

Basis for the determination of waveforms for the sites of dams in Switzerland – Subproject 1: Disaggregation of seismic hazard for return periods of 1000, 5000, 10000 years – Disaggregation dataset

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Description of the data structure of the disaggregation dataset

This dataset relates to part 1 of the project “Basis for the determination of waveforms for the sites of dams in Switzerland”, commissioned by the Swiss Federal Office of Energy (SFOE). The first part of the project deals with the disaggregation of ground shaking hazard levels for mean return periods of 1000, 5000, 10000 years and three intensity measure types: peak ground acceleration (PGA), spectral acceleration at 0.15 s period (SA(0.15s)) and 1.0 s period (SA(1.0s)). The current dataset contains the final disaggregation results produced for every geographical node of the disaggregation grid covering Switzerland; these results are also summarized by SIA 261 (2020) seismic zone. The procedure followed to obtain this dataset is described in the report “Basis for the determination of waveforms for the sites of dams in Switzerland - Subproject 1: Disaggregation of seismic hazard for return periods of 1000, 5000, 10000 years” by Bergamo et al. (2021; doi: <https://doi.org/10.3929/ethz-b-000517545>).

The data format of the dataset is a set of Microsoft Excel ® tables. This document describes the content of each of these tables.

The full list of disaggregation nodes is contained in the file:

- *Disaggregation_nodes_list.xlsx*

where:

Column 1 = Node ID

Column 2 = Longitude (degrees) of the node

Column 3 = Latitude (degrees) of the node

Column 4 = X coordinate (in m) of the node (CH1903 reference system)

Column 5 = Y coordinate (in m) of the node (CH1903 reference system)

Column 6 = Node’s affiliation to SIA 261 zones. NA = not attributed (node outside boundaries of any zone);

Z1a = zone 1a; Z1b = zone 1b; Z2 = zone 2; Z3a = zone 3a; Z3b = zone 3b

The actual disaggregation data are organized in a folder structure schematized by Table 1:

Table 1 – folder structure for the disaggregation data

Level 1	Level 2	Level 3	Level 4	Content
./RP=XXXyears	./Disaggregation_by_node	./PGA		Disagg_by_node_mean_PGA_RP=XXXyrs.xlsx Disagg_by_node_median_PGA_RP=XXXyrs.xlsx Images of disaggregation 3D histograms for all nodes
		./SA(0.15s)		Disagg_by_node_mean_SA(0_15s)_RP=XXXyrs.xlsx Disagg_by_node_median_SA(0_15s)_RP=XXXyrs.xlsx Images of disaggregation 3D histograms for all nodes
		./SA(1.0s)		Disagg_by_node_mean_SA(1_0s)_RP=XXXyrs.xlsx Disagg_by_node_median_SA(1_0s)_RP=XXXyrs.xlsx Images of disaggregation 3D histograms for all nodes
		./AllIMTs	./not_normalized	Disagg_by_node_mean_AllIMTs_RP=XXXyrs.xlsx Disagg_by_node_median_AllIMTs_RP=XXXyrs.xlsx Images of disaggregation 3D histograms for all nodes
	./normalized		Disagg_by_node_mean_AllIMTs_norm_RP=XXXyrs.xlsx Disagg_by_node_median_AllIMTs_norm_RP=XXXyrs.xlsx Images of disaggregation 3D histograms for all nodes	
	./Disaggregation_by_zones		Disagg_by_zone_mean_RP=XXXyrs.xlsx Disagg_by_zone_mean_RP=XXXyrs.xlsx	

The first-level folder subdivides the data by return periods (./RP=975yrs, ./RP=4975yrs, or ./RP=9975yrs). In each of these RP folders, data are subdivided into disaggregation results at the node level (./Disaggregation_by_nodes) and at the zone level (./Disaggregation_by_zones).

In ./Disaggregation_by_nodes data are further subdivided according to the considered IMT: ./PGA, ./SA(0.15s), ./SA(1.0s), ./AllIMTs (stack of the contributions to exceedance of all IMTs). ./AllIMTs is finally partitioned into two subfolders, one for the sum of the contributions to exceedance of all IMTs (./not_normalized) and one for the normalized sum of the contributions to exceedance of all IMTs (./normalized).

In the folders dedicated to the disaggregation results at the node level and to individual IMTs (./RP=XXXyrs/Disaggregation_by_nodes/PGA or /SA(0.15s) or SA(1.0s)), numerical data are stored into two files, named

- *Disagg_by_node_mean_IMT_RP=XXXyrs.xlsx* and *Disagg_by_node_median_IMT_RP=XXXyrs.xlsx*

where *IMT* is either PGA, SA(0_15) or SA(1_0) and *XXX* is the relevant return period; *median* or *mean* indicates the summary statistic applied over the population of 100 random samplings of the hazard model logic tree.

The content of these two files is the following:

Rows 1 – 3 = header with statement of relevant RP, IMT and applied statistics (mean or median).

Rows 4 – 5, columns 4 – 93 = coordinates of the centers of the magnitude (M_W) – distance (R_{JB}) bins of the disaggregation.

