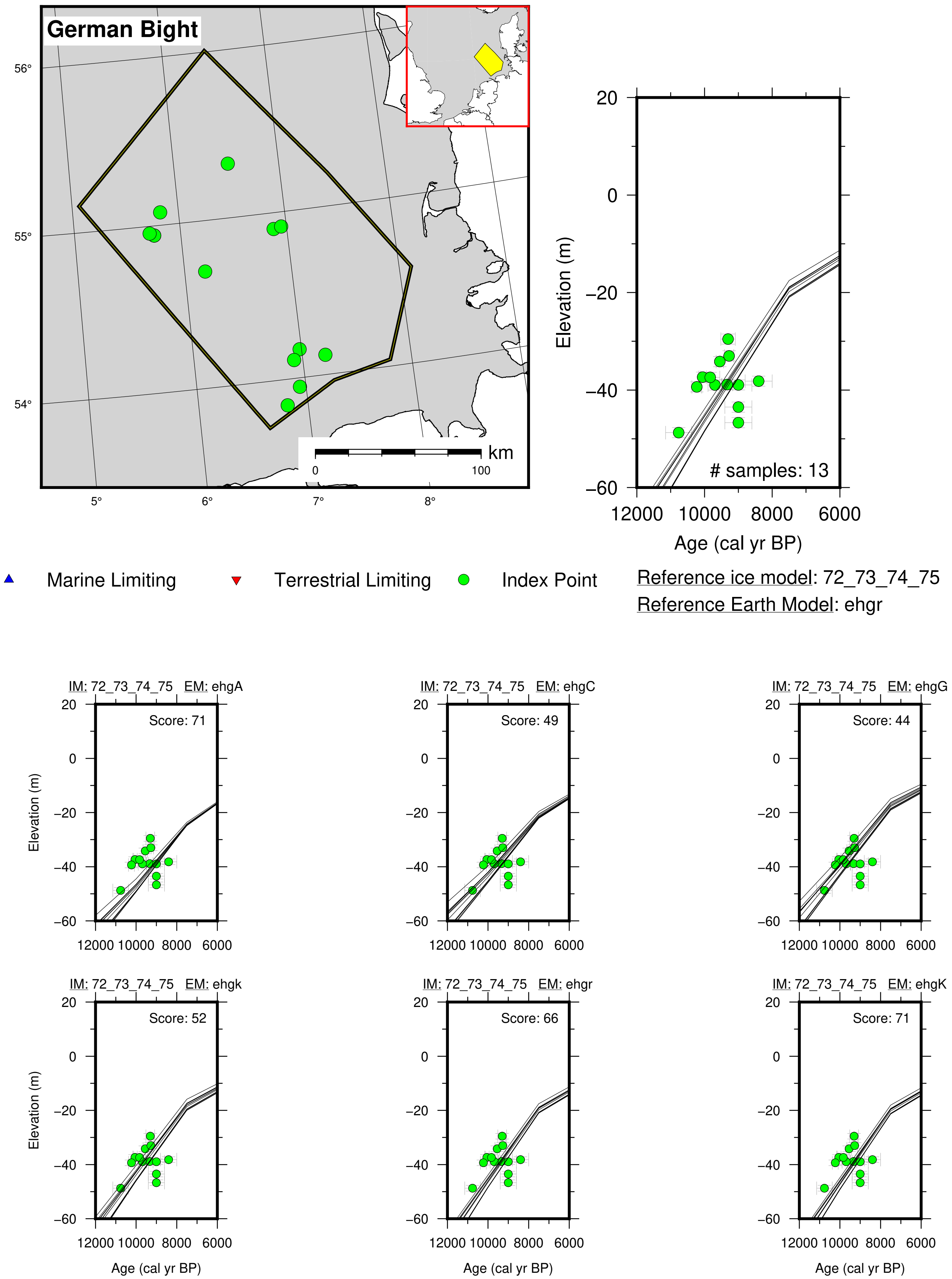


Figure 122: Paleo-sea level and comparison of six models for subregion North Sea, location German Bight.

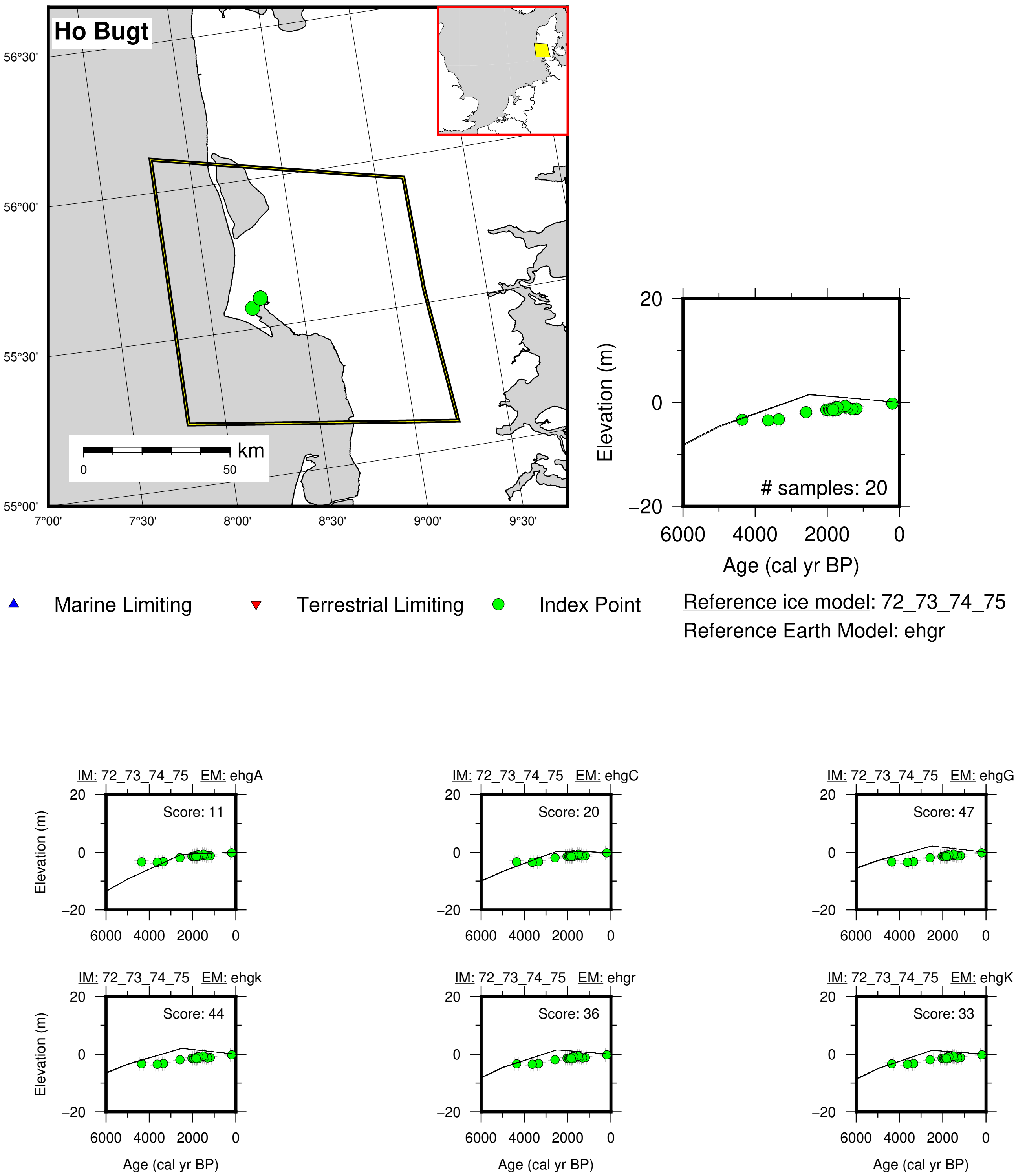


Figure 123: Paleo-sea level and comparison of six models for subregion North Sea, location Ho Bugt.

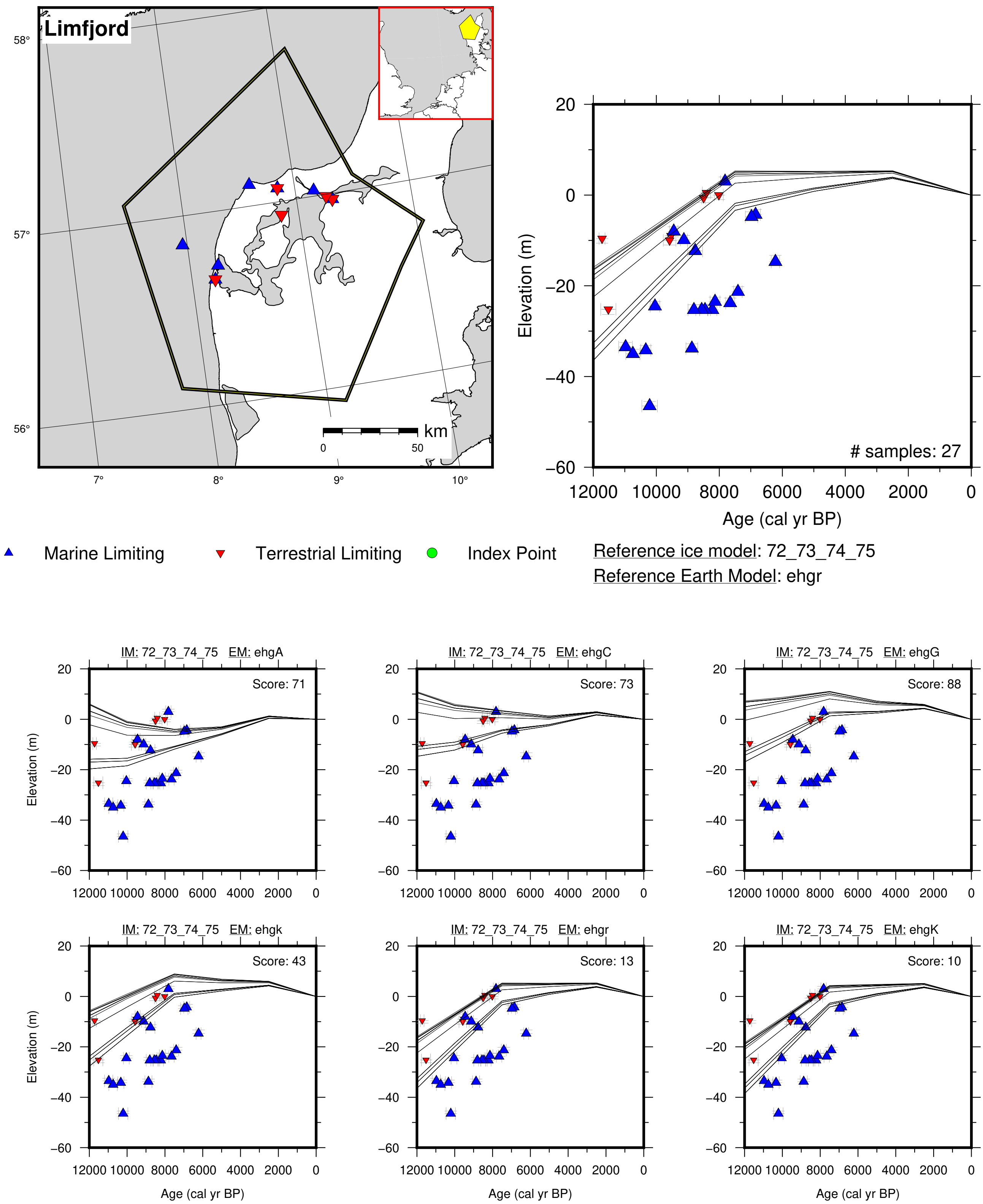


Figure 124: Paleo-sea level and comparison of six models for subregion North Sea, location Limfjord.

9.3 Western Norway

References for the data used in each location.

Stavanger: Helle (2008); Prøsch-Danielsen (2006); Thomsen (1982)

Sotra: Bondevik et al. (2006); Håkansson (1980); Kaland et al. (1984); Krzywinski and Stabell (1984); Lohne et al. (2007); Stabell and Krzywinski (1978, 1979)

Torvikbygd: Helle (2008); Romundset et al. (2010)

Sula: Bondevik et al. (1997a); Hafsten (1979); Lie et al. (1983); Svendsen and Mangerud (1987)

Bjugn: Bondevik et al. (1997a,b); Kjemperud (1982, 1986)

Frosta: Kjemperud (1981a,b, 1986)

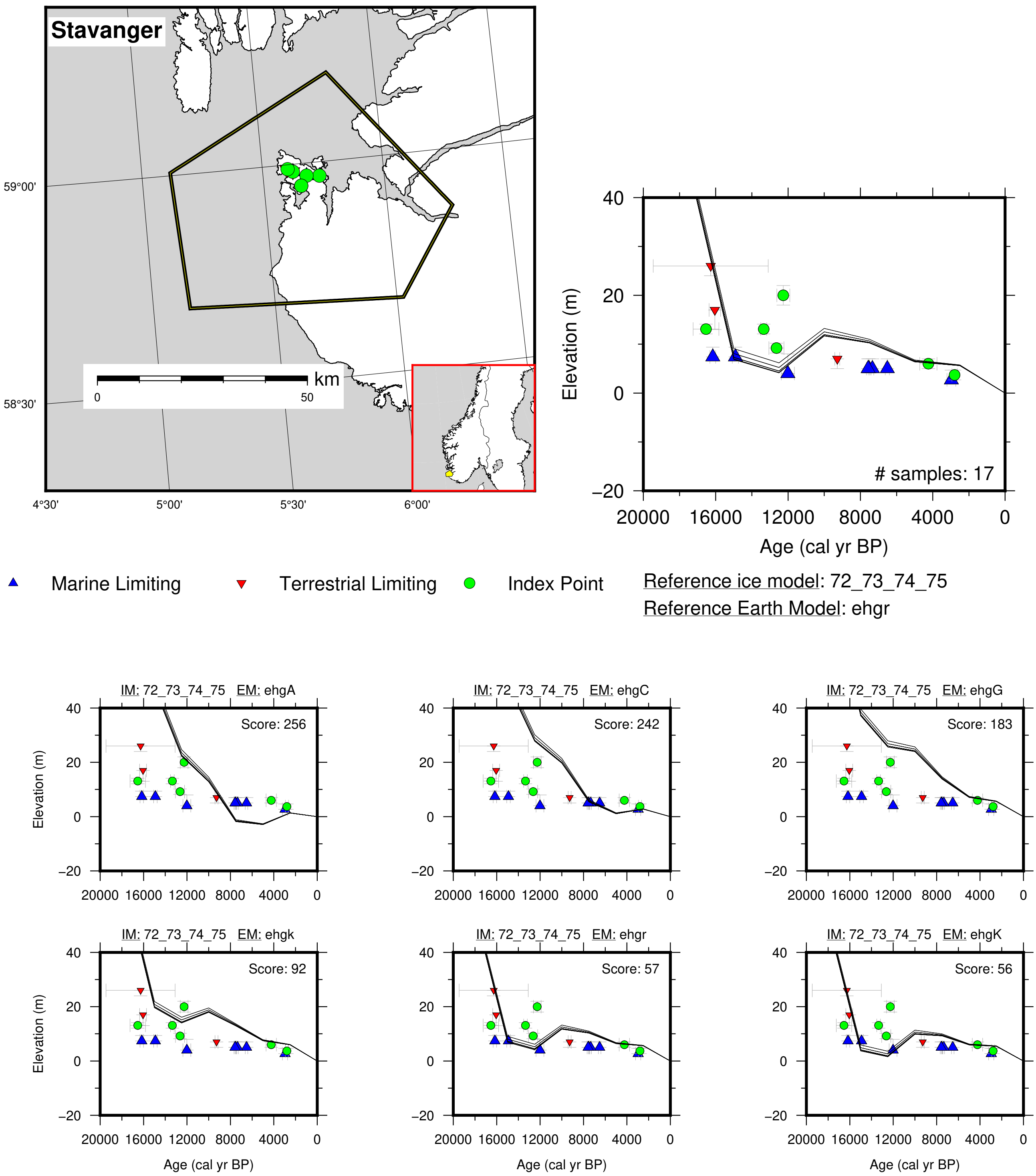


Figure 125: Paleo-sea level and comparison of six models for subregion Western Norway, location Stavanger.

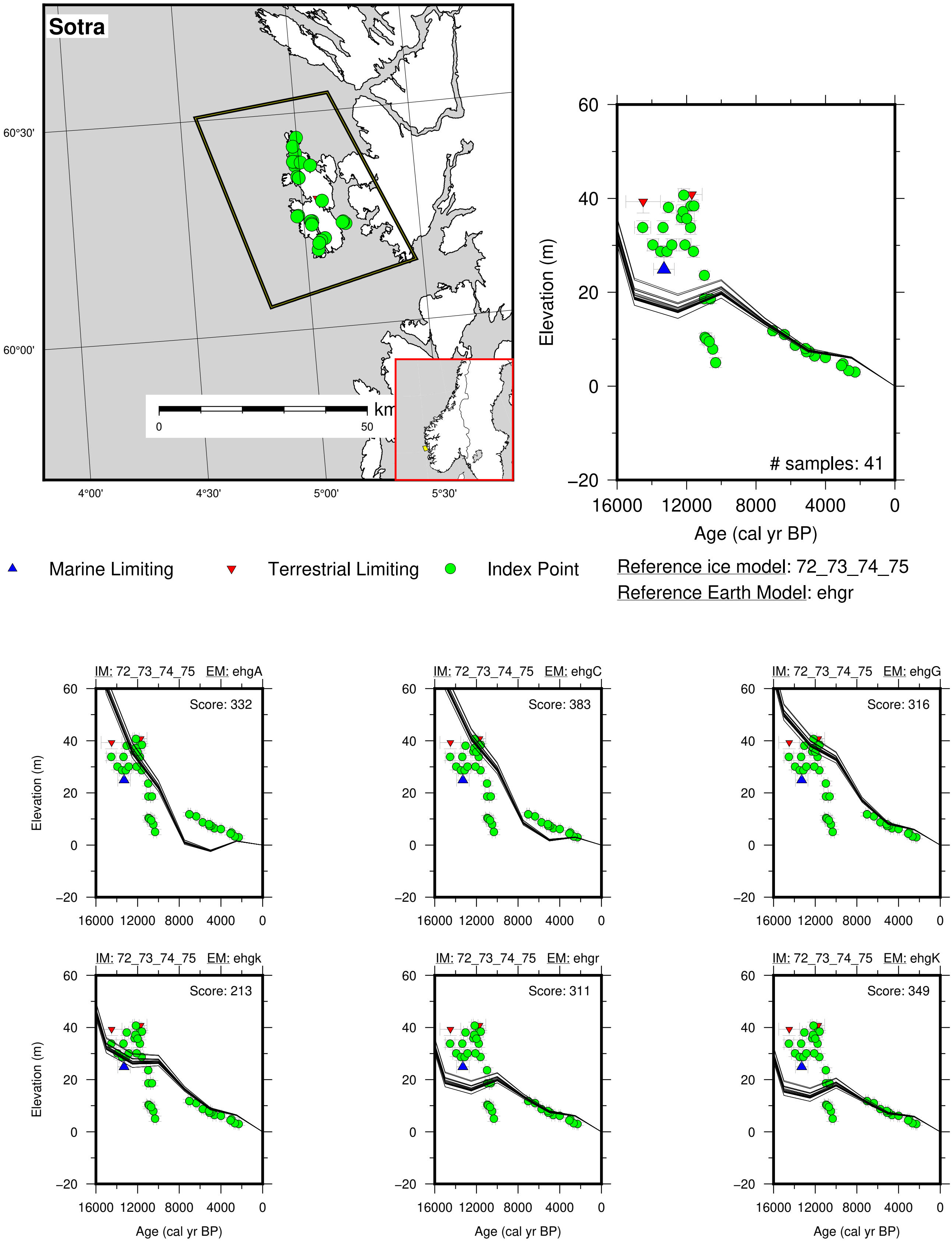


Figure 126: Paleo-sea level and comparison of six models for subregion Western Norway, location Sotra.

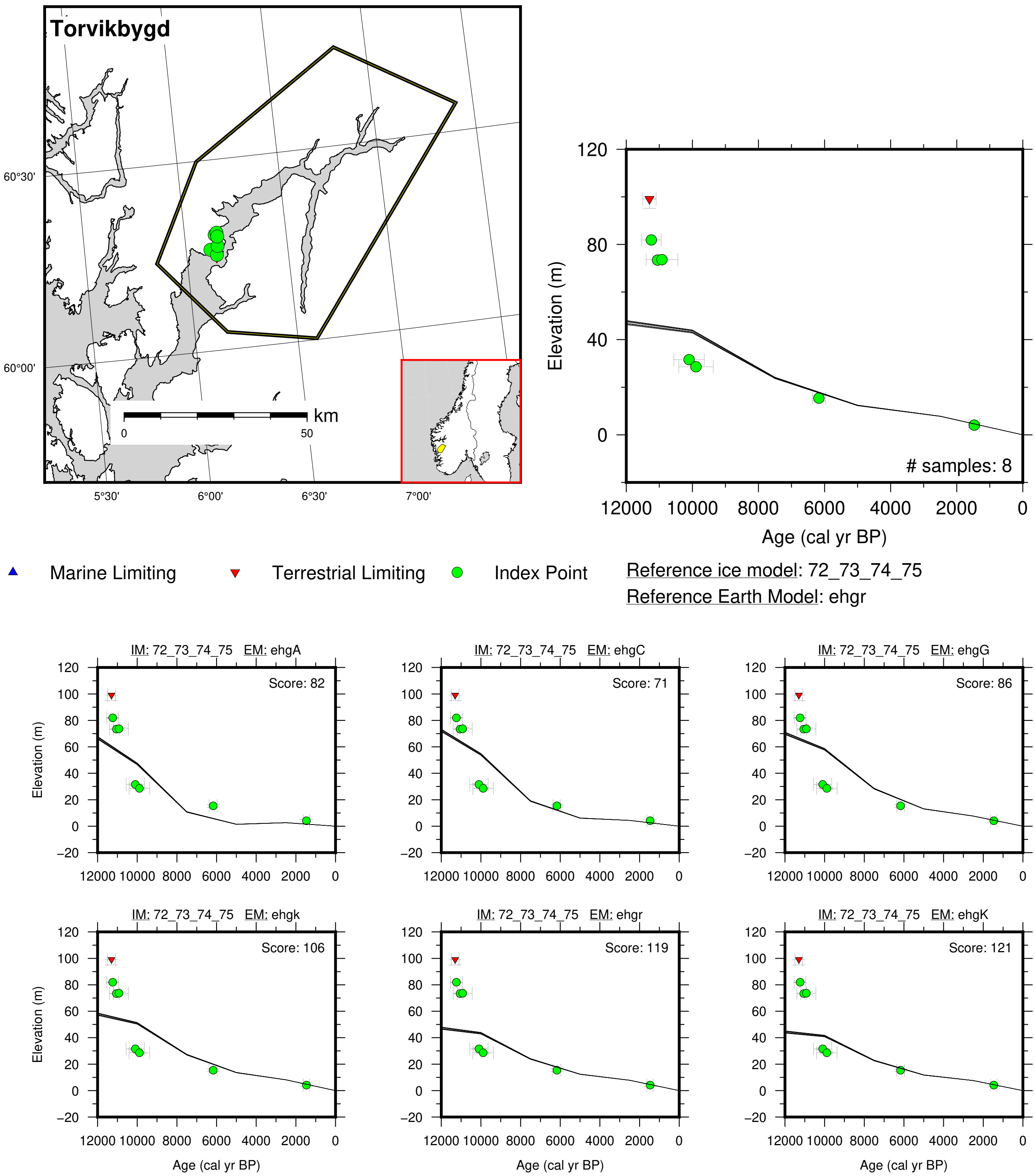


Figure 127: Paleo-sea level and comparison of six models for subregion Western Norway, location Torvikbygd.

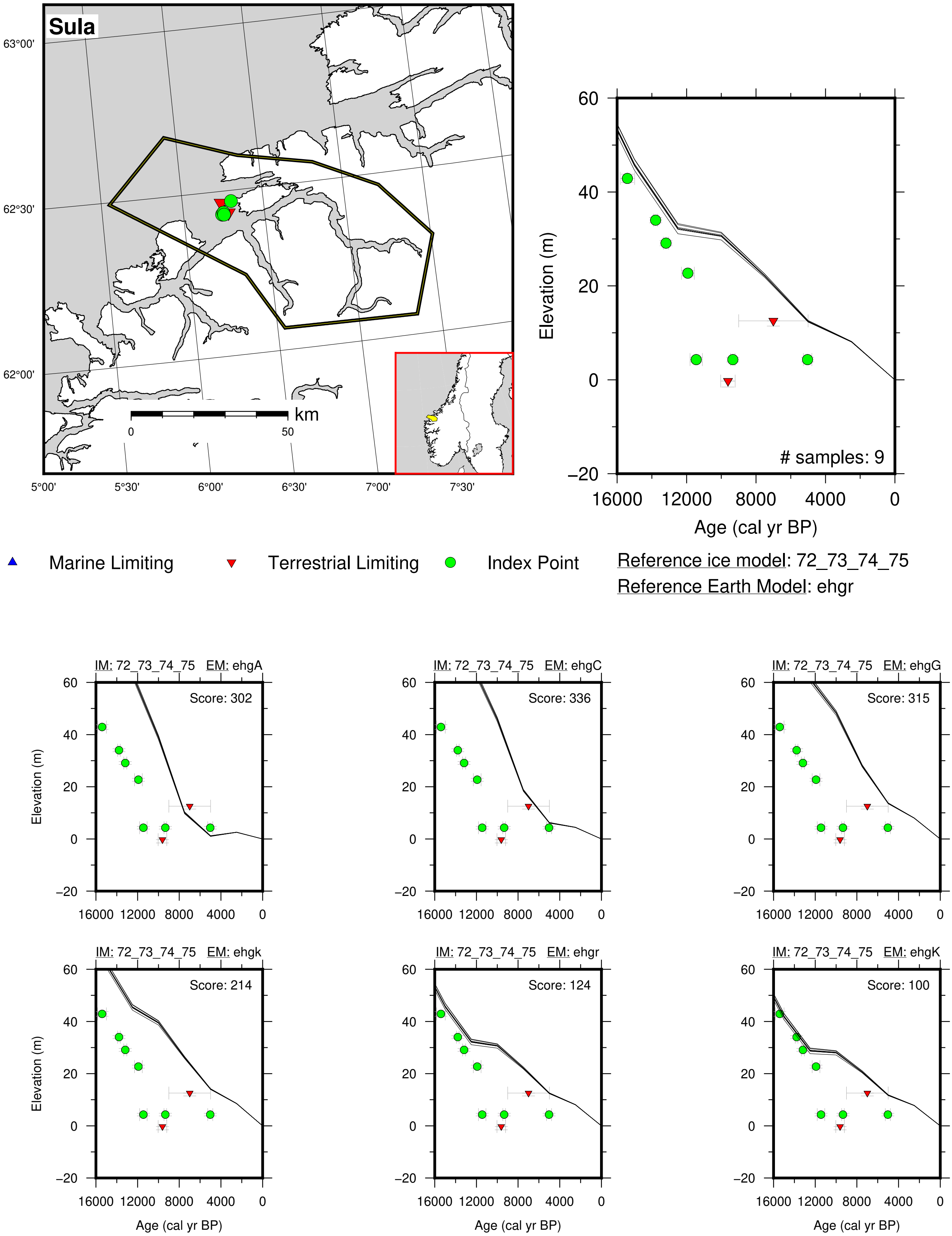


Figure 128: Paleo-sea level and comparison of six models for subregion Western Norway, location Sula.

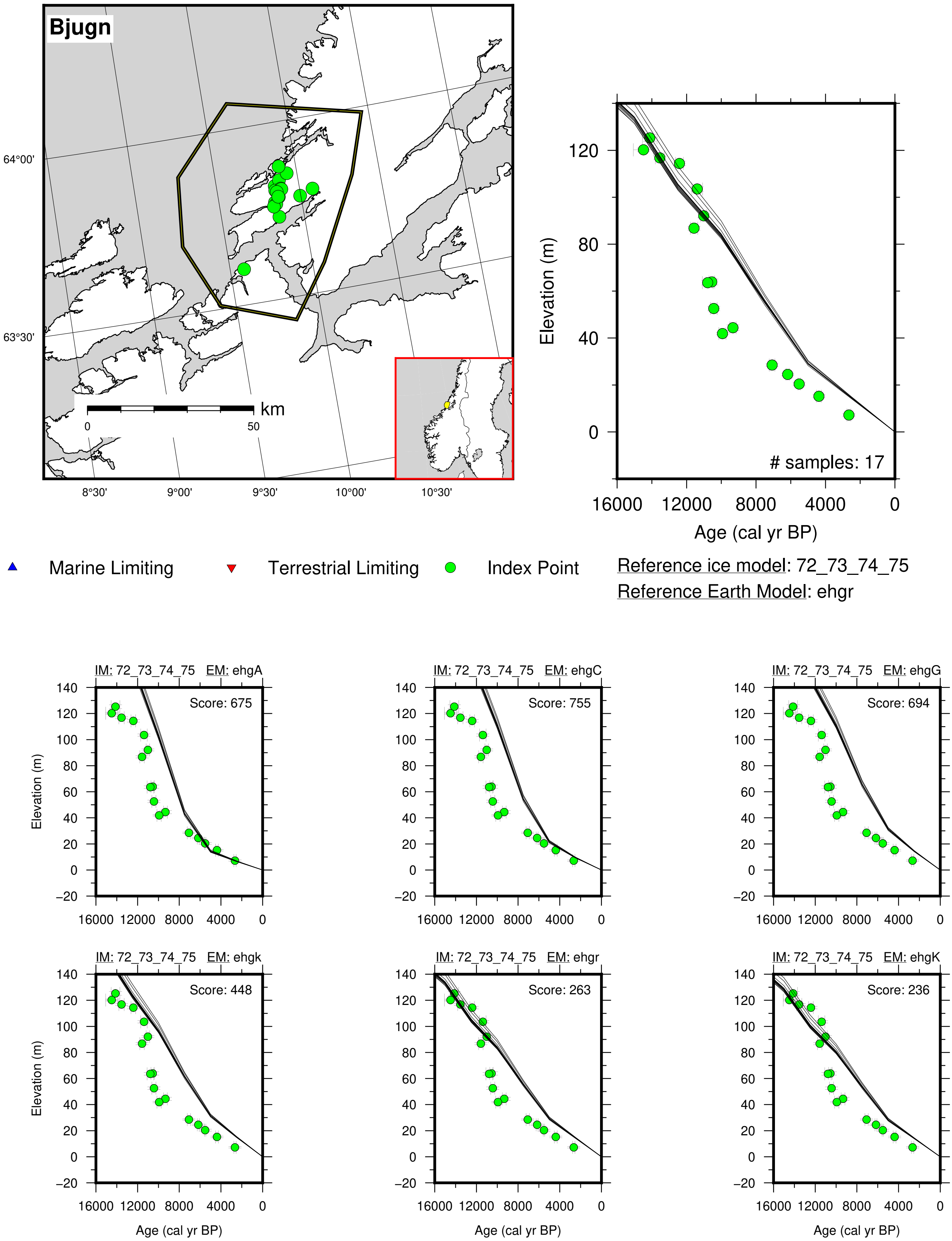


Figure 129: Paleo-sea level and comparison of six models for subregion Western Norway, location Bjugn.

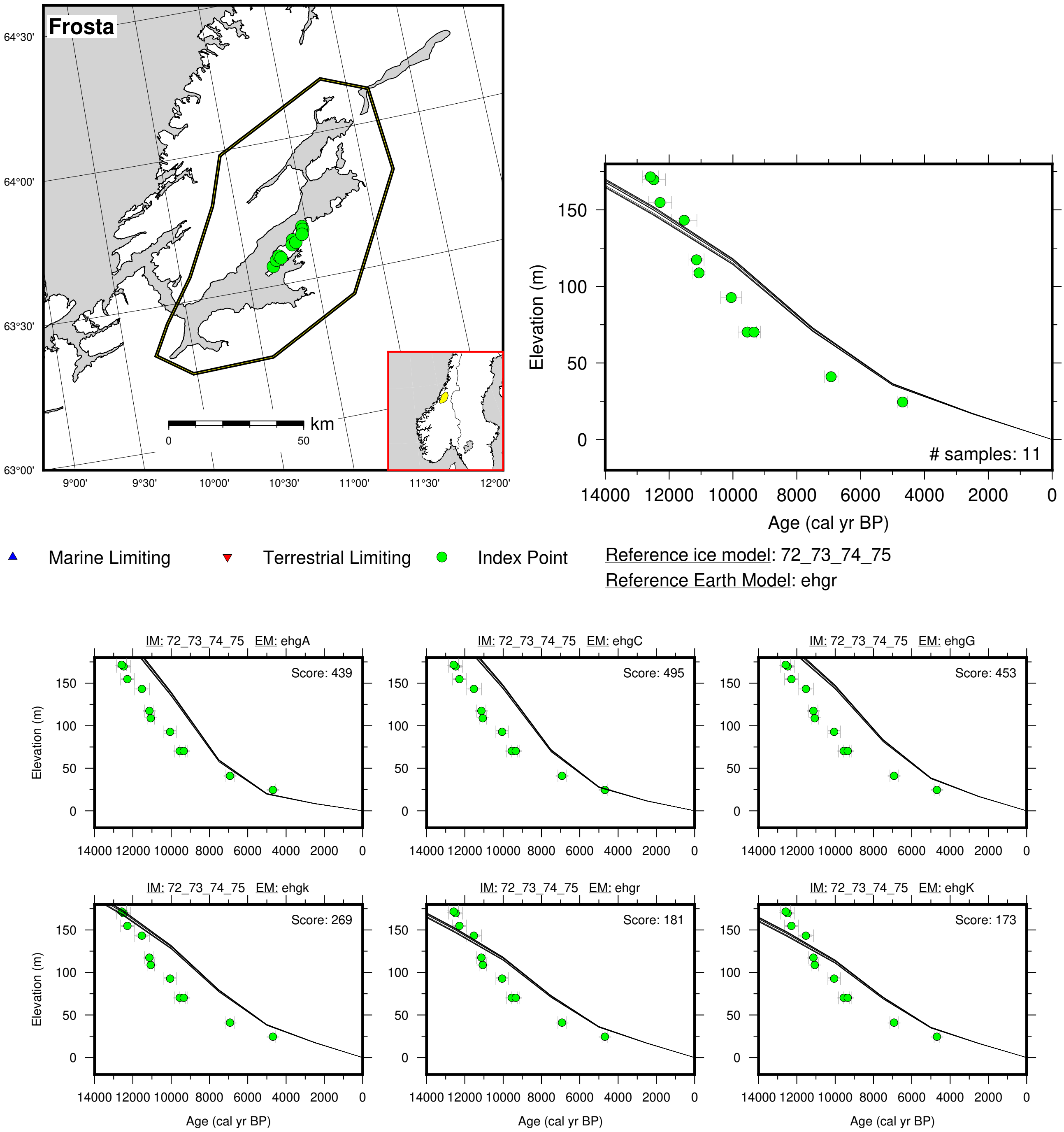


Figure 130: Paleo-sea level and comparison of six models for subregion Western Norway, location Frosta.

10 French Polynesia

10.1 French Polynesia

References for the data used in each location.

Mururoa: Camoin et al. (2001); Hibbert et al. (2016)

Tahiti: Bard et al. (1996, 2010); Deschamps et al. (2012); Hibbert et al. (2016)

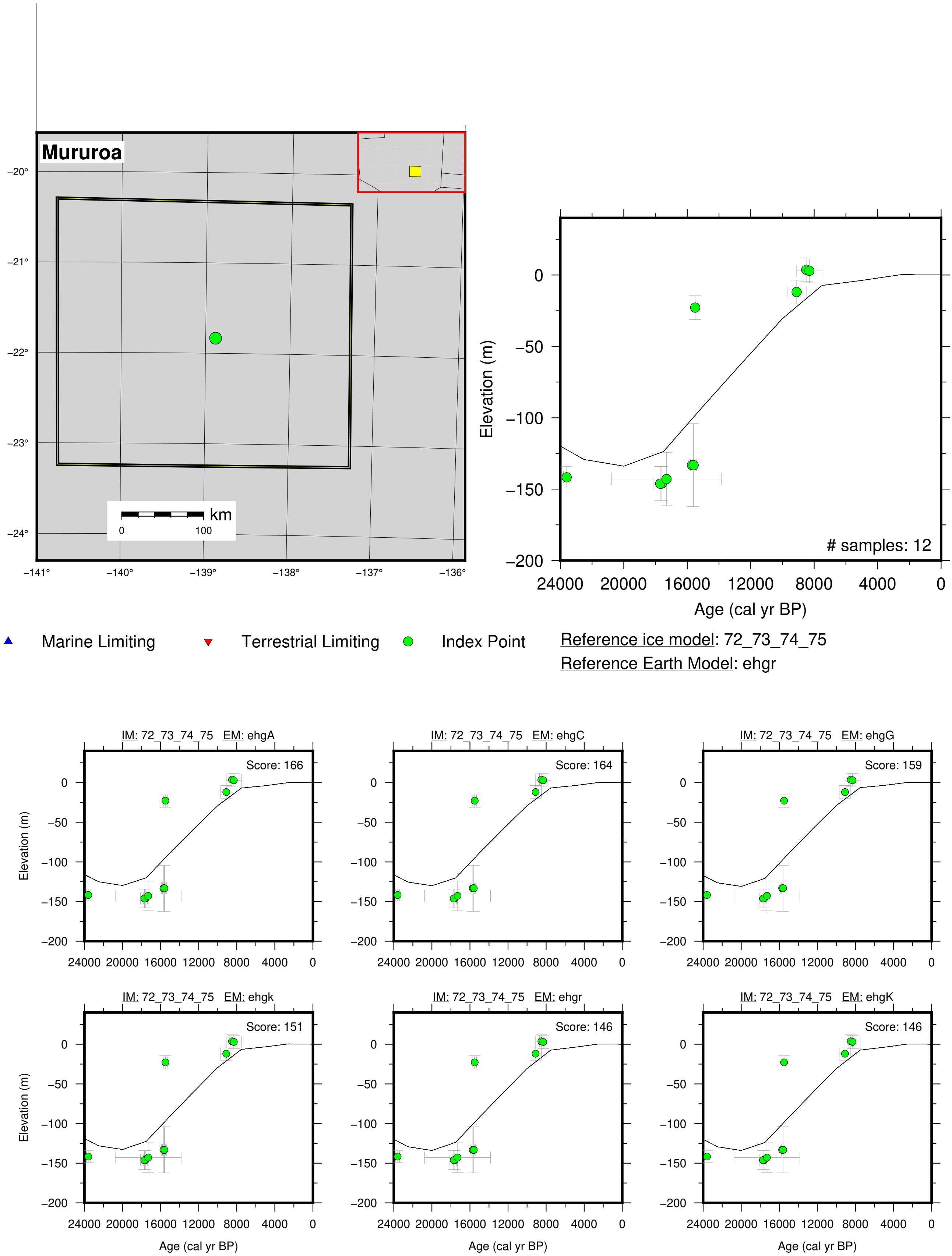


Figure 131: Paleo-sea level and comparison of six models for subregion French Polynesia, location Mururoa.

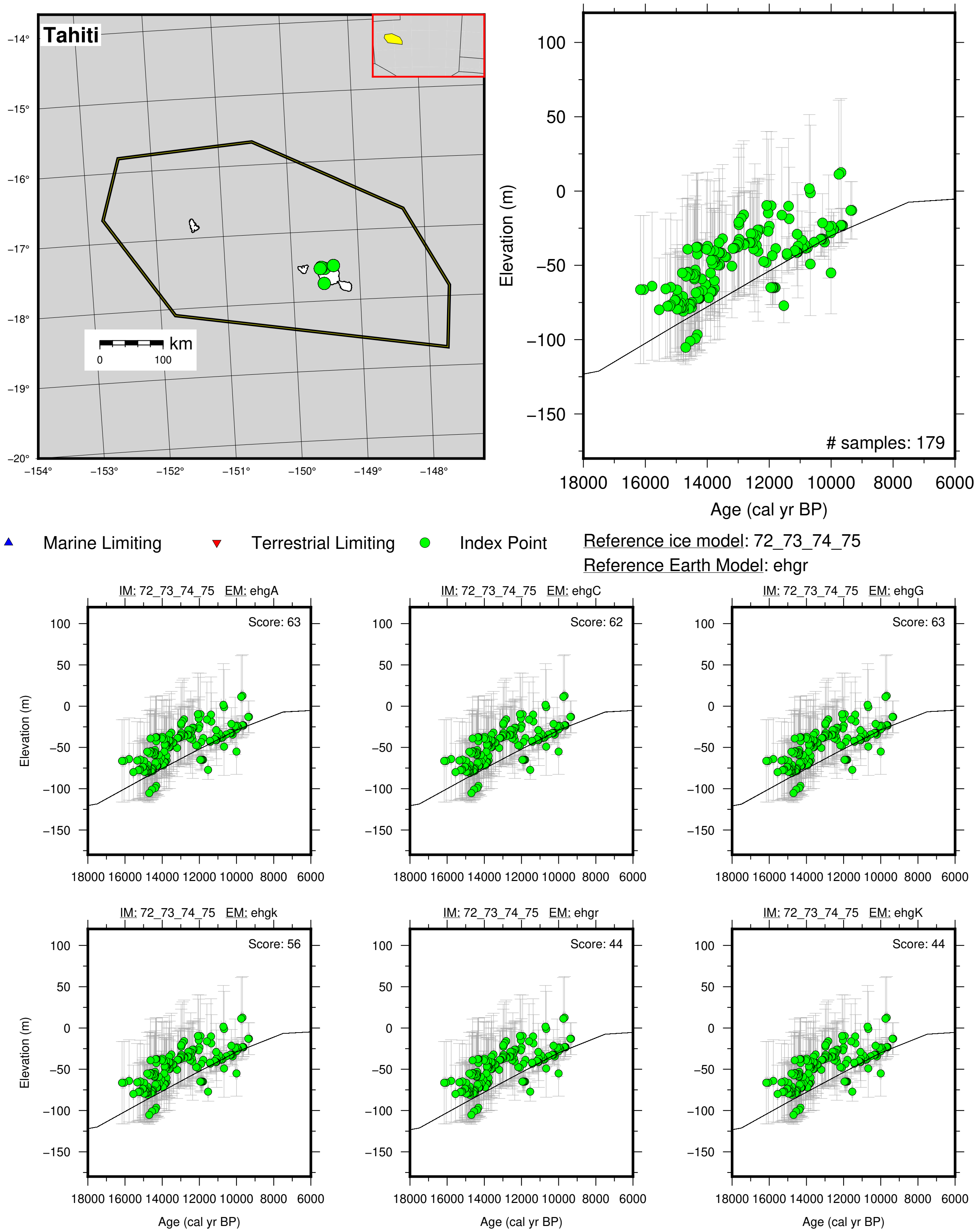


Figure 132: Paleo-sea level and comparison of six models for subregion French Polynesia, location Tahiti.

11 Melanesia

11.1 Melansia

References for the data used in each location.

Vanuatu: Cabioch et al. (2003); Cutler et al. (2004); Hibbert et al. (2016)

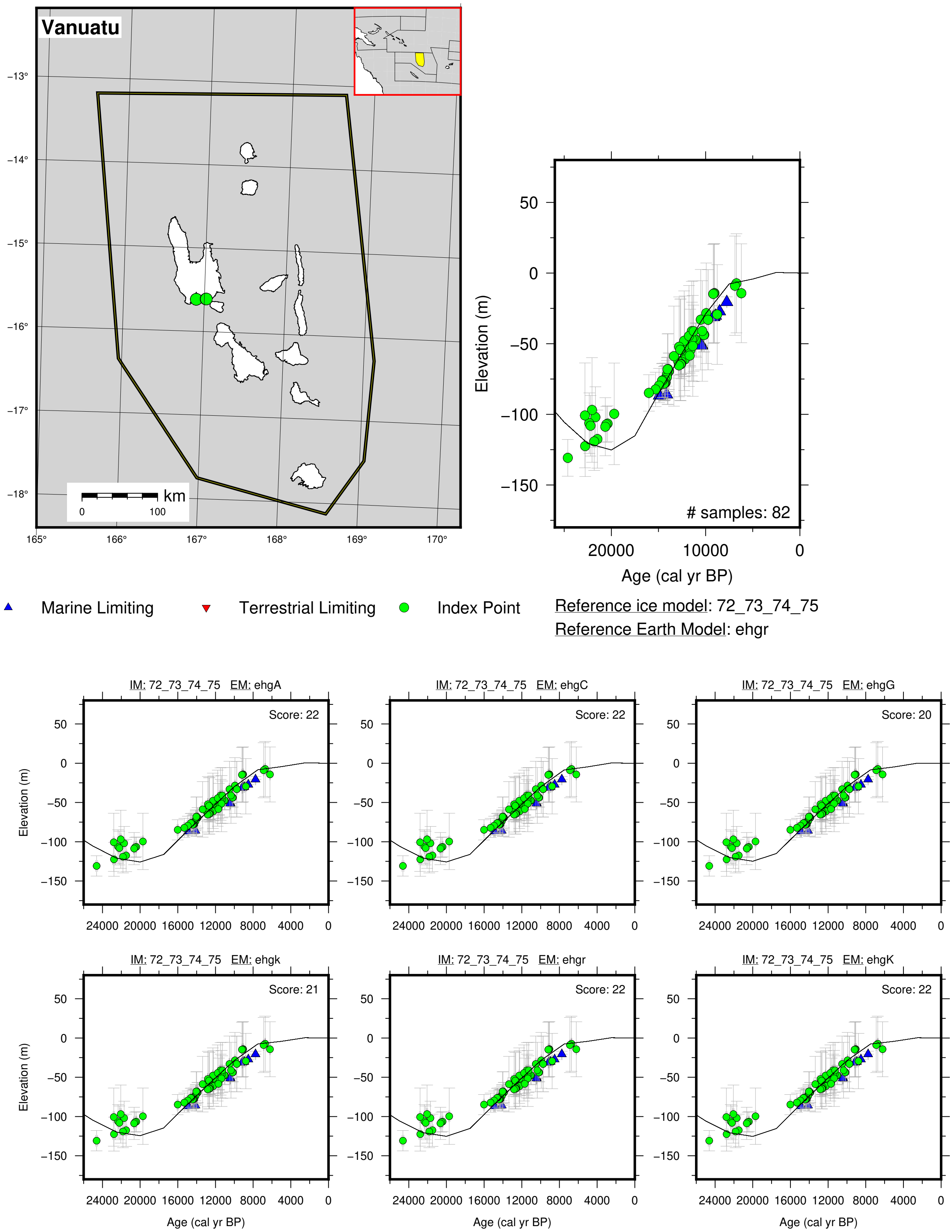


Figure 133: Paleo-sea level and comparison of six models for subregion Melansia, location Vanuatu.

12 MIS 3 - MIS 4

12.1 Eastern United States (MIS3 - MIS4)

References for the data used in each location.

