

Surface Observational Data Support for Model Verification

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Abstract:

Tuning a model to a particular region is aided by comparison with observational data. For this task, the NOAA National Climatic Data Center "Integrated Surface Dataset" (ISD) of worldwide hourly station data will prove an important resource. This talk will review the data native format and will present summary statistics and coverages for the ISD for the region consisting of Alaska, far eastern Russia and northwestern Canada.

Modeling Arctic Clouds and Precipitation Using MODIS

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Abstract:

MODIS radiances are used to retrieve total precipitable water (TPW) and cloud-top pressure (CTP) over the Arctic in near-real time at the Cooperative Institute for Meteorological Satellite Studies (CIMSS) at the University of Wisconsin. These retrievals are being used to validate cloud microphysics in the CIMSS Regional Assimilation System (CRAS). They are also being used to verify forecasts generated by a 48-kilometer CRAS run centered over the North Pole. CTP and TPW from the Aqua and Terra satellites are inserted into a 24-hour forecast spin-up cycle to provide initial water vapor, cloud and precipitation fields. Boundary conditions are provided by the National Center for Environmental Prediction's (NCEP) Global Forecast System (GFS). Preliminary statistics indicate that the MODIS retrievals tend to dry the forecast model in the coastal regions and reduce model cloudiness throughout the model domain. Forecasts can be viewed at <http://cimss.ssec.wisc.edu/realtime/>.

The NOAA "Rapid Refresh" Hourly-Updated Assimilation/Model Forecast Cycle Using WRF For Aviation and Situational Awareness - (RUC goes North-American)

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Abstract:

NOAA/ESRL is developing an hourly update NWP cycle over a North American domain including Alaska. The cycle, called the Rapid Refresh (RR), will replace the current Rapid Update Cycle (RUC) which currently runs at NCEP over a smaller CONUS domain. The RUC currently provides CONUS guidance for forecasts of all aspects of aviation weather, now producing updated 3-d analyses and forecasts updated every hour based on latest hourly observations including aircraft, profiler, METAR, satellite, and radar. The RUC is also used widely for severe weather and public forecasting.

The Rapid Refresh is based on the WRF model, but both the current RUC and Rapid Refresh under development differ from the NCEP NAM model in its model physics (e.g., more sophisticated cloud microphysics). Similarly, the Rapid Refresh uses a version of the Gridpoint Statistical Interpolation assimilation code (used for the NAM), but again with RUC-developed enhancements including assimilation of satellite and METAR cloud data and for PBL-depth effect on assimilation of surface in situ obs. A key goal of the RR is to improve aviation NWP guidance for Alaska through its assimilation and model physics. Alaska-unique considerations for RR WRF configuration and data assimilation will be discussed. With the likely extension of TAMDAR to Horizon Airlines flying over Alaska, current TAMDAR impact experiment results using RUC over CONUS will also be briefly discussed.

Mesoscale Model Experiments for SARJET

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Abstract:

A series of high-resolution numerical weather prediction model experiments were carried for the Southeast Alaska Regional Jets (SARJET) project. These experiments are noteworthy because detailed measurements from the University of Wyoming's King Air research aircraft were available for validation. In general, the NWP simulations were able to replicate the detailed structures in the observed low-level flow. SARJET's primary focus was to better understand barrier jets, a common mesoscale phenomena along mountainous coasts. Case studies have been completed for both a "classic-type" barrier jet including low-level flow with an onshore-directed component, and for a "hybrid-type" barrier jet featuring offshore-directed flow out of a prominent gap in the terrain, using high-resolution simulations from the MM5 NWP model and measurements from the aircraft. Aircraft and wind profiler observations have also been analyzed for a Taku wind event, a downslope windstorm that occurs in the vicinity of Juneau, and are compared with the output from a very-high resolution run of the COAMPS NWP model.

The Polar WRF

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Abstract:

A polar-optimized version of the 5th generation Penn State/National Center for Atmospheric Research (NCAR) Mesoscale Model (MM5) was developed to fill climate and synoptic needs of the polar science community and to achieve an improved regional performance. Continuing the processes of enhancing regional modeling, the developed polar skills are being applied toward the state-of-the-art Weather Research and Forecasting model (WRF). Evaluations and optimizations are especially needed for boundary layer parameterization, cloud physics, snow-surface physics and sea-ice treatment. Testing and development work for Polar WRF began with simulations for ice sheet surface conditions using a Greenland area domain with 40-km horizontal resolution. The winter month December 2002, and the summer month June 2001 are simulated with WRF version 2.1.1 using a series of 48-hour integrations initialized daily at 0000 UTC. Initial and boundary conditions are supplied by the Global Forecast System (GFS) model. The simulations motivated several improvements to Polar WRF, especially to the Noah land surface model and the initial snowpack temperature.

