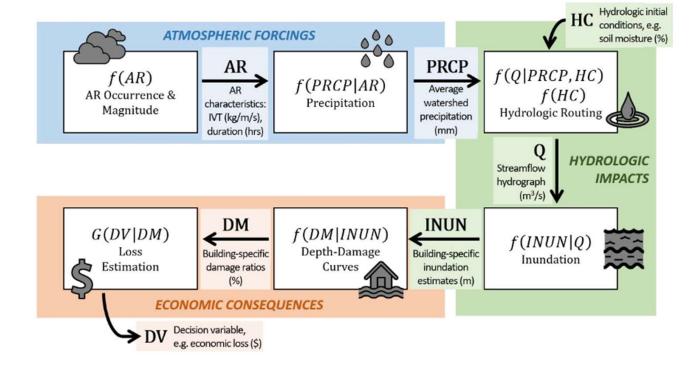
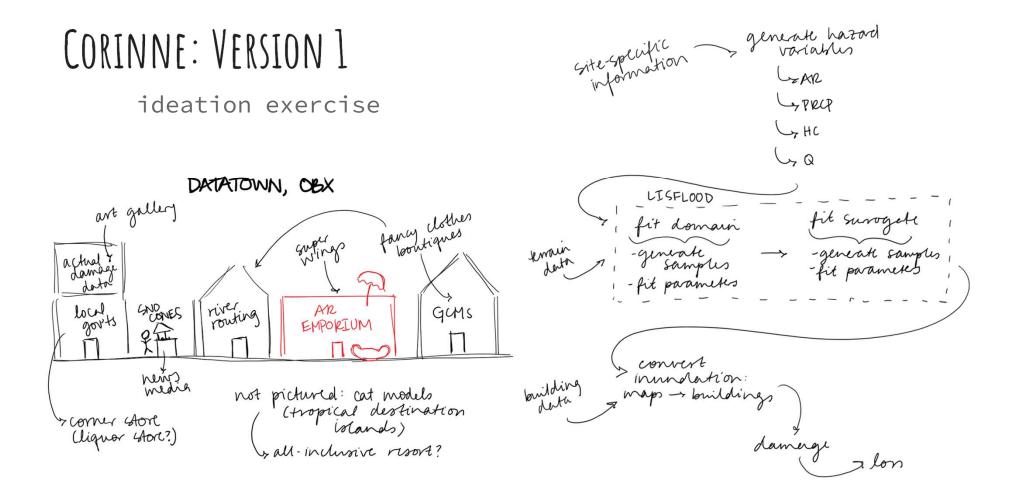
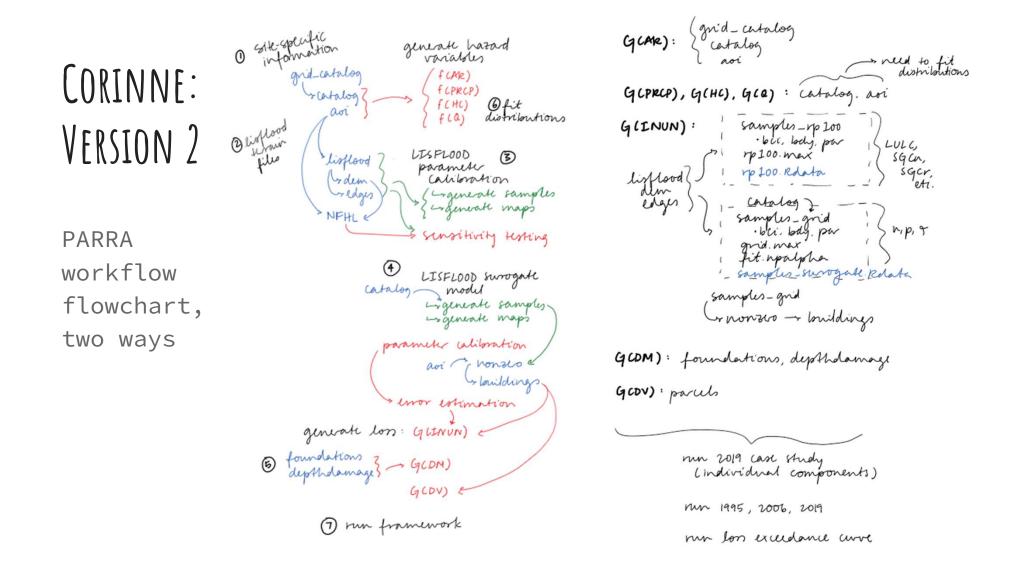
CORINNE: PERFORMANCE-BASED ATMOSPHERIC RIVER RISK ANALYSIS (PARRA) FRAMEWORK

background context







CORINNE: VERSION 3

cleaned-up PARRA workflow graphic

(way too much text)

1) collect site-specific information

grid_catalog.Rmd

Downloads IVT, duration, & AR identification information from Rutz et al. (2014).

