

# Metrics Session

**Background:** Many speakers in earlier sessions set the stage. The need for metrics and V&V was mentioned repeatedly.

In particular, Nick Arge pointed out that V&V and making good metrics requires:

- good understanding of the physical system being modeled
- what, exactly, are you trying to predict
- how does the quality of the input data affect model predictions

## **Bill Lapenta:**

Pointed out that NASA is being pressured to demonstrate the societal benefits of its basic research. The goal is to transition 30% of NASA research to operations. Bill talked of a new joint effort by NOAA and NASA to transition NASA research capabilities to NOAA operational capabilities.

The issue of what constitutes a better metric was brought up. What is a better fit? Not easy to pick a meaningful metric.

## **Masha Kuznetsova:**

Gave an excellent summary of metric studies being done at the CCMC, including heliospheric models and using the Bastille Day storm to evaluate magnetospheric models. In the future, ionospheric models will be verified.

## **Terry Onsager:**

Described the different kinds of validation and metrics that are used for model selection and are used routinely in operations. These are: scientific validation, operational (long-term), and on-going measures of performance. Examples of these types of validation as applied to some currently operational models were shown.

## **Trey Cade:**

Spoke of metrics used in the Air Force weather community. Their goal is 90% accuracy, 80% of the time. It was noted that this concept can lead to trouble.

## **Stephen Quigley:**

Not quite sure what Stephen talked about – FOUO. Nice pictures.

Gave a list of parameters that may be considered for metrics. Also they are developing system impact parameters. Stephen personally guarantees that SEEFS products will be 90% accurate 80% of the time. But since we can't see these products, we'll never know.

## **Kile Baker:**

Scientific metrics – Kile reminded us of the National Space Weather Program's metrics. He compared the NWSP metrics to those recently suggested by CISM.

Kile emphasized the use of multiple metrics as a tool to help in understanding the models themselves.

There was much discussion. George Siscoe pointed out that multiple metrics were good for scientists, while we still need “customer driven” metrics on the operational side.

**Everyone agreed that metrics are tough.**

But we need to apply them to our models – and valuable measures will be developed.

# CCMC Operations and Education Session

Plug for Space Weather Symposium at the 86th AMS Meeting in Atlanta 29  
Jan – 2 Feb

## **Terry:**

Thinks NOAA should hold science-based space weather workshops

Highest priority for new models at SEC:

- SEP event prediction
- Regional geomagnetic activity forecast & nowcast
- Radiation belt electrons forecast and nowcast
- Ionospheric scintillation & TEC forecast and nowcast
- Long view ~27 days
  - Neutral density
  - Geomagnetic activity

**Manucci** – Meteorologist use OSSE's – we don't

**McCoy** – suggested CCMC get in contact with Joint Center for Satellite Data Assimilation (JCSDA)

**Trey:**

- Need for ensemble modeling or at least poor-man ensemble modeling
- Need to provide information to make trades (e.g. COSMIC data vs more ionosondes)
- Importance of providing customers the information so that they can make informed decisions on whether to proceed on a mission or not – Y/N answers
- Decision Aids- AFWA going to ensemble modeling in meteorology – one candidate for space weather is scintillation forecast
- XOO-W rep on JCSDA to push space weather

**Steve:**

Recommended bringing some of the DTRA sponsored high energy event models into CCMC

George Siscoe – says models have advantage that they use same formalism for ionosphere, thermosphere, magnetosphere and solar wind  
– no gaps

# Education Session

**Tom:** Proposed a competition – run by students with a cash prize (NSF could fund) for the best forecast. Competition could be between universities.

Need interagency metrics meeting/workshop.

Issue that traditional physics departments have difficulties teaching space weather courses and students need to double-up to train as space weather scientists

**Chris:**

AFIT has strong space and space weather curriculum

Have students work with CCMC models to develop diagnostics, forecasting and value added products.

Students involved with V&V for AFWA models – exploit new data sources

Use existing runs from CCMC as canned classroom examples

Classroom/laboratory open-ended projects

Research opportunities