



BRAMS and CATT-BRAMS code maintenance, support and dissemination at CPTEC/INPE

- Agenda:
 - What is BRAMS?
 - BRAMS recent projects and developments
 - BRAMS Team activities (CPTEC/INPE)
 - CATT-BRAMS Operation and development
 - BRAMSNET activities
 - GBRAMS activities
 - BRAMS Challenges





What is BRAMS (Brazilian RAMS) #1

- Improvements on Forecast quality in tropical regions
- Single model to Brazilian Regional Weather Centers
- BRAMS v.3.2 = RAMS 5.04 + ...
 - Meteorological new improvements:
 - Shallow Cumulus
 - New Deep Convection (mass flux scheme with several closures, based on Grell et al., 2002)
 - Heterogeneous soil moisture assimilation
 - New 1 km vegetation data derived from IGBP 2.0 + IBGE/INPE dataset LEAF-3 with observed parameters for South American biomes
 - New surface parameterization: SIB 2.5





What is BRAMS (Brazilian RAMS) #2

- Better software quality
- Optimized Code

- BRAMS v.3.2 = RAMS 5.04 + ...
 - Computational new improvements:
 - Binary reproducibility (same results independent of # processors) for a restrict case
 - Better Portability, robustness and Software Quality
 - Optimized code for serial and parallel runs
 - Operational Suite
 - Open source code (GPL license like RAMS)





BRAMS recent projects and developments

- RAMS and BRAMS become open source software (under GNU General Public License - GPL)
- CATT-BRAMS environment model starts operation at CPTEC in 2004
- BRAMSNET project (FINEP 2005-2006)
 - Main goal: Create cooperative net to users and developers
 - Disseminate BRAMS utilization;
 - Stimulate development;
 - Stimulate research advance;
 - Based on major challenges.
- GBRAMS Project (FINEP 2005-2006)
 - Main Goal: Mesoscale Climatology using BRAMS in a grid computing environment.
- SegHidro (FINEP 2005-2006)
 - Hydric Resources and meteorology colaboration tool





BRAMS Team at CPTEC

- Team working on development, maintenance and support
 - Sharing time with others projects
 - Working on CATT-BRAMS, BRAMSNET, GBRAMS, SegHidro

- 6 PhD (CS; + 2 in modeling)
- 3 Msc (CS)
- 1 Undergraduate (CS)

- USP/IAG collaborations





What is CATT-BRAMS?

- Coupled Aerosol and Tracer Transport to the Brazilian developments on the Regional Atmospheric Modeling System
 - Ph. D. program of Saulo Freitas and Karla Longo at Physics Institute of the University of São Paulo
- 3-D transport model to monitoring atmospheric pollution (exploring the BRAMS/RAMS tracer transport capability)
 - Core of a system to monitoring the transport of biomass burning emissions and anthropogenic pollution in south america
 - Includes:
 - 3-D transport model
 - New radiation scheme (CARMA)
 - Plume rise applied to burning emissions
 - Dry and wet deposition of material





CATT-BRAMS Operation

- Code modification due new compiler and new MPI version
- Vector machines demands new optimizations techniques
 - **NEC SX-6 serial performance is bellow new Pentium Xeon!!**
 - **conflicting objectives:** to keep compatibility with RAMS/BRAMS and Code Vectorization
 - Adopted solution:
 - Serial Optimization eliminating repeated calculus (better for serial and vector machines)
 - Data structure transformation: increasing vector length (better for vector machines but needs special attention in cache memory for serial machines)





- New operational suite using SMS software
 - Improve quality control and fault tolerance
- 2 nodes, 16 processors
- Pre-operation procedure => validate release candidate to new operational system
- 3 Grids:
 - Africa and America
 - South America
 - Southeast of Brazil
- On-line monitoring CPTEC/INPE Team

www.cptec.inpe.br/meio_ambiente/





BRAMSNET Support Team experiences

- Web services operation start: 10/2005
- Registered users: 105
- Number of messages involving support: 106
 - Basic software (MPI, HDF, Compilers): 26%
 - BRAMS Installation: 28%
 - BRAMS configuration options: 35%
 - Pre processing procedures: 4%
 - Post processing procedures: 7%





www.cptec.inpe.br/brams

6th RAMS/BRAMS/OLAM International Users Workshop
10 - 12 May 2006 - Ubatuba, Brazil

