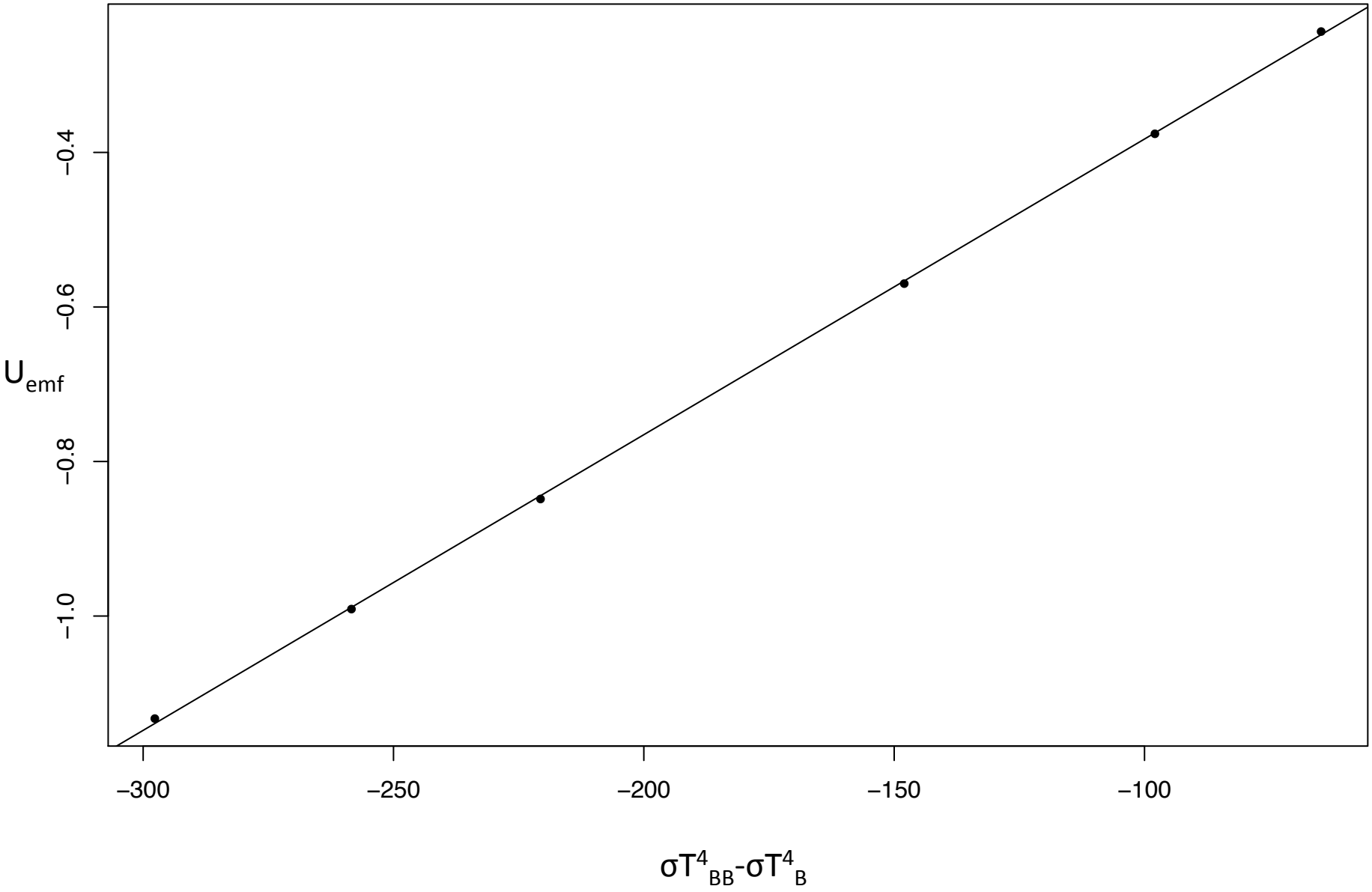
How Stable is the Eppley PIR?

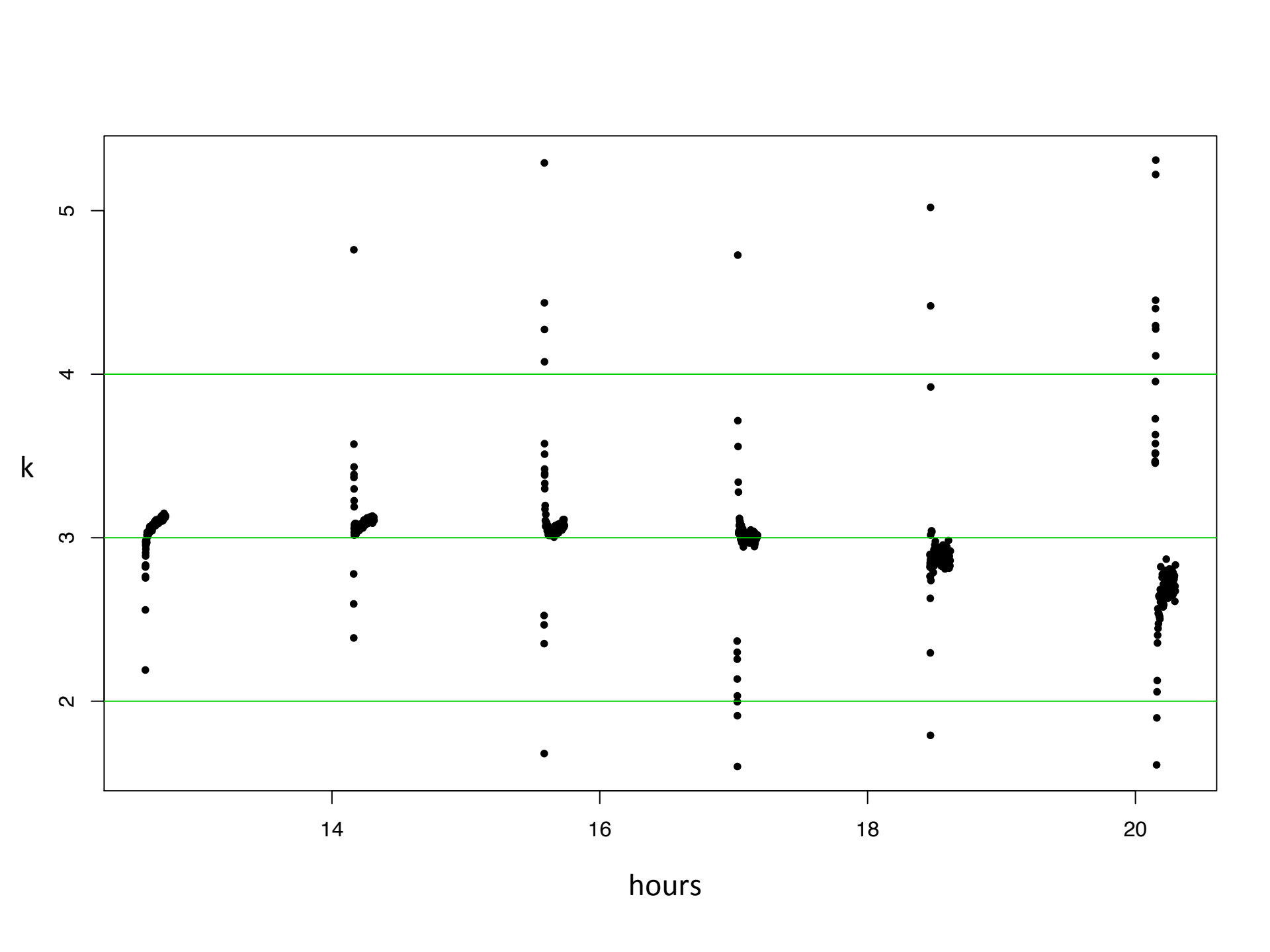
(Broadband Infrared Measurements in ARM)

