



NWS Local Climate Products and Services

**NWS/OCWWS/Climate Services Division
Fiona Horsfall**

**Review of the NCEP Production Suite
December 12, 2007**



NWS Climate Services Outline



- **NWS Climate Services**
- **Linkages to NOAA Climate Services**
- **Equipping the field**
- **Data issues**
- **L3MTO**
- **New products**
- **Future challenges**



NWS Climate Services Customer Requirements

- **Documented requirements for**
 - *More easily understood products*
 - *Localized products and services for public as well as government and business*
- **2004 Survey Lessons learned**
 - *Prioritize improvement: graphics, web access, text descriptions*
 - *Reach customers: most are general public, personal or local use*
 - *Respond to needs: products should be simple, localized, accessible*

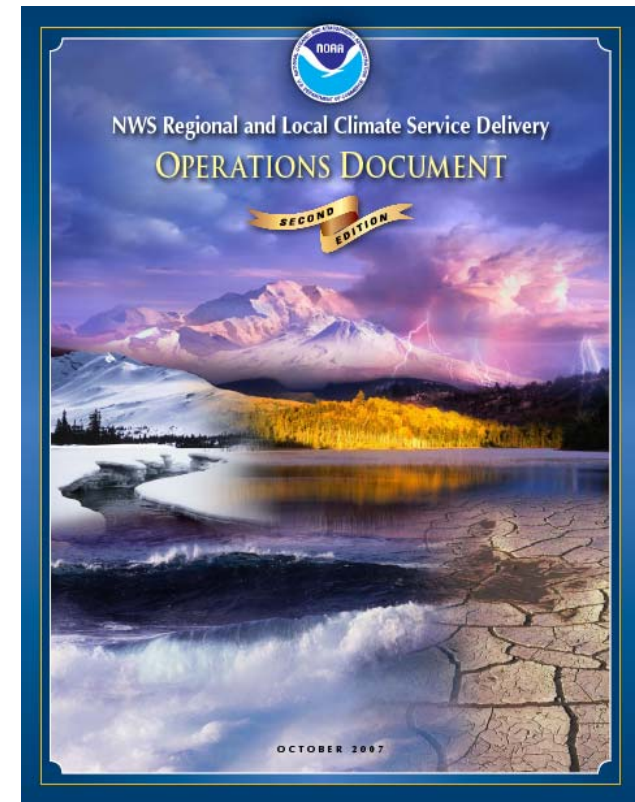


NWS Climate Services

Field Office Roles and Responsibilities



- **NWS Operations Document 2nd Ed**
 - Defines actions necessary to successfully implement climate services at the regional and local levels in NWS
- **Consistent with**
 - NWS Improvement Plan (2004)
 - NWS Regional and Local Climate Services Implementation Plan (2003)
 - NWS WFO Operations Vision and Philosophy (2003)





NWS Climate Services

Field Office Roles and Responsibilities



- **Serve as customer interface**
- **Be the steward and conscience for the integrity of the historical climate record**
- **Participate in NWS climate analysis, monitoring and prediction activities**





NWS Climate Services

NWS Commitment to Regional and Local Climate Services

- **National level**
 - *8 FTEs*
- **Regional level**
 - *~8-10 FTE regional program managers*
- **Local level**
 - *~68 NWS Field Staff 0.5 time equivalent climate services focal points**
- **Total: ~90 FTEs**

***Other responsibilities include issuing watches and warnings, etc.**



NWS Climate Services

Linkage to NOAA Climate Services



- **NWS Field Offices are NOAA's front line for customer service**
 - *WFOs respond to ~**1.5M** calls/requests for climate information*
 - *Calls are for climate change; interpretation of forecasts (CPC, local), data, etc.*
 - *Standardized WFO climate pages are now in the top 20 NWS sites for web traffic (NWS is top NOAA site)*