US Mid Atlantic: Best (2010); Cronin et al. (1981); Culver et al. (2011); Mallinson et al. (2008); Mixon et al. (1982); Moore (2009); Parham et al. (2013); Scott (2006)

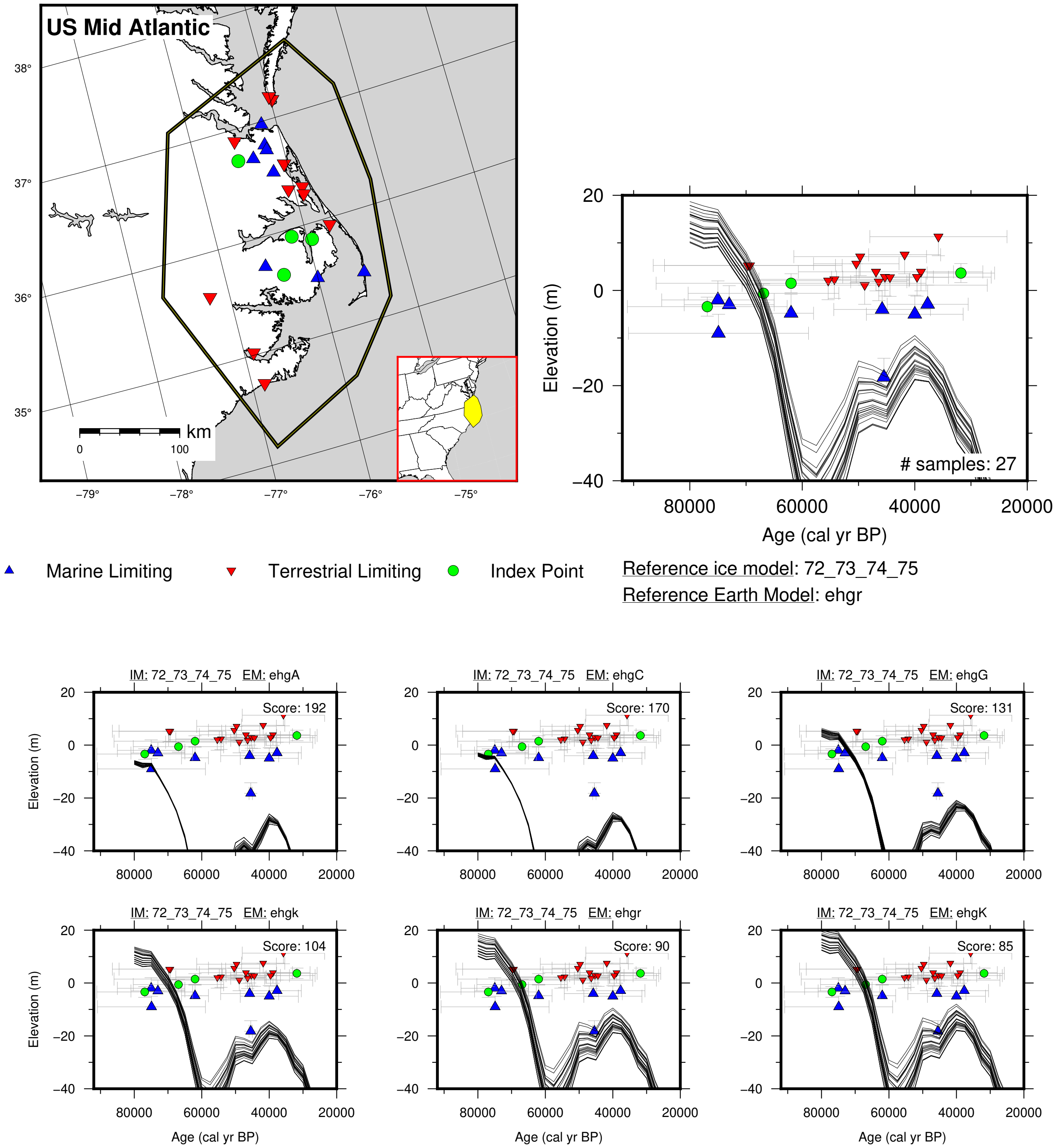


Figure 134: Paleo-sea level and comparison of six models for subregion Eastern United States (MIS3 - MIS4), location US Mid Atlantic.

12.2 French Polynesia (MIS3 - MIS4)

References for the data used in each location.

Mururoa: Camoin et al. (2001); Hibbert et al. (2016)

Tahiti: Hibbert et al. (2016); Thomas et al. (2009)

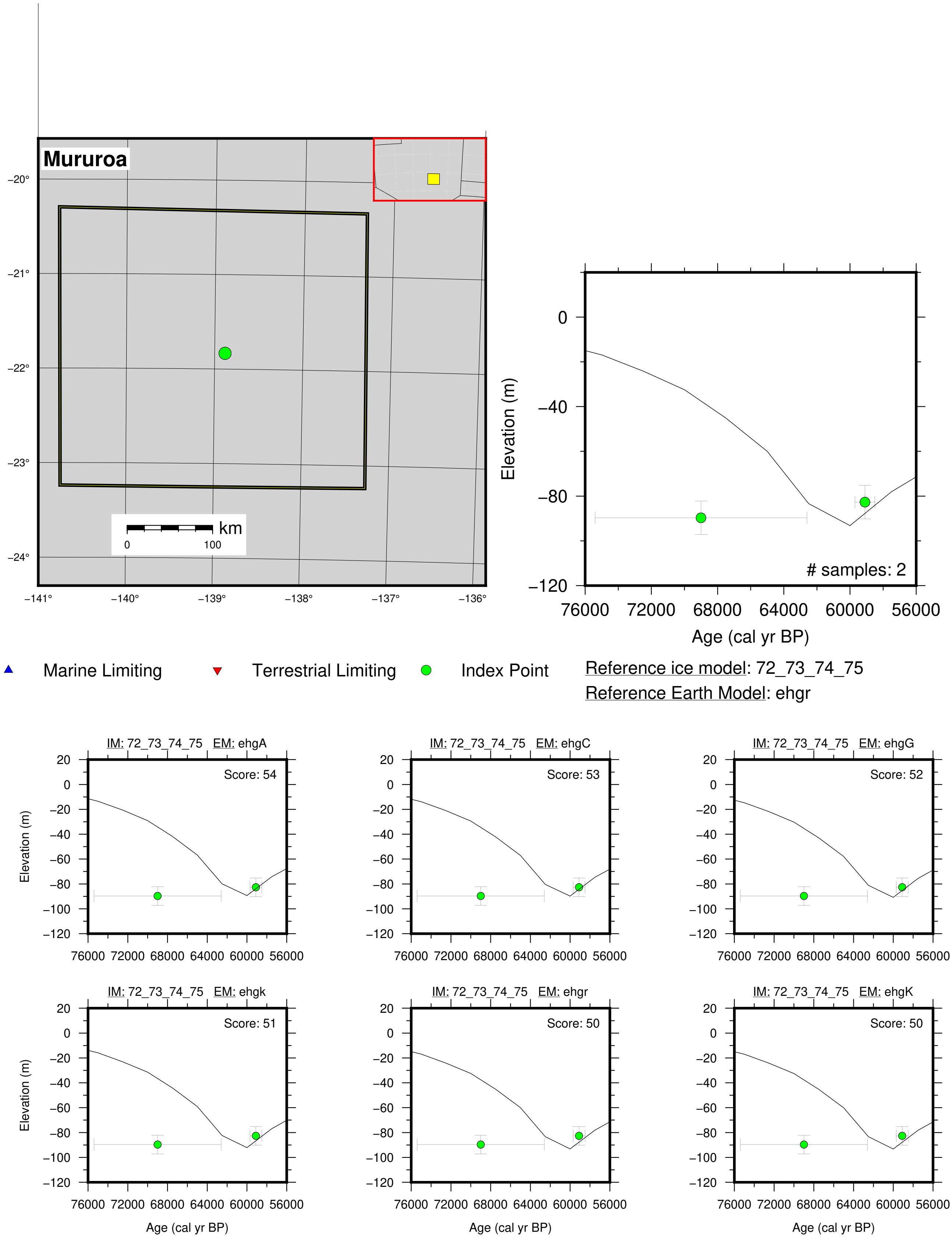


Figure 135: Paleo-sea level and comparison of six models for subregion French Polynesia (MIS3 - MIS4), location Mururoa.

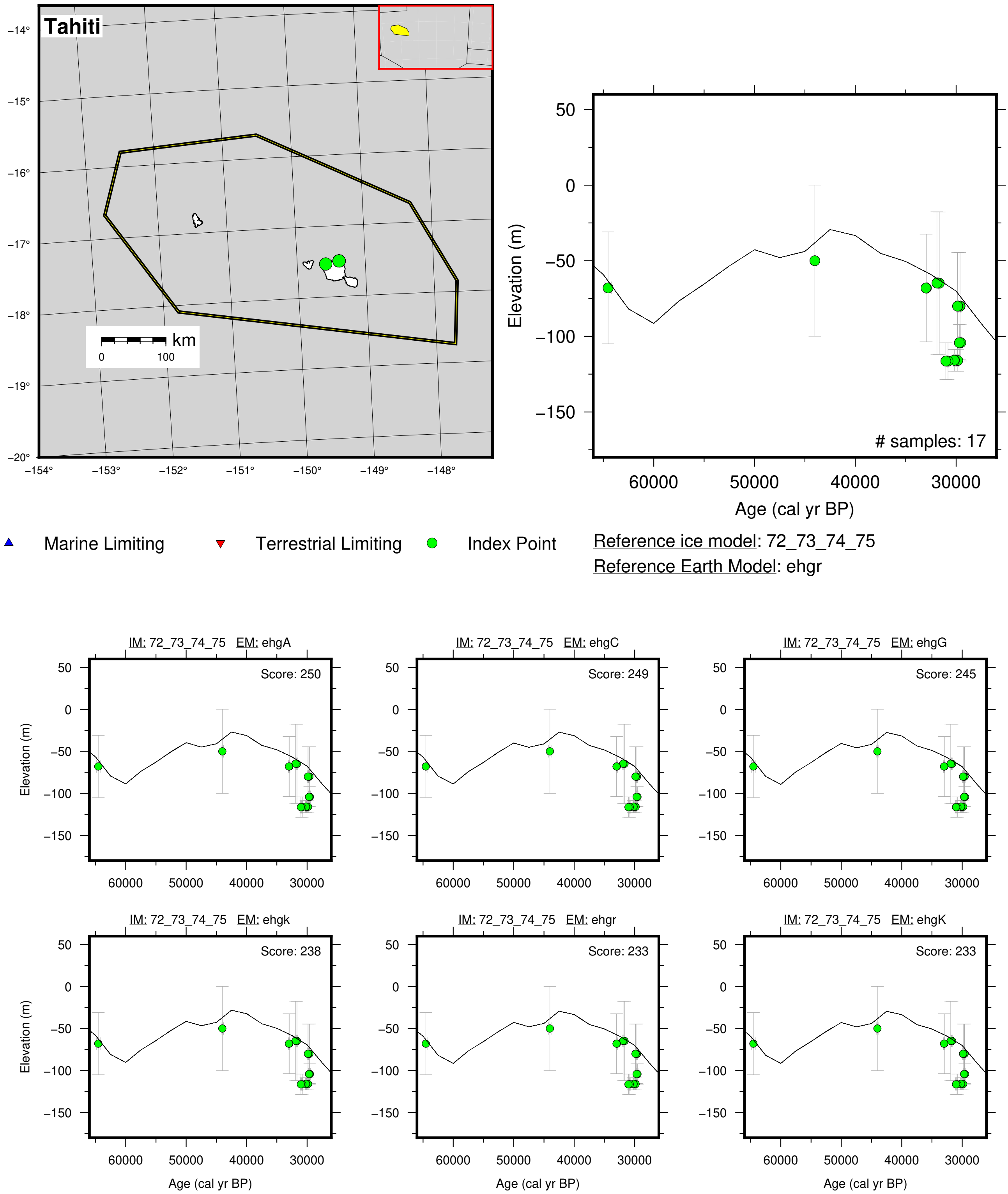


Figure 136: Paleo-sea level and comparison of six models for subregion French Polynesia (MIS3 - MIS4), location Tahiti.

12.3 Melanesia (MIS3 - MIS4)

References for the data used in each location.

Vanuatu: Cabioch and Ayliffe (2001)

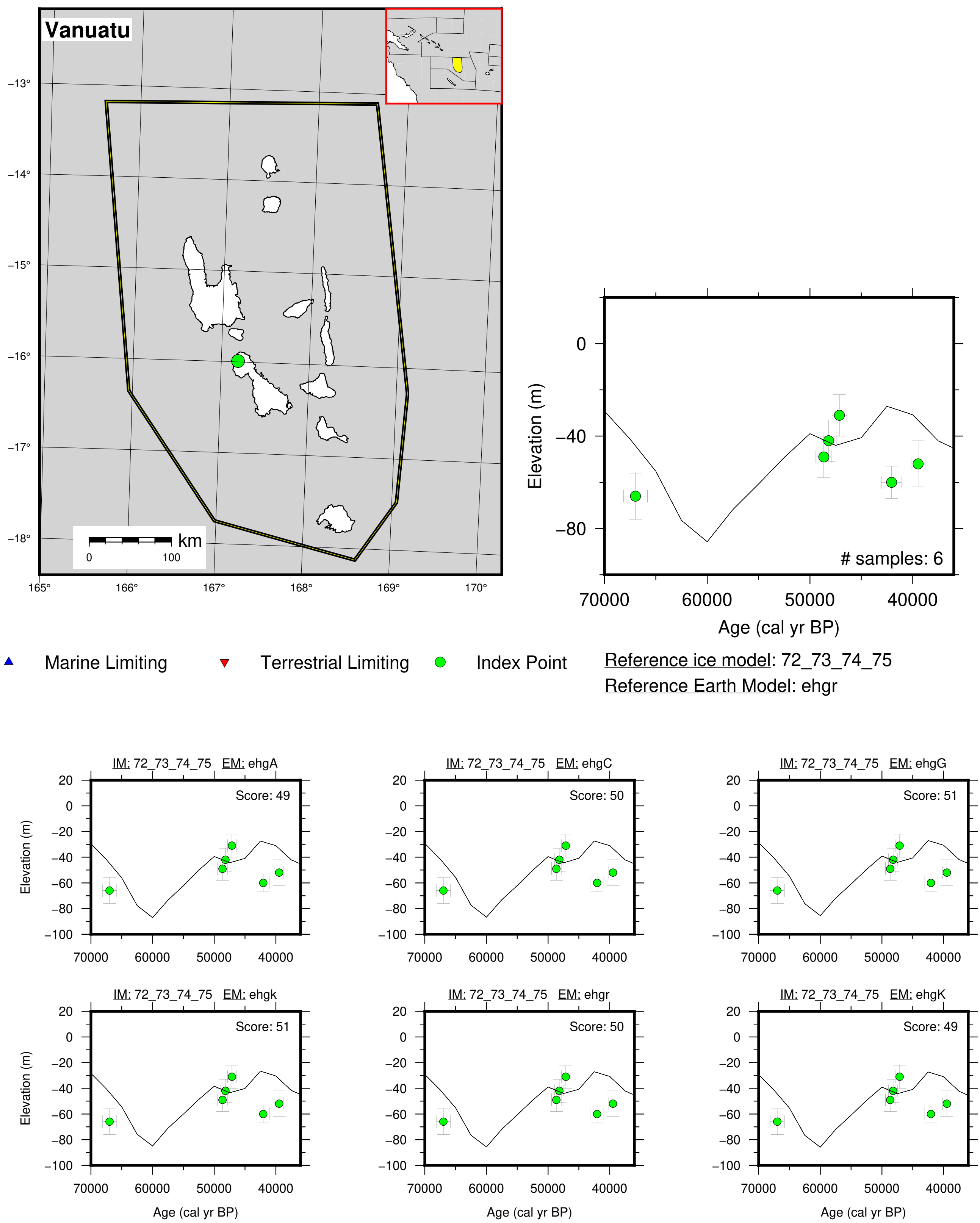


Figure 137: Paleo-sea level and comparison of six models for subregion Melanesia (MIS3 - MIS4), location Vanuatu.

12.4 Northeastern Australia (MIS3 - MIS4)

References for the data used in each location.

Cairns: Yokoyama et al. (2018)

Mackay: Yokoyama et al. (2018)

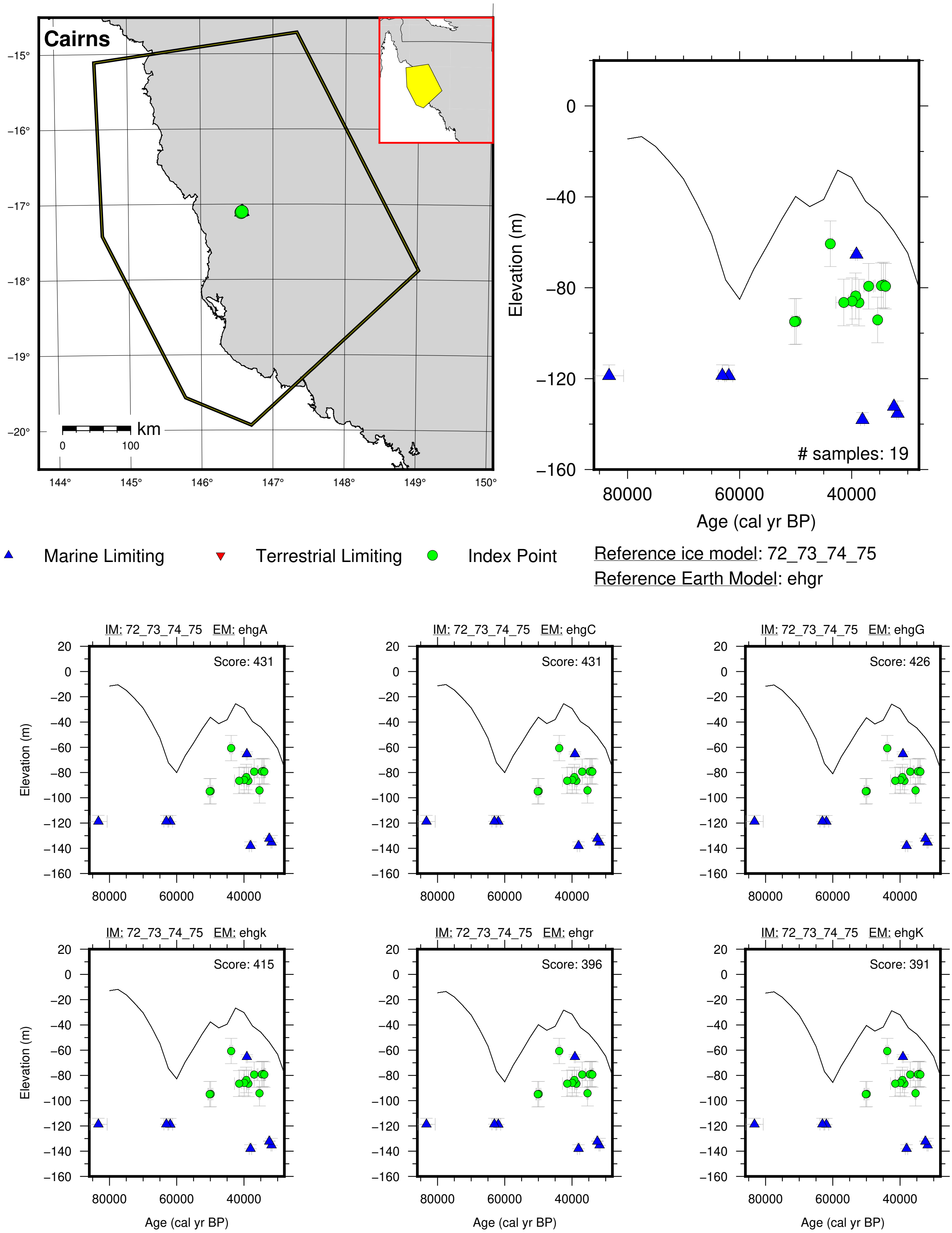


Figure 138: Paleo-sea level and comparison of six models for subregion Northeastern Australia (MIS3 - MIS4), location Cairns.

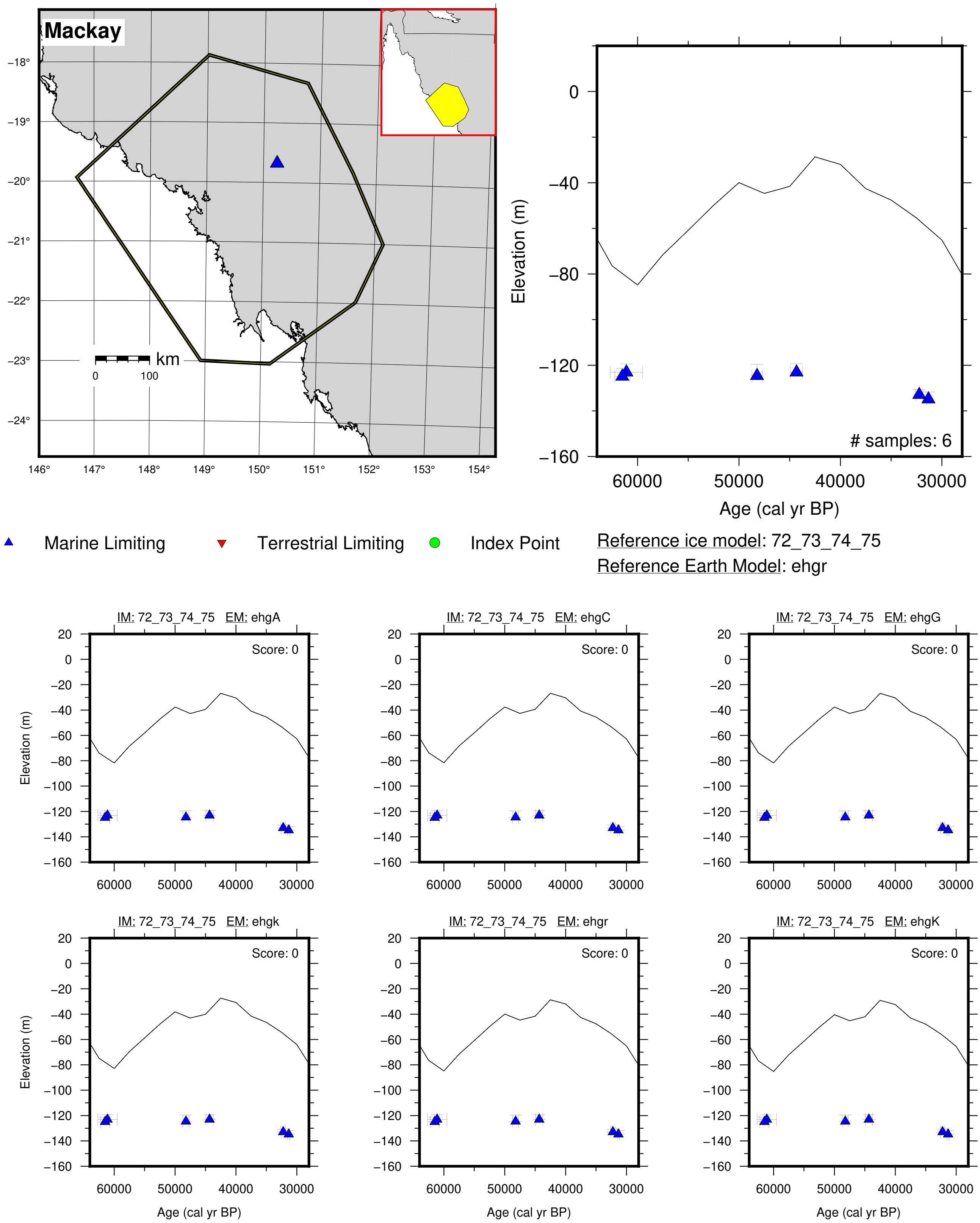


Figure 139: Paleo-sea level and comparison of six models for subregion Northeastern Australia (MIS3 - MIS4), location Mackay.

12.5 Papua New Guinea (MIS3 - MIS4)

References for the data used in each location.

Huon Peninsula: Chappell et al. (1996); Cutler et al. (2003); Hibbert et al. (2016); Yokoyama et al. (2001)

Huon Peninsula de Gelder: Chappell (2002); Chappell et al. (1996); de Gelder et al. (2021)

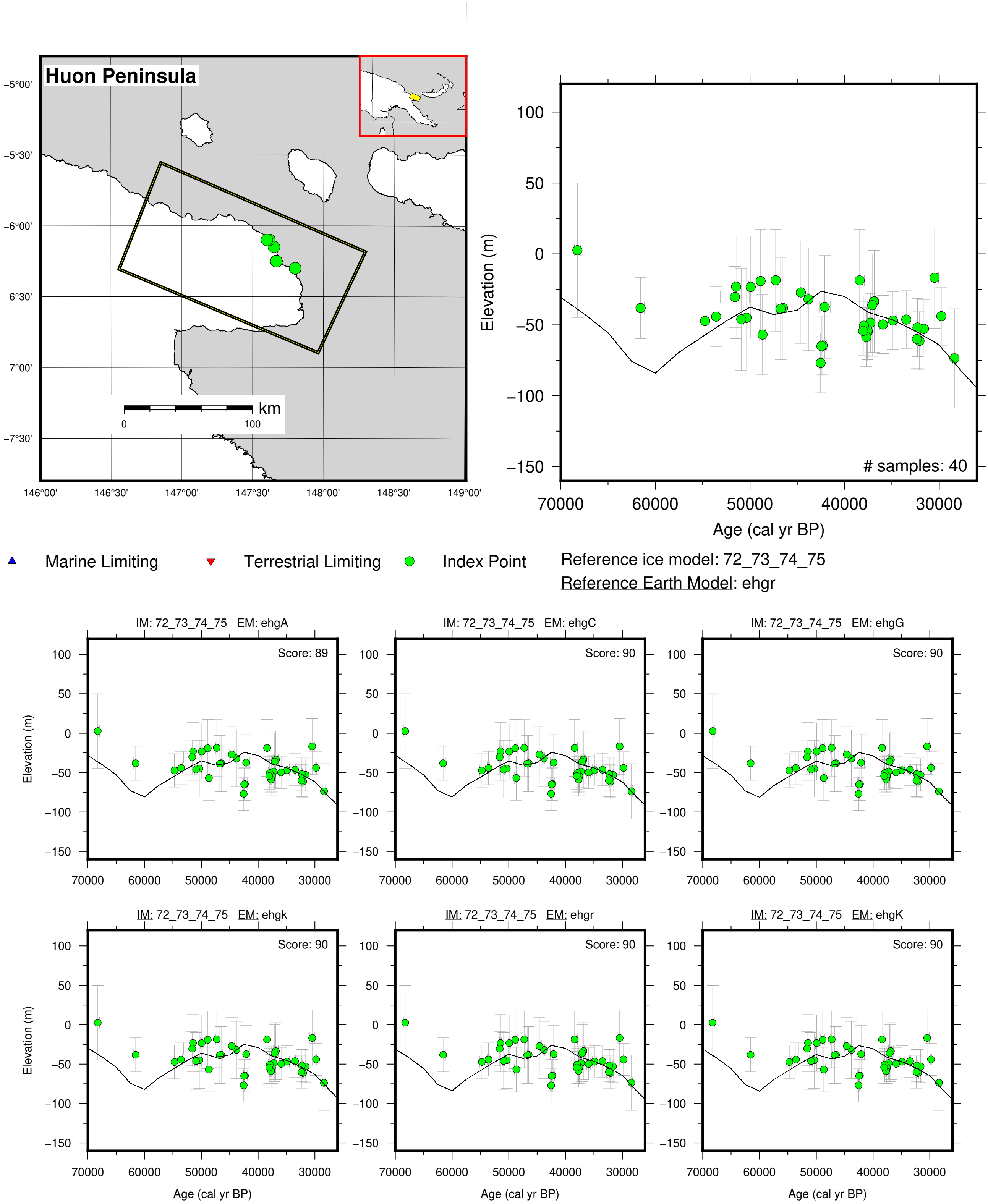


Figure 140: Paleo-sea level and comparison of six models for subregion Papua New Guinea (MIS3 - MIS4), location Huon Peninsula.

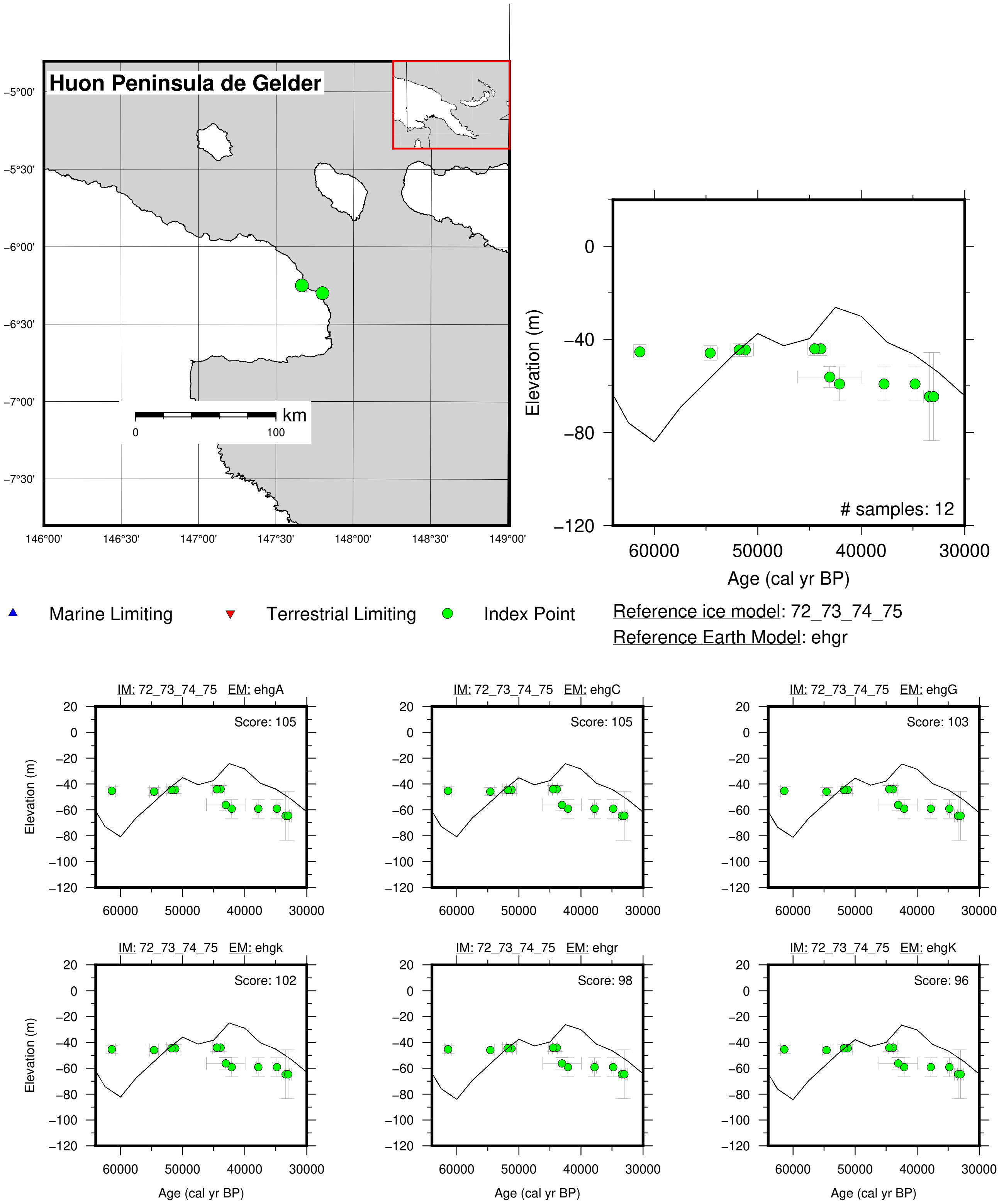


Figure 141: Paleo-sea level and comparison of six models for subregion Papua New Guinea (MIS3 - MIS4), location Huon Peninsula de Gelder.

12.6 Sea of Japan - East Sea (MIS3 - MIS4)

References for the data used in each location.

Tsushima-Korea Strait: Park et al. (2000)

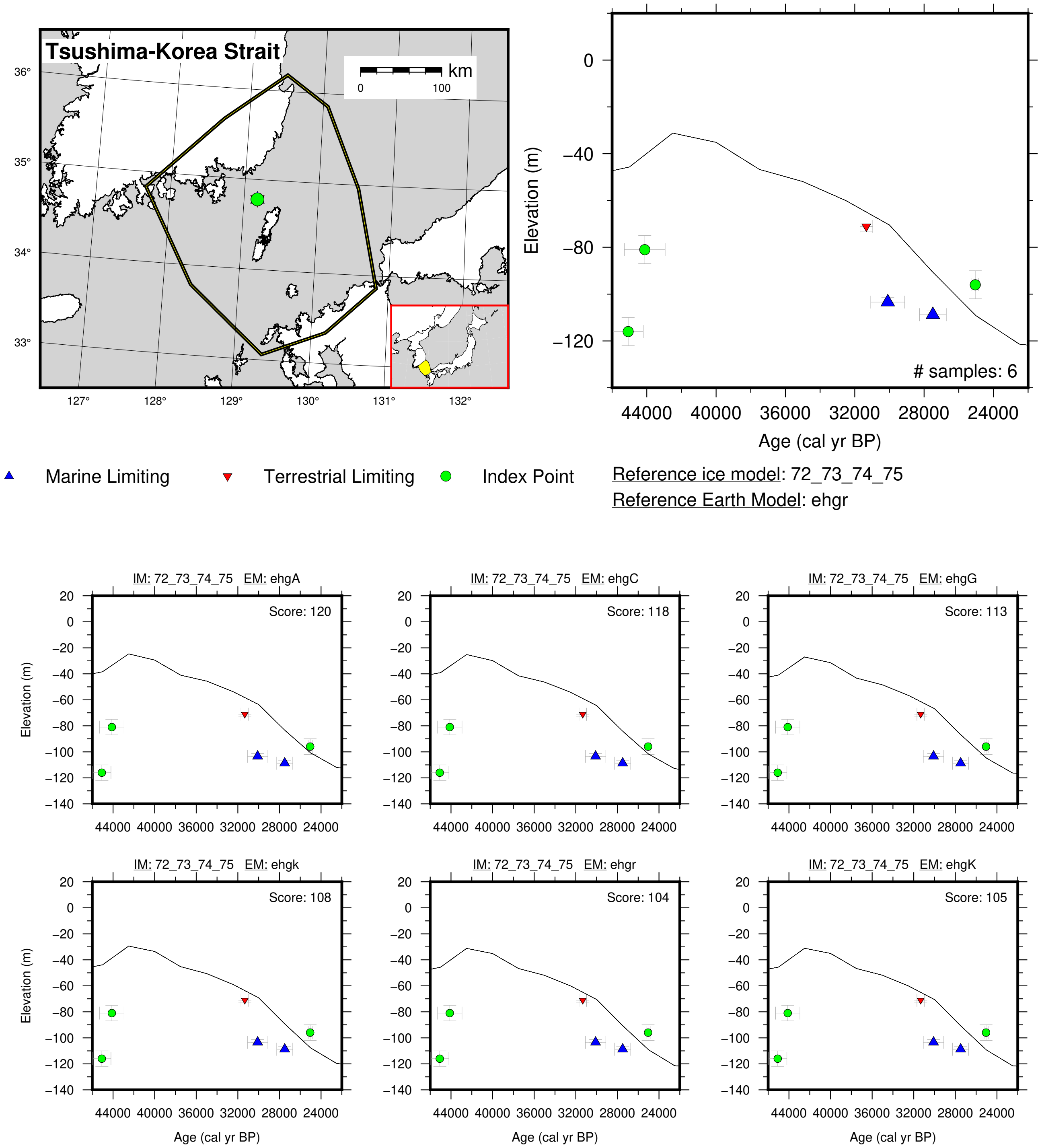


Figure 142: Paleo-sea level and comparison of six models for subregion Sea of Japan - East Sea (MIS3 - MIS4), location Tsushima-Korea Strait.

12.7 Sundaland (MIS3 - MIS4)

References for the data used in each location.

Sunda Shelf: Hanebuth et al. (2003); Steinke et al. (2003)

Vietnam Shelf: Schimanski and Stattegger (2005)

Strait Of Malacca: Geyh et al. (1979)

Mekong Delta: Ta et al. (2002)

Chao Phraya: Tanabe et al. (2003)

Berhala Strait: Geyh et al. (1979)

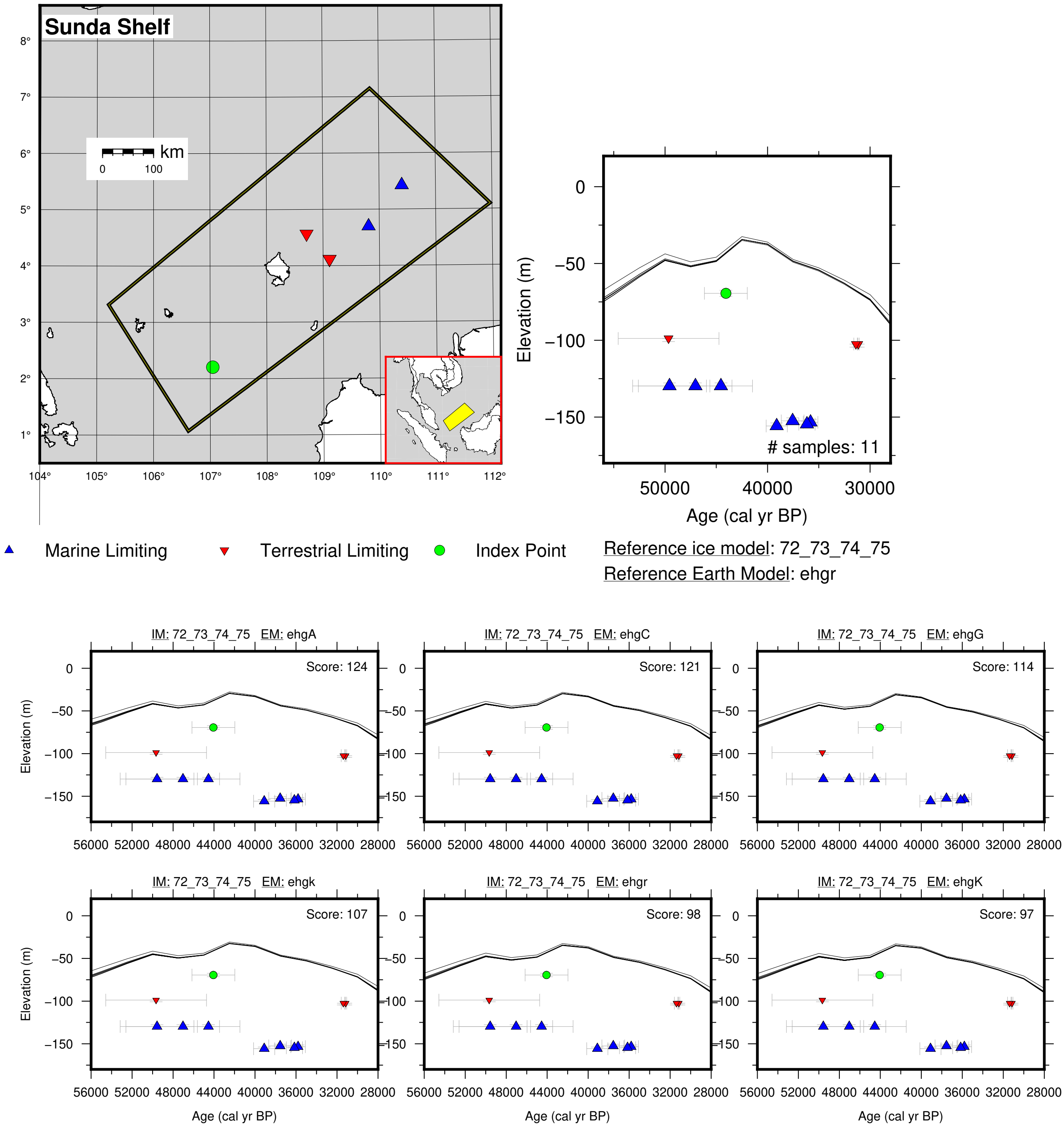


Figure 143: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Sunda Shelf.

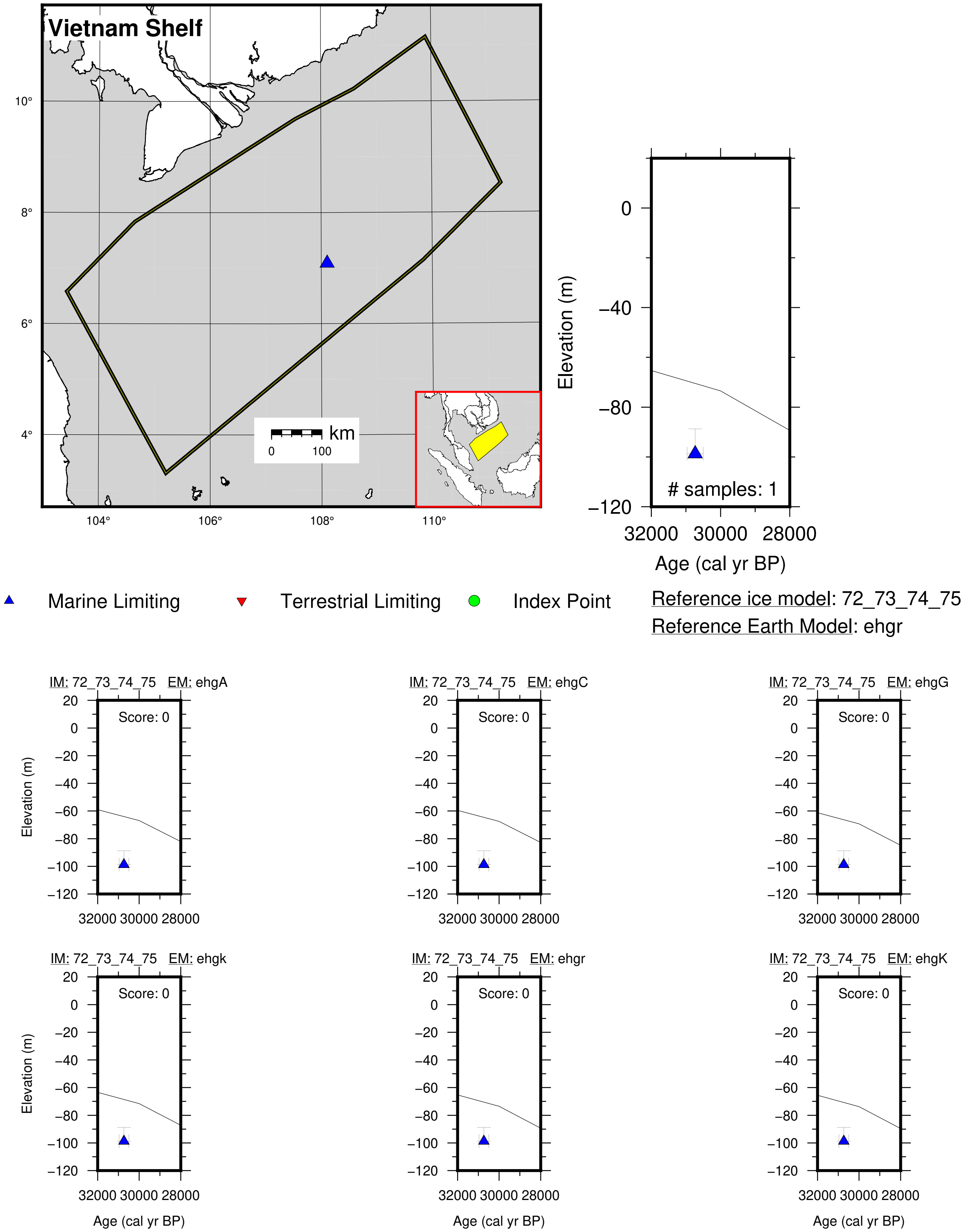


Figure 144: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Vietnam Shelf.

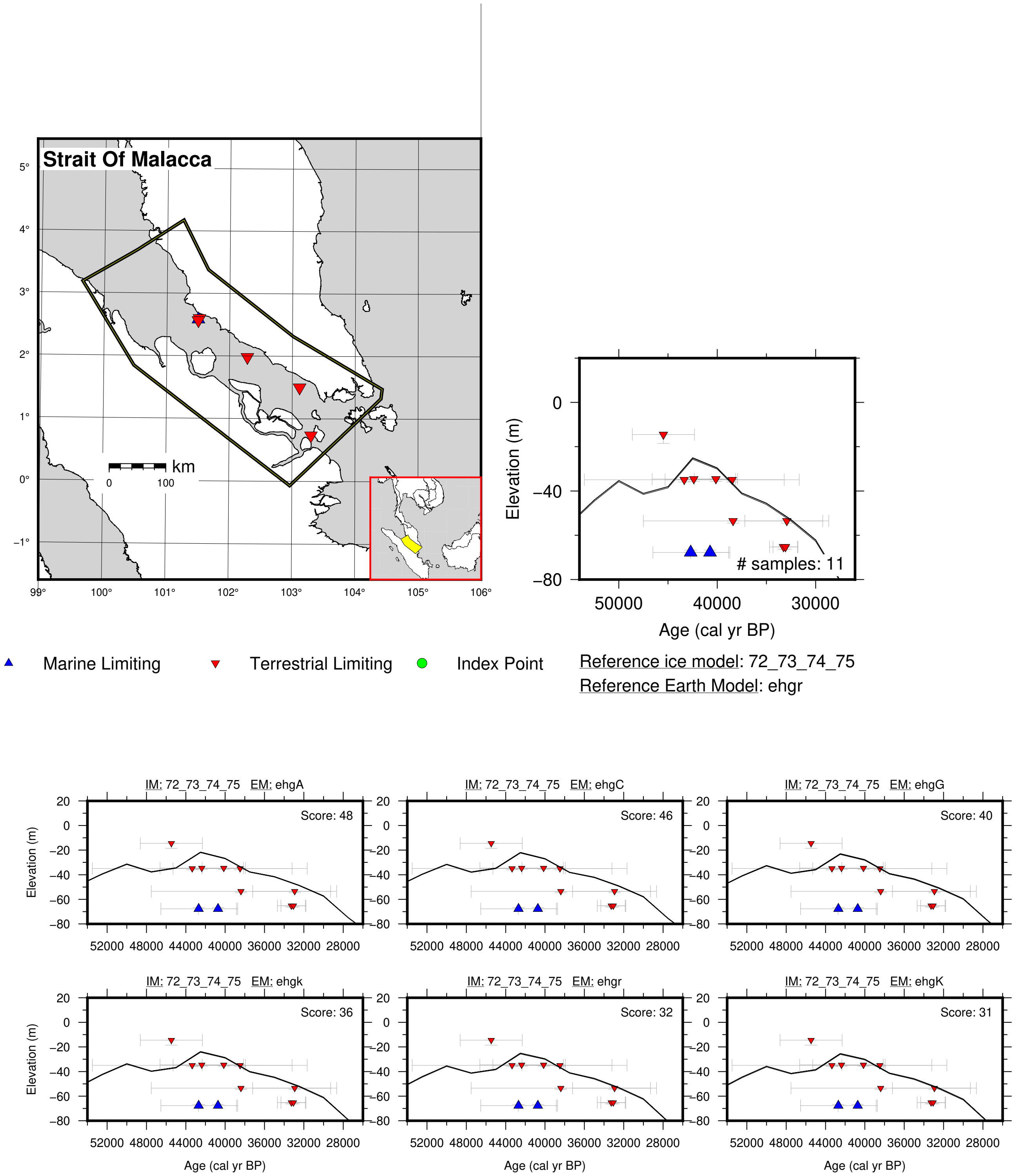


Figure 145: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Strait Of Malacca.

