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The COMET Program is pleased to announce the publication of the three short introductory meteorology lessons:

Met 101: Introduction to the Atmosphere (https://www.meted.ucar.edu/training_module.php?id=1287)
Met 101: Basic Weather Processes (https://www.meted.ucar.edu/training_module.php?id=1289)
Met 101: Introduction to the World's Oceans (https://www.meted.ucar.edu/training_module.php?id=1288)

The three short lessons provide newcomers to the field of meteorology with an introduction to the atmosphere and oceans, as well as the main processes involved in setting up Earth's weather. Topics covered include Earth's heat balance and circulation, global winds, water vapor and the hydrologic cycle, stability and parcel theory, clouds, thunderstorms, ocean currents, tides, and atmospheric and oceanic measurements. The lessons in total offer 90-110 minutes of content (Introduction to the Atmosphere - 35-45 min, Basic Weather Processes - 35-45 min, Introduction to the World's Oceans - 20 min).

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bruce Muller (bmuller AT ucar.edu), Vanessa Vincente (vincente AT ucar.edu), or Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs <https://www.meted.ucar.edu/resources_faq.php>
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The COMET Program is pleased to announce the publication of the new lesson, "Foundations of Meteorological Instrumentation and Measurements" . Involving collaboration from NCAR's Earth Observing Laboratory (EOL), Millersville University, and COMET, the lesson provides an introduction to the instrumentation used for meteorological measurements. Learners will explore the types of observing systems available to measure temperature, pressure, humidity, trace gases, clouds and aerosols, winds, precipitation, and radiation. The lesson also provides information about the main components of an instrument as well as instrument performance characteristics including types of errors.

The intended audience for "Foundations of Meteorological Instrumentation and Measurements" includes undergraduate and graduate students in meteorology and the atmospheric sciences, though anyone interested in measurement science and atmospheric instrumentation may find the content useful. This introductory lesson is intended to provide a foundation for more detailed future training on measuring specific meteorological variables.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alison Rockwell (rockwell AT ucar.edu), Amy Stevermer (asteverm AT ucar.edu), or Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs
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The COMET Program is pleased to announce the publication of the new lesson, "Fire Weather Forecasting: Clear Communications, 2nd Edition". This lesson will introduce National Weather

Service (NWS) forecasters to the communication strategies used for decision support services during wildland fire incidents. It also serves as a baseline for practices that leverage unique NWS capabilities to assist land management, firefighting, and emergency management entities in critical decision-making. The learners will work through a simulation to see the effects of their communication choices on decisions made by fire personnel. The lesson will take between one hour and one hour and fifteen minutes to complete (not including the quiz).

The lesson replaces an earlier edition produced in 2008.

NWS forecast offices could use the lesson in their training programs in preparation for fire weather season. Please follow this link to the MetEd description page that provides additional information and the link to begin the lesson: https://www.meted.ucar.edu/training_module.php?id=1300 .

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu).

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The COMET Program is pleased to announce the publication of the new lesson, "WPC Rainfall Guidance for Tropical Cyclones". This lesson introduces learners to the challenges in predicting precipitation associated with tropical cyclones (TCs). It also provides an overview of the deterministic and probabilistic rainfall guidance products issued by the Weather Prediction Center (WPC) to forecast TC-related precipitation. Learners work through a TC case to practice interpreting the guidance correctly and communicating the precipitation threat. The lesson also highlights the different interpretations of probabilistic products from the WPC and National Hurricane Center, and the need for collaboration between national centers to ensure a unified message. The lesson will take between 30 and 45 minutes to complete (not including the quiz).

The intended audience for "WPC Rainfall Guidance for Tropical Cyclones" includes forecasters in the U.S., Canada, and the Caribbean, emergency managers, and others with general interest in tropical cyclone quantitative precipitation forecasting. NWS forecast offices could also use the module in their training programs in preparation for hurricane season. Please follow this link to the MetEd description page that provides additional information and the link to begin the lesson: https://www.meted.ucar.edu/training_module.php?id=1317.

The MetEd website relies on JavaScript, and some lessons rely on Adobe® Flash® for navigation, animation, and/or presentation of multimedia elements. Ensure that you have a browser updated to its latest version with JavaScript enabled and the latest version of the Adobe FlashPlayer installed. For technical support, please visit our Registration and Support FAQs

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu).

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The COMET Program is pleased to announce the publication of the new lesson, "Additional Statistical Methods in the NWS National Blend of Global Models" (https://www.meted.ucar.edu/training_module.php?id=1299). Versions 2.0 and 3.0 of the National Blend of global Models (NBM) provide forecasts for precipitation, relative humidity, cloud ceiling heights, surface visibility, and ocean wind speed and direction. This lesson introduces learners to the UnRestricted Mesoscale Analysis (URMA, the analysis of record) used to calibrate the NBM's bias and error estimates. Learners will also explore the bias correction, weighting, and post-processing procedures used to produce the new forecast elements. For those unfamiliar with the NBM, we recommend the following prerequisites:

"Gridded Products in the NWS National Blend of Global Models" (https://www.meted.ucar.edu/training_module.php?id=1213)
"Statistical Methods in the NWS National Blend of Global Models" (https://www.meted.ucar.edu/training_module.php?id=1227)

The intended audience for "Additional Statistical Methods in the NWS National Blend of Global Models" includes National Weather Service and other operational weather forecasters, and those with general interest in numerical weather prediction. Users of NWS forecast products across various sectors--including emergency management and planning--might also be interested in the calculations and procedures used to generate these blended forecasts.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version, with JavaScript enabled. For technical support, please visit our Registration and Support FAQs (https://www.meted.ucar.edu/resources_faq.php).

