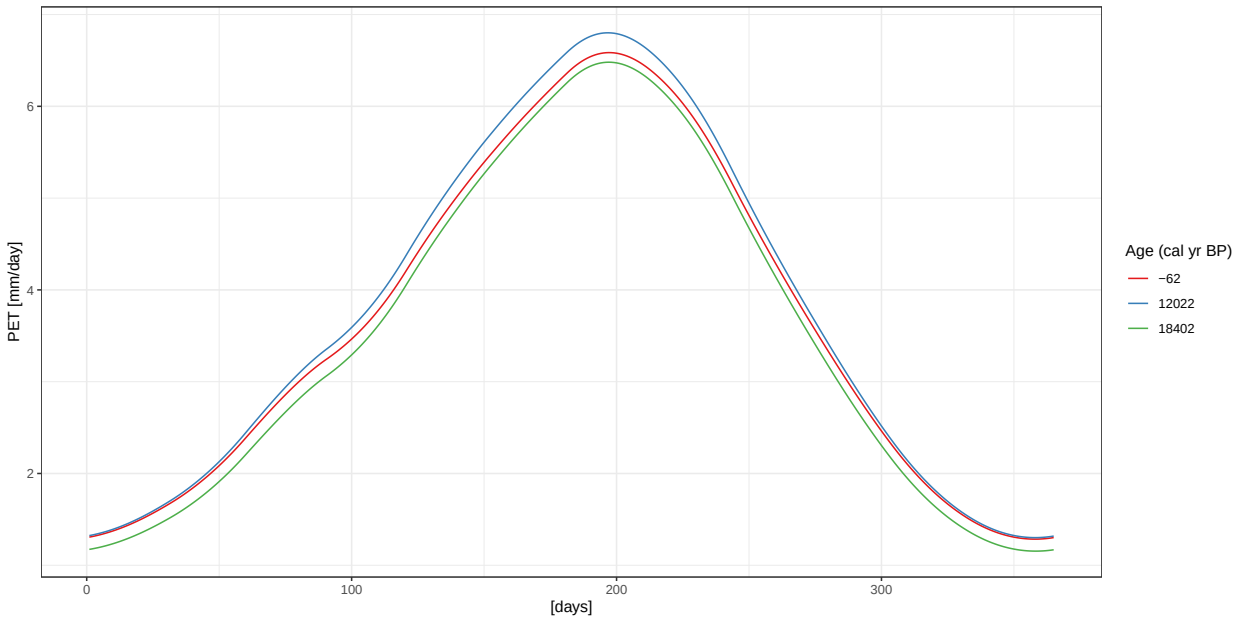
SPLASH v2.0.0: tests

Padul PET

SPLASH v1.0.0

```
year <- 1961
padul_pet_splashv1 <- c(1, 179, 247) %>%
  purrr::map(function(k) {
    purrr::map_dbl(seq_len(365),
                   function(i) {
                     splash::calc_daily_evap(lat = 37.0108,
                                             n = i,
                                             elv = padul_elv,
                                             y = year,
                                             sf = padul_sf[i],
                                             tc = padul_tmp[i] +
                                               padul_anomalies[[k]][i])$pet_mm
                   })
  })
```



SPLASH v2.0.0

```
year <- 1961
padul_lat <- 37.0108
# Estimate daily extraterrestrial radiation, J/m^2
padul_sw <- c(1, 179, 247) %>%
  purrr::map(function(k) {
    purrr::map_dbl(seq_len(365),
                   function(i) {
                     splash::calc_daily_solar(lat = padul_lat,
                                              n = i,
                                              elv = padul_elv,
                                              y = year,
                                              sf = padul_sf[i],
                                              tc = padul_tmp[i] +
                                                padul_anomalies[[k]][i])$ra_j.m2 #rnl_w.m2
                   }) / 24 / 3600 # Divide by 24 hours, then 3600 seconds
  })
```

Find shortwave radiation [W/m2] (using SPLASH v1.0.0)

```
padul_soil_data <-c(sand = 0, # sand(perc)
                    clay = 0, # clay(perc)
                    OM = 0, # organic matter(perc)
                    gravel = 0, # coarse-fragments-fraction(perc)
                    bulk_dens = 0, # bulk density(g cm-3), bd
                    maxdepth = 0) # depth
```