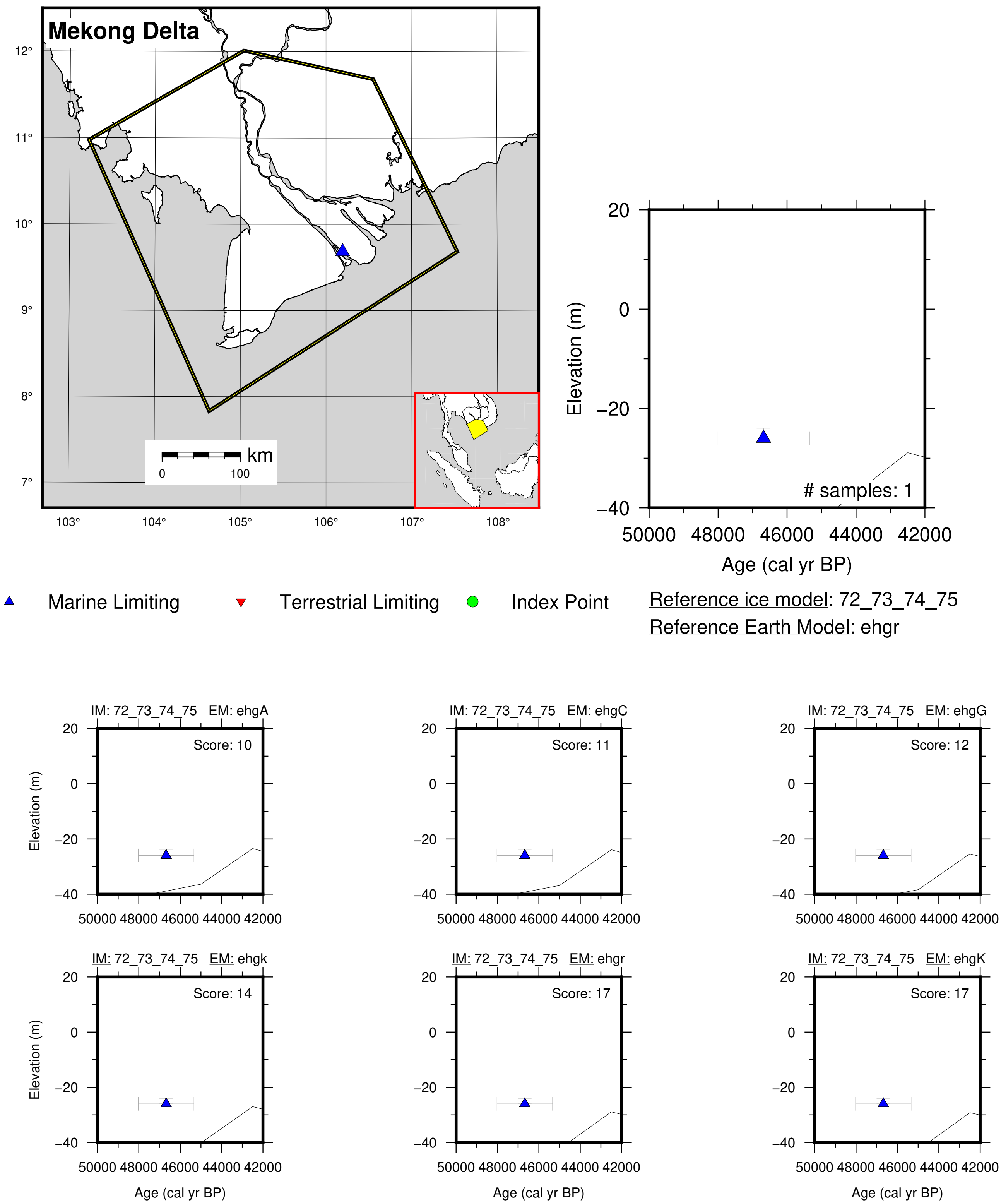


Figure 146: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Mekong Delta.

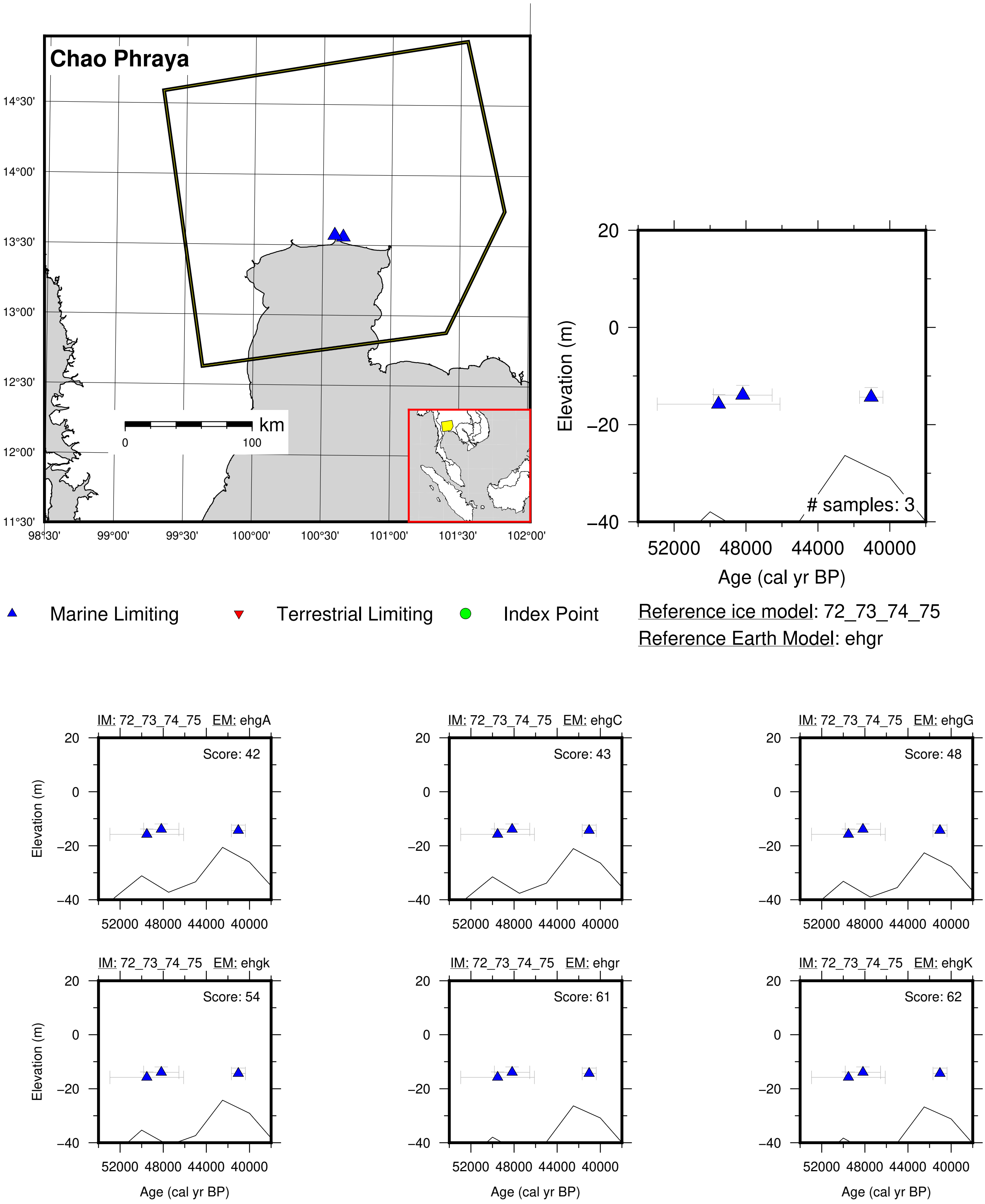


Figure 147: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Chao Phraya.

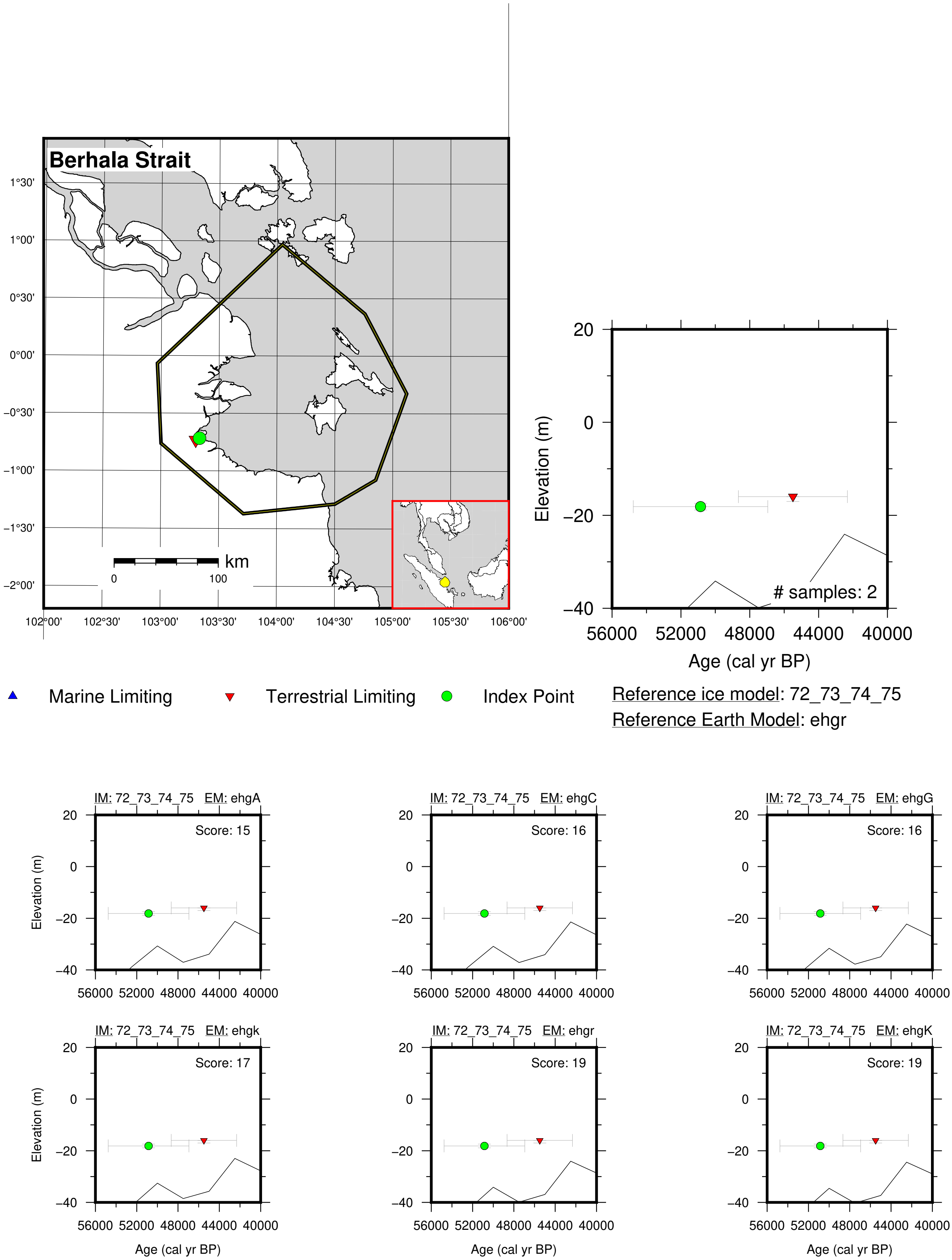


Figure 148: Paleo-sea level and comparison of six models for subregion Sundaland (MIS3 - MIS4), location Berhala Strait.

12.8 Yellow Sea (MIS3 - MIS4)

References for the data used in each location.

South Bohai Sea: Liu et al. (2009); Pico et al. (2016)

Yellow Sea: Liu et al. (2010); Pico et al. (2016); Wang et al. (2014)

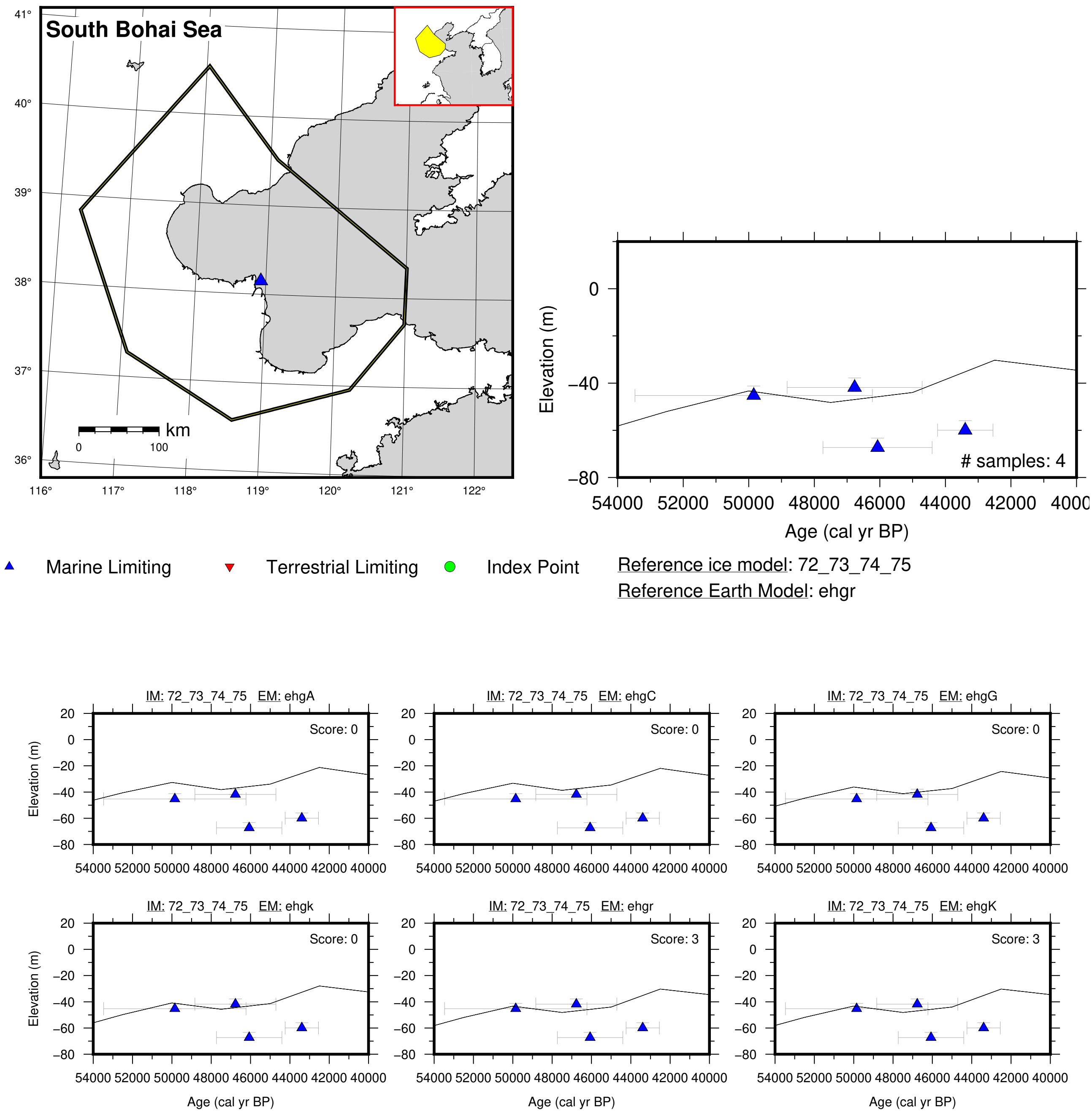


Figure 149: Paleo-sea level and comparison of six models for subregion Yellow Sea (MIS3 - MIS4), location South Bohai Sea.

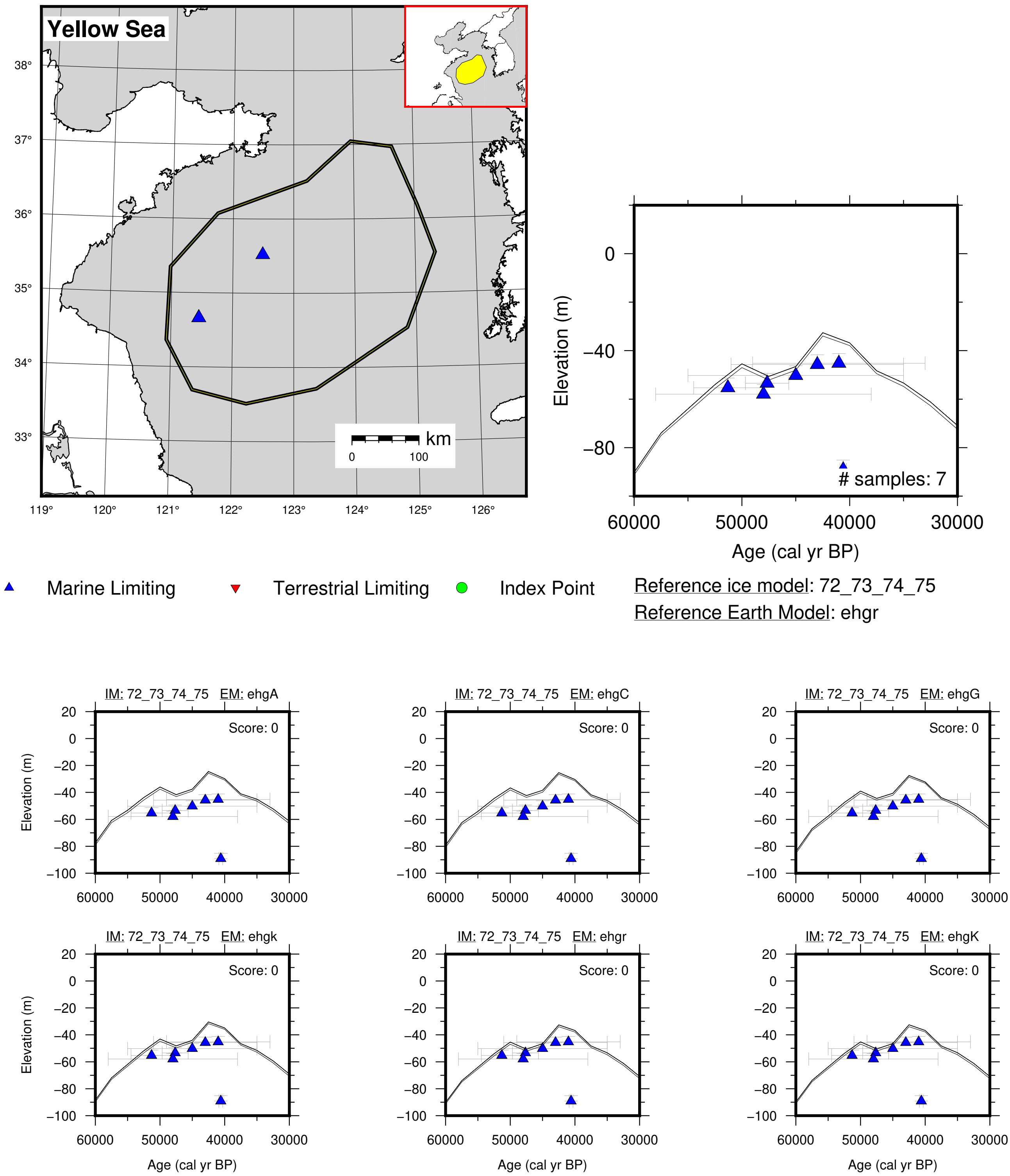


Figure 150: Paleo-sea level and comparison of six models for subregion Yellow Sea (MIS3 - MIS4), location Yellow Sea.

13 North America

13.1 Eastern United States

References for the data used in each location.

Outer Delaware: Belknap (1975); Fletcher et al. (1993); Nikitina et al. (2000); Ramsey and Baxter (1996)

Inner Delaware: Belknap (1975); Kraft (1976); Leorri et al. (2006); Marx (1981); Nikitina et al. (2000); Ramsey and Baxter (1996); Rogers and Pizzuto (1994)

Inner Chesapeake: Cinquemani et al. (1982); Colman et al. (2002)

Eastern Shore: Engelhart et al. (2009); Finkelstein and Ferland (1987); Newman and Rusnak (1965); van de Plassche (1990)

Northern North Carolina: Emery et al. (1967); Horton et al. (2009); Kemp (2009); Mallinson et al. (2005); Sears (1973); Stanton (2008)

Southern North Carolina: Cinquemani et al. (1982); Culver et al. (2007); Field et al. (1979); Horton et al. (2009); Kemp (2009); Spaur and Snyder (1999)

Northern South Carolina: Cinquemani et al. (1982); Gayes et al. (1992)

Southern South Carolina: Cinquemani et al. (1982)

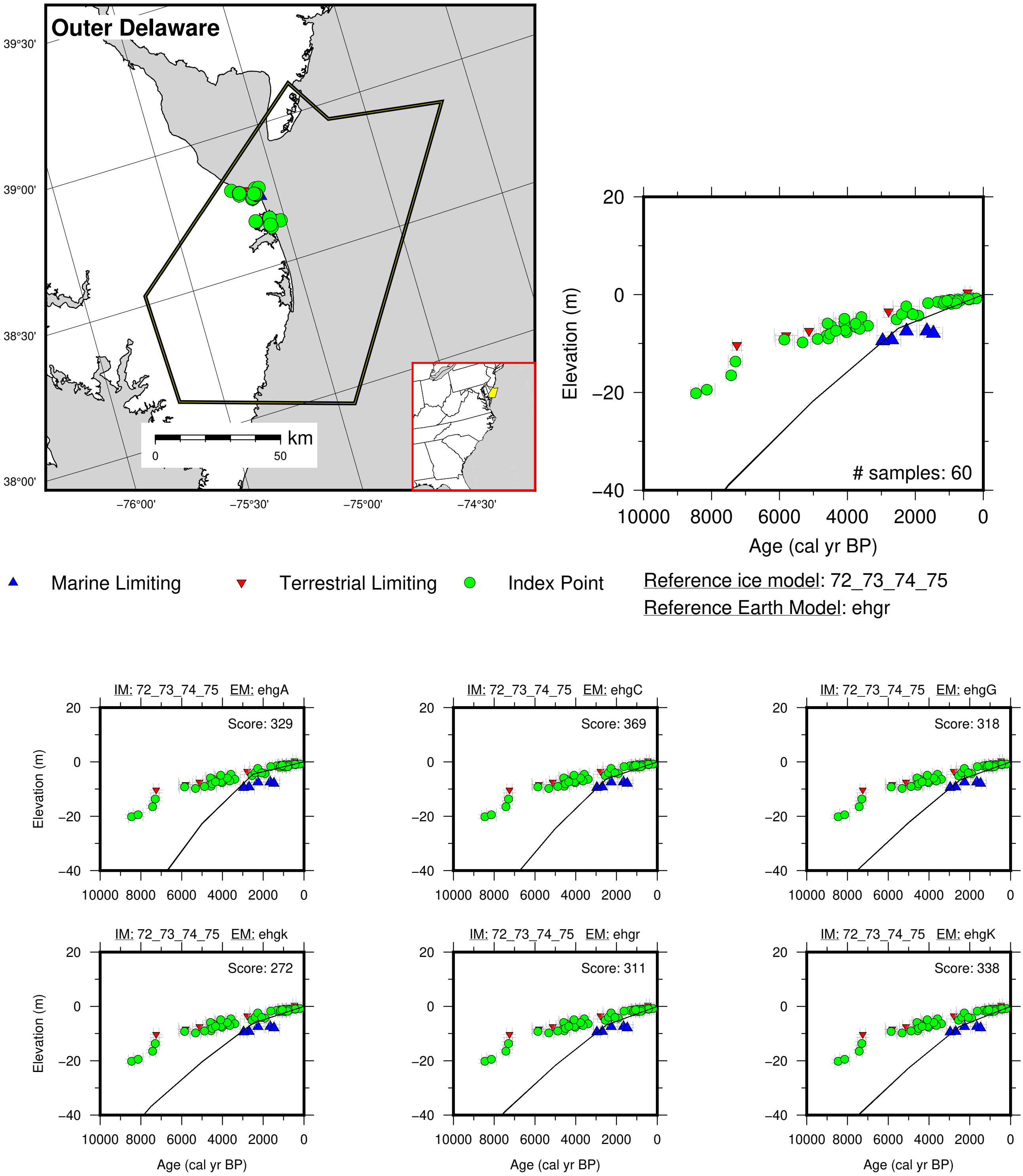


Figure 151: Paleo-sea level and comparison of six models for subregion Eastern United States, location Outer Delaware.

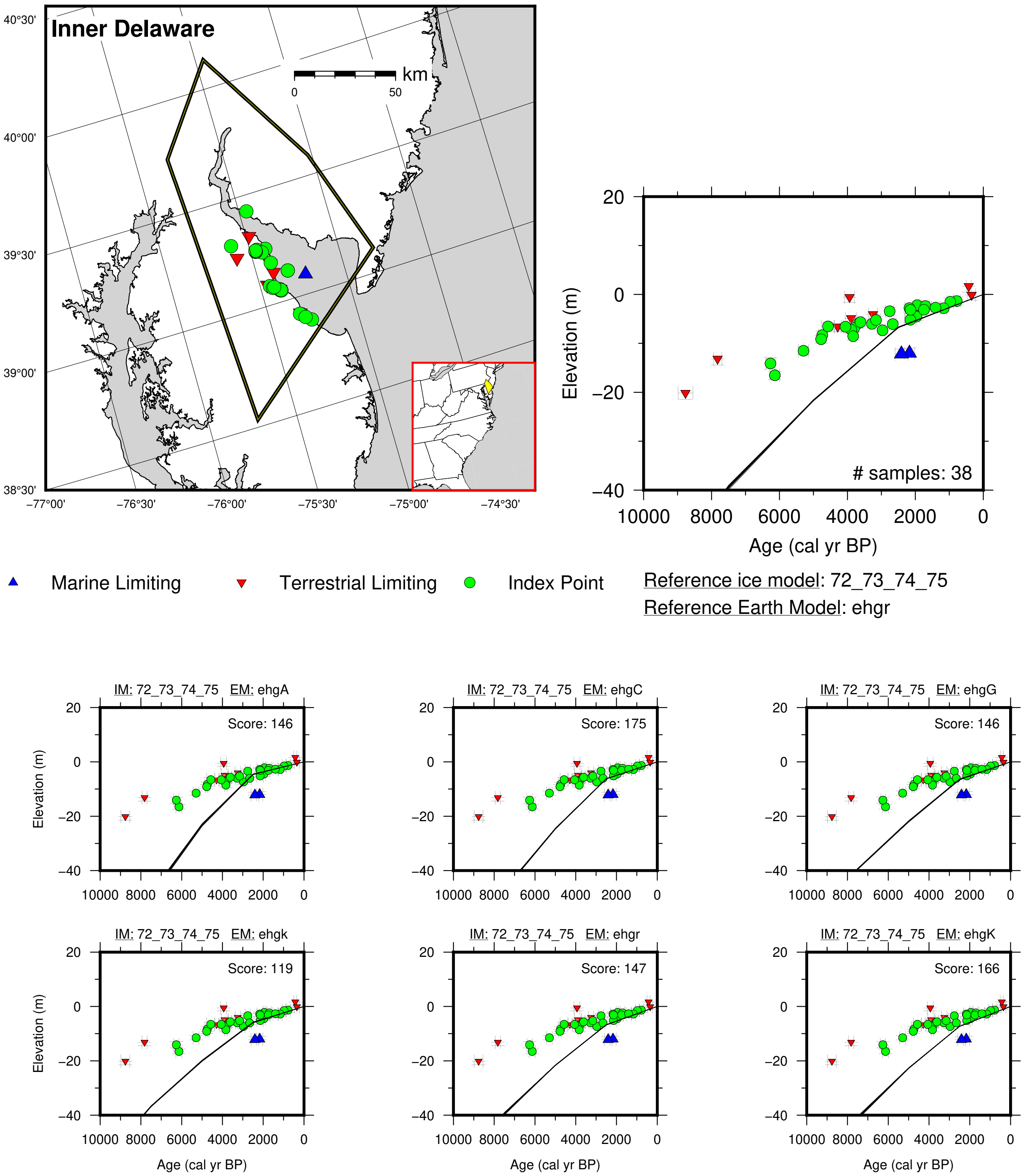


Figure 152: Paleo-sea level and comparison of six models for subregion Eastern United States, location Inner Delaware.

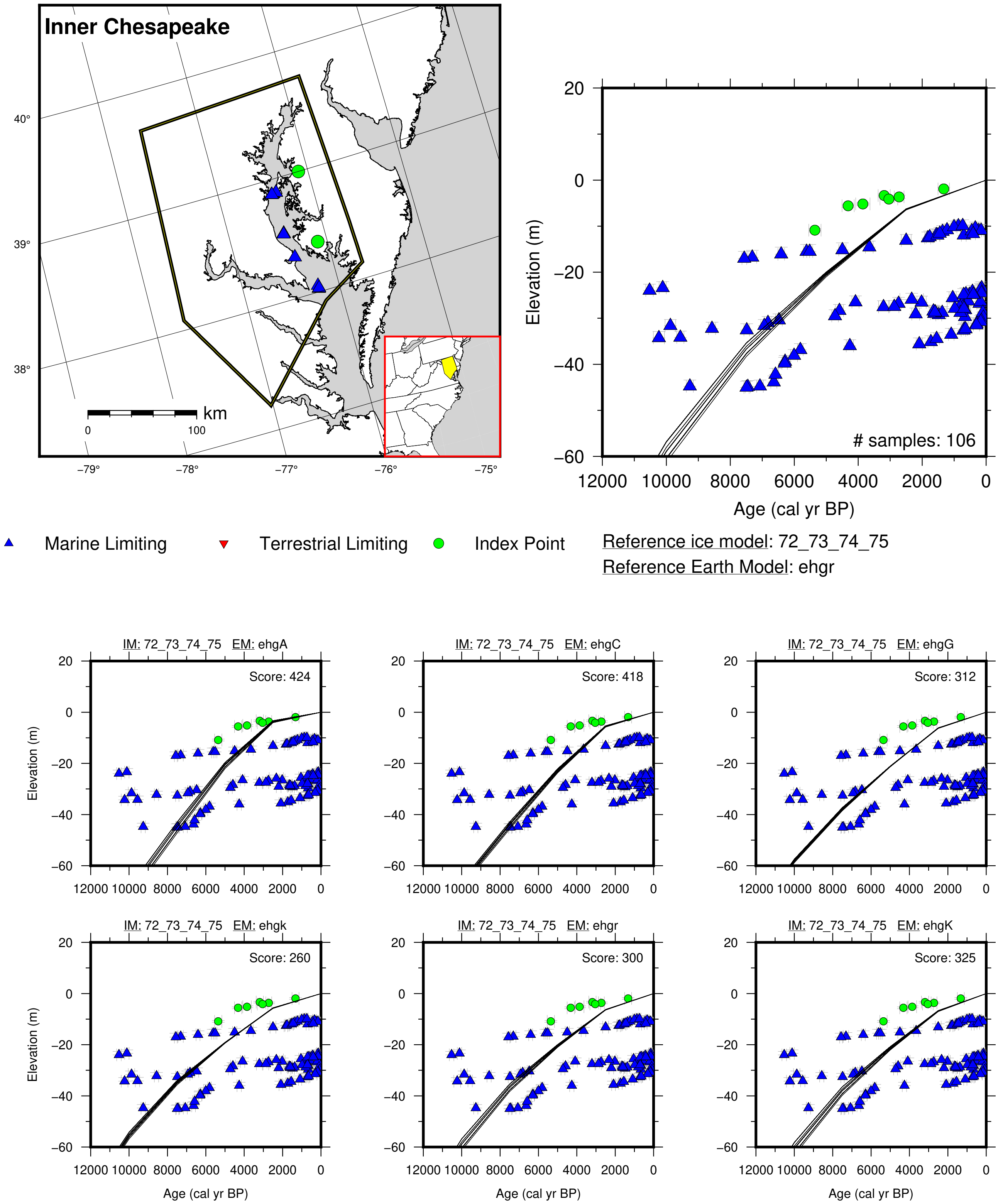


Figure 153: Paleo-sea level and comparison of six models for subregion Eastern United States, location Inner Chesapeake.

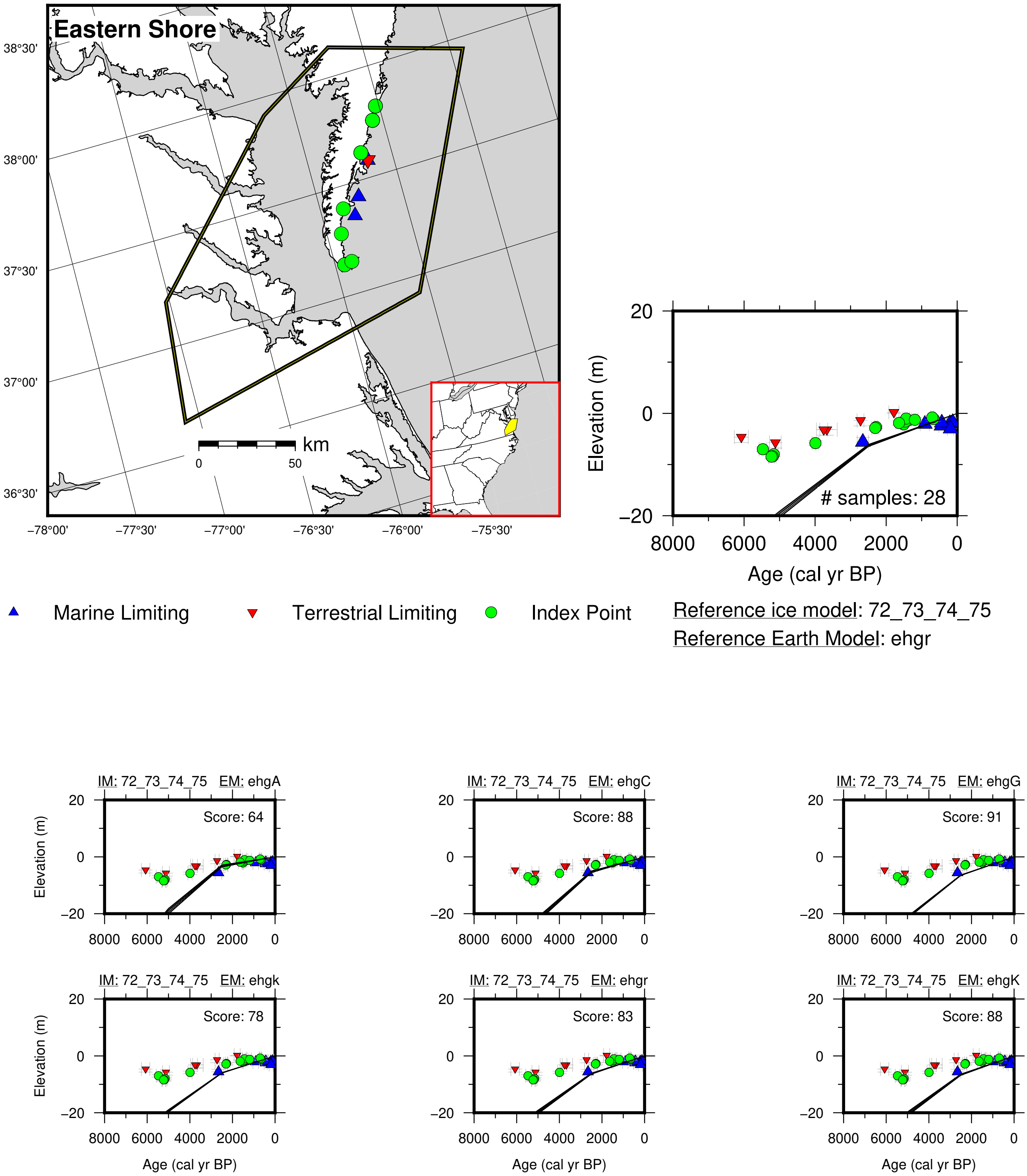


Figure 154: Paleo-sea level and comparison of six models for subregion Eastern United States, location Eastern Shore.

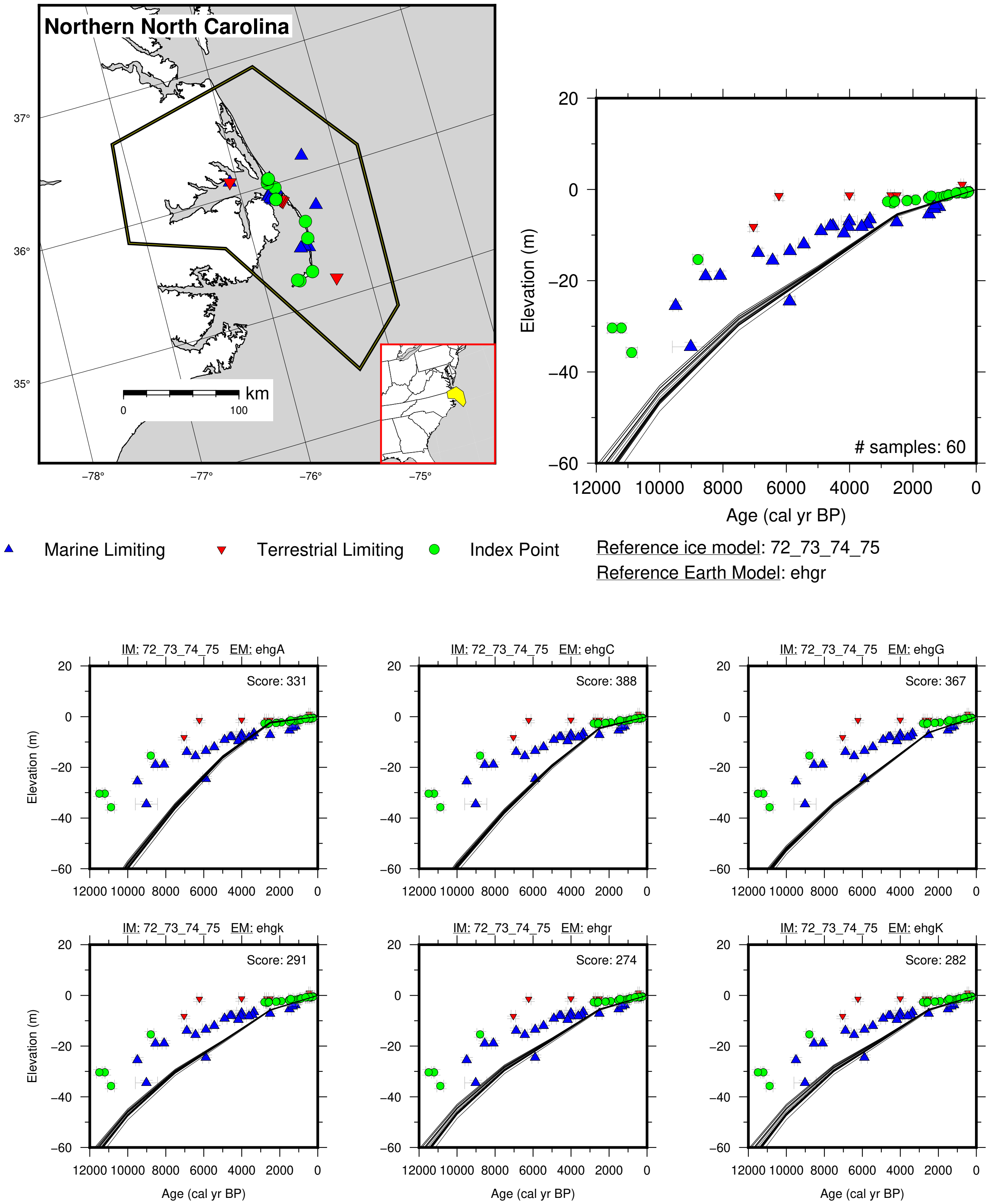


Figure 155: Paleo-sea level and comparison of six models for subregion Eastern United States, location Northern North Carolina.

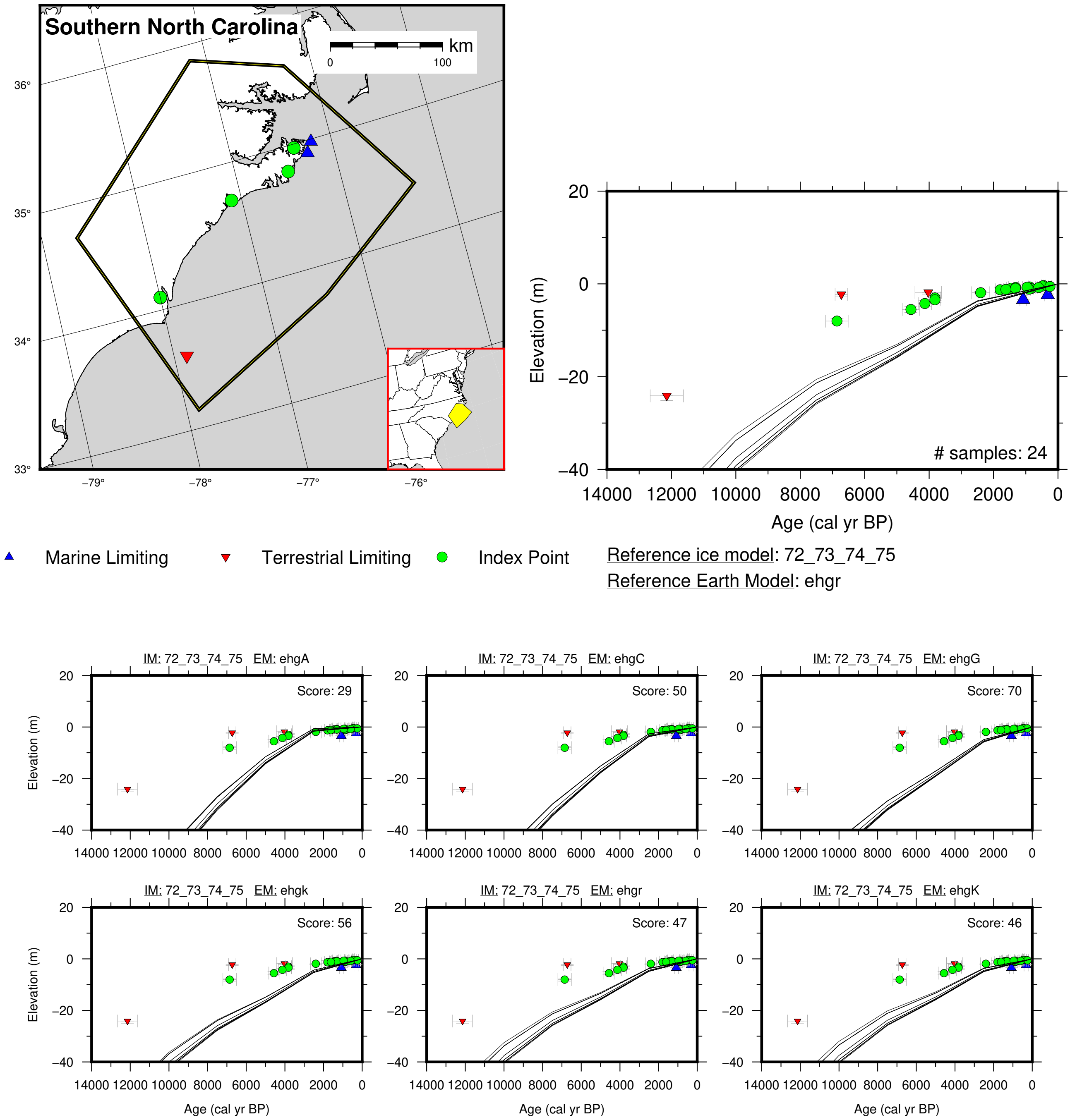


Figure 156: Paleo-sea level and comparison of six models for subregion Eastern United States, location Southern North Carolina.

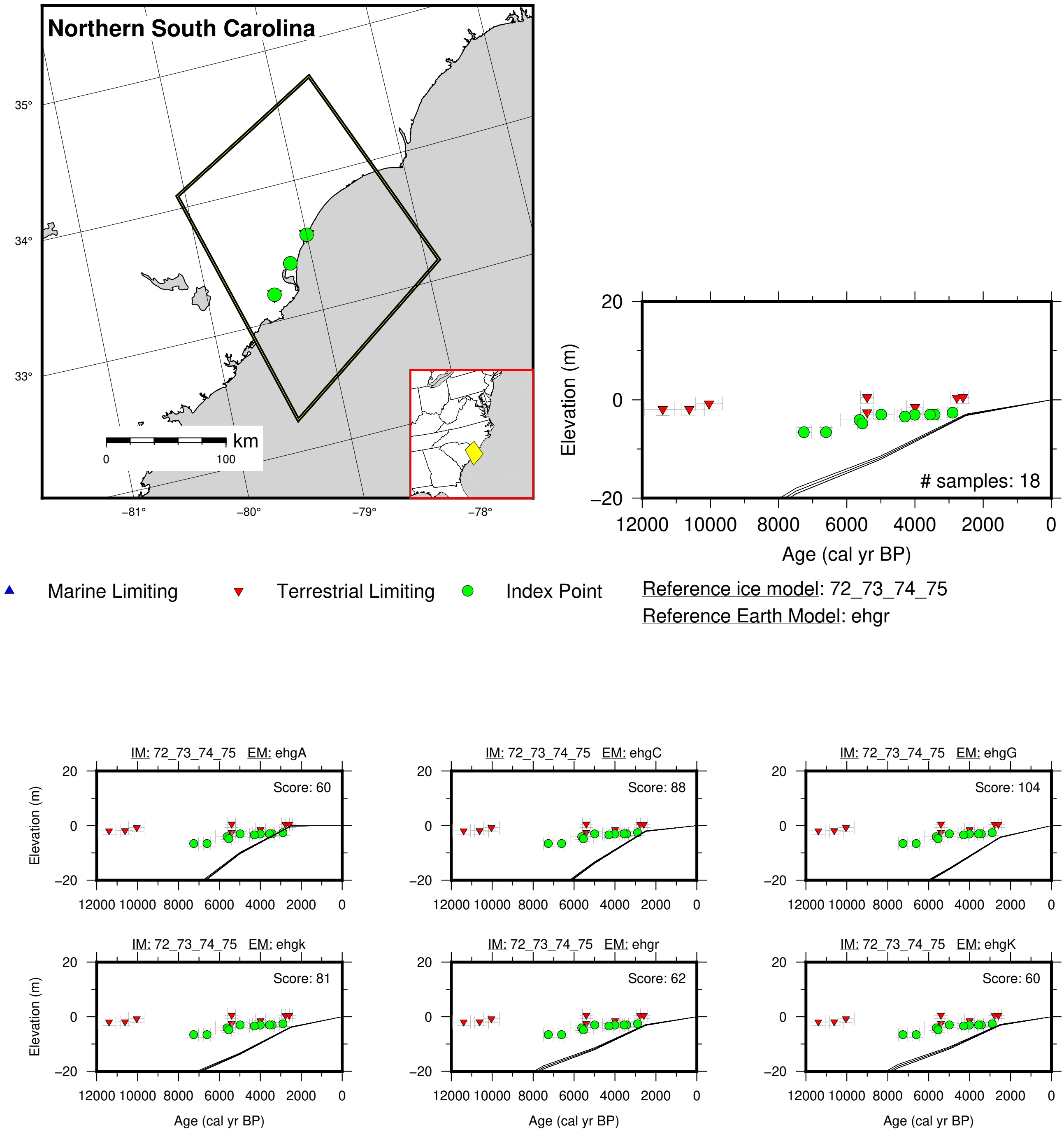


Figure 157: Paleo-sea level and comparison of six models for subregion Eastern United States, location Northern South Carolina.