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Dr. Bill Bua (bua AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu).

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The COMET Program is pleased to announce the publication of the new lesson, "Using the Local Climate Analysis Tool (LCAT) for Water Resilience Decisions" . This lesson demonstrates the utility of the Local Climate Analysis Tool (LCAT) for water resources applications. The training follows a NOAA Climate Resilience Toolkit case study in Tampa, Florida, and illustrates some of types of LCAT analyses available and how these analyses can be used to inform the steps to climate resilience outlined in the Toolkit.

The intended audience for this lesson includes anyone interested in using LCAT for water resources decision-making. The lesson will be most useful to those with some familiarity with drought/water resources questions and information needs. Some background with National Weather Service climate data and products will also be helpful.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs at https://www.meted.ucar.edu/resources_faq.php.

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The COMET® Program is pleased to announce the publication of two new videos that describe the Aviation Weather Center's new Impacts TAF Board tool. The first video, Introducing the Impacts TAF Board, introduces the history, purpose and benefits of the board. The second video, Using the Impacts TAF Board, explores the Impacts TAF Board website and explains the key elements of the board and how to use them.

The intended audience for the Impacts TAF Board Videos (https://www.meted.ucar.edu/training_module.php?id=1279) is aviation flight operations personnel including those at the Air Traffic Control System Command Center (ATCSCC), Air Route Traffic Control Centers (ARTCCs), Center Weather Service Units (CWSUs), Terminal Radar Approach Control Facilities (TRACON), airline meteorologists and general aviation pilots. The lesson should also appeal to public travelers who want to keep abreast of potential changes to their travel timelines.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Andrea Smith (asmith5 AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "Communicating Winter Weather Surface Impacts". This lesson will introduce National Weather Service (NWS) forecasters to the benefits of pre-season coordination in understanding the critical needs of decision-makers, particularly the state and local Departments of Transportation (DOTs). The strategies used by DOTs to mitigate road impacts during the winter and how the NWS can best support their needs are also discussed. Learners will gain insight into the common methods of collaboration between the NWS and DOT, and the different types of winter weather events in which they work together. Learners will also practice communicating winter weather forecast information that best support the concerns of DOT, including working through a simulation to see the effects of their communication choices on DOT decisions. The lesson will take about an hour to complete (not including the quiz).

The intended audience for "Communicating Winter Weather Surface Impacts" includes operational forecasters in U.S. NWS Weather Forecast Offices, and others with general interest in communicating weather information. NWS forecast offices could use the lesson in their training programs in preparation for the winter weather season.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Vanessa Vincente (vincente AT ucar.edu) or Tsvetomir Ross-Lazarov (tlazarov AT ucar.edu).

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The COMET Program is pleased to announce the publication of the new lesson, "Web-Based Ensemble Tools: Ensemble Situational Awareness Table". This lesson covers ensemble tools, the statistical methods used to derive them, and the climatological data sets used to create them. Operationally relevant examples help forecasters assess the web-based ensemble tools from the Ensemble Situational Awareness Table (ESAT), which add value to operational forecasts and help provide impact-based decision support services (IDSS). The lesson also explains how to interpret verification of ensemble tools in an operational perspective. A second lesson, which will be available in 2018, will apply ESAT tools in a high-impact winter case.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bill Bua (bua AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "GOES-16 Case Exercise: 8 May 2017 Colorado Hail Event".

GOES-16 launched in November 2016 and now provides 16 multispectral bands of satellite data, including CONUS scans every five minutes, with 0.5 kilometer visible imagery resolution and 2.0 km longwave infrared resolution. This lesson harnesses GOES-16's increased temporal and spatial resolutions to identify convective development and intensity signatures on traditional longwave IR and visible band imagery, and compares the experience to using legacy GOES products.

The lesson is geared toward early-career forecasters, those forecasters wanting more experience using high-resolution satellite data to forecast convection, and will be useful to aviation forecasters, meteorology major students and instructors, and weather enthusiasts.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Andrea Smith (asmith5 AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "ASMET10: Basic Satellite Imagery Interpretation". In data sparse regions of the world, satellite can be a life-saving forecasting tool if you know what you are seeing. This lesson is intended to provide forecasters with an introduction to interpreting Meteosat Second Generation images and products, including surface and atmospheric features. This 1.25-hour lesson covers 3 channels (visible, infrared, and water vapour) and 4 RGBs (severe convection, dust, natural colour, and night microphysics).