The December 2002 simulations show similar forecast skill in comparison to automatic weather station data as Polar MM5 simulations. Moreover, the modified WRF simulates an improved surface energy balance. The WRF Simulations for June 2001 show slightly less forecast skill than the Polar MM5 simulations. We are also collaborating with the National Center for Atmospheric Research (NCAR) on introducing Polar WRF to the operational Antarctic Mesoscale Prediction System (AMPS) forecasts for U.S. Antarctic operations. Simulations have now begun for the Western Arctic that can be compared to observations from Alaska, including Atmospheric Research Measurement (ARM) North Slope of Alaska (NSA) observations near Barrow. Simulations of the Arctic Ocean pack ice region can be compared to the observations of the Surface Heat Budget of the Arctic Ocean (SHEBA) study.

Evaluation of the Weather Research & Forecasting (WRF) Model for the Time of the 2006 Augustine Volcano Eruption

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Abstract:

Model evaluations of weather situations occurring during volcanic eruptions may aid in understanding the effects of an eruption on local weather, which can allow for more accurate forecasts. The Weather Research & Forecasting (WRF) Model was run for a twenty day period during the most recent eruption of the Augustine Volcano (South Central Alaska) in January, 2006. Simulations of meteorological quantities were compared with station data from the Cook Inlet area of South Central Alaska. Evaluated quantities included hourly data (cloud cover, wind direction and speed, pressure, temperature, dew point, rainfall, snow depth) and daily data (rainfall, maximum temperature, minimum temperature). Statistical analysis of the simulated quantities with the observed was performed by calculating the bias, root mean square error, correlation coefficient, and standard deviation of error. Preliminary results suggest that the WRF simulations are appropriate to use to further investigate the effect of volcanic eruptions on local weather.

Development and Evaluation of Polar WRF: SHEBA and ARM North Slope of Alaska Simulations

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Abstract:

Similar to efforts with MM5 in the early 2000s, a polar version of WRF is currently being developed and evaluated. Evaluation of Polar WRF is being performed in several polar environments (ice sheets, sea ice, tundra). Results from Polar WRF simulations over Arctic sea ice and over the tundra of the North Slope of Alaska will be presented. The model simulations are evaluated using detailed observations of basic meteorological parameters, surface energy budget observations, and cloud observations from the SHEBA sea ice field site and the Department of Energy (DOE) Atmospheric Radiation Measurement (ARM) North Slope of Alaska (NSA) site.

A Pre-operational WRF Forecasting, Verification and Data Access System

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Abstract:

A pre-operational WRF forecasting, verification and data access system has been constructed using ARSC and AOOS resources. Part I: A brief summary of infrastructure used in conjunction with WRF/WRFSI 2.1.2 software. [Maybe some crossover with WRF/WPS 2.2 and implications of NCEP's migration from GRIB1 to GRIB2]. Part II: Short demo of forecast and verification products being produced in near real-time from AOOS and ARSC (NorthAlaska6) grids. Part III: How to obtain, analyze, or visualize model output using OPeNDAP as an access method.

Development of a New Pan-Arctic Land-Based Snowfall Product

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Abstract:

A new product, the Pan-Arctic Snowfall Reconstruction (PASR) is developed to address the problem of cold season precipitation gauge biases for the 1940-1999 period. The method used to create the PASR is different from methods used in other large-scale precipitation data products and has not previously been employed for estimating Pan-Arctic snowfall. The NASA Interannual-to-Seasonal Prediction Project Catchment Land Surface Model is used to reconstruct solid precipitation from observed snow depth and surface air temperatures. The method is tested at four stations in the United States and Canada where results are examined in depth. Reconstructed snowfall at Dease Lake, British Columbia and Barrow, Alaska is higher than gauge observations. Reconstructed snowfall at Regina, Saskatchewan and Minot, North Dakota is lower than gauge observations, probably because snow is transported by wind out of the Prairie region and enters the hydrometeorological cycle elsewhere. These results are similar to gauge biases estimated by a water budget approach. Reconstructed snowfall is consistently higher than snowfall from ECMWF Reanalysis-40 but does not have a consistent relationship with snowfall derived from the WMO Solid Precipitation Intercomparison Project correction algorithms. Advantages of the PASR approach include (1) the assimilation of snow depth observations captures blowing snow where it is deposited and (2) the modeling approach takes into account physical snowpack evolution. These advantages suggest the PASR product could be a valuable alternative to statistical gauge corrections and that arctic ground-based solid precipitation observing networks might emphasize snow depth measurements over gauges.

