# IESM Software Status

John Truesdale, Tony Craig, William Collins

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Societal Dimensions Working Group

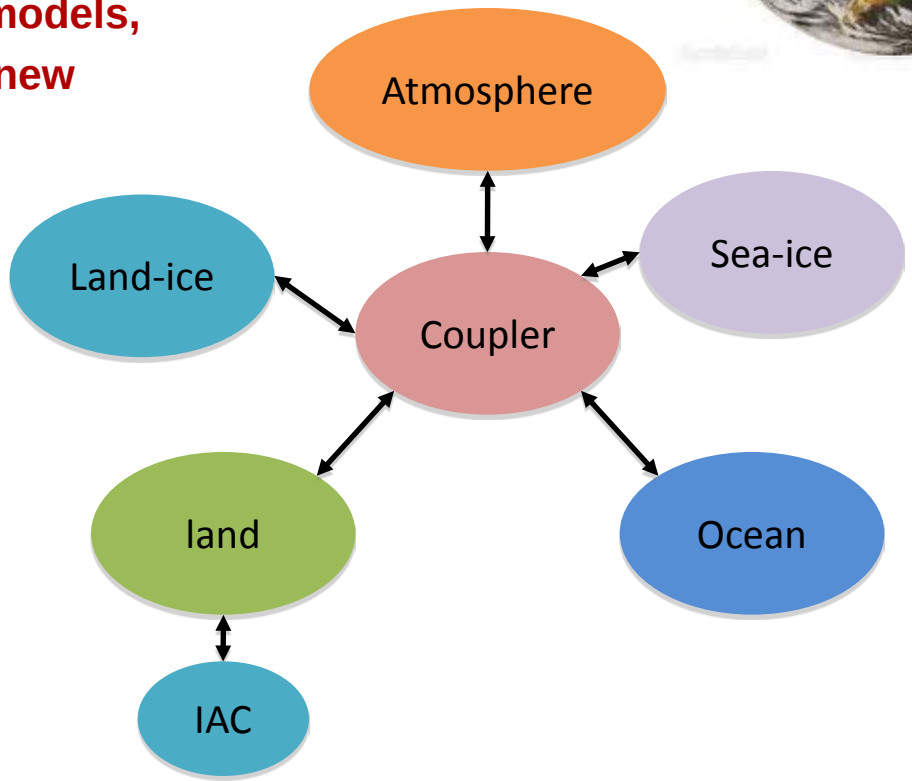
# Outline

- **IESM Code Development**
- **IESM Repository Status/Migration**
- **Configuring, Building, and Running IESM**
- **Future work – NCAR Port**

# Integrated Earth System Model (IESM)

- **IESM is a coupled model with both the human components of an IAM and the physical characteristics of an ESM (Earth System Model).**

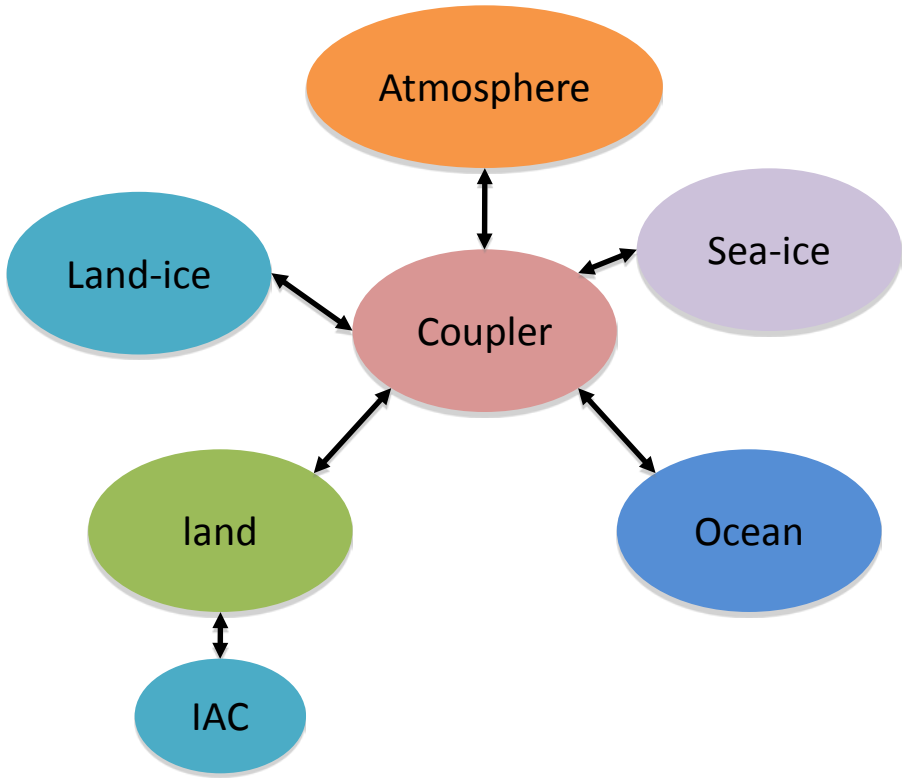
- Composed of **5 separate models, a coupler (CESM), and a new Integrated Assessment subcomponent.**



