

Economic Output and Risk Factors

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What is the relationship between health risk concentrations and economic output?

Calculate correlations between environmental exposures and farm sales (and/or other econ. variables) to understand economic linkages. A p-value of 0 reflects that it is statistically impossible to reach these results under a true null hypothesis.

Correlation Coefficients between predictor X and Crop Total Sales (\$)

```
## # A tibble: 7 x 4
##   predictor                                correlation p_value significance
##   <chr>                                <dbl>    <dbl> <lgl>
## 1 commodity_totals_sales_measured_in_$      0.907      0 TRUE
## 2 commodity_totals_sales_measured_in_$_operati~ 0.745      0 TRUE
## 3 income_farmrelated_operations_with_receipts 0.751      0 TRUE
## 4 income_farmrelated_receipts_measured_in_$    0.803      0 TRUE
## 5 income_net_cash_farm_of_operations_net_incom~ 0.867      0 TRUE
## 6 income_net_cash_farm_of_operations_net_incom~ 0.718      0 TRUE
## 7 income_net_cash_farm_of_operations_operation~ 0.443      0 TRUE
```

```
## # A tibble: 7 x 4
##   predictor                                correlation p_value significance
##   <chr>                                <dbl>    <dbl> <lgl>
## 1 farm_sales_(less_than_2500_$)      0.211  0.0003 TRUE
## 2 farm_sales_(5000_to_9999_$)      0.0146  0.807 FALSE
## 3 farm_sales_(50000_to_99999_$)    0.383    0 TRUE
## 4 farm_sales_(2500_to_4999_$)    -0.0594  0.32 FALSE
## 5 farm_sales_(25000_to_49999_$)    0.346    0 TRUE
## 6 farm_sales_(10000_to_24999_$)    0.126  0.0344 TRUE
## 7 farm_sales_(100000_or_more_$)    0.830    0 TRUE
```

```
## # A tibble: 53 x 4
##   predictor                                correlation p_value significance
##   <chr>                                <dbl>    <dbl> <lgl>
## 1 barley_acres_harvested      0.529      0 TRUE
## 2 barley_operations_with_area_harvested 0.510      0 TRUE
## 3 barley_production_measured_in_bu 0.536      0 TRUE
## 4 beans_dry_edible_(excl_chickpeas_&_lima)_ac~ 0.568      0 TRUE
## 5 beans_dry_edible_(excl_chickpeas_&_lima)_op~ 0.510      0 TRUE
## 6 beans_dry_edible_(excl_chickpeas_&_lima)_pr~ 0.580      0 TRUE
## 7 corn_grain_acres_harvested 0.761      0 TRUE
## 8 corn_grain_operations_with_area_harvested 0.802      0 TRUE
## 9 corn_grain_production_measured_in_bu 0.776      0 TRUE
## 10 corn_silage_acres_harvested 0.346      0 TRUE
```

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## # i 43 more rows
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## # A tibble: 19 x 4
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##	predictor	correlation	p_value	significance
##	<chr>	<dbl>	<dbl>	<lgl>
## 1	animal_totals_incl_products_sales_measured_~	0.378	0	TRUE
## 2	cattle_cows_beef_inventory	0.0106	0.880	FALSE
## 3	cattle_cows_beef_operations_with_inventory	0.153	0.0098	TRUE
## 4	cattle_cows_milk_inventory	0.495	0	TRUE
## 5	cattle_cows_milk_operations_with_inventory	0.0297	0.643	FALSE
## 6	cattle_incl_calves_inventory	0.239	0	TRUE
## 7	cattle_incl_calves_operations_with_inventory	0.145	0.0142	TRUE
## 8	cattle_incl_calves_operations_with_sales	0.178	0.0026	TRUE
## 9	cattle_incl_calves_sales_measured_in_head	0.221	0.0002	TRUE
## 10	chickens_broilers_operations_with_sales	-0.0143	0.854	FALSE
## 11	chickens_broilers_sales_measured_in_head	0.245	0.0368	TRUE
## 12	chickens_layers_inventory	0.00204	0.974	FALSE
## 13	chickens_layers_operations_with_inventory	-0.190	0.0013	TRUE
## 14	hogs_inventory	0.596	0	TRUE
## 15	hogs_operations_with_inventory	-0.0266	0.670	FALSE
## 16	hogs_operations_with_sales	0.0394	0.526	FALSE
## 17	hogs_sales_measured_in_head	0.595	0	TRUE
## 18	sheep_incl_lambs_inventory	-0.148	0.0201	TRUE
## 19	sheep_incl_lambs_operations_with_inventory	-0.0744	0.219	FALSE

