**bayesGIA**

README file last updated by Christopher Piecuch, cpiecuch-at-whoi-dot-edu, Wed Sep 19 2018

**Basic description**

Citation

This code was generated to produce the results presented in the main text of:

Piecuch, C. G., P. Huybers, C. C. Hay, A. C. Kemp, C. M. Little, J. X. Mitrovica, R. M. Ponte, and M. P. Tingley, “Origin of spatial variation in United States East Coast sea level trends during 1900-2017”, *Nature*, xxx.

Please cite this reference when using this code.

**Contents**

PDF documents

* *Piecuch\_model\_description.pdf*: Description of all prior distributions and full conditional distributions evaluated as part of the Gibbs Sampler used in the model.

Text files

* *Copyright*: copyright statement
* *License*: license statement

MATLAB .m files

* *autocorrelation.m*: computes sample autocorrelation of time series
* *bayes\_main\_code.m*: this is the main driver code of the model. Simply execute “bayes\_main\_code” in the MATLAB Command Window from the bayesGIA directory, and this code should run “out of the box”. See lines 27-76 of this code for adjustable input parameters. (Values occurring on these lines presently are the “default” values to reproduce results in Piecuch et al. (2018)).
* *delete\_burn\_in.m*: delete “burn-in” (or “warm-up”) transients from model solution
* *determine\_clusters.m*: create matrix used in spatial covariance structure of relative sea level fluctuations
* *EarthDistances.m*: compute distances between latitude and longitude points on a spherical Earth
* *grab\_coastal\_gia\_cells.m*: create regular grid of coastal locations
* *init\_vals\_pickup.m*: initialize output from pickup file
* *initialize\_output.m*: initialize output
* *prepare\_gps\_data.m*: format GPS data and bring into Bayesian model workspace
* *prepare\_tgr\_data.m*: format tide gauge data and bring into Bayesian model workspace
* *randraw.m*: draw random value from any of a number of distributions
* *set\_hyperparameters.m*: set hyperparameter values (i.e., parameters of the prior distributions)
* *set\_initial\_values.m*: set initial values of model solutions
* *update\_all\_arrays.m*: update model solutions

Subdirectories (each with readme files)

* *GIA*: GIA model priors
* *GPS\_ULR6a*: GPS data of vertical land motion
* *rlr\_annual\_20180522*: tide gauge records of relative sea level
* *SLIPs*: sea level index points from publicly available data bases

**Note on usage of code and MATLAB release**

This code was written and executed (to produce results in Piecuch et al. 2018) using the MATLAB release version MATLAB\_R2015b. The code is also compatible with the MATLAB\_R2016a release. However, it has come to our attention that there are issues with newer MATLAB releases, such that errors are incurred when the code is executed using MATLAB\_R2016b or later. We are currently investigating this issue and hope to provide updated codes, that are compatible with more recent MATLAB releases, as soon as possible.