Domain Science Code From Development to Release

K. Allison Smith

eScience Institute
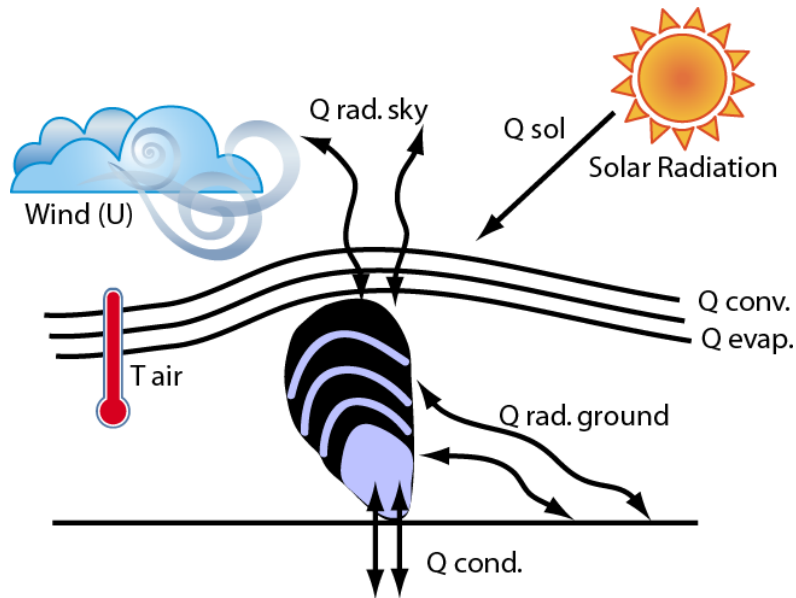
School of Oceanography

University of Washington

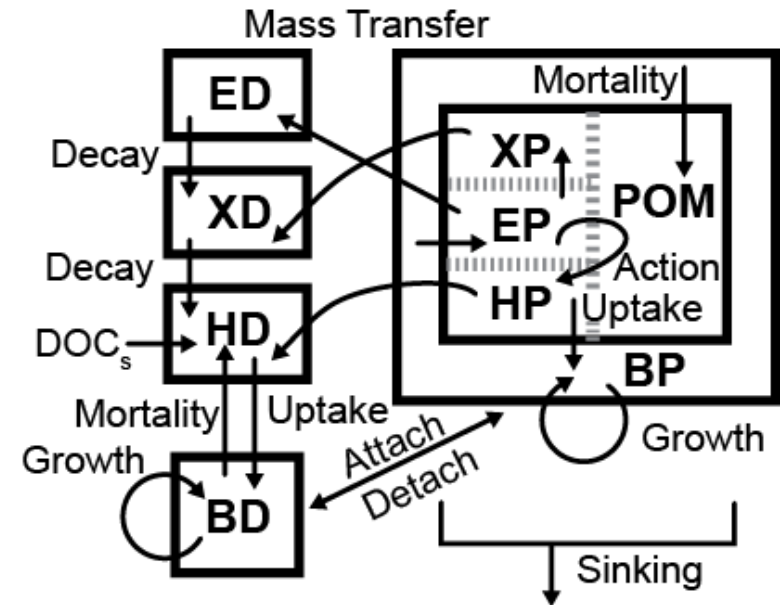https://github.com/kallisons

A little about me...

- postdoc in the eScience Institute
- interdisciplinary scientific research
    - ecophysiology
    - ocean biogeochemistry
    - biogeography
- introductory computer science courses but little formal training
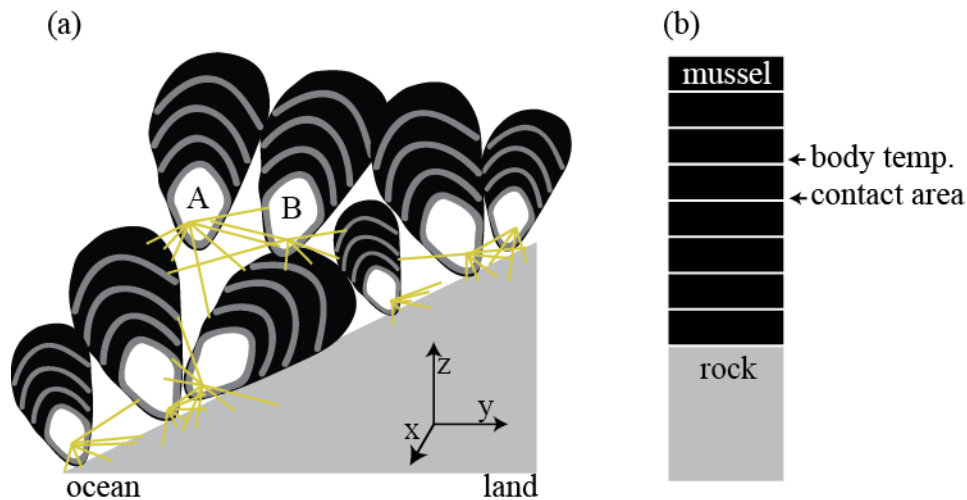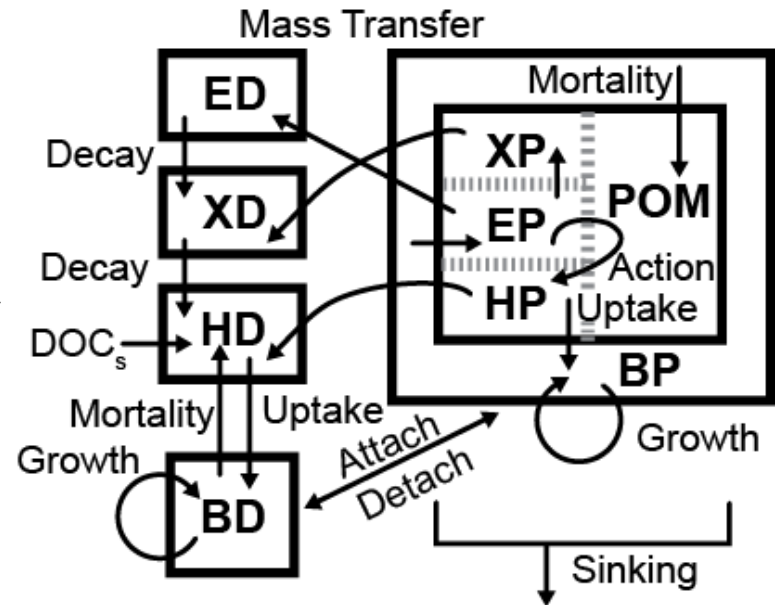
Code development