A tibble: 8 x 4

##	predictor	correlation	p_value	significance
##	<chr>	<dbl>	<dbl>	<lgl>
## 1	ag_land_cropland_acres	0.829	0	TRUE
## 2	ag_land_cropland_number_of_operations	0.627	0	TRUE
## 3	ag_land_cropland_harvested_number_of_operati~	0.601	0	TRUE
## 4	ag_land_incl_buildings_operations_with_asset~	0.443	0	TRUE
## 5	ag_land_incl_buildings_asset_value_measured_~	0.356	0	TRUE
## 6	ag_land_irrigated_number_of_operations	-0.291	0	TRUE
## 7	ag_land_incl_buildings_asset_value_measured_~	0.265	0	TRUE
## 8	ag_land_irrigated_acres	-0.0869	0.162	FALSE

A tibble: 8 x 4

##	predictor	correlation	p_value	significance
##	<chr>	<dbl>	<dbl>	<lgl>
## 1	area_operated_(1.0_to_9.9_acres)	-0.118	0.0507	FALSE
## 2	area_operated_(10.0_to_49.9_acres)	0.0600	0.313	FALSE
## 3	area_operated_(50_to_179_acres)	0.378	0	TRUE
## 4	area_operated_(180_to_499_acres)	0.572	0	TRUE
## 5	area_operated_(500_to_999_acres)	0.699	0	TRUE
## 6	area_operated_(1000_or_more_acres)	0.567	0	TRUE
## 7	farm_operations_area_operated_measured_in_ac~	-0.0312	0.600	FALSE
## 8	farm_operations_area_operated_measured_in_ac~	0.285	0	TRUE

A tibble: 242 x 4

##	predictor	correlation	p_value	significance
##	<chr>	<dbl>	<dbl>	<lgl>
## 1	Avalanche...Annualized.Frequency	0.0495	0.642	FALSE
## 2	Avalanche...Expected.Annual.Loss...Building~	0.0146	0.890	FALSE
## 3	Avalanche...Expected.Annual.Loss...Populati~	0.119	0.262	FALSE
## 4	Avalanche...Expected.Annual.Loss...Populati~	0.119	0.262	FALSE
## 5	Avalanche...Expected.Annual.Loss...Total	0.119	0.260	FALSE
## 6	Avalanche...Expected.Annual.Loss.Rate...Bui~	-0.230	0.0281	TRUE

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## 7 Avalanche...Expected.Annual.Loss.Rate...Nat~ -0.293 0.0049 TRUE
## 8 Avalanche...Expected.Annual.Loss.Rate...Pop~ -0.292 0.0049 TRUE
## 9 Avalanche...Expected.Annual.Loss.Score 0.119 0.260 FALSE
## 10 Avalanche...Exposure...Impacted.Area..sq.mi. 0.160 0.131 FALSE
## # i 232 more rows

## # A tibble: 2 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 expense_totals_operating_expense_measured_in~ 0.908 0 TRUE
## 2 expense_totals_operating_expense_measured_in~ 0.750 0 TRUE

## # A tibble: 11 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 Expected.Annual.Loss...Agriculture.Value...~ 0.757 0 TRUE
## 2 Expected.Annual.Loss.Rate...Agriculture...C~ 0.322 0 TRUE
## 3 Expected.Annual.Loss...Score...Composite 0.286 0 TRUE
## 4 Expected.Annual.Loss...Total...Composite 0.286 0 TRUE
## 5 Expected.Annual.Loss.Rate...Population...Co~ 0.254 0 TRUE
## 6 Expected.Annual.Loss.Rate...National.Percen~ 0.247 0 TRUE
## 7 Expected.Annual.Loss...State.Percentile...C~ 0.220 0.0002 TRUE
## 8 Expected.Annual.Loss...Building.Value...Com~ 0.216 0.0002 TRUE
## 9 Expected.Annual.Loss.Rate...Building...Comp~ 0.215 0.0003 TRUE
## 10 Expected.Annual.Loss...Population...Composi~ 0.0882 0.137 FALSE
## 11 Expected.Annual.Loss...Population.Equivalen~ 0.0882 0.137 FALSE

## # A tibble: 2 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 farm_operations_number_of_operations 0.443 0 TRUE
## 2 farm_operations_acres_operated 0.213 0.0003 TRUE

