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Supplement of

Importance of bitwise identical reproducibility in earth system modeling and status report

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SUPPLEMENTARY INFORMATION

Table of Contents for the Supplementary Information:

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Supplementary Table 1 | Information on each selected paper, including the title, the name of the journal, year of publication, and the number of ensemble members used. These papers are from 17 journals: *Climate Dynamics* (J1), *Geophysical Research Letters* (J2), *Geoscientific Model Development* (J3), *Global and Planetary Change* (J4), *Global Biogeochemical Cycles* (J5), *Journal of Advances in Modelling Earth Systems* (J6), *Journal of Climate* (J7), *Journal of Geophysical Research: Atmospheres* (J8), *Journal of Hydrology* (J9), *Journal of Physical Oceanography* (J10), *Journal of the Atmospheric Sciences* (J11), *Monthly Weather Review* (J12), *Nature* (J13), *Nature Climate Change* (J14), *Nature Geoscience* (J15), *Proceedings of the National Academy of Sciences of the United States of America* (J16), and *Quarterly Journal of the Royal Meteorological Society* (J17).

| No. | Title of Paper | Journal | Year of publication | Number of ensemble members |
|-----|---|---------|---------------------|----------------------------|
| 1 | Enhanced albedo feedback in North Africa from possible combined vegetation and soil-formation processes | J1 | 2006 | - |
| 2 | Sensitivity of the last glacial inception to initial and surface conditions | J1 | 2006 | - |
| 3 | Simulations of warm tropical conditions with application to middle Pliocene atmospheres | J1 | 2006 | - |
| 4 | Future abrupt reductions in the summer Arctic sea ice | J2 | 2006 | <10 |
| 5 | Impact of Atlantic multidecadal oscillations on India/Sahel rainfall and Atlantic hurricanes | J2 | 2006 | <20 |
| 6 | Projected changes in mean and extreme precipitation over the Mediterranean region from a high resolution double nested RCM simulation | J2 | 2006 | - |
| 7 | The climate sensitivity to human appropriation of vegetation productivity and its thermodynamic characterization | J4 | 2006 | - |
| 8 | Reconstructing a lost Eocene paradise-Part I. Simulating the change in global floral distribution at the initial Eocene thermal maximum | J4 | 2006 | - |
| 9 | Adiabatic reduction of circulation-related CO ₂ air-sea flux biases in a North Atlantic carbon-cycle model | J5 | 2006 | - |
| 10 | Analysis of ecosystem controls on soil carbon source-sink relationships in the northwest Great Plains | J5 | 2006 | - |
| 11 | Coastal ocean CO ₂ -carbonic acid- carbonate sediment system of the Anthropocene | J5 | 2006 | - |
| 12 | Dusty weather forecasts using the MesoNH mesoscale atmospheric model | J8 | 2006 | - |

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|----|---|-----|------|------|
| 13 | Quantification of the source of errors in AM2 simulated tropical clear-sky outgoing longwave radiation | J8 | 2006 | <5 |
| 14 | A general circulation model study of the orographic gravity waves over Antarctica excited by katabatic winds | J8 | 2006 | - |
| 15 | Hydrologic response to scenarios of climate change in sub watersheds of the Okanagan basin, British Columbia | J9 | 2006 | <5 |
| 16 | Multifractals, cloud radiances and rain | J9 | 2006 | - |
| 17 | Assessment of an efficient numerical solution of the 1D Richards' equation on bare soil | J9 | 2006 | - |
| 18 | The role of eddies in determining the structure and response of the wind-driven southern hemisphere overturning: Results from the Modelling Eddies in the Southern Ocean (MESO) project | J10 | 2006 | - |
| 19 | The summertime heat budget and circulation of southeast new England shelf waters | J10 | 2006 | - |
| 20 | A Modelling Study of the Impact of Tropical Instability Waves on the Heat Budget of the Eastern Equatorial Pacific | J10 | 2006 | - |
| 21 | Eddy Influences on Hadley Circulations: Simulations with an Idealized GCM | J11 | 2006 | - |
| 22 | High-Resolution Simulation of Shallow-to-Deep Convection Transition over Land Marat Khairoutdinov and David Randall | J11 | 2006 | - |
| 23 | Representing Convective Organization in Prediction Models by a Hybrid Strategy | J11 | 2006 | - |
| 24 | The Operational JMA Nonhydrostatic Mesoscale Model | J12 | 2006 | - |
| 25 | Boundary Conditions for Limited-Area Ensemble Kalman Filters | J12 | 2006 | <100 |
| 26 | Effect of Land–Atmosphere Interactions on the IHOP 24–25 May 2002 Convection Case | J12 | 2006 | - |
| 27 | Modelling conservation in the Amazon basin | J13 | 2006 | - |
| 28 | The Southern Ocean biogeochemical divide | J13 | 2006 | - |
| 29 | Weakening of tropical Pacific atmospheric circulation due to anthropogenic forcing | J13 | 2006 | <10 |
| 30 | Cross influences of ozone and sulfate precursor emissions changes on air quality and climate | J16 | 2006 | - |
| 31 | Distinct metastable atmospheric regimes despite nearly Gaussian statistics: A paradigm model | J16 | 2006 | - |
| 32 | Integrated model shows that atmospheric brown clouds and greenhouse gases have reduced rice harvests in India | J16 | 2006 | <10 |
| 33 | New version of the TOMCAT/SLIMCAT off-line chemical transport model: Intercomparison of stratospheric tracer experiments | J17 | 2006 | - |
| 34 | Sensitivity of extratropical cyclone characteristics to horizontal resolution in the ECMWF model | J17 | 2006 | - |
| 35 | Development of a new wind-rose for the British Isles using radiosonde data, and application to an atmospheric transport mode | J17 | 2006 | - |
| 36 | Global validation of the ISBA sub-grid hydrology | J1 | 2007 | - |

