Supplementary Information

Dealing with intra-individual variability in the analysis of activity patterns from accelerometer data

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Table S1: Sample size and data collection schedule for accelerometer data and direct observations of male (M) and female (F) Alpine ibex in the Gran Paradiso National Park (Italy)

Animal ID	Sex	Period of data collection for activity data	# Days of activity data	Period of data collection for observations	# Hours of observation
22510	M	18/10/2017 - 22/12/2017	65	08/11/2017 - 16/12/2017	78.10
22512	M	19/10/2017 - 22/04/2018	185	10/11/2017 - 18/03/2018	165.18
15716	M	13/05/2015 - 19/09/2015	129	14/05/2015 - 23/07/2015	15.52
15717	M	27/05/2015 - 22/11/2016	545	05/06/2015 - 03/01/2016	74.37
15718	M	13/05/2015 - 30/11/2016	567	06/06/2015 - 04/12/2015	72.37
15720	M	26/05/2015 - 30/11/2016	553	06/06/2015 - 03/01/2016	80.85
15721	M	05/05/2015 - 30/11/2016	574	13/05/2015 - 06/01/2016	65.60
15722	M	26/05/2015 - 14/09/2017	841	03/06/2015 - 16/12/2015	54.88
12293	F	09/05/2014 - 04/01/2016	605	30/05/2014 - 21/10/2014	28.25
12505	F	08/05/2014 - 17/04/2016	709	03/06/2014 - 23/10/2014	29.00
12506	F	13/05/2014 - 07/06/2016	755	31/05/2014 - 23/10/2014	25.58
12507	F	22/04/2014 - 04/04/2016	712	31/05/2014 - 23/10/2014	23.83
12508	F	09/05/2014 - 08/10/2015	517	03/06/2014 - 23/10/2014	15.58
12510	F	08/05/2014 - 22/04/2016	714	02/06/2014 - 22/10/2014	28.83
12511	F	08/05/2014 - 09/03/2016	670	03/06/2014 - 15/10/2014	29.83
12512	F	14/05/2014 - 10/05/2016	727	30/05/2014 - 16/10/2014	18.00
12227	M	06/06/2013 - 17/07/2013	41	/	/
12228	M	22/05/2013 - 08/12/2014	565	/	/
12229	M	15/05/2013 - 04/10/2013	142	/	/
12230	M	28/06/2013 - 24/07/2013	26	/	/
12231	M	22/05/2013 - 12/09/2013	113	/	/
12232	M	09/05/2013 - 17/07/2013	69	/	/
12233	M	28/06/2013 - 25/10/2013	119	/	/
12234	M	07/05/2013 - 02/08/2013	87	/	/
12235	M	06/06/2013 - 17/01/2015	590	/	/
12236	M	07/05/2013 - 16/10/2013	162	/	/

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Table S2: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the monthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.565	0.009	62.46	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.884	8	181.32	<0.001***
s (collar ID)	15.61	17	10.15	<0.001***

Table S3: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the bimonthly temporal scale.

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.569	0.008	72.38	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.909	8	179.5	<0.001***
s (collar ID)	15.364	17	11.92	<0.001***

Table S4: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the seasonal temporal scale.

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.569	0.008	68.37	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.885	8	192.739	<0.001***
s (collar ID)	15.397	17	9.737	<0.001***

Table S5: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the biannual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.566	0.007	82.2	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.892	8	172.97	<0.001***
s (collar ID)	14.812	17	15.09	<0.001***

Table S6: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the annual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.571	0.009	64.8	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.864	8	364.8	<0.001***
s (collar ID)	15.706	17	18.8	<0.001***

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Table S7: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the monthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.241	0.013	18.560	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.856	8	920.97	<0.001***
s (collar ID)	15.979	17	16.91	<0.001***

Table S8: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the bimonthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.244	0.014	17.920	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.848	8	1001.75	<0.001***
s (collar ID)	16.074	17	18.65	<0.001***

Table S9: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the seasonal temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.244	0.013	18.130	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.869	8	914.6	<0.001***
s (collar ID)	16.028	17	18.01	<0.001***

Table S10: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the biannual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.242	0.015	16.090	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.876	8	1293.81	<0.001***
s (collar ID)	16.239	17	19.03	<0.001***

Table S11: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of male Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the annual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.244	0.016	15.140	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.853	8	1653.99	<0.001***
s (collar ID)	16.336	17	20.72	<0.001***

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Table S12: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the monthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.719	0.010	74.620	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.852	8	81.16	<0.001***
s (collar ID)	7.824	8	53.46	<0.001***

Table S13: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the bimonthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.718	0.009	77.200	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.88	8	103.79	<0.001***
s (collar ID)	7.81	8	49.52	<0.001***

Table S14: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the seasonal temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.718	0.009	80.460	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.895	8	114.3	<0.001***
s (collar ID)	7.794	8	44.9	<0.001***

Table S15: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the biannual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.720	0.009	81.170	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.858	8	63.01	<0.001***
s (collar ID)	7.795	8	43.78	<0.001***

Table S16: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the diurnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the annual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.729	0.009	81.25	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.862	8	60.54	<0.001***
s (collar ID)	7.805	8	46.84	<0.001***

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Table S17: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the monthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.210	0.010	22.050	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.775	8	197.84	<0.001***
s (collar ID)	7.745	8	26.53	<0.001***

Table S18: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the bimonthly temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.208	0.010	20.660	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.501	8	189.56	<0.001***
s (collar ID)	7.776	8	30.52	<0.001***

Table S19: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the seasonal temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.209	0.010	20.760	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.580	8	184.71	<0.001***
s (collar ID)	7.775	8	30.45	<0.001***

Table S20: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the biannual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.209	0.010	21.480	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.777	8	221.65	<0.001***
s (collar ID)	7.761	8	29.29	<0.001***

Table S21: Effect of Julian date estimated by the Generalised Additive Mixed Model fitted to predict the nocturnal active time of female Alpine ibex in the Gran Paradiso National Park (Italy) by means of the threshold value determined at the annual temporal scale

Parametric coefficients:

	Estimate	**Std. Error**	**t value**	**Pr(> | t |)**
(Intercept)	0.222	0.012	17.890	<0.001***

Approximate significance of smooth terms:

	edf	**Ref.df**	**F**	**p-value**
s (Julian date)	7.695	8	297.78	<0.001***
s (collar ID)	7.850	8	47.17	<0.001***