Padul soil data

```
padul_pet_splashv2 <- 1:3 %>%
  purrr::map(function(k) {
    # Create core time series object: solar radiation (sw), temperature(tc), and precipitation (pn)
    core <- tibble::tibble(
      time = lubridate::as_date(lubridate::ymd("1961-01-01"):lubridate::ymd("1961-12-31")),
      sw_in = padul_sw[[k]],
      tc = padul_tmp + padul_anomalies[[k]],
      pn = padul_pre
    ) %>%
      tidyr::pivot_longer(c(sw_in, tc, pn), "id") %>%
      tsbox::ts_xts()

    # Combine core data with soil data for Padul
    padul_data <- list(core = core,
                       lat = padul_lat,
                       elev = padul_elv,
                       slop = 0,
                       asp = 0,
                       soil_data = padul_soil_data,
                       Au = 0,
                       resolution = 250.)
```

```
  # Run SPLASH and return PET
  aux <- padul_data %$%
    rsplash::splash.point(
      sw_in = core$sw_in,      # shortwave radiation W/m2
      tc = core$tc,               # air temperature C
      pn = core$pn,            # precipitation mm
      lat = lat,                 # latitude deg
      elev = elev,                # elevation masl
      slop = slop,               # slope deg
      asp = asp,                 # aspect deg
      soil_data = soil_data,  # soil data: sand,clay,som in w/w %. Gravel v/v %, bulk density g/cm3,
      Au = Au,                    # upslope area m2
      resolution = resolution # resolution pixel dem used to get Au
    )
  aux
  # (aux$pet %>%
  #   as.numeric() +
  # aux$aet %>%
  #   as.numeric())
})
```

Run SPLASH

```
#> Loading required namespace: xts
```

```
#> Warning in max(tc[p_snow >= 0.5]): no non-missing arguments to max; returning
#> -Inf
```

```
#> Warning in max(tc[p_snow >= 0.5]): no non-missing arguments to max; returning
#> -Inf
```