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|----|---|-----|------|-----|
| 37 | The impact of natural and anthropogenic forcings on climate and hydrology since 1550 | J1 | 2007 | - |
| 38 | Long-term effects of anthropogenic CO ₂ emissions simulated with a complex earth system model | J1 | 2007 | <10 |
| 39 | Can the Atlantic Ocean drive the observed multidecadal variability in Northern Hemisphere mean temperature? | J2 | 2007 | <20 |
| 40 | Connections between deep tropical clouds and the Earth's ionosphere | J2 | 2007 | - |
| 41 | Contribution of land-atmosphere coupling to recent European summer heat waves | J2 | 2007 | - |
| 42 | Frequency of precipitation and temperature extremes over France in an anthropogenic scenario- Model results and statistical correction according to observed values | J4 | 2007 | <5 |
| 43 | Extremes in temperature and precipitation around the Mediterranean basin in an ensemble of future climate scenario simulations | J4 | 2007 | <5 |
| 44 | The application of Regional Climate Model output for the simulation of high-mountain permafrost scenarios | J4 | 2007 | - |
| 45 | Estimating the greenhouse gas fluxes of European grasslands with a process-based model: 1. Model evaluation from in situ measurements | J5 | 2007 | - |
| 46 | Enhanced CO ₂ outgassing in the Southern Ocean from a positive phase of the Southern Annular Mode | J5 | 2007 | - |
| 47 | What determines the magnitude of carbon cycle-climate feedbacks? | J5 | 2007 | - |
| 48 | Sensitivity of chemical tracers to meteorological parameters in the MOZART-3 chemical transport model | J8 | 2007 | - |
| 49 | Analysis of the global distribution of water isotopes using the NCAR atmospheric general circulation model | J8 | 2007 | - |
| 50 | Analysis of tropical radiative heating profiles: A comparison of models and observations | J8 | 2007 | - |
| 51 | Global water-balance modelling with WASMOD-M: Parameter estimation and regionalisation | J9 | 2007 | - |
| 52 | An overview of the rangelands atmosphere-hydrosphere-biosphere interaction study experiment in northeastern Asia (RAISE) | J9 | 2007 | - |
| 53 | Improvement of the PEST parameter estimation algorithm through Extended Kalman Filtering | J9 | 2007 | - |
| 54 | Regional dynamic and steric sea level change in response to the IPCC-A1B scenario | J10 | 2007 | - |
| 55 | A correction for land contamination of atmospheric variables near land-sea boundaries | J10 | 2007 | - |
| 56 | Numerical simulation of air-sea coupling during coastal upwelling | J10 | 2007 | - |
| 57 | A Combined Eddy-Diffusivity Mass-Flux Approach for the Convective Boundary Layer | J11 | 2007 | - |
| 58 | Cancellation of aerosol indirect effects in marine stratocumulus through cloud thinning | J11 | 2007 | <50 |
| 59 | Evolution of water vapor concentrations and stratospheric age of air in | J11 | 2007 | <5 |

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|----|---|-----|------|------------|
| | coupled chemistry-climate model simulations | | | |
| 60 | Local Ensemble Transform Kalman Filtering with an AGCM at a T159/L48 Resolution | J12 | 2007 | ≥ 100 |
| 61 | System Design and Evaluation of Coupled Ensemble Data Assimilation for Global Oceanic Climate Studies | J12 | 2007 | < 50 |
| 62 | Examining Two-Way Grid Nesting for Large Eddy Simulation of the PBL Using the WRF Model | J12 | 2007 | - |
| 63 | Warming trends in Asia amplified by brown cloud solar absorption | J13 | 2007 | < 5 |
| 64 | Projected increase in continental runoff due to plant responses to increasing carbon dioxide | J13 | 2007 | ≥ 100 |
| 65 | Changes in climate and land use have a larger direct impact than rising CO ₂ on global river runoff trends | J16 | 2007 | - |
| 66 | Changes in severe thunderstorm environment frequency during the 21st century caused by anthropogenically enhanced global radiative forcing | J16 | 2007 | - |
| 67 | Impact of vegetation removal and soil aridation on diurnal temperature range in a semiarid region: Application to the Sahel | J16 | 2007 | - |
| 68 | A comparison of cloud-resolving model simulations of trade wind cumulus with aircraft observations taken during RICO | J17 | 2007 | - |
| 69 | Evaluation of the Met Office global forecast model using Geostationary Earth Radiation Budget (GERB) data | J17 | 2007 | - |
| 70 | Modelling suppressed and active convection: comparing a numerical weather prediction, cloud-resolving and single-column model | J17 | 2007 | - |
| 71 | Incorporating organic soil into a global climate model | J1 | 2008 | - |
| 72 | Statistical and dynamical assessment of vegetation feedbacks on climate over the boreal forest | J1 | 2008 | < 100 |
| 73 | Response of the mean global vegetation distribution to interannual climate variability | J1 | 2008 | - |
| 74 | Impact of stratospheric ozone hole recovery on Antarctic climate | J2 | 2008 | < 50 |
| 75 | Relevance of ERA40 dynamical downscaling for modelling deep convection in the Mediterranean Sea | J2 | 2008 | - |
| 76 | When can we expect extremely high surface temperatures? | J2 | 2008 | < 20 |
| 77 | Presentation, calibration and validation of the low-order, DCESS Earth System Model (Version 1) | J3 | 2008 | - |
| 78 | European bioclimatic affinity groups: Data-model comparisons | J4 | 2008 | - |
| 79 | Possible impacts of 21st century climate on vegetation in Central and West Africa | J4 | 2008 | - |
| 80 | The influence of different environmental and climatic conditions on vegetated aeolian dune landscape development and response | J4 | 2008 | - |
| 81 | Future changes in climate, ocean circulation, ecosystems, and biogeochemical cycling simulated for a business-as-usual CO ₂ emission scenario until year 4000 AD | J5 | 2008 | - |
| 82 | Global 3-D land-ocean-atmosphere model for mercury: Present-day versus preindustrial cycles and anthropogenic enrichment factors for deposition | J5 | 2008 | - |