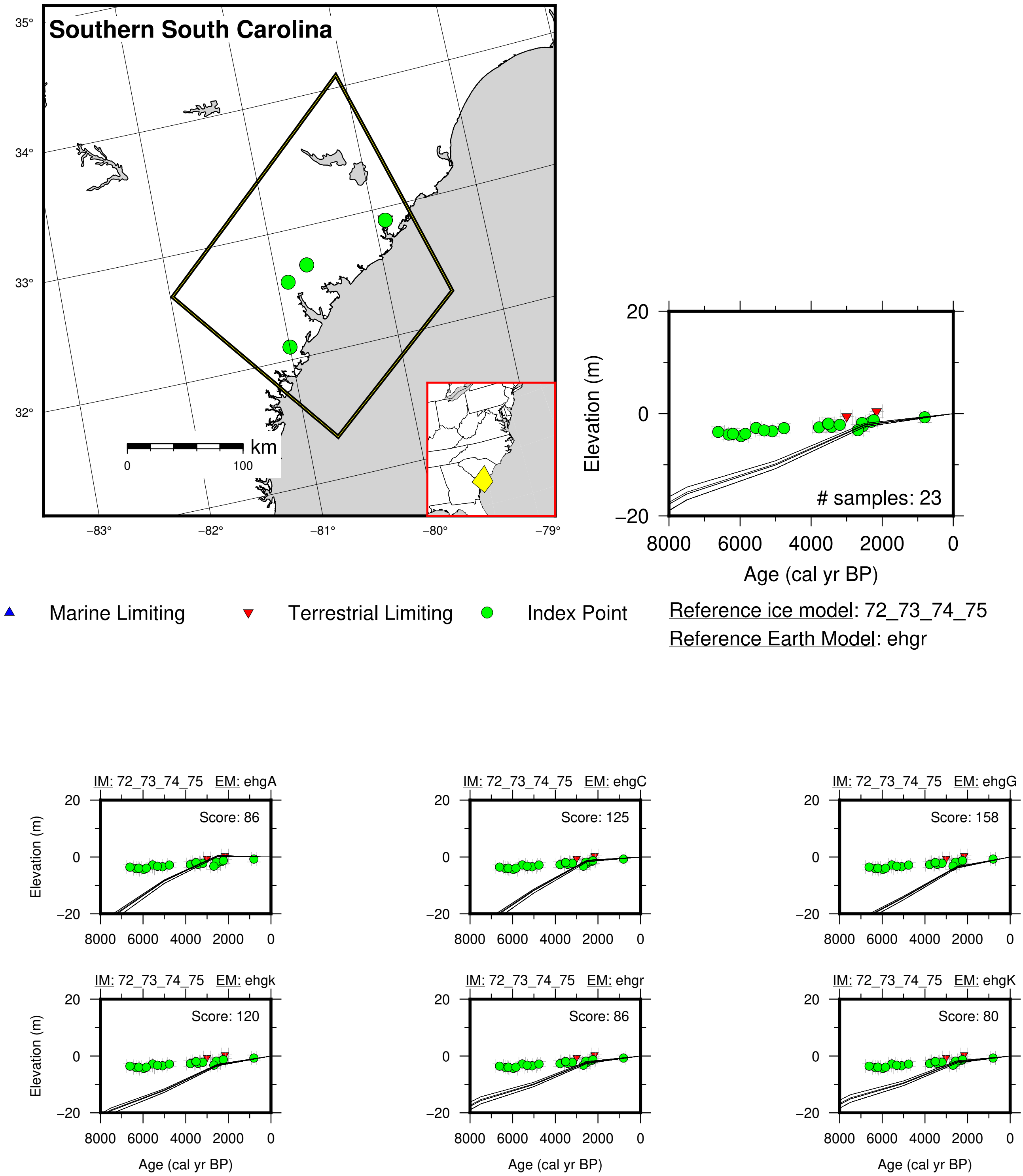


Figure 158: Paleo-sea level and comparison of six models for subregion Eastern United States, location Southern South Carolina.

13.2 Gulf of St Lawrence

References for the data used in each location.

Cape Breton: Blake and Lowdon (1976); Miller and Livingstone (1993); Shaw et al. (2009)

Magdalen Islands: Barnett et al. (2017); Dredge et al. (1992); Rémillard et al. (2016, 2017)

Prince Edward Island: Kranck (1972); McCallum and Wittenberg (1965); McNeely and Brennan (2005); Ogden and Hart (1976); Scott et al. (1981, 1987); Stea and Mott (1989); Walton et al. (1961)

Chaleur Bay: McNeely and Brennan (2005); Rampton et al. (1984)

Anticosti Island: Dubois et al. (1988); Lavoie and Filion (2001); Painchaud et al. (1984)

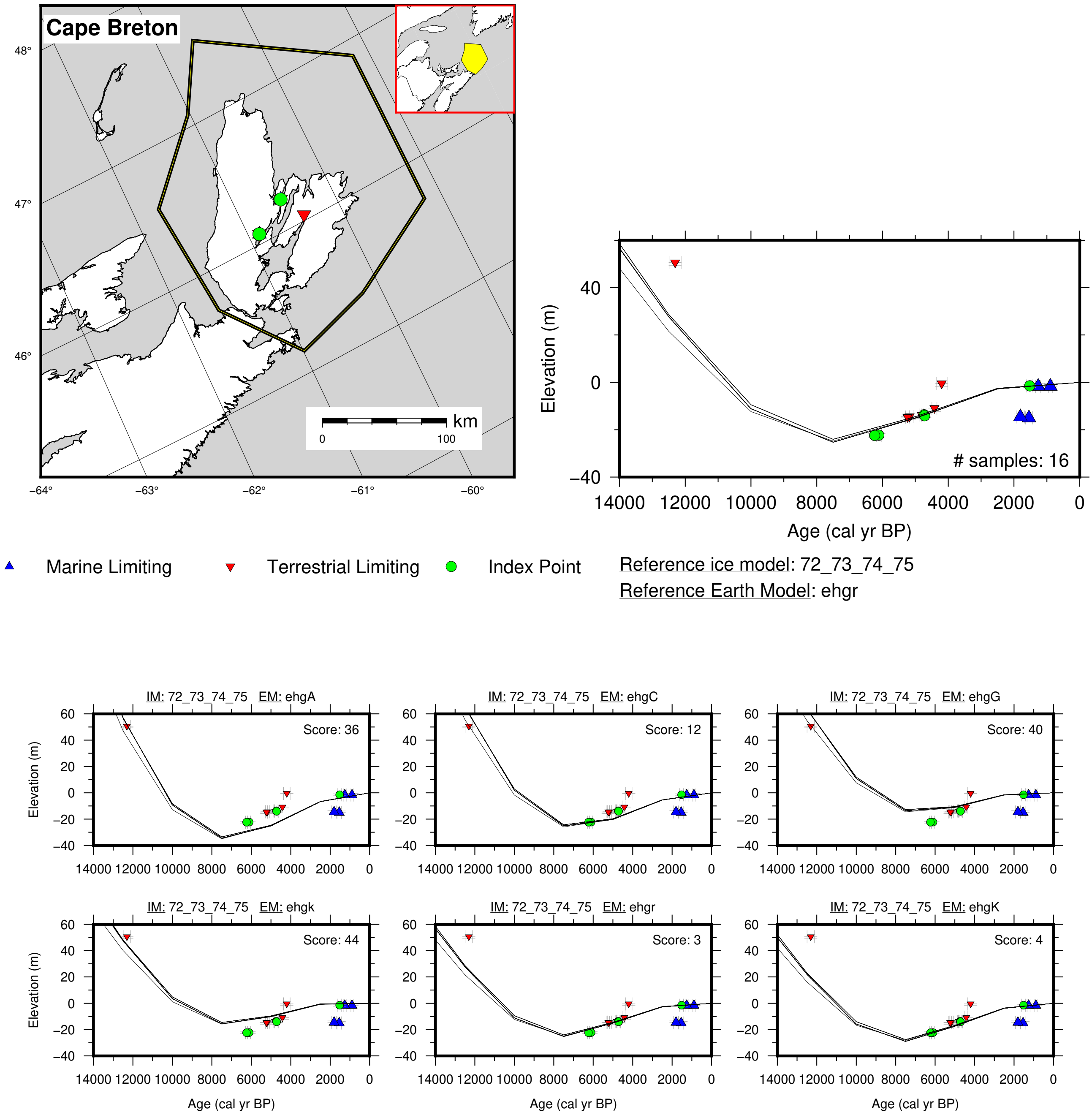


Figure 159: Paleo-sea level and comparison of six models for subregion Gulf of St Lawrence, location Cape Breton.

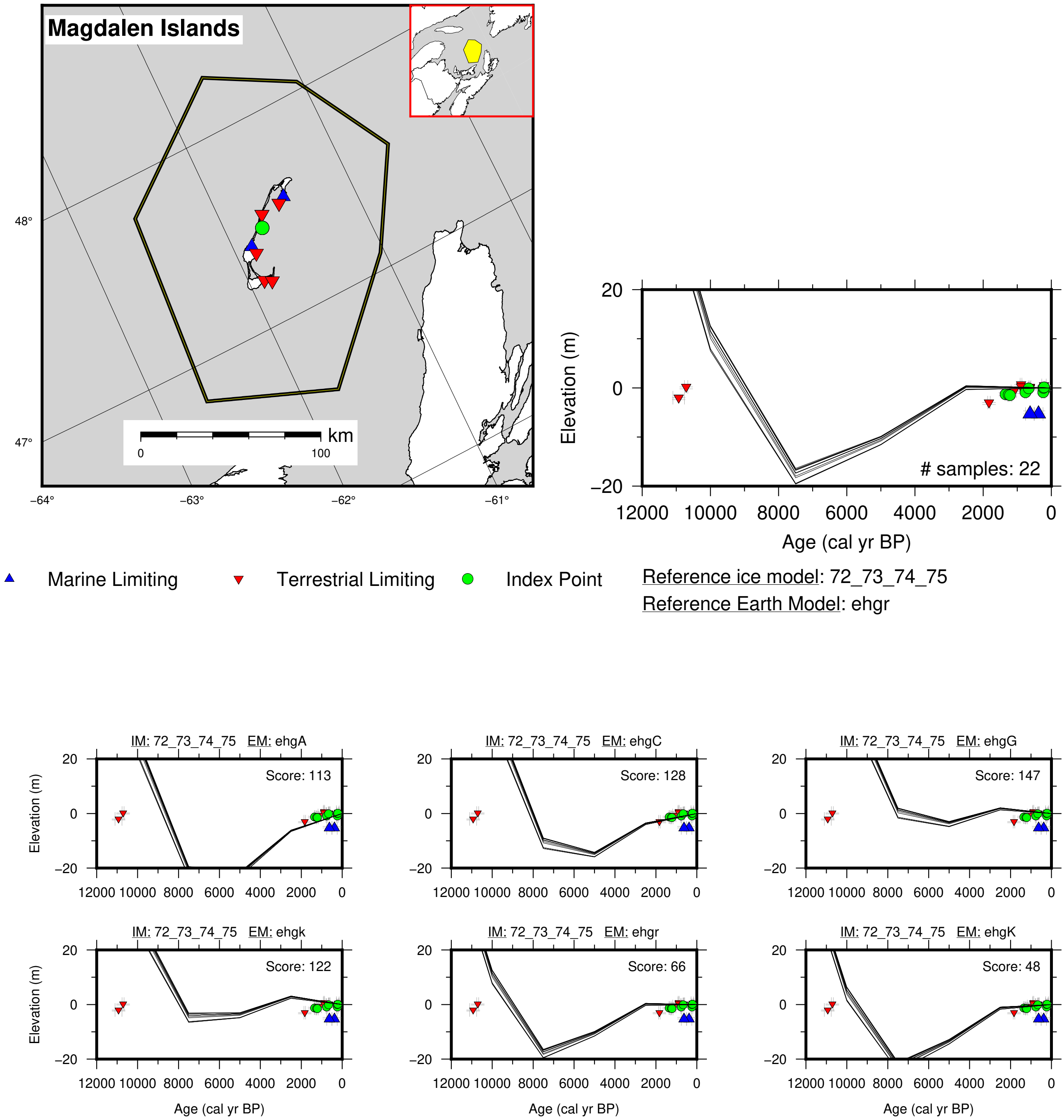


Figure 160: Paleo-sea level and comparison of six models for subregion Gulf of St Lawrence, location Magdalen Islands.

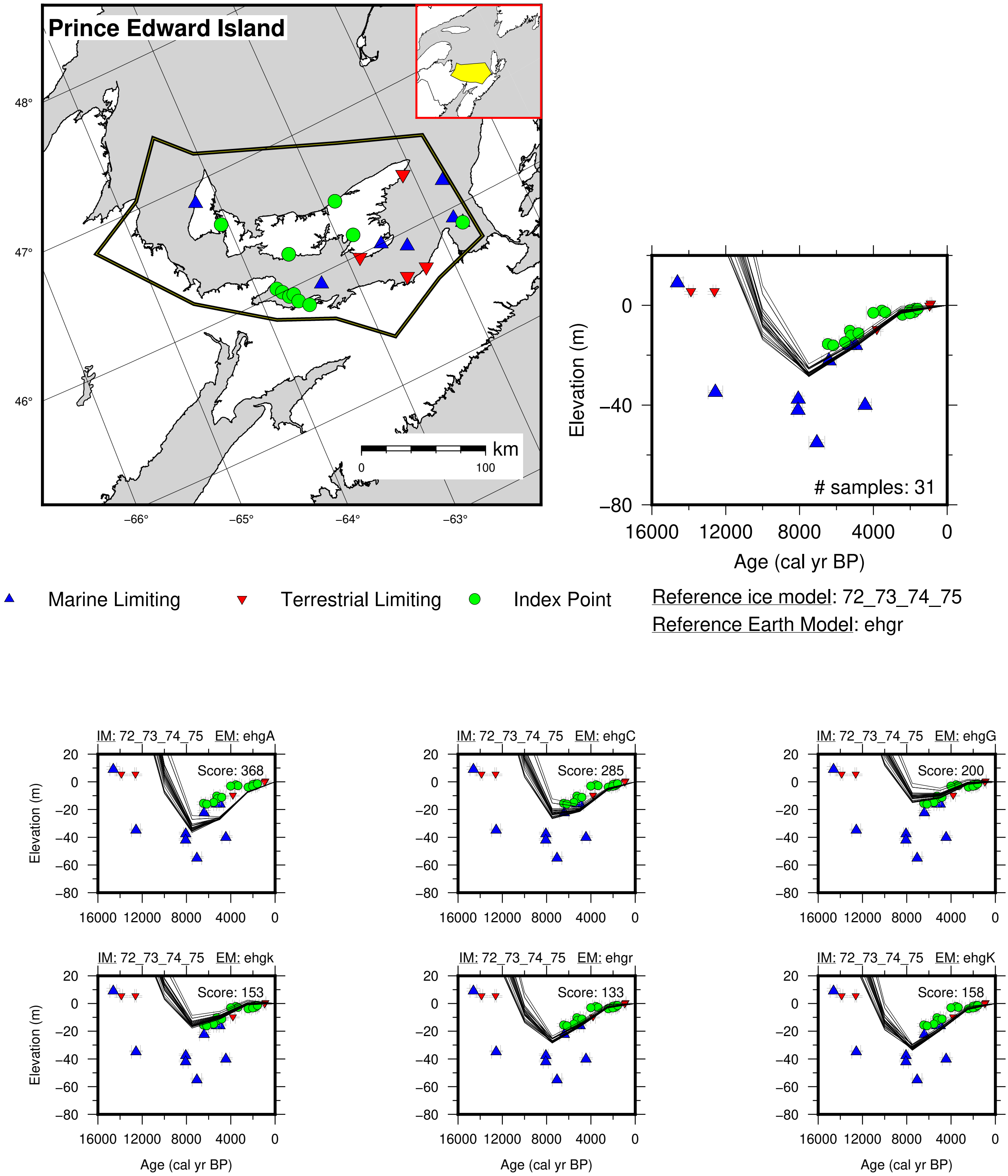


Figure 161: Paleo-sea level and comparison of six models for subregion Gulf of St Lawrence, location Prince Edward Island.

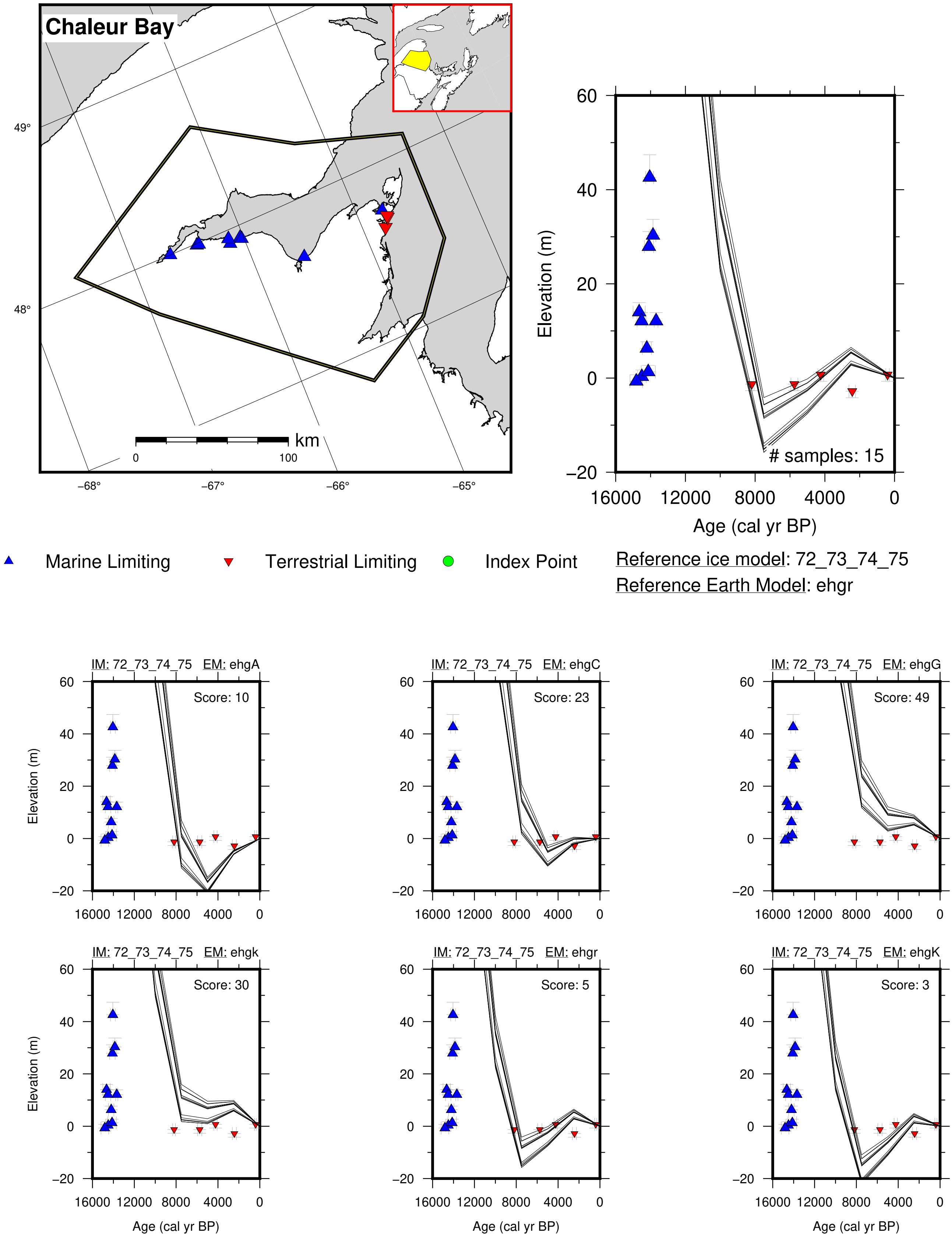


Figure 162: Paleo-sea level and comparison of six models for subregion Gulf of St Lawrence, location Chaleur Bay.

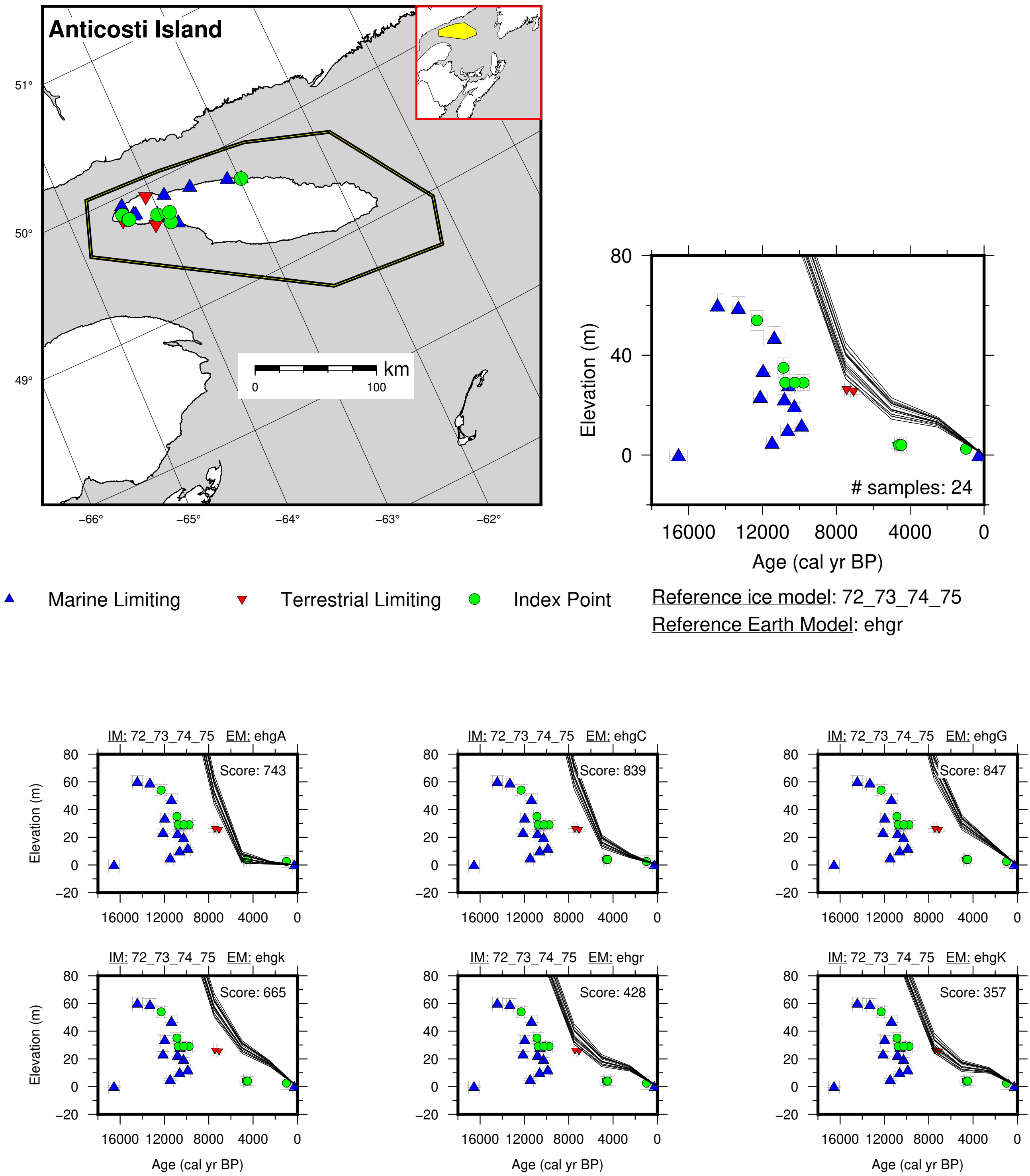


Figure 163: Paleo-sea level and comparison of six models for subregion Gulf of St Lawrence, location Anticosti Island.

13.3 Hudson Bay

References for the data used in each location.

Kivalliq: Aylsworth et al. (1981); Blake (1983, 1986, 1988); Dyck and Fyles (1962); Dyck et al. (1966); Lowdon and Blake (1970); Lowdon and Blake (1979); McNeely and Atkinson (1995); Morrison (1989); Ridler (1974); Rutherford et al. (1973, 1979); Simon et al. (2014); Walton et al. (1961)

Churchill: Anderson and Hodgetts (2007); Andrews and Falconer (1969); Blake (1982, 1988); Dyck and Fyles (1964); Hodgetts (2007); Kuhry (2008); Lowdon and Blake (1973); Lowdon et al. (1971); Meyer (1970); Morlan et al. (2000); Nash (1972); Wagner (1967)

West James Bay: Bunbury et al. (2012); Dyck et al. (1965); Dyke and Peltier (2000a); Glaser et al. (2004); McAndrews et al. (1982); McNeely and Brennan (2005); Vogel and Waterbolk (1972); Webber et al. (1970)

East James Bay: Beaulieu-Audy et al. (2009); Farrand (1962); Hardy (1976); Pendea et al. (2010)

Umiujaq: Allard and Seguin (1985); Allard and Tremblay (1983a,b); Cayer (2003); Filion et al. (1991); Gajewski and Garralla (1992); Hillaire-Marcel (1976); Lajeunesse and Allard (2003); Lamarre et al. (2012); Lavoie et al. (2012); Lowdon and Blake (1980); Lowdon et al. (1967); McNeely (2006); Plumet (1974); Saulnier-Talbot and Pienitz (2001); Walcott and Craig (1975)

Inukjuak: Andrews and Falconer (1969); Andrews and Short (1983); Buckley and Willis (1970); Harington (2003); Lauriol and Gray (1997); Lemieux et al. (2011); Lowdon and Blake (1968); Saint-Laurent and Filion (1992); Wagner (1967)

Ivujivik: Daigneault (2008); Harington (2003); Martindale et al. (2020); Matthews (1966, 1967); McNeely and Brennan (2005); Wagner (1967)

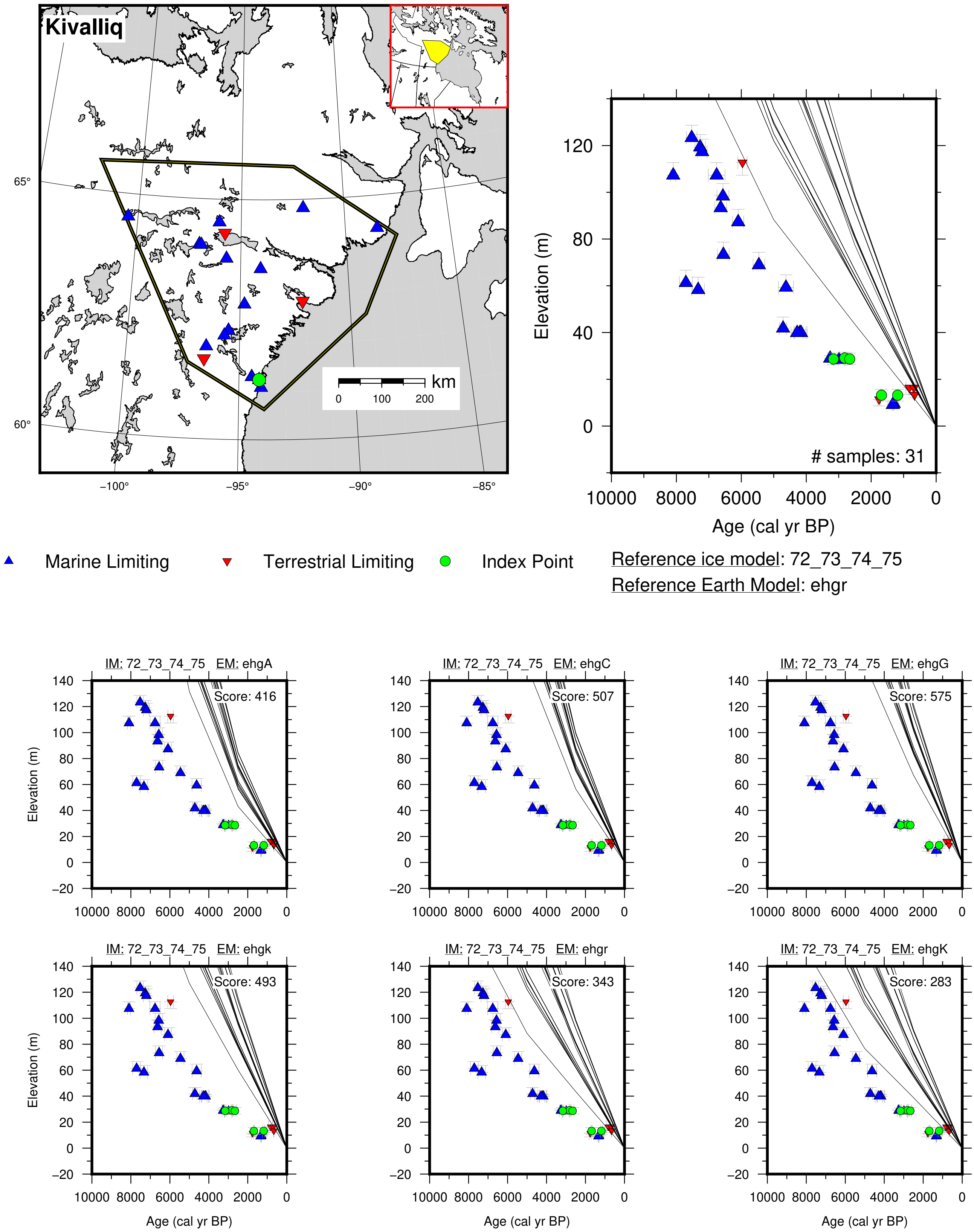


Figure 164: Paleo-sea level and comparison of six models for subregion Hudson Bay, location Kivalliq.

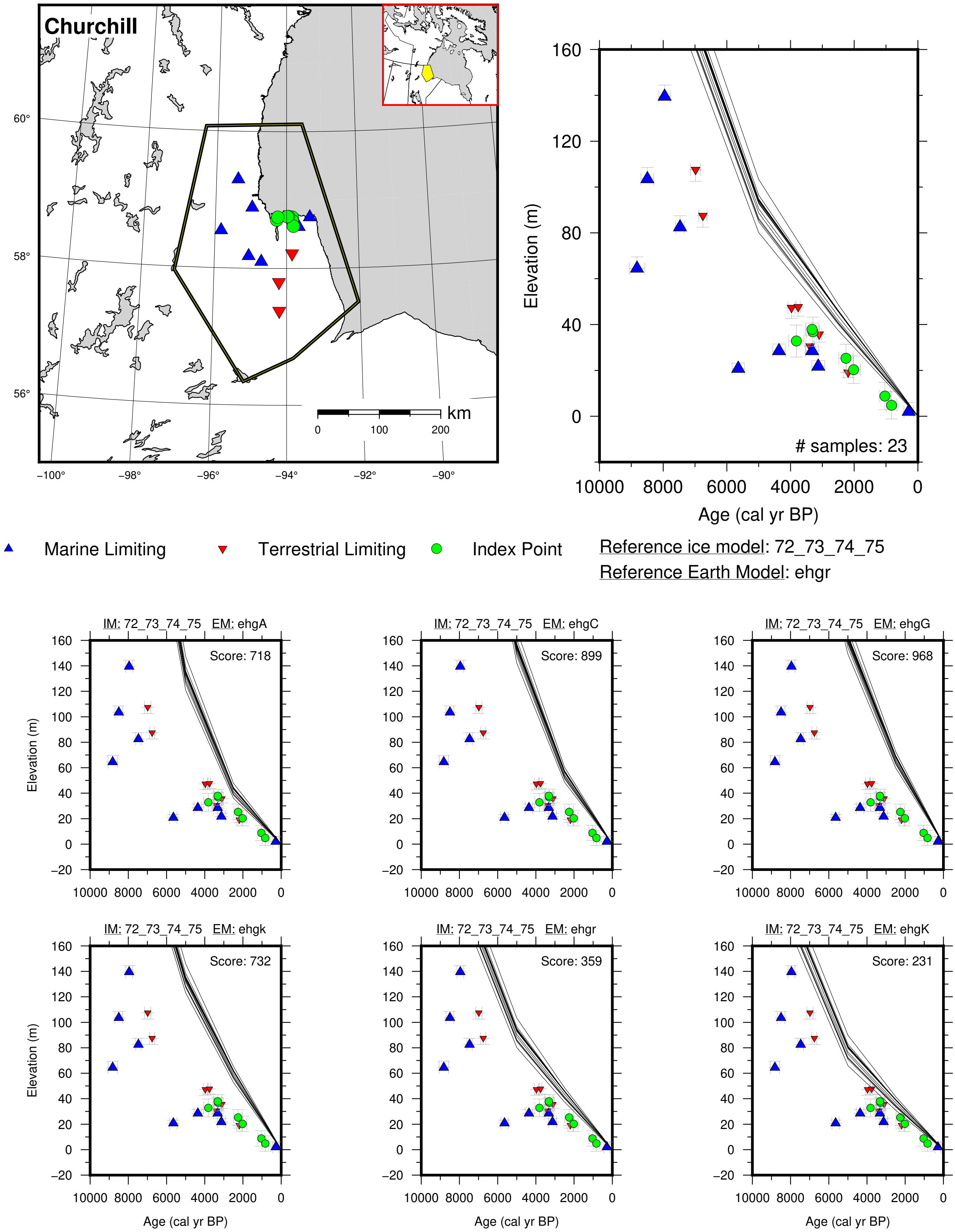


Figure 165: Paleo-sea level and comparison of six models for subregion Hudson Bay, location Churchill.

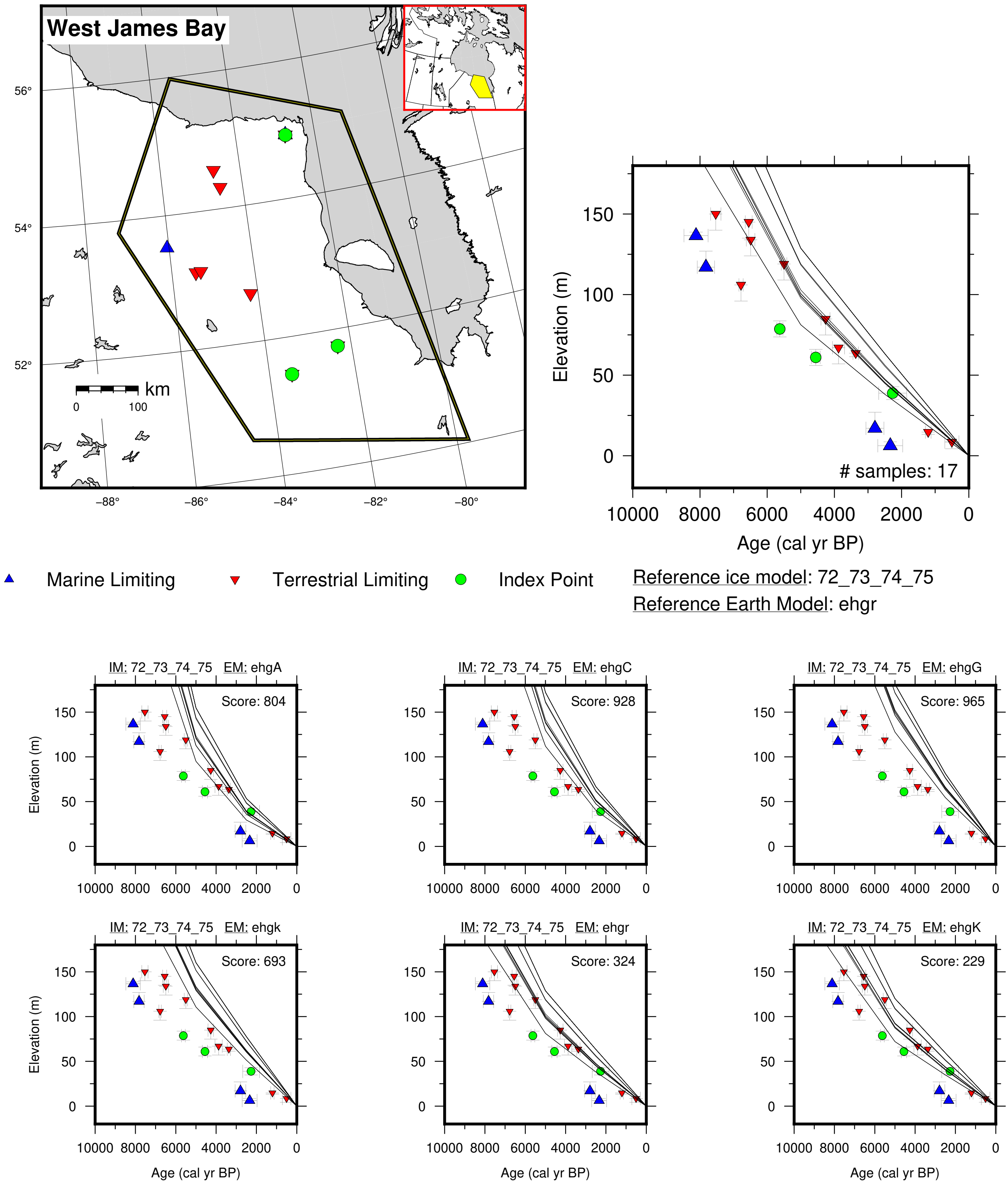


Figure 166: Paleo-sea level and comparison of six models for subregion Hudson Bay, location West James Bay.

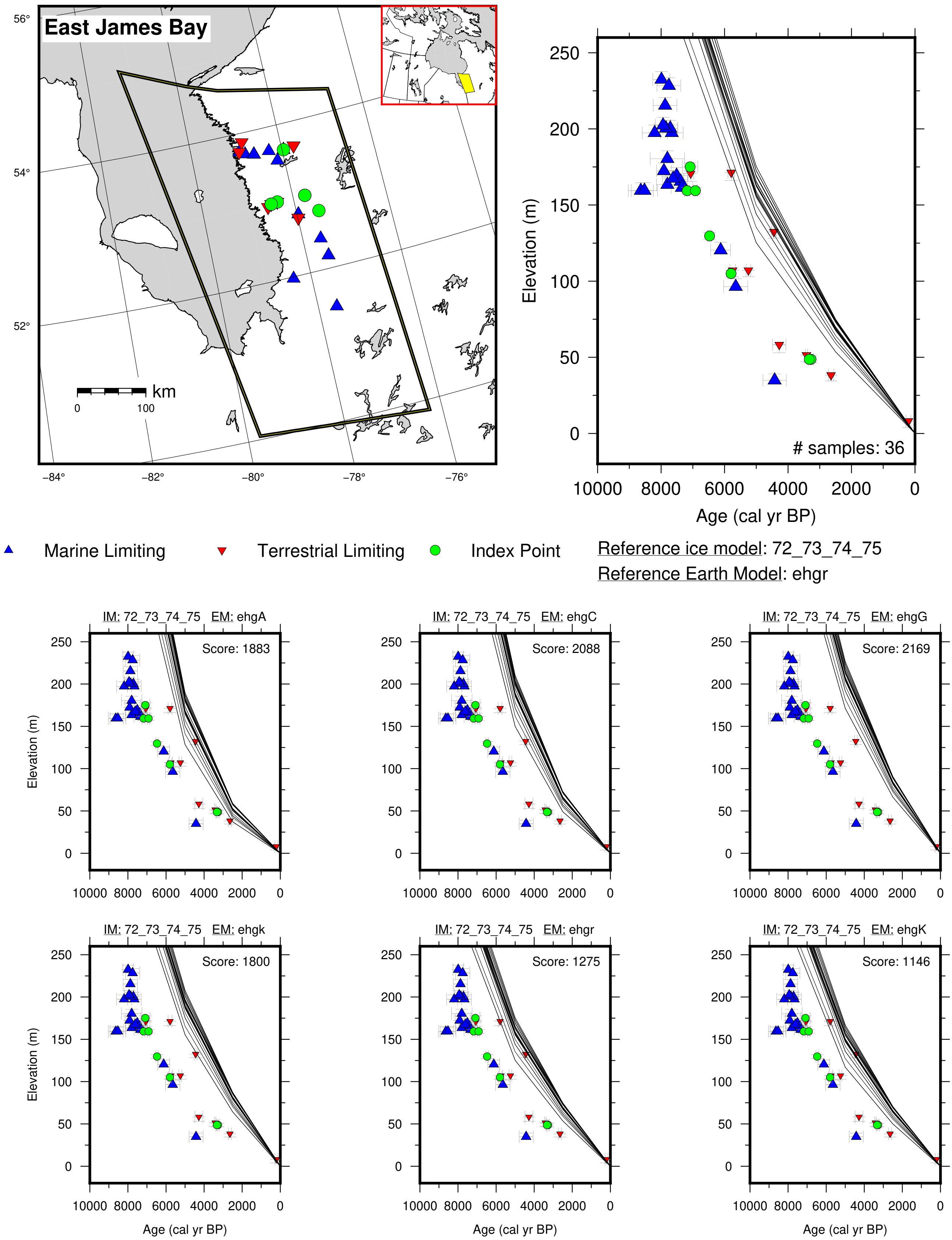


Figure 167: Paleo-sea level and comparison of six models for subregion Hudson Bay, location East James Bay.

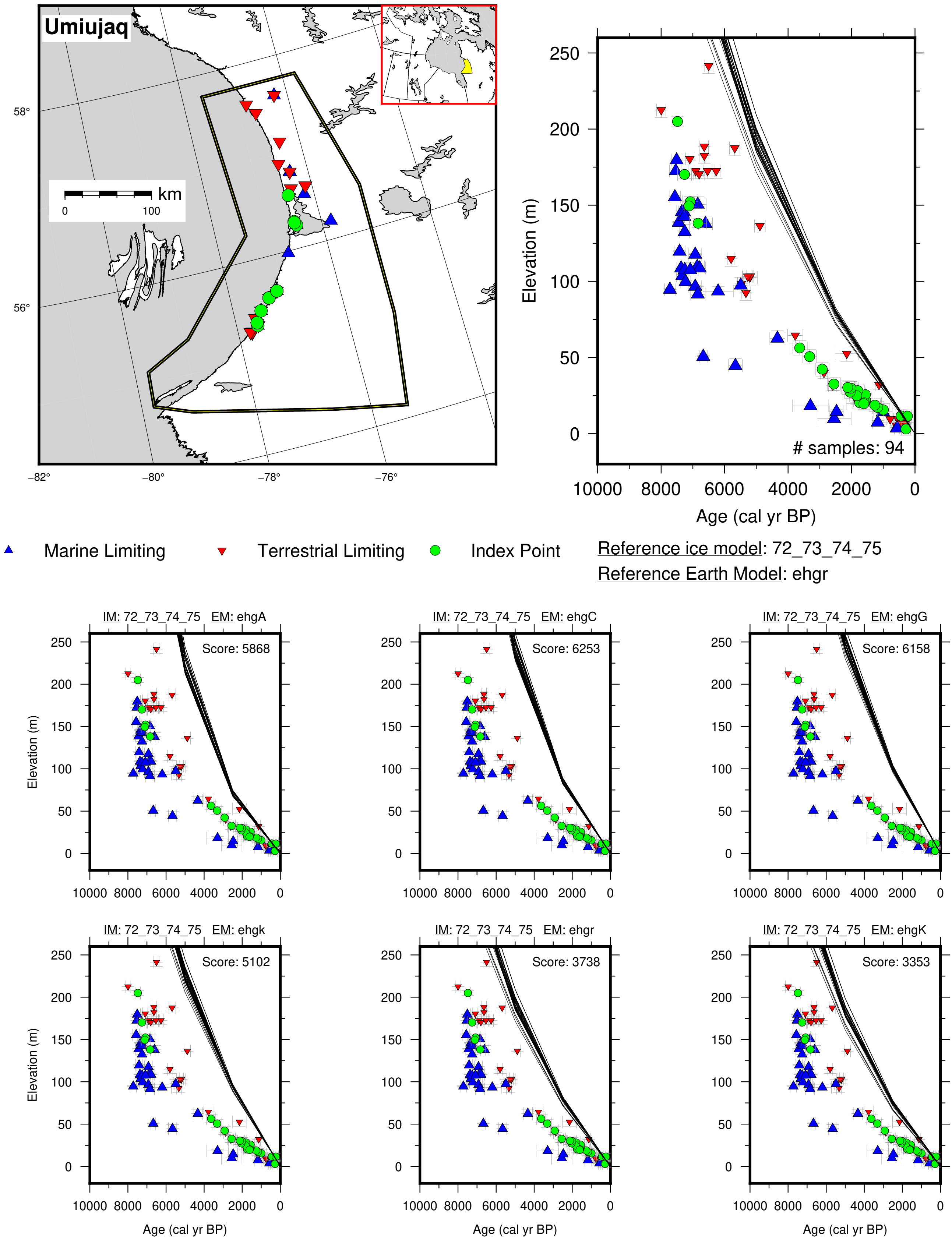


Figure 168: Paleo-sea level and comparison of six models for subregion Hudson Bay, location Umiujaq.

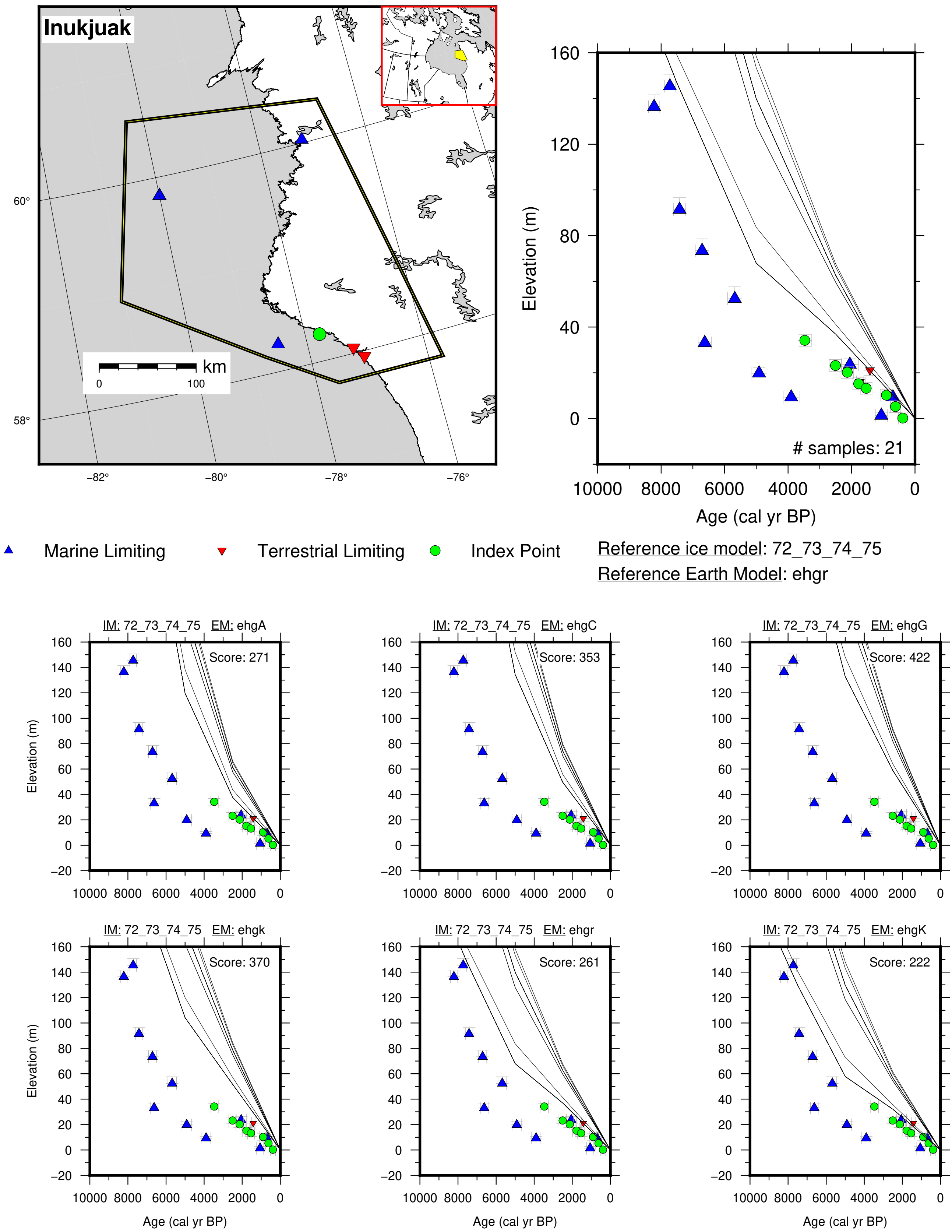


Figure 169: Paleo-sea level and comparison of six models for subregion Hudson Bay, location Inukjuak.