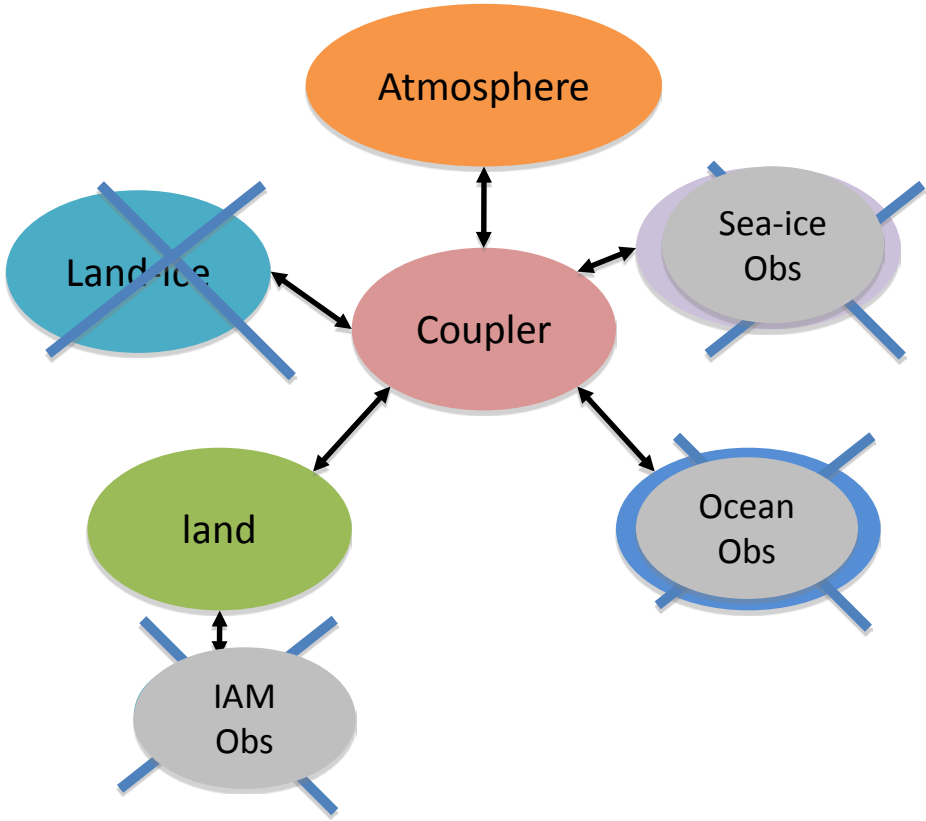
# Capabilities: components settings

- CESM/IESM offers **countless possibilities**:
- Supports several **components configurations**

Fully Coupled Model

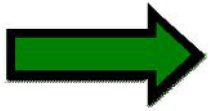



Atmosphere and Land Only



# IESM Repository Status/Migration

## IESM Development Repository

## CESM Repository


- **Original IESM Repo at ORNL**
  - Very Limited access
- **Development work at NERSC**
  - Hopper
  - Hosted all GCAM/GLM boundary data
  - Oracle Berkeley DB XML
- **Finished initial design, implementation, and validation**
  - Focused on seamless integration with CESM
  - IAC single threaded
  - Only a few percent of model run time.
- **Now beginning science runs and adding additional functionality**
  - Data IAC functionality