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| 83 | Simulated 21st century's increase in oceanic suboxia by CO ₂ -enhanced biotic carbon export | J5 | 2008 | - |
| 84 | Consequences of considering carbon-nitrogen interactions on the feedbacks between climate and the terrestrial carbon cycle | J7 | 2008 | - |
| 85 | The annual cycle of the energy budget. Part I: Global mean and land-ocean exchanges | J7 | 2008 | - |
| 86 | Energy of Midlatitude Transient Eddies in Idealized Simulations of Changed Climates | J7 | 2008 | - |
| 87 | Goddard Earth Observing System chemistry-climate model simulations of stratospheric ozone-temperature coupling between 1950 and 2005 | J8 | 2008 | <5 |
| 88 | Radiative impact of boreal smoke in the Arctic: Observed and modeled | J8 | 2008 | - |
| 89 | Spectrally resolved fluxes derived from collocated AIRS and CERES measurements and their application in model evaluation: Clear sky over the tropical oceans | J8 | 2008 | - |
| 90 | The impacts of climate change on hydrology in Ireland | J9 | 2008 | ≥100 |
| 91 | Estimated changes in flood quantiles of the river Meuse from resampling of regional climate model output | J9 | 2008 | - |
| 92 | Comparison of the estimated water and energy budgets of a large winter wheat field during AgriSAR 2006 by multiple sensors and models | J9 | 2008 | - |
| 93 | Permanent Meanders in the California Current System | J10 | 2008 | - |
| 94 | The Storm-Track Response to Idealized SST Perturbations in an Aquaplanet GCM | J11 | 2008 | - |
| 95 | Factors Determining the Impact of Aerosols on Surface Precipitation from Clouds: An Attempt at Classification | J11 | 2008 | - |
| 96 | Subsiding Shells around Shallow Cumulus Clouds | J11 | 2008 | <20 |
| 97 | Impact of a New Radiation Package, McRad, in the ECMWF Integrated Forecasting System | J12 | 2008 | <5 |
| 98 | The Ocean-Land-Atmosphere Model (OLAM). Part II: Formulation and Tests of the Nonhydrostatic Dynamic Core | J12 | 2008 | - |
| 99 | The Ocean-Land-Atmosphere Model (OLAM). Part I: Shallow-Water Tests | J12 | 2008 | - |
| 100 | Increasing risk of Amazonian drought due to decreasing aerosol pollution | J13 | 2008 | - |
| 101 | Mountain pine beetle and forest carbon feedback to climate change | J13 | 2008 | - |
| 102 | Coherent high- and low-latitude control of the northwest African hydrological balance | J15 | 2008 | - |
| 103 | Increase in hourly precipitation extremes beyond expectations from temperature changes | J15 | 2008 | - |
| 104 | Oceanic link between abrupt changes in the North Atlantic Ocean and the African monsoon | J15 | 2008 | <10 |
| 105 | A bulk turbulent air-sea flux algorithm for high-wind, spray conditions | J10 | 2008 | - |
| 106 | The role of Southern Ocean surface forcings and mixing in the global conveyor | J10 | 2008 | - |
| 107 | Impact of geoengineering schemes on the global hydrological cycle | J16 | 2008 | - |

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|-----|--|-----|------|------|
| 108 | Massive global ozone loss predicted following regional nuclear conflict | J16 | 2008 | - |
| 109 | Predicting and understanding forest dynamics using a simple tractable model | J16 | 2008 | <100 |
| 110 | Analysis of the 26 July 2005 heavy rain event over Mumbai, India using the Weather Research and Forecasting (WRF) model | J17 | 2008 | ≥100 |
| 111 | Modelling suppressed and active convection: Comparisons between three global atmospheric models | J17 | 2008 | - |
| 112 | The impact of aerosols on non-precipitating marine stratocumulus.I: Model description and prediction of the indirect effect | J17 | 2008 | - |
| 113 | Effects of global irrigation on the near-surface climate | J1 | 2009 | - |
| 114 | Climate response to the physiological impact of carbon dioxide on plants in the Met Office Unified Model HadCM3 | J1 | 2009 | - |
| 115 | Influence of modern land cover on the climate of the United States | J1 | 2009 | - |
| 116 | Are historical records sufficient to constrain ENSO simulations? | J2 | 2009 | - |
| 117 | Impacts of climate change on stratospheric ozone recovery | J2 | 2009 | - |
| 118 | Suppression of south Asian summer monsoon precipitation in the 21st century | J2 | 2009 | - |
| 119 | Simulated pre-industrial climate in Bergen Climate Model (version 2): model description and large-scale circulation features | J3 | 2009 | - |
| 120 | Simulations of the impacts of dynamic vegetation on interannual and interdecadal variability of Asian summer monsoon with modern and mid-Holocene orbital forcings | J4 | 2009 | - |
| 121 | Climate model sensitivity to atmospheric CO ₂ concentrations for the middle Miocene | J4 | 2009 | - |
| 122 | Comparison of mid-Pliocene climate predictions produced by the HadAM3 and GCMAM3 General Circulation Models | J4 | 2009 | - |
| 123 | Effects of anthropogenic land cover change on the carbon cycle of the last millennium | J5 | 2009 | - |
| 124 | Impacts of increasing anthropogenic soluble iron and nitrogen deposition on ocean biogeochemistry | J5 | 2009 | - |
| 125 | Natural variability and anthropogenic trends in oceanic oxygen in a coupled carbon cycle-climate model ensemble | J5 | 2009 | <10 |
| 126 | Lifetime of Anthropogenic Climate Change: Millennial Time Scales of Potential CO ₂ and Surface Temperature Perturbations | J7 | 2009 | - |
| 127 | Will Extratropical Storms Intensify in a Warmer Climate? | J7 | 2009 | - |
| 128 | Stable water isotopes in HadCM3: Isotopic signature of El Niño–Southern Oscillation and the tropical amount effect | J8 | 2009 | - |
| 129 | Numerical model simulation of the Saharan dust event of 6-11 March 2006 using the Regional Climate Model version 3 (RegCM3) | J8 | 2009 | - |
| 130 | Evaluating regional cloud-permitting simulations of the WRF model for the Tropical Warm Pool International Cloud Experiment (TWP-ICE), Darwin, 2006 | J8 | 2009 | - |
| 131 | The impact of soil moisture changes on gravity residuals obtained with a | J9 | 2009 | - |

