



# EnsStat

## Ensemble Statistics

### User's guide

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The purpose of EnsStat is to provide tools to compute basic ensemble statistics.

The tools are provided as a library of modules, which can be easily plugged in any existing software. This library includes:

- the computation of ensemble mean and standard deviation;
- the computation of ensemble covariance or correlation structure.

# 1 Description of the modules

In this section, the modules are described one by one, giving for each of them: the method that has been implemented, the list of public variables and public routines (with a description of input and output data), the MPI parallelization, and an estimation of the computational cost as a function of the size of the problem.

## 1.1 Module: `meanstd`

The purpose of this module is to compute ensemble mean and standard deviation.

### Method

#### Public variables

None.

#### Public routines

**ensemble\_meanstd:** compute ensemble mean and standard deviation.

**ens (input)** : input ensemble;

**mean (output)** : ensemble mean;

**std (output, optional)** : ensemble standard deviation;

**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).

**update\_meanstd:** update ensemble mean and ensemble mean square anomaly with new member.

**vct (input)** : additional ensemble member;

**idx (input, optional)** : index of new member (present if weight and weightsum are not present);

**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).

**weightsum (input/output, optional)** : current sum of weights;

**mean (input/output)** : ensemble mean;

**msqra (input/output, optional)** : ensemble mean square anomaly.

### MPI parallelization

### Computational cost

## 1.2 Module: `meancov`

The purpose of this module is to compute ensemble covariance, ensemble correlation structure, or representers.

### Method

#### Public variables

**correlation\_missing\_value** missing value to use where no valid data is available (default=-9999.).

## Public routines

**ensemble\_covariance:** compute ensemble covariance with respect to a scalar reference ensemble:

**ens (input)** : input ensemble;  
**ensref (input)** : scalar reference ensemble;  
**cov (output)** : ensemble covariance;  
**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).

**ensemble\_correlation:** compute ensemble correlation with respect to a scalar reference ensemble:

**ens (input)** : input ensemble;  
**ensref (input)** : scalar reference ensemble;  
**correl (output)** : ensemble covariance;  
**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).

**ensemble\_representer:** compute ensemble representer with respect to a scalar reference ensemble:

**ens (input)** : input ensemble;  
**ensref (input)** : scalar reference ensemble;  
**representer (output)** : ensemble covariance;  
**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).

**update\_meancov:** update ensemble mean and ensemble mean product of anomalies with new member:

**vct (input)** : additional ensemble member;  
**varref (input)** : new value of scalar reference ensemble;  
**idx (input, optional)** : index of new member (present if weight and weightsum are not present);  
**weight (input, optional)** : weight associated to each ensemble member (default=equal weights).  
**weightsum (input/output, optional)** : current sum of weights;  
**mean (input/output)** : ensemble mean;  
**meanref (input/output)** : reference ensemble mean;  
**mproda (input/output, optional)** : ensemble mean product of anomalies.

## MPI parallelization

## Computational cost