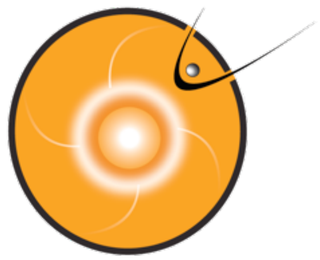
Kameleon Support for SWMF Ionospheric Data



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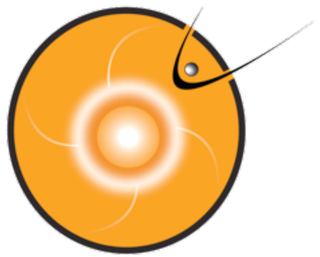
Community Coordinated Modeling Center
NASA Goddard Space Flight Center





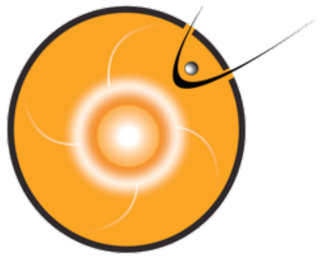


Overview

- Kameleon software
- Advantages
- Requirements
- Examples/Demo
- Discussion

http://tinyurl.com/CCMC-Example



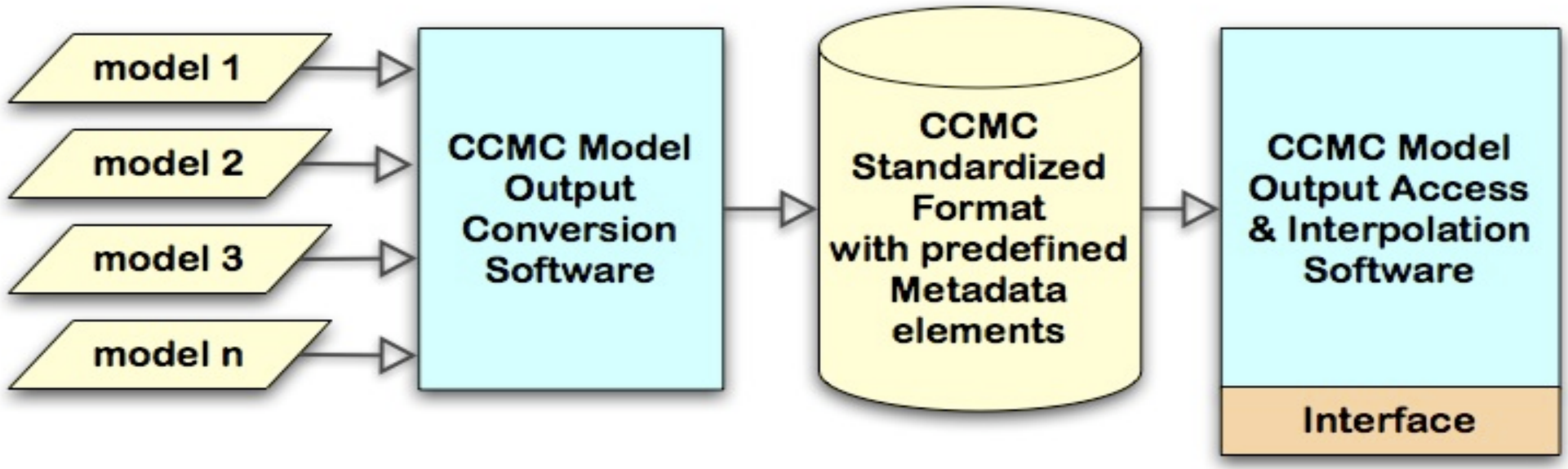
Software suite that consists of two parts

