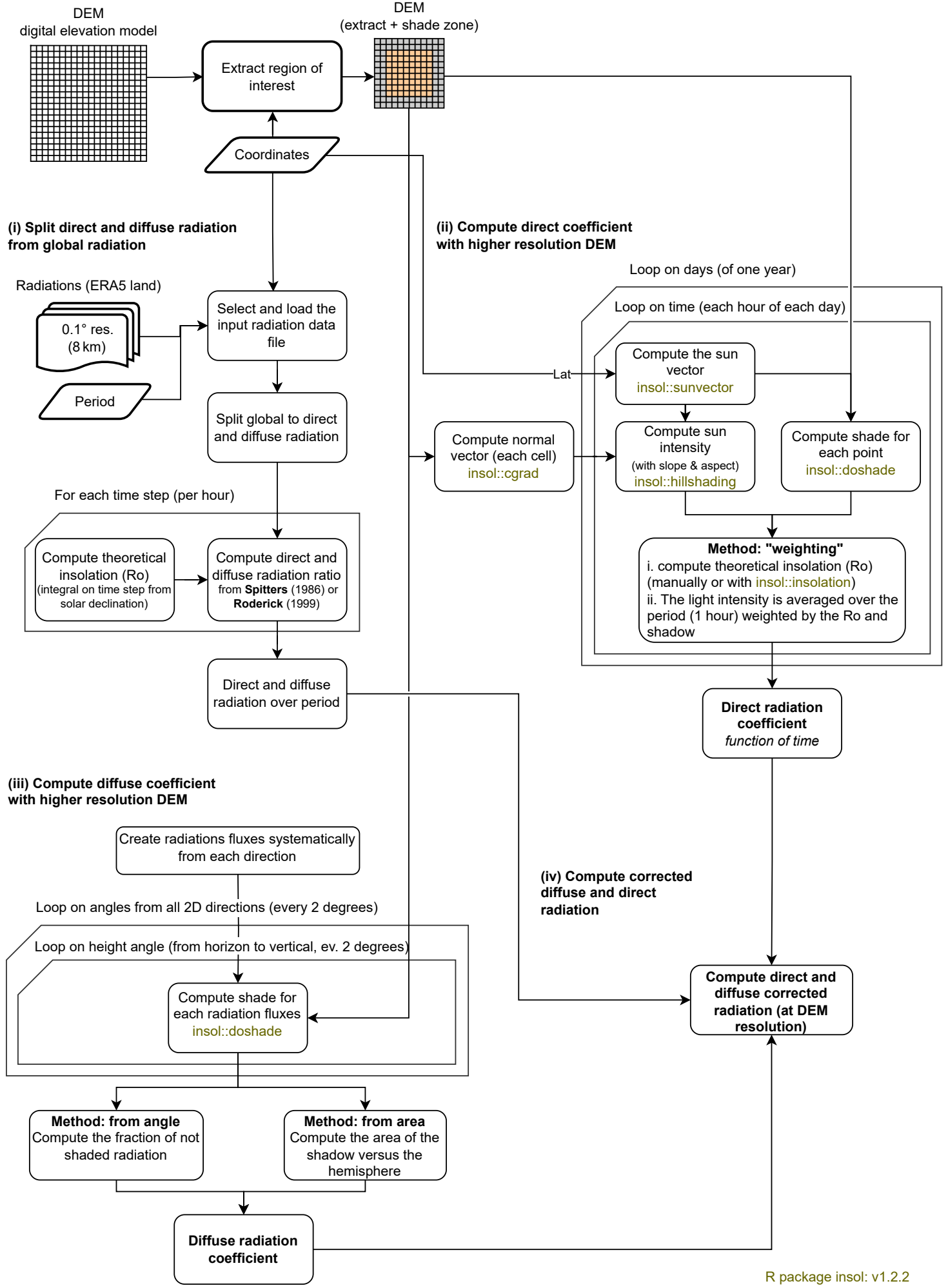
DEM
digital elevation model
Extract region of interest
DEM
(extract + shade zone)
Coordinates
(i) Split direct and diffuse radiation from global radiation
Radiations (ERA5 land)
0.1° res. (8 km)
Period
Select and load the input radiation data file
Split global to direct and diffuse radiation
For each time step (per hour)
Compute theoretical insolation (Ro)
(integral on time step from solar declination)
Compute direct and diffuse radiation ratio
from Spitters (1986) or Roderick (1999)
Direct and diffuse radiation over period
(ii) Compute direct coefficient with higher resolution DEM
Loop on days (of one year)
Loop on time (each hour of each day)
Lat
Compute the sun vector
insol::sunvector
Compute normal vector (each cell)
insol::cgrad
Compute sun intensity
(with slope & aspect)
insol::hillshading
Compute shade for each point
insol::doshade
Method: "weighting"
i. compute theoretical insolation (Ro) (manually or with insol::insolation)
ii. The light intensity is averaged over the period (1 hour) weighted by the Ro and shadow
Direct radiation coefficient
function of time
(iii) Compute diffuse coefficient with higher resolution DEM
Create radiations fluxes systematically from each direction
Loop on angles from all 2D directions (every 2 degrees)
Loop on height angle (from horizon to vertical, ev. 2 degrees)
Compute shade for each radiation fluxes
insol::doshade
Method: from angle
Compute the fraction of not shaded radiation
Method: from area
Compute the area of the shadow versus the hemisphere
Diffuse radiation coefficient
(iv) Compute corrected diffuse and direct radiation
Compute direct and diffuse corrected radiation (at DEM resolution)
R package insol: v1.2.2