## # A tibble: 3 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 National.Risk.Index...Value...Composite 0.270 0 TRUE
## 2 National.Risk.Index...Score...Composite 0.270 0 TRUE
## 3 National.Risk.Index...State.Percentile...Com~ 0.211 0.0003 TRUE

## # A tibble: 7 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 Community.Resilience...Score 0.369 0 TRUE
## 2 Community.Resilience...State.Percentile 0.179 0.0025 TRUE
## 3 Community.Resilience...Value 0.369 0 TRUE
## 4 Community.Risk.Factor...Value -0.0762 0.200 FALSE
## 5 Social.Vulnerability...Score -0.0627 0.292 FALSE
## 6 Social.Vulnerability...State.Percentile 0.0616 0.300 FALSE
## 7 Social.Vulnerability.ExpectedLossRate.Adjust 0.231 0.0001 TRUE

## # A tibble: 10 x 4
## predictor correlation p_value significance
## <chr> <dbl> <dbl> <lgl>
## 1 machinery_totals_asset_value_measured_in_$ 0.918 0 TRUE
## 2 Agriculture.Value.... 0.907 0 TRUE
## 3 govt_programs_federal_operations_with_recei~ 0.826 0 TRUE

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## 4 machinery_totals_asset_value_measured_in_$_~      0.751  0    TRUE
## 5 govt_programs_federal_receipts_measured_in_$      0.746  0    TRUE
## 6 Shape__Length      -0.255  0    TRUE
## 7 Area..sq.mi.      -0.241  0    TRUE
## 8 Shape__Area      -0.184  0.0018 TRUE
## 9 Building.Value....      0.108  0.0684 FALSE
## 10 Population..2020.      -0.0447  0.453  FALSE

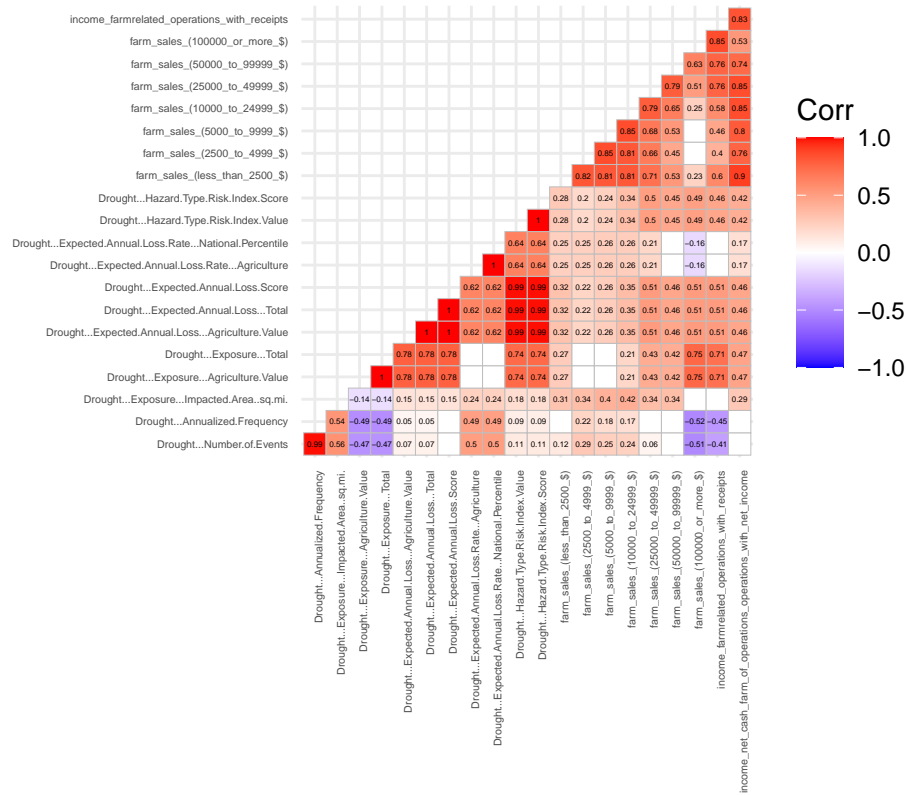
## Count of Significant (True) and Non-Significant (False) Correlations (p < 0.05)
##
## FALSE  TRUE
##      80   298

## # A tibble: 299 x 2
##   predictor                                p_value
##   <chr>                                <dbl>
## 1 ag_land_cropland_acres                      0
## 2 ag_land_cropland_number_of_operations        0
## 3 ag_land_cropland_harvested_number_of_operations 0
## 4 ag_land_incl_buildings_operations_with_asset_value 0
## 5 ag_land_incl_buildings_asset_value_measured_in_$_operation 0
## 6 ag_land_irrigated_number_of_operations        0
## 7 ag_land_incl_buildings_asset_value_measured_in_$_acre 0
## 8 hogs_sales_measured_in_head                  0
## 9 hogs_inventory                              0
## 10 cattle_cows_milk_inventory                  0
## # i 289 more rows

