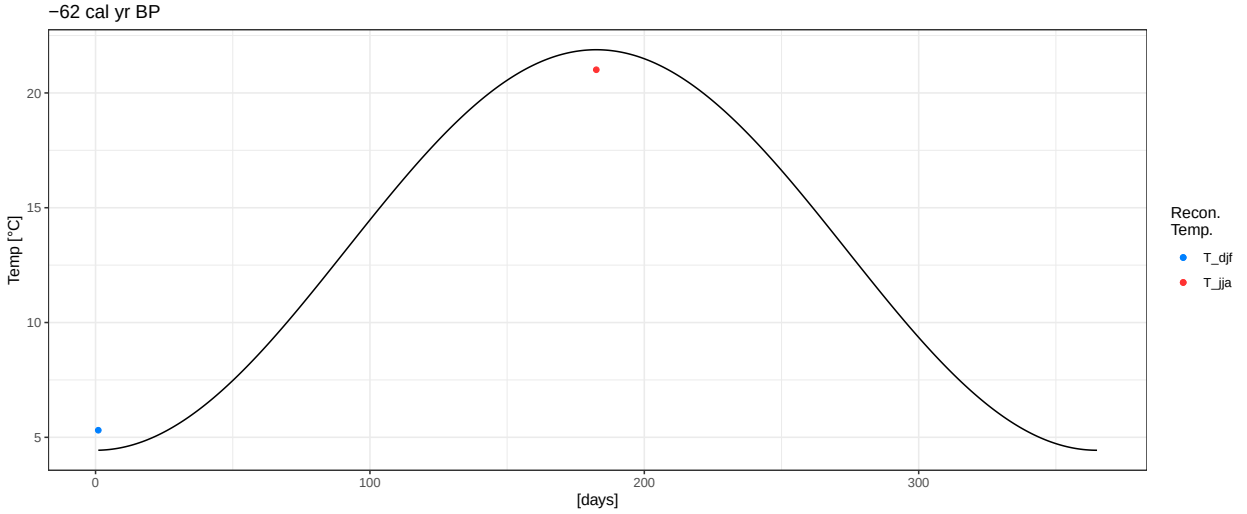
Padul Data: MI and Precip. corrections

New corrections

Calculate temperature anomalies

Using both T_{djf} and T_{jja} for each record, a sinusoidal curve was fitted using the `int_sin` function.

```
padul <- padul %>%
  dplyr::mutate(Tmean = (T_jja + T_djf) / 2,
                Tmax = Tmean + (T_jja - Tmean) / 0.9,
                Tmin = Tmean + (T_djf - Tmean) / 0.9)
```



Row 1 was used as the baseline to calculate the temperature anomalies.

```
padul %>%
  dplyr::slice(1) %>%
  knitr::kable()
```

Age (cal yr BP)	MI	P_ann	T_djf	T_jja	Tmean	Tmax	Tmin
-62	0.425809	458.807	5.30846	21.0099	13.15918	21.8822	4.436158