# IESM Repository Status/Migration (cont.)

- **Last month created initial port to NCAR**
  - IAC ported to very recent CESM tag
    - cesm_1_0 (2010) ->  CESM_1_1_0_rel06 (2012/13)
  - Followed CESM repository conventions
    - new branches for script, driver, component mods
  - Provides CESM developer access
- **Initial IESM test configuration running – not yet validated**
  - First machine supported is Hopper
  - Yellowstone, Titan, Evergreen, others to follow
- **Begin support/conversion to CESM conforming code/requirements**
  - Replace light (development only) API with real CESM functionality
    - clocks, mct packed input output arrays
  - Build IESM specific libraries and import boundary data
    - GCAM/GLM Boundary data
    - Berkeley DB XML 2.5.16

# Configuring, Building and Running CESM

Very complex:  total of **1 500 000 of lines** of code

Very easy to use: can be run with **4 commands** !!!!

```
# (1) create a new case
create_newcase –case case01 –res f09_g16 -compset IRCP45CN -mach hopper

# (2) configure the case
cesm_setup

# (3) build the executable
./case01.hopper.build

# (4) submit the run to the batch queue
./case01.hopper.submit
```

# Configuring, Building and Running IESM

Two additional steps for IESM!!!!

Still Very easy to use !!!!

```
# (1) create a new case
create_newcase –case case01 –res f09_g16 -compset IRCP45CN -mach hopper

# (2) edit env_run.xml –
change CLM_IAC_MODE to giac

# (3) case setup
cesm_setup

# (4) edit/add new giac parameters to user_nl_clm
emacs user_nl_clm – add new surfdat, inidat, history tape variables.

# (5) build the executable
./case01.hopper.build

# (6) submit the run to the batch queue
./case01.hopper.submit
```

# Obtaining IESM

1. Request Access via CESM Developer Code Repository Access Page

   http://www.cesm.ucar.edu/working_groups/Software/secp/repo_access_form.shtml

2. Check out IESM tag using SVN

   setenv SVNREPO \ https://svn-ccsm-models.cgd.ucar.edusvn co
   $SVNREPO/cesm1/exp_tags/cesm1_1_iesm01

   svn co $SVNREPO/cesm1/exp_tags/cesm1_1_iesm01

3. Configure, build, and run just like CESM

   cd scripts

   ./create_newcase -case IAC1 -res f09_g16 -compset IRCP45CN -mach hopper

   cd IAC1

   edit env_run.xml

   change CLM_IAC_MODE to giac

   ./cesm_setup

   edit user_nl_clm, add giac specific clm namelist variables

   *.build

   *.submit

# Future Work – NCAR Port

- **Finish testing and validation**
  - Simple test cases running
  - Work through differences in newer versions CESM compsets
  - Validate against ORNL Repository
- **Documentation/Web Page**
  - README.iesm in top IESM directory
  - Clean up and expand Quick Start Guide
  - Use developers documentation for IESM User Guide
- **Merge Data IAC functionality from ORNL Repository**
- **Bring NCAR port in line with CESM requirements**
  - Begin Dialog with CESM Software Engineers
  - Flesh out IESM interfaces using CESM functionality
- **Refactor IAC subcomponent into full IESM Component???**

# Supporting Cast

- **PNNL – JGCRI**: Ben Bond-Lamberty, Kate Calvin, Jae Edmonds, Mohamad Hejazi, Tony Janetos, Sonny Kim, Page Kyle, Pralit Patel, Allison Thomson, Marshall Wise, Yuyu Zhou
- **PNNL-** Richland: Maoyi Hyang, Ruby Leung, Hongyi Li, Nathalie Voisin
- **ORNL** – Peter Thornton, Marcia Branstetter, Jiafu Mao, Xiaoying Shi
- **LBNL** – Bill Collins, Andy Jones, Lisa Murphy, Alan Di Vittorio, Alan Sanstad, Margaret Torn
- **UMD** - George Hurtt, Louise Chini