NOAH Mussel LSM v1.0

Microbial Remineralization Model v1.0

Code development

NOAH Mussel LSM v2.0

Microbial Remineralization Model v1.0

General characteristics of models

1. Environmental input data
   - downloaded from NOAA, NASA, BATS
   - formatted into input files using R

2. Code that simulates physical and biological processes
   - fortran

3. Processing output into graphs
   - analyzed and plotted using R and Python

Novel component

1. Environmental input data
   – downloaded from NOAA, NASA, BATS
   – formatted into input files using R

2. **Code that simulates physical and biological processes**
   – **fortran**

3. Processing output into graphs
   – analyzed and plotted using R and Python

Related component

1. Environmental input data
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3. **Processing output into graphs**
   – **analyzed and plotted using R and Python**

Desire to release code, but...

- developed by 2 scientists working closely together
- poorly annotated
- filepaths for my computer
- software dependencies
- not sure of how to release it
  - intimidated by sourceforge, etc.
  - personal website seems limited

eScience Institute

- learned about github

- digital object identifiers (DOI) have become important for journal publications

- github has instructions for getting a DOI through zenodo

- if open source, there is no cost

- data scientists to answer questions

Accepted for publication in November

(a)

A B

ocean land

(b)

mussel

← body temp.

← contact area

rock

z

y

x
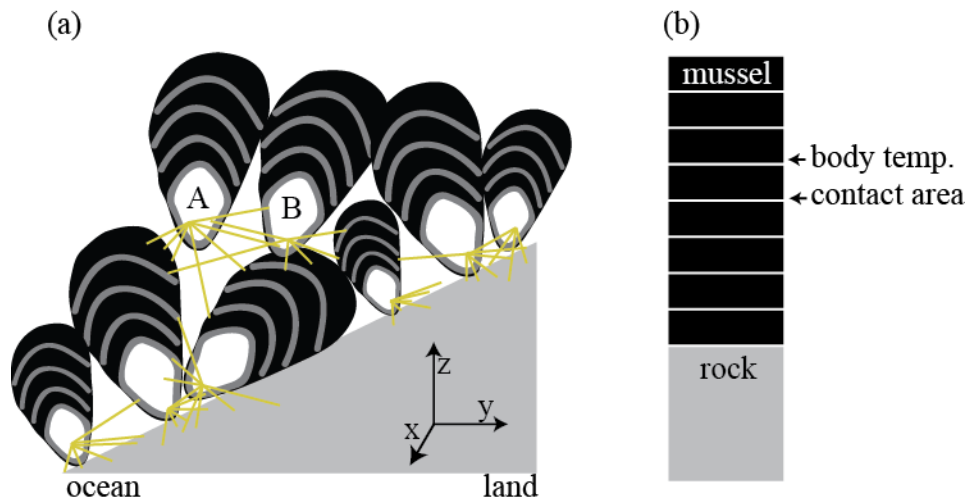
NOAH Mussel LSM v2.0

- Journal encouraged data release

- 1 week to send final paper version

- Should I do a code release?
  - YES!