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| | superconducting gravimeter | | | |
| 132 | Large-scale coupled hydrologic and hydraulic modelling of the Ob river in Siberia | J9 | 2009 | - |
| 133 | An easily implemented agro-hydrological procedure with dynamic root simulation for water transfer in the crop-soil system: Validation and application | J9 | 2009 | - |
| 134 | Comparison of three downscaling methods in simulating the impact of climate change on the hydrology of Mediterranean basins | J9 | 2010 | - |
| 135 | The Effect of Wind-Wave-Current Interaction on Air-Sea Momentum Fluxes and Ocean Response in Tropical Cyclones | J10 | 2009 | - |
| 136 | Modelling the Pathways and Mean Dynamics of River Plume Dispersal in the New York Bight | J10 | 2009 | - |
| 137 | Combined Effects of Wind, Tide, and Horizontal Density Gradients on Stratification in Estuaries and Coastal Seas | J10 | 2009 | - |
| 138 | Convection in a Parameterized and Superparameterized Model and Its Role in the Representation of the MJO | J11 | 2009 | - |
| 139 | How Do Outer Spiral Rainbands Affect Tropical Cyclone Structure and Intensity? | J11 | 2009 | - |
| 140 | Structure of the Madden-Julian Oscillation in the Superparameterized CAM | J11 | 2009 | - |
| 141 | Parameterization of PBL Processes in an Atmospheric General Circulation Model: Description and Preliminary Assessment | J12 | 2009 | - |
| 142 | The Maximum Intensity of Tropical Cyclones in Axisymmetric Numerical Model Simulations | J12 | 2009 | - |
| 143 | Evaluation of Planetary Boundary Layer Parameterizations in Tropical Cyclones by Comparison of In Situ Observations and High-Resolution Simulations of Hurricane Isabel (2003). Part I: Initialization, Maximum Winds, and the Outer-Core Boundary Layer | J12 | 2009 | - |
| 144 | The role of terrestrial plants in limiting atmospheric CO ₂ decline over the past 24 million years | J13 | 2009 | - |
| 145 | Warming caused by cumulative carbon emissions towards the trillionth tonne | J13 | 2009 | - |
| 146 | Increased seasonality through the Eocene to Oligocene transition in northern high latitudes | J13 | 2009 | - |
| 147 | Asian dust transported one full circuit around the globe | J15 | 2009 | - |
| 148 | Climate response to regional radiative forcing during the twentieth century | J15 | 2009 | <10 |
| 149 | Ocean methane hydrates as a slow tipping point in the global carbon cycle | J16 | 2009 | - |
| 150 | On the stability of the Atlantic meridional overturning circulation | J16 | 2009 | - |
| 151 | Setting cumulative emissions targets to reduce the risk of dangerous climate change | J16 | 2009 | <20 |
| 152 | Representation and prediction of the Indian Ocean dipole in the POAMA seasonal forecast model | J17 | 2009 | <20 |
| 153 | Sources of water vapour contributing to the Elbe flood in August 2002-A | J17 | 2009 | <10 |

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| | tagging study in a mesoscale model | | | |
| 154 | Two-way one-dimensional high-resolution air-sea coupled modelling applied to Mediterranean heavy rain events | J17 | 2009 | - |
| 155 | A method for climate and vegetation reconstruction through the inversion of a dynamic vegetation model | J1 | 2010 | - |
| 156 | Climate modification by future ice sheet changes and consequences for ice sheet mass balance | J1 | 2010 | - |
| 157 | Role of dynamic vegetation in regional climate predictions over western Africa | J1 | 2010 | - |
| 158 | Do global warming targets limit heatwave risk? | J2 | 2010 | ≥100 |
| 159 | Global warming shifts Pacific tropical cyclone location | J2 | 2010 | - |
| 160 | Persistence of heat waves and its link to soil moisture memory | J2 | 2010 | - |
| 161 | Sensitivity of 21st century stratospheric ozone to greenhouse gas scenarios | J2 | 2010 | - |
| 162 | An ocean-atmosphere climate simulation with an embedded cloud resolving model | J2 | 2010 | - |
| 163 | Enhanced nutrient supply to the California Current Ecosystem with global warming and increased stratification in an earth system model | J2 | 2010 | - |
| 164 | Quantifying carbon - nitrogen feedbacks in the Community Land Model (CLM4) | J2 | 2010 | - |
| 165 | Simulating emission and chemical evolution of coarse sea-salt particles in the Community Multiscale Air Quality (CMAQ) model | J3 | 2010 | - |
| 166 | Bergen Earth system model (BCM-C): model description and regional climate-carbon cycle feedbacks assessment | J3 | 2010 | - |
| 167 | Aeolian dust modelling over the past four glacial cycles with CLIMBER-2 | J4 | 2010 | - |
| 168 | Weather regimes—Moroccan precipitation link in a regional climate change simulation | J4 | 2010 | <20 |
| 169 | An attempt to quantify the impact of changes in wetland extent on methane emissions on the seasonal and interannual time scales | J5 | 2010 | - |
| 170 | The Impact of North Atlantic-Arctic Multidecadal Variability on Northern Hemisphere Surface Air Temperature | J7 | 2010 | - |
| 171 | Validation of a High-Resolution Regional Climate Model for the Alpine Region and Effects of a Subgrid-Scale Topography and Land Use Representation | J7 | 2010 | - |
| 172 | Evaluation of tropical cloud and precipitation statistics of Community Atmosphere Model version 3 using CloudSat and CALIPSO data | J8 | 2010 | - |
| 173 | Impact of air-sea interaction on East Asian summer monsoon climate in WRF | J8 | 2010 | <5 |
| 174 | Climate simulations with a new air-sea turbulent flux parameterization in the National Center for Atmospheric Research Community Atmosphere Model (CAM3) | J8 | 2010 | - |
| 175 | Actual evapotranspiration assessment by means of a coupled energy/hydrologic balance model: Validation over an olive grove by means of scintillometry and measurements of soil water contents | J9 | 2010 | - |