The intended audience for this lesson is any operational forecaster wanting to expand their knowledge of satellite channels and products. With its broad scope, the lesson should also appeal to meteorology students.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bryan Guarente (guarent AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new short video, "Geodetic Control in Surveying: Active vs. Passive." Aimed at surveyors and GIS professionals, this 3-minute video explains the difference between active and passive control methods in surveying, and the strengths and weaknesses of each. Passive control is the traditional method of referencing positions to physical benchmarks that have known locations. Active control references positions to one or more Continuously Operating Reference Station (CORS). These stations use continuous contact with global navigation satellite systems (GNSS/GPS) to provide a highly accurate and updated position.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of a new training resource, "Operational Environmental Monitoring Applications using the Community Satellite Processing Package (CSPP)". This resource provides an overview of the Community Satellite Processing Package (CSPP) and the satellite imagery and products accessible through the software, which is freely available from the Cooperative Institute for Meteorological Satellite Studies (CIMSS) at the University of Wisconsin-Madison. The software enables environmental data analysts, forecasters, and others to access polar-orbiting satellite imagery and products in near real-time. These products support operational forecasting, as well as a range of environmental and decision support applications.

This resource includes two YouTube videos: Operational Applications Using Imagery Products from CSPP and Operational Applications Using Microwave Products from CSPP. These videos feature operational and decision-support examples based on Joint Polar Satellite System (JPSS) satellite products available through CSPP.

The intended audience for Operational Environmental Monitoring Applications using the Community Satellite Processing Package (CSPP) includes anyone interested in accessing and downloading polar-orbiting satellite data, and particularly those needing access to near real-time information and products. The lesson should appeal to operational forecasters, environmental analysts, researchers, students, and anyone interested in free, timely access to the satellite data products.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Amy Stevermer

(asteverm AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, National Water Model, Part 1: Science and Products. This 30-minute interactive lesson will introduce key products, both official and unofficial, that were generated as part of the guidance suite from the National Water Model in August 2017. Hurricane Harvey and its remnants caused severe flooding during the period examined in the lesson. The lesson will provide a chance to interpret output and gain some knowledge about the scientific information presented.

We are also pleased to announce the publication of the new lesson, National Water Model, Part 2: Early Performance. This 30-minute interactive lesson will review and interpret data regarding the early performance of the National Water Model (versions 1.0 -1.2). Verification and evaluation of the National Water Model has been occurring since it went operational in August 2016. This lesson will review some of the main issues in model performance through early 2018, including some retrospective verification extending back to 2011. You will see how model performance has been improved as a result of verification. Among the topics addressed are peak flow timing errors, model bias and correlation, the impacts of basin calibration, inclusion of reservoirs, snowpack evolution, drainage in sandy soils, Quantitative Precipitation Forecasts (QPF), and time-lagged ensembles.

These lessons are aimed at forecasters in the River Forecast Centers (RFCs) of the National Weather Service (NWS). Each lesson may also be useful to others interested in water predictive services including the NWS Weather Forecast Offices, other government agencies, academic communities, and local users like emergency managers.

We welcome any comments or questions about the content, instructional approach, or use of this lesson. Please e-mail them to Matt Kelsch (kelsch AT ucar.edu). For technical support, please visit our Registration and Support FAQs .

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The COMET Program is pleased to announce the publication of the new lesson, "Radio Wave Propagation". As a society we have become dependent on satellite communications, but satellites fail with alarming frequency. Before the advent of satellites, long distance communications were carried out with high frequency (HF) radio transmissions. This 1-hour lesson examines the factors that control long-distance radio communications, with an emphasis on refraction in the ionosphere, frequency selection, and the effects of solar radiation.

The intended audience for Radio Wave Propagation is any potential radio operator who communicates across long distances using HF frequencies. This can include members of the U.S. DoD, emergency management, and amateur radio operators.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs .

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The COMET Program is pleased to announce the publication of the new lesson, Forecasters' Overview of the Middle East. This 2.5-hour lesson focuses on the major aspects of synoptic and mesoscale weather patterns, hazards to aviation and maritime operations, geography, oceanography, and climatology. The “Geography” Unit covers major political boundaries, cities, ports, topographical features, rivers, and seismicity. The “Oceanography” Unit includes major bathymetric features; mean sea surface temperature, vertical temperature profiles, salinity and velocity, ocean currents, and tidal ranges. The “Climatology” Unit covers the seasonal climatology of jet streams, synoptic weather systems, extratropical cyclones and monthly and seasonal statistics of high winds and seas. The “Weather Events” and “Hazards to Operations” Units cover dust storms, hazards to personnel, and other marine and aviation hazards.