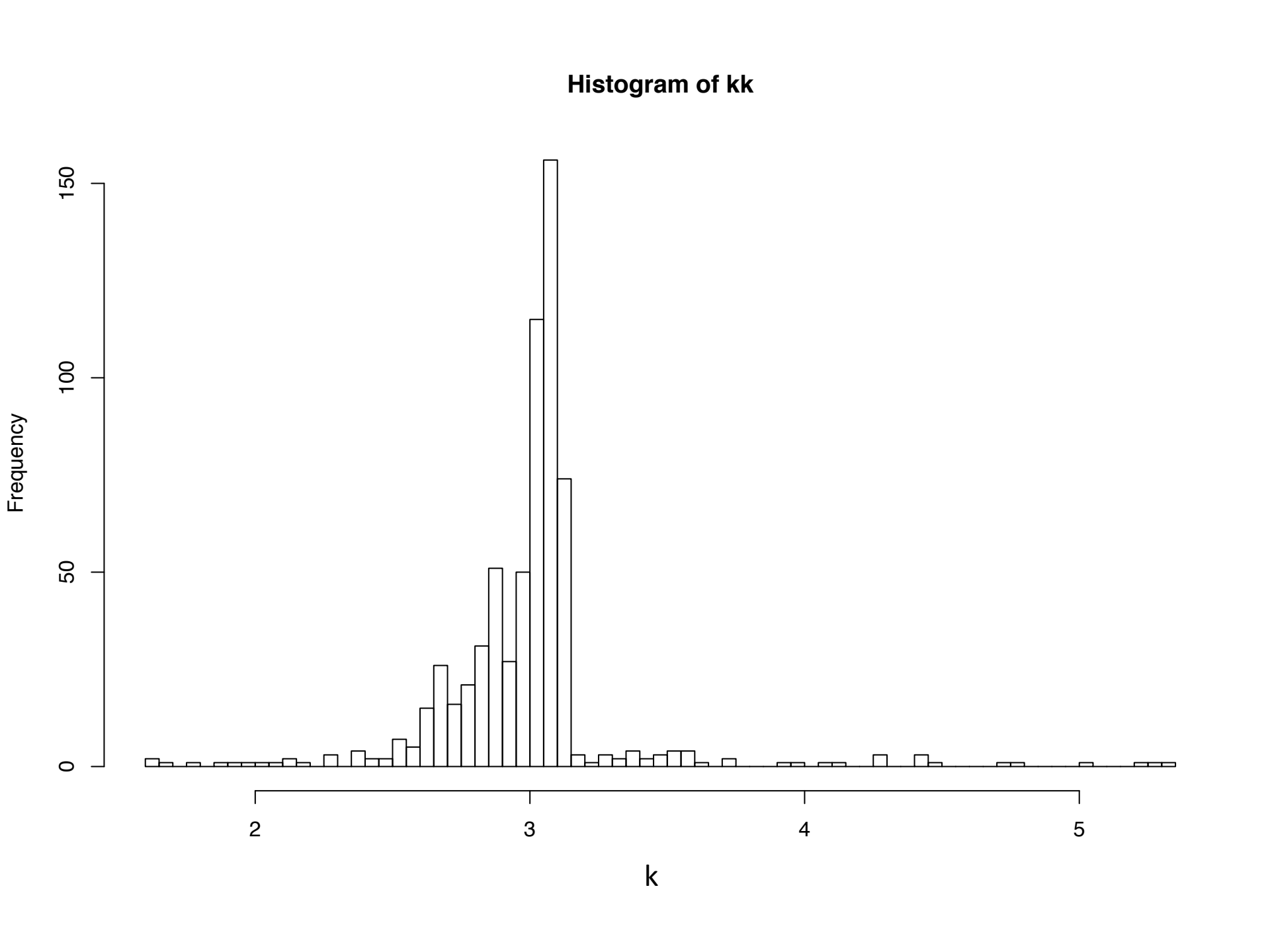
- Blackbody calibrations over 15 year period
- Currently ARM uses Eppley cals with ‘k’ equal to 4 and ‘c’ determined in Eppley blackbody