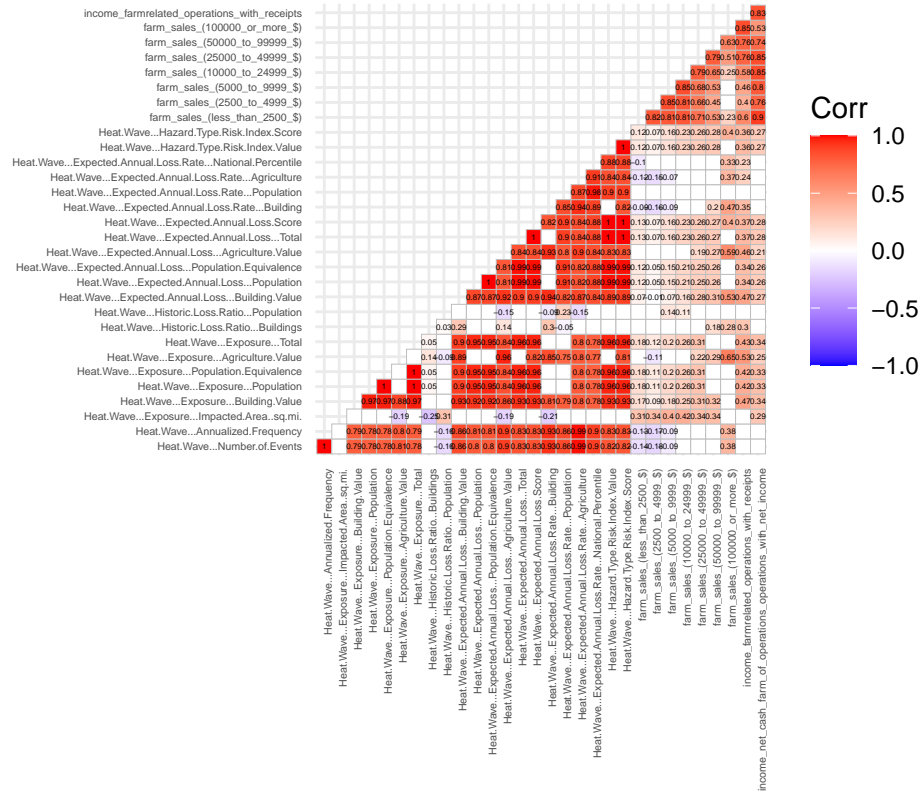
```

Below are a series of correlation plots between variables of economic output and different weather and natural disaster predictors.

