IESM Software Status

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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
- Sea-ice
- Land-ice
- Ocean
- Coupler
- Land
- IAC

**Atmosphere and Land Only**

- Atmosphere
- Land-ice
- Coupler
- IAC Obs
- Ocean Obs
- IAM Obs
- Land

**Obs**
IESM Repository Status/Migration

IESM Development 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
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.edu/svn 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