The intended audience for this lesson is Navy meteorologists focused on the Middle East as well as other meteorologists interested in this geographical region.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov@ AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu). For technical support, please visit our registration and support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, GOES-16 and S-NPP/JPSS Case Exercise: Hurricane Harvey Surface Flooding. This 30-minute interactive lesson will review and interpret surface flooding associated with Hurricane Harvey in August 2017. Using data from both the GOES-16 ABI and the S-NPP VIIRS, you will become familiar with the use of satellite data as tools for analysis and short-term forecasts of surface flooding. The lesson will lead you through the interpretation of several key satellite bands and a satellite-derived flood map. Interactions will focus on local phenomena that presented diagnostic and forecasting challenges during the flood event.

The lesson is aimed at forecasters in the National Weather Service (NWS) and other weather and hydrological services internationally. The lesson is also useful to those needing near real-time flood mapping, including the Federal Emergency Management Agency (FEMA), the United States Army Corps of Engineers (USACE), and the World Meteorological Organization (WMO). Researchers and university users who focus on hydrology may also find this lesson relevant.

We welcome any comments or questions about the content, instructional approach, or use of this lesson. Please e-mail them to Matt Kelsch (kelsch AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the online lesson entitled "Situational Awareness in The Fire Environment". Maintaining situational awareness is a crucial skill in every decision-support situation. Wildland fires that threaten populated areas have the potential to inflict devastating damage to communities and can also threaten the personnel working on the fire. This lesson introduces the Situational Awareness Cycle. Learners practice using it to continuously monitor and adapt their support strategies and decision-support information depending on the rapidly evolving wildfire conditions. It also discusses a range of

tools that can be used to build and maintain situational awareness. The lesson will take between forty-five minutes and one hour to complete (not including the quiz).

The intended audience for "Situational Awareness in The Fire Environment" is any operational and/or fire weather forecaster in training or preparing for the fire weather season.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of "Unified Terrain in the National Blend of Models". This approximately 30-minute lesson describes the new, unified terrain now being used in the National Blend of Models forecast downscaling and blending processes. The method used to create the new Unified Terrain is briefly described, and areas that will show improved RTMA/URMA analyses are noted. Also noted are regions that show less improvement, such as near poorly resolved but meteorologically significant terrain features. We include case examples to illustrate where improvements work more and less well.

This lesson is intended for operational users of the RTMA/URMA and National Blend of Models data. It may also prove useful to students in colleges and universities doing coursework in numerical weather prediction (NWP).

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bill Bua (bua AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "GOES-16 GLM Case Exercise Buenos Aires Tornado and Hail Event". The Global Lightning Mapper (GLM) flies aboard the new GOES-R series satellites. The GLM's continuous lightning monitoring capability is a valuable asset to detecting and monitoring developing thunderstorms 24 hours a day. This 30-minute lesson introduces learners to the benefits of using GLM observations in assessing convection. Learners will explore a severe weather event near Buenos Aires, Argentina, and practice using GLM observations to determine initial convection, supplement other data tools in estimating tendencies in storm strength, and evaluate the potential for severe weather.

The intended audience for "GOES-16 GLM Case Exercise: Buenos Aires Tornado and Hail Event" includes operational forecasters, researchers, and others interested in the value of GOES-R series GLM products for operational weather support.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Vanessa Vincente (vincente AT ucar.edu).

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The COMET Program is pleased to announce the publication of the new short video, "The Value of Accurate Water Levels". NOAA's Center for Operational Oceanographic Products and Services (CO-OPS) operates the National Water Level Observation Network (NWLON) a system of water level sensors, that form the backbone of our nation's coastal observation infrastructure.

This short video, intended for decision makers and the general public, describes the value of accurate NWLON water level data provided by CO-OPS.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "GOES-R Geostationary Lightning Mapper (GLM) North America Examples". The Geostationary Lightning Mapper (GLM) aboard the GOES-R series satellites provides continuous lightning detection from space, giving forecasters a unique tool to monitor developing thunderstorms. This 45 minute lesson introduces learners to the benefits of using GLM gridded products, primarily Flash Extent Density (FED). Learners will explore several North American convective events and use Flash Extent Density, in combination with other satellite and radar data, to diagnose convective initiation, storm intensification, and areal extent of lightning activity. Helpful hints to keep in mind while using GLM gridded products will be discussed. Finally, learners will get a sneak peek into future GLM gridded products and their advantages.

The intended audience for "GOES-R Geostationary Lightning Mapper (GLM) North America Examples" includes operational forecasters, researchers, students and others interested in the value of GOES-R series GLM products for operational weather support. Please follow the links to the MetEd description page that provides additional information as well as the link to begin the lesson.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs .

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Andrea Smith (asmith5 AT ucar.edu).

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The COMET Program is pleased to announce the publication of the online lesson entitled "Scenario-Based Planning for Sea Level Change in the U.S. Using the USACE Sea Level Change Curve Calculator and Guidance". The key to wise, long-term planning in relation to sea

level rise is to visualize potential future water-level scenarios that may impact a project's function or stability. These scenarios must consider not only rising sea levels, but also tides and storm surge.