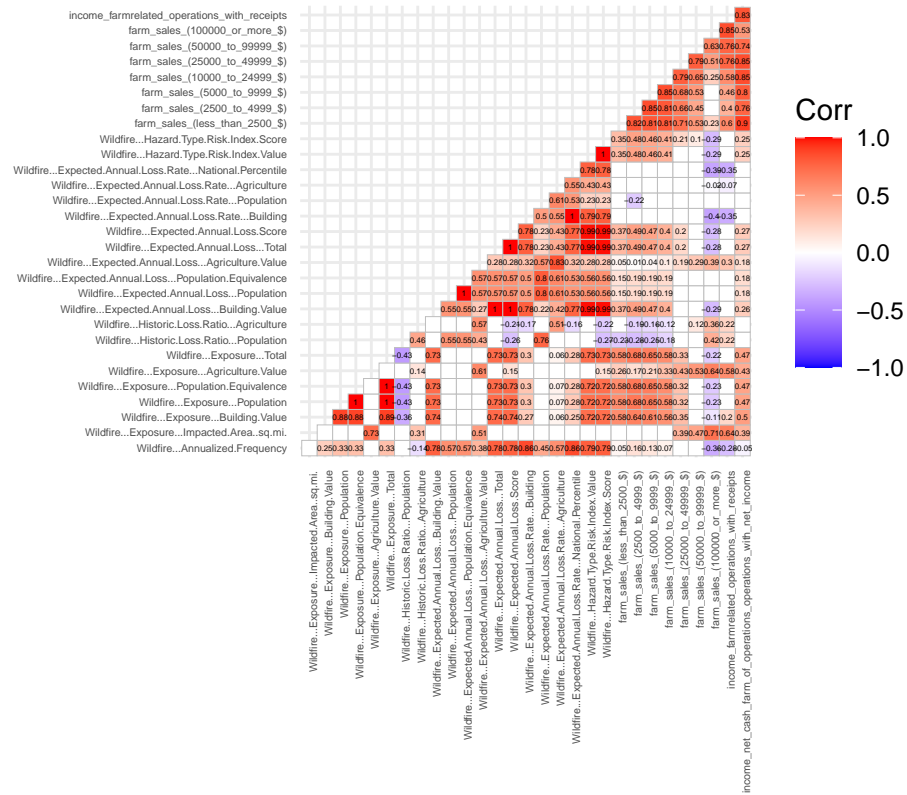
Correlation Plot: drought



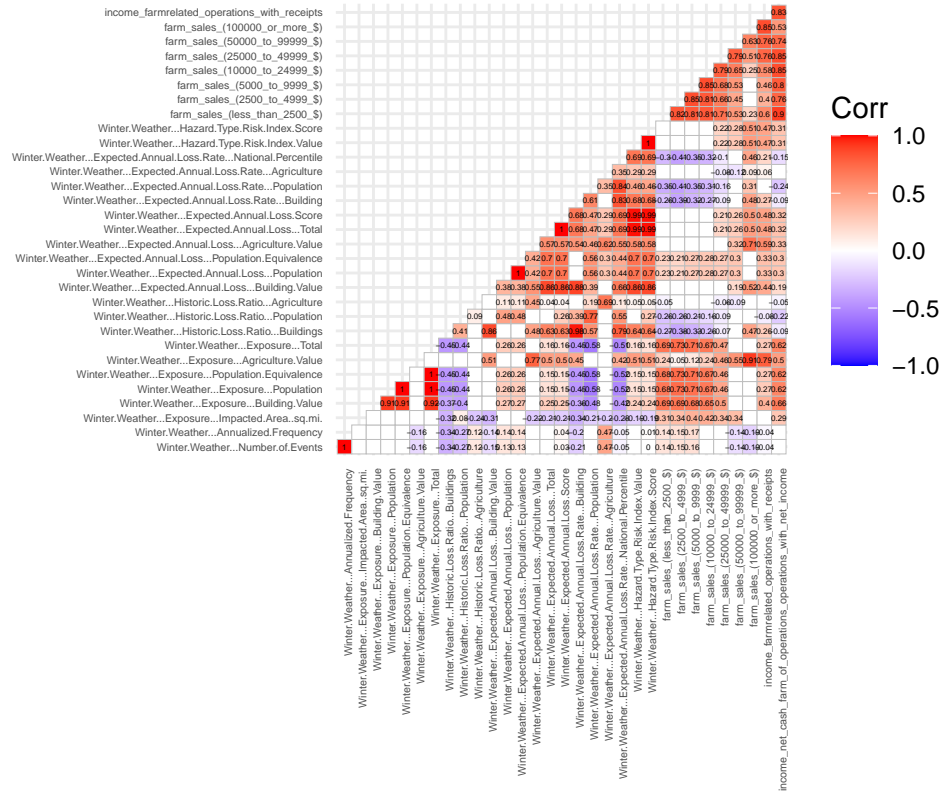
Correlation Plot: heat.wave



