Ocean Modeling and ECCO

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How to get Estimating the Circulation and Climate of the Ocean (ECCO) output

ECCO: Estimating the Circulati ×

Dimitris

www.ecco-group.org

Estimating the Circulation & Climate of the Ocean

about ecco | products | model | automatic differentiation | news archive | publications | computing

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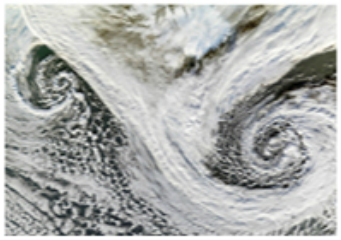
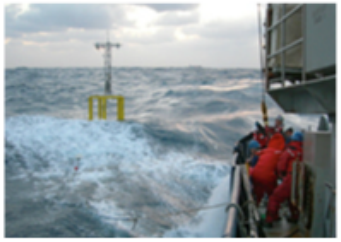
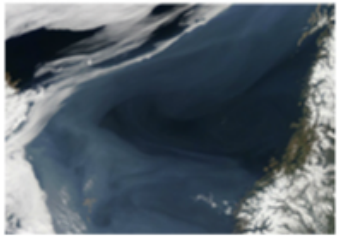


THE ECCO CONSORTIUM

ECCO was established in 1998 as part of the World Ocean Circulation Experiment (WOCE) with the goal of combining a general circulation model (GCM) with diverse observations in order to produce a quantitative depiction of the time-evolving global ocean state. The importance of such an endeavor is recognized by numerous national and international organizations, such as the WMO's World Climate Research Programme (WCRP) and UNESCO's Intergovernmental Oceanographic Comission (IOC). These programs have all noted the necessity of synthesizing the diverse remotely-sensed and in-situ observations with known dynamics and thermodynamics through a GCM. ECCO products are in support of the Climate Variability and Predictability (CLIVAR) programme and the Global Ocean Data Assimilation Experiment (GODAE).
more

ECCO PRODUCTS

ECCO products as well as input fields and quality-controlled observations are freely available from several data servers through various applications (including DODS/OPeNDAP, LAS, GDS, Dapper, SRB, Ingrid).
A summary of available ECCO products and data servers can be found here.

ECCO'S GENERAL CIRCULATION MODEL

The ECCO code is based on the MIT general circulation model (MITgcm), a numerical model designed for study of the atmosphere, ocean, and climate. It comes with a variety of packages including physical parameterizations, a sea-ice model, biochemical components, and allows flexible porting across various HPC platforms.
For more details on the MITgcm click here.

AUTOMATIC/ALGORITHMIC DIFFERENTIATION (AD)

Since the mid-1990's, groups at MIT, SIO, JPL and GFDL have applied automatic/algorithmic differentiation (AD) tools for generating tangent linear and adjoint code for ocean circulation and climate studies. ECCO relies heavily on the AD tool TAMC and its commecial successor TAF. The ECCO group is also involved in the development of a new open-source AD tool OpenAD.
More details can be found here.

IN THE NEWS

July 2017: ECCO version 4 release 3, covering 1992-2015, now available online:

The new release 3 extends the Version 4 estimate using additional observations. The product also incorporates improvements in modeling and estimation. A summary document describes details of the changes. Also available are descriptions of how to evaluate property budgets and how to reproduce the results and generate additional fields using MITgcm..

June 2017: A new 20-yr ECCO climatology is now available online:

ECCO version 4 has been used to calculate a uniform 20-year climatology as a time-mean over the period 1994-2013. The climatology is

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www.ecco-group.org/products.htm

Estimating the Circulation & Climate of the Ocean

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+ products
servers
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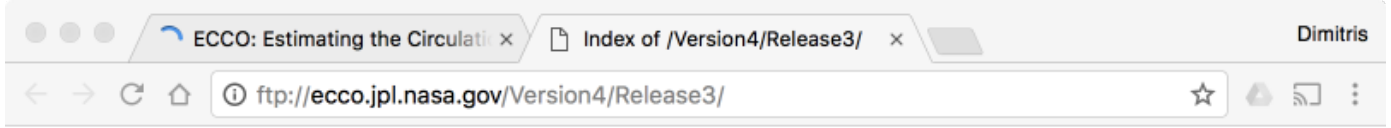
PRODUCTS

ECCO products listed below are freely available through several types of servers (a direct link is provided below via each product's `Release Name' in the product table). We kindly ask users to refer to the citable identifier associated with the product they choose to use (provided below via the `Release identifier' links). The products are listed below in an order that reflects their time of publication (see `Release identifier'). The following products are currently being extended: ECCO-v4 (JPL/AER/MIT), SOSE (UCSD), ECCO2 (JPL), ECCO-JPL (JPL), and GECCO2 (UH).

