



Met Office
Hadley Centre

JULES development and benchmarking

Matt Pryor, JULES science meeting, University of Leeds, 10 June 2010



Contents

This presentation covers the following areas

- JULES developments
 - What is in JULES 2.1.x
 - Plans for ongoing JULES development – versions 2.2 and 3.0
 - Procedures for adoption of community code
- Benchmarking



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JULES development



JULES v2.1.x

- JULES v2.1 initially released September 2009
 - Re-integrated with the Met Office UM
 - New layered snow scheme
 - Implementation of RothC soil carbon within TRIFFID
 - Change in linearisation procedure
 - netCDF output
 - Files reformatted using Fortran 90 syntax
- JULES v2.1.2 released February 2010
 - Corrects two major bugs – one in the new snow scheme related to snow melt and one related to bare soil evaporation
 - Several minor control level bugs fixed
 - **KNOWN BUG:** There is a known bug in `sf_stom`. A solution was posted to the JULES users mailing list by Doug Clark – contact me for details. This will be fixed in v2.2



Plans for v2.2 and v3.0

- JULES v2.2 - planned for Autumn 2010
 - Ability to run full soil carbon independently of competing vegetation
 - Ozone damage (Stephen Sitch, Uni of Leeds)
 - Effect of direct/diffuse radiation on photosynthesis (Lina Mercado, CEH)
- JULES v3.0 - planned for Spring 2011
 - Integrate IMOGEN
 - Rethink of I/O (to accommodate IMOGEN)
 - Considering CF convention netCDF for input and output



Procedures for adoption of community code

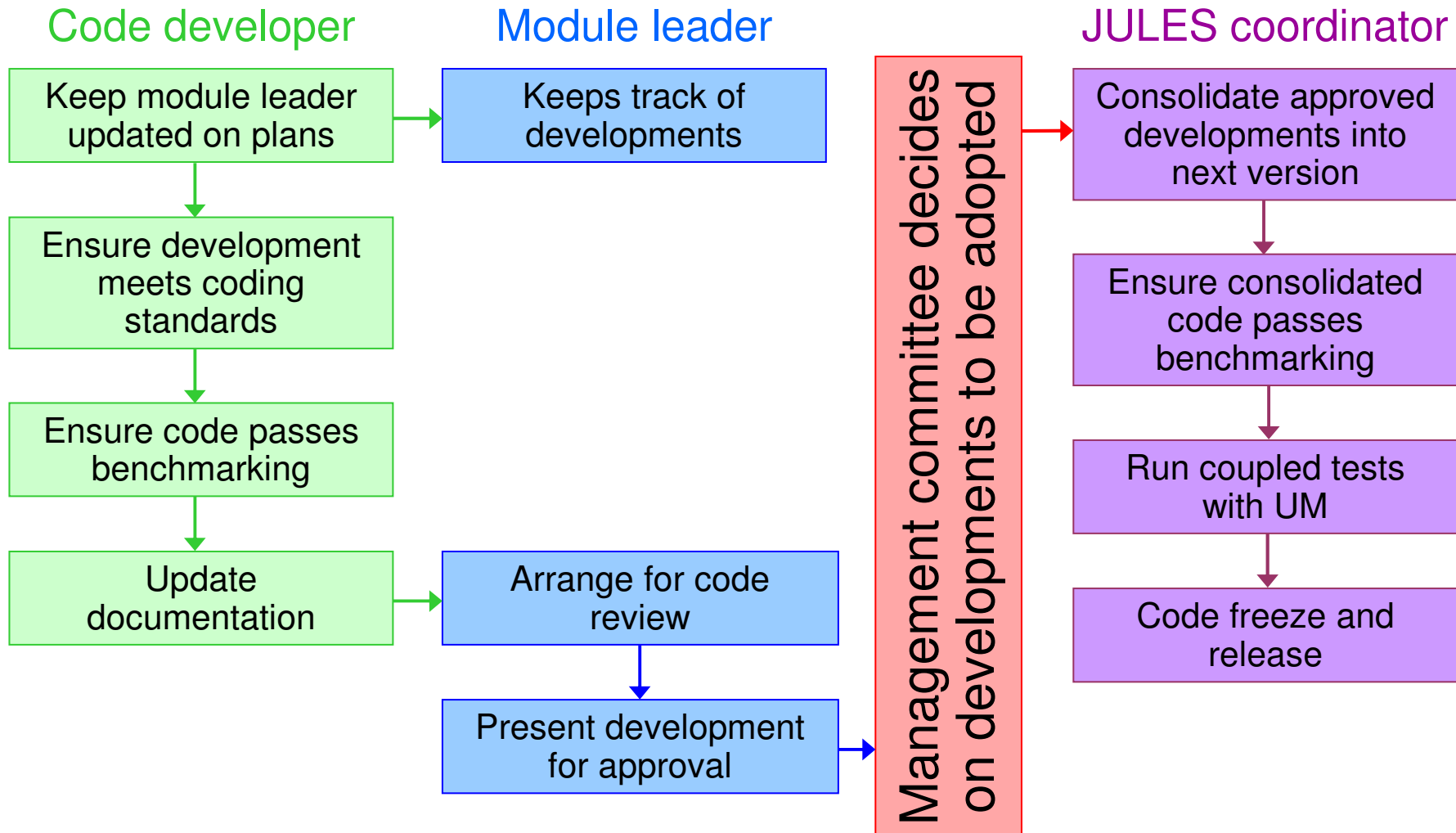
Available at http://www.jchmr.org/jules/upgrade_procedures.tar.gz

Coding standards

- Why?
 - Portability
 - Maintainability
 - Readability
- Derived from Met Office UM coding standards
- Provides guidance on formatting, style and features that should and shouldn't be used in Fortran code
- Includes advice on dealing with floating-point arithmetic



Procedures for adoption of new community code





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Benchmarking



Benchmarking

- Originally to be written in IDL – now switched to R
 - Open-source so no expensive licences or virtual machines required
- Generates HTML reports
 - Easily distributed to anyone with a browser
 - Easy to post on developer's or official JULES website
- FLUXNET benchmarks have been implemented
 - Tests for evaporation, GPP and respiration
 - Traffic-light system for statistics – mean, correlation, RMSE
 - Green for changes that show a statistically significant improvement
 - Yellow for changes that are not statistically significant
 - Red for changes that show a statistically significant degradation
 - Details of evaporation tests published (*Blyth et al., 2010*)



Future work

- Full benchmarking suite planned for end of summer 2010
- Distributed benchmarks
 - Closure of water, energy and carbon budgets
 - Atmospheric CO₂
 - NDVI
 - Fractional coverage of PFTs
- Paper to be published detailing methods (*Blyth et al.*)



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Questions and answers