Creates a catalog of historic AR events based on grid_catalog.Rmd. Calculates hazard variables and other roteach AR event.

aoi.Rmd

Defines the area of interest (aoi) as a rectangular sf object in R.

sonoma.Rmd

lisflood.Rmd

NFHL.Rmd

Generates figures describing Sonoma and California. (Fig. 2)

terrain files

Formats the digital elevation

model (DEM) for use in

for river width and

floodplain roughness.

LISFLOOD. Creates rasters

Defines coordinates for the

study area inlet and outlet.

Creates a raster file of the

FEMA NFHL to serve as the

"true" value for comparison.

3) fit inundation distribution

generate LISFLOOD

calibrate LISFLOOD environment parameters

PRCP.R

RNFF.R

f(PRCP)

ĝ

2)

fit hazard distributions

Finds best-fit coefficients for a quantile

regression and simulates new precipitation

values as a function of AR characteristics..

Fits a lognormal distribution to recorded soil moisture values in the historic catalog and simulates new values based on this distribution.

and soil moisture using the curve number

runoff, and soil moisture. Fits a loanormal

distribution to time to peak streamflow (tp)

method. Fits a linear regression to peak

based on values in the historic catalog.

Simulates new values of Qp and tp.

Calculates runoff as a function of precipitation

streamflow (Qp) as a function of precipitation,

generate_files.sh

Generates Latin hypercube samples for the environmental parameters of interest and produces LISFLOOD input files for each realization.

run_lisflood.sh Produces a LISFLOOD inundation map for each of the realizations.

rp100.Rmd

Determines best-fit parameter values, performs parameter sensitivity testing, and calculates accuracy metrics for the "observed" (NFHL) vs. simulated inundation maps.

INUN.R

4) fit damage & loss distributions

foundations.Rmd

Estimates the distribution of foundation types by census tract.

depthdamage.Rmd

Creates a dataset of residential building points that fall within the area defined by nonzero.Rmd. Attaches RESA safety tag information and valuation information from the Sonoma tax assessor roll.

DM.R

Randomly assigns foundation heights to buildings and determines water depths. Converts depths to expected damage rate Converts depths to expected damage ratios.

DV.R

Uses the valuation information in buildings.Rmd to estimate repair cost for each building.

Estimates surrogate model error

Calculates a conservative buffer

around maximum inundated

area to speed up Monte Carlo

compared to LISFLOOD model.

nonzero.Rmd

simulations.

buildings.Rmd

fit LISFLOOD surrogate model

generate files.sh surrogatemodel.Rmd

Generates Latin hypercube samples for the hydrograph parameters of interest and produces LISFLOOD input files for each realization.

run_lisflood.sh

Produces a LISFLOOD inundation map for each one of the realizations.

fit_npalpha.sh surrogate model

hyperparameters.

Calculates best-fit values for Identifies single-family residential buildings within the bounds of nonzero.Rmd.

Uses the surrogate model to determine height of inundation (m) at each of the buildinas in buildinas.Rmd as a function of peak streamflow and time to peak.

5) run PARRA framework

componentmodels.Rmd

Steps through a component-by-component case study using data from a 2019 AR event in Sonoma County. (Fig. 3-8)

PARRA.sbatch

Runs the PARRA framework from ARs to impacts for a given number of Monte Carlo realizations.

lossexceedance.Rmd

Creates a loss exceedance curve for ARinduced fluvial flood losses to residential buildings in Sonoma County. Creates a mitigated loss exceedance curve after raising all residences above the 100-year flood elevation. (Fig. 10)

legend

data creation scripts R markdown files (with figures) Sherlock/Linux files component model scripts