ECCO products are primarily released in the form of monthly field time series. These fields are primarily distributed on their native model grid to allow for accurate transport and budget computations. However fields interpolated to a simple longitude latitude grid may also be provided, which can most easily be plugged into third party software. Some of the products further provide the associated obsevational inputs, which allow users to e.g. assess model-data misfits. Examples of these supplementary data sets are indicated by a '>' under the associated `Release identifier'.

For comments or questions please concact us via: ecco-support@mit.edu

Product	Release Identifier	Release Name	Covered Time Period	Model Grid	Depth Levels	Estimation Method	Software Generation	Comments
ECCO-V4	I.D.	Release 3	1992-2015	LLC90	50	adjoint	4	Documen-tation
	>	Interpolated climatology	1993-2014	1/2 deg.	50	-	-	Report
ECCO-V4	I.D.	Release 2	1992-2011	LLC90	50	adjoint	4	README; eccov4.pdf
	>	interpolated fields	1992-2011	1/2 deg.	50	-	-	
	>	T-S tendency terms	1992-2015	LLC90	50	-	-	
	>	in-situ profile data sets	1992-2015	pointwise	19 to 55	-	-	
ECCO-V4	I.D.	Release 1	1992-2011	LLC90	50	adjoint	4	NL free surface; real FWF
GECCO2	I.D.	Release 1	1948-2014	0.3 to 1 deg.	50	adjoint	-	
SOSE	I.D.	iteration 100	2005-2010	1/6 deg.	42	adjoint	3	Southern Ocean only



Index of /Version4/Release3/

Name	Size	Date Modified
[parent directory]		
README	2.6 kB	6/29/17, 12:49:00 PM
[illegible]		6/30/17, 12:20:00 PM
input_ecco/		6/14/17, 9:56:00 AM
input_forcing/		6/14/17, 9:56:00 AM
input_init/		6/14/17, 9:56:00 AM
interp_monthly/		6/14/17, 9:56:00 AM
nctiles_daily/		6/14/17, 9:56:00 AM
nctiles_grid/		6/14/17, 9:56:00 AM
nctiles_monthly/		6/14/17, 9:56:00 AM
nctiles_monthly_snapshots/		6/14/17, 9:56:00 AM
other/		6/14/17, 9:59:00 AM
profiles/		6/14/17, 9:57:00 AM

```
------------------------------------------------------------------------------------------------
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ECCO Version 4: Third Release       [ECCO v4-r3] [ftp://ecco.jpl.nasa.gov/Version4/Release3/]
------------------------------------------------------------------------------------------------
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- This directory contains the 'ECCO version 4, release 3' state estimate files:
  README                              This file
  doc                                 basic documentation of the state estimate
  nctiles_grid                        LLC90 grid (in nctiles and MITgcm input formats)
  nctiles_monthly                     monthly mean fields (LLC90 grid)
  nctiles_monthly_snapshots           monthly snapshots at end of each month (LLC90 grid)
  nctiles_daily                       daily mean fields (LLC90 grid)
  profiles                            estimated profiles (model equivalent of observed profiles)
  interp_monthly                      monthly mean fields (interpolated to regular lat-lon grids)
  input_forcing                       atmospheric forcing input for MITgcm/pkg/exf
  input_ecco                          data constraint and error files
  input_init                          files needed to re-run the state estimate
  other                               unadjusted atmospheric forcing and ocean angular momentum
quantities

- References:
  Forget, G., J.-M. Campin, P. Heimbach, C. N. Hill, R. M. Ponte, and C. Wunsch, 2015:
   ECCO version 4: an integrated framework for non-linear inverse modeling and global ocean
   state estimation. Geoscientific Model Development, 8, 3071-3104, doi:10.5194/gmd-8-3071-2015
  Forget, G., J.-M. Campin, P. Heimbach, C. N. Hill, R. M. Ponte, and C. Wunsch, 2016:
   ECCO version 4: Second Release, http://hdl.handle.net/1721.1/102062

- Software:
  The ECCO v4-r3 files were produced using the â€™checkpoint65uâ€™ versions of the general
circulation
   model (MITgcm and ECCO v4 settings) and Matlab analysis toolboxes (gcmfaces and MITprof).
  These software versions are available at http://mitgcm.org/download/other_checkpoints/
   and http://mit.ecco-group.org/opendap/ecco_for_las/version_4/checkpoints/contents.html

- Contact Us:
  ecco-support@mit.edu (please subscribe via http://mailman.mit.edu/mailman/listinfo/ecco-support)

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README file revision history:
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- Add directory other                          [Ou Wang] [2017/05/08]
- Add directory nctiles_daily                  [Ou Wang] [2017/05/03]
- README file creation                         [Ou Wang] [2016/08/02]
```