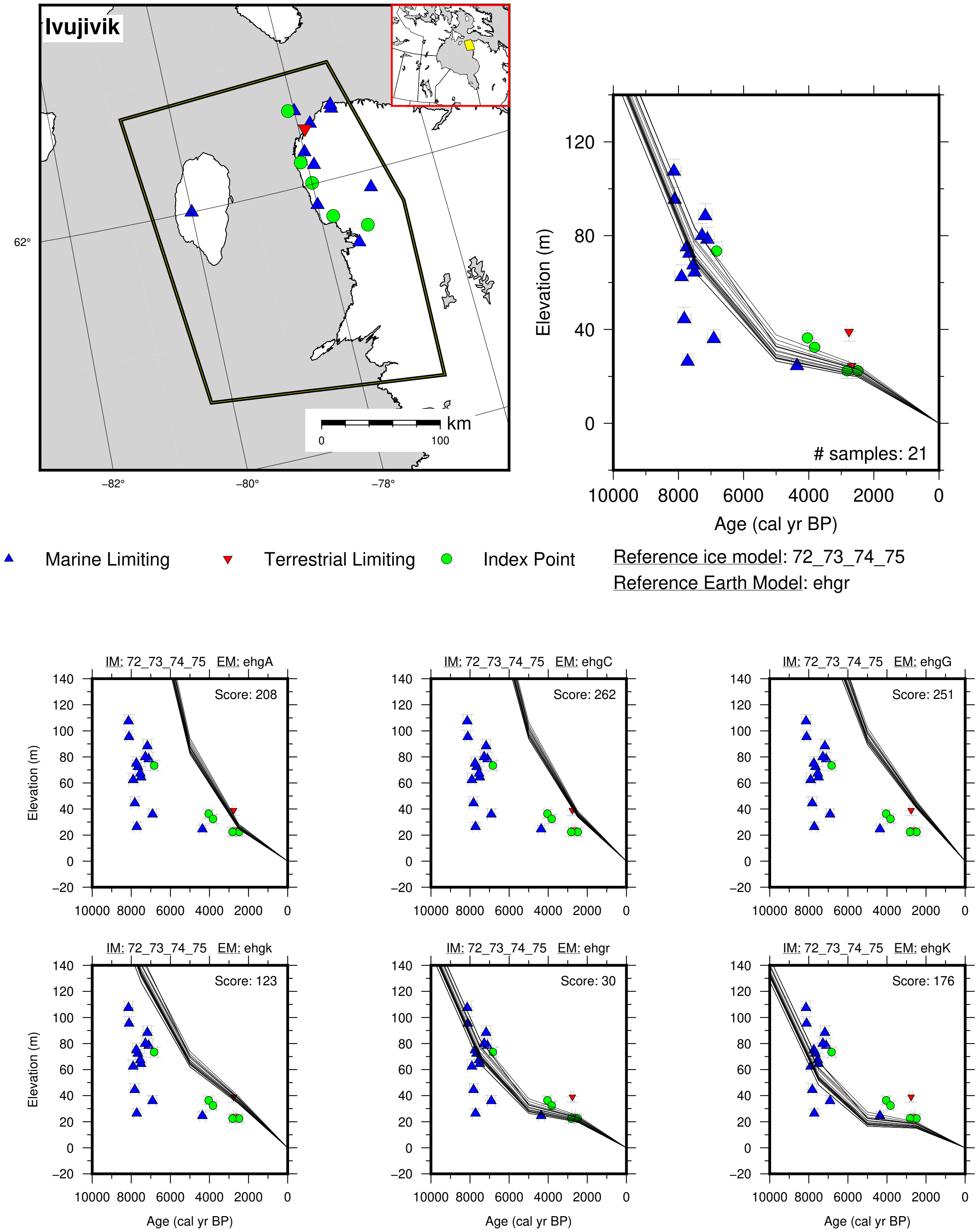


Figure 170: Paleo-sea level and comparison of six models for subregion Hudson Bay, location Ivujivik.

13.4 Hudson Strait

References for the data used in each location.

Sugluk: Bartley and Matthews (1969); Daigneault (2008); Gray et al. (1993); Gray (2001); Gray and Lauriol (1985); Kasper and Allard (2001); Lauriol and Gray (1997); Lowdon and Blake (1968); Matthews (1966); McNeely and Brennan (2005); McNeely and McCuaig (1991); Ricard (1989); Simon et al. (2016)

Kangiqsujuaq: Gray et al. (1993); Gray (2001); Lauriol and Gray (1987); McNeely (2002, 2005); McNeely and Atkinson (1995); Vacchi et al. (2018)

Western Ungava Bay: Gray et al. (1980); Lauriol and Gray (1987); Lauriol et al. (1979); Løken (1978); Simon et al. (2016)

Southern Ungava Bay: Gray et al. (1993); Gray (2001); Pienitz et al. (1991); Simon et al. (2016)

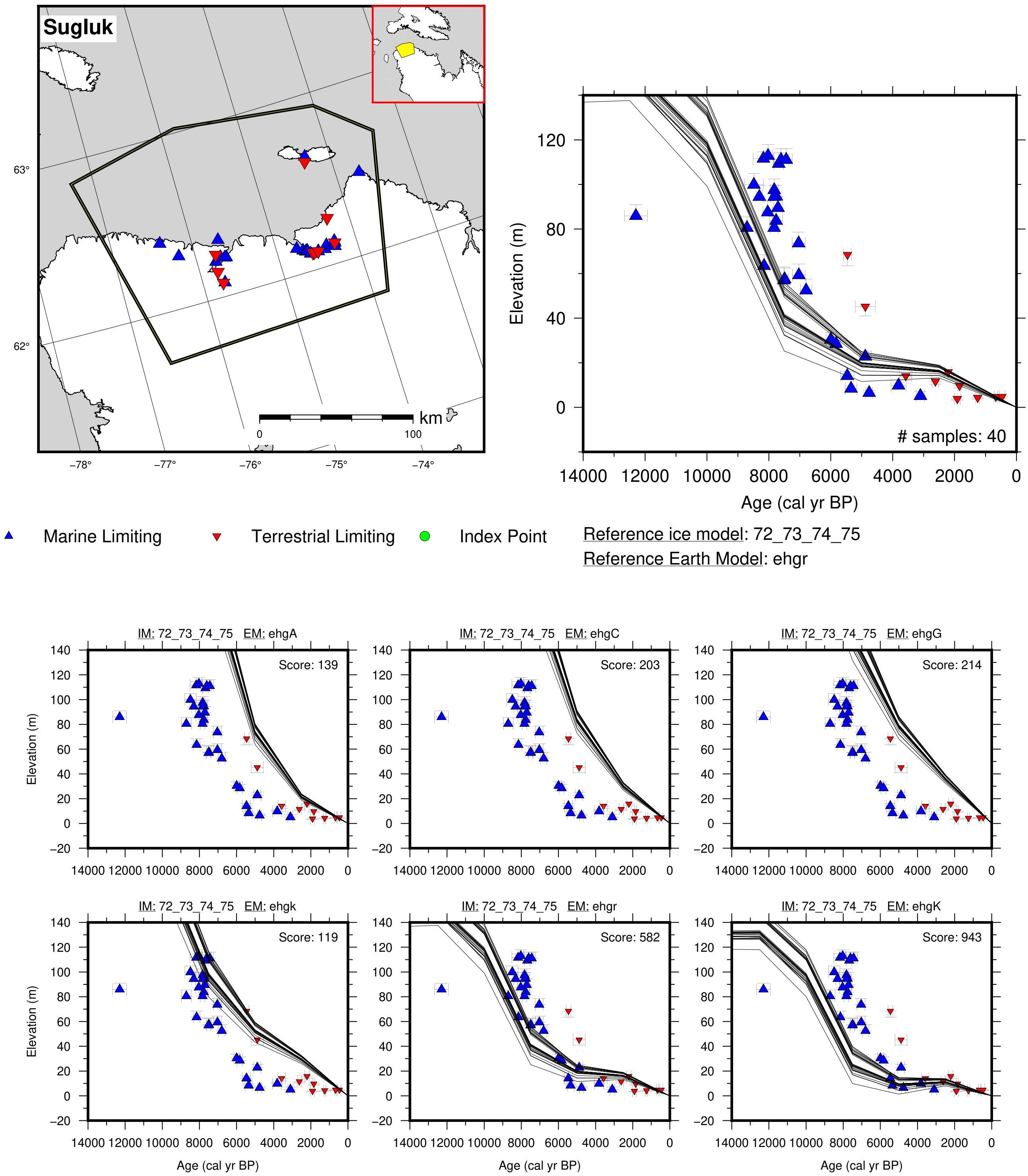


Figure 171: Paleo-sea level and comparison of six models for subregion Hudson Strait, location Sugluk.

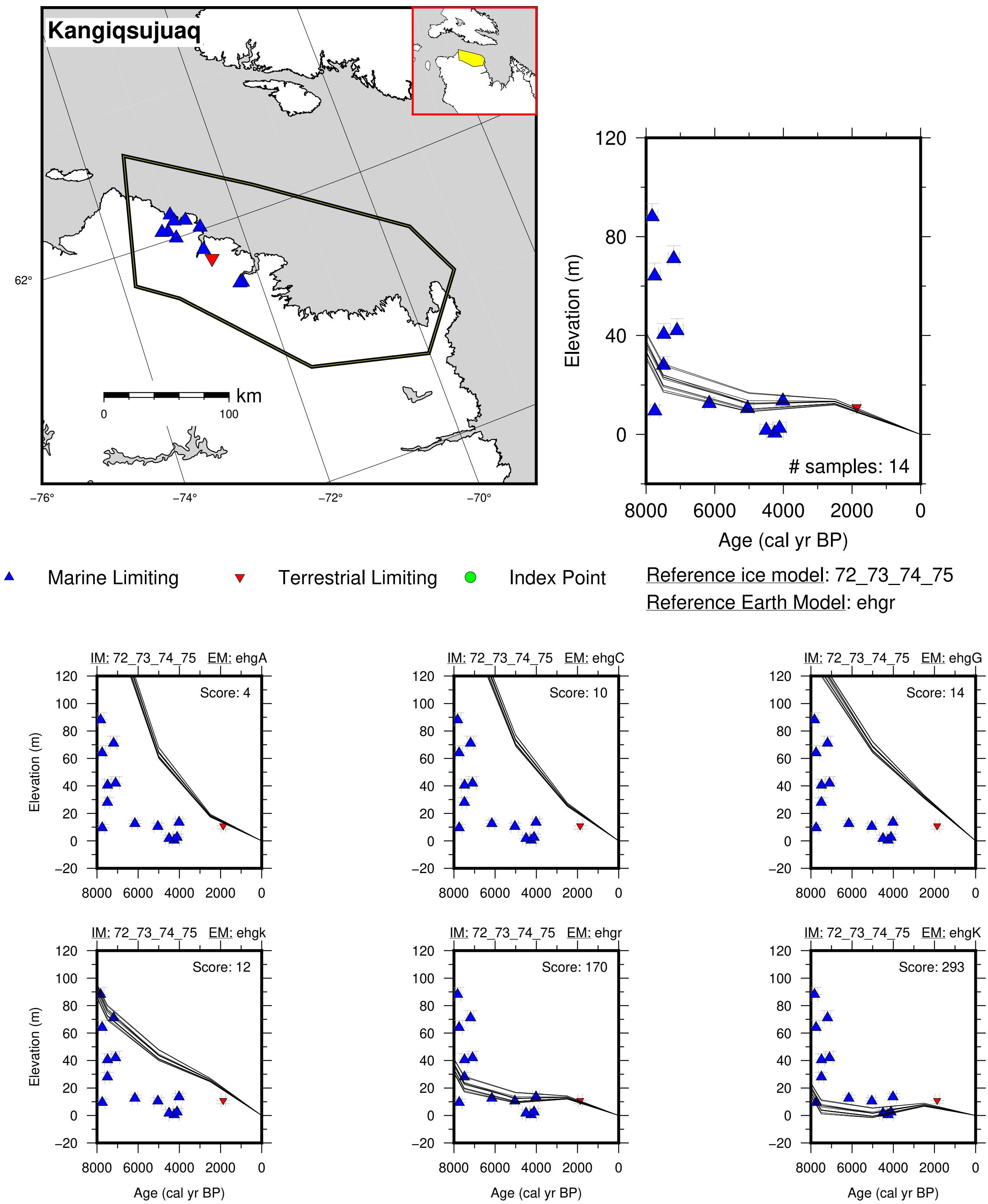


Figure 172: Paleo-sea level and comparison of six models for subregion Hudson Strait, location Kangiqsujuaq.

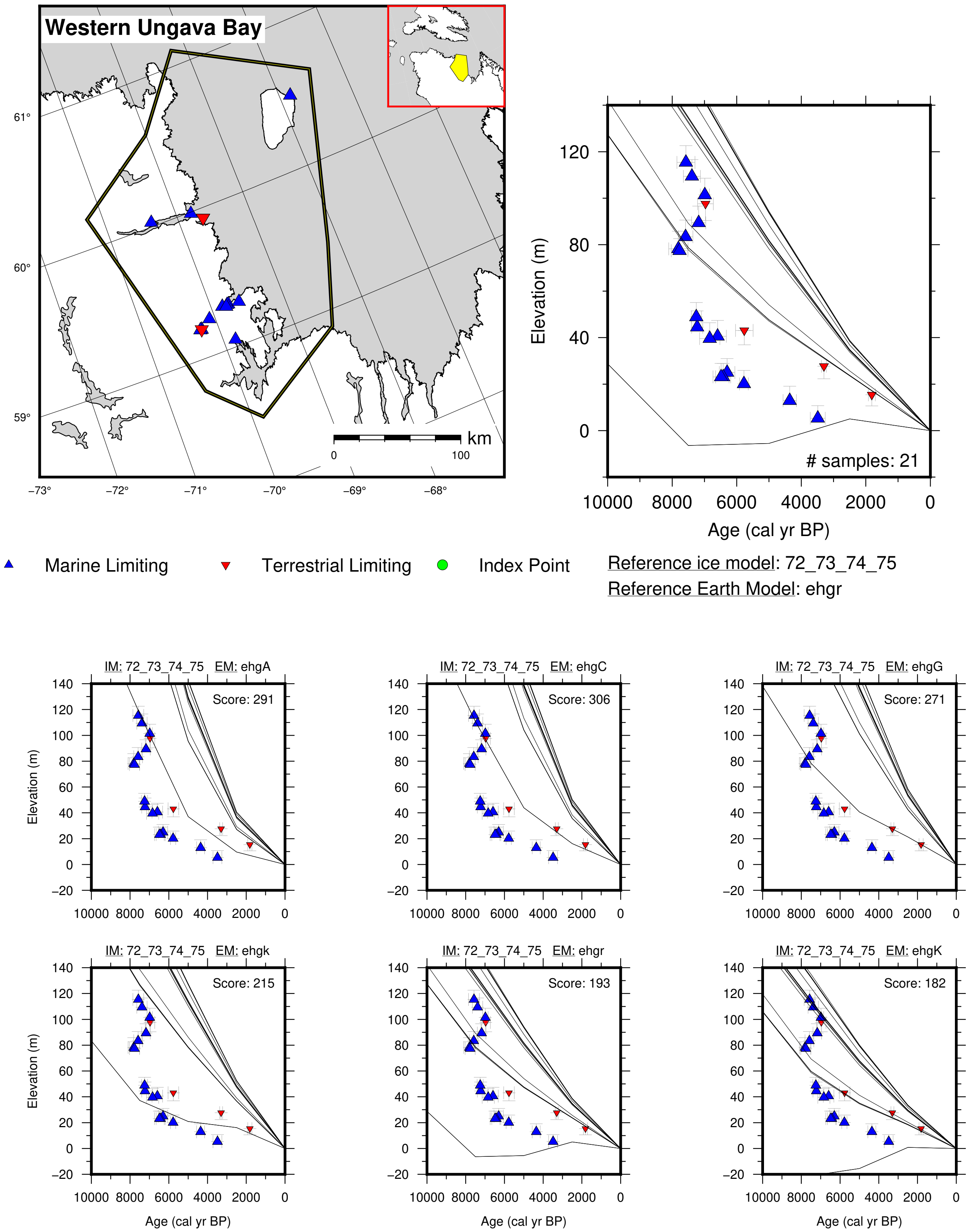


Figure 173: Paleo-sea level and comparison of six models for subregion Hudson Strait, location Western Ungava Bay.

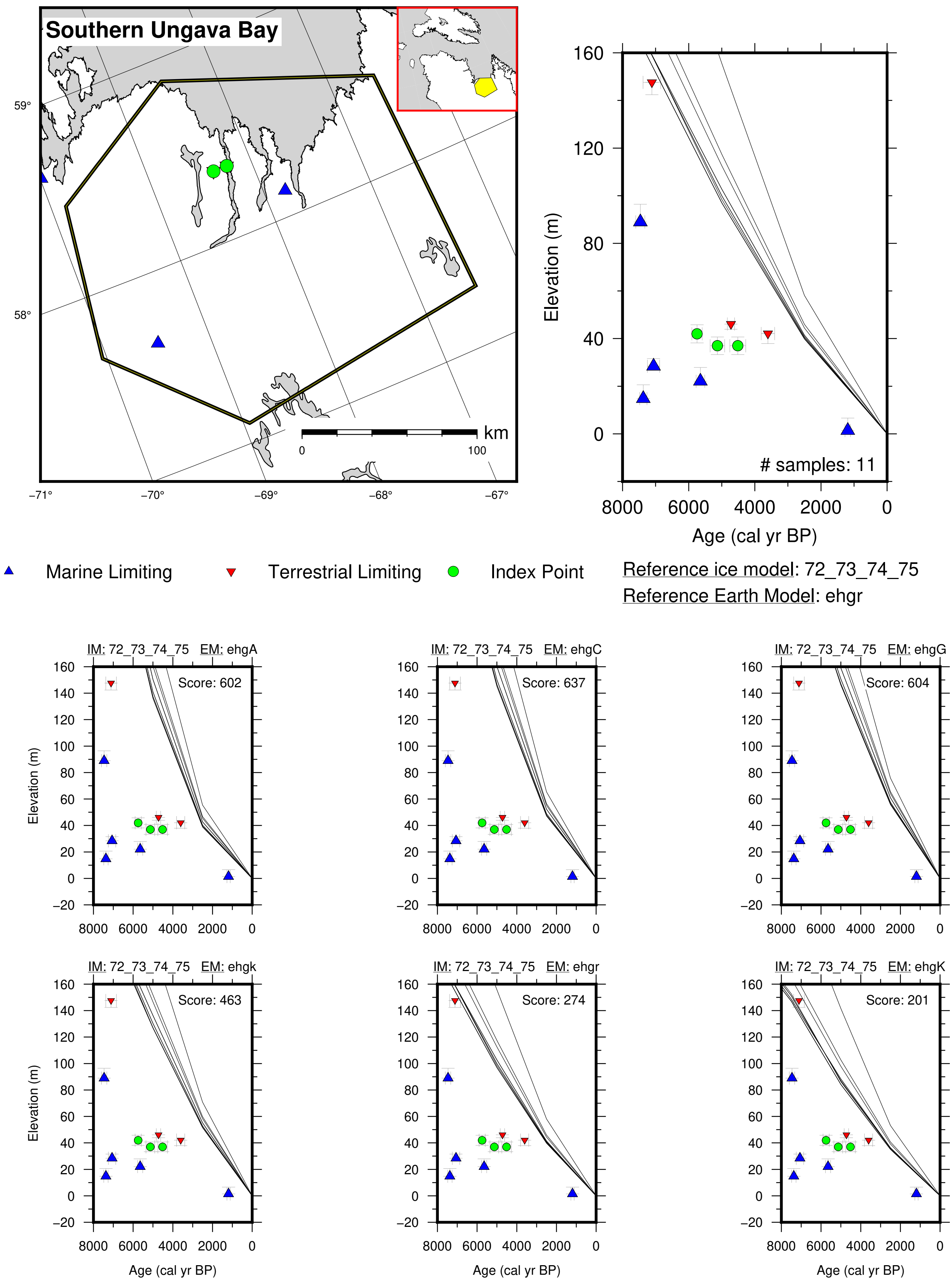


Figure 174: Paleo-sea level and comparison of six models for subregion Hudson Strait, location Southern Ungava Bay.

13.5 Labrador

References for the data used in each location.

Torngat: Dyke et al. (2003); Evans and Rogerson (1988); Lowdon and Blake (1975); Martindale et al. (2020); McNeely and Brennan (2005); Savoie and Gangloff (1980); Vacchi et al. (2018)

Nain: Clark and Fitzhugh (1990); Martindale et al. (2020)

Hamilton Inlet: Fitzhugh (1972, 1975); Lowdon and Blake (1975); Martindale et al. (2020); McNeely and Brennan (2005)

Lake Melville: Awadallah and Batterson (1990); Batterson (1996); Jordan (1975); King (1985); Liverman (1997); Lowdon and Blake (1975); Martindale et al. (2020); McNeely and Brennan (2005)

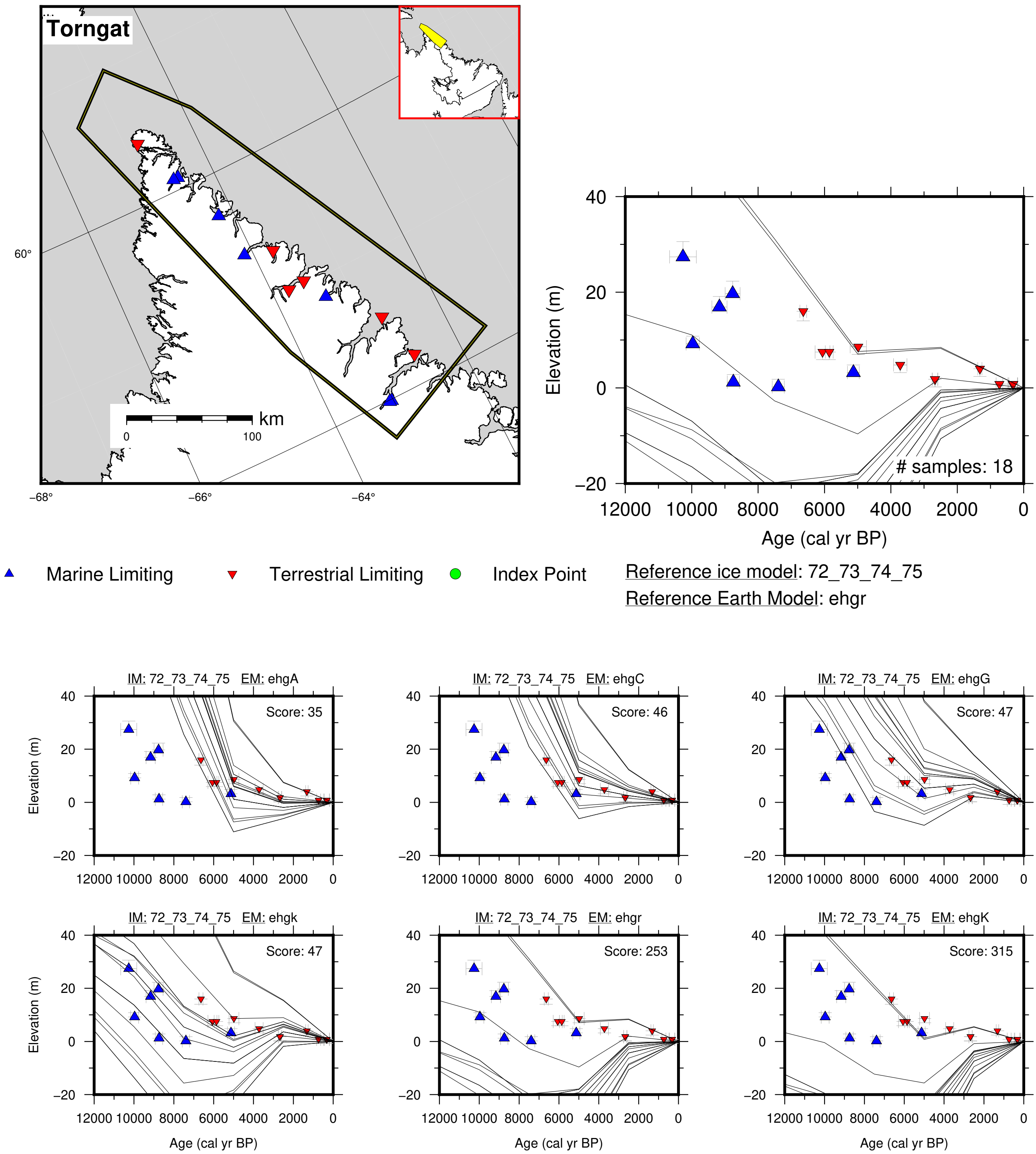


Figure 175: Paleo-sea level and comparison of six models for subregion Labrador, location Torngat.

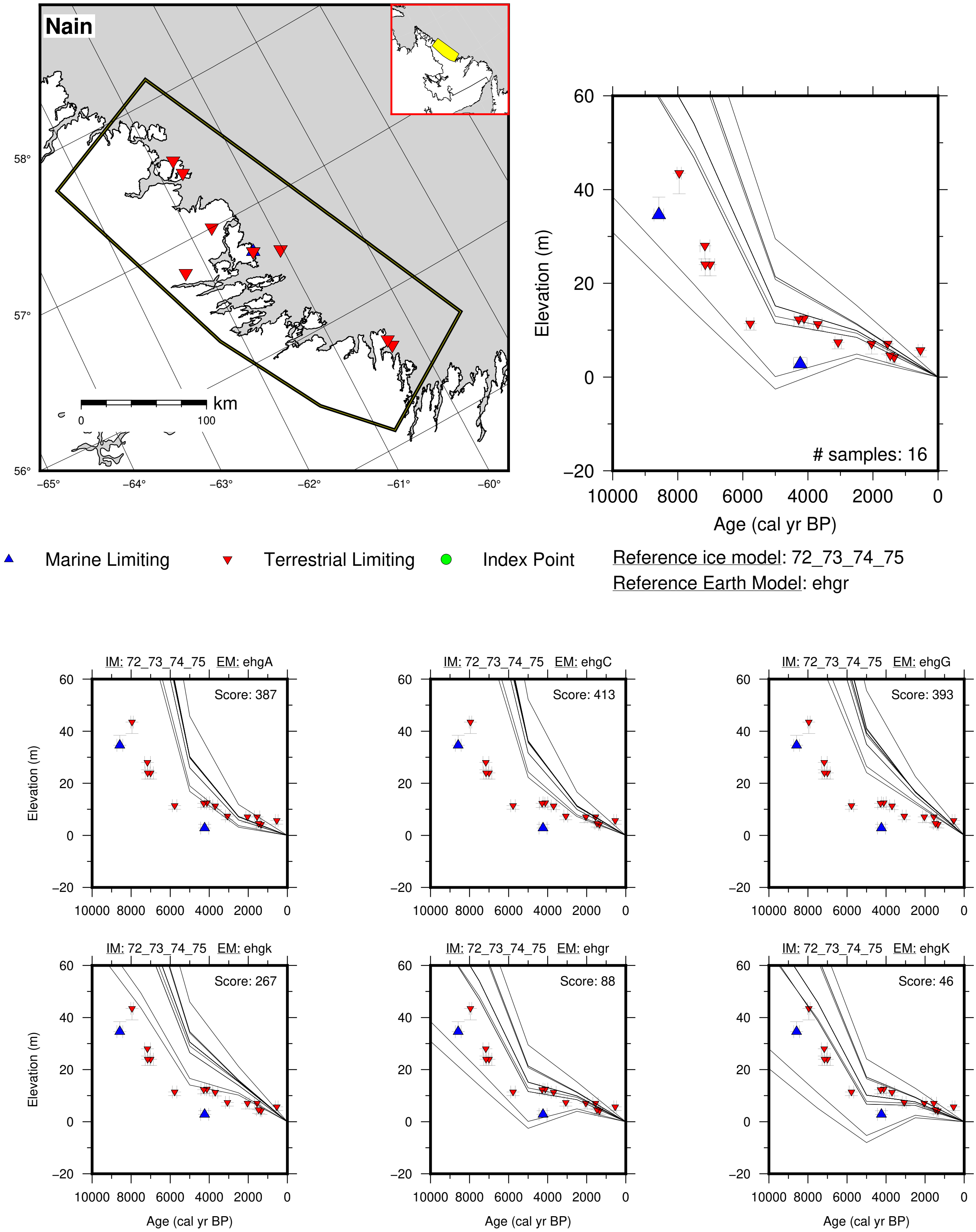


Figure 176: Paleo-sea level and comparison of six models for subregion Labrador, location Nain.

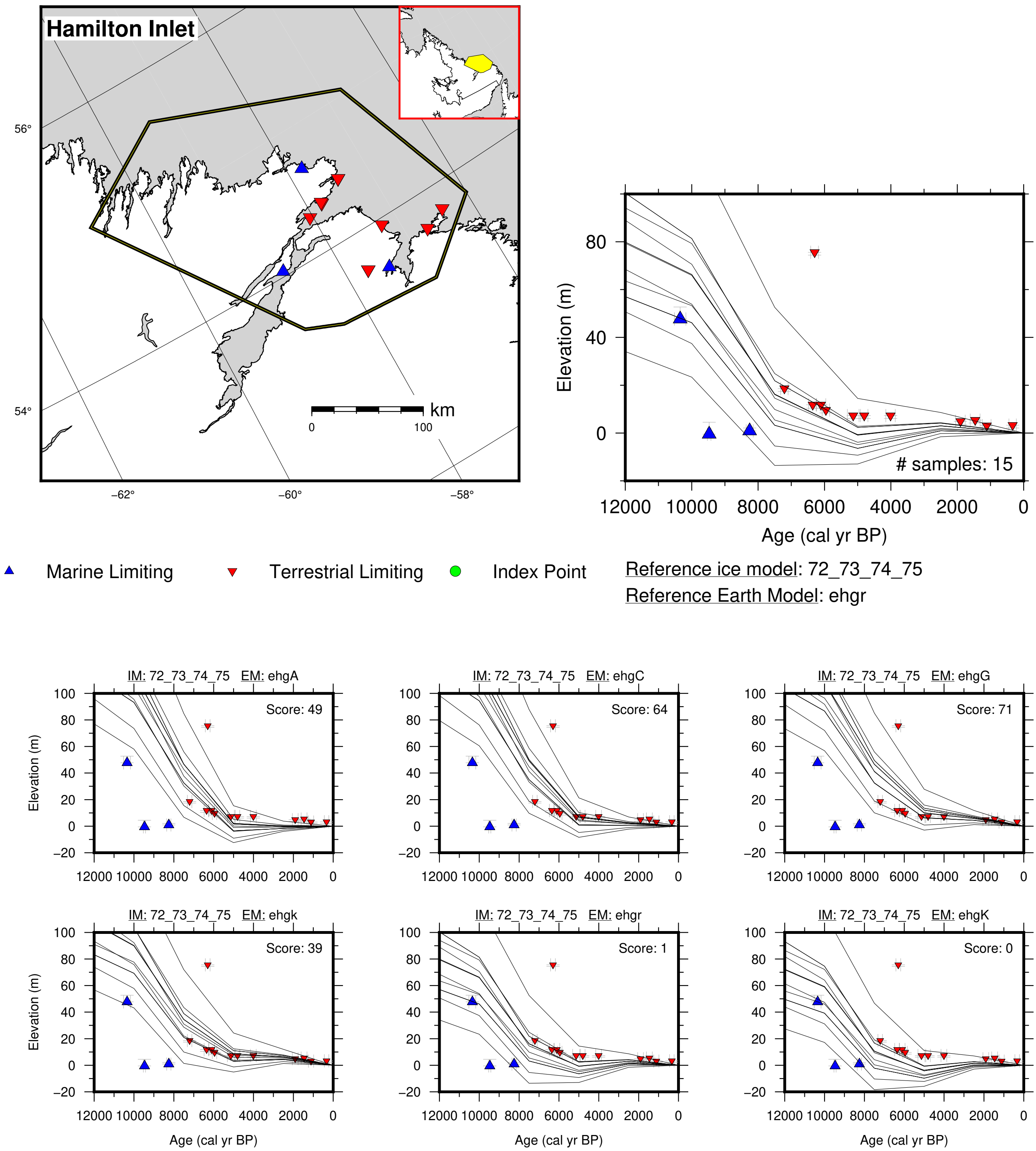


Figure 177: Paleo-sea level and comparison of six models for subregion Labrador, location Hamilton Inlet.

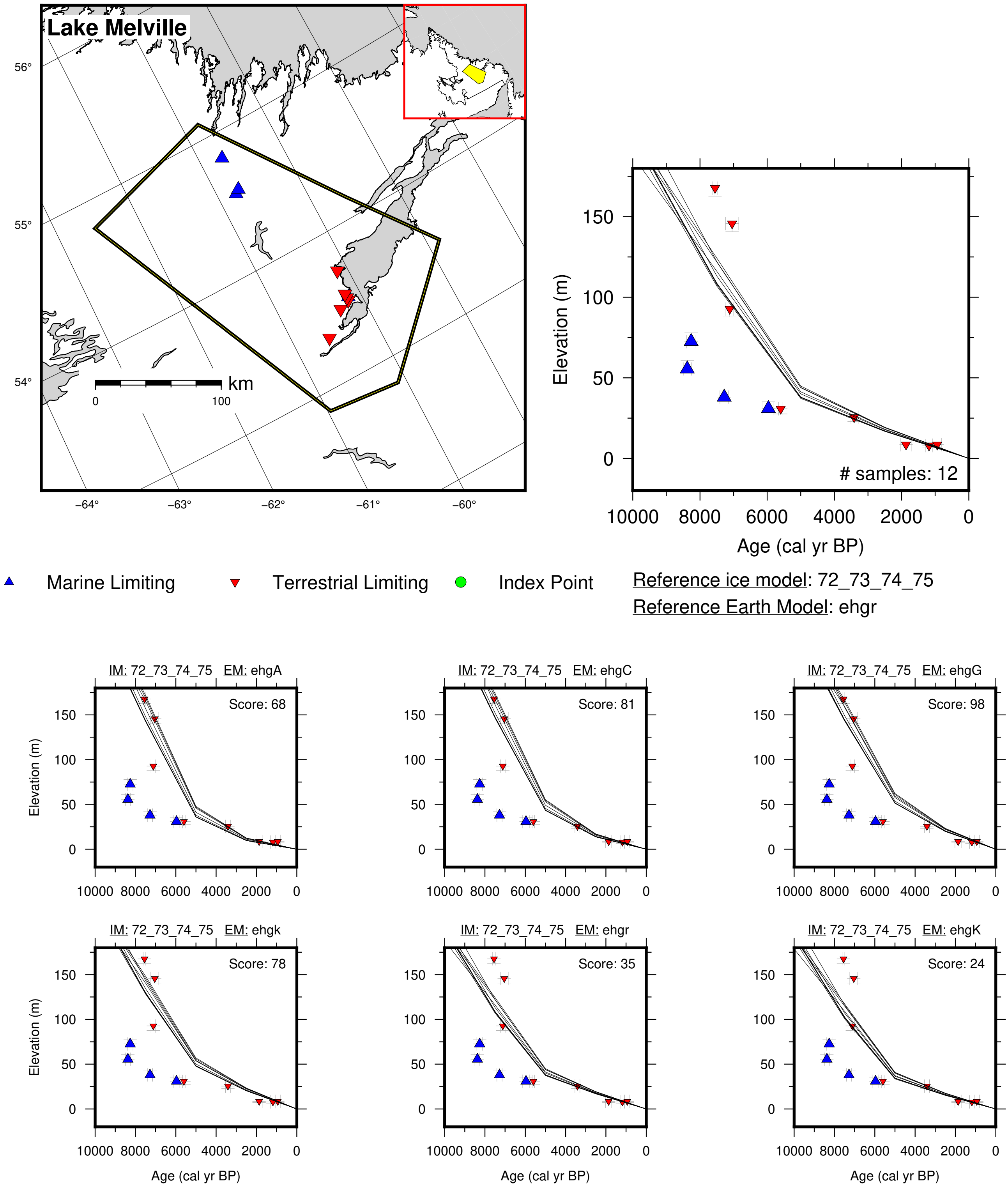


Figure 178: Paleo-sea level and comparison of six models for subregion Labrador, location Lake Melville.

13.6 Maritimes

References for the data used in each location.

Sable Island: Amos and Miller (1990); Scott et al. (1984, 1989); Vacchi et al. (2018)

Halifax: Blake (1988); Edgecombe et al. (1999); Gehrels et al. (2004, 2005); Miller et al. (1982); Scott and Medioli (1982); Scott et al. (1995); Shaw et al. (1993)

Shelburne: Blake (1983); Lowdon and Blake (1970); Scott and Greenberg (1983)

Cumberland: Dalrymple and Zaitlin (1994); Scott and Greenberg (1983); Shaw et al. (2010); Stea and Wightman (1987); Stuckenrath et al. (1966)

Passamaquoddy Bay: Blake (1984); Gehrels et al. (2004); Martindale et al. (2020); McNeely (2005); Miller (1990); Nicks (1991); Rampton et al. (1984); Seaman (2004); Stea and Mott (1998)

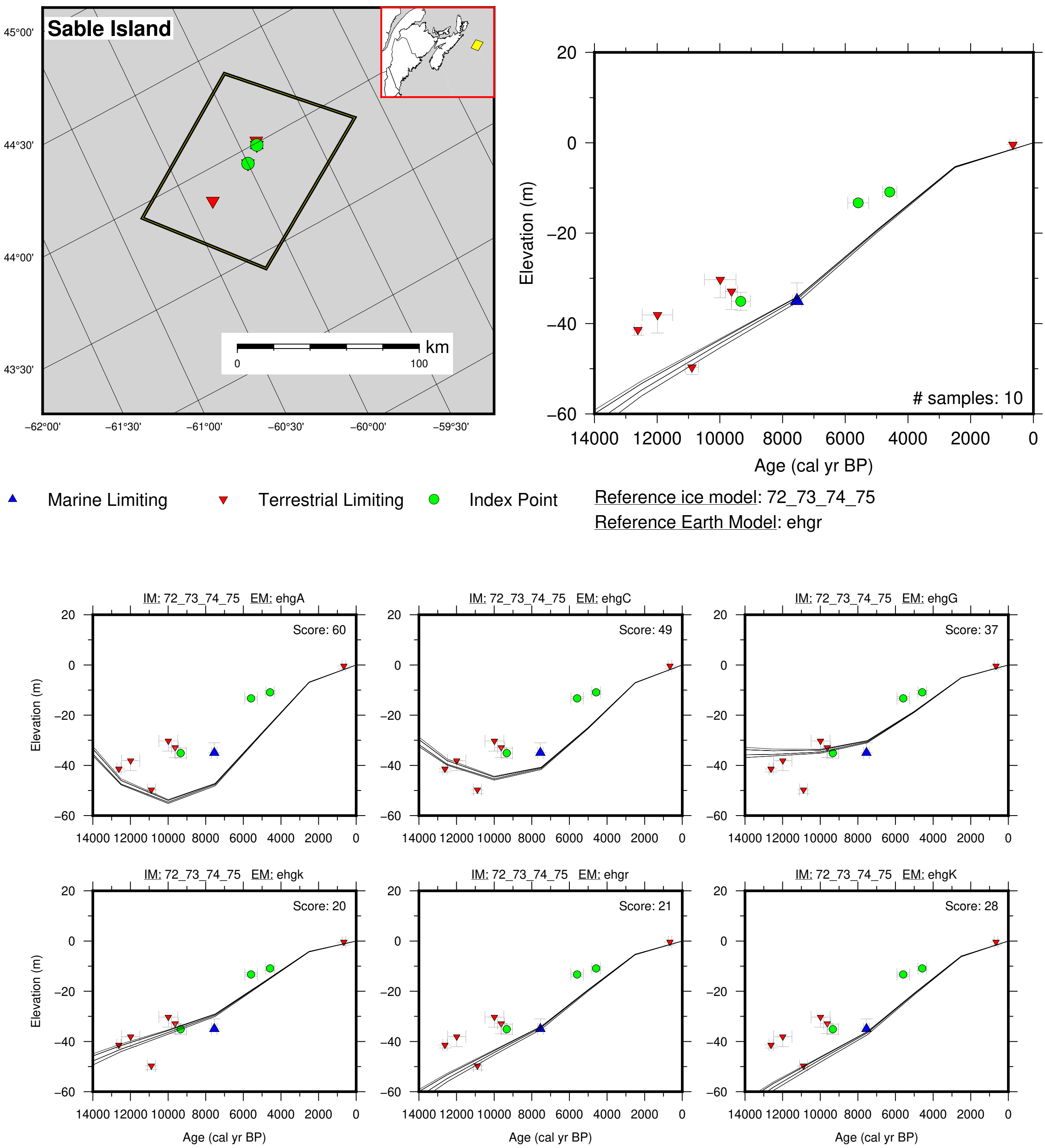


Figure 179: Paleo-sea level and comparison of six models for subregion Maritimes, location Sable Island.

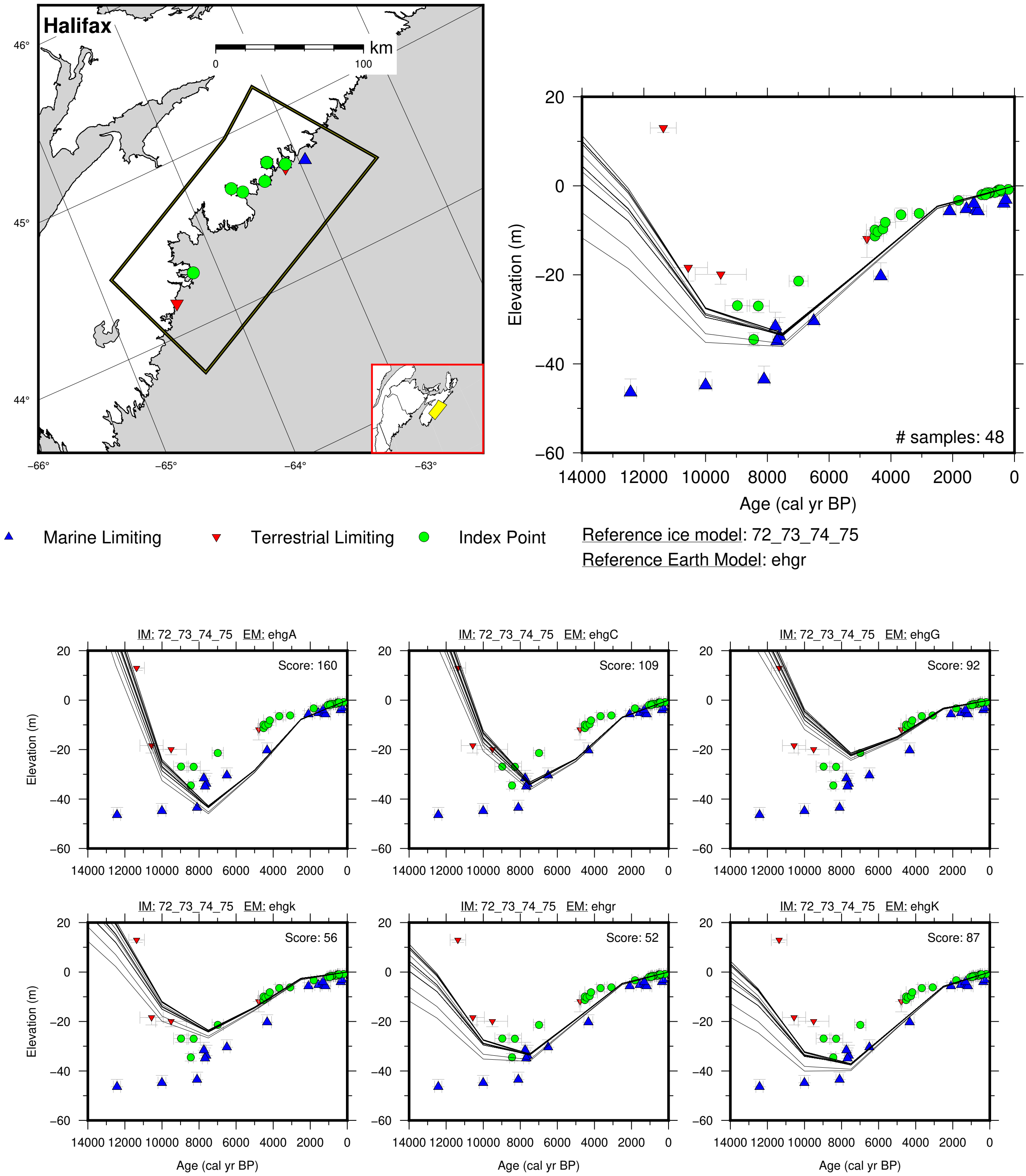


Figure 180: Paleo-sea level and comparison of six models for subregion Maritimes, location Halifax.

