SUPPLEMENTAL DATA CAPTIONS

Supplemental Figure 1 – Measured stratigraphic sections in the donga adjacent to the unpaved road that served as travel over Old Wapadsberg Pass (base at S 31° 55.199', E 24° 53.666') and New Wapadsberg Pass along the R61 highway (base at S 31° 55.928', E 24° 52.876') on which siderite-nodule samples were collected for stable-isotope geochemistry. See Prevec et al. (2010) for description of lithofacies.

Supplemental Table 1 – Latest Permian paleosols characterized by Retallack et al. (2003) for the pre-extinction PTB as defined by vertebrate biostratigraphy (Ward et al., 2005). Paleosol features are a compilation of data presented in the text (cross hatched cells), table 1 (black cells), illustrations (gray cells), and GSA Data Repository 2003122 (vertical lined cells). New Wapadsberg Pass Protosols are provided for comparative purposes.

Supplemental Table 2 – Calculated values of Base Loss ((Na, Ca, K, Mg)/Ti), Clayeyness (Al/Si), Mineral Assemblage Stability (Fe/K), Calcification ((Ca+Mg)/Al), Salinization ((K+Na)/Al), and Mineralogical Maturity (Si/Al; Sheldon and Tabor, 2009) for the NWP paleosol profile based on XRF weight percentage values converted to molar abundances.

Supplemental Table 3– CIA-K values calculated from XRF wt% data converted to molar abundance for the present study, compared with the average calculated values for the Elandsberg and Palingkloof members based on data reported by Coney et al. (2007) for their Wapadsberg Pass section. These values assume that the uppermost Elandsberg and lowermost Palingkloof member lithologies are (Zam and Kuta) paleosols as reported by Retallack et al. (2003) for the boundary interval. Bada paleosol, weight-percentage data from GSA data repository 2003122 of Retallack et al. (2003) are presented as soil profile averages for comparison with those reported by Coney et al. (2007) and this contribution. Molecular ratio calculations derived from an Excel spreadsheet template provided by N. Tabor (Southern Methodist University).

Supplemental Table 4 – Trace element data obtained using ICP-OES in ppm for New Wapadsberg Pass paleosol samples, compared with values reported by Coney et al (2007) from across the vertebrate-defined PTB.

Supplemental Table 5 – Trace element data obtained using XRF in ppm for New Wapadsberg Pass paleosol samples, compared with values reported by Coney et al (2007) from across the vertebrate-defined PTB.

	Bada	Du	Hom	Pawa	Som	Zam	NWP
GRAIN SIZE							
Clayey Siltstone				[gray]		[vertical lines]	
Siltstone	[black]	[gray]		[black]	[black]	[black]	[cross hatched]
Sandy Siltstone	[gray]				[gray]	[vertical lines]	[cross hatched]
V.F. Sandstone						[vertical lines]	
F. Sandstone	[vertical lines]		[vertical lines]	[vertical lines]	[vertical lines]	[vertical lines]	
Med Sandstone	[vertical lines]	[vertical lines]	[vertical lines]		[vertical lines]	[vertical lines]	
Sandstone		[black]	[black]		[vertical lines]		
COLOR							
White			[black]				
Light Gray	[black]		[gray]				
Green Gray	[gray]	[vertical lines]	[vertical lines]	[black]	[vertical lines]	[vertical lines]	[cross hatched]
Olive Gray							[cross hatched]
(Light) Blue Gray	[diagonal hatched]	[black]		[gray]	[vertical lines]	[gray]	
Gray Purple					[black]	[black]	
Dark Red Gray					[vertical lines]	[vertical lines]	
NODULES							
Nodules <10	[gray]		[black]		[black]		[cross hatched]
Nodules >10							
SED STRUCTURES							
Relict Beds		[diagonal hatched]		[black]	[gray]	[diagonal hatched]	[cross hatched]
PRECIPITATES							
Calcareous	[vertical lines]	[vertical lines]	[vertical lines]		[vertical lines]		
Evaporites	[vertical lines]		[black]				
BIOLOGICAL							
Rhizoconcretions	[black]		[black]				[cross hatched]
Roots	[diagonal hatched]	[black]	[diagonal hatched]	[diagonal hatched]	[vertical lines]	[black]	[cross hatched]
Burrows				[black]		[black]	

Text	[diagonal hatched]
Table 1	[black]
Figures 5,6	[gray]
Data Repository	[vertical lines]

Supplemental Table 1 – Latest Permian paleosols characterized by Retallack et al. (2003) for the pre- and post-extinction boundary, as defined by vertebrate biostratigraphy (Ward et al., 2005). A complete understanding of the features displayed by each paleosol only can be obtained through a compilation from their text (cross hatched cells), table 1 (black cells), illustrations (gray cells), and GSA Data Repository 2003122 (vertical lined cells). New Wapadsberg Pass paleosol characters are provided for comparative purposes.