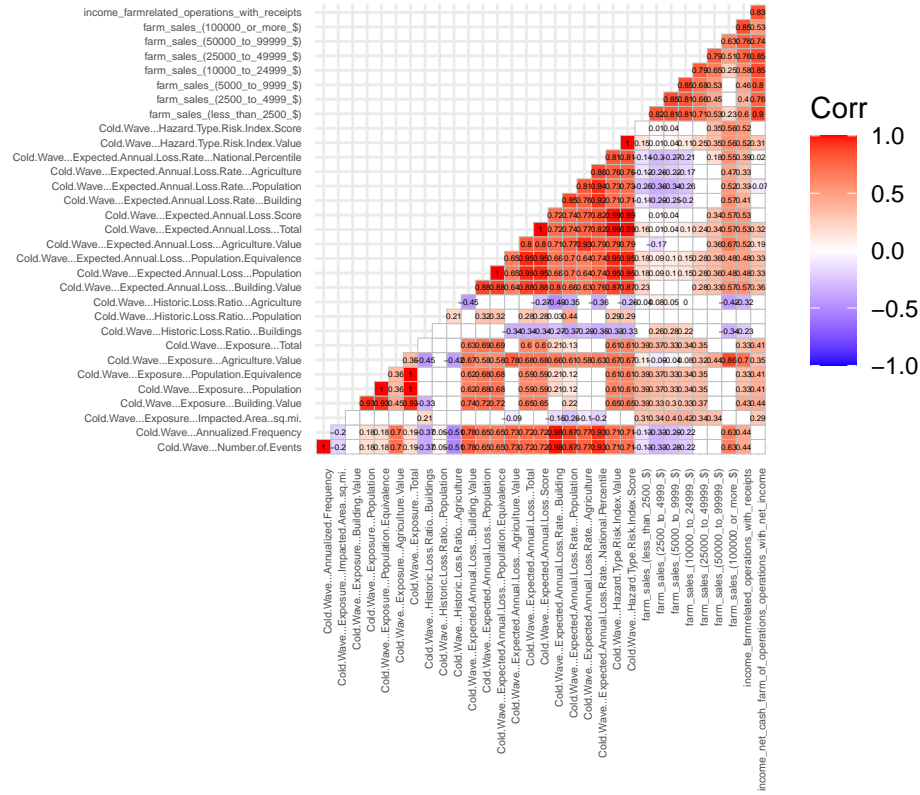
Correlation Plot: wildfire



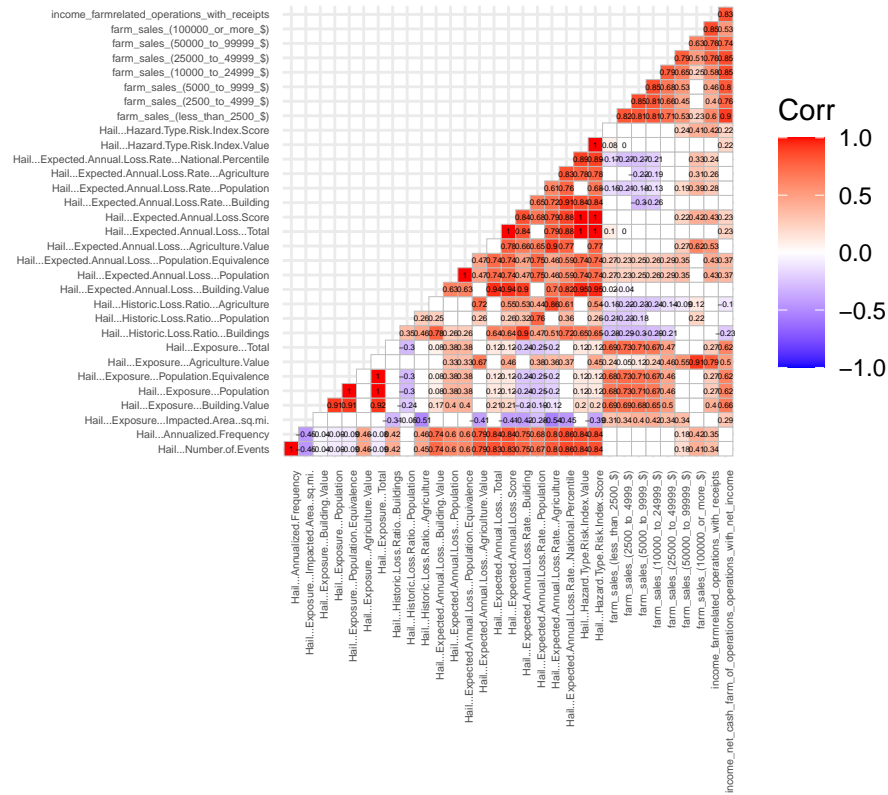
Correlation Plot: winter.weather



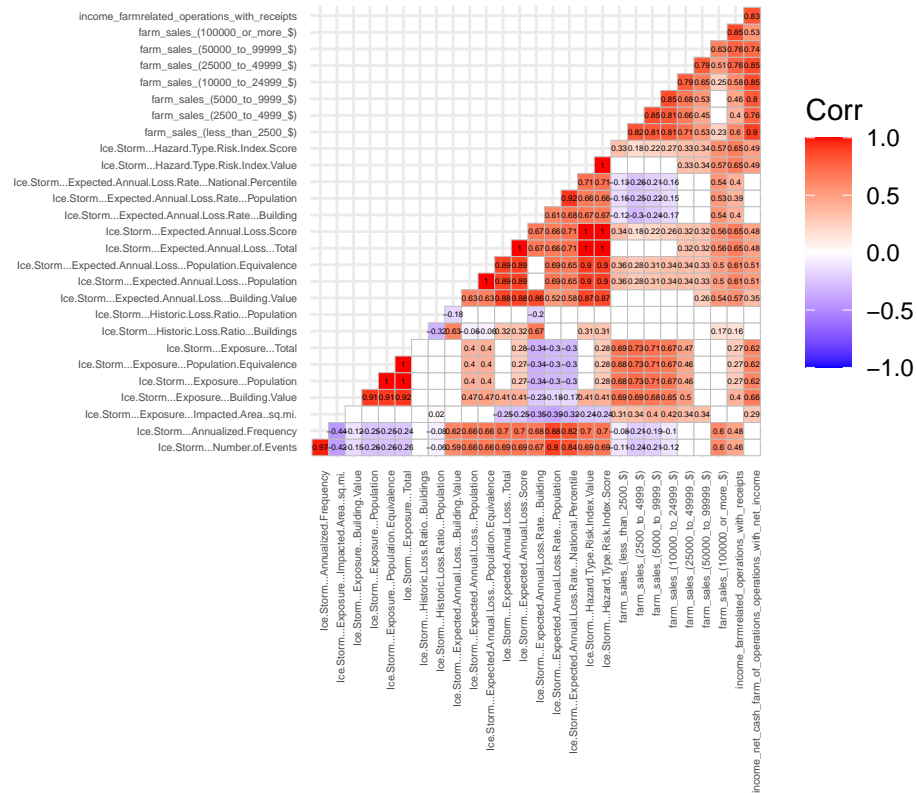