How to download and run the Massachusetts Institute of Technology general circulation model (MITgcm)

MITgcm

M.I.T General Circulation Model News and Information

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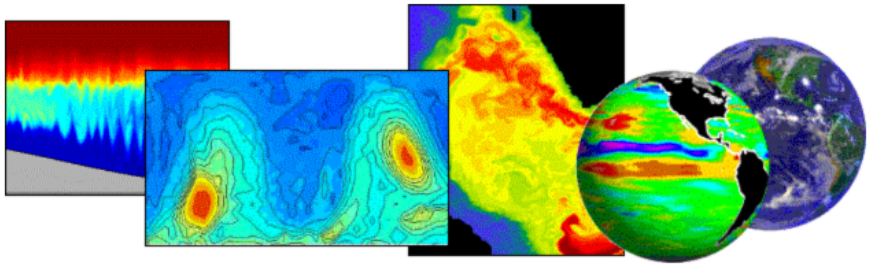
About MITgcm



The **MITgcm** (**MIT** General **C**irculation **M**odel) is a numerical model designed for study of the atmosphere, ocean, and climate. Its non-hydrostatic formulation enables it to simulate fluid phenomena over a wide range of scales; its adjoint capability enables it to be applied to parameter and state estimation problems. By employing fluid isomorphisms, one hydrodynamical kernel can be used to simulate flow in both the atmosphere and ocean.

You are welcome to download and use MITgcm.

Papers charting the development of MITgcm can be found here.

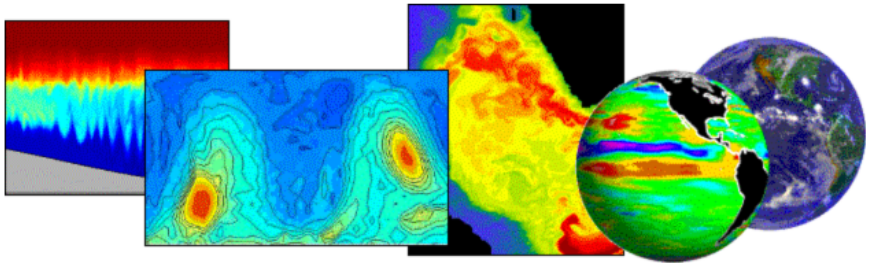
Latest News and Features

Plunging into Early Paleozoic Oceans with MITgcm

Apr 20th, 2017 by Helen Hill

Story by Helen Hill

[print_link]



MITgcm

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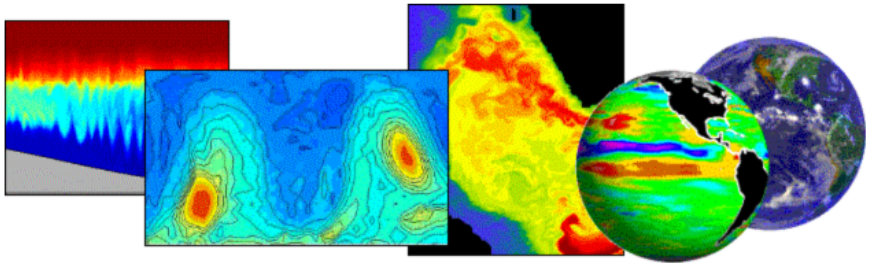
The MITgcm code and documentation are under continuous development. The last official release was called "Release1_patch8" and the current development is stabilizing in anticipation of a "Release2_beta" announcement. Both the last stable release and the current CVS contents can be obtained at:

- View through the CVS code browser
- Download using CVS pserver

```
bash or sh shell:
  $ export CVSROOT=':pserver:cvsanon@mitgcm.org:/u/gcmpack'
  $ cvs login
    ( enter the CVS password: "cvsanon" )
  $ cvs co -P MITgcm

tcsh or csh shell:
  $ setenv CVSROOT ':pserver:cvsanon@mitgcm.org:/u/gcmpack'
  $ cvs login
    ( enter the CVS password: "cvsanon" )
  $ cvs co -P MITgcm
```

- Download the most recent checkpoint as a "tar" file.
- Download one of the daily snap-shots.