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Model Description

Brazilian Regional Atmospheric Modeling System (BRAMS)

BRAMS (Brazilian Regional Atmospheric Modeling System) is a joint project of [ATMET](#), [IME/USP](#), [IAG/USP](#) and [CPTEC/INPE](#), funded by [FINEP](#) (Brazilian Funding Agency), aimed to produce a new version of [RAMS](#) tailored to the tropics. The main objective is to provide a single model to Brazilian Regional Weather Centers. The BRAMS/RAMS model is a multipurpose, numerical prediction model designed to simulate atmospheric circulations spanning in scale from hemispheric scales down to large eddy simulations (LES) of the planetary boundary layer. The BRAMS' code is written in FORTRAN, under [GNU General Public Licence \(GPL\)](#).

BRAMS Version 3.2 is RAMS Version 5.04 plus:

- Shallow Cumulus and New Deep Convection (mass flux scheme with several closures, based on Grell et al., 2002)
- Binary reproducibility (same results independent of processors)
- New 1 km vegetation data derived from IGBP 2.0 + IBGE/INPE dataset LEAF-3 with observed parameters for South American biomes
- Enhanced Portability and Software Quality





Examples of Frequent problems

- MPI installation:
 - LAM MPI are not supported
 - Two or more different MPI versions
 - MPICH did not recognize Fortran 90 compiler
 - mpif90 are not generated
 - MPICH compiled with different compiler than BRAMS
- HDF installation:
 - Different version
- BRAMS installation:
 - Restart a compilation procedure





BRAMSNET Challenge

Maintenance

CIRCUIT

Use

Development





BRAMSNET cases

- EPAGRI (SC) asks for optimization
 - High execution time (5h 13')
- Specific optimization to EPAGRI grid by CPTEC/INPE,
 - Specific Domain partition
 - Execution time reduction: 20% (4h 9')
- CPTEC send Beta version to be tested on IAG/USP with specific domain partition to IAG/USP
 - Execution time reduction: 15%
- Code Optimization candidate to be included in BRAMS 4.0





GBRAMS

- Mesoscale Climatology
- BRAMS in Grid Computing
 - 3 different centers: LAC/INPE, CPTEC/INPE, UFRGS
 - 3 different middleware's: Globus, OAR/CIGRI and OurGrid
- GBRAMS problems:
 - Not prepared to long term running
 - TIME variable round-off errors



English

GridSphere
Home

Welcome to GridSphere 2.0.3

Thank you for downloading and installing the GridSphere portal.

Below you will find links to documents relating to GridSphere installation, administration and portlet development.

- ◆ [GridSphere User's Guide \(HTML\) \(PDF\)](#)
- ◆ [GridSphere Portal Administrator's Guide \(HTML\) \(PDF\)](#)
- ◆ [GridSphere Portlet Reference Guide \(HTML\) \(PDF\)](#)
- ◆ [GridSphere Tag Library User's Guide \(HTML\) \(PDF\)](#)
- ◆ [GridSphere Frequently Asked Questions \(HTML\) \(PDF\)](#)
- ◆ [GridSphere JavaDoc API \(HTML\)](#)

Please join the mailing lists for more involvement:

- ◆ [Developers List](#) Discussions relating to overall GridSphere and portlet development.
- ◆ [Users List](#) Discussions on installing and configuring GridSphere.
- ◆ [CVS List](#) CVS commit information. Very useful if you're a developer.

and please submit bug reports to [GridSphere \(Jira\) bugtracker](#)

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BRAMS challenges

- Very large Execution options (10e9 combinations)
 - Restricts the binary reproducibility (done 4x)
 - Creates non initiated variable data (60 cases)
 - Very difficult to proceed with exhaustive test cases
 - Restricts the operational case
 - Team focus on improve software quality instead of optimization

- Improve the cycle:
 - Development (research) - maintenance – operational use

- Support software infra-structure
 - Creation of user-friendly shell scripts to optimize software installation

- First time users tutorials

- Improve the inclusion of features from external collaborations