Correlation Plot: Cold.Wave



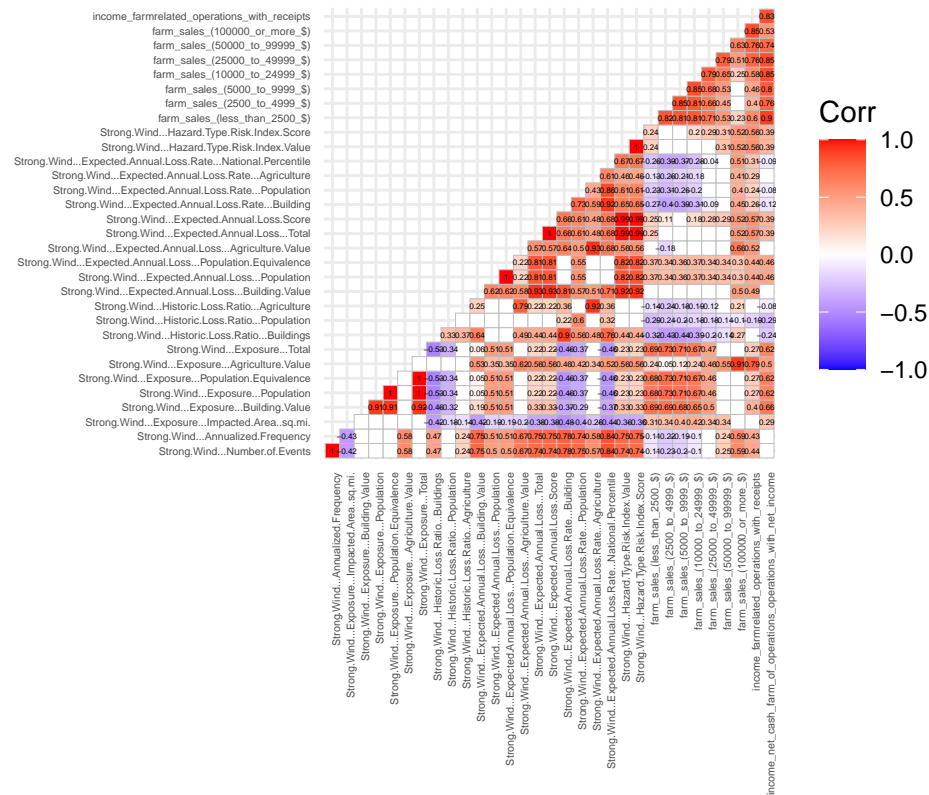
Correlation Plot: hail



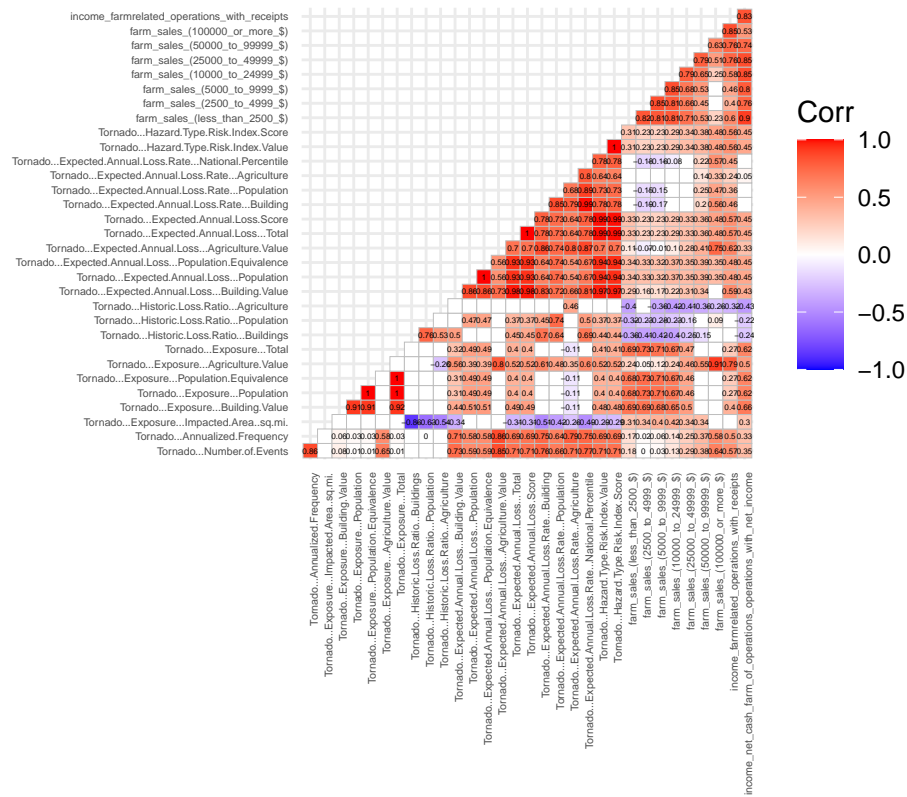
Correlation Plot: ice.storm