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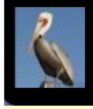
Several documents are currently available:

- The most recent online documentation
- The Release-1 online documentation (stable)
- Our on-line code browser provides a view of the various subroutines, functions and variables, showing how they are called and used.
- An MITgcm "Developer's HOWTO" manual is available in multiple formats:
  - Single-page or Multi-page (html)
  - PDF file or PostScript file

Papers charting the development of MITgcm can be found here.



MITgcm

MITgcm.org Contact Us Site Index

Quick Links

Search

Welcome to the web page for the development/testing version of MITgcm, a numerical model designed for the study of the atmosphere, ocean, and climate. For an overview, please see MIT's Climate Modeling Initiative (CMI) which introduces the MITgcm model, its applications, and the development team.

MITgcm is freely available to all; we encourage you to download it, use it, and give us feedback to help us improve it.

MITgcm:

- can be used to study both atmospheric and oceanic circulation
- has a non-hydrostatic capability
- supports horizontal orthogonal curvilinear coordinates
- has a finite volume treatment of topography
- supports a wide range of physical parameterizations
- has tangent linear and adjoint code maintained alongside the forward model
- can run on your pc, workstation or parallel computer using flexible domain decomposition

Here you can:

- access the user manual (PDF), the online table of contents (HTML), and browse the overview section (HTML)
- read the [illegible] downloading the code or go straight to our online CVS browser and download section
- follow tutorial examples of the use of MITgcm in the study of atmospheric and oceanic flows
- browse the hyperlinked code
- View the "Developer's HOWTO" in multiple formats:
  - Single-page HTML
  - Multi-page HTML
  - PDF file
  - PostScript file

If you have any comments or questions, please contact us here.

Alistair Adcroft, Jean-Michel Campin, Stephanie Dutkiewicz, Constantinos Evangelinos, David Ferreira, Gael Forget, Baylor Fox-Kemper, Patrick Heimbach, Chris Hill, Ed Hill, Helen Hill, Oliver Jahn, Martin Losch, John Marshall, Guillaume Maze, Dimitris Menemenlis and Andrea Molod

Earth, Atmospheric and Planetary Sciences,
Massachusetts Institute of Technology

Last update 2017-08-02

Website designed by Souter Computer Services

3. Getting started with MITgcm

This chapter is divided into two main parts. The first part, which is covered in sections 3.1 through 3.7, contains information about how to run experiments using MITgcm. The second part, covered in sections 3.9 through 3.20, contains a set of step-by-step tutorials for running specific pre-configured atmospheric and oceanic experiments.

We believe the best way to familiarize yourself with the model is to run the case study examples provided with the base version. Information on how to obtain, compile, and run the code is found here as well as a brief description of the model structure directory and the case study examples. Information is also provided here on how to customize the code when you are ready to try implementing the configuration you have in mind. The code and algorithm are described more fully in chapters 2 and 4.

Subsections

… but before running MITgcm you need a Unix-based operating system.
I recommend VirtualBox and Ubuntu (or Lubuntu)


Oracle VM VirtualBox
Dimitris
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Technical docs
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VirtualBox is a powerful x86 and AMD64/Intel64 virtualization product for enterprise as well as home use. Not only is VirtualBox an extremely feature rich, high performance product for enterprise customers, it is also the only professional solution that is freely available as Open Source Software under the terms of the GNU General Public License (GPL) version 2. See "About VirtualBox" for an introduction.
Presently, VirtualBox runs on Windows, Linux, Macintosh, and Solaris hosts and supports a large number of guest operating systems including but not limited to Windows (NT 4.0, 2000, XP, Server 2003, Vista, Windows 7, Windows 8, Windows 10), DOS/Windows 3.x, Linux (2.4, 2.6, 3.x and 4.x), Solaris and OpenSolaris, OS/2, and OpenBSD.
VirtualBox is being actively developed with frequent releases and has an ever growing list of features, supported guest operating systems and platforms it runs on. VirtualBox is a community effort backed by a dedicated company: everyone is encouraged to contribute while Oracle ensures the product always meets professional quality criteria.
News Flash
New July 27th, 2017
VirtualBox 5.1.26 released!
Oracle today released a 5.1 maintenance release which improves stability and fixes regressions. See the Changelog for details.
Important December 2nd, 2016
We're hiring!
Looking for a new challenge? We're looking for a System administrator(Germany).
New July 12th, 2016
VirtualBox 5.1 released!
Many enhancements and improvements. Read more in the announcement.
More information...
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The leading operating system

