

NASA Ames Legacy Global Climate Model Verification and Validation Plan

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1. Introduction

This document describes the Verification and Validation Plan for the NASA Ames Legacy Mars Global Climate Model (GCM). This document defines the scope of the tests. It indicates the items to be tested, identifies the required configuration for each item, describes the process for performing each test, the plan for recording, processing, and archiving the results, and discusses the plan for accepting the results, and appropriate follow-up actions required depending on the results.

2. Related Documents

- NASA Ames Legacy Mars GCM Software Requirements Document

3. Verification

- The verification test shall confirm successful implementation of the GCM by confirming successful output creation
- The 'make' command shall be executed within the 'code' directory and produce the executable 'gcm2.3'
- The 'data' directory, the 'gcm2.3' executable, and the 'mars' input file shall be copied into a user-created directory to contain output data
- The successful implementation of the GCM shall be verified by setting $\tau_{\text{aue}} = 3$ in the input file, running the model, and executing the 'htest' program on the resulting output
- The inputs for 'htest' shall be 'fort.11' followed by '1,1,1' and the result shall match the contents of 'verification.txt' in the 'documentation' directory.

4. Validation

4.1 Overview

Validation shall be performed by comparison of the default output data to included plots in the 'analysis/validation' subdirectory. The same plots shall be generated by the test described. This test shall validate the model performance by running the GCM with default inputs and compare with pre-defined results for various predicted fields.

4.2 Validation Test

1. Using the default input file, the GCM shall be run for 80400 model hours, producing fort.11, fort.45, fort.51, and fort.91 output files numbered from '0002' to '0335'

2. The Fortran files `extractmod.f90` and `GCMextract_FB.f` shall be compiled to an executable assumed in this document to be named 'ExtractGCM' which is a program to post-process model output by performing vertical interpolation to constant pressure surfaces, as well as seasonally average certain fields
3. Execution of this program in the output directory shall request input for the first history file number, followed by the last history file number. 268 shall be input for the first file, and 335 for the last file. This shall create the output files: 'fort.40', 'fort.41', 'fort.42', 'fort.43'
4. A directory named 'plots' shall be created
5. The `plotGCM.pro` and `readfort.pro` scripts shall be copied from the analysis directory, the `readfort` section shall be uncommented, and the `readnc` section shall be commented
6. Running the `plotGCM.pro` script in IDL shall create a suite of plots matching the plots within the validation directory