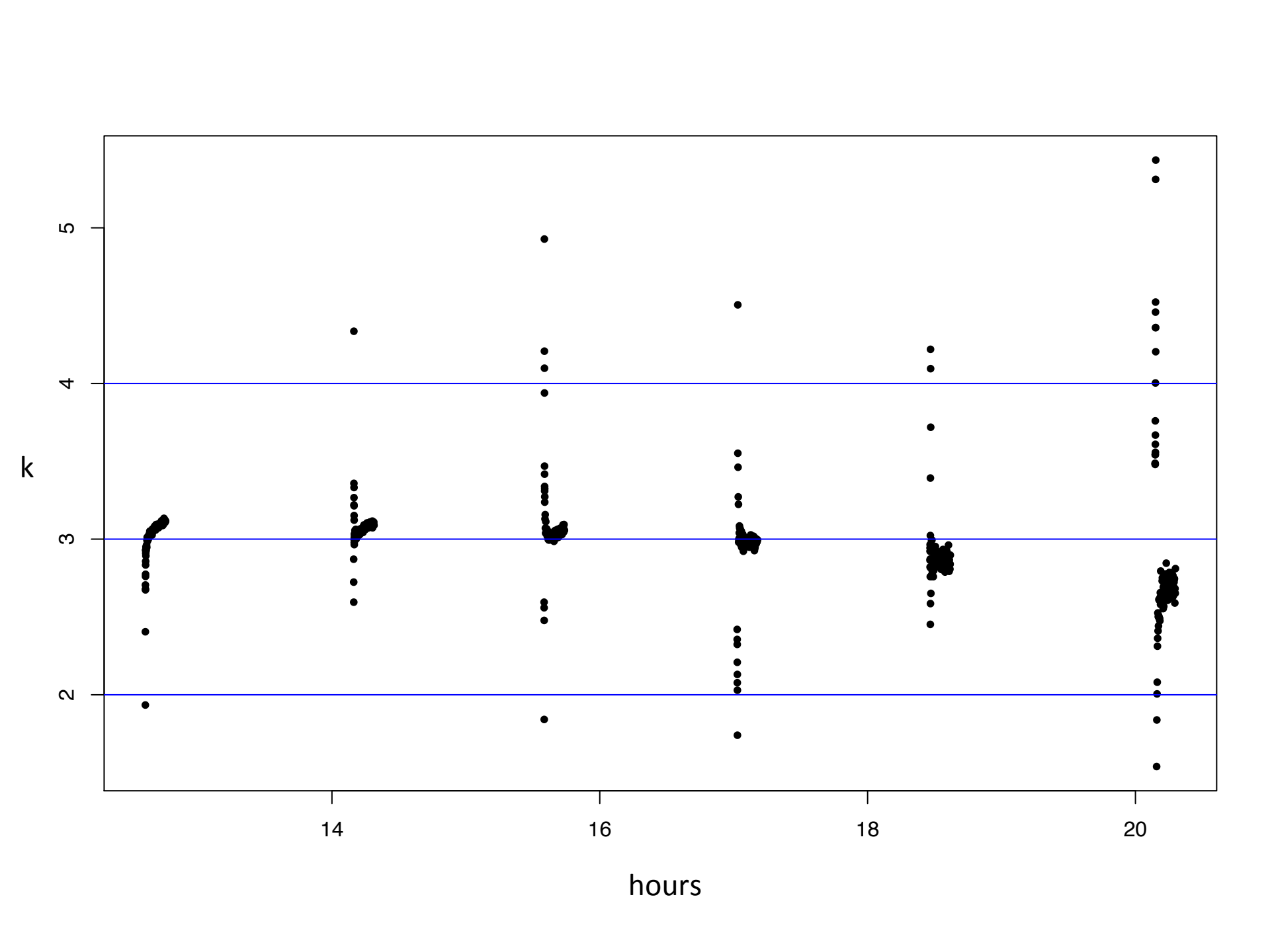
$$\sigma T_{BB}^4 = \frac{U_{emf}}{c} + \sigma T_B^4 - k\sigma(T_D^4 - T_B^4)$$

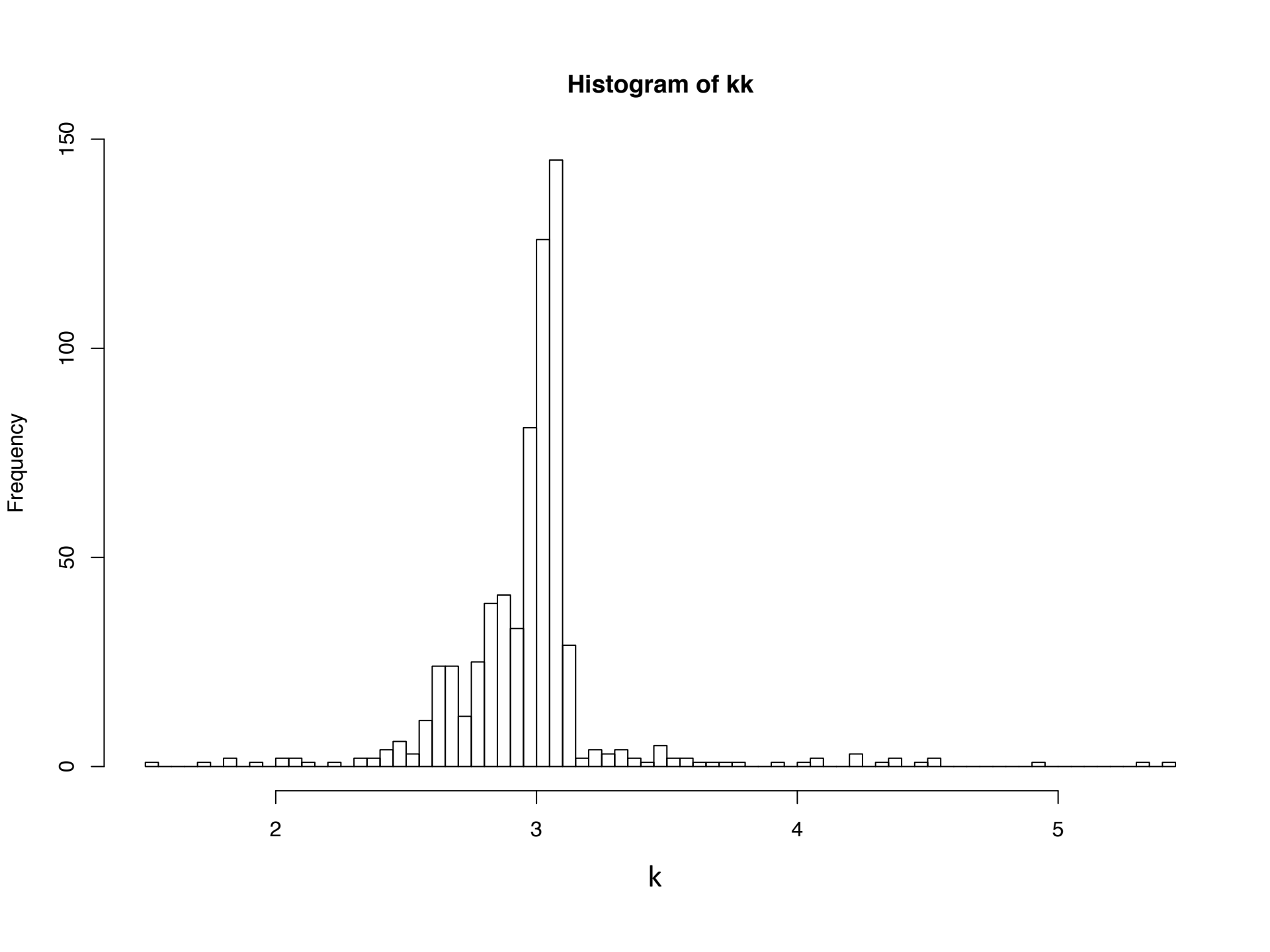
$$c = \frac{U_{emf}}{\sigma(T_{BB}^4 - T_B^4)}$$