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2 August 2017

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1 August 2017

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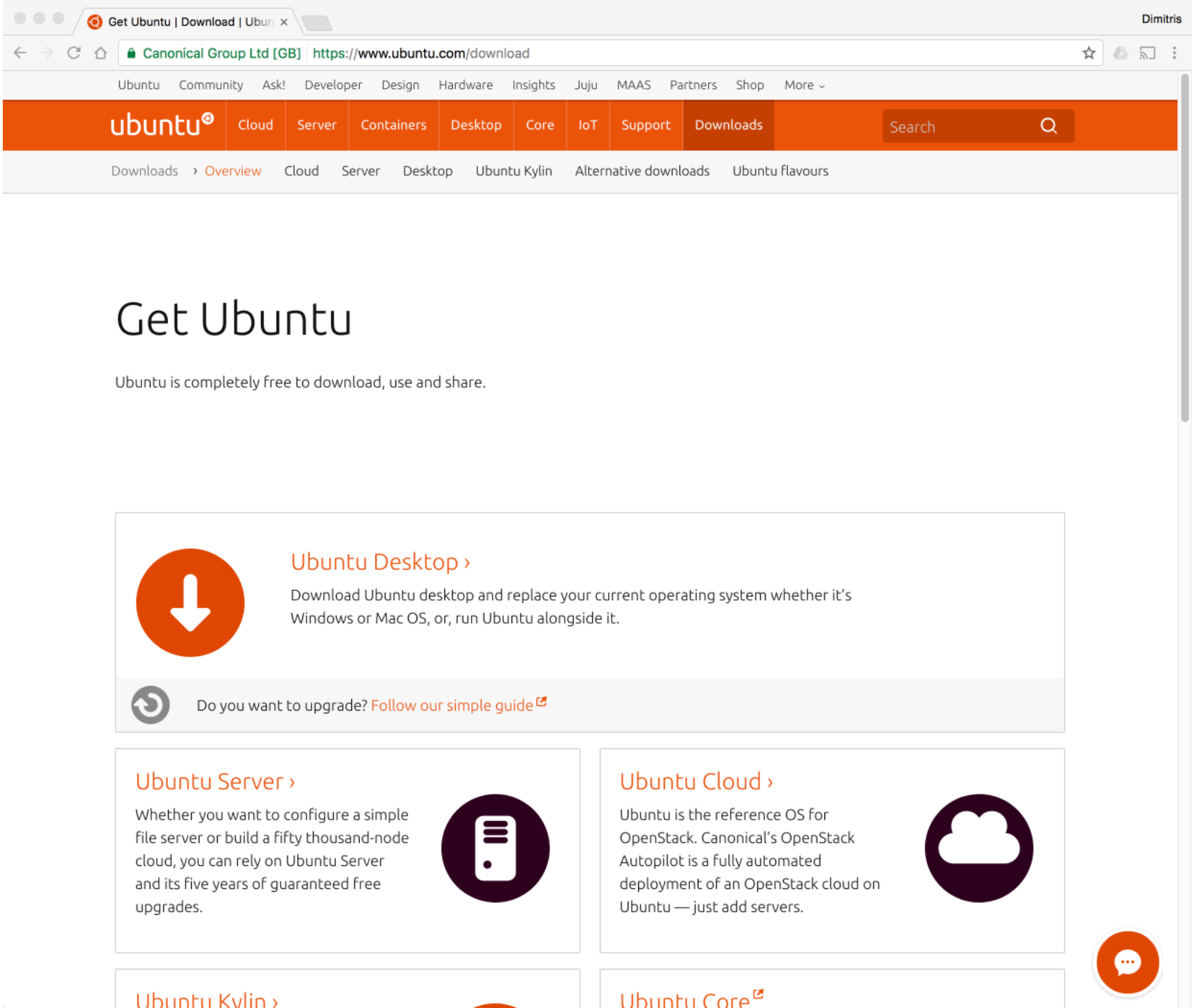
1 August 2017