This lesson introduces tools and concepts that are essential for scenario-based planning for sea level change. The lesson guides the learner through the use of the USACE Sea Level Change Calculator to produce site-specific water-level projections. The lesson also introduces the NOAA Sea Level Rise Viewer and NOAA's Sea Level Trends website.

The primary audience for "Scenario-Based Planning for Sea Level Change in the U.S. Using the USACE Sea Level Change Curve Calculator and Guidance" is practitioners within USACE and other agencies, such as engineers and other technical staff, planners, and management/leadership staff. Other professional areas to which the lesson will be particularly relevant include water resource planners, coastal city planners, and biologists. Please follow the links to the MetEd description page that provides additional information as well as the link to begin the lesson.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please email your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu).

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The COMET Program is pleased to announce the publication of a new 7-minute video on YouTube titled, "Using Multi-hazard, Impacts-based Forecast and Warning Services". This lesson uses a heavy rain situation in Barbados to demonstrate the use of Multi-hazard, Impacts-based, Forecast and Warning Services. The lesson is part of the larger Weather Ready Nations effort.

The intended audience is forecasters, emergency managers and other critical decision makers. The lesson should also appeal to students and members of the general public with an interest in impacts-based forecasting.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Matt Kelsch (kelsch AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of a new interactive lesson on MetEd titled, "Leveraging Social Science to Improve Risk Communications <https://www.meted.ucar.edu/training_module.php?id=1379> ".

NWS forecasts are only one of many sources of forecast guidance that both expert users and the public have access to. Decision support for a spectrum of end users requires that the NWS will use social science findings and practices as a guide for making its products more accessible and effective. This lesson will focus on effective messaging when communicating weather hazards.

In the process the learner will become familiar with some messaging best practices that are based on social science findings.

The intended audience includes operational forecasters and hydrologists who support decision making and weather readiness. The lesson may also be useful to researchers, university students, and end users in the decision making process.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Matt Kelsch (kelsch AT ucar.edu). For technical support, please visit our Registration and Support FAQ <https://www.meted.ucar.edu/resources_faq.php>.

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The COMET Program is pleased to announce the publication of the new lesson, "Instrumentation and Measurement of Wind". This lesson, containing over 1.5 hours of content, is the sixth of ten lessons planned as part of an Instrumentation and Measurement of Atmospheric Parameters distance learning course. The lesson content results from subject matter expertise and collaboration by NCAR's Earth Observing Laboratory, Millersville University, and The COMET Program, and offers a comprehensive overview of wind measurement.

This lesson summarizes the science and techniques used to measure atmospheric wind. It presents an overview of the main sensor types for wind, including mechanical, electronic, and drifting-position sensors as well as sensors relying on impact pressure and sensors utilizing timing or Doppler shifts. The advantages and limitations of the sensor types and information about uncertainty and errors are reviewed with a focus on understanding which sensors might be best for particular applications.

The intended audience for "Instrumentation and Measurement of Wind" includes undergraduate and graduate students in meteorology and the atmospheric sciences, though anyone interested in measurement science and instrumentation, particularly as related to winds, may find the content useful.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alison Rockwell (rockwell AT ucar.edu), Amy Stevermer (asteverm AT ucar.edu), or Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs

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The COMET Program is pleased to announce the publication of a new video, "Satellite Signals from Space: Smart Science for Understanding Our Weather and Climate". This video provides anyone interested with a brief overview of the Constellation Observing System for Meteorology, Ionosphere, and Climate, called COSMIC. The video is part of the UCAR Center for Science Education's Satellites and Weather Teaching Box.

Targeted to students and teachers in Grades 5-9 but accessible to anyone, the video introduces the latest COSMIC mission (COSMIC-2), which uses satellites orbiting near Earth to measure

how the atmosphere affects signals from global positioning system (GPS) satellites high above the surface.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this video. Please e-mail your comments or questions to Lon Goldstein (longold AT ucar.edu) or Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "Land Surface Analysis: An Introduction to the EUMETSAT LSA-SAF Products". This 45-minute lesson provides an overview of the satellite-derived products generated by the Satellite Application Facility on Land Surface Analysis (LSA-SAF) that may provide beneficial information to the agriculture community. Learners will practice reading and interpreting the LSA-SAF products to better understand the characteristics of vegetation. The lesson also discusses the application of satellite-derived products in regression analysis to model agricultural production, and uses a wine production case in the Portuguese Douro Valley to show learners how seasonal crop productions may be modeled.

The intended audience for "Land Surface Analysis: An Introduction to the EUMETSAT LSA-SAF Products" includes farmers, agricultural producers, and others with interest in crop yield predictions. National and international operational forecasters with interest in satellite data applications in agriculture may also find this lesson useful.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Vanessa Vincente (vincente AT ucar.edu).

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The COMET® Program is pleased to announce the publication of the new lesson, "Basic Satellite and NWP Integration". NWP is one of the most important forecasting tools in our toolbox. Yet identifying when/where it isn't capturing reality is difficult. In the short-term forecasting range, it is important as a forecaster to identify when/where NWP output isn't matching reality. Then you can make appropriate changes to the forecast output.

