

# Package ‘spEDM’

December 16, 2024

**Title** Spatial Empirical Dynamic Modeling

**Version** 1.0

**Description** Integrates empirical dynamic modeling (EDM) with geospatial cross-sectional data to analyze causality via geographical convergent cross mapping (GCCM) described in Gao et al. (2023) <[doi:10.1038/s41467-023-41619-6](https://doi.org/10.1038/s41467-023-41619-6)>.

**License** GPL-3

**Encoding** UTF-8

**RoxygenNote** 7.3.2

**URL** <https://stsc1.github.io/spEDM/>, <https://github.com/stsc1/spEDM>

**BugReports** <https://github.com/stsc1/spEDM/issues>

**Depends** R (>= 4.1.0)

**LinkingTo** Rcpp, RcppThread

**Imports** dplyr, sdsfun (>= 0.6.0), terra

**Suggests** ggplot2, knitr, Rcpp, RcppThread, rmarkdown, sf, spdep

**VignetteBuilder** knitr

**NeedsCompilation** yes

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**Repository** CRAN

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`gccm`*geographical convergent cross mapping*

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**Description**

geographical convergent cross mapping

**Usage**

```
gccm(  
  cause,  
  effect,  
  data,  
  libsizes = NULL,  
  E = 3,  
  nb = NULL,  
  RowCol = NULL,  
  trendRM = TRUE  
)
```

**Arguments**

<code>cause</code>	Name of causal variable.
<code>effect</code>	Name of effect variable.
<code>data</code>	The observation data, must be <code>sf</code> or <code>SpatRaster</code> object.
<code>libsizes</code>	(optional) A vector of library sizes to use.
<code>E</code>	(optional) The dimensions of the embedding.
<code>nb</code>	(optional) The neighbours list.
<code>RowCol</code>	(optional) Matrix of selected row and cols numbers.
<code>trendRM</code>	(optional) Whether to remove the linear trend.

**Value**

A `data.frame`.

**Examples**

```
columbus = sf::read_sf(system.file("shapes/columbus.gpkg", package="spData")[1],  
                       quiet=TRUE)  
gccm("HOVAL", "CRIME", data = columbus)
```

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