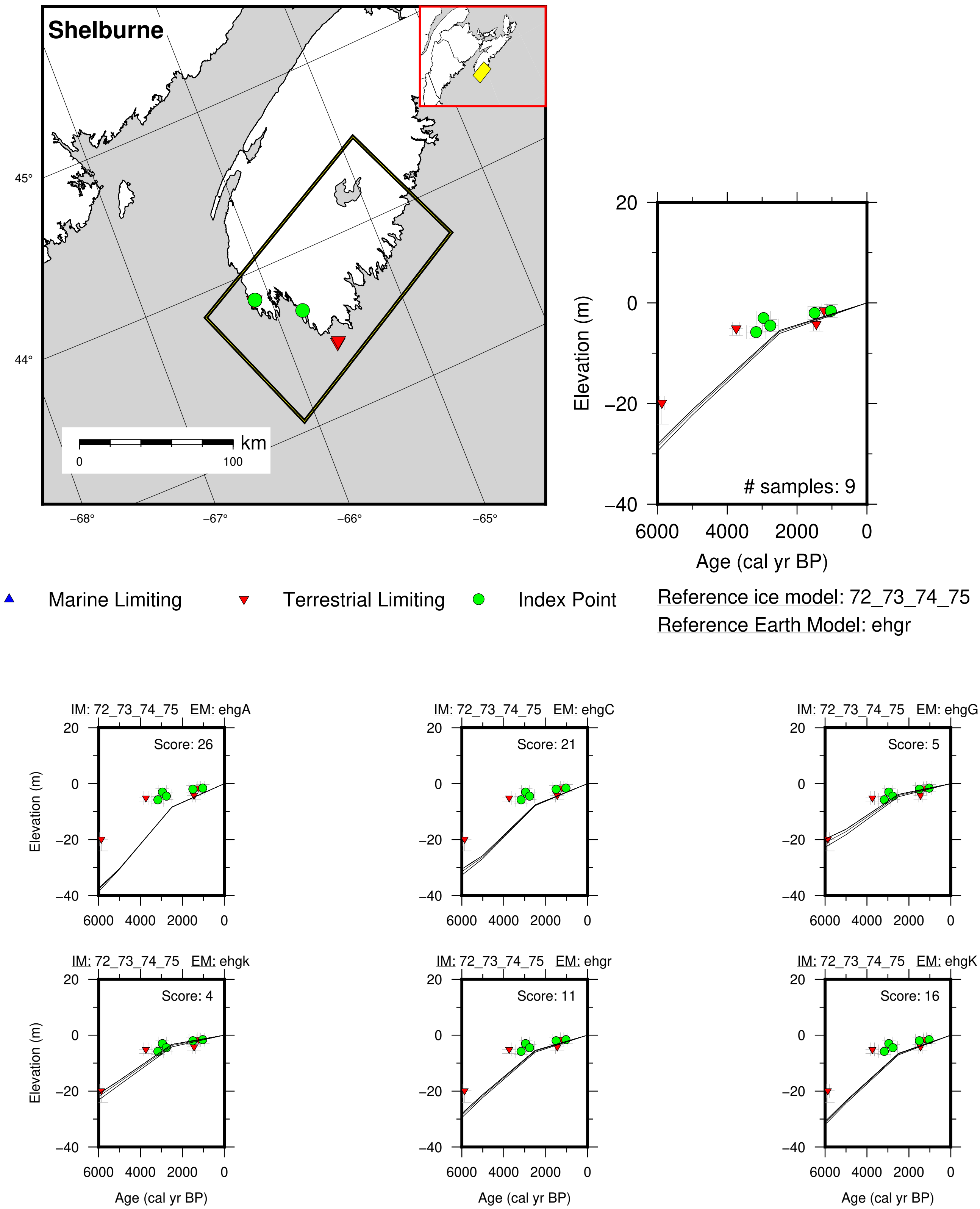


Figure 181: Paleo-sea level and comparison of six models for subregion Maritimes, location Shelburne.

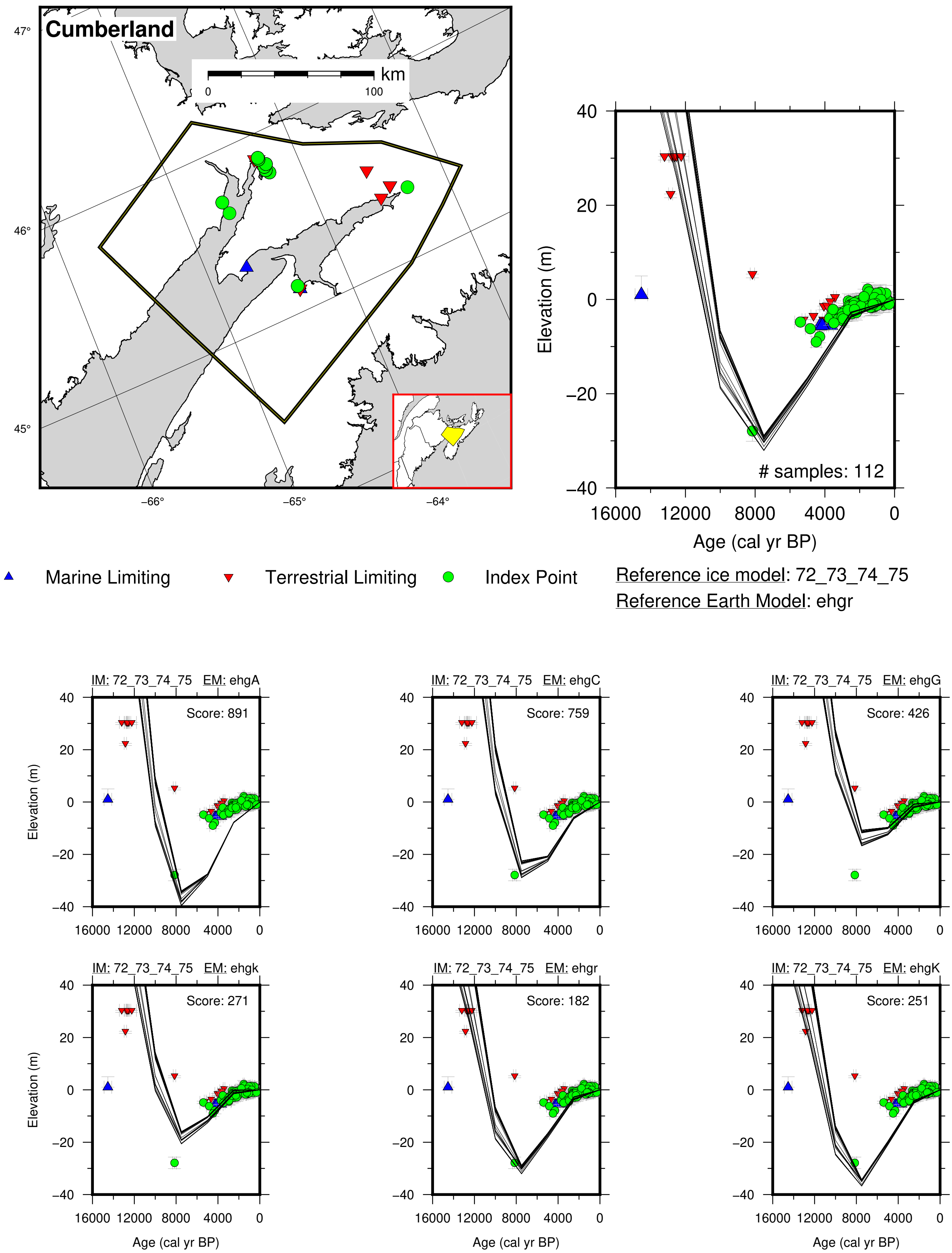


Figure 182: Paleo-sea level and comparison of six models for subregion Maritimes, location Cumberland.

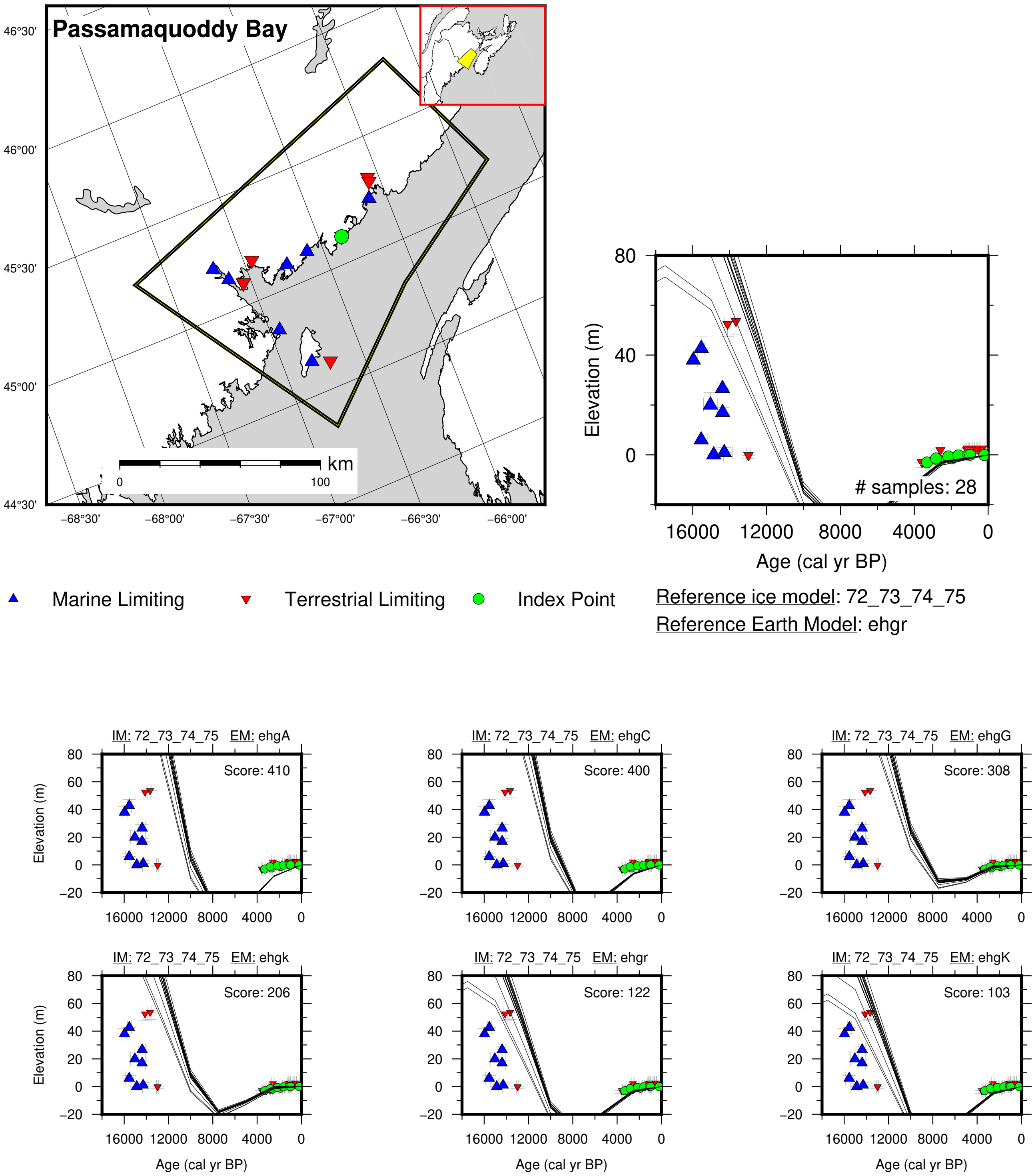


Figure 183: Paleo-sea level and comparison of six models for subregion Maritimes, location Passamaquoddy Bay.

13.7 Newfoundland

References for the data used in each location.

Great Northern Peninsula: Bell et al. (2005); Grant (1992, 1994); Martindale et al. (2020); McNeely and Jorgensen (1993); McNeely and McCuaig (1991); Nydal (1989); Tuck (1971)

Notre Dame Bay: Blake (1983); Daly et al. (2007); Dyck and Fyles (1963); McNeely and Brennan (2005); McNeely and McCuaig (1991); Scott et al. (1991); Shaw and Edwardson (1994)

Avalon Peninsula: Catto et al. (1997); Daly et al. (2007); MacPherson (1996); McNeely (2006); Shaw and Forbes (1995)

Bay Of Islands: Brookes et al. (1985); Brookes and Stevens (1985); Daly et al. (2007); Grant (1994); McNeely and Brennan (2005); McNeely and McCuaig (1991)

Port Aux Basques: Bell et al. (2003); Blake (1988); Brookes et al. (1985); Daly et al. (2007); Dyke et al. (2003); Forbes et al. (1993); Kemp et al. (2017); Lowdon and Blake (1980); Lowdon et al. (1971); McNeely (2002); McNeely and Atkinson (1995); McNeely and Brennan (2005); McNeely and Jorgensen (1992, 1993); McNeely and McCuaig (1991); Shaw and Forbes (1987, 1995); Shaw and Potter (2015)

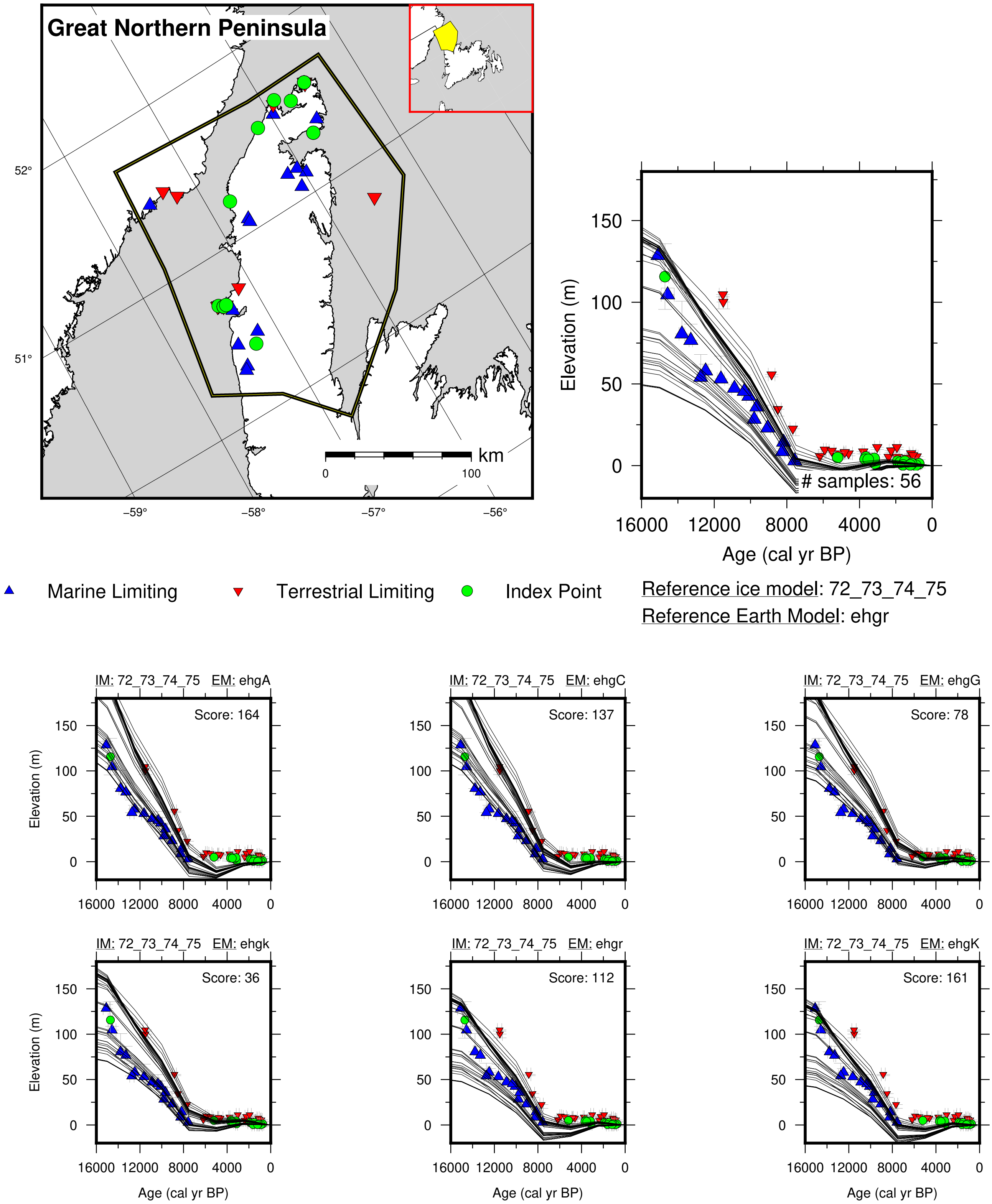


Figure 184: Paleo-sea level and comparison of six models for subregion Newfoundland, location Great Northern Peninsula.

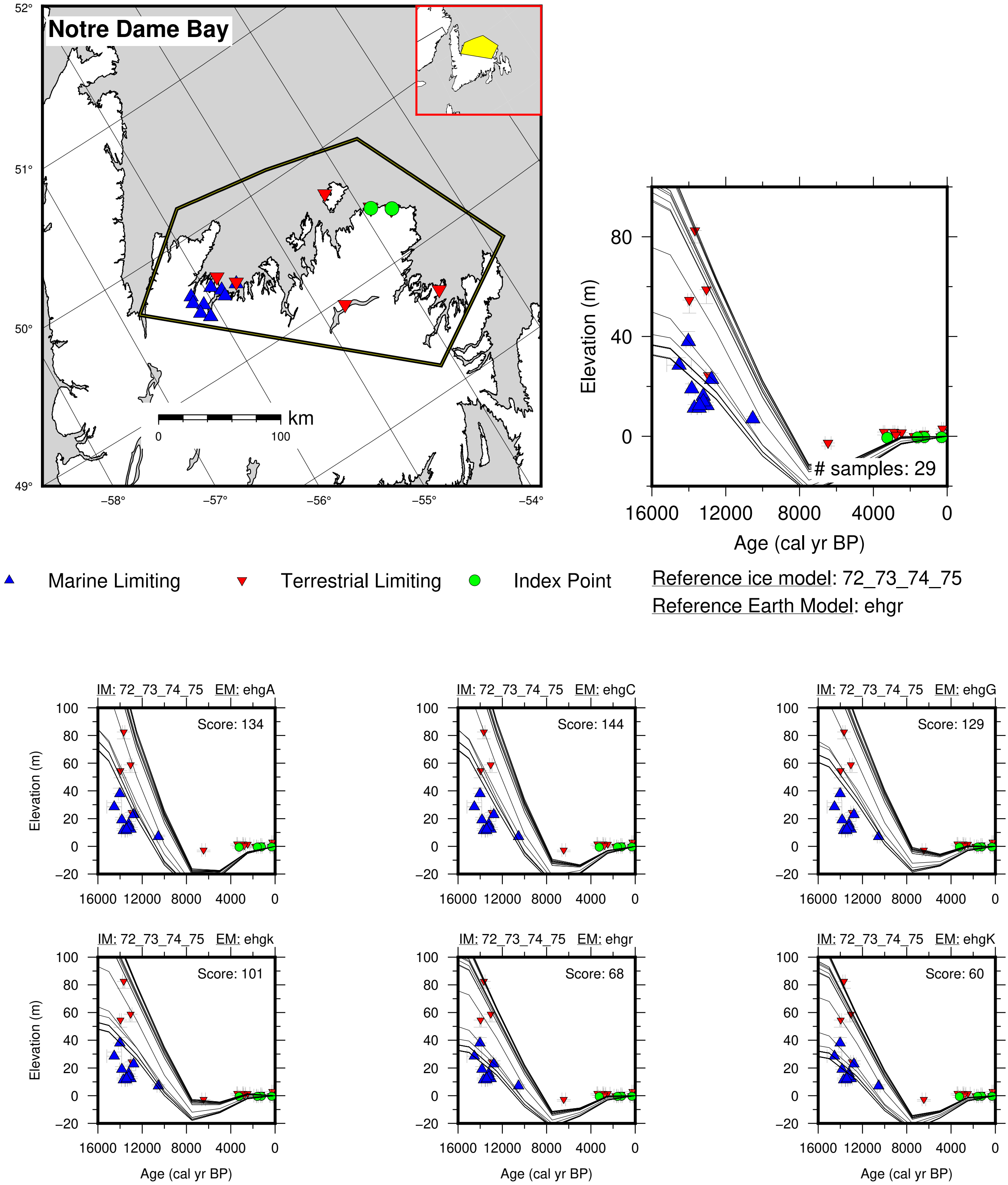


Figure 185: Paleo-sea level and comparison of six models for subregion Newfoundland, location Notre Dame Bay.

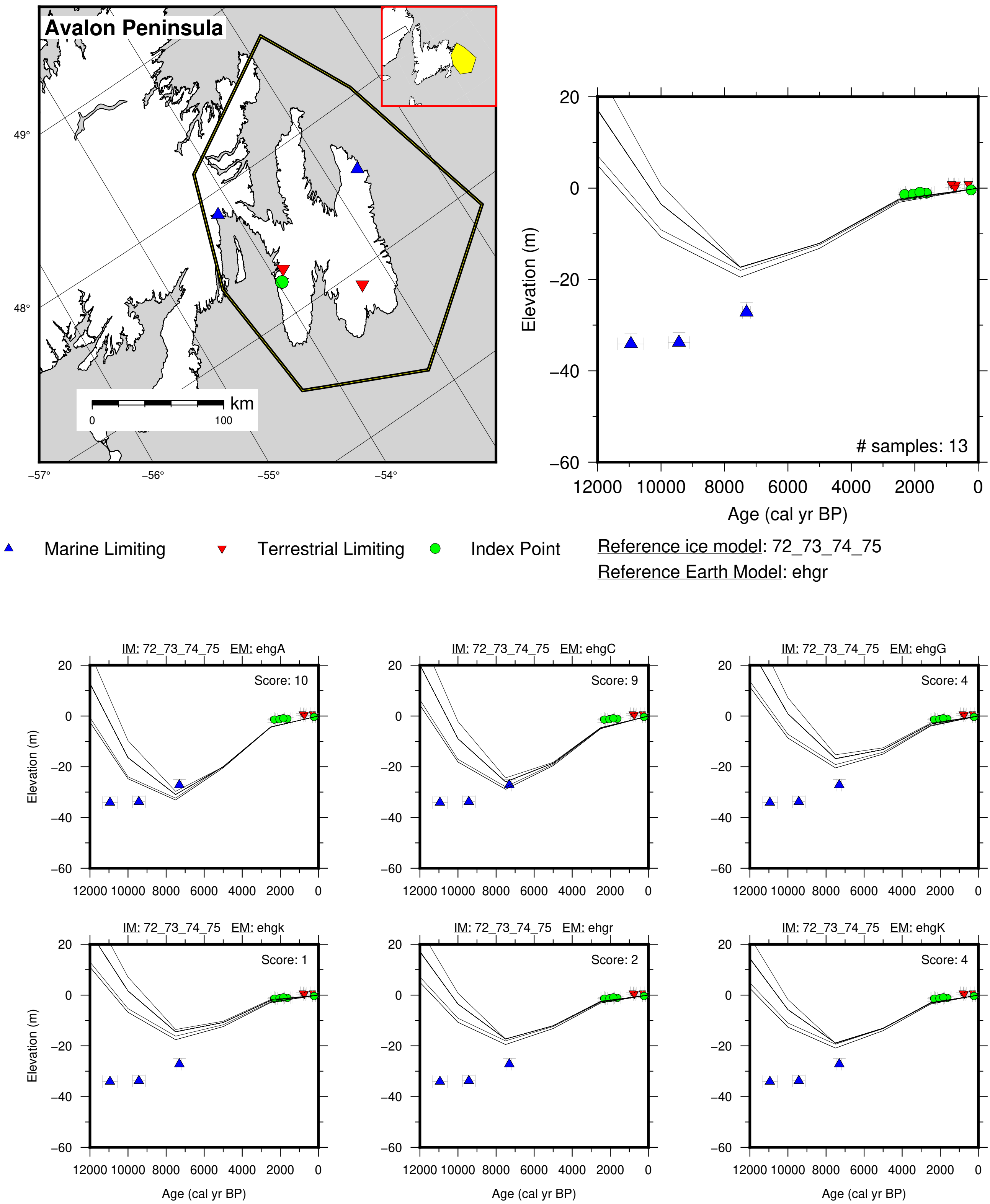


Figure 186: Paleo-sea level and comparison of six models for subregion Newfoundland, location Avalon Peninsula.

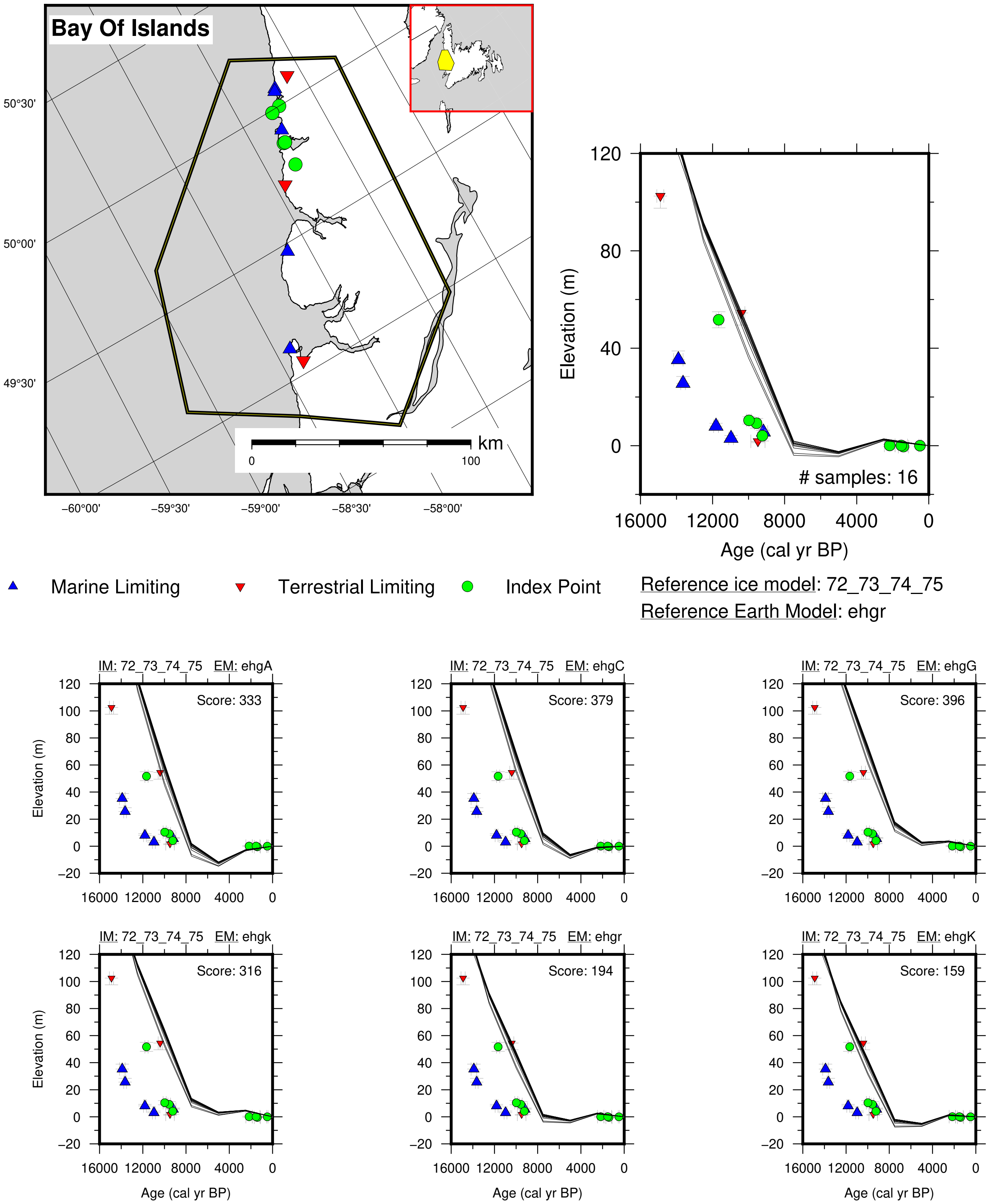


Figure 187: Paleo-sea level and comparison of six models for subregion Newfoundland, location Bay Of Islands.

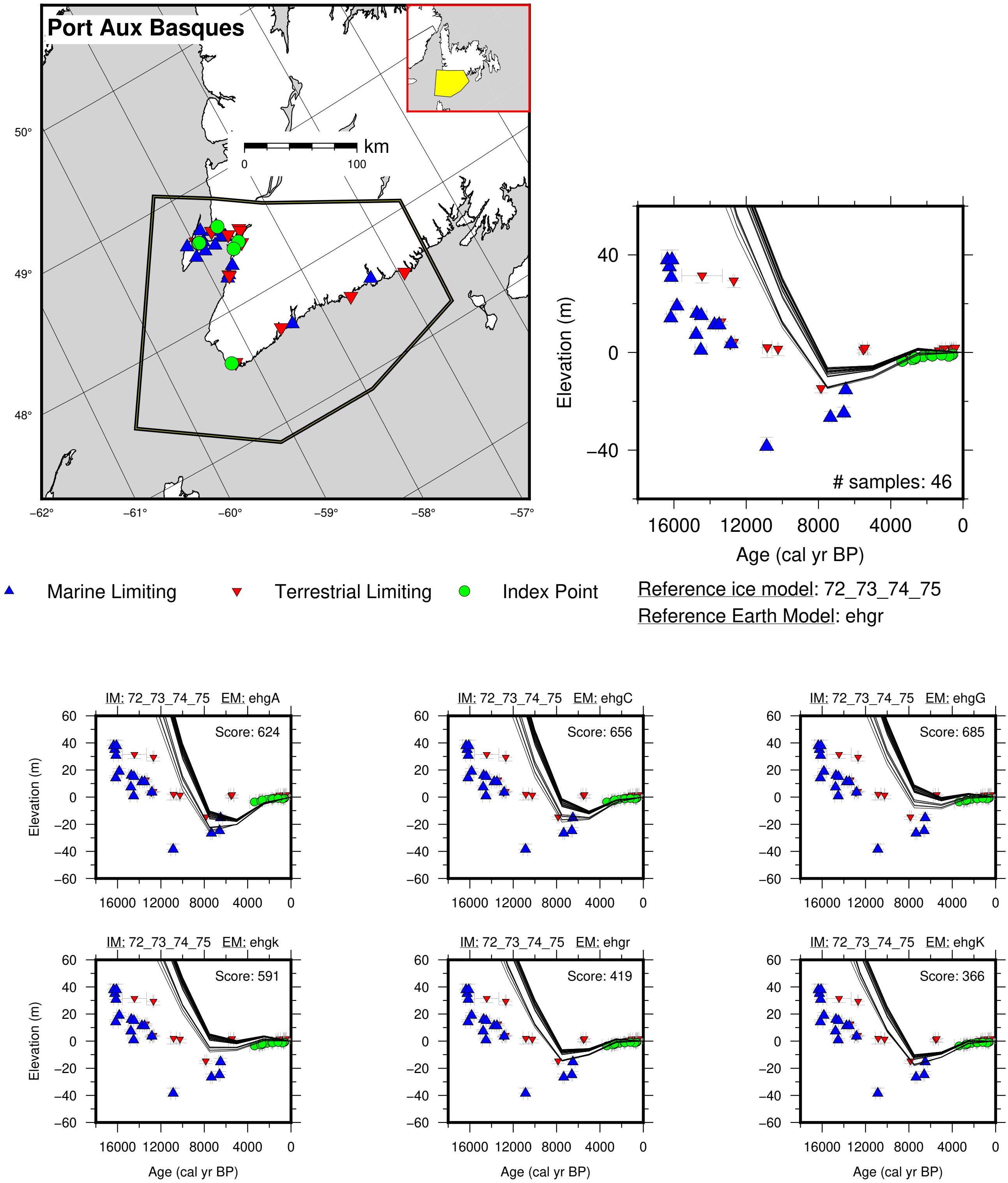


Figure 188: Paleo-sea level and comparison of six models for subregion Newfoundland, location Port Aux Basques.

13.8 Northeastern United States

References for the data used in each location.

Eastern Maine: Belknap et al. (1989); Gehrels (1999); Gehrels and Belknap (1993); Gehrels et al. (1996)

Southern Maine: Barnhardt et al. (1995); Belknap et al. (1989); Bloom (1963); Gehrels et al. (1996, 2002); Kelley et al. (1992, 1995)

Northern Massachusetts: Donnelly (2006); Kaye and Barghoorn (1964); Kirwan et al. (2011); Newman et al. (1980); Oldale et al. (1993); Redfield (1967); Redfield and Rubin (1962)

Southern Massachusetts: Emery et al. (1967); Field et al. (1979); Gutierrez et al. (2003); Oldale and O'Hara (1980); Redfield (1967); Redfield and Rubin (1962); Stuiver et al. (1963)

Connecticut: Bloom (1963); Cinquemani et al. (1982); Donnelly et al. (2004); Nydick et al. (1995); Redfield and Rubin (1962); van de Plassche (1991); van de Plassche et al. (1989, 1998, 2002)

Long Island: Bloom (1963); Cinquemani et al. (1982); Field et al. (1979); Pardi and Newman (1980); Pardi et al. (1984); Redfield (1967); Redfield and Rubin (1962)

New York: Olson and Broecker (1961); Pardi et al. (1984); Slagle et al. (2006)

New Jersey: Cinquemani et al. (1982); Donnelly et al. (2001); Engelhart and Horton (2012); Field et al. (1979); Miller et al. (2009); Pardi et al. (1984); Psuty (1986); Stuiver and Daddario (1963)

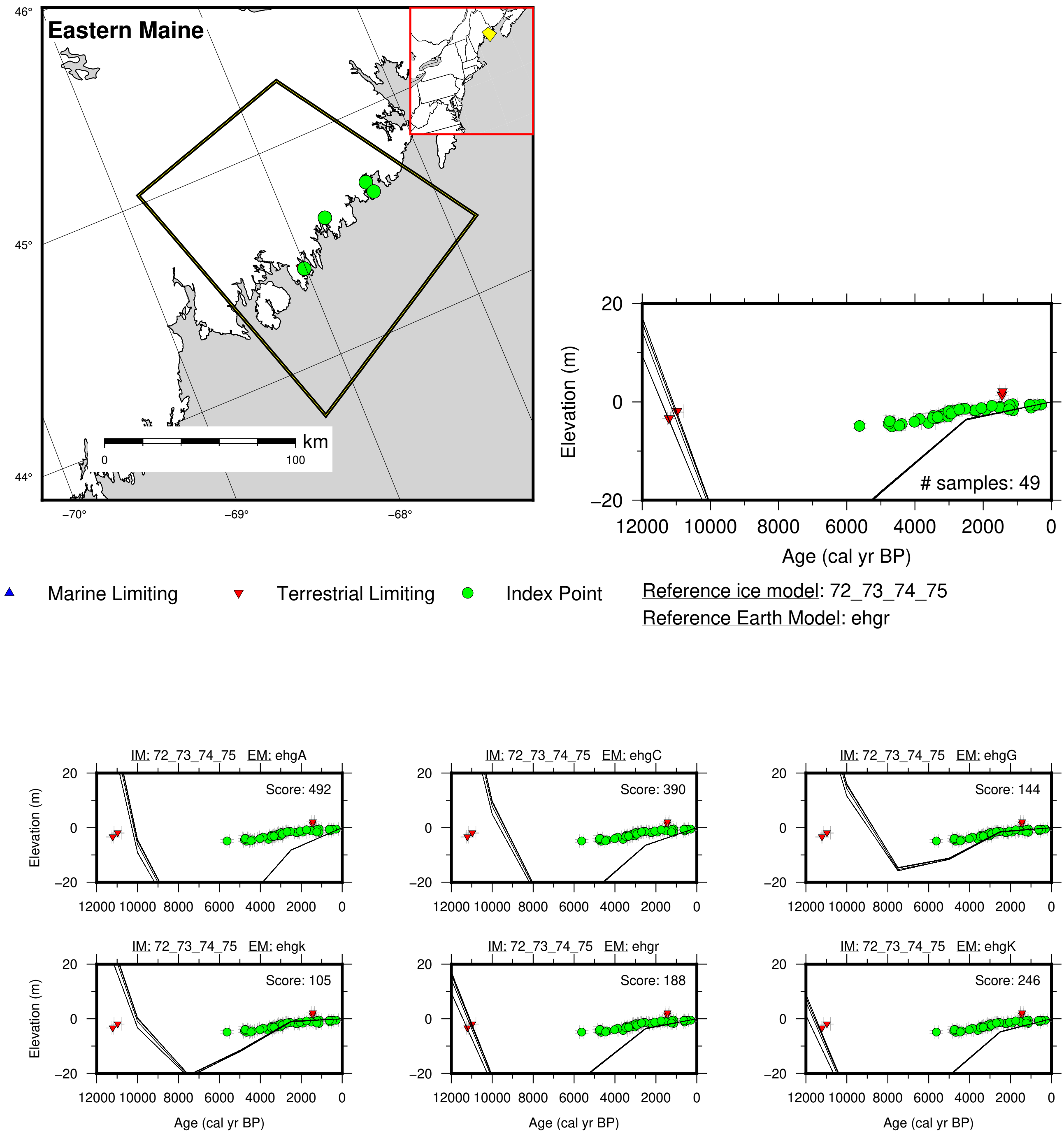


Figure 189: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Eastern Maine.

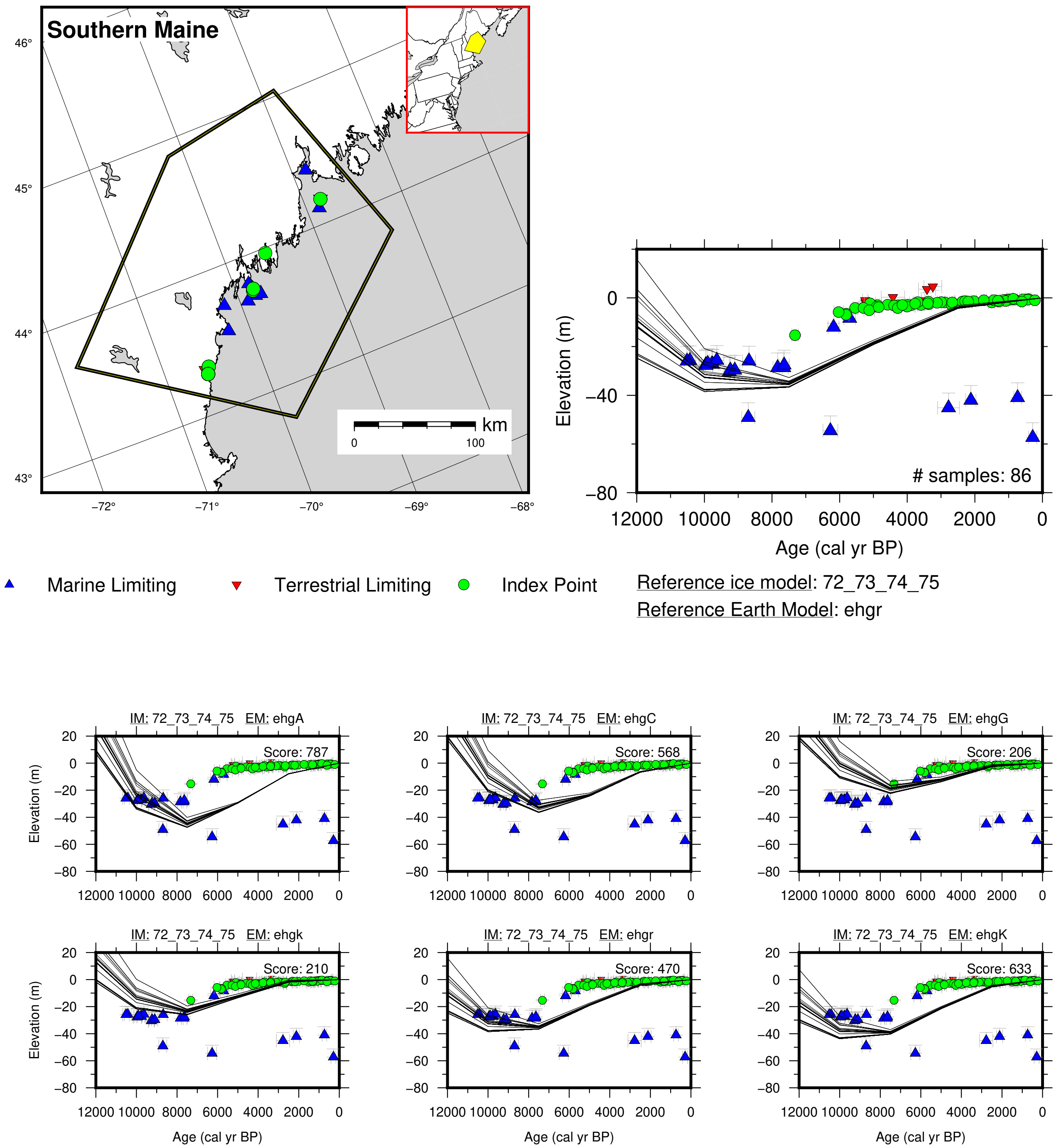


Figure 190: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Southern Maine.

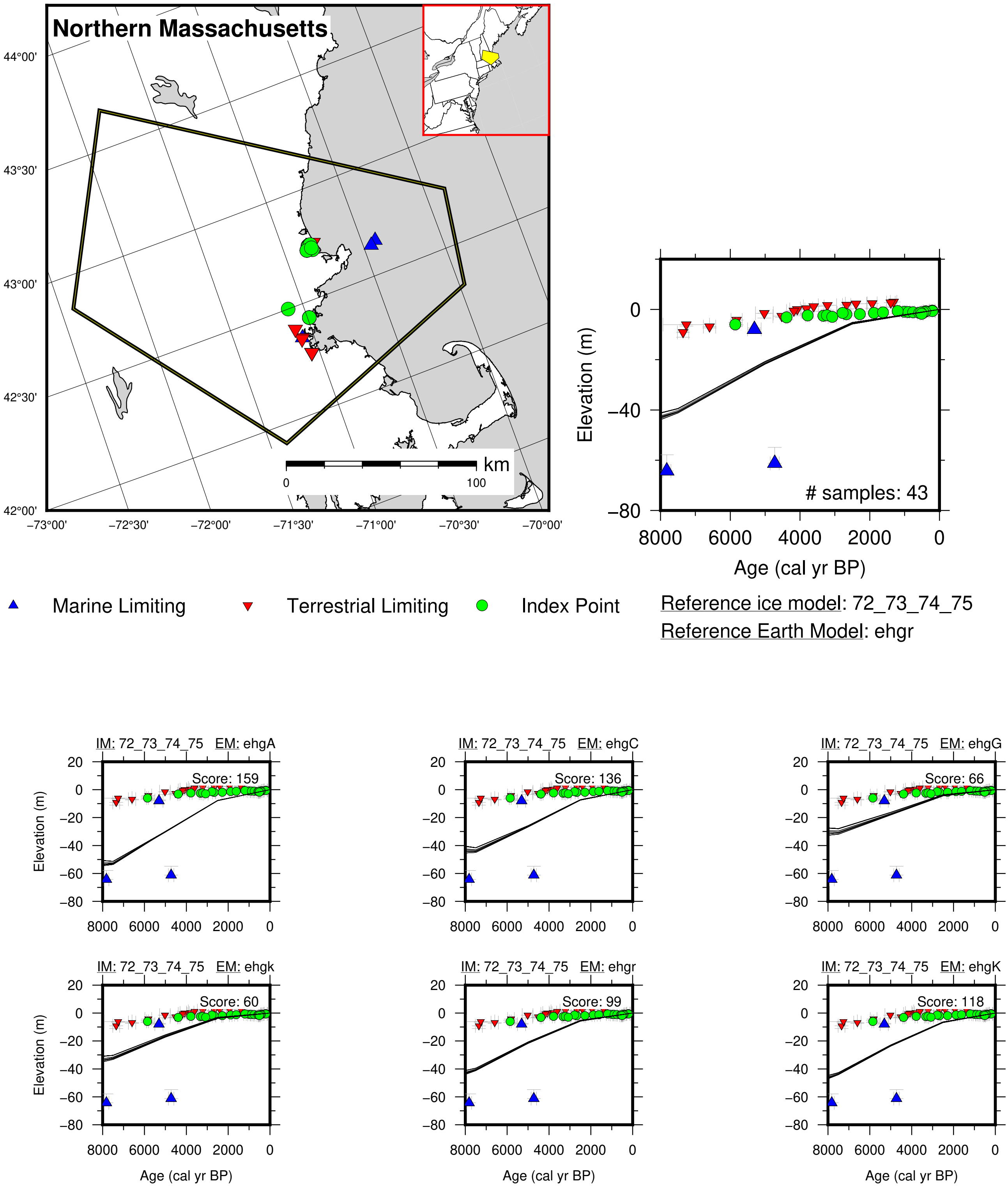


Figure 191: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Northern Massachusetts.

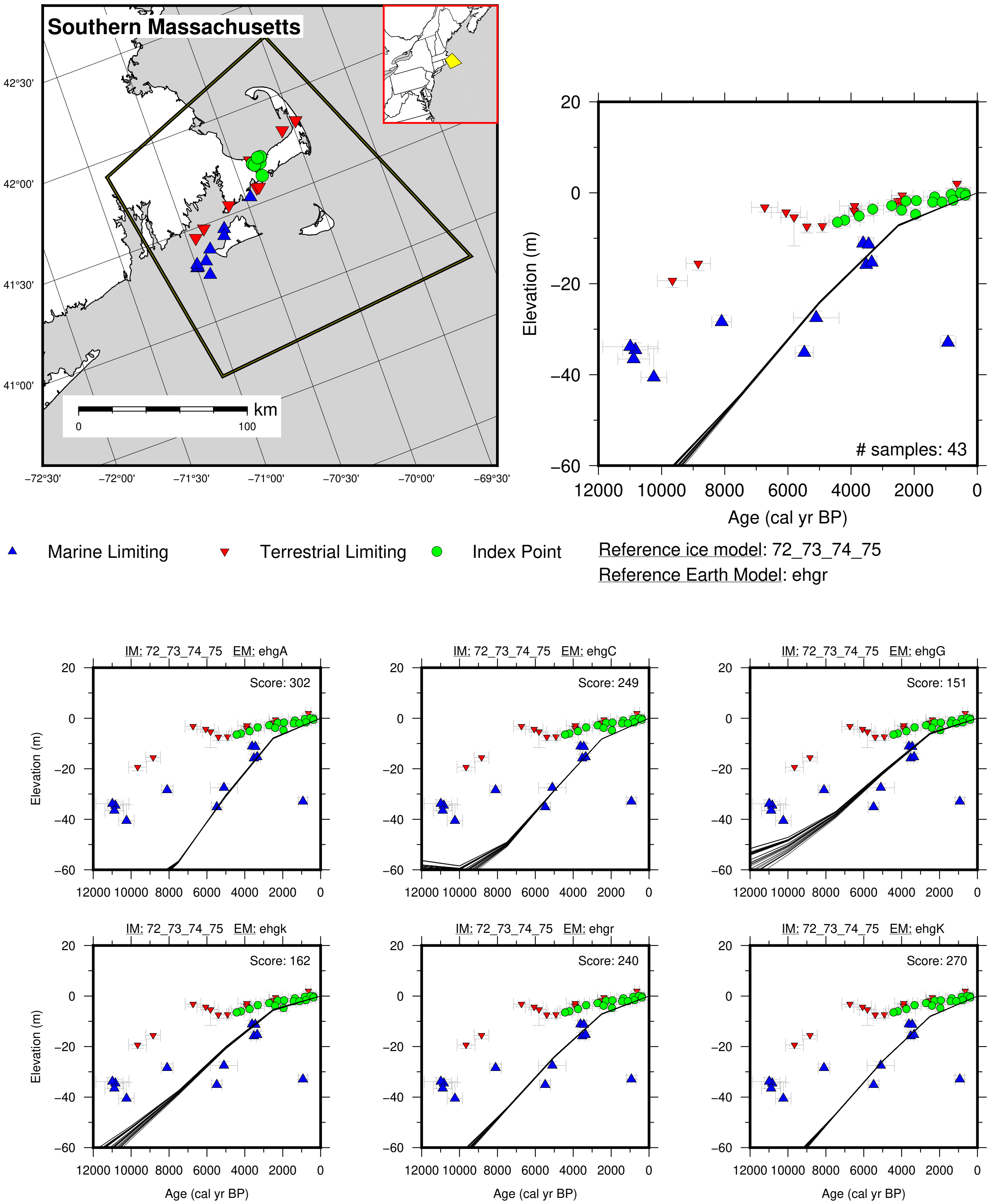


Figure 192: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Southern Massachusetts.