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| 176 | Climate informed monthly streamflow forecasts for the Brazilian hydropower network using a periodic ridge regression model | J9 | 2010 | - |
| 177 | The Role of Mesoscale Eddies in the Remote Oceanic Response to Altered Southern Hemisphere Winds | J10 | 2010 | <5 |
| 178 | Jet Formation and Evolution in Baroclinic Turbulence with Simple Topography | J10 | 2010 | - |
| 179 | Genesis of Pre-Hurricane Felix (2007). Part I: The Role of the Easterly Wave Critical Layer | J11 | 2010 | - |
| 180 | Initial Development and Genesis of Hurricane Dolly(2008) | J11 | 2010 | - |
| 181 | Sensitivity of Tropical Cyclone Inner-Core Size and Intensity to the Radial Distribution of Surface Entropy Flux | J11 | 2010 | - |
| 182 | The Ocean-Land-Atmosphere Model: Optimization and Evaluation of Simulated Radiative Fluxes and Precipitation | J12 | 2010 | - |
| 183 | A Numerical Investigation of the Effects of Dry Air Aloft on Deep Convection | J12 | 2010 | - |
| 184 | Retrospective Forecasts of the Hurricane Season Using a Global Atmospheric Model Assuming Persistence of SST Anomalies | J12 | 2010 | <10 |
| 185 | Decreased frequency of North Atlantic polar lows associated with future climate warming | J13 | 2010 | - |
| 186 | Tropical cyclones and permanent El Niño in the early Pliocene epoch | J13 | 2010 | - |
| 187 | Earth system sensitivity inferred from Pliocene modelling and data | J15 | 2010 | - |
| 188 | Influence of high-latitude vegetation feedbacks on late Palaeozoic glacial cycles | J15 | 2010 | - |
| 189 | Influence of the state of the Indian Ocean Dipole on the following year's El Niño | J15 | 2010 | - |
| 190 | Climate mitigation and the future of tropical landscapes | J16 | 2010 | - |
| 191 | Greenhouse gas emissions from alternative futures of deforestation and agricultural management in the southern Amazon | J16 | 2010 | - |
| 192 | Observed suppression of ozone formation at extremely high temperatures due to chemical and biophysical feedbacks | J16 | 2010 | - |
| 193 | Can mesoscale models reproduce meandering motions? | J17 | 2010 | - |
| 194 | A modelling case-study of soil moisture-atmosphere coupling | J17 | 2010 | - |
| 195 | Simulation of the Madden-Julian Oscillation and its teleconnections in the ECMWF forecast system | J17 | 2010 | <20 |
| 196 | A regional and global analysis of carbon dioxide physiological forcing and its impact on climate | J1 | 2011 | <20 |
| 197 | COSMO-CLM2 a new version of the COSMO-CLM model coupled to the Community Land Model | J1 | 2011 | - |
| 198 | Global and regional ocean carbon uptake and climate change: sensitivity to a substantial mitigation scenario | J1 | 2011 | - |
| 199 | A step-response simple climate model to reconstruct and interpret AOGCM projections | J2 | 2011 | - |
| 200 | Recovery mechanisms of Arctic summer sea ice | J2 | 2011 | <5 |

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| 201 | Ice-core data evidence for a prominent near 20 year time-scale of the Atlantic Multidecadal Oscillation | J2 | 2011 | - |
| 202 | Development and evaluation of an Earth-System model – HadGEM2 | J3 | 2011 | - |
| 203 | The HadGEM2-ES implementation of CMIP5 centennial simulations | J3 | 2011 | <5 |
| 204 | The HadGEM2 family of Met Office Unified Model climate configurations | J3 | 2011 | <10 |
| 205 | Modelling the 8.2 ka event using a coupled atmosphere-ocean GCM | J4 | 2011 | <20 |
| 206 | Testing DNDC model for simulating soil respiration and assessing the effects of climate change on the CO ₂ gas flux from Irish agriculture | J4 | 2011 | - |
| 207 | Attributing uncertainties in simulated biospheric carbon fluxes to different error sources | J5 | 2011 | - |
| 208 | China's terrestrial carbon balance: Contributions from multiple global change factors | J5 | 2011 | - |
| 209 | The impact of the North Atlantic Oscillation on the uptake and accumulation of anthropogenic CO ₂ by North Atlantic Ocean mode waters | J5 | 2011 | - |
| 210 | Parameterizing Convective Organization to Escape the Entrainment Dilemma | J6 | 2011 | - |
| 211 | Droplet nucleation: Physically-based parameterizations and comparative evaluation | J6 | 2011 | - |
| 212 | The Dynamical Core, Physical Parameterizations, and Basic Simulation Characteristics of the Atmospheric Component AM3 of the GFDL Global Coupled Model CM3 | J7 | 2011 | <10 |
| 213 | Atmospheric and Surface Contributions to Planetary Albedo | J7 | 2011 | - |
| 214 | Analysis of the Arctic atmospheric energy budget in WRF: A comparison with reanalyses and satellite observations | J8 | 2011 | - |
| 215 | Analysis of the biases in the downward shortwave surface flux in the GFDL CM2.1 general circulation model | J8 | 2011 | <10 |
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| 219 | Upper-Ocean Response to Hurricane Frances (2004) Observed by Profiling EM-APEX Floats | J10 | 2011 | - |
| 220 | On the Nature and Variability of the East Greenland Spill Jet: A Case Study in Summer 2003 | J10 | 2011 | - |
| 221 | Dynamically Forced Increase of Tropical Upwelling in the Lower Stratosphere | J11 | 2011 | - |
| 222 | Response of Tropical Precipitation to Global Warming | J11 | 2011 | - |
| 223 | A Dynamical Interpretation of the Poleward Shift of the Jet Streams in Global Warming Scenarios | J11 | 2011 | - |
| 224 | A Coupled Atmosphere–Wave–Ocean Modelling System: Simulation of | J12 | 2011 | - |