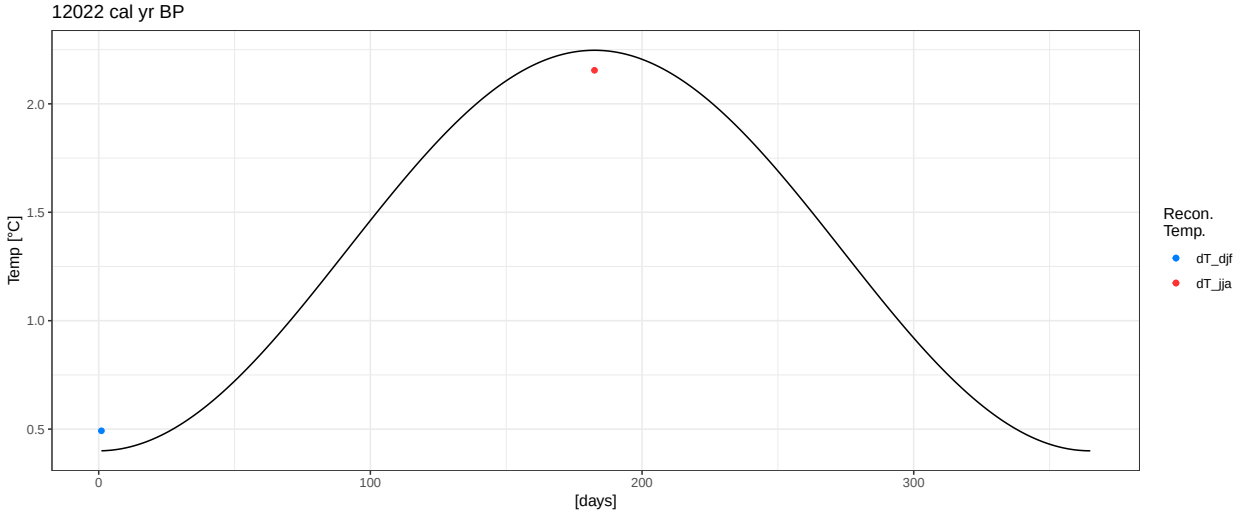
where

$$T_{\text{mean}} = (T_{\text{jja}} + T_{\text{djf}})/2$$
$$T_{\text{max}} = T_{\text{mean}} + (T_{\text{jja}} - T_{\text{mean}})/0.9$$
$$T_{\text{min}} = T_{\text{mean}} + (T_{\text{djf}} - T_{\text{mean}})/0.9$$

```
padul_anomalies <- seq_len(nrow(padul)) %>%
  purrr::map(~codos::int_sin(padul$Tmin[.x] - padul$Tmin[1],
                             padul$Tmax[.x] - padul$Tmax[1]))
```

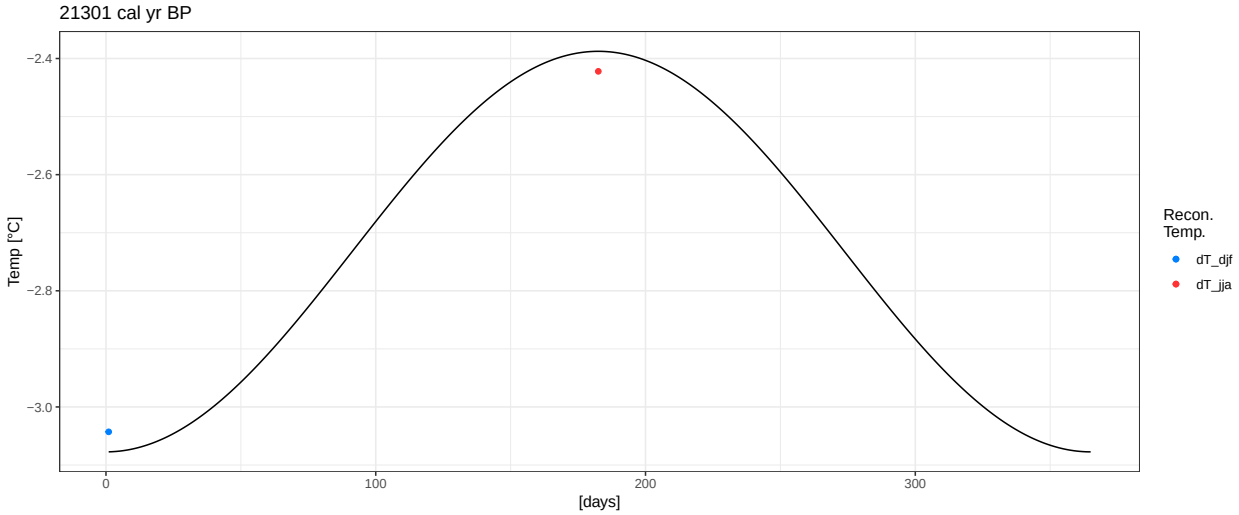
Padul: Anomaly for age = 12022 cal yr BP

Age (cal yr BP)	MI	P_ann	T_djf	T_jja	Tmean	Tmax	Tmin
-62	0.425809	458.807	5.30846	21.0099	13.159180	21.882202	4.4361578
12022	0.465376	479.259	5.80075	23.1646	14.482675	24.129258	4.8360917
			0.49229	2.1547	1.323495	2.247056	0.3999339