NWS Climate Services

Equipping the Field with Tools to Deliver Climate Services

xmACIS: Tool for WFO Customer Data Services

- Powerful web-based data mining tool
- Integrates NOAA software/databases
- Daily updated climate database
- Synchronized with NCDC archives
- Metadata
- All data reported for a site
- All COOP and ASOS sites selected by WFO & Threadex sites
- All daily data is accessible

AMARILLO INTERNATIONAL AP (KARA)
Daily Frequencies
Number of Days with Maximum Temperature > 12.0 degrees F
Years: 1948-2005

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	48	41	53	54	54	57	57	57	57	57	57	54
2	48	51	50	54	54	57	57	57	57	57	57	54
3	47	50	52	54	54	57	57	57	57	57	57	54
4	47	49	50	54	54	57	57	57	57	57	57	53
5	49	49	54	54	54	57	57	57	57	57	57	53
6	48	41	54	54	54	57	57	57	57	57	57	52
7	48	52	54	54	54	57	57	57	57	57	57	52
8	51	48	55	54	54	57	57	57	57	57	57	50
9	48	49	55	54	54	57	57	57	57	57	57	47
10	48	53	52	54	54	57	57	57	57	57	57	49
11	48	51	51	55	54	57	57	57	57	57	57	49
12	50	51	53	55	54	57	57	57	57	57	57	51
13	54	51	53	54	54	57	57	57	57	57	57	52
14	54	53	54	54	54	57	57	57	57	57	57	52
15	54	55	55	54	54	57	57	57	57	57	57	49
16	48	52	54	54	54	57	57	57	57	57	57	52
17	51	51	54	54	54	57	57	57	57	57	57	52
18	47	53	55	54	54	57	57	57	57	57	57	49
19	49	55	55	54	54	57	57	57	57	57	57	52
20	47	54	54	54	54	57	57	57	57	57	57	51
21	50	54	55	54	54	57	57	57	57	57	57	47
22	52	54	54	54	54	57	57	57	57	57	57	47
23	51	55	55	54	54	57	57	57	57	57	57	49
24	53	54	54	54	54	57	57	57	57	57	57	45
25	53	53	55	54	54	57	57	57	57	57	57	47
26	51	55	55	54	54	57	57	57	57	57	57	51
27	51	55	54	54	54	57	57	57	57	57	57	50
28	49	52	54	54	54	57	57	57	57	57	57	50
29	49	54	54	54	54	57	57	57	57	57	57	52
30	48	-	54	54	54	57	57	57	57	57	57	48



NWS Climate Services

Equipping the Field with Tools to Deliver Climate Services

NOWData

- Data query system for public use
- Recent local data
- Free access to limited data sets and products
- Stations selected by WFOs
- Used by
 - Public
 - Partners
 - Researchers
 - Media
 - Etc.

The screenshot displays the NOWData web interface. At the top, it says 'National Weather Service Forecast Office Baltimore/Washington'. Below this is a navigation menu with 'Home', 'News', 'Organization', and 'Search for:'. The main content area is titled 'NOWData - NOAA Online Weather Data'. It features five search criteria: 1. Product (with a dropdown for 'Monthly 1 Stn, WV'), 2. Location (with a dropdown for 'Mount Washington, VA'), 3. Variable (with a dropdown for 'Monthly 1 Stn, WV'), 4. Year (with a dropdown for 'Current year'), and 5. View (with a dropdown for 'Last year'). There are checkboxes for 'Daily data for a month', 'Daily extremes', 'Monthly averages', 'Monthly occurrences', 'Monthly extremes', 'Daily extremes', 'Daily/monthly normals', 'Record extremes', and 'First last dates'. Below the search options is a 'Product Description' section for 'MONTHLY AVERAGES/POTENTIALS', which explains that the data is calculated as averages or totals for each month of the year. The page also includes a 'LACIS' logo and a footer with information about the Applied Climate Information System (ACIS) project.