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| | the Intensity of an Idealized Tropical Cyclone | | | |
| 225 | Development of a Coupled Groundwater–Atmosphere Model | J12 | 2011 | - |
| 226 | Operational Convective-Scale Numerical Weather Prediction with the COSMO Model: Description and Sensitivities | J12 | 2011 | - |
| 227 | Late Holocene methane rise caused by orbitally controlled increase in tropical sources | J13 | 2011 | - |
| 228 | Anthropogenic greenhouse gas contribution to flood risk in England and Wales in autumn 2000 | J13 | 2011 | ≥100 |
| 229 | Melt-induced speed-up of Greenland ice sheet offset by efficient subglacial drainage | J13 | 2011 | - |
| 230 | Model-based evidence of deep-ocean heat uptake during surface-temperature hiatus periods | J14 | 2011 | <10 |
| 231 | Importance of background climate in determining impact of land-cover change on regional climate | J14 | 2011 | - |
| 232 | A model for orbital pacing of methane hydrate destabilization during the Palaeogene | J15 | 2011 | - |
| 233 | Departures from eustasy in Pliocene sea-level records | J15 | 2011 | - |
| 234 | Ongoing climate change following a complete cessation of carbon dioxide emissions | J15 | 2011 | - |
| 235 | Implications for the hydrologic cycle under climate change due to the expansion of bioenergy crops in the Midwestern United States | J16 | 2011 | <50 |
| 236 | Laboratory simulations show diabatic heating drives cumulus-cloud evolution and entrainment | J16 | 2011 | - |
| 237 | Permafrost carbon-climate feedbacks accelerate global warming | J16 | 2011 | - |
| 238 | Stratospheric gravity waves revealed in NWP model forecasts | J17 | 2011 | - |
| 239 | Unified treatment of dry convective and stratocumulus-topped boundary layers in the ECMWF model | J17 | 2011 | <20 |
| 240 | The Canadian Global Environmental Multiscale model on the Yin-Yang grid system | J17 | 2011 | - |
| 241 | Bi-decadal variability excited in the coupled ocean–atmosphere system by strong tropical volcanic eruptions | J1 | 2012 | <10 |
| 242 | EC-Earth V2.2: description and validation of a new seamless earth system prediction model | J1 | 2012 | - |
| 243 | Global off-line evaluation of the ISBA-TRIP flood model | J1 | 2012 | - |
| 244 | Abrupt onset of the Little Ice Age triggered by volcanism and sustained by sea-ice/ocean feedbacks | J2 | 2012 | - |
| 245 | Local and remote controls on observed Arctic warming | J2 | 2012 | - |
| 246 | CAM-chem: description and evaluation of interactive atmospheric chemistry in the Community Earth System Model | J3 | 2012 | - |
| 247 | Toward a minimal representation of aerosols in climate models: description and evaluation in the Community Atmosphere Model CAM5 | J3 | 2012 | - |
| 248 | Pre-industrial and mid-Pliocene simulations with NorESM-L | J3 | 2012 | - |
| 249 | Coastal marsh die-off and reduced attenuation of coastal floods: A model | J4 | 2012 | - |

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| | analysis | | | |
| 250 | The medieval climate anomaly in Europe - Comparison of the summer and annual mean signals in two reconstructions and in simulations with data assimilation | J4 | 2012 | <100 |
| 251 | Analysis of seasonality and annual mean distribution of atmospheric potential oxygen (APO) in the Pacific region | J5 | 2012 | - |
| 252 | Atmospheric fluxes of organic N and P to the global ocean | J5 | 2012 | - |
| 253 | The importance of the terrestrial weathering feedback for multimillennial coral reef habitat recovery | J5 | 2012 | - |
| 254 | An improved lake model for climate simulations: Model structure, evaluation, and sensitivity analyses in CESM1 | J6 | 2012 | - |
| 255 | A mechanistic ecohydrological model to investigate complex interactions in cold and warm water-controlled environments: 2. Spatiotemporal analyses | J6 | 2012 | - |
| 256 | Fast cloud adjustment to increasing CO ₂ in a superparameterized climate model | J6 | 2012 | - |
| 257 | Tuning the climate of a global model | J6 | 2012 | - |
| 258 | The CCSM4 Land Simulation, 1850-2005: Assessment of Surface Climate and New Capabilities | J7 | 2012 | <10 |
| 259 | GFDL's ESM2 Global Coupled Climate-Carbon Earth System Models. Part I: Physical Formulation and Baseline Simulation Characteristics | J7 | 2012 | - |
| 260 | Simulating the Biogeochemical and Biogeophysical Impacts of Transient Land Cover Change and Wood Harvest in the Community Climate System Model (CCSM4) from 1850 to 2100 | J7 | 2012 | - |
| 261 | Evaluation of nonlocal and local planetary boundary layer schemes in the WRF model | J8 | 2012 | - |
| 262 | WRF simulation over complex terrain during a southern California wildfire event | J8 | 2012 | - |
| 263 | Local and large-scale atmospheric responses to reduced Arctic sea ice and ocean warming in the WRF model | J8 | 2012 | <20 |
| 264 | Hydrological impacts of land use change in three diverse South African catchments | J9 | 2012 | - |
| 265 | Assessing the effects of urbanization on annual runoff and flood events using an integrated hydrological modelling system for Qinhui River basin, China | J9 | 2012 | - |
| 266 | Calibrating a soil-vegetation-atmosphere transfer model with remote sensing estimates of surface temperature and soil surface moisture in a semi arid environment | J9 | 2012 | - |
| 267 | Transient Evolution of Langmuir Turbulence in Ocean Boundary Layers Driven by Hurricane Winds and Waves | J10 | 2012 | - |
| 268 | Seasonal Variation of the Indonesian Throughflow in Makassar Strait | J10 | 2012 | - |
| 269 | Multidecadal Sea Level and Gyre Circulation Variability in the Northwestern Tropical Pacific Ocean | J10 | 2012 | - |
| 270 | A Particle-Surface-Area-Based Parameterization of Immersion Freezing on | J11 | 2012 | - |

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| | Desert Dust Particles | | | |
| 271 | Droplet Activation and Mixing in Large-Eddy Simulation of a Shallow Cumulus Field | J11 | 2012 | - |
| 272 | Observed Decadal North Atlantic Tripole SST Variability. Part I: Weather Noise Forcing and Coupled Response | J11 | 2012 | <20 |
| 273 | Examination of the Two Types of ENSO in the NCEP CFS Model and Its Extratropical Associations | J12 | 2012 | - |
| 274 | Mesoscale Impacts of Explicit Numerical Diffusion in a Convection-Permitting Model | J12 | 2012 | - |
| 275 | Sensitivity of Midlatitude Storm Intensification to Perturbations in the Sea Surface Temperature near the Gulf Stream | J12 | 2012 | - |
| 276 | Increased future ice discharge from Antarctica owing to higher snowfall | J13 | 2012 | <100 |
| 277 | Past extreme warming events linked to massive carbon release from thawing permafrost | J13 | 2012 | <20 |
| 278 | Slowdown of the Walker circulation driven by tropical Indo-Pacific warming | J13 | 2012 | <100 |
| 279 | Impact of climate change on the Baltic Sea ecosystem over the past 1,000 years | J14 | 2012 | - |
| 280 | Relative outcomes of climate change mitigation related to global temperature versus sea-level rise | J14 | 2012 | <10 |
| 281 | Summer-time climate impacts of projected megapolitan expansion in Arizona | J14 | 2013 | <5 |
| 282 | Anthropogenic and natural warming inferred from changes in Earth's energy balance | J15 | 2012 | - |
| 283 | Broad range of 2050 warming from an observationally constrained large climate model ensemble | J15 | 2012 | - |
| 284 | Riverine source of Arctic Ocean mercury inferred from atmospheric observations | J15 | 2012 | - |
| 285 | Indian Ocean warming modulates Pacific climate change | J16 | 2012 | ≥ 100 |
| 286 | Shifting from marine reserves to maritime zoning for conservation of Pacific bigeye tuna (<i>Thunnus obesus</i>) | J16 | 2012 | - |
| 287 | Assessing the performance of a prognostic and a diagnostic cloud scheme using single column model simulations of TWP-ICE | J17 | 2012 | - |
| 288 | High-resolution simulation of a major West African dust-storm: comparison with observations and investigation of dust impact | J17 | 2012 | - |
| 289 | Improving the diurnal cycle of convection in GCMs | J17 | 2012 | - |
| 290 | Multidecadal-to-centennial SST variability in the MPI-ESM simulation ensemble for the last millennium | J1 | 2013 | <10 |
| 291 | Aerosol and ozone changes as forcing for climate evolution between 1850 and 2100 | J1 | 2013 | - |
| 292 | Tropical variability and stratospheric equatorial waves in the IPSLCM5 model | J1 | 2013 | - |
| 293 | Could a future "Grand Solar Minimum" like the Maunder Minimum stop | J2 | 2013 | - |

