CCMC Workshop, April 15, 2016

Student Feedback on Class Usage of the CCMC

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and the students of AOSS 477

and a special thank you to Annie Liemohn

AOSS 477: Space Weather Modeling

- ***Using*** state-of-the-art space weather models
  - Not really a programming course
  - We have a different one for that
- Students use models and conduct their own space weather numerical investigation
  - Several projects on using codes and writing/presenting reports based on their numerical experiments
  - Data used as model input and for model result comparison
- Variety of student assessment criteria
  - Many oral presentations and written reports
  - Peer grading of the oral presentations
  - In-class discussion participation

Relies heavily on CCMC

- Spend a day going over what's at CCMC website
  - What's there, how it's structured, examples of runs/plots
- Spend a day playing with the plotting tools
  - Playing around with visualization pages
  - Lots of small group work
  - At first: assign them a specific task
  - Later on: give them a question to explore
- Spend a day with iSWA/SWE
  - Explore the real-time Sun-to-Earth space weather connection
- Spend a day going over the VMR (Darren came in)
  - Virtual Model Repository, a NASA-sponsored VxO
  - In case you don't have it: http://vmr.engin.umich.edu/
  - Linked to CCMC output files

Going "Under the Hood" with Models

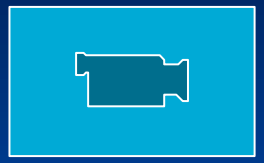
- MHD Models
  - Started with a general discussion of MHD equations, MHD extensions, and typical CFD techniques
  - BATS-R-US, LFM, OpenGGCM, Winglee code, MAS, ENLIL
- Inner Mag Models
  - HEIDI, RCM, RAM-SCB, CRCM/RBE/CIMI, VERB, DGCPM, IMPTAM, STET
- Other Kinetic Codes
  - HALFSHEL, MTP/VTP, iPIC3D, Vlasiator
- Ionosphere-Thermosphere Codes
  - GITM, SAMI, CTIP, TIEGCM
- Empirical Models
  - Weimer codes, Tsygnanenko family, IRI, MSIS, WINDMI
- Coupled code suites
  - SWMF, CISM, other examples from CCMC

Modeling Studies

- Modeling Study #1: Instant Run jobs
  - I pose the question, they conduct runs to address it
- Modeling Study #2: Existing RoR outputs
  - They pose the question, pick the model(s), and make plots to address it
- Modeling Study #3: Submit a RoR job
  - They pose the question, pick the model(s), and make plots to address it
- Data comparisons can be included for any of them
  - We cover extensive data-model comparison methodology

Let's see what they did

- Cue the music video



- My daughter has become music video producer
- I gave her slides from ~30 presentations
- She made this…an artistic rendering of images using CCMC models

Student Feedback on the CCMC

- CCMC staff are very helpful, courteous, prompt, and supportive
- Most codes are well described with links to key papers containing additional details
- Models work well and anyone can get a run output
- Learning curve to understand run requests and plot creation is fairly gentle
- Existing runs are available for anyone to examine and make plots
- Convenient availability of output file download for advanced plotting and analysis
- iSWA is a useful and powerful tool for event analysis

Student Suggestions for Improving CCMC

- Information availability:
  - Some "info" links are broken or blank, in general add more
  - Background info for some of the models is out of date (e.g., Weimer code)
- Existing RoR files:
  - Would like more description of each run, not easy to see all user options,
- Submitting RoR runs:
  - Entering name and job title first is awkward, before you see and set the run configuration
  - Clicking "submit" on each page is misleading, make it "next" on each page and "submit" only on the last one
  - Some settings are presented above the novice user level, more info
  - Including satellite tracking: add more info for the novice user
  - Selecting a C.R. run for ENLIL only does 4 days
- Output plots and files:
  - There is no way to get the "full simulation result" downloaded; only 3 values can be selected at a time
  - Color scales cannot be changed easily, and color bar is too small
  - For BATS-R-US output, there are 2 of several of the values in the list