GFDL Stakeholders - The following is a substantial sample of GFDL stakeholders and why they need GFDL

Academia - GFDL hosts a blog on climate science that is used as the basis for courses on climate science in China and the US

Carbon Mitigation Initiative (Stephen Pacala) - The CMI is a partnership between Princeton University and BP with the goal of finding solutions to the carbon and climate problem. GFDL climate science, including studies of climate extremes, is of great interest to CMI, which is currently funding a post-doc (Dr. Monika Barcikowska) stationed at GFDL working on understanding climate variability and change.

CLIVAR Hurricane Working Group - HIRAM motivated the CLIVAR Hurricane Working Group. GFDL provided key support by designing the inter-comparison experiments, supplying forcing data as well as participating in the analysis. The projects have led to a dozen of publications already, more will come. The organizations involved in CLIVAR HWG can be seen from this webpage (http://www.usclivar.org/working-groups/hurricane).

Emory University (Eri Saikawa) - apply regional chemistry models to study the impact of anthropogenic emissions on air quality, using meteorological fields from AM3 simulations (historical and future) as boundary conditions

ENVIRON (Chris Emery) - using AM3 model output as boundary conditions for regional modeling

ESRL/NOAA/CIRES (Joost de Gouw, Ann Middlebrook, Carsten Warneke) - GFDL provided output from our SENEX simulations to the campaign data archive. These PIs are using GFDL results to aid in the interpretation of their SENEX observations. (David Parrish, Owen Cooper) We provided tropospheric O3 concentrations from CM3 simulations to facilitate comparison with observed long-term trends in tropospheric baseline ozone concentrations at northern midlatitudes.

GSFC/NASA (Tom Hanisco and Glenn Wolfe) - also use GFDL model results for SENEX

Harvard University: GEOS-Chem Group (Daniel Jacob) - using the new isoprene photochemical oxidation mechanism developed at GFDL (by Jingqiu Mao); Harvard Smithsonian Center for Astrophysics is using high-resolution AM3 ozone data to evaluate the ability of the future geostationary satellite instrument TEMPO

Hemispheric Transport of Air Pollution Phase 2 - recommends GFDL-AM3 as one of three global models to provide boundary conditions for regional model simulations in order to study the effects on hemispheric pollution transport on finer spatial and temporal scales

International Research Institute for Climate and Society at Columbia University (Lisa Goddard) - Every month GFDL's CVP Group provides predictions of sea surface temperature, surface land temperature and precipitation to the IRI to assist in the generation of their El Nino forecast plume and their "Tier-2" land precipitation and temperature predictions

IPCC AR5 WG1 Ch6 (Philippe Ciais and Christopher Sabine) and Ch12 (Matthew Collins and Reto Knutti) - use GFDL's ESM projections for Carbon Cycle representation and projections under anthropogenic forcing and climate change

Isaac Ginis (University of Rhode Island) - co-developed the air-sea interface and ocean coupling with GFDL for the operational hurricane prediction system

Lamont-Doherty/Columbia University (Arlene Fiore) - use GFDL's AM3 model. They are using output from CMIP5 and other simulations, and are porting AM3 to run on their local computer cluster. They are also collaborators on developing updates for AM3 components.

Lawrence Livermore National Labs (Phil Duffy) - GFDL is collaborating with LLNL and US Army Corps on a joint research project to simulate Superstorm Sandy under pre-industrial conditions. Paper in preparation.

MOM use in major international research and operational efforts

NCEP CFSv2

Australia BLUElink operational ocean forecasting

The Australian Community Climate Earth System Simulator (ACCESS)

NASA JPL (Graham Stephens) - compares AM3-simulated cloud microphysical properties to satellite (CloudSat) retrievals in order to study aerosol effects on precipitation formation

The following institutions are users of Paul Ginoux's dust source:

- NASA GISS (Ron Miller)
- NASA GSFC (Mian Chin)
- NOAA ARL (Richard Artz)

NCAR/CGD, NASA/GSFC (contact: Bill Putman), and NASA/GISS - use the finite volume (FV) core

NHC and NCEP - use GFDL Operational Hurricane Prediction System

NOAA Coral Reef Watch (Mark Eakin) - use GFDL's projections for coral reef bleaching under climate change

NOAA NEFSC (Kevin Friedland and Vincent Saba) - use GFDL ESM biogeochemical and ecological change projections for the Northeast Atlantic

NOAA Ocean Acidification Program (Libby Jewett and Dwight Gledhill) - use GFDL's ESM projections for ocean acidification over the coming century

NOAA ORR (J. A. Galt, Christopher Barker and Debra Payton) - used GFDL's high resolution ocean simulations of the Deepwater Horizon oil spill

NOAA PIFSC (Jeff Polovina) - use GFDL ESM biogeochemical and ecological change projections for the Northwest Pacific

NOAA SWFSC (Cisco Werner and Elliot Hazen) - use GFDL ESM biogeochemical and ecological change projections for the California current system

NOAA/National Weather Service (Jin Huang) - GFDL's CVP Group provides seasonal prediction data to the NWS through the NMME project, and participates in interpretations of the seasonal predictions. Every month GFDL provides the predictions from three initialized coupled systems to the NWS for the following twelve months.