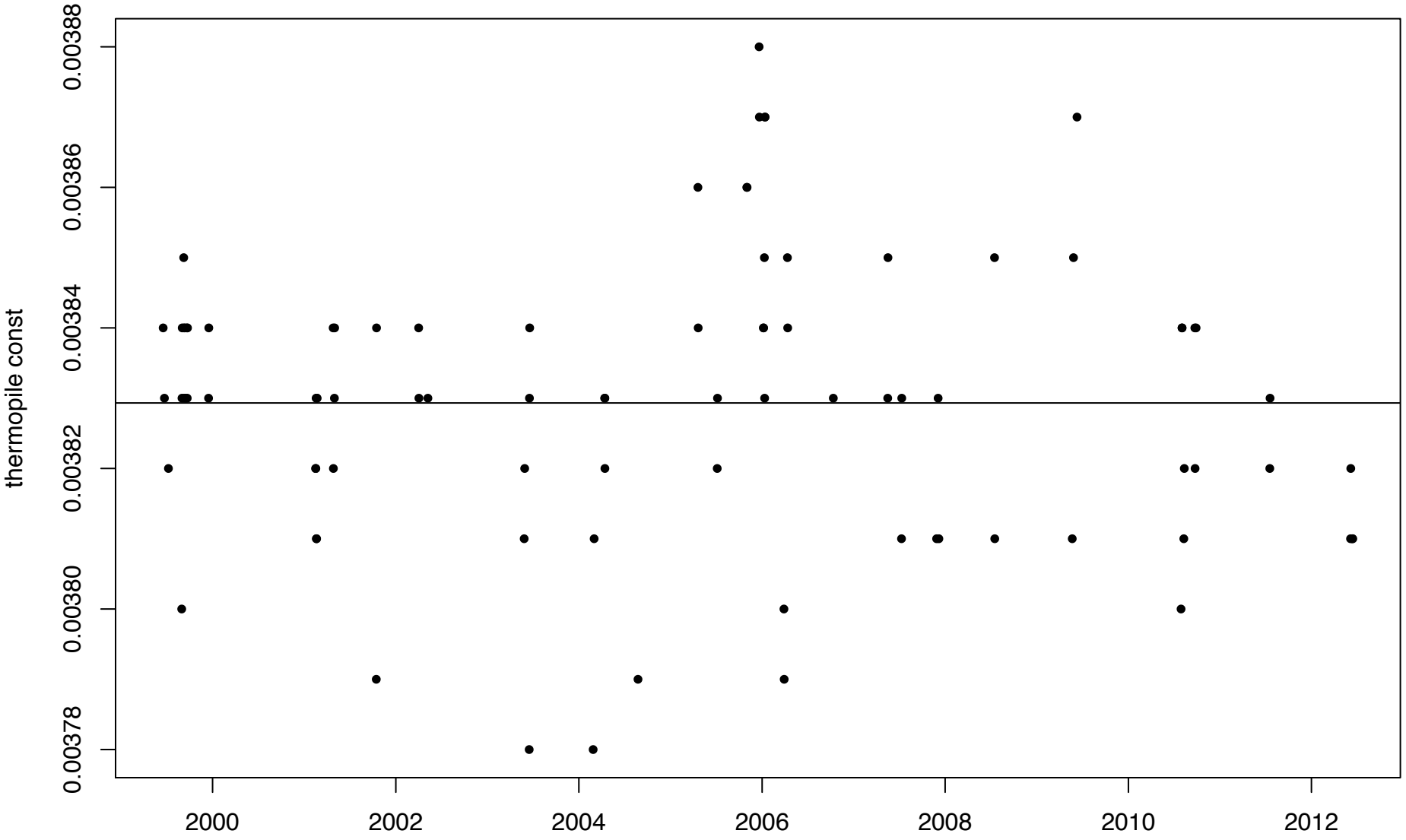

−0.4
−0.6
−0.8
−1.0
U_{emf}
−300
−250
−200
−150
−100
$\sigma T^4_{BB}-\sigma T^4_{B}$