Padul: Anomaly for age = 21301 cal yr BP

Age (cal yr BP)	MI	P_ann	T_djf	T_jja	Tmean	Tmax	Tmin
-62	0.425809	458.807	5.30846	21.0099	13.159180	21.882202	4.436158
21301	0.430404	500.945	2.26559	18.5878	10.426695	19.494589	1.358801
			-3.04287	-2.4221	-2.732485	-2.387613	-3.077357



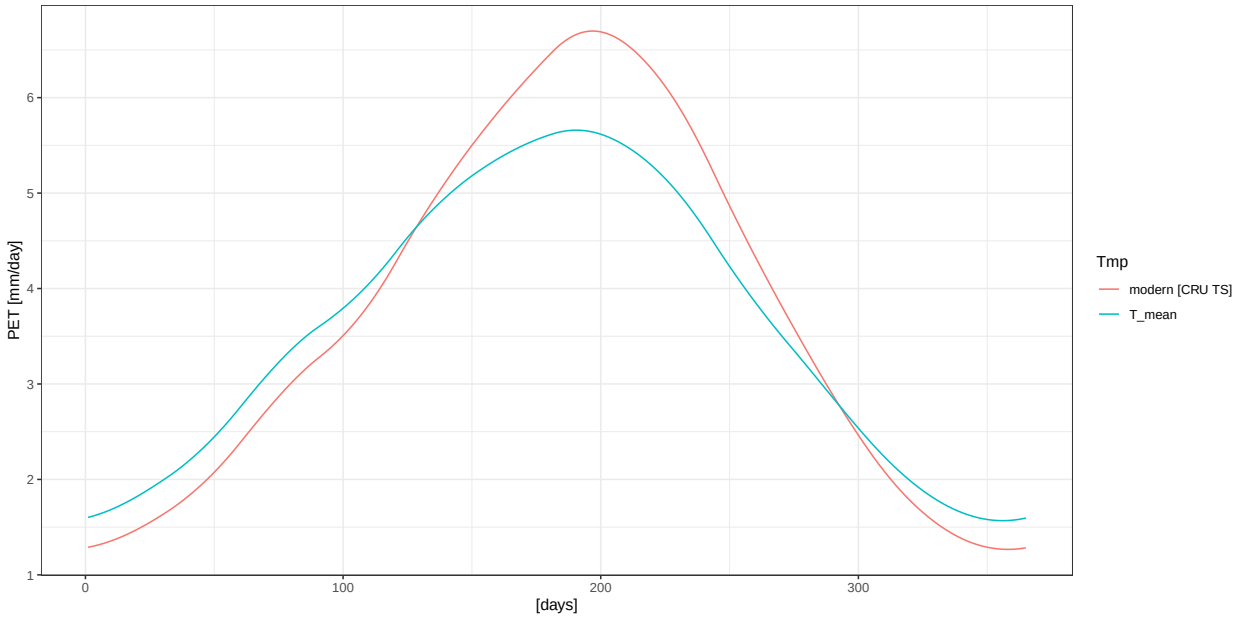
Calculate potential evapotranspiration (PET)