To find those mismatches anywhere in the world, one of the best tools is satellite imagery. In this lesson, we will focus on a few cases using satellite imagery to help identify mismatched features/processes between the satellite imagery and the NWP.

Anyone trying to add value to short-term NWP forecasts could benefit from taking this lesson to learn a process for assessing NWP output compared to observations. This lesson focuses on fog and convection in Africa, however this lesson can apply to many other cases, and is generalized enough to help forecasters from anywhere in the world.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bryan Guarente (guarente AT ucar.edu). For technical support, please visit our Registration and Support FAQs

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The COMET Program is pleased to announce the publication of a series of lessons designed for National Weather Service (NWS) forecasters and decision makers to help prepare for the new-generation JPSS and GCOM-W polar-orbiting environmental satellites.

The course is intended to help learners develop and improve their understanding of the value and anticipated benefits of JPSS, including improved monitoring of meteorological, environmental, and climatological phenomena and related hazards.

Part of the Satellite Foundational Course for JPSS (SatFC-J), the lessons are intended to help learners develop or improve their understanding of the capabilities, products and benefits provided by the imaging and sounding instruments on board these two satellite missions. The lessons will also help prepare the learner for future exploration and use of polar-orbiting satellite products in meteorological analysis and forecasting, and in other disciplines that involve environmental monitoring and prediction.

Five lessons in the series are accessible through the MetEd website at the following links:

- SatFC-J: Orbits and Data Availability
- SatFC-J: The VIIRS Imager
- SatFC-J: The CrIS and ATMS Sounders
- SatFC-J: The AMSR2 Microwave Imager
- SatFC-J: The VIIRS Day/Night Band

The full set of SatFC-J lessons is accessible via https://www.meted.ucar.edu/training_module.php?id=1614.
[Note that NOAA personnel should access the lessons through the Commerce Learning Center (CLC).]

We welcome any comments or questions you may have regarding the content, instructional approach, or use of the lessons. Please e-mail your comments or questions to Patrick Dills (dills AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "Interpreting and Communicating EPS Guidance: Germany Winter Event". This 45-minute lesson briefly introduces learners to the benefits of using probabilistic forecast information to assess weather and communicate forecast uncertainties. Learners will explore a winter weather event in Germany and practice synthesizing deterministic and probabilistic forecast guidance to better understand forecast uncertainties based on lead-time. Additionally, learners will decide how to best communicate the potential weather threats and impacts to local end users. The lesson is another component of the Forecast Uncertainty: EPS Products, Interpretation, and Communication distance learning course.

The intended audience for "Interpreting and Communicating EPS Guidance: Germany Winter Event" includes national and international forecasters, upper-level meteorology students, and decision-makers who regularly receive specialized communications from weather agencies.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Vanessa Vincente (vincente AT ucar.edu).

The COMET Program is pleased to announce the publication of the new lesson, "Convection-allowing Models (CAMs): Winter Applications". This lesson explains how convection-allowing models (CAMs) can be used for winter weather guidance. Examples of CAMs winter weather products are described as the student moves through a winter weather case study from the Northern Plains in April 2018. Students use the CAM products to forecast the event's progress and its impact on the region.

The intended audience for Convection-allowing Models (CAMs): Winter Applications is the operational forecaster in the public or private sector with winter weather forecast responsibilities. As high-resolution NWP and its use is a relatively new topic, the lesson should also be of interest to the academic community.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bill Bua (bua AT ucar.edu) or Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET® Program is pleased to announce the publication of the new five-lesson "Modifying NWP Output Course". The course is intended to increase forecasters' skill in (1) finding mismatches between NWP output and observations and (2) making adjustments to that NWP output, with an overall goal of adding human value to model forecasts. These five short lessons provide three different approaches to make modifications to NWP forecasts, culminating

in instruction for how to use Potential Vorticity as a tool to assess meso-synoptic NWP initializations.

The intended audience for "Modifying NWP Output Course" includes operational forecasters, researchers, students and others interested in increasing their skill with identifying and modifying mismatches between observations and NWP output. Please follow the links to the MetEd description page that provides additional information as well as the links to begin the lessons.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please email your comments or questions to Bryan Guarente (guarente AT ucar.edu).

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The COMET® Program is pleased to announce the publication of the new two-lesson "Frontal Diagnosis Course". The course is intended to increase learners' abilities to correctly identify different types of cold fronts and effectively diagnose their characteristics, both conceptually and from observed satellite data. The two short lessons compare and contrast three different types of fronts: Classic/Stacked fronts, Katabatic fronts, and Anabatic fronts. Throughout the lessons, learners must analyze and categorize all three types of front, along with dry conveyor belt pulses.

The intended audience for the "Frontal Diagnosis Course" includes operational forecasters, researchers, students and others interested in increasing their capabilities to identify and diagnose aspects of these three different cold frontal types in order to bring more value to their frontal analyses and forecasts. Please follow the links to the MetEd description page that provides additional information as well as the links to begin the lessons.