NWS Climate Services Training



Climate Services Professional Development Series (PDS)

- **Residence training***
 - Climate Variability
 - **229 NWS staff trained**
 - Operational Climate Services
 - **189 NWS staff trained**
- **Online tutorials***
- **Webcasts***
- **Teletraining***

Climate Services Professional Development Series - Module Frame

http://www.weather.gov/om/csd/pds/index.html

National Weather Service

Climate Services

Home News Department Search [input type="text"] [input type="button" value="GO"] [input type="button" value="NWS"] [input type="button" value="NOAA"]

Local Forecast by "City, ST" or Zip Code

[input type="text" value="DCA, DC"] [input type="button" value="GO"]

Professional Development Series

PCU 1: Climate Services Infrastructure

PCU 2: Climate Variability

PCU 3: CPC Products and Methodologies

PCU 4: Local Climate Products

PCU 5: Climate Customer Outreach

PCU 6: Climate Observations

Residence Training

Climate Variability

Climate Services

Distance Learning

Climate Services Division

Executive Producer: Martin Timofeyev, OOWWS OSD

The purpose of this training is to facilitate NWS field staff's understanding and application of climate products and services (e.g., from NCEP, NOAA laboratories, National Climatic Data Center) products and papers). Field staff must be able to interpret and apply services and techniques of dynamic climatology at the local level. Field staff must be able to communicate climate information and concepts as part of the office outreach program.

Professional Competency Units

This Professional Development Series (PDS) includes the Professional Competency Units (PCU) listed below. Click on a unit's site details.

- PCU 1: Demonstrate knowledge of the infrastructure for Climate Data and Services
- PCU 2: An Overview of Climate Variability
- PCU 3: The Basis of CPC Products
- PCU 4: The Application of CPC Products
- PCU 5: Respond to User Requests for Historical Climate Data and Information, and Provide Public Outreach
- PCU 6: Demonstrate knowledge of TREC, ARI, and Consistent Climate Data Observations and the Broad Range of Their Applications

The following Climate Services PDS Instructional Components are now available:

Instructional Component	Supporting Competency Unit
Residence Training in Climate Variability	PCU1 PCU2 PCU3 PCU4 PCU5 PCU6

- * **Available to NOAA users outside of NWS**
- * **Available to users outside of NWS, NOAA**

<http://www.nws.noaa.gov/om/csd/pds/index.shtml>



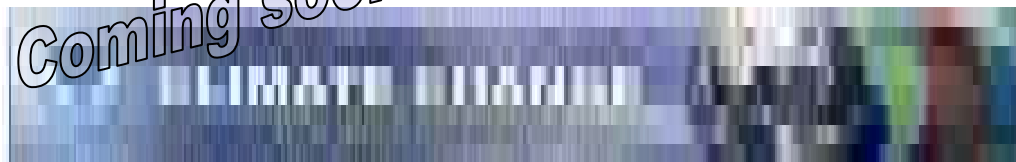
NWS Climate Services Field Support – Outreach Materials



Downloadable fact sheets



Coming soon



Available at: <http://www.weather.gov/os/brochures.shtml>



NWS Climate Services

Ensuring Climate Record Integrity



- **COOP Paperless Initiative** Electronic Ingest of manual observations - Upfront QC
- **COOP 21st Century Transition Plan** Remedial actions to ensure maximum quality data; leverages partnerships
- **HCN Modernization** Automating our longest-record stations for monitoring regional climate; ~1000 HCN stations modernized; automated temp and precip
- **Fisher/Porter Automated Rain Gauge Upgrade** Rescuing the nation's only comprehensive hourly precipitation network; 2,500 gauges nationwide
- **National Quality Assurance/Quality Control Policy**





NWS Climate Services

Local Climate Services



- **NWS Local Climate web page**
 - *Provides “one-stop shopping” for national and local climate information including*
 - *Convenient links to national products*
 - Short and long-range forecasts
 - Drought monitoring and outlooks
 - *Local Climate Data*
 - *Local Climate Outlooks and more...*



NWS Climate Services

Local Climate Services



- Access a local Climate page from the NWS National Climate web page by selecting the location on the national map
- Also available from local office websites

<http://www.weather.gov/climate>

National Oceanic and Atmospheric Administration's
National Weather Service

Local Forecast by City, ST
City, ST Go
RSS Feeds
Warnings
Current
By State/County...
W/ Alerts
Observations
Radar
Satellite
Snow Cover
Surface Weather...
Forecasts
Local
Graphical
Aviation
Marine
Hurricanes
Severe Weather
Fire Weather
Treat Messages
By State
By Message Type
National
Forecast Models
Numerical Models
Statistical Models...
Climate
Real Weather
Predictions
Weather Safety
Weather Radio
Hazard Assess...