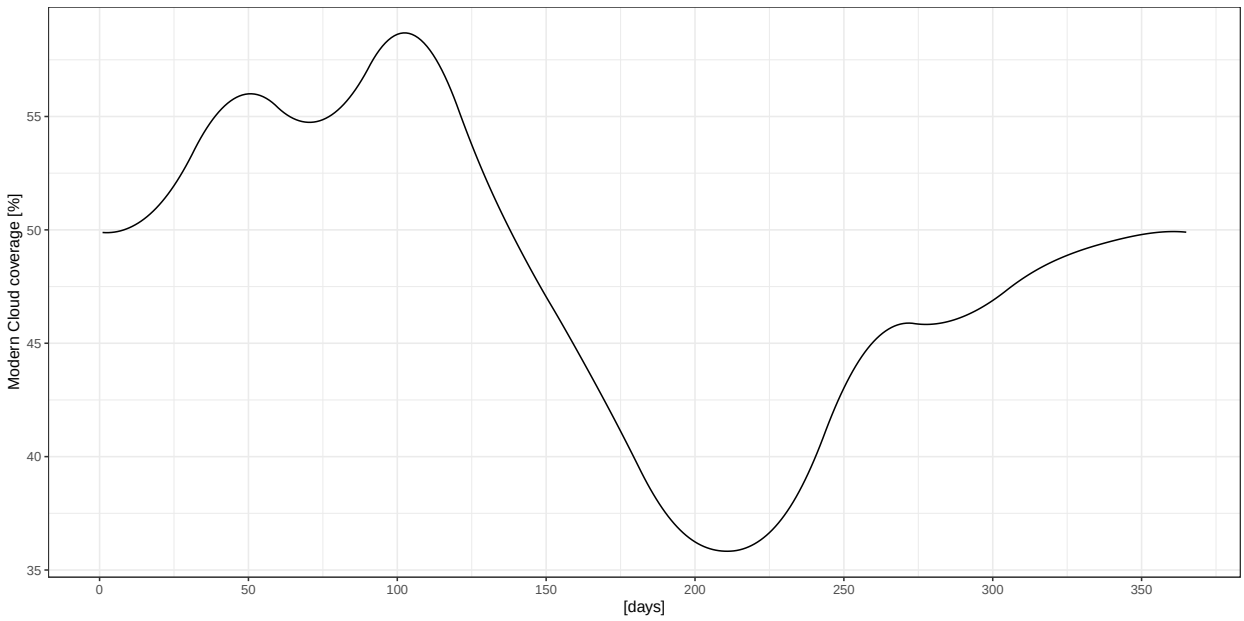
Padul location: 37.0108, -3.6039

Padul PET: Anomaly for age = 12022 cal yr BP

Params (`splash::calc_daily_evap`)

- Latitude: `37.0108`
- Elevation: 959
- Year: `1961`
- Sunshine fraction: [`CRU TS 4.04`]
- Temperature: $T_{\text{mean, i}}$ (14.482675) $+T_{\text{anomalies, i, day}}$





		[(T_djf + T_jja) / 2]		CRU TS 4.04	
day	sunshine fraction	Temp	PET	Temp	PET
1	0.5011582	14.88275	1.602247	7.135793	1.288733
2	0.5012256	14.88316	1.609329	7.130528	1.294312
3	0.5012185	14.88384	1.616948	7.126690	1.300383
4	0.5011370	14.88480	1.625099	7.124294	1.306945
5	0.5009810	14.88603	1.633779	7.123363	1.313994
100	0.4137719	15.94476	3.793212	12.568695	3.506774
101	0.4133551	15.96045	3.816267	12.663310	3.535225
102	0.4131502	15.97610	3.839862	12.761001	3.564514
103	0.4131574	15.99170	3.864009	12.861799	3.594663
104	0.4133770	16.00725	3.888722	12.965736	3.625692
105	0.4138090	16.02274	3.914009	13.072839	3.657622
200	0.6376062	16.68814	5.616716	26.629589	6.689089
201	0.6383766	16.68329	5.607496	26.670833	6.682886
202	0.6390596	16.67818	5.597420	26.705452	6.675047
203	0.6396579	16.67282	5.586504	26.733563	6.665604
204	0.6401744	16.66720	5.574764	26.755289	6.654593
205	0.6406121	16.66132	5.562219	26.770747	6.642046
300	0.5311425	15.40290	2.536467	14.164174	2.463255
301	0.5302380	15.38865	2.505293	13.983450	2.423060
302	0.5293001	15.37454	2.474369	13.803263	2.383330
303	0.5283288	15.36054	2.443708	13.623687	2.344081
304	0.5273243	15.34669	2.413327	13.444811	2.305331
305	0.5262870	15.33296	2.383237	13.266737	2.267097

Calculate corrected Precipitation

$$\text{corrected } P_{ann} = MI \times PET_{ann}$$

age_calBP	past_temp	past_co2	modern_co2	present_t	recon_mi	corrected_mi	corrected_P_ann
-62	13.15918	368.02	332.1725	13.15918	0.425809	0.3760617	456.9169
12022	14.48268	248.13	332.1725	14.48268	0.465376	0.6389500	548.4560
18402	11.03844	188.34	332.1725	11.03844	0.502894	0.8642041	505.4448