HEALTH impacts from PM and O3:

IDL code 04.4\_health\_impacts\_from\_hires\_gridmaps\_gbd2017.pro

Sequence of calculations:

BLOCK 1:

Set names of directories for code ancillary data

Set names of directories for scenario input and result output

Define set of scenarios and years to be processed

Set age classes relevant for each cause of death (COD)

Load ancillary file templates (needed to read ASCI files and store in structures)

BLOCK 2:

Load ancillary files (same files always needed):

population by age group

country masks

files with base mortality rates

file with the risk rate analytical function parameters

Create txt output file (table) and write headers

Create gridmap placeholders for Attributable Fractions (AF) – note: IHD and STROKE have an additional age class dimension (15 classes)

BLOCK 3: Start of actual calculations

LOOP OVER SCENARIOS

LOOP OVER YEARS (within scenario)

Retrieve population file for given year.

If specific year not available, interpolate between available years

*(If the input year is 2000, needs a different read commando due to different file formatting)*

Read the 7.7’x7.5’ resolution input file (ncdf file created with separate module) into structure SC and copy the layer with PM concentrations in variable SC\_HIRES

Calculation of AF for each of the 6 CODs (as well as uncertainty bounds SIG):

simple formula: AF = 1-1/RR with function RR attributes (1) earlier retrieved RR function parameters and (2) PM concentration in grid cell.

SUBBLOCK 3a:

Check if global base mortality gridmap for current year is available.

If not: compute and store for future runs (is independent of scenario).

If needed, interpolate between available years.

Calculation done for central, lower and upper boundary values, and for each of 15 age classes for IHD and STROKE.

Method: read country mortality values from a restored ASCI table and assign the value to each grid cell of the country in the global high resolution map

SUBBLOCK 3b:

If data do not exist:

Create global grid maps with age class fraction (relative to total population) for each of the 6 CODS (of which IHD and STRIKE have 15 age classes each) – store for future use.

BLOCK 4 (STILL WITHIN SCENARIO AND YEAR LOOP): create mortality grid maps

Multiply the previously prepared gridded layers to obtain the mortalities = AF\*BASEMORT\*POP\*AGEFRAC

Apply error propagation of uncertainties on each factor (sig\_min, sig\_max)

First for PM, then for O3

BLOCK 5 (STILL WITHIN SCENARIO AND YEAR LOOP): create mortality grid maps

Aggregate mortalities and population to lower resolution (0.5x0.5deg) to speed up the aggregation to countries by summing mortalities of 4x4 subgrids.

Regrid high resolution pollutant gridmaps to 0.5x0.5deg

BLOCK 6 (STILL WITHIN SCENARIO AND YEAR LOOP): aggregate grids to country values

LOOP OVER COUNTRIES

Use country masks (0.5x0.5) and make sum or pop weighted mean; calculate uncertainty ranges with proper error propagation

Print output line in TXT file (adds one output line for every scenario/year loop pass)

END COUNTRY LOOP

BLOCK 7 (STILL WITHIN SCENARIO AND YEAR LOOP):

Store the 0.5x0.5 gridmaps in a ncdf file (one file for each (scenario, year).

END YEARS LOOP

END SCENARIO LOOP

Close the TXT file

END PROGRAMME