Recent and Future Permafrost Variability, Retreat and Degradation in Greenland and Alaska: An Integrated Approach

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Abstract:

In spite of its role in the geological, ecological, engineering, and climate change sciences, modeling of permafrost has remained the domain of individuals and small groups of scientists and hence little direct interaction between the permafrost and climate modeling community has taken place. The research proposed here seeks to bridge this gap at the local to regional scale for two quite different geographical regions; western Greenland and Alaska. More specifically, climate modeling will be performed at an unprecedented spatial scale that allows us to address central permafrost issues such as the accurate delineation of different zones of permafrost, active layer depth and seasonality, thereby combining climate modeling with spatially oriented approaches to permafrost modeling at scales of societal interest. The project will incorporate existing near-surface weather, climate and permafrost observations supplemented with new targeted measurements at locations where climate change is presently taking place, e.g. in the discontinuous permafrost zone.

Simulating Beaufort Sea Coastal Wind Events Using MM5 and WRF

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Abstract:

Complex surface conditions in the coastal region of Beaufort Sea and sparse observations make the weather simulation difficult. For such a potential oil production region, offshore and surface wind fields have been found a critical factor that impacts the development assessments, such as oil spill assessment.

Extreme wind events are often found in this region. Although the strongest winds occur in winter time, there are a few in summer and fall in record. For example, the two cases of 9-12 August 2000 and 7-10 October 2006 caused maximum daily average winds of 25 and 20 m/s at Deadhorse Alaska, respectively. The two cases are associated with two different weather systems, one with a low pressure system and the other with a high.

The two widely used mesoscale models, MM5 and WRF, are used to simulate the two wind events in order to identify the strengths of each model in simulating surface winds. In addition, effects of land sea contrast and complex topography are studied through high resolution (~10 km) simulations.

Estimating Strong Wind Event Return Frequency in Alaska

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Abstract:

Our study focuses on development of a method to estimate return values for strong wind events (1979 to 2005) for the coastal regions surrounding the towns of Barrow, Homer, and Nome in Alaska. Strong winds drive wind setup surges and wave action that damage coastal infrastructure. A Gumbel, or extreme value, distribution is fitted to six-hourly wind data from the NCEP/DOE global reanalysis 2, and curve location and scale parameters are extracted. These are fed into an algorithm that gives return frequency. The associated 'return values' represent wind speed thresholds that will be exceeded on average once every return period. For a 50-year return interval Barrow has the highest wind speed. This work demonstrated that large values for scale and location give a higher T-year return value, meaning a stronger wind event for a given return frequency.

Description and Application of a State-of-the-Art Fully Coupled Multi-Scale Air Quality and Weather Prediction Model (WRF/Chem)

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Abstract:

We will describe the Weather Research and Forecasting (WRF) model as it is coupled with chemistry. This model now includes many atmospheric chemistry routines covering biogenic emissions, deposition, photolysis, chemical mechanisms. In addition, various atmospheric aerosol routines (modal and sectional approaches) have been added to WRF. The chemistry and aerosol routines are usually solved in an “online,” or “fully-coupled” fashion with the meteorological forecast model. In other words, the interaction and transport of meteorological, chemical, and aerosol species are calculated using the same physical parameterizations with no need to interpolate in time and/or space. The most recent version of this modeling system includes the direct and indirect effects of aerosols. An overview of the current status of this modeling system and ongoing as well as future development will be discussed. In addition some evaluation results and scientific applications will be presented.

A Performance Comparison of Real-time MM5 and WRF Forecasts During Winter, 2006

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Abstract:

A real-time Alaskan weather forecasting system built around the MM5 mesoscale model has been operating continuously at UAF for nearly five years, producing consistent, accurate forecasts for the Alaskan weather and aviation communities, as well as the general public. Recently, the WRF model was used to implement a new real-time forecasting system to run in parallel with the existing MM5 system, utilizing the same nested domain setup and a similar model configuration to produce forecasts for six domains at four different resolutions four times per day. We will present results of the verification of the two real-time systems against both surface and upper-air station observations over a period of several months (Nov. 2006-Feb. 2007), describing their overall performance through a suite of metrics and directly comparing the capabilities of the two premier mesoscale models to accurately forecast Alaskan weather conditions throughout the challenging winter season.