For best viewing of content on the MetEd website, please ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please email your comments or questions to Bryan Guarente (guarente AT ucar.edu).

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The COMET Program is pleased to announce the publication of the video, "What's New in the National Blend of Models version 3.2". This short video describes the U.S. National Weather Service (NWS) National Blend of Models v3.2 upgrade. This upgrade includes the first official probabilistic weather elements, along with new weather elements for:

- Aviation,
- Fire Weather,

- Water Resources,
- Winter Weather,
- Tropical Weather, and
- Marine applications.

Version 3.2 adds several new model components and a new forecast domain for Guam.

The intended audience for the National Blend of Models Version 3.2 video is any operational forecaster using NBM grids.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bill Bua (bua AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET® Program is pleased to announce the publication of a new video highlighting the capabilities of the upcoming FORMOSAT-7/COSMIC-2 satellite mission, scheduled to launch in June 2019. This six-minute video, Introducing the FORMOSAT-7/COSMIC-2 Satellite System – Next Generation Observations for Weather and Climate, is aimed at a broad public audience.

Completed in partnership with UCP's COSMIC Program, this video provides an overview of the latest-generation Constellation Observing System for Meteorology, Ionosphere, and Climate (FORMOSAT-7/COSMIC-2), based on interviews with scientists and mission planners. These experts introduce the instrumentation used and describe the collaborations that made the COSMIC-2 mission possible. They describe how COSMIC uses a technique called radio occultation--making use of existing navigation satellite signals passing through the atmosphere to provide detailed measurements of temperature, pressure, and water vapor--and explain how these data contribute to exciting improvements in numerical weather prediction, hurricane forecasts, climate studies, and analysis of space weather affecting communication networks and other systems on Earth.

We welcome any comments or questions you may have regarding the content or use of this video. Please e-mail your comments or questions to Lon Goldstein (longold AT ucar.edu) or Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of an update to the MetEd Operational Models Encyclopedia for the Global Forecast System (GFS) model, including the finite volume 3-dimensional (FV3) dynamical core. This GFS upgrade, the first to use the FV3 core, was made operational at 12 UTC 11 June 2019. Besides the new dynamical core, the microphysics scheme was upgraded to directly predict precipitation, and the land surface model (LSM) was altered to reduce a high bias in surface soil layer evaporation.

The intended audience for the MetEd Operational Models Encyclopedia includes operational public and private sector users of numerical weather prediction models. This new entry will be of particular interest to those using GFS in the forecast process. Colleges and universities with synoptic and dynamic meteorology courses may find the content in the Encyclopedia useful as a learning tool as well.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Bill Bua (bua AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "GOES-16/JPSS Case Exercise: Monitoring the Rhea Oklahoma Grassland Fire". Given the extensive economic, health, and safety impacts as well as the increased impacts of wildland fires, the new capabilities available from current GOES-R and JPSS satellite remote sensing technologies will aid in fire detection and provide more effective monitoring of fire evolution, smoke and other related impacts.

This lesson provides the opportunity for forecasters and others to become more familiar with the enhanced capability and utility of newer satellite products through interpretation activities and interactions based in the context of the April 2018 Oklahoma Rhea grassland fire. This 0.75-hour lesson follows the detection, spread, and evolution of the Rhea Fire over its first couple of days.

The intended audience for GOES-16/JPSS Case Exercise: Monitoring the Rhea Oklahoma Grassland Fire is any operational meteorologist, including IMETs, and others needing to use satellite information for fire/smoke detection and monitoring. The lesson should also appeal to individuals from emergency operation centers and others (fire and land management agency personnel, USFS and state forestry fire behavior analysts) with interest in detecting and monitoring fires.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Patrick Dills (dills AT ucar.edu) or Tony Mancus (tmancus AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "The Forecast Process: Using the Forecast Funnel". The lesson is a somewhat broad brush review of the overall forecast process, but with specific application of the forecast funnel approach as used by Australia's Bureau of Meteorology (BoM).

The forecast process components of the lesson include decision support and communication, use of numerical weather prediction, and applying the forecast funnel approach. The forecast funnel is described in detail, along with the forecaster time pyramid, and it is applied using a BoM forecast policy example.

This 2-hour lesson was written by Dr. Mick Pope of The Bureau of Meteorology Training Centre and is intended for introductory-level forecasters and for students in meteorology.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alan Bol (alanbol AT ucar.edu) or Matt Kelsch (kelsch AT ucar.edu). For technical support, please visit our Registration and Support FAQs

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The COMET Program is pleased to announce the publication of the new lesson, Critical Fire Weather Patterns. In this lesson, learners will explore the alignment of meteorological and non-meteorological factors that create Critical Fire Weather Patterns. Several scenarios will step learners through the decision-making processes for identifying the presence of a Critical Fire Weather Pattern and communicating with partners using terminology familiar to them. The scenarios will also illustrate how coordination and consistency among meteorologists support the fire agencies and other partners.