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| | global warming? | | | |
| 294 | Day-to-day ionospheric variability due to lower atmosphere perturbations | J2 | 2013 | - |
| 295 | The impact of an intense summer cyclone on 2012 Arctic sea ice retreat | J2 | 2013 | - |
| 296 | Evaluation of the carbon cycle components in the Norwegian Earth System Model (NorESM) | J3 | 2013 | - |
| 297 | Sensitivity of remote aerosol distributions to representation of cloud-aerosol interactions in a global climate model | J3 | 2013 | - |
| 298 | Numerical issues associated with compensating and competing processes in climate models: an example from ECHAM-HAM | J3 | 2013 | - |
| 299 | Reduced complexity model for assessing patterns of rainfall erosivity in Africa | J4 | 2013 | - |
| 300 | Sensitivity of Late Permian climate to bathymetric features and implications for the mass extinction | J4 | 2013 | - |
| 301 | Eddy compensation and controls of the enhanced sea-to-air CO ₂ flux during positive phases of the Southern Annular Mode | J5 | 2013 | - |
| 302 | Humic substances may control dissolved iron distributions in the global ocean: Implications from numerical simulations | J5 | 2013 | - |
| 303 | Revisiting "nutrient trapping" in global coupled biogeochemical ocean circulation models | J5 | 2013 | - |
| 304 | Characteristics of the ocean simulations in the Max Planck Institute Ocean Model (MPIOM) the ocean component of the MPI-Earth system model | J6 | 2013 | <5 |
| 305 | Global ocean biogeochemistry model HAMOCC: Model architecture and performance as component of the MPI-Earth system model in different CMIP5 experimental realizations | J6 | 2013 | - |
| 306 | Climate and carbon cycle changes from 1850 to 2100 in MPI-ESM simulations for the Coupled Model Intercomparison Project phase 5 | J6 | 2013 | - |
| 307 | Climate Change from 1850 to 2005 Simulated in CESM1(WACCM) | J7 | 2013 | <5 |
| 308 | Greenhouse Gas Policy Influences Climate via Direct Effects of Land-Use Change | J7 | 2013 | - |
| 309 | The role of circulation features on black carbon transport into the Arctic in the Community Atmosphere Model version 5 (CAM5) | J8 | 2013 | - |
| 310 | Uncertainty quantification and parameter tuning in the CAM5 Zhang-McFarlane convection scheme and impact of improved convection on the global circulation and climate | J8 | 2013 | - |
| 311 | Natural land carbon dioxide exchanges in the ECMWF integrated forecasting system: Implementation and offline validation | J8 | 2013 | - |
| 312 | Hydrologic and geochemical modelling of a karstic Mediterranean watershed | J9 | 2013 | - |
| 313 | Influence of sea-level rise on freshwater lenses of different atoll island sizes and lens resilience to storm-induced salinization | J9 | 2013 | - |
| 314 | Parameterizing Surface and Internal Tide Scattering and Breaking on Supercritical Topography: The One- and Two-Ridge Cases | J10 | 2013 | - |
| 315 | A Comparison of Tidal Conversion Parameterizations for Tidal Models | J10 | 2013 | - |

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| 316 | A Probabilistic Bulk Model of Coupled Mixed Layer and Convection. Part II: Shallow Convection Case | J11 | 2013 | - |
| 317 | On the Geographic Asymmetry of Typhoon Translation Speed across the Mountainous Island of Taiwan | J11 | 2013 | - |
| 318 | Surface Wind and Upper-Ocean Variability Associated with the Madden-Julian Oscillation Simulated by the Coupled Ocean-Atmosphere Mesoscale Prediction System (COAMPS) | J12 | 2013 | - |
| 319 | The Canadian Seasonal to Interannual Prediction System. Part I: Models and Initialization | J12 | 2013 | <20 |
| 320 | Divergent global precipitation changes induced by natural versus anthropogenic forcing | J13 | 2013 | - |
| 321 | Dynamics of a Snowball Earth ocean | J13 | 2013 | - |
| 322 | Recent global-warming hiatus tied to equatorial Pacific surface cooling | J13 | 2013 | - |
| 323 | Attribution of historical ozone forcing to anthropogenic emissions | J14 | 2013 | - |
| 324 | Management of trade-offs in geoengineering through optimal choice of non-uniform radiative forcing | J14 | 2013 | - |
| 325 | The critical role of extreme heat for maize production in the United States | J14 | 2013 | - |
| 326 | Contribution of ocean overturning circulation to tropical rainfall peak in the Northern Hemisphere | J15 | 2013 | - |
| 327 | Experimental evidence for efficient hydroxyl radical regeneration in isoprene oxidation | J15 | 2013 | - |
| 328 | Robust direct effect of carbon dioxide on tropical circulation and regional precipitation | J15 | 2013 | - |
| 329 | Microphysical effects determine macrophysical response for aerosol impacts on deep convective clouds | J16 | 2013 | - |
| 330 | Enhanced basal lubrication and the contribution of the Greenland ice sheet to future sea-level rise | J16 | 2013 | - |
| 331 | Historical warming reduced due to enhanced land carbon uptake | J16 | 2013 | <5 |
| 332 | A global hexagonal C-grid non-hydrostatic dynamical core (ICON-IAP) designed for energetic consistency | J17 | 2013 | - |
| 333 | Improvements in the stratospheric transport achieved by a chemistry transport model with ECMWF (re)analyses: identifying effects and remaining challenges | J17 | 2013 | - |
| 334 | Gravity waves over Antarctica and the Southern Ocean: consistent momentum fluxes in mesoscale simulations and stratospheric balloon observations | J17 | 2013 | - |
| 335 | Different flavors of the Atlantic Multidecadal Variability | J1 | 2014 | ≥ 100 |
| 336 | Tropical cyclones in enhanced resolution CMIP5 experiments | J1 | 2014 | - |
| 337 | Evaluation of the new UKCA climate-composition model – Part 2: The Troposphere | J3 | 2014 | <50 |
| 338 | PLASIM-ENTSem v1.0: a spatio-temporal emulator of future climate change for impacts assessment | J3 | 2014 | ≥ 100 |
| 339 | Projected trends in mean, maximum, and minimum surface temperature in | J4 | 2014 | - |