Impact of Central Alaska Land-Cover Changes on Evapo(transpi)ration and Precipitation

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Abstract:

In high-latitudes, land-cover changes caused by wildfires and/or increased agricultural use cannot only alter regional evapotranspiration, precipitation and runoff, but also modify the interaction between the global and regional water cycle. Thus, the land-cover changes may affect neighboring areas by atmospheric transport of the modified air mass. Two 40-year simulations performed with the fully coupled Community Climate System Model (CCSM) with current and altered land-cover in Interior Alaska are analyzed using similarity coefficients to examine the long-range impact of these land-cover changes. The result shows that the land-cover changes lead to increased evapotranspiration in June and July. Precipitation decreases from late summer to early fall due to decreased large-scale transport. Weaker interaction between the regional and global water cycle is found in most months with decreased monthly moisture fluxes into and out of Alaska as a consequence of the land-cover changes. The similarity analysis shows that the impact of the land-cover changes is the smallest during summer and the radius of influence is the smallest during winter, while during onset of snow coverage and snowmelt the impact is the greatest and the farthest reaching outside the region (similarity coefficient less than 0.9 in mid-latitudes). These findings suggest that the high latitude land-cover changes are the most pronounced and likely to cause significant impact outside Alaska during the transient seasons.

A Climatology of Operational Model Simulated Low Level Jets over Cook Inlet and Shelikof Strait of Alaska

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Abstract:

Alaska Experiment Forecast Facility (AEFF) in University of Alaska Anchorage has been producing daily numerical weather modeling for Cook Inlet and Shelikof Strait region for recent years. Using these model outputs, we have systematically studied LLJs and other winds in Cook Inlet and Shelikof Strait.

The comparison between the RAMS winds and the Synthetic Aperture Radar (SAR)-derived winds when available verifies the existence of these wind jets and the capability of the model to simulate these cases. A climatology of simulated low-level wind jets over the Cook Inlet and Shelikof Strait of Alaska shows 10 different regimes of the low-level wind jets as the function of location and orientation. These regimes are categorized into four more general groups: cross-channel westerly, easterly, and up and down Inlet flows. The nature of a particular regime is largely a function of pressure gradient orientation and local topography. Jets in the same group have a similar occurrence distribution with time. The westerly Iliamna jet is the most often occurring strong gap wind in Cook Inlet, Alaska.

The Weather Research and Forecast Model

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Abstract:

Modeling the earth's atmosphere, one of the first applications of high-performance computing, continues to stress the limits of processing power from tera to petascale computing. Successive waves of HPC technology combined with a steady increase in processor speed have enabled longer simulations at higher resolutions and increasingly complex numerical methods, physical forcing schemes, and data assimilation techniques. The ongoing software engineering challenge is to exploit advances in computing, which occur on a roughly two-year cycle, while preserving maintainability, extensibility, and portability of multi-million dollar operational weather and climate modeling software over life spans measured in decades. The Weather Research and Forecast (WRF) model is an eight-year multi-institution project to develop a next-generation forecast model and data-assimilation system for operational weather forecasting, hurricane prediction, regional climate simulation, atmospheric chemistry and air quality prediction, and basic atmospheric research. It is used for operational forecasting at the National Weather Service and the Air Force Weather Agency. WRF has been designed as a high-performance computing application from the outset and is supported to the research community for use on a range of platforms from workstations to large supercomputers. This talk will describe the WRF model today and looking forward towards petascale computing.

On the Prediction of Alaska Fire Weather

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Abstract:

The Weather Research and Forecasting model (WRF) is applied for fire weather prediction for June 2005. Standard indices used in the National Fire Danger Rating System and Fosberg fire weather indices (FFWI) are calculated and evaluated by means of indices derived from observations to assess WRF's suitability in Alaska fire weather prediction. The evaluation shows that all indices can be predicted well several days ahead. A modified FFWI that considers fuel availability is superior to the standard FFWI. Means of modified FFWI derived from WRF and observations do not differ significantly (95% confidence) according to a t-test, but temporal variance does according to f-test. Determination of modified FFWI is more accurate in relatively flat than mountainous terrain. Based on these results one can conclude that WRF is a suitable tool for fire weather forecast.