- Most beneficial to have a DOI in the journal publication

Novel component

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Software for code release

- Github

- Atom to edit README.md file

- Zenodo

https://github.com/kallisons

https://github.com/kallisons

README.md - /Users/kasmith/Code/PublishedProjects/MicrobeReminModel_v1.0 - Atom

MicrobeReminModel_v1.0

- .git
- Graphs
- Input
- Model
- Output
- RCode
- TestFiles
- .DS_Store
- .gitignore
- LICENSE.md
- README.md

README.md tab:

```
[![DOI](https://zenodo.org/badge/8411/kallisons/NOAH_
LSM_Mussel_v2.0.svg)](http://dx.doi.org/10.5281/zenod
o.13380)

NOAH_LSM_Mussel_v2.0
====================

NOAH LSM Mussel v2.0 is a mathematical model that
predicts mussel bed temperatures from atmospheric and
oceanic data by mimicking the thermal properties of a
mussel bed exposed to tidal inundation and wave
run-up. The model is derived from the National
Weather Service NOAH Land Surface Model.  In v2.0, it
is possible to change the within mussel bed contact
which determines conductive heat transfer.  Mussel
survival is predicted using mussel bed temperatures
from the model.

Please cite the following papers if you use this
code:

**NOAH_LSM_Mussel_v2.0**

Mislan, KAS and DS Wethey. 2015. A biophysical basis
for patchy mortality during heat waves. Ecology.

**NOAH_LSM_Mussel_v1.0**

Wethey DS, LD Brin, B Helmuth, and KAS Mislan. 2011.
Predicting intertidal organism temperatures with
modified land surface models.  Ecological Modelling
222:3568-3576.
[http://dx.doi.org/10.1016/j.ecolmodel.2011.08.019](h
ttp://dx.doi.org/10.1016/j.ecolmodel.2011.08.019)

**NOAH_LSM**
```

README.md Preview tab:

DOI 10.5281/zenodo.13380

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NOAH_LSM

Chen F, and J Dudhia. 2001. Coupling an advanced land surface-hydrology model with the Penn State-NCAR MM5 modeling system. Part I: Model implementation and sensitivity. Monthly Weather Review, 129:569-585.

Ek MB, Mitchell KE, Lin Y, Rogers E, Grunmann P, Koren V, and JD Tarpley. 2003. Implementation of Noah land surface model advances in the National Centers for Environmental Prediction operational mesoscale Eta model. Journal of Geophysical Research: Atmospheres (1984–2012), 108(D22). http://dx.doi.org/10.1029/2002JD003296

/Users/kasmith/Code/PublishedProjects/NOAH_LSM_Mussel_v2.0/README.md 1,1

UTF-8   GitHub Markdown

https://github.com/kallisons

Sections in README

- Summary with papers to cite

- NOAH LSM User Guide

- Software dependencies

- Folders description

- Opening a shell (Mac and Windows)

- Compiling the model

- Running the model

- Verify example model output

- Processing the model output with R

- Verify example R output

- Model input data

- Acknowledgements

NOAH LSM Mussel v2.0 - Z...   +

https://zenodo.org/record/13380?ln=en#.VL7EKKZZXn8   Search

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27 December 2014   Software   Open access

NOAH LSM Mussel v2.0

K.A.S. Mislan ; David S. Wethey

(show affiliations)

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NOAH_LSM

Available in

GitHub

Publication date:
27 December 2014

DOI
DOI 10.5281/zenodo.13380

Keyword(s):
model   intertidal   climate change   mussel
temperature   marine   code   software

Published in:
Ecology: in press (2014)

Related publications and datasets:
Supplement to:

https://github.com/kallisons

Forum papers are short empirical, conceptual, or theoretical papers about new and exciting ideas at the forefront of ecology and biogeography. Intellectually challenging papers taking original approaches, pushing or exploring the limits of the field, are favoured. Short papers taking a multidisciplinary approach are specially encouraged. Contributions in this category will be solicited by the editors. However, unsolicited submissions will also be considered and sent for pre-submission assessment by Forum editors.

Review & Synthesis papers provide a critical assessment of the literature with emphasis on current topics in which rapid and significant advances are occurring. Items in this category should be more focused than the broad, topical reviews typically published elsewhere, developing a synthesis that inspires new hypotheses or new methods. Contributions in this category will be solicited by the editors. However, unsolicited submissions will also be considered and sent for pre-submission assessment by Review & Synthesis editors.

Software Notes announce new software or software already in use but not previously published in a peer-reviewed journal for the study of spatial and temporal patterns in ecology. Software Notes should provide a summary of the software that describes its benefits and potential application(s). Software Notes are published with high priority and the section is intended as an outlet for the very best software tools in spatiotemporal ecology. Products that are available only on a commercial basis will not be considered.

Commentaries highlight recent exciting original research in Ecography, or other journals as long as the scope of the Commentary fits clearly that of Ecography. Most items in these sections are commissioned by the editors, but unsolicited contributions are welcome. The writing style should be light and constructive, and the Commentary should be written with a minimum of technical language and jargon. Commentaries should not exceed 1500 words including text, author details, figure/table legends, and references, and will have a maximum of 15 references. 1-2 figure/table items are allowed. Contributed commentaries will be subject to streamlined peer review.

Brevia concisely present important new research results of broad significance. Brevia items should be written in a clear and accessible manner and the use of jargon and abbreviations should be avoided wherever possible. Brevia articles consist of a continuous main text without any sections or subheadings.

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Discussion