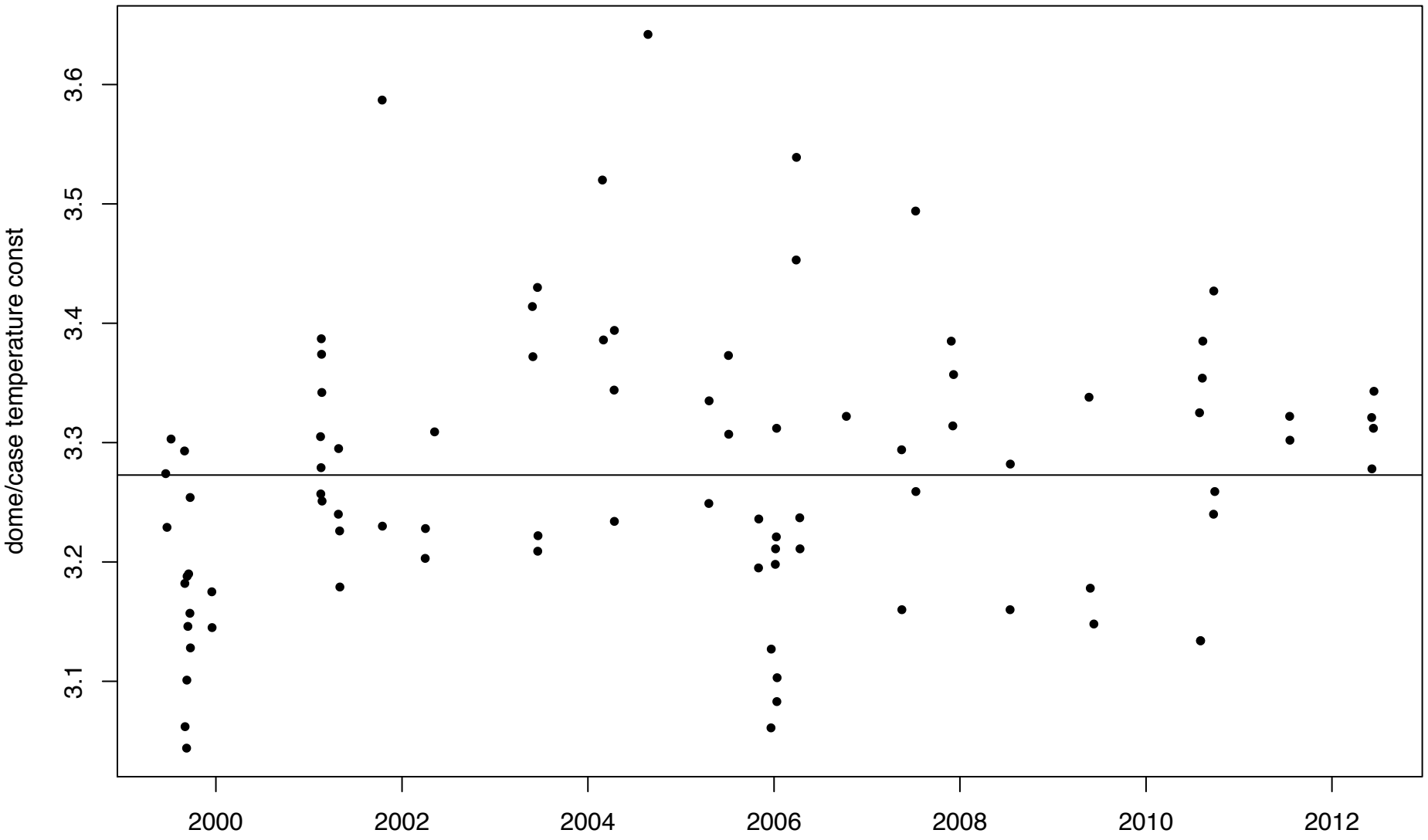

k
5
4
3
2
14
16
18
20
hours

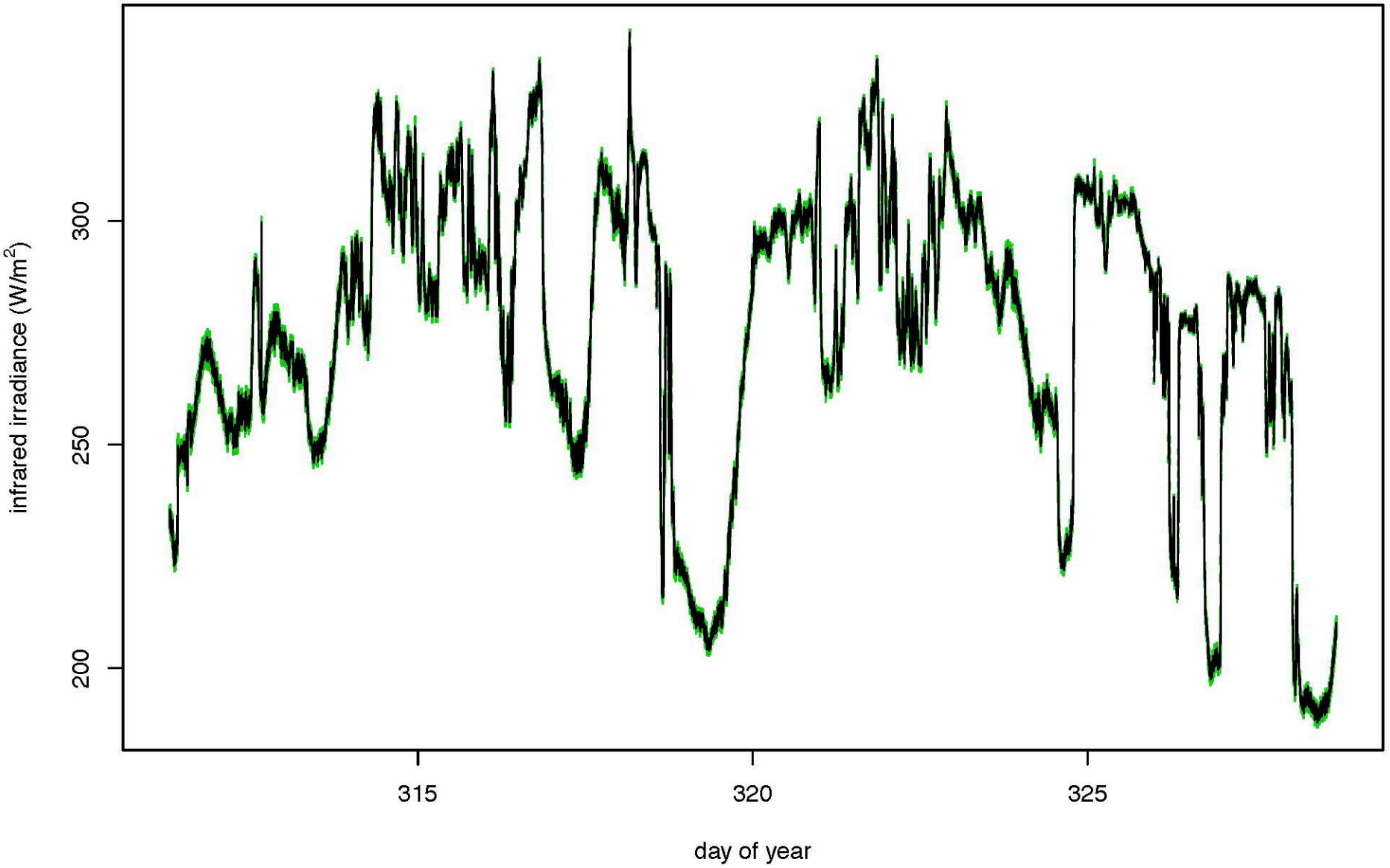

Histogram of kk
Frequency
0
50
100
150
2
3
4
5
k

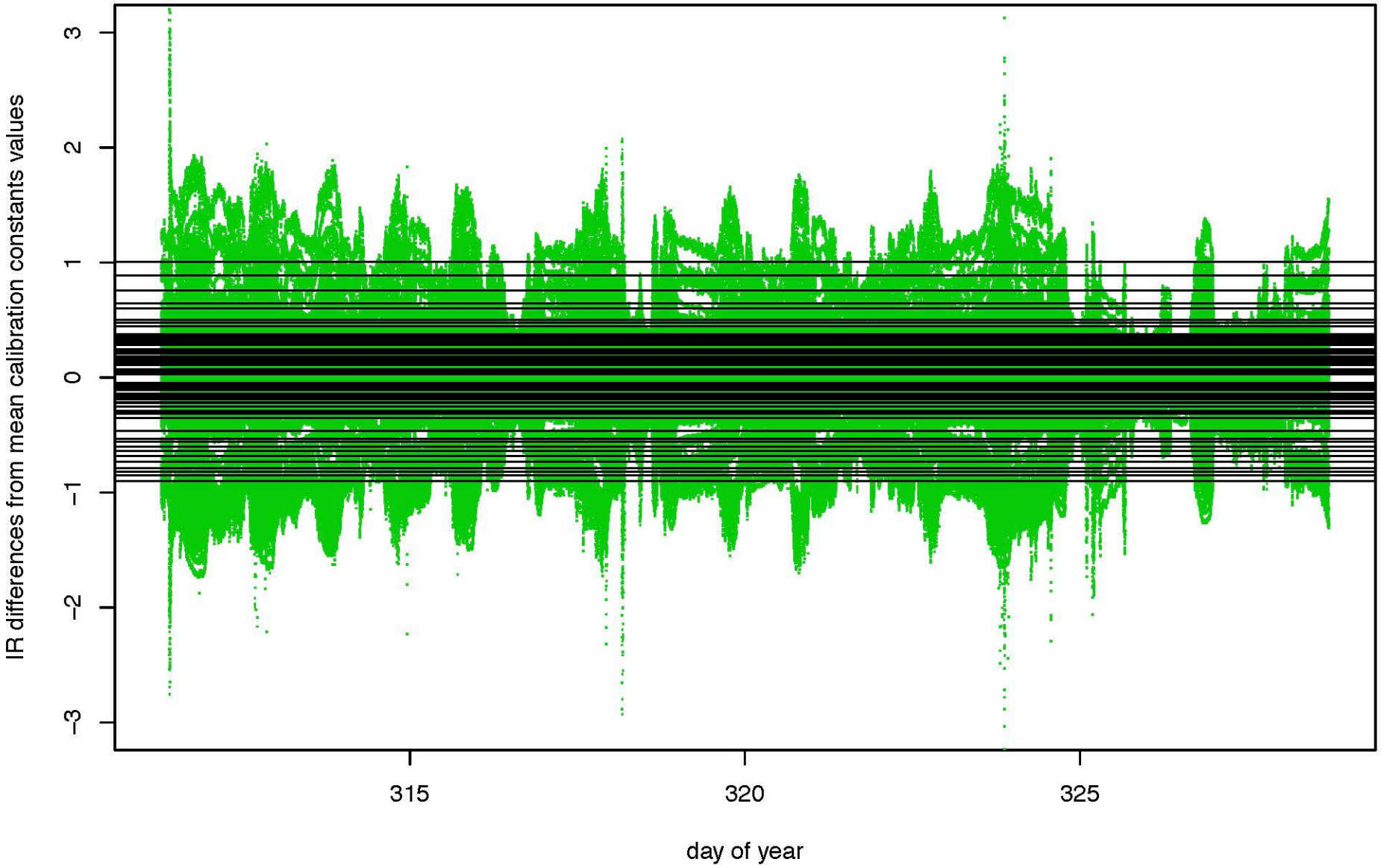

k
2
3
4
5
14
16
18
20
hours


Histogram of kk
Frequency
0
50
100
150
2
3
4
5
k


thermopile const
0.00388
0.00386
0.00384
0.00382
0.00380
0.00378
2000
2002
2004
2006
2008
2010
2012


dome/case temperature const
3.1
3.2
3.3
3.4
3.5
3.6
2000
2002
2004
2006
2008
2010
2012


infrared irradiance (W/m^2)
200
250
300
315
320
325
day of year


IR differences from mean calibration constants values
3
2
1
0
−1
−2
−3
315
320
325
day of year

Station: BAO8 Project: RAD

Ch	Date/time on	Date/time off	Inst	Task	Type
7	29-JUL-1991 20:41:31	8-APR-1993 16:06:30	27415	D_IR	PYRGEOMETER
10	30-JUL-2001 10:18:31	26-FEB-2004 16:52:30	27415	U_IR	PYRGEOMETER

Station: BERM Project: RAD