Numerical Examination of Precipitation-Recycling Changes in Response to Doubling and Tripling CO₂ Concentrations and Concurrent Land-Cover Changes in Alaska

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Abstract:

A modified precipitation-recycling model (PRM) is introduced and applied to climate-model data. The modifications avoid assumptions about negligible impact of liquid and solid atmospheric water and runoff on the regional water cycle, and about regional and global water cycle interactions. The modified PRM serves to examine precipitation-recycling changes in response to doubling and tripling CO₂ concentrations without and with concurrent land-cover changes in Alaska. The results show that land-cover changes affect Alaska's water cycle differently under different CO₂ conditions. For unchanged land-cover, in Alaska, increasing CO₂ reduces the region's control of its water cycle.

Impact of Young Fire Scars on Weather and Climate of Alaska

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Abstract:

As especially observed during the 2004 Alaska fire season, huge wildfires drastically alter land cover leading to a change in the dynamic, radiative, vegetative, thermal, and hydrological surface characteristics. A case study was performed with the Mesoscale Model generation 5 (MM5) assuming the landscape prior to and after the 2004 wildfires in Interior Alaska to quantitatively examine the impact of fire-caused land-cover changes on summer cloud and precipitation formation. Further 40-year simulations were performed with CCSM2.0.1 without and with assumption of young fire scars to examine the long term impact. Preliminary results show that consistent thru the scales young fire scars yield drier conditions on the regional scale. However, locally the risk of flash floods may increase.

Tradeoffs in Resolution versus Computational Resources in Modeling a Tanana Valley Wind Event

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Abstract:

In early October 2006 a significant wind event occurred over mainland Alaska, with winds at Delta Junction gusting up to 52 mph. The event was modeled with WRF over a 400x400 km region centered in the Tanana Valley at horizontal resolutions of 3, 9 and 27 km. This presentation will discuss an analyses of the model output with particular emphasis on evaluating performance as a function of resolution, and computational demands as a function of resolution. Model results will be compared directly with surface and sounding observations in the region in an effort to gauge WRF performance.

Operational Modeling Efforts at the Anchorage NWS Forecast Office

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Abstract:

Forecasting for areas of complex terrain has long been a problem for operational forecasters. Given the current state of National Weather Service operational models, local modeling efforts have become more prevalent. These efforts have been put forth in order to understand and perhaps better portray local mesoscale effects. Therefore, efforts have been made at the National Weather Service Forecast Office in Anchorage to produce an operational local mesoscale model run.

The local model run at NWS Anchorage uses the community based WRF (Weather Research and Forecast) model to produce a 36 hour forecast. The current domain covers an area roughly from Cook Inlet through Prince William Sound and stretching from the Matanuska Valley to Kachemak Bay with a resolution of 4 km. Model output is then pushed into the NWS operational platform for view by forecasters.

Numerical Weather Forecast over Prince William Sound of Alaska

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Abstract:

Weather forecast in Prince William Sound of Alaska is a challenge, mainly due to the combination of complex terrain and ocean. The newest version of numerical model WRF and RAMS are employed over this region at Alaska Experimental Forecast Facility (AEFF). The comparison based on a long term modeling results of these two models will show the strength and weakness of each model and indicate the needs of improvement of the model.

Application of Weather Research and Forecasting Model (WRF) for Estimation of Uncertainty in Area Averages

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Abstract:

The coarseness and distribution of observational networks introduce uncertainty in the area averages calculated from observations. In evaluation studies often such area averages are compared to the simulated values because simulated values are at least grid cell averages. Therefore, it is essential to determine the impact of network resolution and site distribution on area averages. Simulated values and area averages of observation can be considered to be in the good agreement if the simulated values fall within the area average \pm its uncertainty.

The Weather Research and Forecasting Model (WRF) grid is assumed to represent an observational network. Area averages of quantities for 2.8×2.8 areas, the typical size of the climate model grid-cells, are determined from the WRF data for July and December. These area averages of quantities (e.g. soil and near surface temperature, precipitation and snow depth) are assumed to be the "ground truth" (reference). To assess the impact of site distribution and number of sites within the network, 400 grid points are arbitrarily taken as "sites". The area average quantities are also calculated from these "sites" and compared with the reference area averages in order to estimate the uncertainty.

Investigating the Treatment of Winter Inversions by WRF

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Abstract:

Inversions are common in mountainous areas such as Fairbanks, Alaska and Missoula, Montana, featuring impressive near-surface vertical temperature gradients. Unfortunately, the operational models used by the National Weather Service rarely capture these events with meaningful detail for local forecasters. This presentation will discuss results from modeling inversions in Missoula and Fairbanks with WRF at various horizontal and vertical resolutions, comparing model output with observations.