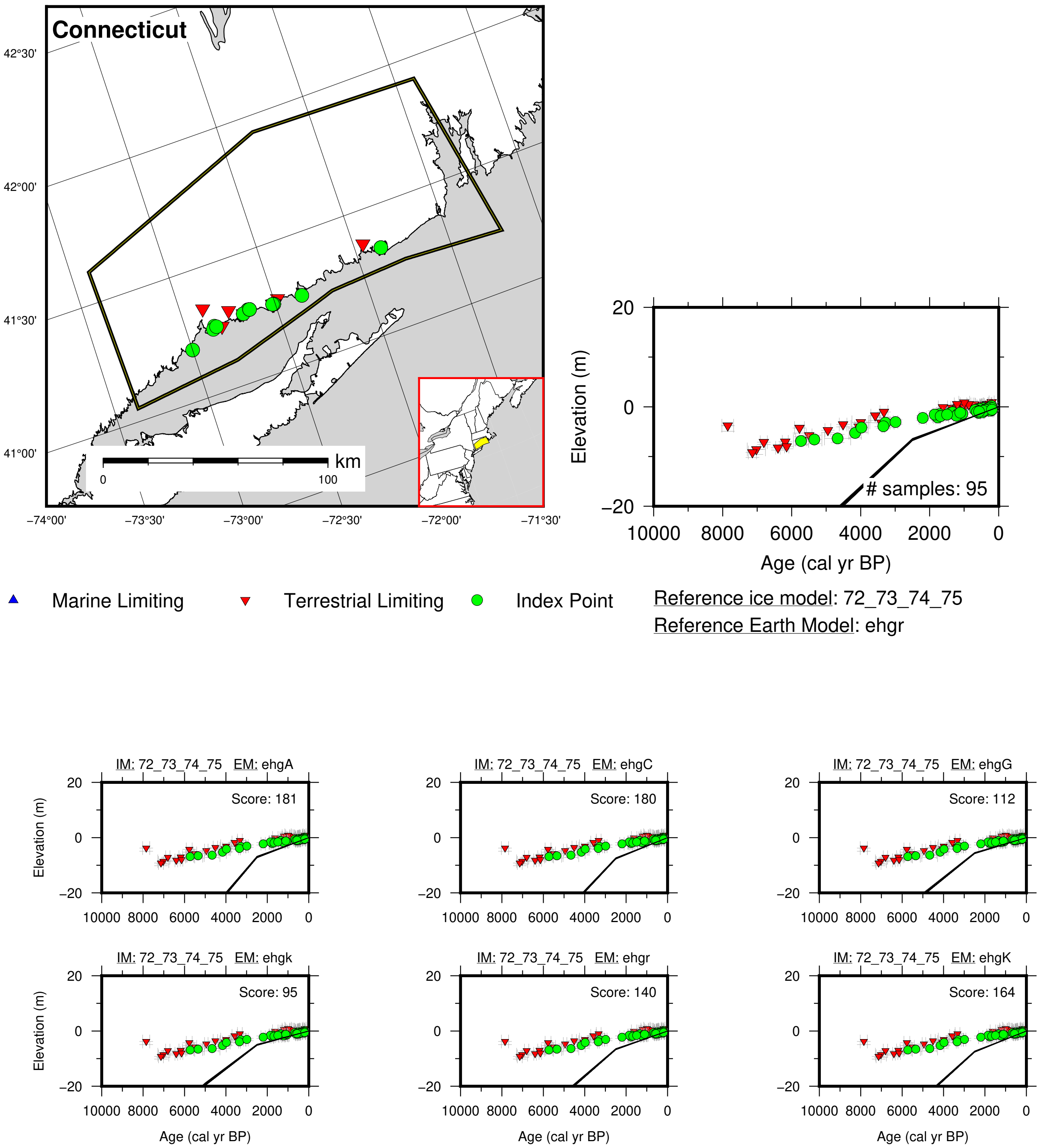


Figure 193: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Connecticut.

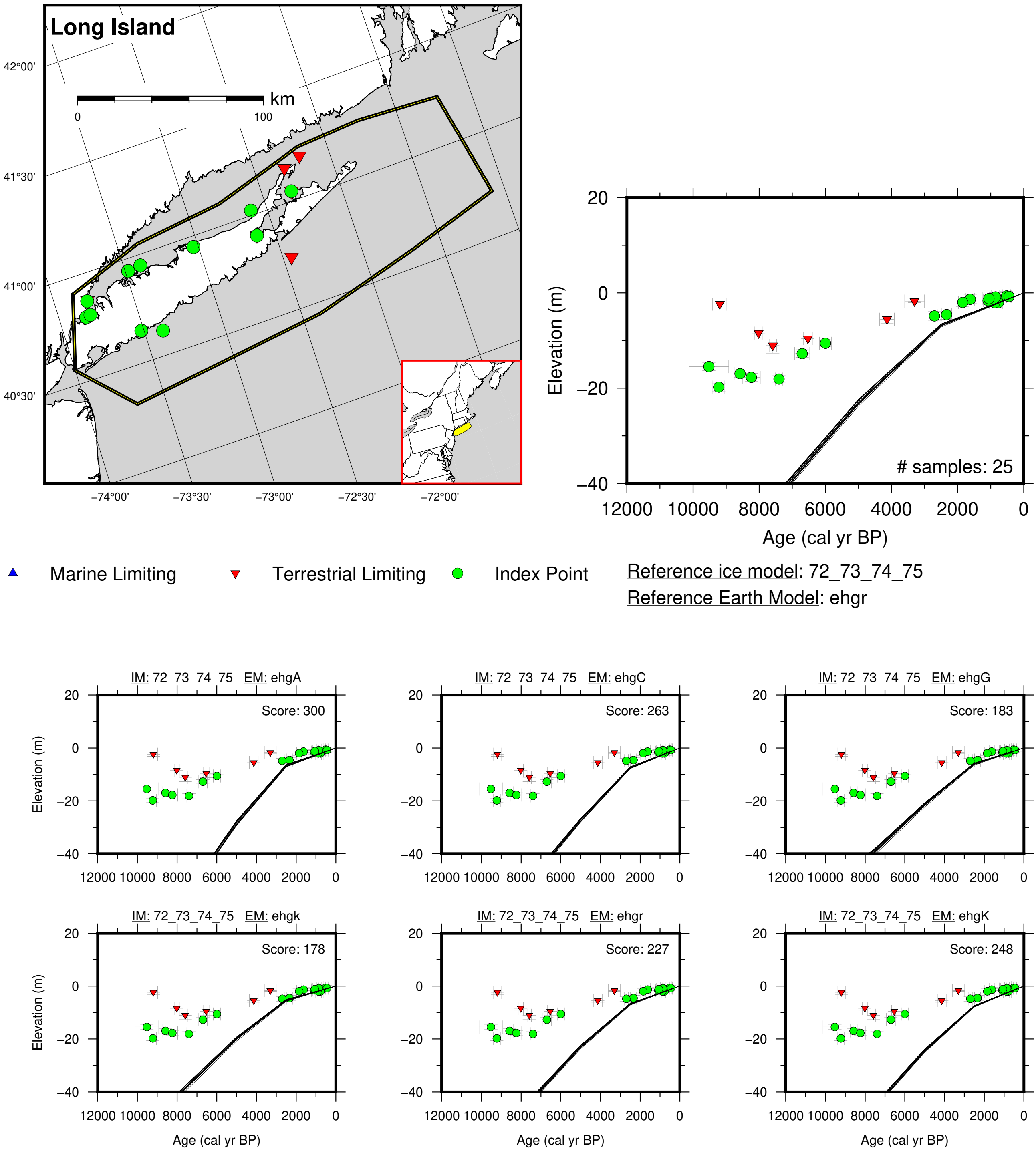


Figure 194: Paleo-sea level and comparison of six models for subregion Northeastern United States, location Long Island.

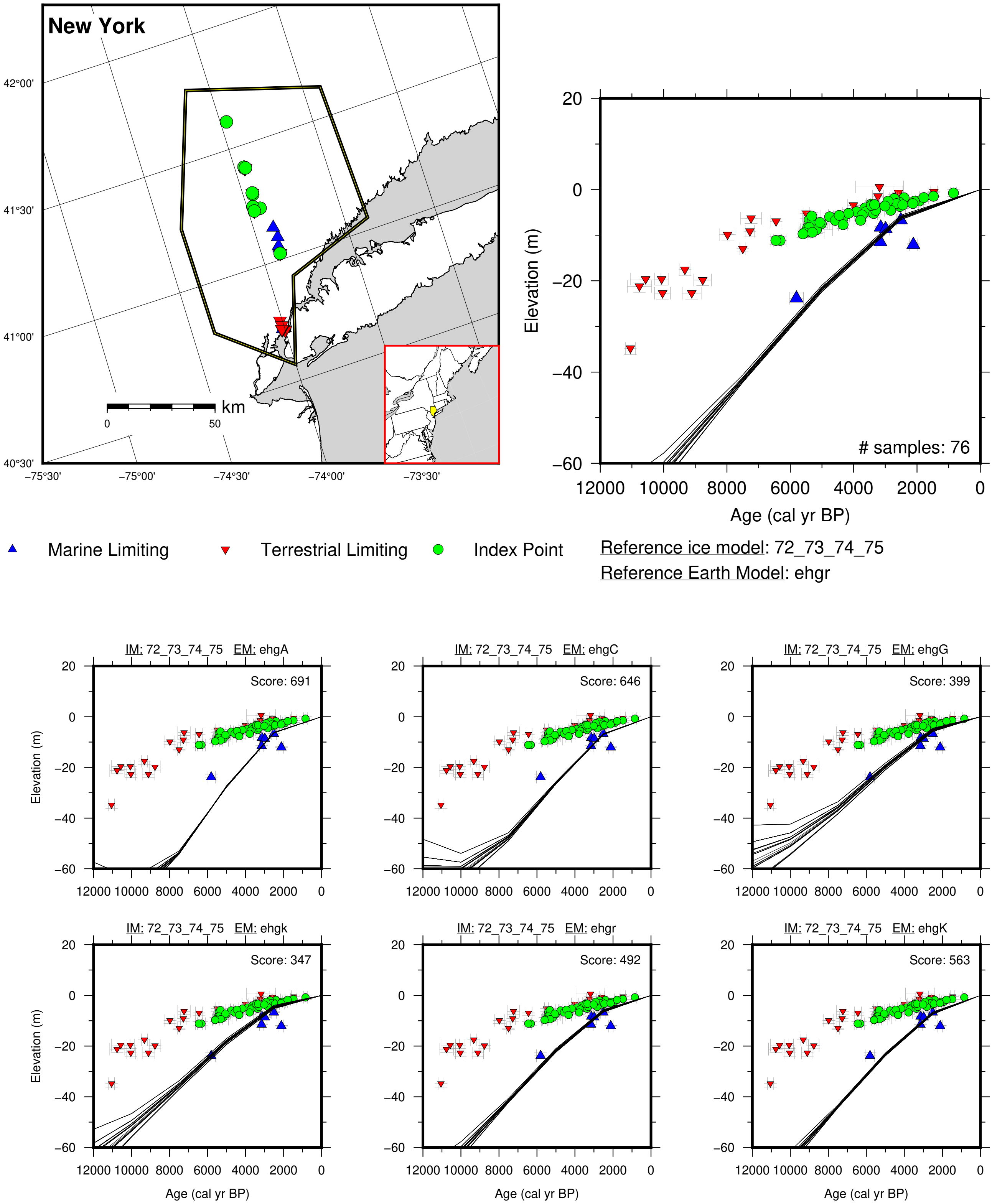


Figure 195: Paleo-sea level and comparison of six models for subregion Northeastern United States, location New York.

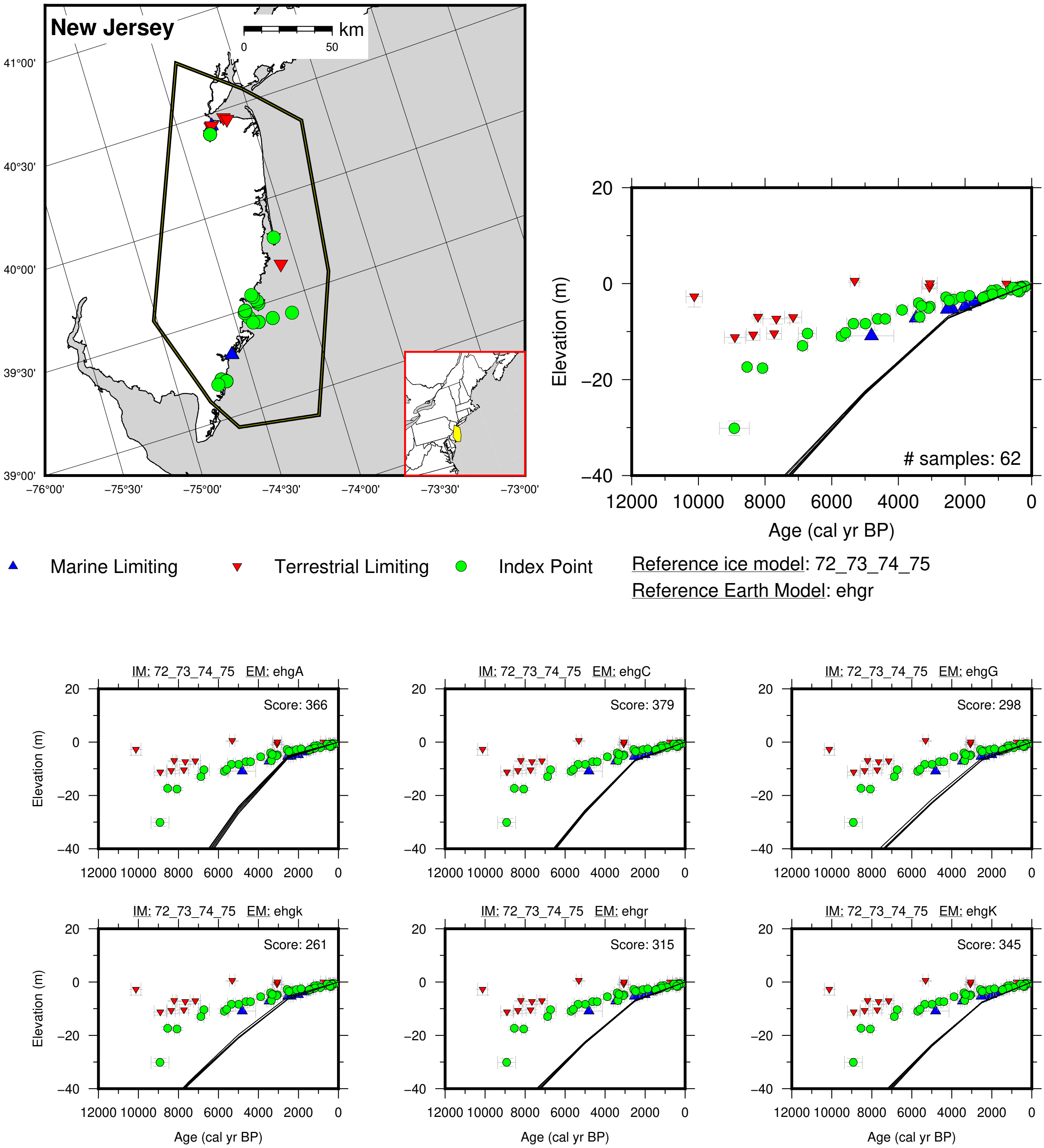


Figure 196: Paleo-sea level and comparison of six models for subregion Northeastern United States, location New Jersey.

13.9 St Laurence Lowlands

References for the data used in each location.

Rimouski: Blake and Lowdon (1976); Dionne (1990, 1999, 2001a, 2005); Dionne and Coll (1995); Dyck and Fyles (1963); Harington (2003); Hétu (1994, 1998); Hétu and Bail (1996); Locat (1977); Vacchi et al. (2018)

Forestville: Dietrich et al. (2017); Dionne (1996, 2001b); Dionne and Occhietti (1996); Dionne et al. (2004); Dubois et al. (1988); Martindale et al. (2020)

Quebec City: Bhiry et al. (2000); Brodeur and Allard (1985); Dionne (1988, 1997, 1998); Filion (1987); Govare and Gangloff (1989); McNeely (2006); McNeely and Brennan (2005); Occhietti et al. (2001); Parent and Occhietti (1988); Samson et al. (1977)

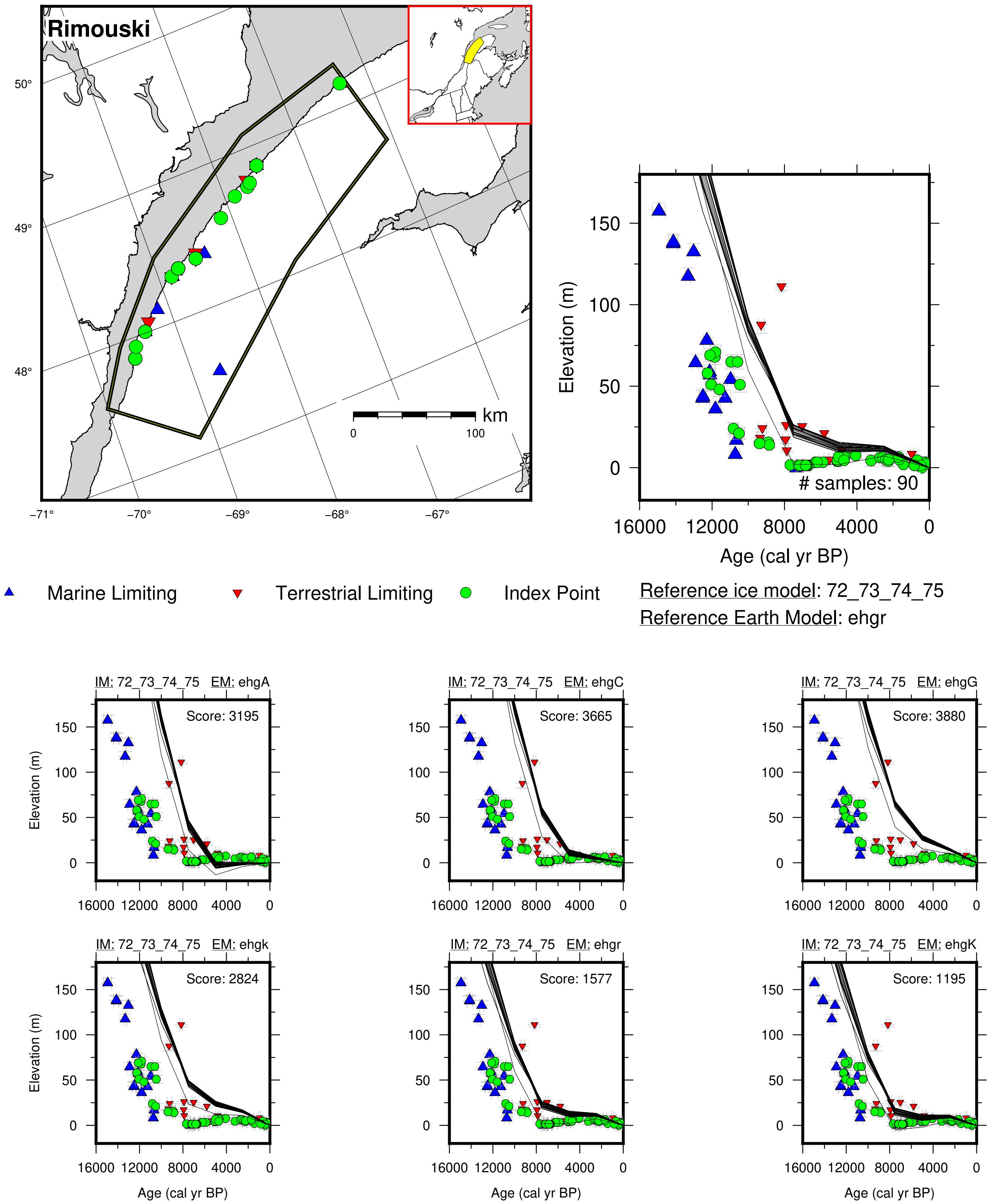


Figure 197: Paleo-sea level and comparison of six models for subregion St Laurence Lowlands, location Rimouski.

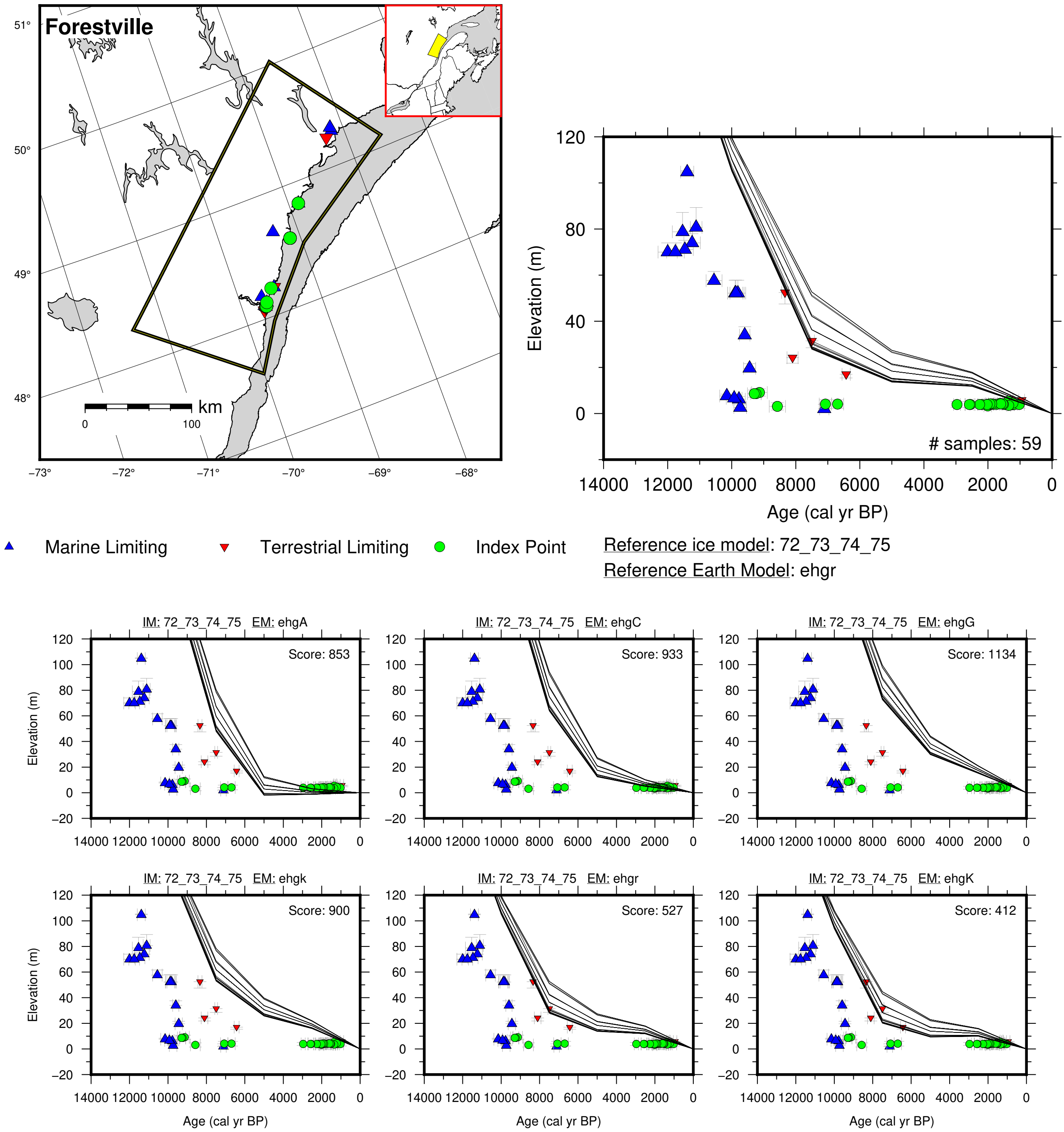


Figure 198: Paleo-sea level and comparison of six models for subregion St Laurence Lowlands, location Forestville.

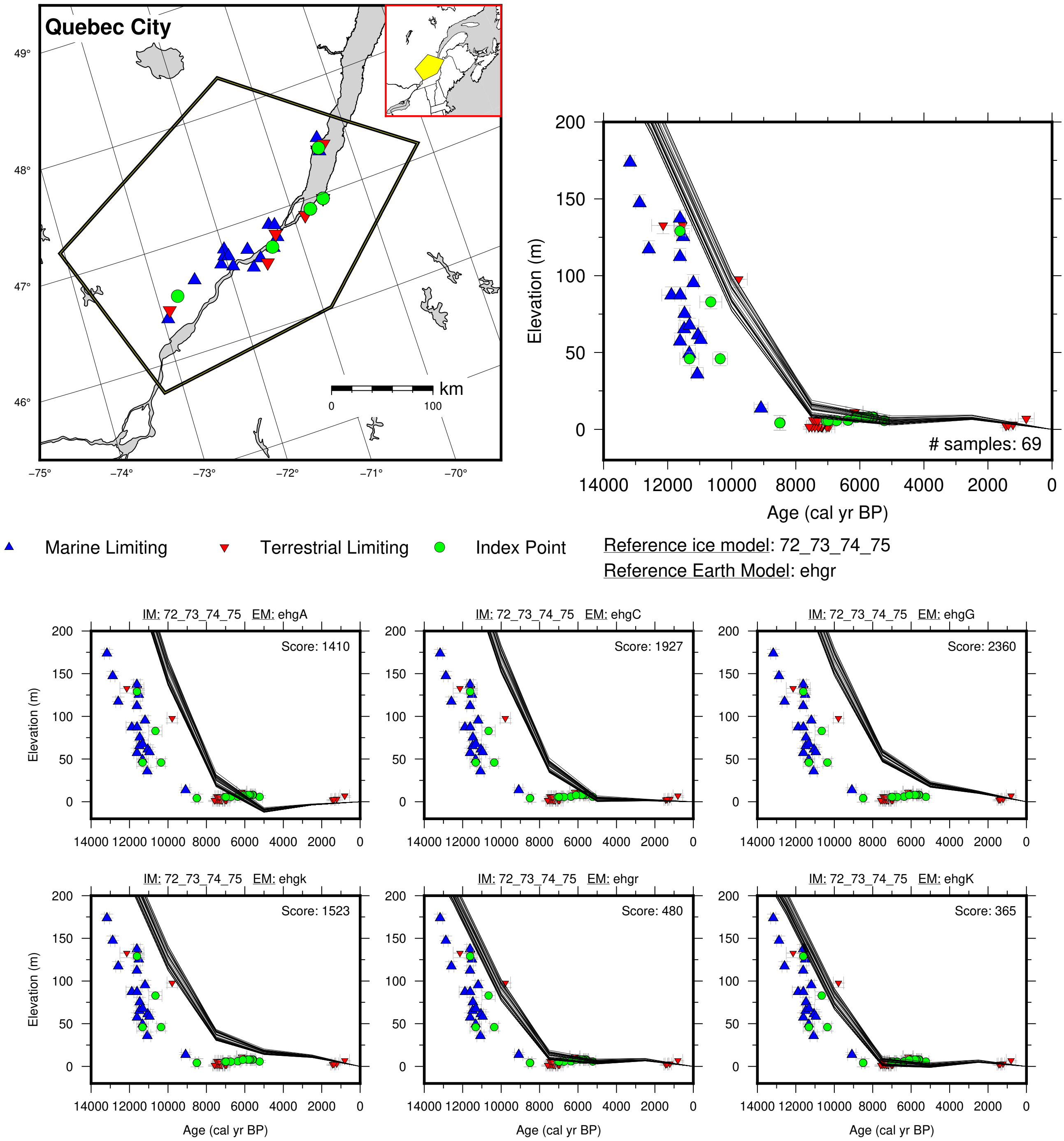


Figure 199: Paleo-sea level and comparison of six models for subregion St Laurence Lowlands, location Quebec City.

14 Proxy Based Sea Level

14.1 Red Sea

References for the data used in each location.

Red Sea proxy 30ka: Grant et al. (2014)

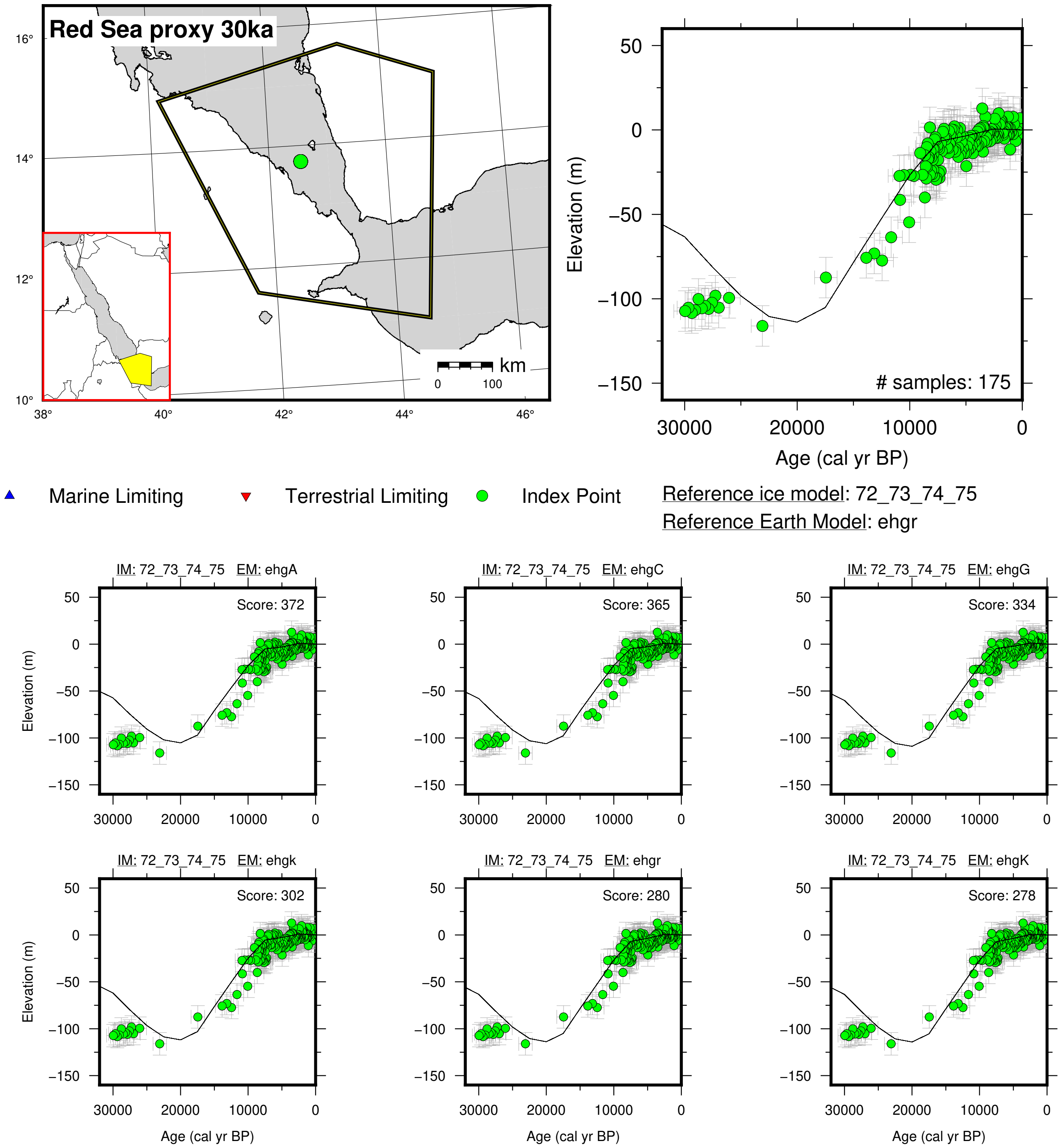


Figure 200: Paleo-sea level and comparison of six models for subregion Red Sea, location Red Sea proxy 30ka.

15 South Asia

15.1 Bay of Bengal

References for the data used in each location.

Ganges Delta: Wiedicke et al. (1999)

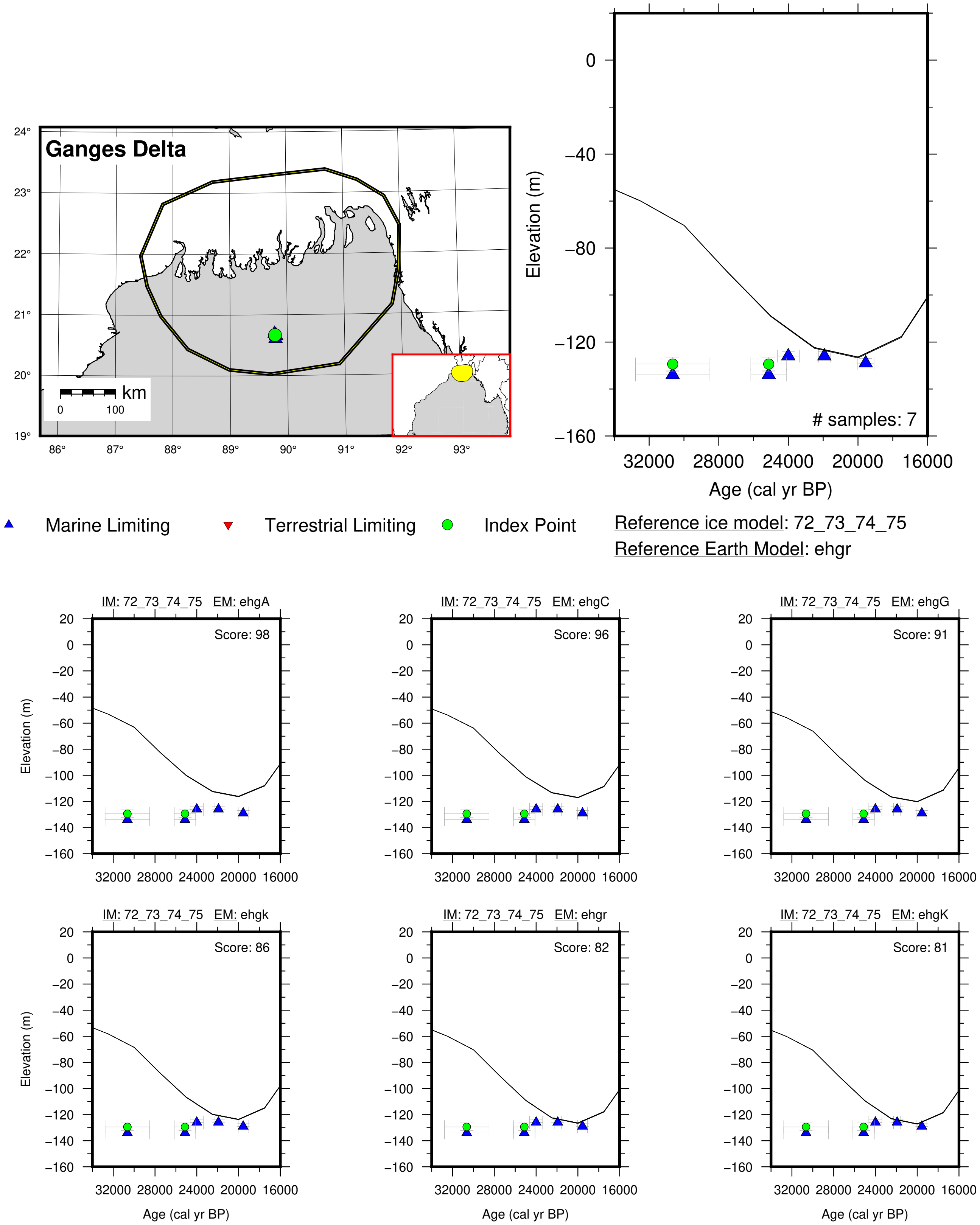


Figure 201: Paleo-sea level and comparison of six models for subregion Bay of Bengal, location Ganges Delta.

16 Southeast Asia

16.1 Java Sea

References for the data used in each location.

Central Java: Azmy et al. (2010)

South Sulawesi: de Klerk (1982); Mann et al. (2016); Tjia et al. (1972)

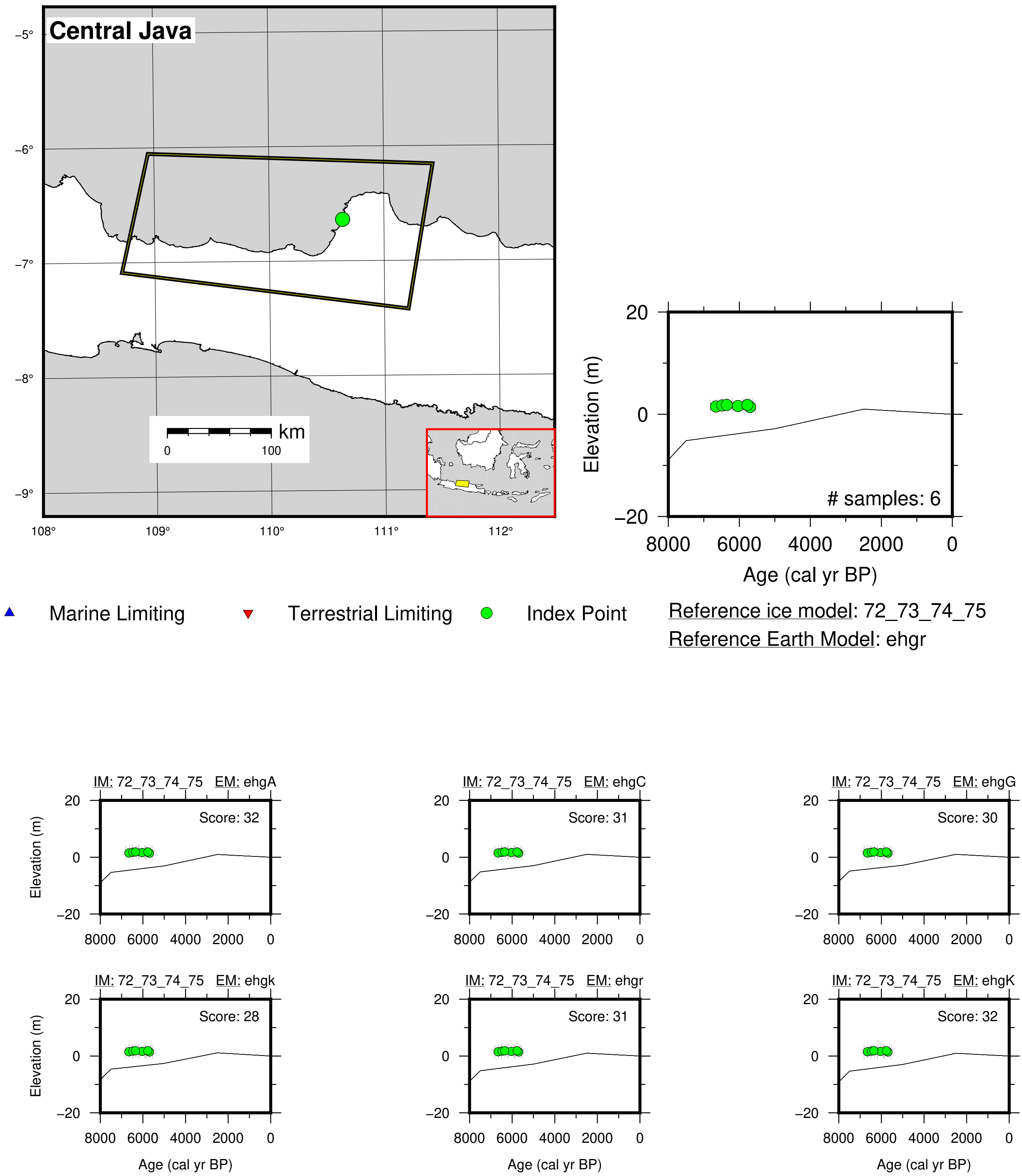


Figure 202: Paleo-sea level and comparison of six models for subregion Java Sea, location Central Java.

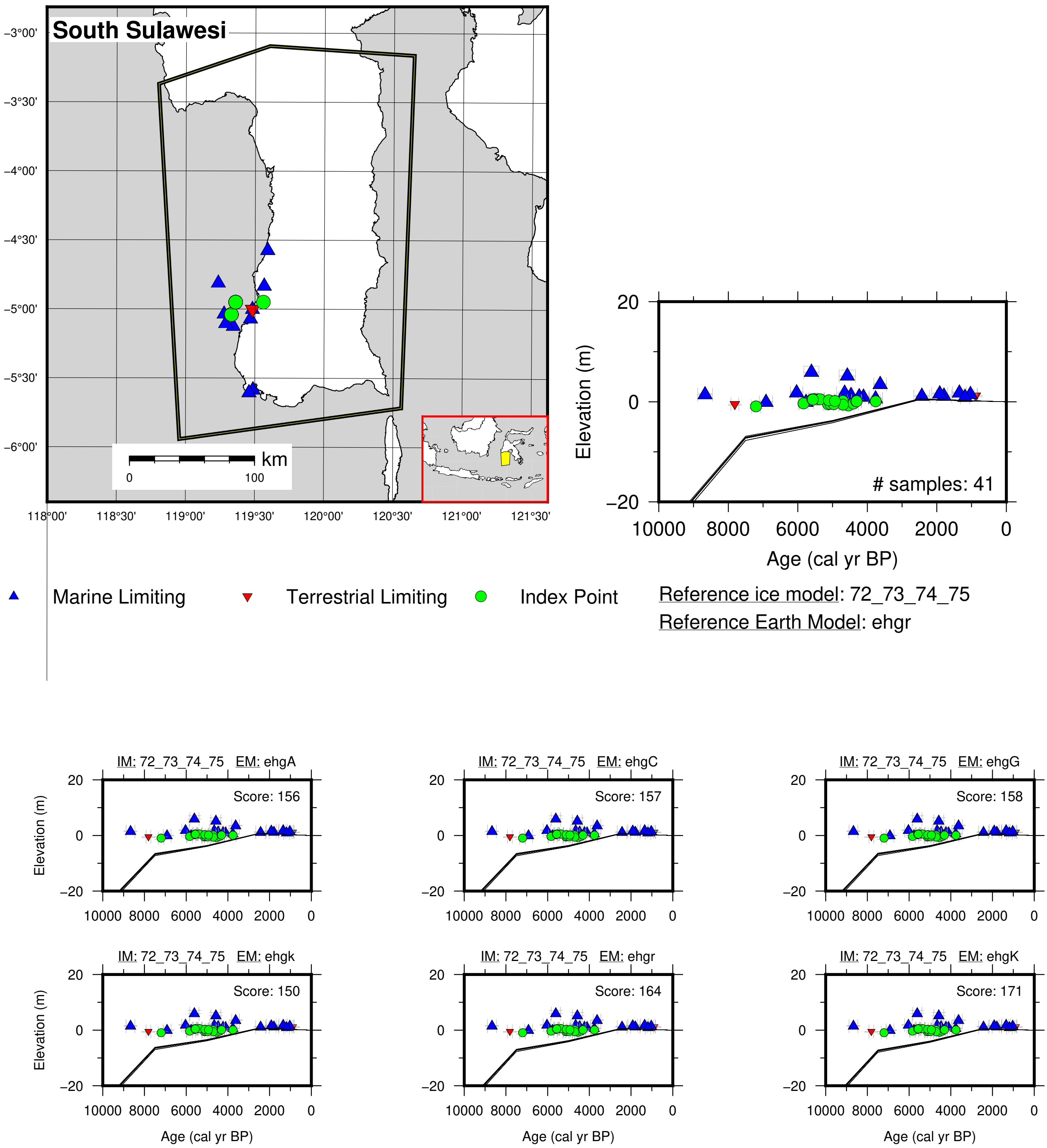


Figure 203: Paleo-sea level and comparison of six models for subregion Java Sea, location South Sulawesi.

16.2 Papua New Guinea

References for the data used in each location.

Huon Peninsula: Chappell and Polach (1991); Cutler et al. (2003); Edwards et al. (1993); Hibbert et al. (2016)

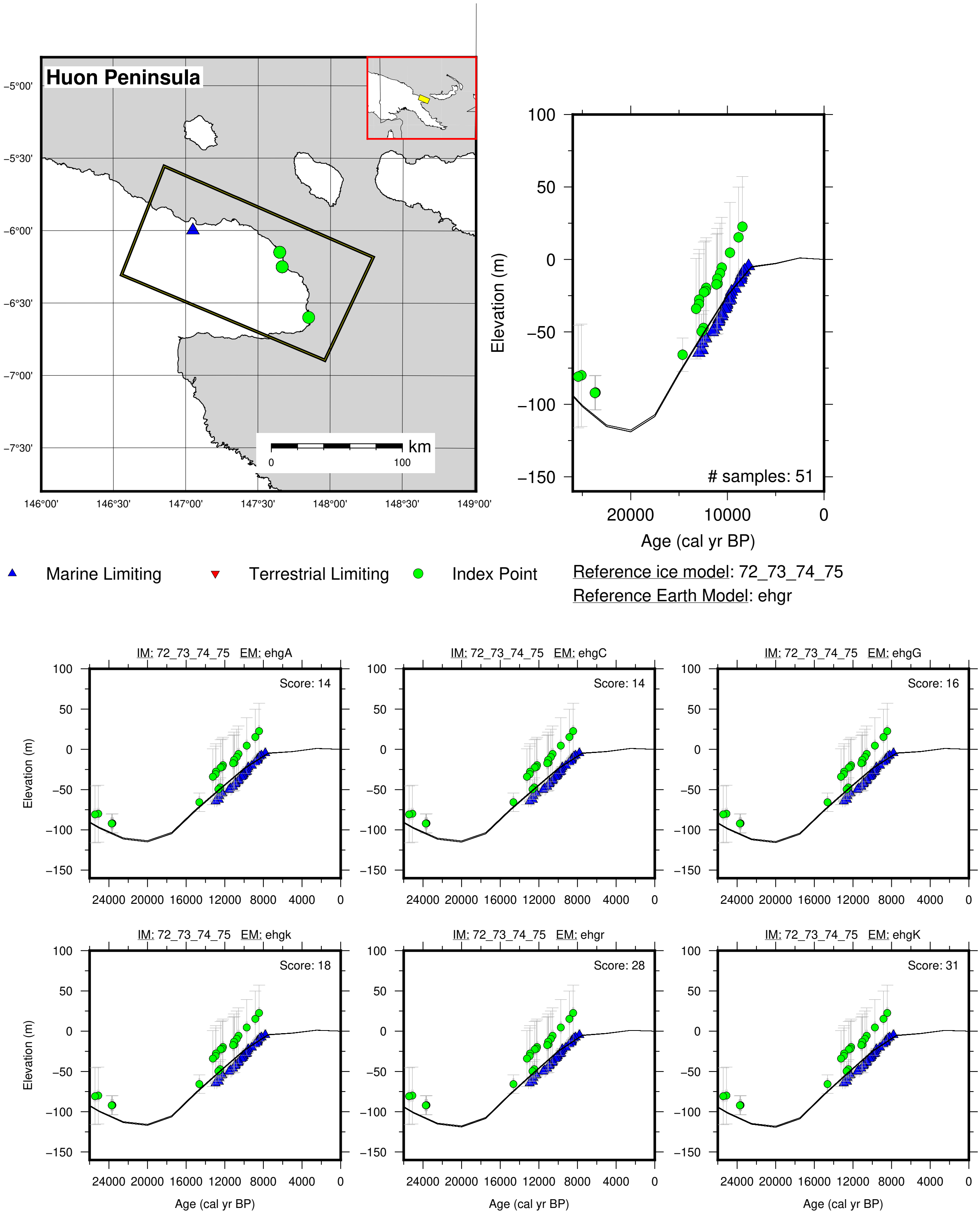


Figure 204: Paleo-sea level and comparison of six models for subregion Papua New Guinea, location Huon Peninsula.