Click on a map below to obtain local climate information.

As part of its ongoing efforts to improve service to the public, The National Weather Service has released an experimental local 3-month temperature outlook. Access the product through the "Select Climate Outlook" drop down menu above the national map.

Warnings & Forecasts | Graphical Forecasts | National Maps | Radar | Rivers | Air Quality | **Climate**

Max/Min Temperature: [m] [Go] Apr/May-Jun 2007 [m] [Go]

Highest and Lowest Temperatures for the 24 hours ending at 7 PM EST Sun Nov 26 2006

Prepared by NOAA National Centers for Environmental Prediction, Hydrological Prediction Center
American Samoa | Guam | Puerto Rico



NWS Climate Services

Local Climate Services

L3MTO



- **Climate Prediction tab will take you to a broad selection of products and services, including the Local 3-Month Temperature Outlook**

<http://www.weather.gov/climate>



NWS Climate Services

Local Climate Services

L3MTO



- **Downscaled from CPC forecast**
- **Available in a variety of formats**
- **~ 1200 stations available**
- **User guides also available**

Current Hazards
MD/DC
VA
WV
Hazardous Outlook
Current Conditions
Observations
Satellite Images
Hydrology
Rivers&Lakes AHPS
Public Info Stmt
Local Storm Report
Radar Imagery
Sterling Radar
Nationwide
Forecasts
Text
Español
Aviation
Marine
Discussion
Fire Weather
Tropical
Winter Weather
Graphical
Long Range
Climate
Local
National
More...
Weather Safety
Weather Radio
Storm Ready
Skywarn™
Safety/Preparedness
Additional Info
Past Events
Storm Reports
Education/ Outreach
Online Tour
Weather Calculator
Contractions
Links
Contact Us
E-mail Staff
webmaster

National Outlook | **Local Outlook** | **Background Information** | **Questions and Feedback**

The Local Three-Month Temperature Outlook is presented in a variety of formats. Each site-specific outlook is provided in graphical, tabular, and text formats for thirteen forecast leads, from 0.5 months to 12.5 months. Access to current outlooks is provided using small icons below. Additionally, a Help button is available for each product component and a Product Description Document is available through the [NWS National Catalogue of New or Enhanced Products](#). A detailed [Users Guide](#) is also available which describes the web pages and features of the outlook along with a [Climate Glossary](#) of terms used.

National Outlook → **Local Outlook**

Local Outlook → **Three Category Outlook** (Help)
Local Outlook → **Outlook Table** (Help)
Local Outlook → **Text Discussion** (Help)

Local Outlook → **Probability of Exceedance Calendar** (Help)
Local Outlook → **Temperature Range** (Help)