Modeling Marine Winds in Complex Terrain - WRF vs WsEta

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Abstract:

The complex mountainous terrain and numerous fjords and inlets in the Juneau Forecast Office's area of marine responsibility prevents even the available higher resolution NCEP models (12KM NAM) from accurately predicting wind fields over Southeast Alaska's inner channels. Good success in the short term periods (as verified by hi-res SAR images) was achieved, in a reasonable amount of computing time, running the WsEta at 4KM. When the new WRF Environmental Modeling System replaced the WsEta, it turned out to be poor at reproducing these gap-type low level winds when compared with the WsEta at the same 4KM resolution. Only in elevated terrain was the WRF superior to the WsEta, which was consistently too weak. A resolution of 2KM was necessary to achieve the same kind of terrain channeled or blocked flows that the WsEta was able to produce at 4KM. Initially it was assumed this was the result of coordinate system differences, however, the WsEta with Sigma coordinates still produced channel winds closer to SAR observations than the WRF at the same resolution.

More work remains to be done in testing smaller domains, nested runs and different horizontal and vertical resolutions, but these results highlight the fact that grid resolution is not the only consideration for optimum model performance. Careful validation of parameterization schemes and other defaults is vital and in coastal domains, SAR wind observations can be a valuable verification data source. For very high resolution gap-type wind flows, it appears the default WRF configurations require significantly greater resources than the WsEta.

The Need for Fine-Resolution Local Modeling at the Fairbanks, Alaska Office of the National Weather Service

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Abstract:

NOAA's National Weather Service now produces gridded forecasts at single-km resolution in space and hourly resolution in time. Local mesoscale models, such as the WRF, can help meteorologists produce such forecasts by providing a viable first-guess which accounts for the influence of local terrain on synoptic-scale weather patterns. The limited spatial domain of the mesoscale model ensures that the long-wave solution of a coarser regional or hemispheric model will be retained even while the mesoscale model introduces new detail. Secondly, the capability to specify the microphysical parameters of the WRF model offers an opportunity to optimize the model to meet the circumstances of northern Alaska.

Smoke Dispersion in Alaska's Interior

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Abstract:

Extended wildfires creating hazardous smoke episodes affect repeatedly residents and communities of Interior Alaska. Research to quantify fire extent, fuel consumption, and smoke production in the mostly boreal forest types is critical for effective modeling of fire effects. The US fire science (USFS) lab has developed a real time smoke dispersion system, which produces operational forecasts of smoke in the continental United States. Our efforts focus on possibilities of adaptation of the USFS system for Alaska's Interior.

Smoke forecasts are based on fire detection from near real time MODIS data; fuel burn and plume rise at model initialization time are estimated using a sequence of models in order to run WRF/Chem non-hydrostatic air chemistry forecasts. We evaluate smoke forecasts using MODIS fire extent products from the Geographic Information Network of Alaska (GINA) for selected days during the 2004 fire season, when Alaska wildfires burned 6.6 millions of acres and particulate matter threatened human health for weeks. Measurements of smoke particulates carried out by the Fairbanks North Star Borough provide high quality data for evaluation of WRF/Chem smoke dispersion forecasts.

Using WRF Forecasts in Operational Dispersion Modeling of Volcanic Ash

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Abstract:

The Puff dispersion model is used by the Alaska Volcano Observatory for tracking volcanic ash clouds as an operational tool and for the analysis of past eruptions. Global to regional meteorological forecast models have been used for Puff initialization at horizontal resolutions from 10's to 100's km. To use Puff as a tool for predicting boundary layer dispersion and ash fall requires a much higher spatial resolution to resolve the low level wind patterns. Thus, forecasts using the Weather Research and Forecasting (WRF) model are now used as initialization for Puff. Here we will show how WRF has been used operationally for Puff and also for past eruptions, for example Mt. Spurr (1992). Operationally, the WRF model can be run for custom regions around any volcano and the simulations are compared to known ashfall maps for validation and assist in the determination of the accuracy in Puffs operational ashfall predictions.

Panel Discussion: Future Impact of Climate Change

Panelists: Flannery, Olsson, Romanofsky, Wendler

Abstract:

Panelists will discuss and respond to questions concerning the next 10, 50 and 100 years of weather phenomena, as impacted by global climate change. Themes might include the role of weather models for understanding climate change, the impact of changing climate on weather model accuracy, the role of models for predicting and understanding extreme weather events, and assessment of weak spots in models and observation for dealing with changing weather patterns.