	Na/Ti	K/Ti	Ca/Ti	Mg/Ti	(Ca+Mg) / Al	(K+Na)/Al	Al / Si	Si / Al	Fe / K
NWP Claystone	1.19	3.90	1.52	3.59	0.31	0.31	0.18	5.69	0.76
NWP -2 cm	1.31	3.80	1.19	4.29	0.33	0.31	0.17	5.90	0.80
NWP -4 cm	1.88	3.48	1.48	4.39	0.37	0.34	0.15	6.48	0.96
NWP -6 cm	1.69	3.63	1.51	4.59	0.38	0.33	0.16	6.44	1.03
NWP -8 cm	1.68	3.77	1.45	4.80	0.38	0.33	0.17	5.97	0.97
NWP -10 cm	3.17	3.79	2.69	3.37	0.37	0.42	0.14	7.40	0.79
NWP -15 cm	2.74	3.99	3.19	3.65	0.42	0.41	0.14	6.95	0.66
NWP -20 cm	2.37	3.87	2.96	3.55	0.42	0.40	0.15	6.75	0.63
NWP -25 cm	1.19	3.90	1.52	3.59	0.31	0.31	0.18	5.69	0.76
NWP -30 cm	2.42	3.97	3.36	3.77	0.46	0.41	0.15	6.73	0.68
NWP -40 cm	2.47	3.88	2.88	3.82	0.43	0.41	0.15	6.76	0.74
NWP -50 cm	2.12	3.90	2.31	3.93	0.40	0.39	0.15	6.53	0.70
NWP -60 cm	1.20	4.23	1.53	4.65	0.39	0.34	0.16	6.26	0.83
average	1.96	3.85	2.12	4.00	0.38	0.36	0.16	6.43	0.79

Supplemental Table 2 – Calculated values of Base Loss ((Na, Ca, K, Mg)/Ti), Clayeyness (Al/Si), Mineral Assemblage Stability (Fe/K), Calcification ((Ca+Mg)/Al), Salinization ((K+Na)/Al), and Mineralogical Maturity (Si/Al; Sheldon and Tabor, 2009) for the NWP paleosol profile based on XRF weight percentage values converted to molar abundances.

	Wt %				Molar				Molar Ratio	
Sample	Na_2O	AL_2O_3	K_2O	CaO	Na	AL	K	Ca	Al/(Al+Ca +Na+K)	CIA-K
Claystone	0.86	19.62	4.30	1.00	0.01	0.19	0.05	0.02	71.34	85.87
-2 cm	0.92	19.17	4.06	0.76	0.01	0.19	0.04	0.01	72.46	86.88
-4 cm	1.28	17.72	3.62	0.91	0.02	0.17	0.04	0.02	69.74	82.44
-6 cm	1.13	17.68	3.68	0.92	0.02	0.17	0.04	0.02	70.20	83.38
-8 cm	1.16	18.66	3.96	0.91	0.02	0.18	0.04	0.02	70.40	83.99
-10 cm	1.89	16.08	3.44	1.45	0.03	0.16	0.04	0.03	62.92	73.65
-15 cm	1.70	16.84	3.77	1.79	0.03	0.17	0.04	0.03	62.41	73.54
-20 cm	1.58	17.20	3.93	1.79	0.03	0.17	0.04	0.03	63.00	74.61
-25 cm	0.86	19.62	4.30	1.00	0.01	0.19	0.05	0.02	71.34	85.87
-30 cm	1.60	17.02	3.99	2.01	0.03	0.17	0.04	0.04	61.60	73.03
-40 cm	1.65	16.99	3.94	1.75	0.03	0.17	0.04	0.03	62.58	74.26
-50 cm	1.47	17.56	4.11	1.45	0.02	0.17	0.04	0.03	64.90	77.66
-60 cm	0.83	17.97	4.45	0.96	0.01	0.18	0.05	0.02	69.40	85.26
Avg. Palingkloof Mbr.	1.94	15.09	3.15	1.82	0.03	0.15	0.03	0.03	60.4	69.9
Avg. Elandsberg Mbr.	1.59	14.94	3.16	4.08	0.03	0.15	0.03	0.07	52.6	59.8
Avg. Elandsberg Mbr. Bada paleosol	2.48	14.65	3.30	2.25	0.04	0.14	0.03	0.05	55.5	64.2