Ch	Date/time on	Date/time off	Inst	Task	Type
10	11-SEP-2007 14:11:31	24-MAY-2010 12:35:30	27415	D_IR	PYRGEOMETER

Station: KWAJ Project: RAD

Ch	Date/time on	Date/time off	Inst	Task	Type
4	1-NOV-1993 12:00:31	16-APR-1996 17:02:30	27415	D_IR	PYRGEOMETER

Station: BRW Project: RAD

Ch	Date/time on	Date/time off	Inst	Task	Type
2	24-JUL-2009 22:00:31	18-AUG-2011 23:46:30	27415	D_IR	PYRGEOMETER

Station: SKAG Project: RAD

Ch	Date/time on	Date/time off	Inst	Task	Type
2	13-APR-1999 16:24:31	28-JAN-2000 18:32:30	27415	D_IR	PYRGEOMETER
6	29-JUL-2008 15:15:31	5-MAR-2009 23:40:30	27415	D_IR2	PYRGEOMETER
6	28-MAY-2009 00:00:31	3-JUN-2009 19:28:30	27415	D_IR2	PYRGEOMETER

Station: THD Project: RAD

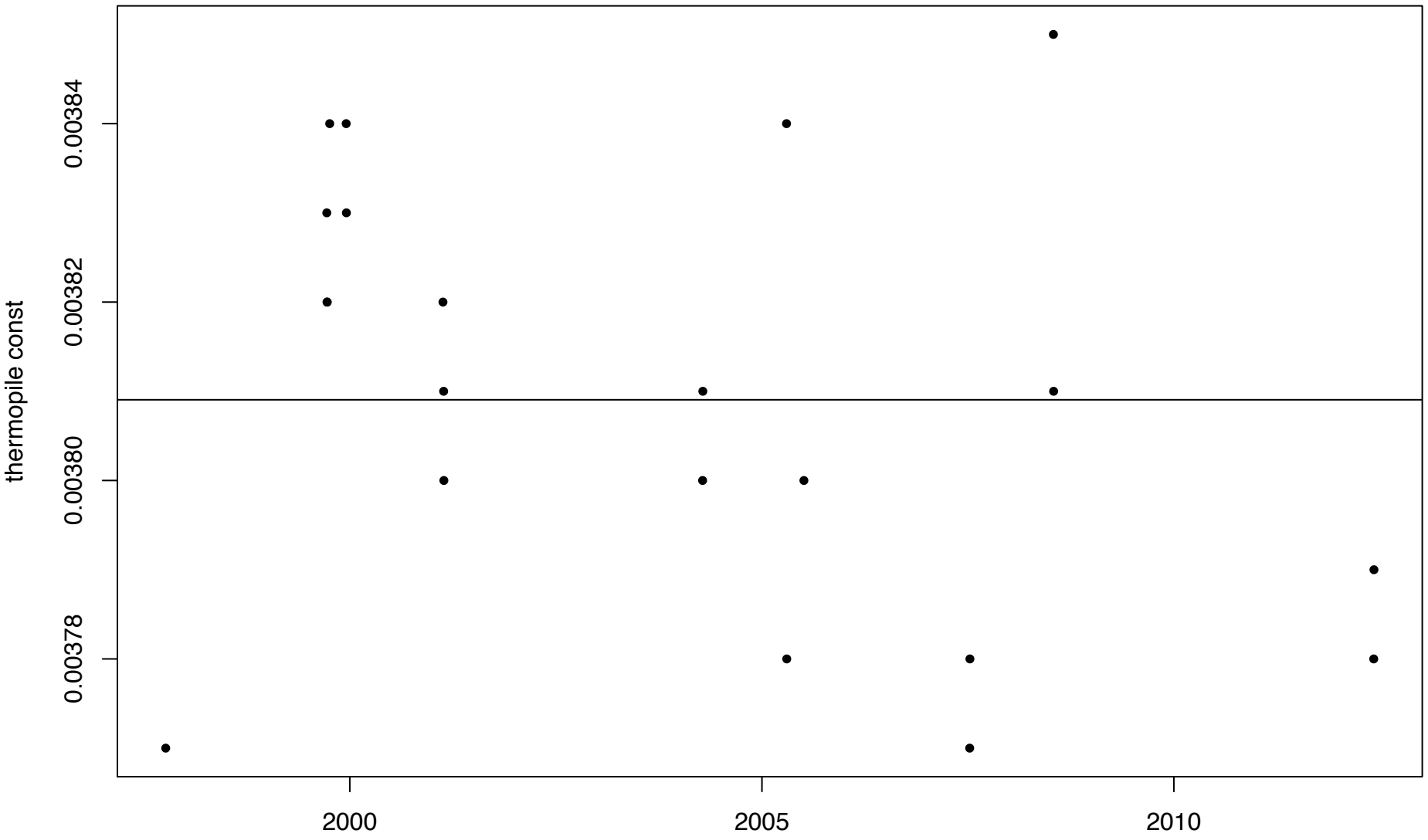
Ch	Date/time on	Date/time off	Inst	Task	Type
12	9-JAN-2006 19:03:31	23-MAY-2006 18:46:30	27415	D_IR	PYRGEOMETER