NOAA/NWS Seasonal Hurricane Outlook Team (National Hurricane Center and Climate Prediction Center; Christopher Landsea and Eric Blake) - Every spring and summer GFDL's CVP Group provides results from its real-time seasonal hurricane predictions to the NHC and CPC scientists to help in the generation of NOAA's Seasonal Hurricane Outlook for May, and its August mid-season update

NOAA/NWS/CPC (Yan Xue) - Every month GFDL's CVP Group provides output of our coupled data assimilation system for real-time evaluation of the state of the global oceans, and to help inform the assessment of ENSO predictions

NOAA/OAR/Climate Program Office/Office of Climate Observations (David Legler) - In collaboration with NOAA/NWS/CPC, GFDL-CVP Group has been working to produce an assessment of the impact of different ocean observing system components in estimation of the state of the climate system and on seasonal prediction skill

Purdue University (Jeff Dukes and Nick Smith) - utilize GFDL and Princeton expert input on the Integrated Network for Terrestrial Ecosystem Research on Feedbacks to the Atmosphere and Climate (INTERFACE): Linking experimentalists, ecosystem modelers, and Earth system modelers

Rutgers University, Department of Environmental Sciences (Benjamin R. Lintner) - use GFDL model products, in collaboration with Dr. Kirsten Findell. A post-doc in Dr. Lintner's group is using the CM2.1R prediction-system runs to better understand the relative roles of large-scale SST forcing and local soil moisture anomalies in North American droughts and pluvials.

South Central Climate Science Center (Berrien Moore) - GFDL's statistical downscaling team, led by Keith Dixon, provides a key capability to the SCCSC; namely, evaluating and enhancing the quality of information transferred and translated from the large-scale climate to local-scale climate and impacts. A post doc (Dr. Carlos Gaitan) is stationed at GFDL as part of this collaboration with Univ. of Oklahoma and the SCCSC. Papers describing the method and its application are in preparation.

Taiwan Normal University (Prof. Cheng-Ta Chen) and University of Melbourne (Prof. Kevin Walsh) - use the Zetac regional atmospheric model developed at GFDL for climate simulation of tropical cyclone activity. The model was ported to both Taiwan and Australia and is being run there for northwest Pacific and southwest Pacific basin research applications. One paper is in press, and another in preparation.

Texas A&M University (Rengyi Zhang) - uses GFDL's AM3 to study the impact of Asian air pollutants on the mid-latitude storms

U.S. Army Corps of Engineers (Jeff Arnold) - GFDL was contacted by the Army Corps to help understand potential changes in hurricane surge risk along the US East Coast and is receiving $130K in funding for FY14. The GFDL hurricane model is being used in research mode to

explore climate change impacts on Sandy-like storms. Knutson is a member of the US ACE Numerical Modeling Review Group which reviews a project to compute the joint probability of various coastal storm parameters for the US East Coast.

University of California (Robert Allen) - uses the black carbon wet deposition simulated with GFDL's AM3 model to study the transport and removal of air pollutants

University of Florida (Stefan Gerber) - use GFDL's LM3 to assess land use change and nitrogen feedbacks on the terrestrial carbon sink

University of Maryland (George Hurtt and Louise Chini) - utilize GFDL ESM output of CMIP5 scenarios of LU change and co-lead CMIP6 Land Use MIP

University of Michigan (Joyce Penner) - uses the meteorological fields simulated with GFDL's AM3 model to study their influence on aerosol transport

University of Michigan (Xianglei Huang) - uses GFDL's AM2 and AM3 models to study the band-by-band structure of cloud radiative forcing

University of North Carolina (Jason West) - apply chemical transport models (regional and global) to study health impacts of air pollution, using meteorological fields from AM3 simulations (historical and future) as input/boundary conditions

University of Texas Austin (Rong Fu) - uses a number of GFDL models to examine the underlying causes of Amazonian rainfall biases

University of Toronto (Jon Abbatt) - using box model results for HO2 uptake by aerosols to interpret laboratory results

WCRP/CLIVAR Coordinated Ocean-ice Reference Experiments (CORE)

CORE atmospheric state: A partnership between GFDL and NCAR provides the atmospheric state used to force the CORE simulations. Stakeholders include roughly 20 international ocean climate modeling groups who make use of the CORE forcing for research purposes.

GFDL CORE simulations: GFDL has provided output from three global ocean-ice simulations (MOM, GOLD, and MOM-1/4 degree) for use in the international CORE Phase II comparison project. Stakeholders include roughly 20 international ocean climate modeling groups who make use of the CORE forcing for research purposes.

Ongoing projects making use of these models results include the following:

A. Atlantic climate mean (Danabasoglu, *et al.*)
B. Atlantic climate variability (Danabasoglu, *et al.*)
C. Sea level: global and regional (Griffies, *et al.*)
D. Southern Ocean watermasses (Downes, *et al.*)
E. Southern Ocean circulation (Farneti, *et al.*)
F. Arctic Ocean climate (Wang, *et al.*)
G. Indian Ocean climate (Ravichandran, *et al.*)

Willis Research Network (Geoffrey Saville) - Knutson (Climate Impacts and Extremes Group) and Vecchi (Climate Change, Variability and Predictability Group) are GFDL leads on the participation in the WRN. WRN has funded a two-year postdoctoral position at GFDL (Dr. Hyeong-Seog Kim). This private-sector (re-insurance industry)/public sector (GFDL) collaboration explores potentially useful applications of our hurricane/climate research and models.

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Woodrow Wilson School/Princeton University (Denise Mauzerall) - use GFDL chemistry-climate model output, collaborating with GFDL on climate and air quality impacts

World Meteorological Organization (Tetsuo Nakazawa, Chief of World Weather Research) - The WMO World Weather Research Program/Tropical Cyclone Panel formed an expert team in 2006 on Climate Impacts on Tropical Cyclones. GFDL's Tom Knutson is currently co-chair and Isaac Held is a member of this team, which in 2010 produced an assessment report on Tropical Cyclones and Climate Change (Nature Geoscience, 2010).