1. Conversion software

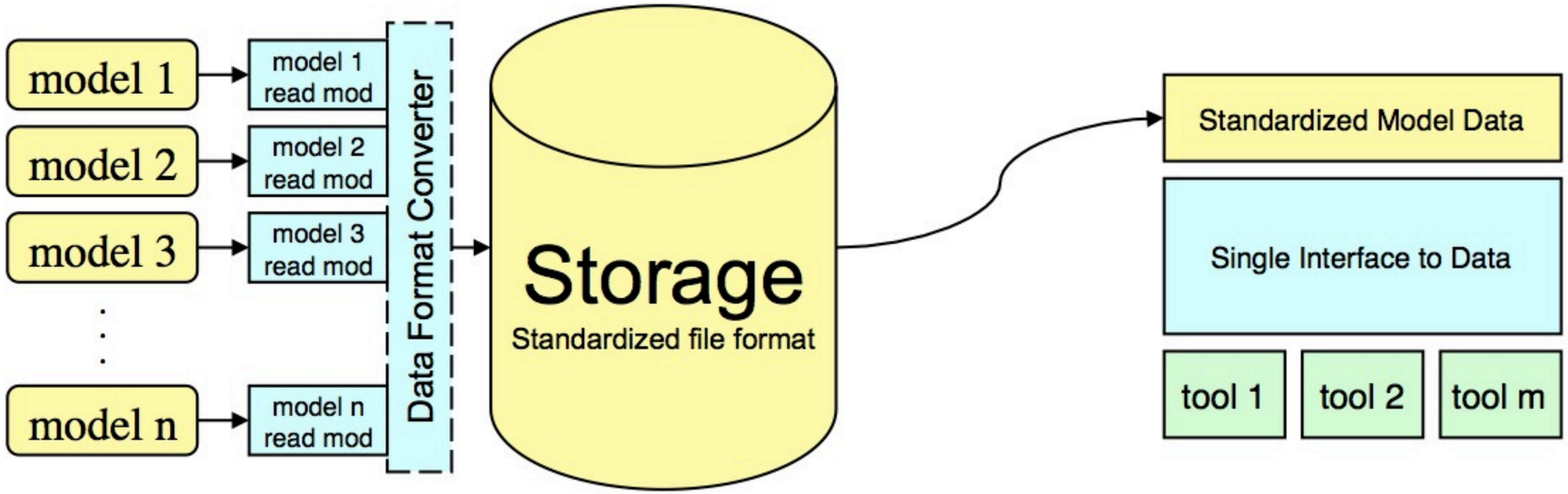
2. Access and interpolation software

Kameleon Converter

Converts multiple model formats to a single standardized data file with embedded metadata.



Kameleon Converter



Kameleon Converter

Kameleon Global Attributes

- README
- README_visualization
- model_name
- model_type
- generation_date
- original_output_file_name
- run_registration_number
- generated_by
- terms_of_usage
- grid_system_count
- grid_system_n_number_of_dimensions
- grid_system_n_dimension_m_size
- grid_system_n
- output_type
- standard_grid_target
- grid_n_type
- start_time
- end_time
- run_type

Kameleon Variable Attributes

- valid_min
- vaid_max
- units
- grid_system
- mask
- description
- is_vector_component
- position_grid_system
- data_grid_system
- actual_min
- actual_max

Model Specific Attributes

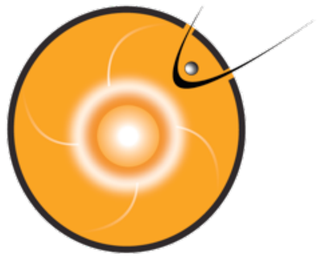
- Additional grid descriptors
- Original output data or descriptors that don't map to predefined attributes
- Any additional elements that are specifc our unique to a particular model or space weather domain

Collaborating with SPASE Computational Model Working Group

Kameleon Library

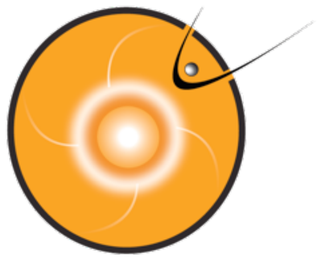
- Written using C++
- Java, Python, C, Fortran and IDL wrappers
- Simple interface

```
ccmc::Kameleon kameleon;
kameleon.open(filename);
kameleon.loadVariable(variable);
ccmc::Interpolator * interpolator = kameleon.createNewInterpolator();
float value = interpolator->interpolate(variable, c0,c1,c2 );
delete interpolator;
kameleon.close();
```



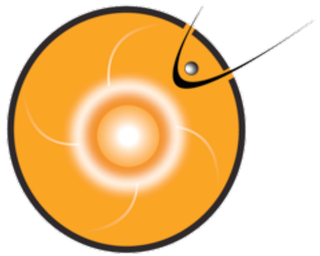
Advantages

- File sizes are much smaller - converted files are ~30% of the original size
- Access library has multiple language wrappers - including Fortran!
- Simple interface
- Interpolations are fast!



Requirements

- C++ and Fortran compilers that are compatible with each other
- OSX and Linux
- Tested with GCC combinations
  - g++, gcc, and gfortran
  - g++, gcc, and ifort
- Modification of Makefile to adjust paths/compilers/executables



Examples/Demo

- How to compile
- Example fortran code with a single interpolation
- Example fortran code with 9 million interpolations
- Example fortran code outputting interpolated grid

http://tinyurl.com/CCMC-Example

Examples/Demo

kid = kameleon ID
iid = interpolator ID
vid = variable ID

Declared as Integers

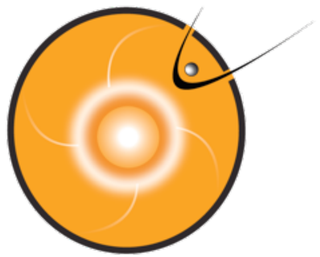
rc0, rc1, rc2 = real components of the position

```
 call f_kameleon_create(kid)
call f_kameleon_open(kid,cdf_file_path,status)
 call f_kameleon_load_variable(kid,variable)
 call f_interpolator_create(kid, iid)
 call f_kameleon_get_variable_id(kid,variable, vid);
 call f_kameleon_interpolate_by_id(iid, vid, rc0, rc1, rc2,
&d0, d1, d2, interpolated_value)
 call f_interpolator_delete(iid);
 call f_kameleon_close(kid)
 call f_kameleon_delete(kid,status)
```

Examples/Demo

TIE-GCM :

```
if (iamie==1) then
   iprint = 0
   if (istep==1) iprint = 1
   if (iprint>0) write(6,"('advance calling getamie...')")
   call getamie(iyear,iday,int(secs),amie_ibkg,iprint)
endif
if (iamie <= 0) then
if (potential_model == 'WEIMER05'.or.
  |          potential_model == 'WEIMER') then
   call weimer05(byimf,bzimf,swvel,swden,wei05sc_ncfile,istep)
   ........
```



Discussion

Kameleon • Advantages • Requirements • Examples • Discussion