Rows 7 – 472, columns 1 – 93 = nodes' metadata and disaggregation data. Every row refers to a disaggregation node. Column 1 = node ID number; column 2 = node longitude (deg); column 3 = node latitude (deg); column 4 – 93 = % of contribution to exceedance of the $M_W - R_{JB}$ bin.

In the same folder hosting the files *Disagg_by_node_mean/median_IMT_RP=XXXyrs.xlsx* we also provide the images (.png format) of the 3D histograms of the disaggregation for all nodes and for both mean and median statistics (similar to Figure 3).

In the folders dedicated to the disaggregation results at the node level and for the stack of all IMTs (./RP=XXXyrs/Disaggregation_by_nodes/AllIMTs/not_normalized), numerical data are stored into two files, named

- *Disagg_by_node_mean_AllIMTs_RP=XXXyrs.xlsx* and *Disagg_by_node_median_AllIMTs_RP=XXXyrs.xlsx*

where *median* or *mean* indicates the summary statistic applied over the population of 100 random samplings of the hazard model logic tree (for each of the three IMTs), *XXX* is the relevant return period.

The content of these two files is the following:

Rows 1 – 3 = header with statement of relevant RP, IMT and applied statistics (mean or median).

Rows 4 – 5, columns 4 – 93 = coordinates of the centers of the magnitude (M_W) – distance (R_{JB}) bins of the disaggregation.

Rows 7 – 472, columns 1 – 93 = nodes' metadata and disaggregation data. Every row refers to a disaggregation node. Column 1 = node ID number; column 2 = node longitude (deg); column 3 = node latitude (deg); columns 4 – 93 = sum of contribution to exceedance (%) of the $M_W - R_{JB}$ bins.

In the same folder hosting the files *Disagg_by_node_mean/median_AllIMTs_RP=XXXyrs.xlsx* we also provide the images (.png format) of the 3D histograms of the disaggregation for all nodes and for both mean and median statistics (similar to Figure 13, top row).

In the folders dedicated to the disaggregation results at the node level and for the *normalized* stack of all IMTs (./RP=XXXyrs/Disaggregation_by_nodes/AllIMTs/normalized), numerical data are stored into two files, named

- *Disagg_by_node_mean_AllIMTs_norm_RP=XXXyrs.xlsx* and *Disagg_by_node_median_AllIMTs_norm_RP=XXXyrs.xlsx*

where *median* or *mean* indicates the summary statistic applied over the population of 100 random samplings of the hazard model logic tree (for each of the three IMTs), *XXX* is the relevant return period.

The content of these two files is the following:

Rows 1 – 3 = header with statement of relevant RP, IMT and applied statistics (mean or median).

Rows 4 – 5, columns 4 – 93 = coordinates of the centres of the magnitude (M_W) – distance (R_{JB}) bins of the disaggregation.

Rows 7 – 472, columns 1 – 93 = nodes' metadata and disaggregation data. Every row refers to a disaggregation node. Column 1 = node ID number; column 2 = node longitude (deg); column 3 = node latitude (deg); columns 4 – 93 = normalized sum of contribution to exceedance (relative significance) of the $M_W - R_{JB}$ bins.

In the same folder hosting the files *Disagg_by_node_mean/median_AllIMTs_norm_RP=XXXyrs.xlsx* we also provide the images (.png format) of the 3D histograms of the relative significance for all nodes and for both mean and median statistics (similar to Figure 13, bottom row).

In the folders dedicated to the disaggregation results at the zone level (./RP=XXXyrs/Disaggregation_by_zones) numerical results are stored into two files, named

- *Disagg_by_zone_median_RP=XXXyrs.xlsx* and *Disagg_by_zone_mean_RP=XXXyrs.xlsx*

where *median* or *mean* indicates the summary statistic applied over the population of nodes belonging to the same SIA 261 seismic zone, and *XXX* is the relevant return period.

The content of these two files is the following:

Rows 1 – 2 = header with statement of relevant RP and applied statistics (mean or median).

Rows 3 – 4, columns 3 – 92 = coordinates of the centres of the magnitude (M_W) – distance (R_{JB}) bins of the disaggregation.

Rows 6 – 20, columns 1 – 92 = zones' statistic metadata (for individual IMTs) and disaggregation data.

Column 1 = IMT;

Column 2 = zone;

Columns 3 – 92 = mean or median contributions to exceedance (%) of the $M_W - R_{JB}$ bins (one for each column) over the population of nodes falling into the considered zone.

Rows 21 – 25, columns 1 – 92 = zones' statistic metadata (for the stack of all IMTs) and disaggregation data.

Column 1 = "AllIMTs, sum of contrib. (%)"

Column 2 = zone;

Columns 3 – 92 = mean or median sum of the contributions to exceedance (%) at the $M_W - R_{JB}$ bins (one for each column) over the population of nodes falling into the considered zone.

Rows 26 – 30, columns 1 – 92 = zones' statistic metadata (for the *normalized* stack of all IMTs) and disaggregation data.

Column 1 = "AllIMTs, norm. (-)"

Column 2 = zone;

Columns 3 – 92 = normalized mean or median sum of the contributions to exceedance at the $M_W - R_{JB}$ bins (one for each column) over the population of nodes falling into the considered zone (relative significance, ranging from 0 to 1).