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| | China from simulations | | | |
| 340 | Modelling Obliquity and CO2 Effects on Southern Hemisphere Climate during the Past 408 ka | J7 | 2014 | - |
| 341 | Regional Climate Modelling over the Maritime Continent. Part I: New Parameterization for Convective Cloud Fraction | J7 | 2014 | - |
| 342 | A comparative evaluation of impact of domain size and parameterization scheme on simulation of tropical cyclones in the Bay of Bengal | J8 | 2014 | - |
| 343 | A numerical study of a persistent cold air pool episode in the Salt Lake Valley, Utah | J8 | 2014 | - |
| 344 | Hydrological evaluation of the Noah-MP land surface model for the Mississippi River Basin | J8 | 2014 | - |
| 345 | Water Budget and Precipitation Efficiency of Typhoon Morakot (2009) | J11 | 2014 | - |
| 346 | An Evaluation of WRF Simulations of Clouds over the Southern Ocean with A-Train Observations | J12 | 2014 | - |
| 347 | Improving the Representation of Low Clouds and Drizzle in the ECMWF Model Based on ARM Observations from the Azores | J12 | 2014 | <5 |
| 348 | Using Variable-Resolution Meshes to Model Tropical Cyclones in the Community Atmosphere Model | J12 | 2014 | <20 |
| 349 | Impacts of the north and tropical Atlantic Ocean on the Antarctic Peninsula and sea ice | J13 | 2014 | - |
| 350 | Tropospheric ozone trends at Mauna Loa Observatory tied to decadal climate variability | J15 | 2014 | <5 |
| 351 | Role of ocean heat transport in climates of tidally locked exoplanets around M dwarf stars | J16 | 2014 | - |

Supplementary Table 2 | Survey results of bitwise identical reproducibility for all selected papers.

The survey results are classified into several types. The last column shows the ID numbers of the corresponding papers (Supplementary Table 1).

| Survey result | Description | Papers |
|---|--|---|
| No replies | No corresponding author: No email address for the correspondence is included in the paper. | A total of five papers. Their ID numbers are: 81, 89, 161, 199, and 207. |
| | Email rejected: Emails to all corresponding authors were rejected. The most common reason is that the email addresses of the corresponding authors have been changed. | A total of 66 papers. Their ID numbers are: 1-3, 7, 12, 17, 22, 28, 30, 34, 37, 40, 45, 49, 50, 52, 55, 59, 60, 67, 78, 86, 88, 91, 93, 96, 98, 99, 107, 113-115, 118, 128, 129, 131-133, 140, 148, 151, 153, 155, 156, 160, 163, 165, 169, 171, 175, 178, 183, 189, 196, 202, 205, 228, 241, 247, 266, 268, 274, 275, 284, 301, and 323. |
| | No reply: Email to at least one corresponding author was not rejected, while no reply was received from the authors (autoreply was not considered). | A total of 212 papers. Their ID numbers are: 4, 6, 9-11, 13, 15, 16, 18-20, 23, 24, 26, 29, 31-33, 35, 36, 38, 41, 43, 44, 47, 51, 53, 54, 56, 57, 62-66, 68-77, 79, 80, 82-84, 87, 90, 92, 100, 103-106, 108, 109, 111, 112, 116, 117, 119-122, 124, 126, 127, 134-139, 141, 142, 144-147, 149, 150, 152, 154, 158, 162, 164, 166-168, 170, 172, 174, 176, 177, 179, 181, 182, 185-188, 190-194, 198, 201, 204, 206, 208-210, 213-225, 227, 229, 230, 233, 234, 236-238, 240, 242-246, 248-252, 258-265, 267, 269-271, 273, 276-281, 283, 288, 290-293, 295, 297, 302, 307-319, 325, 327-336, 338-343, and 345-349 |
| Replied without required information | Replied without required information and confirmation: The authors replied to our emails, but did not give any required | A total of seven papers. Their ID numbers are: 58, 95, 123, 125, 212, 226, and 299. |

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| | information for bitwise identical reproduction and did not explain why. | |
| | Inconvenient for reproduction: The authors confirmed that they were inconvenient to provide required information. The most common reasons include: 1) some resources such as model code are not open to the public; 2) the original simulation setting is not preserved due to the renewal of computers; 3) it would take a lot of time for the authors to help fellow scientists to recreate the simulation setting, if possible. | A total of 47 papers. Their ID numbers are: 5, 8, 14, 21, 25, 27, 39, 42, 46, 48, 61, 85, 94, 97, 101, 110, 130, 143, 157, 159, 173, 180, 184, 195, 197, 200, 203, 231, 232, 239, 254, 256, 272, 282, 285-287, 289, 294, 296, 298, 300, 320, 321, 324, 337, and 350. |
| Unsuccessful re-run | Failed to re-run the simulations with the information provided by the authors. The most common reason is that we failed to compile the model code due to the lack of an appropriate computing environment. | A total of five papers. Their ID numbers are: 102, 257, and 304-306. |
| Successful re-run | Successfully re-ran the simulations with the information provided by the authors, but bitwise identical results were not reproduced due to the lack of an appropriate computing environment. | A total of four papers. Their ID numbers are: 253, 255, 326, and 351. |
| Successful bitwise identical reproduction | The bitwise identical simulation results were successfully reproduced . | A total of five papers. Their ID numbers are: 211, 235, 303, 322, and 344. |