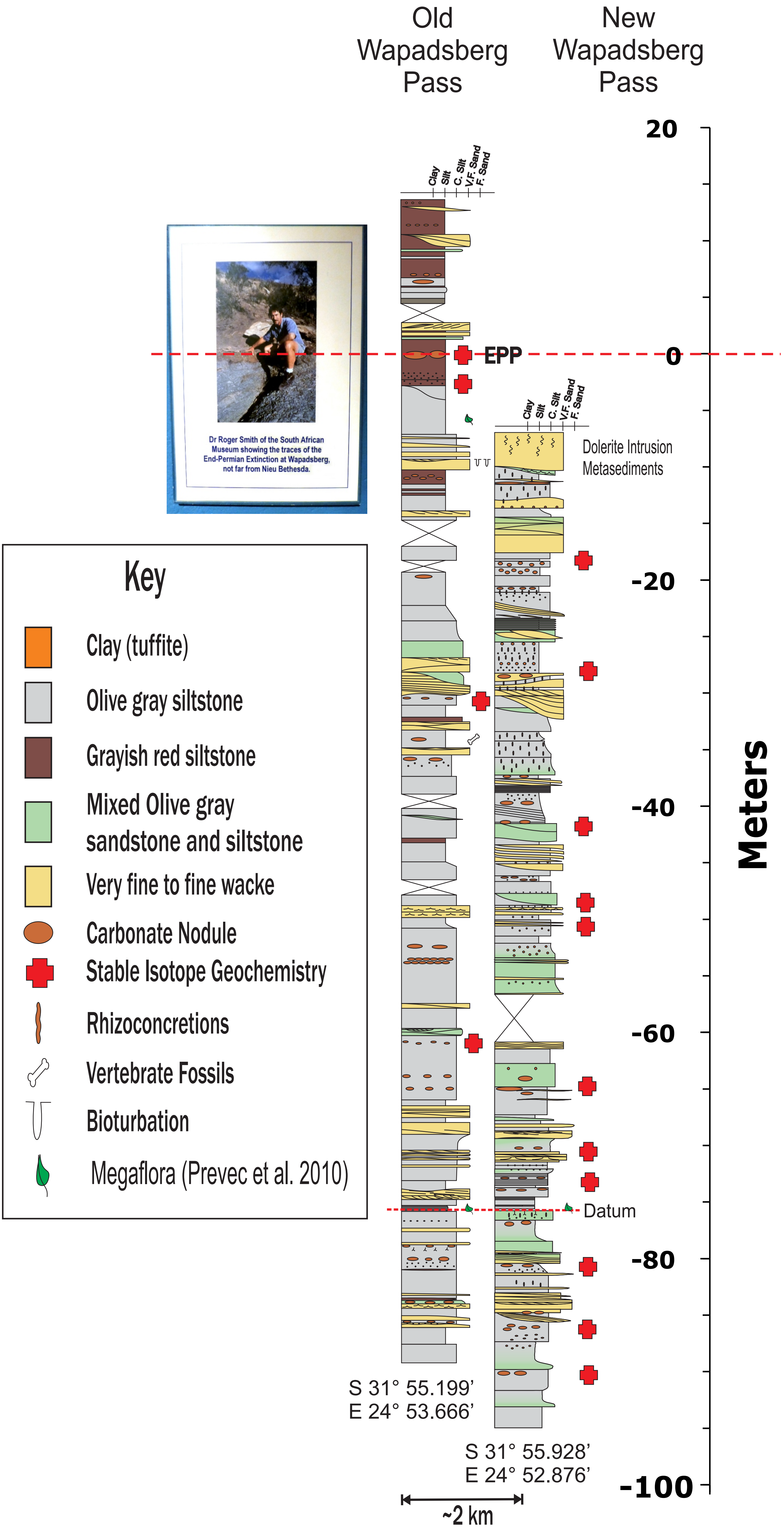
Supplemental Table 3- CIA-K values calculated from XRF wt% data converted to molar abundance for the present study, compared with the average calculated values for the Elandsberg and Palingkloof members based on data reported by Coney et al. (2007) for their Wapadsberg Pass section. These values assume that the uppermost Elandsberg and lowermost Palingkloof member lithologies are (Zam and Kuta) paleosols as reported by Retallack et al. (2003) for the boundary interval. Bada paleosol, weight-percentage data from GSA data repository 2003122 of Retallack et al. (2003) are presented as soil profile averages for comparison with those reported by Coney et al. (2007) and this contribution. Molecular ratio calculations derived from an Excel spreadsheet template provided by N. Tabor (Southern Methodist University).