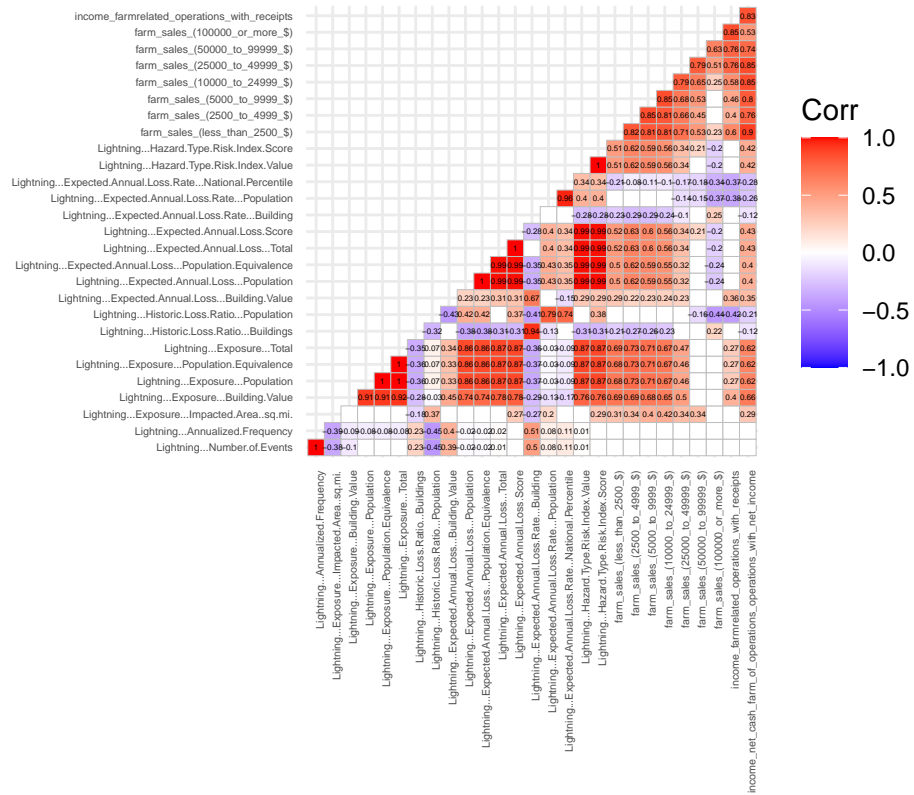
Correlation Plot: strong.wind



Correlation Plot: tornado



Correlation Plot: lightning



Correlation Plot: avalanche