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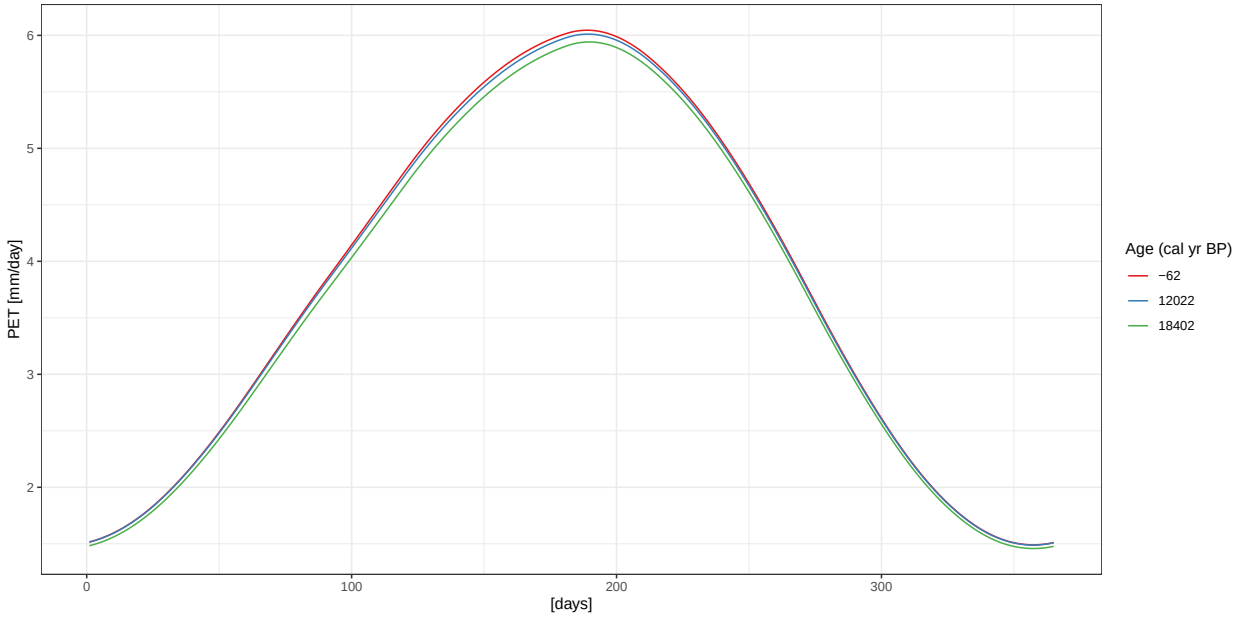
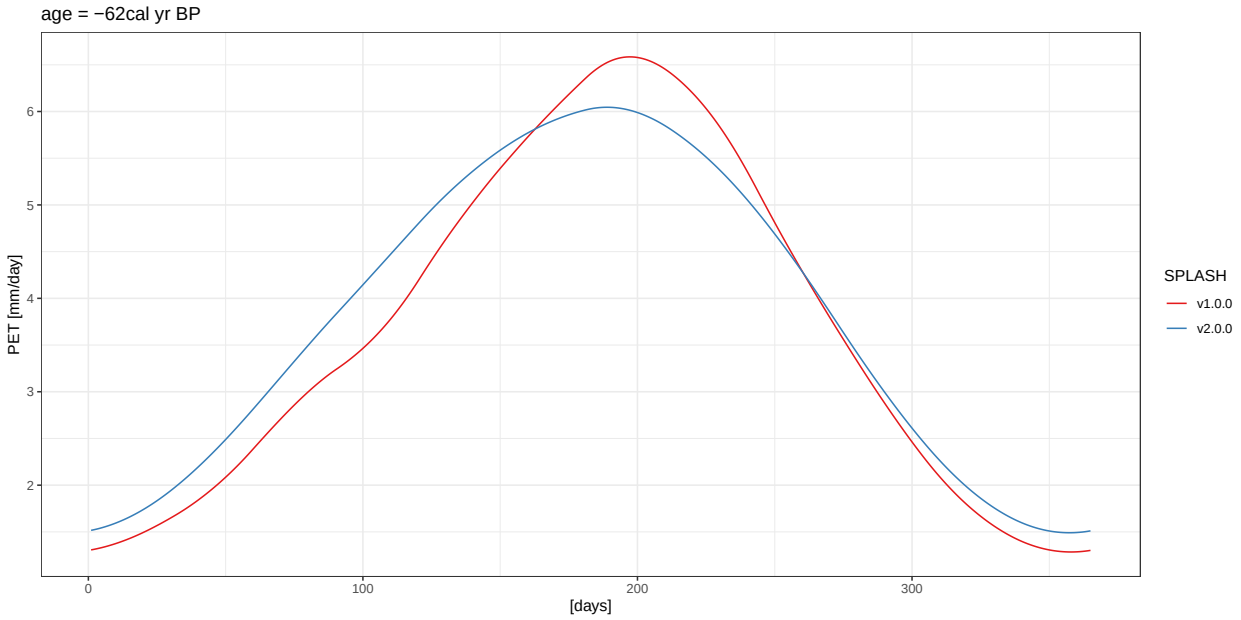
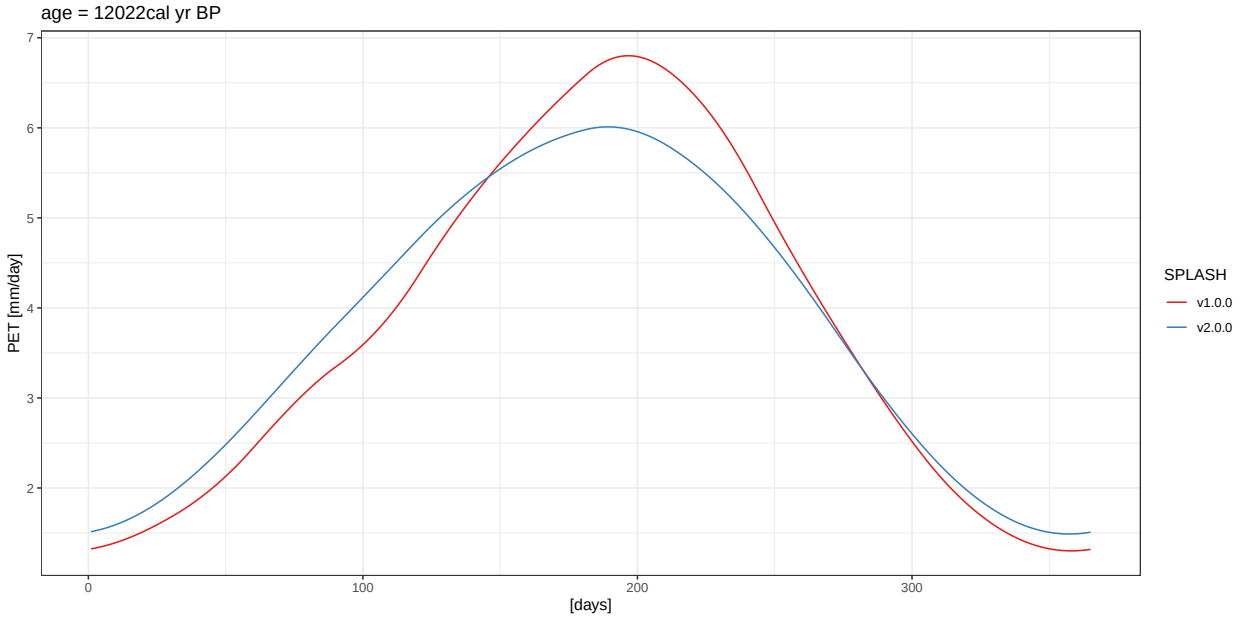
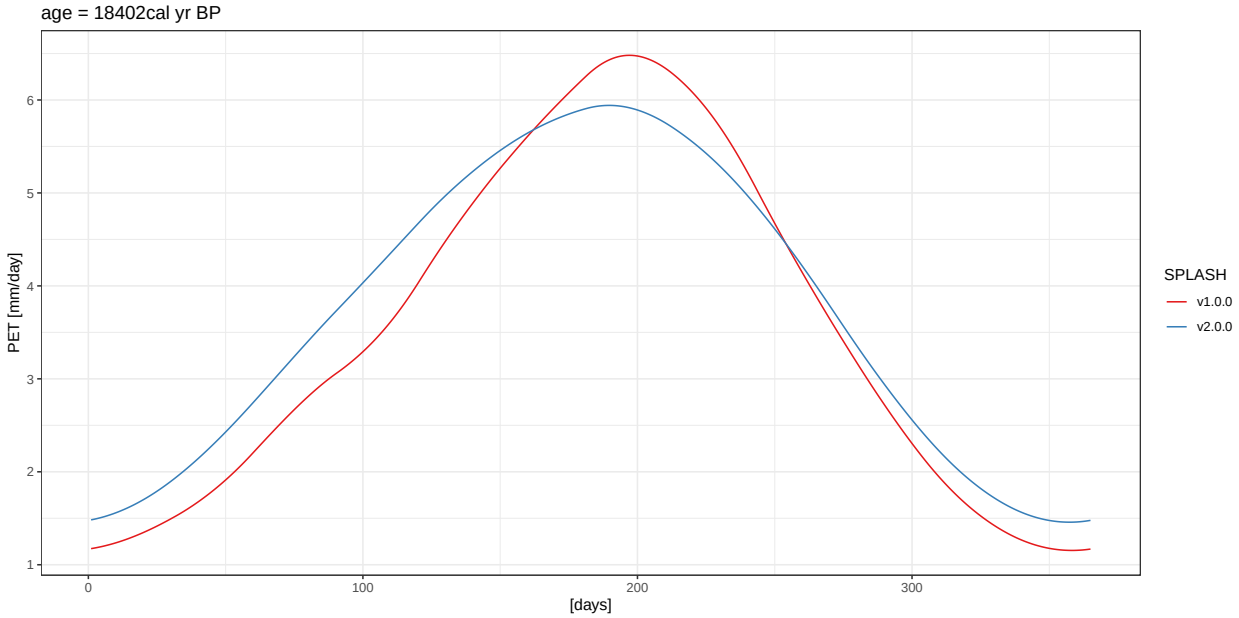
#> Warning in max(tc[p_snow >= 0.5]): no non-missing arguments to max; returning
#> -Inf
```



PET comparisons






age = 18402cal yr BP
PET [mm/day]
1
2
3
4
5
6
0
100
200
300
[days]
SPLASH
v1.0.0
v2.0.0

Calculate corrected Precipitation

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

SPLASH v1.0.0

age_calBP	past_temp	past_co2	modern_co2	present_t	recon_mi	P_ann	corrected_mi	corrected_P_ann
-62	13.15918	368.02	332.1725	13.15918	0.425809	458.807	0.3760617	499.9298
12022	14.48268	248.13	332.1725	14.48268	0.465376	479.259	0.6389500	578.3969
18402	11.03844	188.34	332.1725	11.03844	0.502894	489.202	0.8642041	589.6707

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age_calBP	past_temp	past_co2	modern_co2	present_t	recon_mi	P_ann	corrected_mi	corrected_P_ann
-62	13.15918	368.02	332.1725	13.15918	0.425809	458.807	0.3760617	517.2639
12022	14.48268	248.13	332.1725	14.48268	0.465376	479.259	0.6389500	577.6369
18402	11.03844	188.34	332.1725	11.03844	0.502894	489.202	0.8642041	622.0128