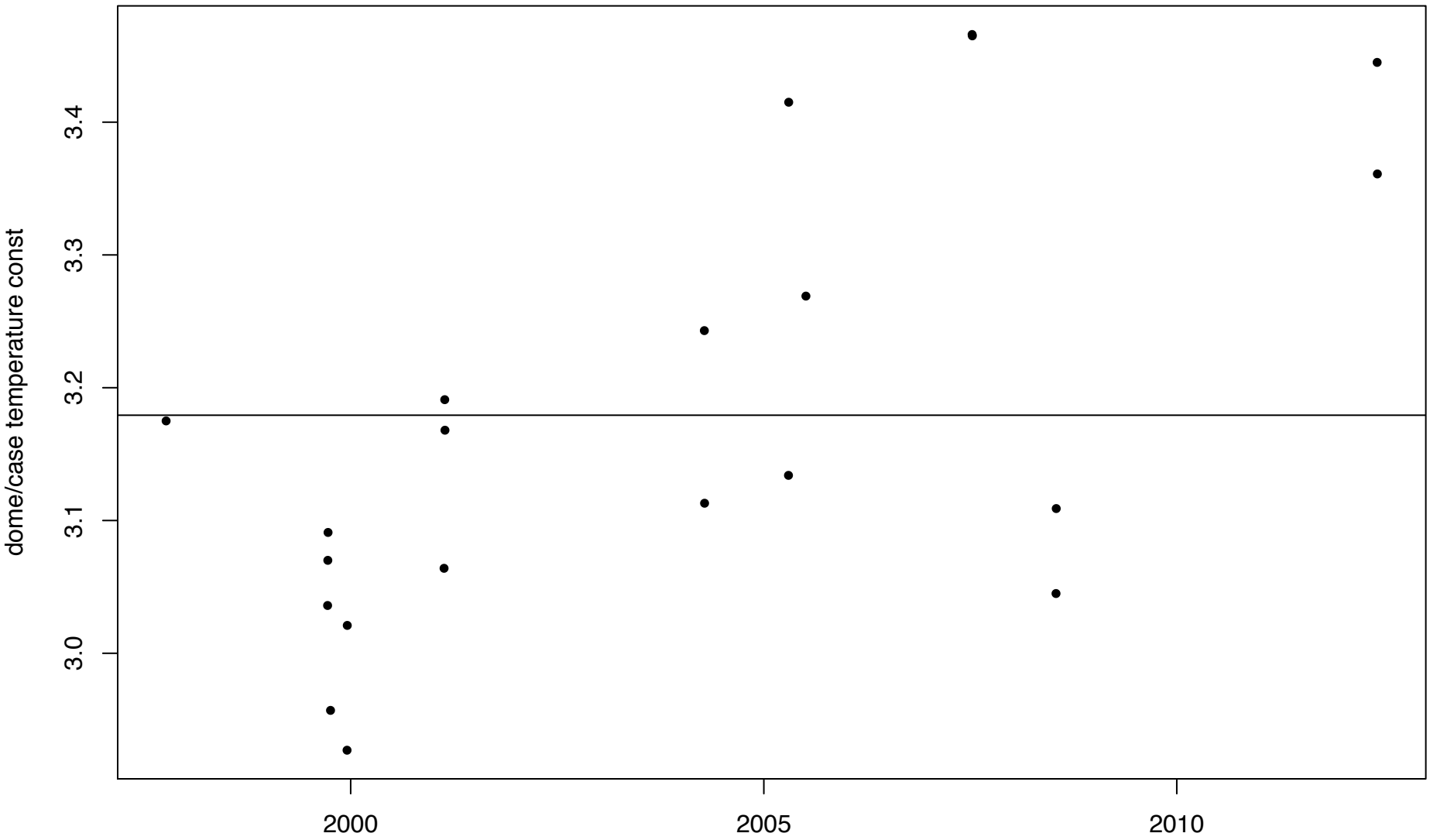
Station: NENA Project: RAD

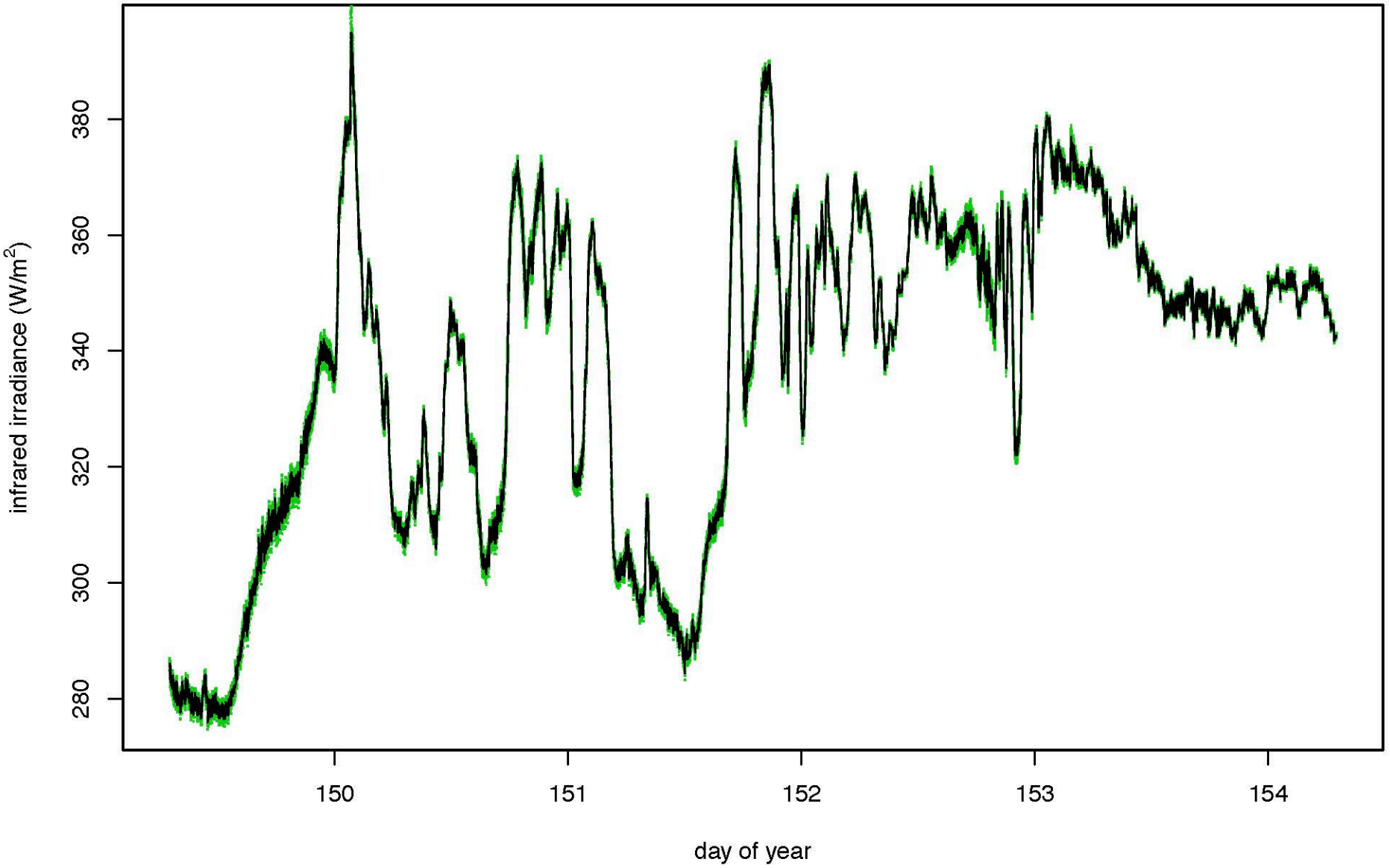
Ch	Date/time on	Date/time off	Inst	Task	Type
2	27-MAY-2004 05:59:30	25-JUN-2004 00:00:00	27415	D_IR	PYRGEOMETER
2	28-JUN-2004 16:39:30	14-AUG-2004 17:06:30	27415	D_IR	PYRGEOMETER

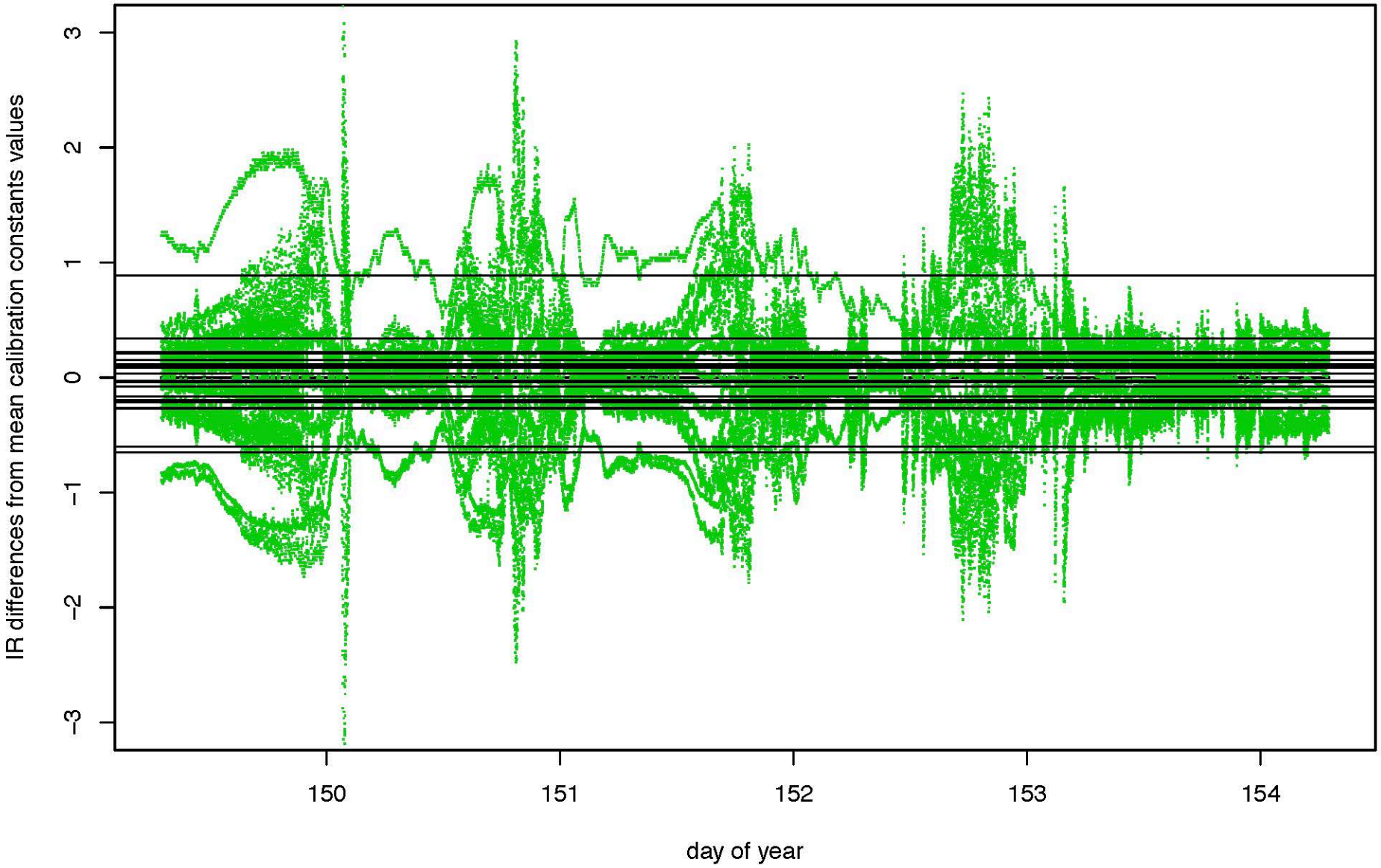
Station: SUM Project: RAD2

Ch	Date/time on	Date/time off	Inst	Task	Type
3	16-AUG-2013 23:59:31		27415	D_IR	PYRGEOMETER


thermopile const
0.00384
0.00382
0.00380
0.00378
2000
2005
2010


dome/case temperature const
3.0
3.1
3.2
3.3
3.4
2000
2005
2010


infrared irradiance (W/m^2)
280
300
320
340
360
380
150
151
152
153
154
day of year


IR differences from mean calibration constants values
3
2
1
0
−1
−2
−3
150
151
152
153
154
day of year