16.3 Sundaland

References for the data used in each location.

Chao Phraya: Horton et al. (2005); Sinsakul (1992); Somboon (1988); Somboon and Thiramongkol (1992)

Mekong Delta: Hanebuth et al. (2012); Stattegger et al. (2013); Tamura et al. (2007, 2009)

Strait Of Malacca: Bird et al. (2007, 2010); Geyh et al. (1979); Hassan (2001); Hesp et al. (1998); Horton et al. (2005); Tjia and Fujii (1992)

Sunda Shelf: Hanebuth et al. (2000, 2003, 2009)

Vietnam Shelf: Hanebuth et al. (2000)

Phuket: Scheffers et al. (2012); Scoffin and Le Tissier (1998)

Thale Noi: Horton et al. (2005)

West Malay Peninsula: Tjia and Fujii (1992); Tjia et al. (1972)

East Malay Peninsula: Parham et al. (2014); Tjia and Fujii (1992)

Southeast Malay Peninsula: Hassan (2001); Horton et al. (2005); Tjia and Fujii (1992); Tjia et al. (1983)

Belitung Island: Meltzner et al. (2017)

Ca Na: Stattegger et al. (2013)

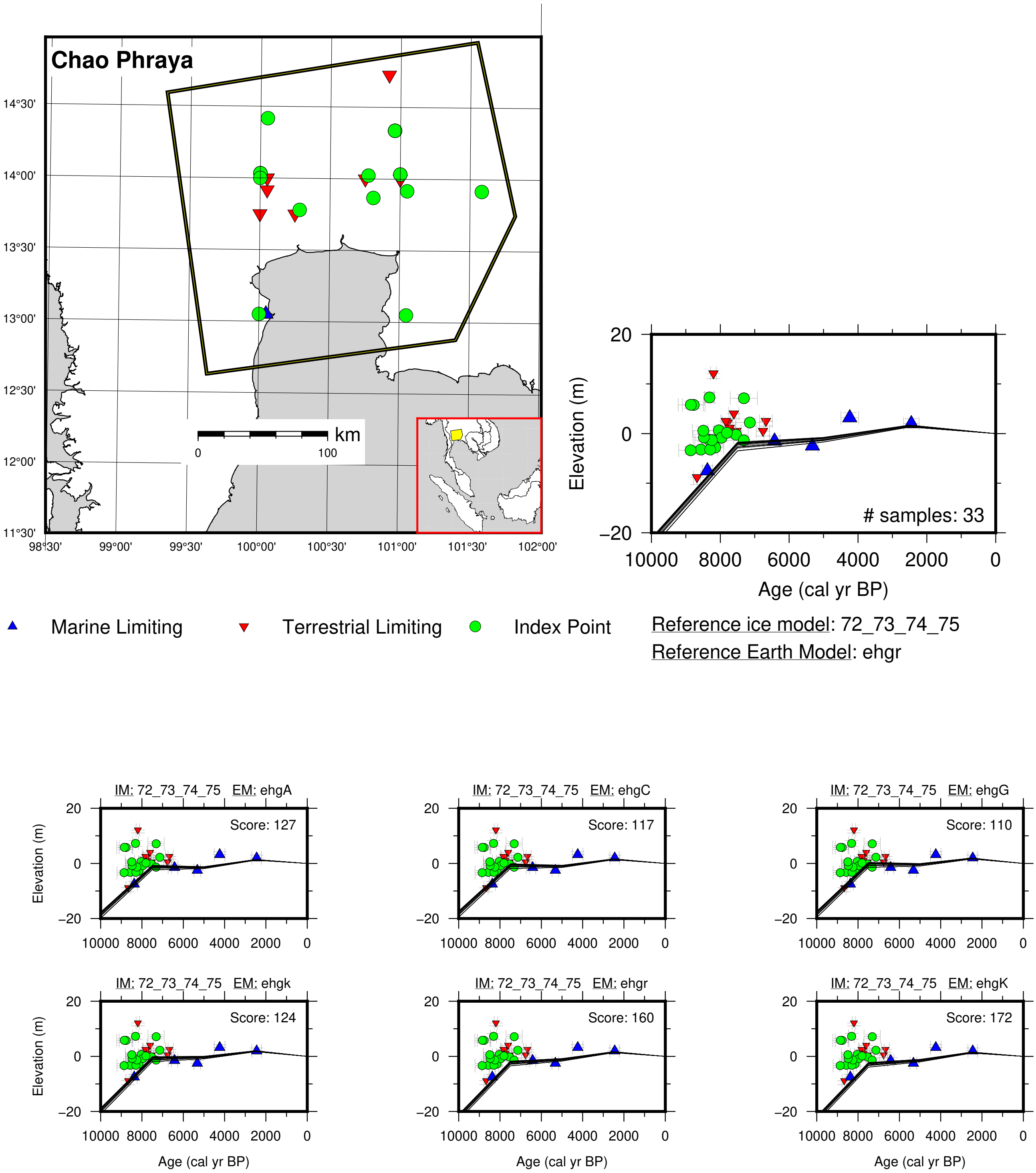


Figure 205: Paleo-sea level and comparison of six models for subregion Sundaland, location Chao Phraya.

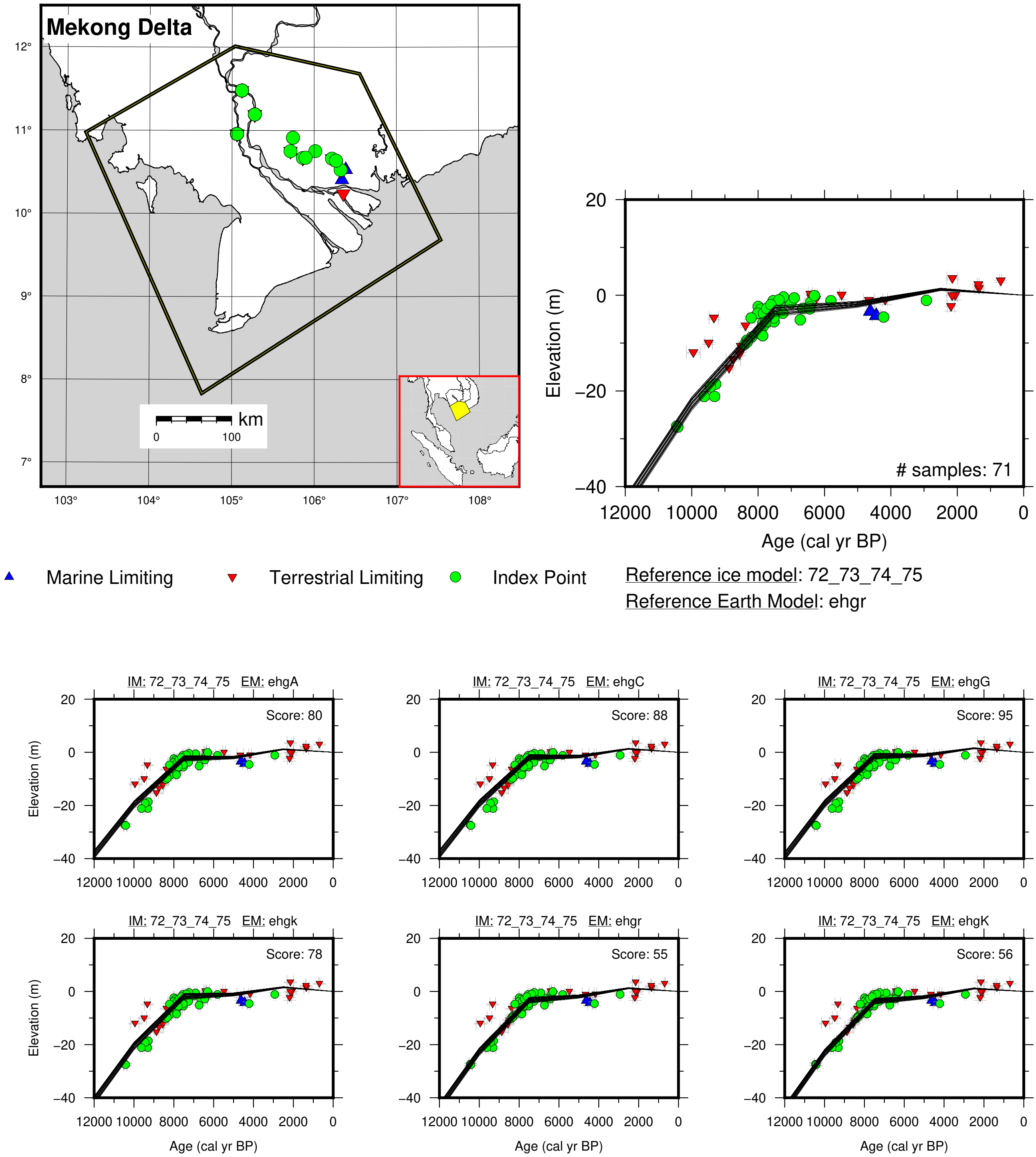


Figure 206: Paleo-sea level and comparison of six models for subregion Sundaland, location Mekong Delta.

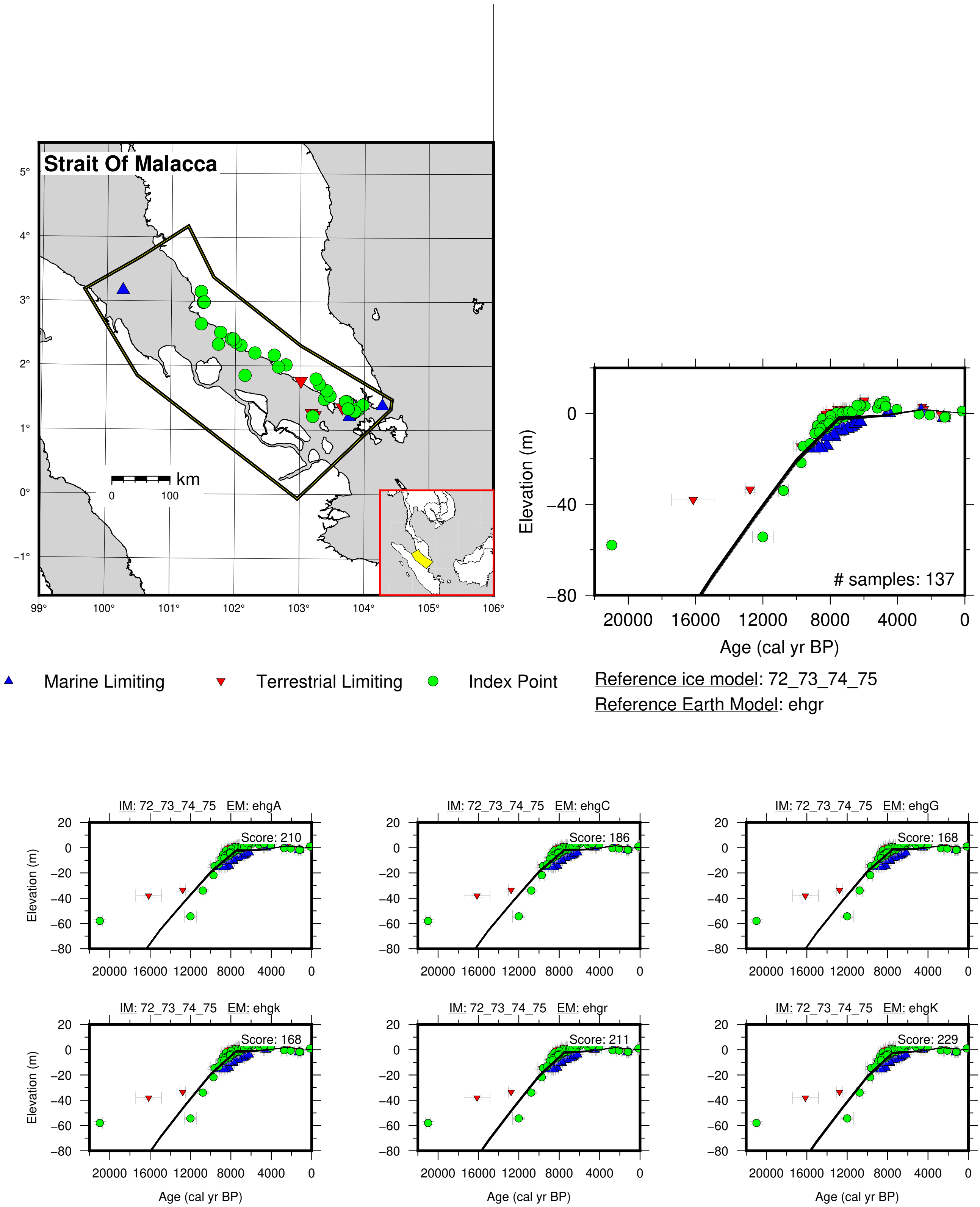


Figure 207: Paleo-sea level and comparison of six models for subregion Sundaland, location Strait Of Malacca.

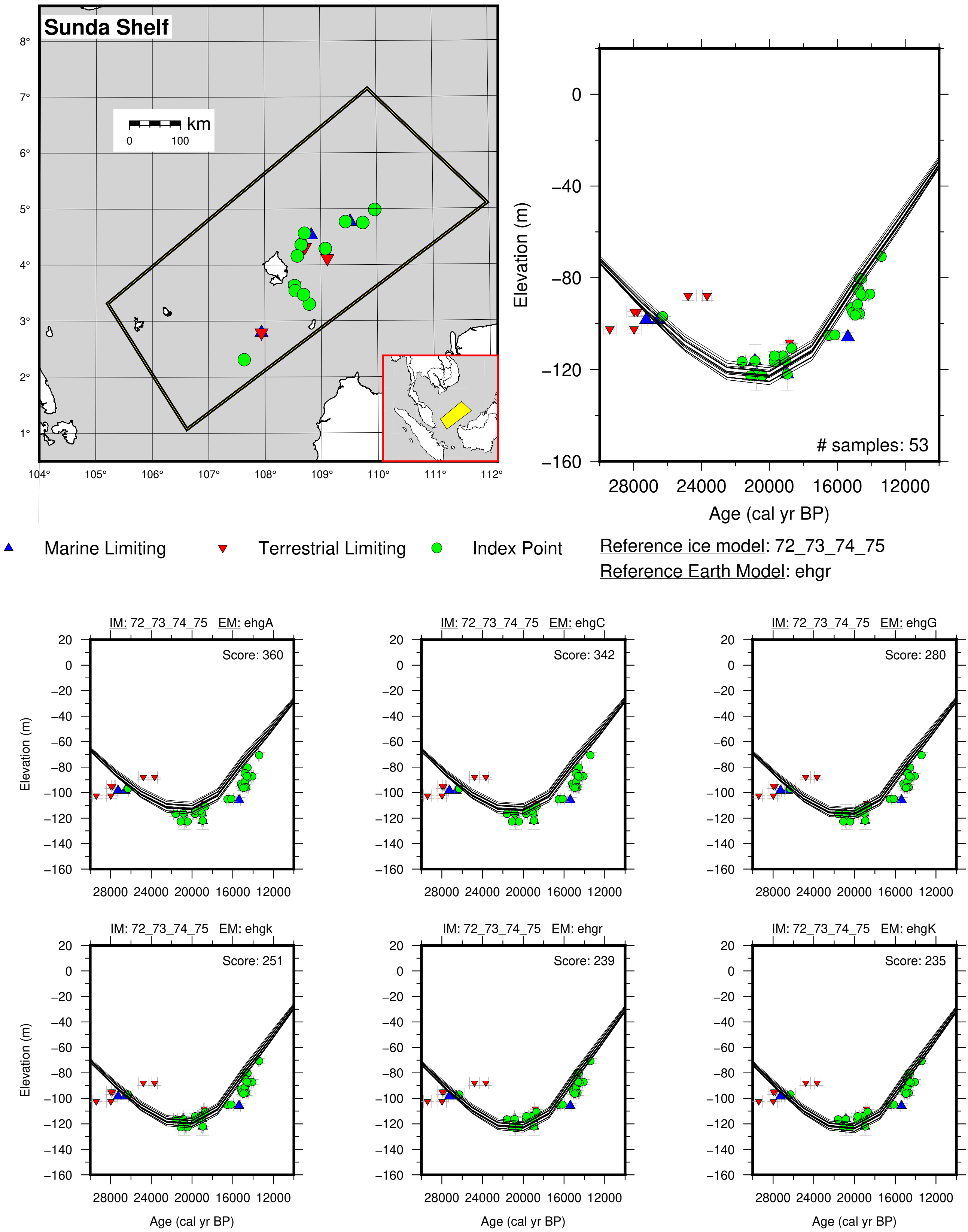


Figure 208: Paleo-sea level and comparison of six models for subregion Sundaland, location Sunda Shelf.

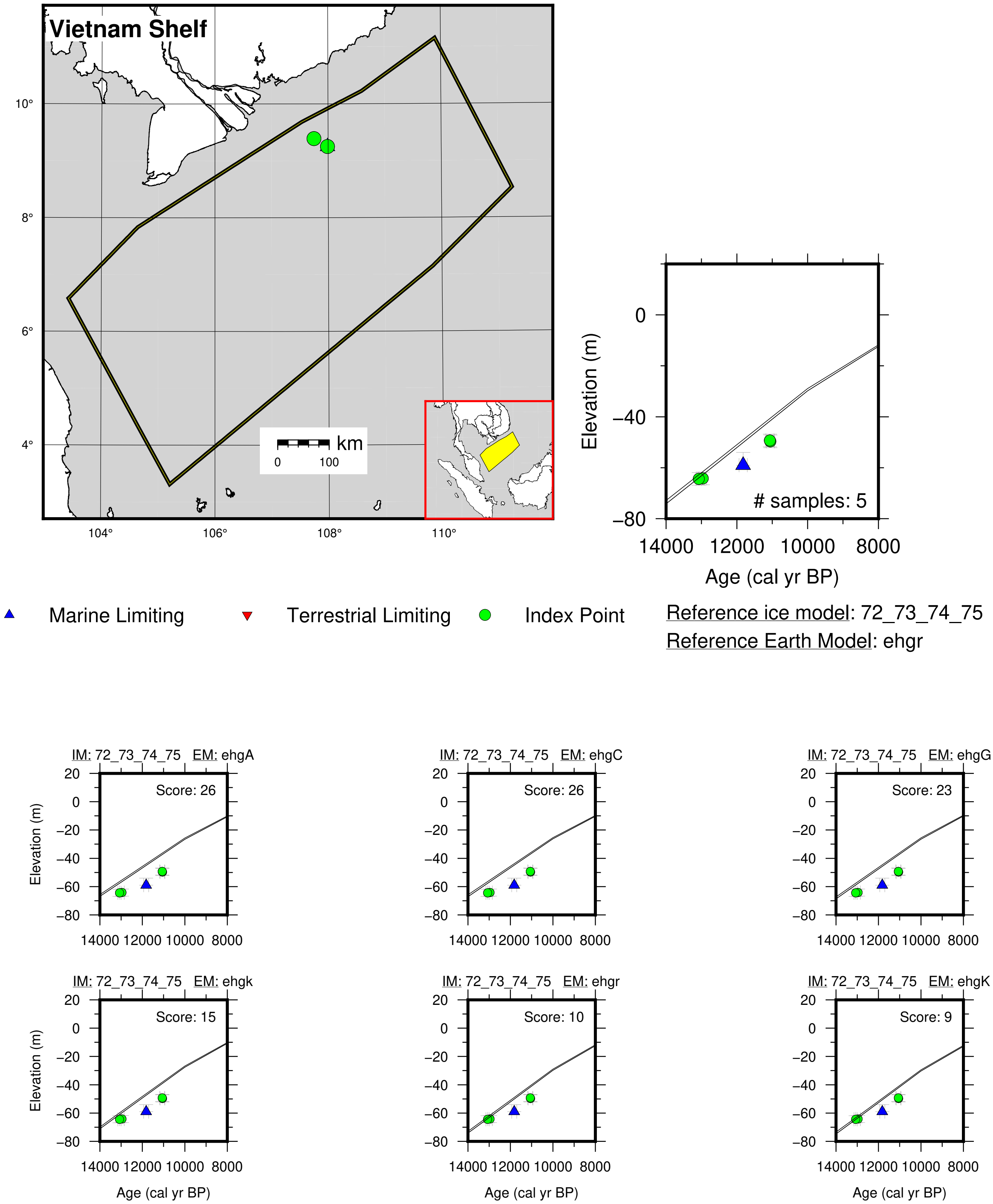


Figure 209: Paleo-sea level and comparison of six models for subregion Sundaland, location Vietnam Shelf.

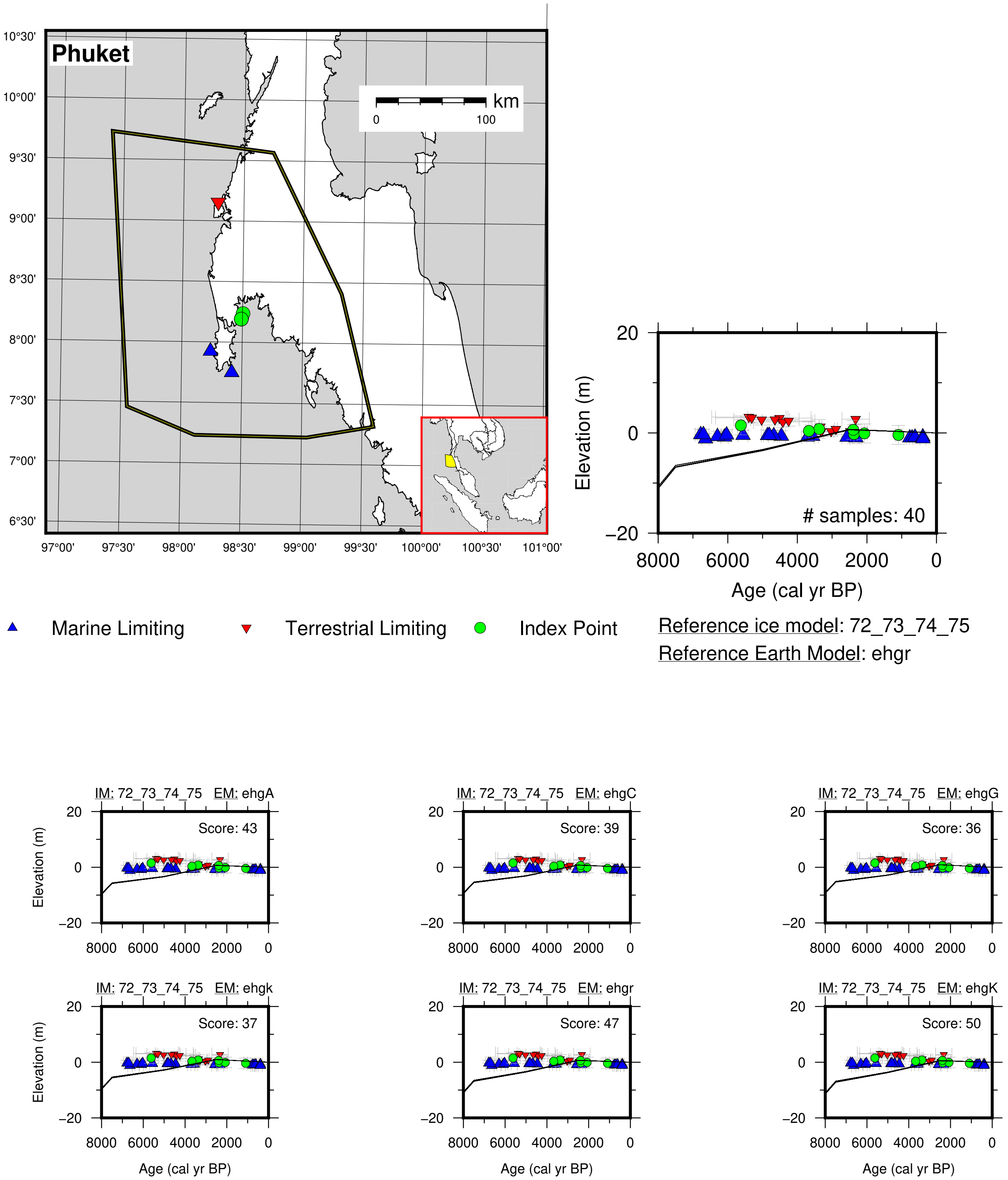


Figure 210: Paleo-sea level and comparison of six models for subregion Sundaland, location Phuket.

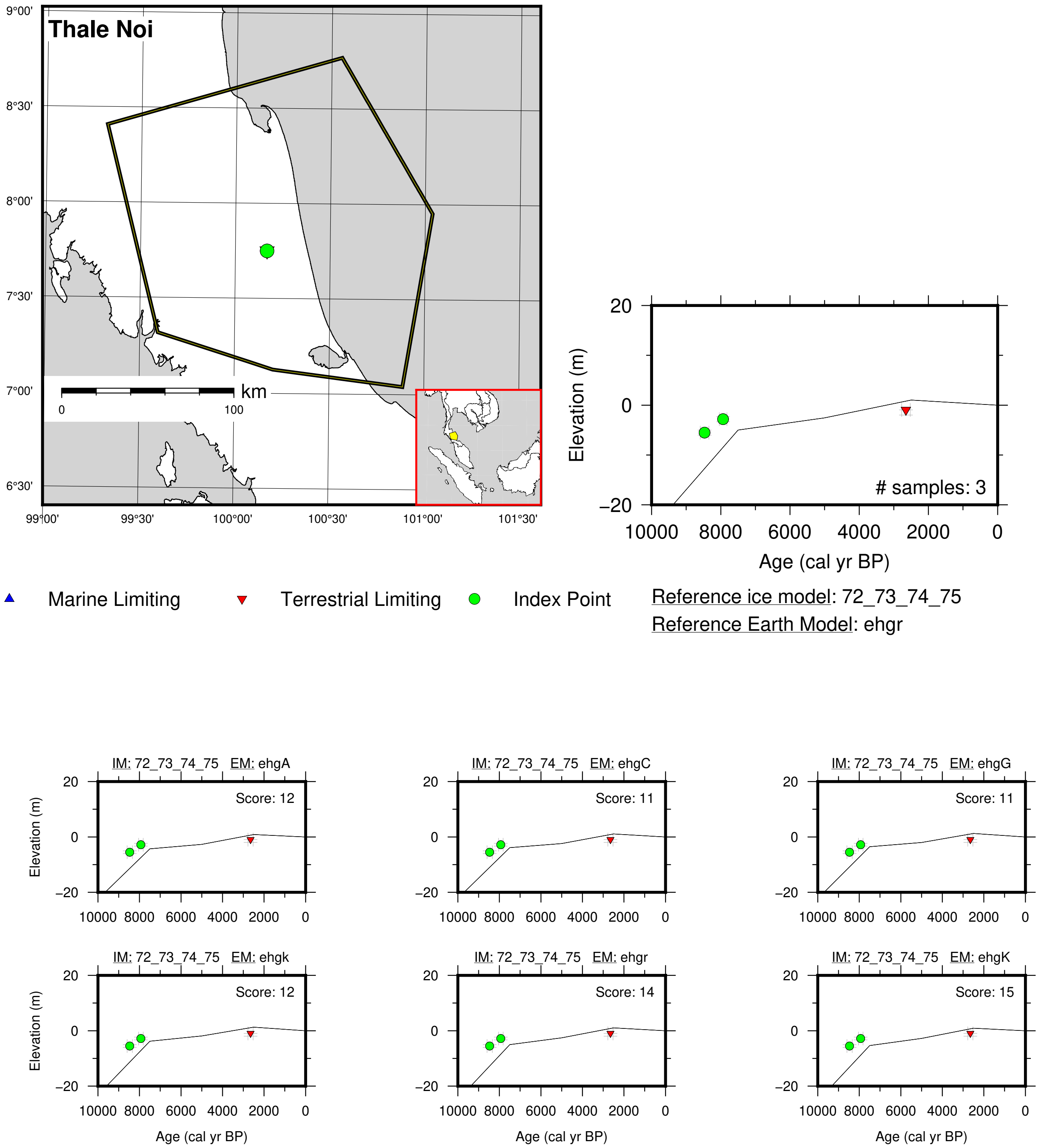


Figure 211: Paleo-sea level and comparison of six models for subregion Sundaland, location Thale Noi.

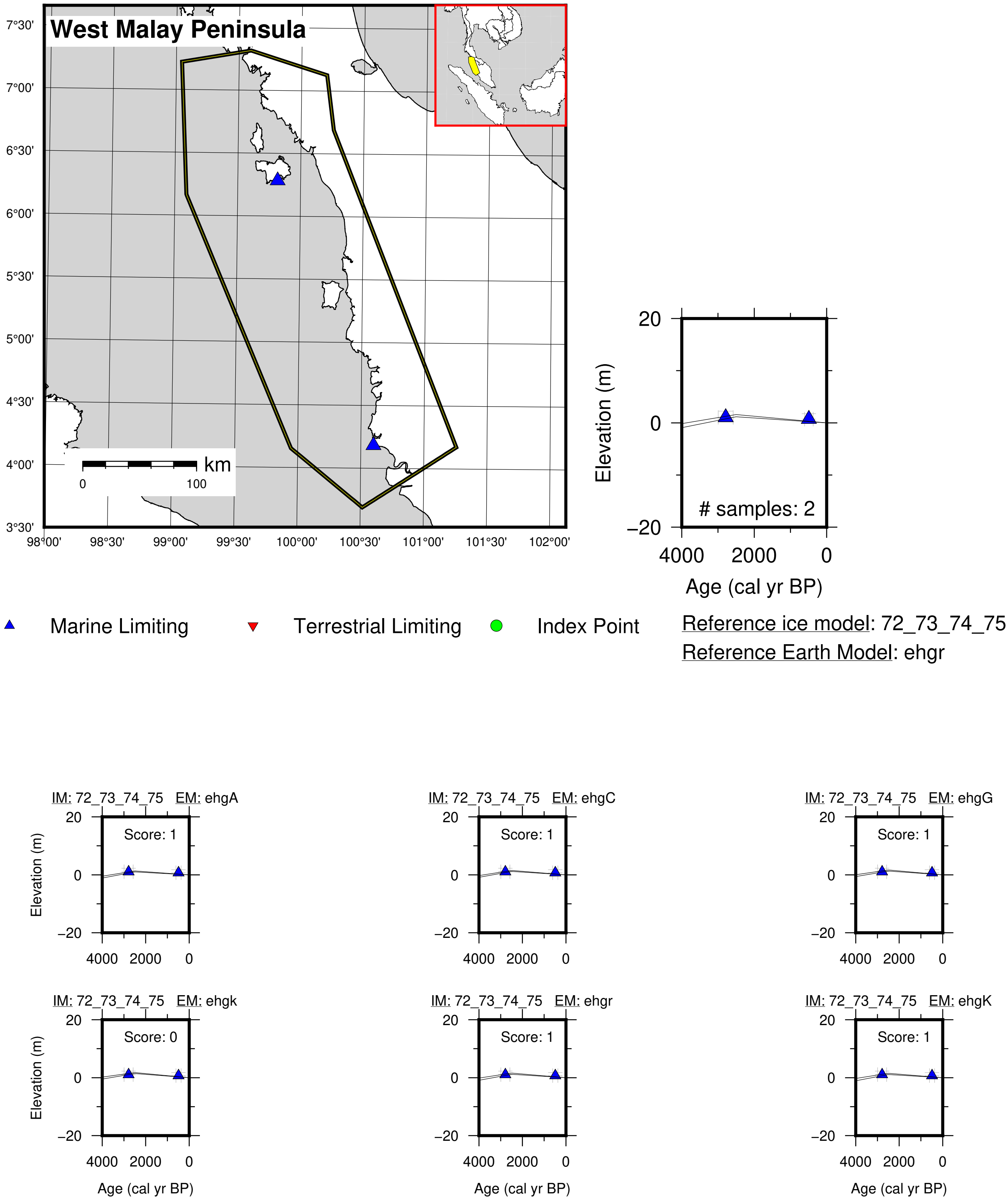


Figure 212: Paleo-sea level and comparison of six models for subregion Sundaland, location West Malay Peninsula.

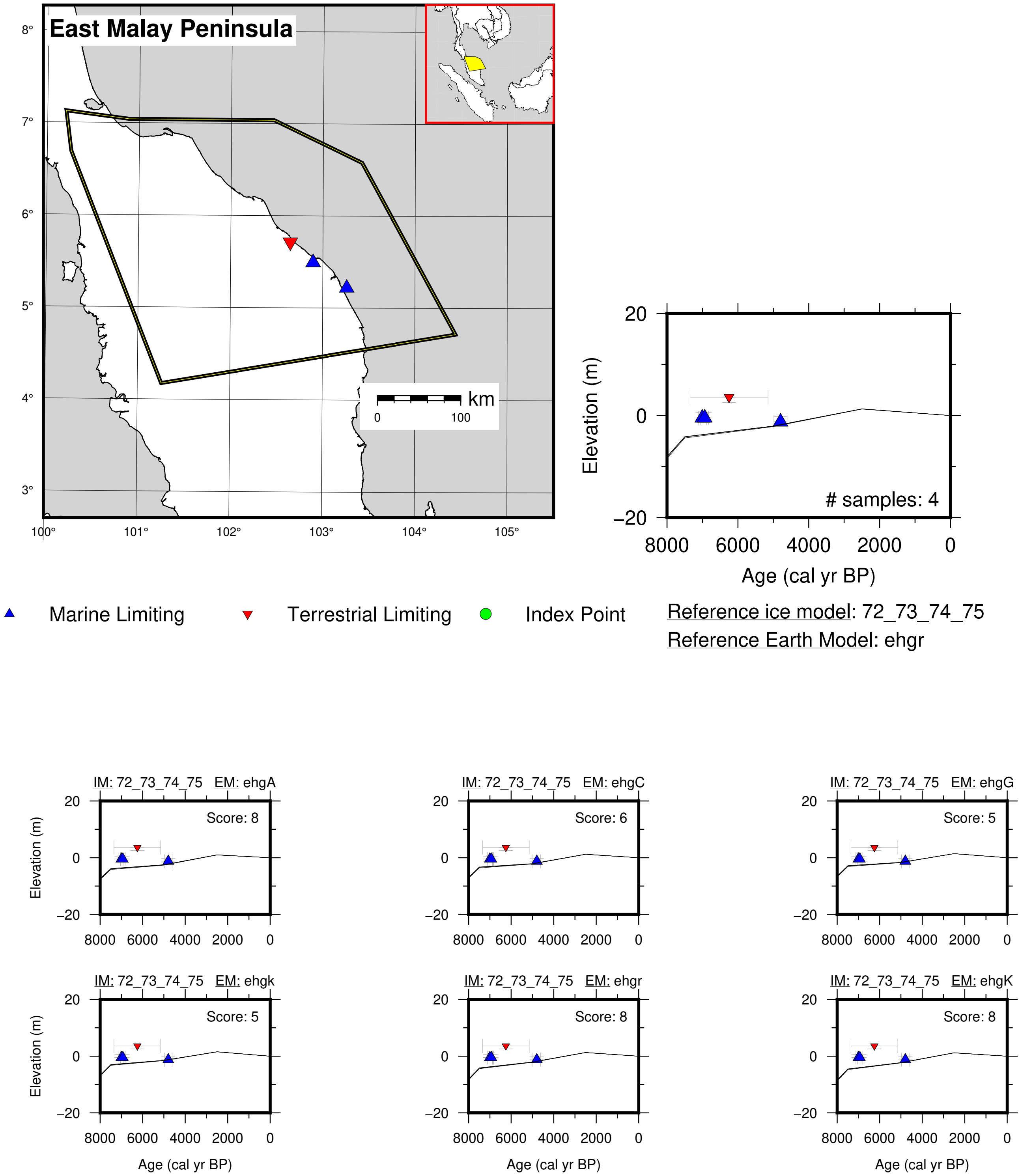


Figure 213: Paleo-sea level and comparison of six models for subregion Sundaland, location East Malay Peninsula.

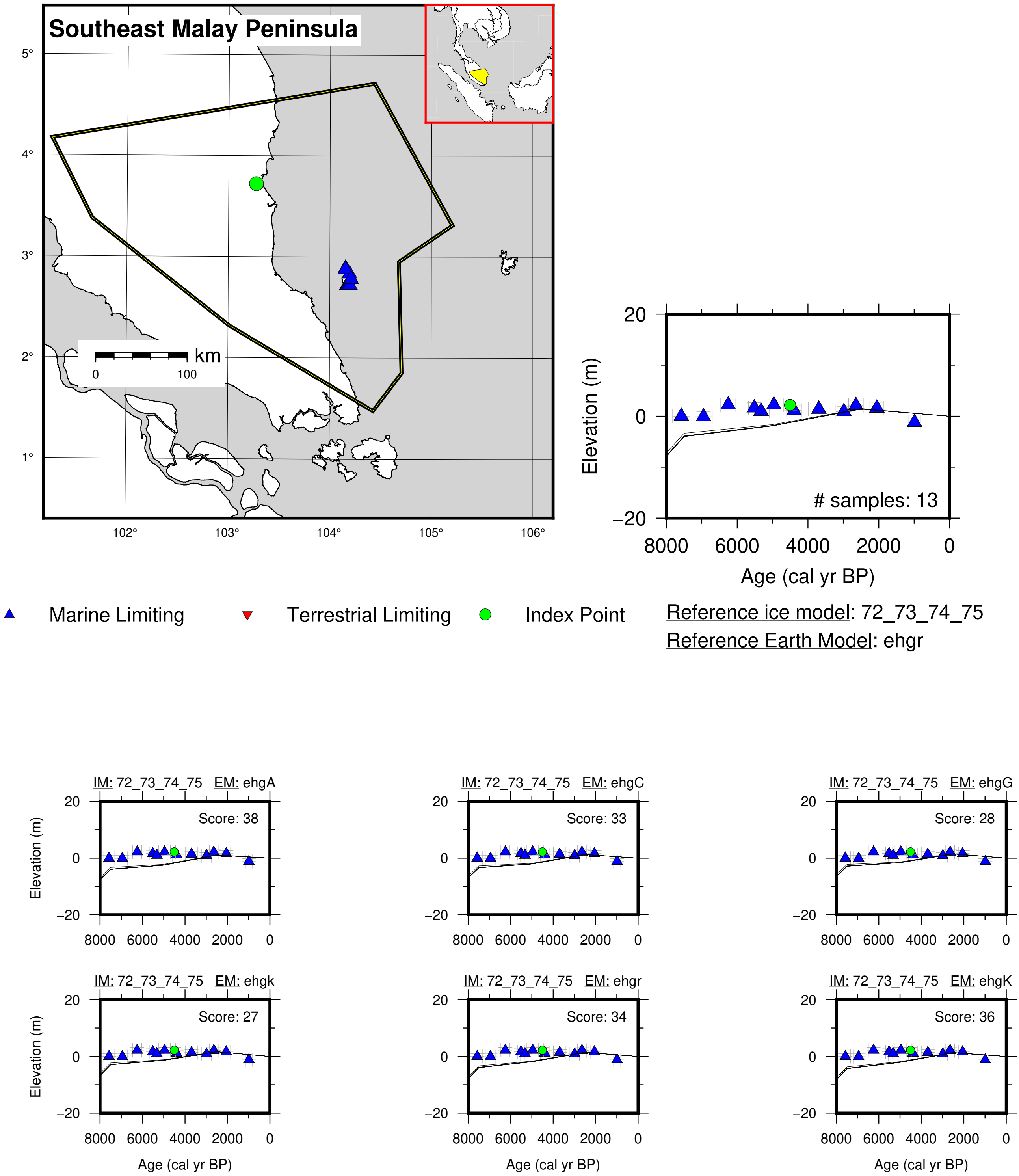


Figure 214: Paleo-sea level and comparison of six models for subregion Sundaland, location Southeast Malay Peninsula.

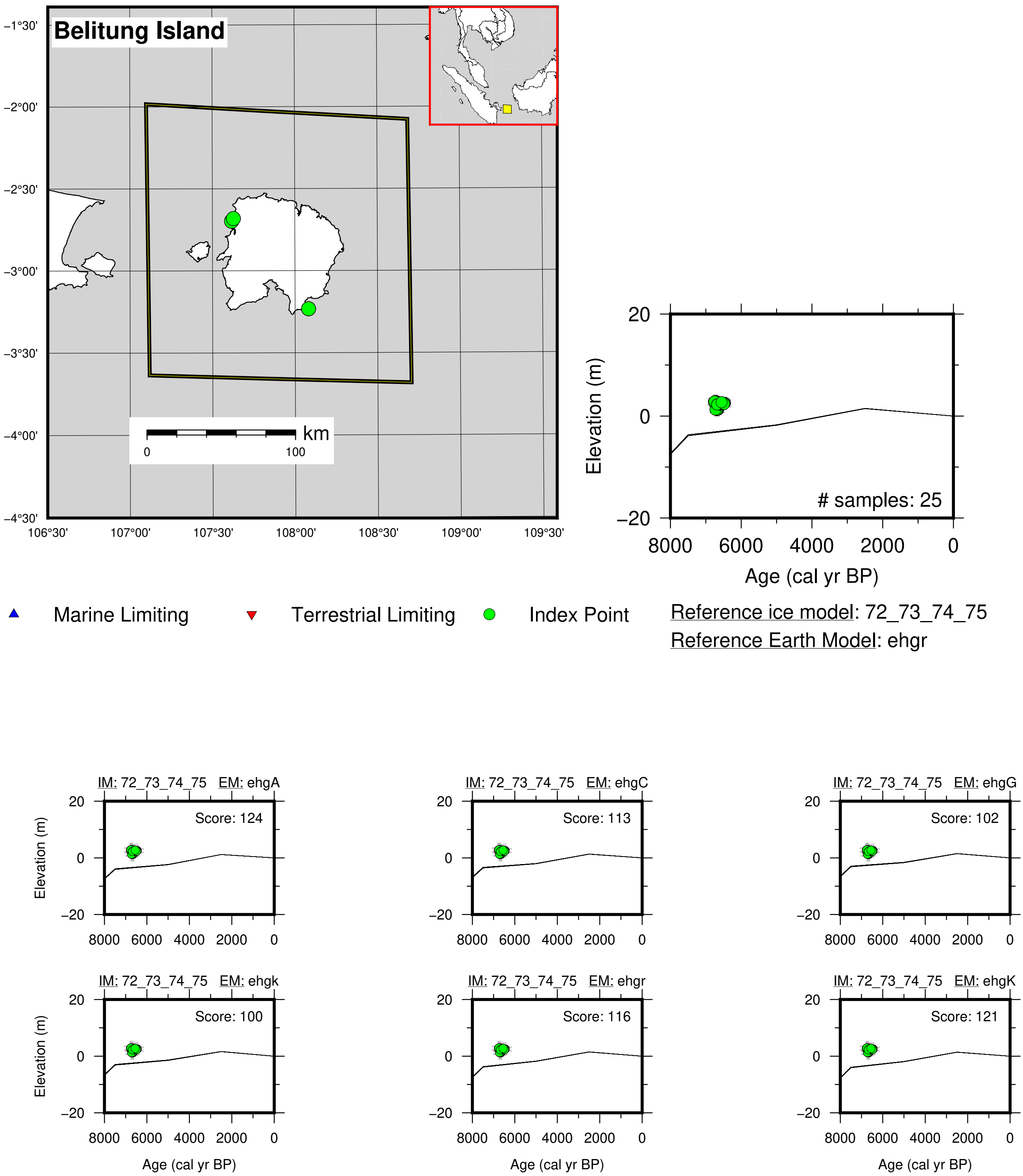


Figure 215: Paleo-sea level and comparison of six models for subregion Sundaland, location Belitung Island.

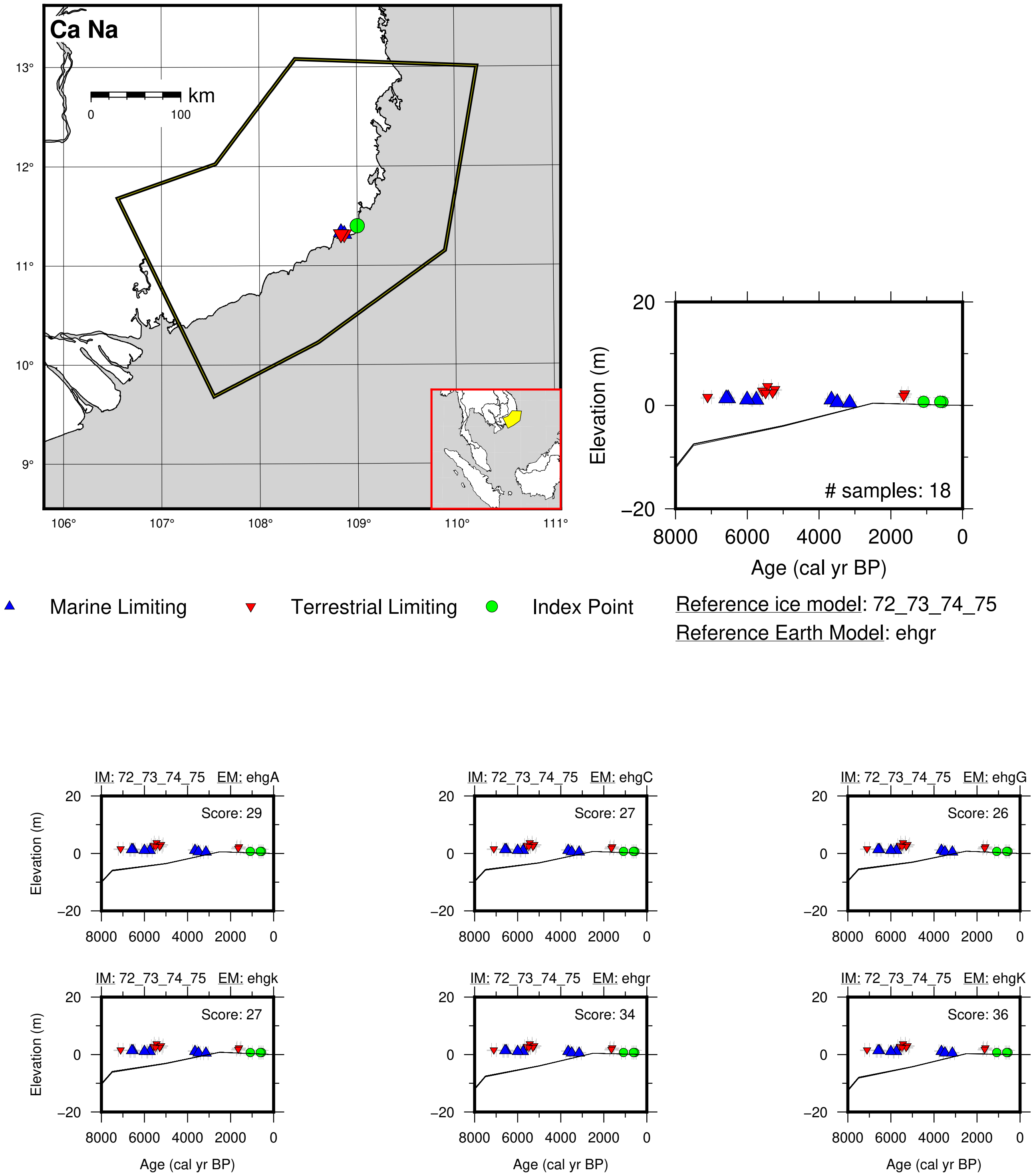


Figure 216: Paleo-sea level and comparison of six models for subregion Sundaland, location Ca Na.

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