SPOTLIGHT

Webinar: Speed up your software development lifecycle using Kubernetes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Ubuntu is completely free to download, use and share.
Ubuntu Desktop ›
Download Ubuntu desktop and replace your current operating system whether it's Windows or Mac OS, or, run Ubuntu alongside it.
Do you want to upgrade? Follow our simple guide
Ubuntu Server ›
Whether you want to configure a simple file server or build a fifty thousand-node cloud, you can rely on Ubuntu Server and its five years of guaranteed free upgrades.
Ubuntu Cloud ›
Ubuntu is the reference OS for OpenStack. Canonical's OpenStack Autopilot is a fully automated deployment of an OpenStack cloud on Ubuntu — just add servers.
Ubuntu Kylin ›
Ubuntu Core

My favorite flavor of Ubuntu is Lubuntu because it uses minimal resources and can run on old laptops or workstations

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lightweight, fast, easier

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Help with promotion, like lubuntu on facebook and Follow @lubuntudesktop

lubuntu wiki

Join the lubuntu team and learn more about our subprojects on the lubuntu wiki.

mailing list

check out the mailing list of the lubuntu project

become a developer

Share your development expertise and help shape the future of lubuntu on Launchpad.

artists

Share your artistic skills and design lubuntu art. Join the lubuntu art and

Lubuntu is a fast and lightweight operating system. The core of the system is based on Linux and Ubuntu. Lubuntu uses the minimal desktop LXDE, and a selection of light applications. We focus on speed and energy-efficiency. Because of this, Lubuntu has very low hardware requirements. Lubuntu was founded by Mario Behling and is currently mainly developed by Julien Lavergne. Please join us and contribute to an exciting International Free and Open Source Software project. Install Lubuntu on your computer and start getting involved. Quick links for direct Downloads of the latest version:

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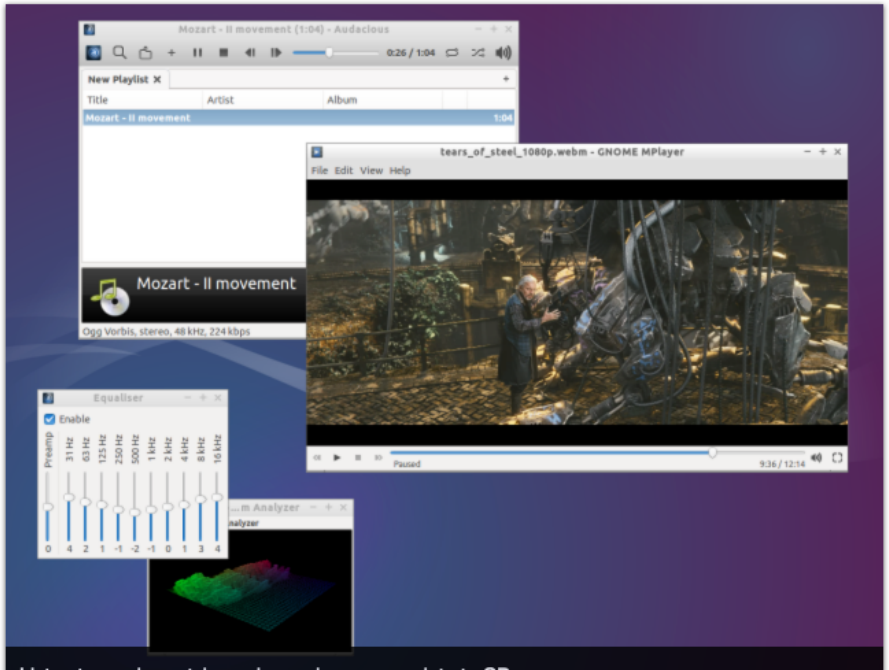
PCs with the Windows 8 logo or UEFI firmware, choose the 64-bit download. Visit the help pages for more info about which download is best for you. The section discusses both the standard installs and those required for computers with low memory (RAM), old chipsets (i586) and low disk-space (netbooks).



Hands-on demo of VirtualBox/Lubuntu/MITgcm

or

movies of km-scale global-ocean + tides simulation

(you pick)