The focus of the lesson is on recognizing that the presence of a Critical Fire Weather Pattern is more important than determining if a particular set of criteria, such as Red Flag Warning Criteria, will be met. The lesson will also introduce tools that help identify patterns and in turn help facilitate impact decision support services (IDSS).

NWS forecast offices could use Critical Fire Weather Patterns in their training programs in preparation for fire weather season.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu) or Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new "CESM Distance Learning Course". The Community Earth System Model (CESM) is a fully-coupled, community, global climate model that provides state-of-the-art computer simulations of the Earth's past, present, and future climate states. The CESM Distance Learning Course is based on the CESM Tutorial held annually at the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. This course consists of 12 lectures and 4 practical sessions on simulating the climate system and practical sessions on running Community Earth System Model (CESM), modifying components, and analyzing data. The course is targeted at the graduate student level.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Alan Bol (alanbol AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "Communicating Wind Risk through Tropical Watches and Warnings". This lesson provides an overview of the qualitative and quantitative aspects assessed by forecasters when issuing high wind and storm surge watches and warnings for tropical cyclone events. Learners will explore the critical role that wind speed probability guidance and risk play in the issuance of watches and warnings for both coastal and inland areas. Also, learners will practice using probabilistic wind

guidance in identifying the coastal and inland areas most likely to require watches warnings. The lesson will discuss how the Hurricane Threats and Impacts graphic is used to communicate potential tropical cyclone threats and impacts, and how this information is related to the issuance of watches and warnings.

The intended audience for "Communicating Wind Risk through Tropical Watches and Warnings" includes forecasters in the U.S., Canada, and the Caribbean, emergency managers, and others with general interest in tropical cyclone impacts. National Weather Service forecast offices could also use the module in their training programs in preparation for hurricane season.

The MetEd website relies on JavaScript for navigation, animation, and/or presentation of multimedia elements. Internet Explorer does not support one element of the lesson, please use Microsoft Edge instead of Internet Explorer. Ensure that you have a browser updated to its latest version with JavaScript enabled. For technical support, please visit our Registration and Support FAQs.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Tsvet Ross-Lazarov (tlazarov AT ucar.edu) or Vanessa Vincente (vincente AT ucar.edu).

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The COMET Program is pleased to announce the publication of a new resource on the COMET MetEd YouTube channel, containing recorded sessions from the 2019 NWS Satellite Applications Workshop. The workshop, co-sponsored by the US National Weather Service (NWS) Operations Proving Ground (OPG), NWS Office of the Chief Learning Officer (OCLO), and the GOES-R and JPSS Programs, included 12 recorded sessions in which NWS forecasters shared success stories, best practices, and ongoing challenges associated with integrating next-generation satellite products into the operational forecaster's decision-making process. The workshop sessions include: Heavy Precipitation and Flash Flooding in Mountainous Terrain; Detecting Blowing Snow; Lake Effect Snow and Blizzard Warnings; Mesoanalysis and Storm-Scale Applications; Weather Prediction Center Applications; Ocean Prediction Center Applications; GLM Applications for Lightning Safety; Detecting and Monitoring Volcanic Ash; Wildfire Applications: Warn-on-Detection Fire Warnings; Wildfire Applications: Big Timber Wildfires; Assessing Uncertainty in Convective Operations; and the Polar Book Club.

The intended audience for the 2019 NWS Satellite Applications Workshop recordings includes any operational forecaster needing to learn more about the latest satellite applications based on GOES-R and JPSS imagery and products. With their broad scope, the recordings should also appeal to students and other users of satellite meteorology information. NWS staff can access the recordings individually and as part of a curriculum via the CLC by searching for "2019 satellite workshop".

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Amy Stevermer (asteverm AT ucar.edu). For technical support, please visit our Registration and Support FAQs.

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The COMET Program is pleased to announce the publication of the new lesson, "Instrumentation and Measurement of Atmospheric Trace Gases" This lesson offers a detailed overview of the instrumentation used to measure atmospheric trace gases, represented by various chemical compounds in Earth's atmosphere. The content focuses on three analytical approaches, including spectrometric methods (optical and molecular), chromatographic methods, and chemical conversion methods. Sensor performance metrics (calibration, uncertainty, time resolution, and precision) associated with these main techniques are discussed, along with recommendations for ensuring the representativeness of the observations and understanding sensor uncertainty and the limitations and applications of particular platforms or designs.

"Instrumentation and Measurement of Atmospheric Trace Gases" is part of the Instrumentation and Measurement of Atmospheric Parameters course series. The course series is a joint effort combining expertise from NCAR's Earth Observing Laboratory, Millersville University, and The COMET Program. The lessons in the course are designed for advanced undergraduate and graduate students, but can be useful for anyone needing more detailed information about measurement applications and theory.

We welcome any comments or questions you may have regarding the content, instructional approach, or use of this lesson. Please e-mail your comments or questions to Amy Stevermer (asteverm AT ucar.edu), Tony Mancus (tmancus AT ucar.edu), or Alison Rockwell (rockwelll AT ucar.edu). For technical support, please visit our Registration and Support FAQs.
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