sample	B	Ba	Be	Co	Cr	Cs	Cu	Ga	Ni	Pb	Sr	V	Zn	Dy	Eu	Gd	La	Nd	Sm	Yb	Li	Ti	Y	Mo
NWPASH	62	857	3	10	61	857	31	15	19	56	369	123	53	5	1	15	57	171	11	2	39	3566	23	13
NWP-2	63	709	3	9	67	709	25	26	27	54	87	107	66	3	0	12	25	139	7	1	46	3585	16	12
NWP-4	55	679	3	16	63	679	19	27	27	45	104	97	73	4	0	13	20	138	7	1	47	3466	18	10
NWP-6	60	712	3	26	64	712	18	24	29	54	103	98	87	5	0	15	21	140	7	1	49	3393	18	10
NWP-8	61	708	4	9	69	708	19	25	32	50	98	111	140	4	0	15	23	138	8	2	54	3537	19	11
NWP-10	74	953	3	38	31	954	24	10	50	49	229	72	122	11	1	14	34	137	9	2	40	2926	23	21
NWP-15	49	740	4	6	36	740	12	17	13	39	206	71	68	5	0	14	39	142	10	2	36	3118	30	8
NWP-20	51	750	4	7	40	751	15	15	14	35	185	76	63	7	0	14	40	157	11	2	39	3377	31	9
NWP-25	55	744	5	20	45	744	20	18	21	41	184	83	76	13	0	16	51	170	12	2	41	3419	34	10
NWP-30	61	803	5	30	46	803	24	20	30	50	202	86	140	11	0	17	50	173	13	3	43	3562	35	10
NWP-40	59	687	4	14	46	687	19	21	26	40	177	86	156	7	0	16	40	155	11	2	42	3372	30	9
NWP-50	56	635	4	7	47	636	15	15	21	46	152	93	126	5	1	14	32	147	9	2	44	3489	26	8
NWP-60	64	667	4	40	59	668	17	17	42	61	89	126	118	6	0	15	35	149	9	2	54	3568	24	9
AVERAGE	59	742	4	18	52	742	20	19	27	48	168	95	99	7	0	15	36	150	10	2	44	3414	25	11
Coney et al. (2007); Avg. Elandsberg Fm		543		10	44		22		18		231	77	84		1.28	7	44	42	7	3			31	
Coney et al. (2007); Avg. Palingkloof Fm		824		11	46		29		16		347	91	86		1.33	7	41	39	7	3			34	

Supplemental Table 4 – Trace element data obtained using ICP-OES in ppm for New Wapadsberg Pass paleosol samples, compared with values reported by Coney et al (2007) from across the vertebrate-defined PTB.

Sample	Ba (PPM)	Cr (PPM)	Zn (PPM)	Sr (PPM)	Y (PPM)	Zr (PPM)	Rb (PPM)	Nb (PPM)
NWP ASH	1015	85	45	431	30	205	201	22
NWP-2	805	76	61	100	22	131	192	17
NWP-4	777	73	65	119	23	128	174	18
NWP-6	758	68	81	116	24	120	173	18
NWP-8	798	84	139	112	24	125	184	20
NWP-10	936	44	96	253	27	275	145	18
NWP-15	816	46	64	218	36	245	163	21
NWP-20	862	50	60	203	36	234	180	23
NWP-25	833	55	72	202	42	221	174	25
NWP-30	827	53	126	206	39	231	180	23
NWP-40	778	58	159	193	35	213	177	24
NWP-50	706	56	123	174	33	225	187	23
NWP-60	772	82	115	101	31	156	218	22
AVERAGE	822	64	93	187	31	193	181	21
Coney et al. (2007); Avg. Elandsberg Fm	543	46	84	231	31	160	146	17
Coney et al. (2007); Avg. Palingkloof Fm	824	44	86	347	34	187	143	18

Supplemental Table 5 – Trace element data obtained using XRF in ppm for New Wapadsberg Pass paleosol samples, compared with values reported by Coney et al (2007) from across the vertebrate-defined PTB.



Old Wapadsberg Pass
New Wapadsberg Pass
Clay
Silt
C. Silt
V.F. Sand
F. Sand
EPP
Dr Roger Smith of the South African Museum showing the traces of the End-Permian Extinction at Wapadsberg, not far from Nieu Bethesda.
Dolerite Intrusion Metasediments
Datum
20
0
-20
-40
-60
-80
-100
Meters
Key
Clay (tuffite)
Olive gray siltstone
Grayish red siltstone
Mixed Olive gray sandstone and siltstone
Very fine to fine wacke
Carbonate Nodule
Stable Isotope Geochemistry
Rhizoconcretions
Vertebrate Fossils
Bioturbation
Megaflora (Prevec et al. 2010)
S 31° 55.199’
E 24° 53.666’
S 31° 55.928’
E 24° 52.876’
~2 km