J2.8 ISSUES AND TRENDS IN METEOROLOGY AND HYDROLOGY AND THEIR IMPLICATIONS FOR COMET® SCIENTIFIC TRAINING

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1. INTRODUCTION

The COMET scientific group recently engaged in an extensive discussion on the future direction of our training efforts. We also solicited input from a number of external experts, both in academia and in operations. Our group focused on identifying training needs in the context of the theme "what will be the role of human forecasters in 5 years?" The following was developed as an outcome of this discussion.

2. SCIENTIFIC ADVANCES

The direction of COMET scientific training in the next five years will be driven by scientific and technological advances, coupled with the evolving priorities of our multi-agency sponsors. We expect a continued need for training in traditional areas such as aviation meteorology, numerical weather prediction, and satellite meteorology. With our principal sponsor (NOAA) having an increasing emphasis on weather forecasters becoming more broadly-versed environmental scientists, we anticipate a need to expand our scientific training scope beyond our traditional emphasis on mesoscale meteorology to explore areas such as space weather, air pollution and dispersion, climate variability, and hydrology.

With an increased agency-wide emphasis on training, other areas of NOAA may look to COMET for development of scientific training, and this may necessitate further expansion of our scientific scope into areas such as physical oceanography.

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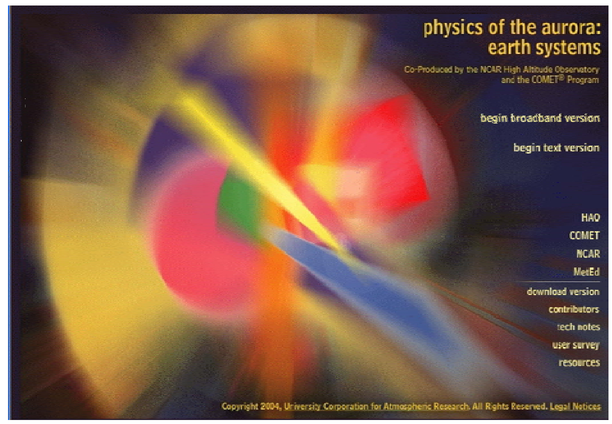

Figure 1. The *Physics of the Aurora: Earth Systems* module represents COMET's initial venture into space weather education.

3. TECHNOLOGICAL ADVANCES

Several technological advances will provide new tools for the forecasting environment and will need to be incorporated into our suite of scientific training. In addition, the trend of the operational community towards digital products and services (such as the NWS IFPS) will be a major driver for training requirements. To this end, we expect to incorporate greater use of geographic information systems (GIS) in training the forecast community. The emergence of the high resolution WRF model and the increasing use of model ensemble forecasts will necessitate an increased emphasis on the utility and limitations of mesoscale models and ensembles in training the forecast process. Operational implementation of high-resolution and polarized radar products, as well as the introduction of dozens of new satellite data products, will allow continued emphasis on integration of in-situ- and remotely-sensed systems to diagnose and forecast weather systems. We are also likely to see an increasing trend toward probabilistic forecast products.

With so many new tools and data sources becoming available, it is likely that the forecaster will be unable to process all of the information at her/his disposal. As a result, we expect forecasters will need to be trained on what tools are most relevant for particular weather scenarios. Although a forecast funnel approach will still be valid, we believe that the above scientific and technological advances point to a critical need to update the aging forecast process module to make it relevant to contemporary forecast operations.

4. TRAINING METHODOLOGY

Training methodology will evolve to accommodate the needs brought about by scientific and technology advances. With some sponsors considering consolidation of forecast operations, new or updated training approaches must be employed to compensate for the loss of local expertise. We expect to emphasize "best practice" methodology applied to weather forecasting and information management. This will likely be reflected in increased use of highly-interactive simulations such as WES in our scientific training.
In addition, we are likely to explore the development of online performance support systems to provide forecasters with just-in-time training for particular weather scenarios.

In spite of all of the new tools available, our training should never lose sight of the importance of diagnostic analysis and basic principles of weather forecasting. With the increased emphasis on customer service, we anticipate some training focus on the societal impacts of weather forecasts as well. In addition, we expect to collaborate with other trainers to give operational training officers much-needed background on effective methodologies to be employed in on-station training of forecasters. This will be essential to the successful delivery of blended learning courses (such as the Distance Learning Operations Course) to remote forecast sites.

Figure 2. The *NPOESS Userport* Website is a major training portal that addresses emerging satellite technology. http://meted.ucar.edu/npoess/

We also recognize the need to be more proactive in our relationship with the academic community. To this end, we will soon be surveying colleges and universities to help identify methodologies that will enable us to best serve these institutions.

5. MEASURING TRAINING IMPACTS

Finally, the sponsor community is demanding greater accountability of training programs and we will need to look for innovative ways to quantify the impact of training on operational forecasting. Historically, this has been a difficult problem for the training community to address, but we expect that multiple sponsors will require it in the next few years. We will look for ways to step beyond simple pre- and post-testing for training modules, perhaps exploring creative use of tools such as WES to give a more thorough assessment of the impacts of our scientific training.

6. ACKNOWLEDGEMENTS

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