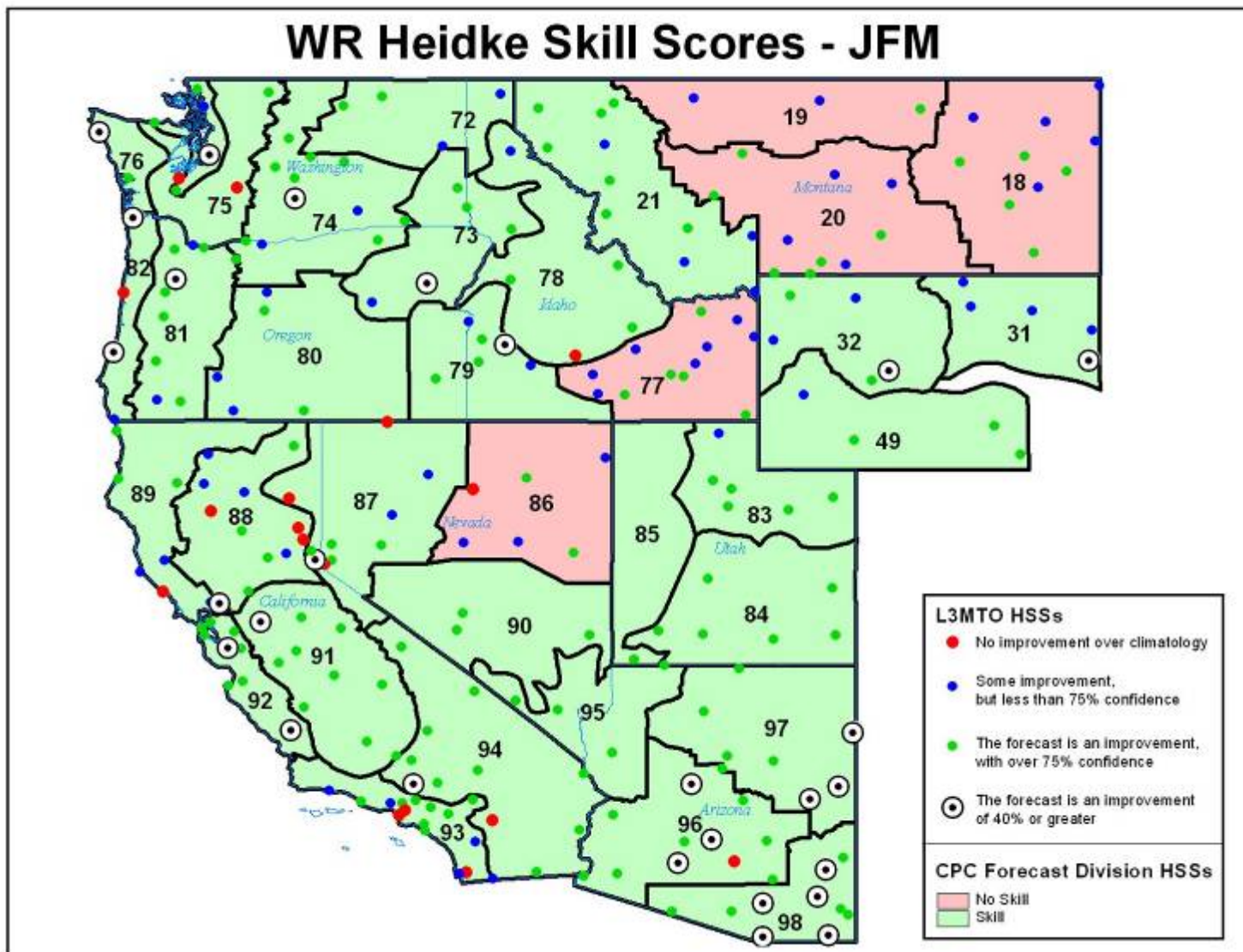
Probability of Exceedance Calendar ↔ **Temperature Range**

Temperature Range → **PoE Table** (Help)
Temperature Range → **Probability of Exceedance** (Help)
Temperature Range → **Probability of Non-Exceedance** (Help)
Probability of Exceedance ↔ **Probability of Non-Exceedance**
Probability of Non-Exceedance → **PoNE Table** (Help)



L3MTO Verification

WR Heidke Skill Scores - JFM





L3MTO Verification

- **Overall, for the majority of stations and seasons, L3MTO has higher skill than 1971-2000 climatology**
- **For some station/season combinations, L3MTO does not have long term skill. At such stations/seasons a Verification Filter will be applied**



NWS Climate Services New Products



- **Local 3-Month Precipitation Outlook (L3MPO)**
- **3-Month Outlook of Local El Niño/La Niña Impacts (3MOLEI)**



NWS Climate Services

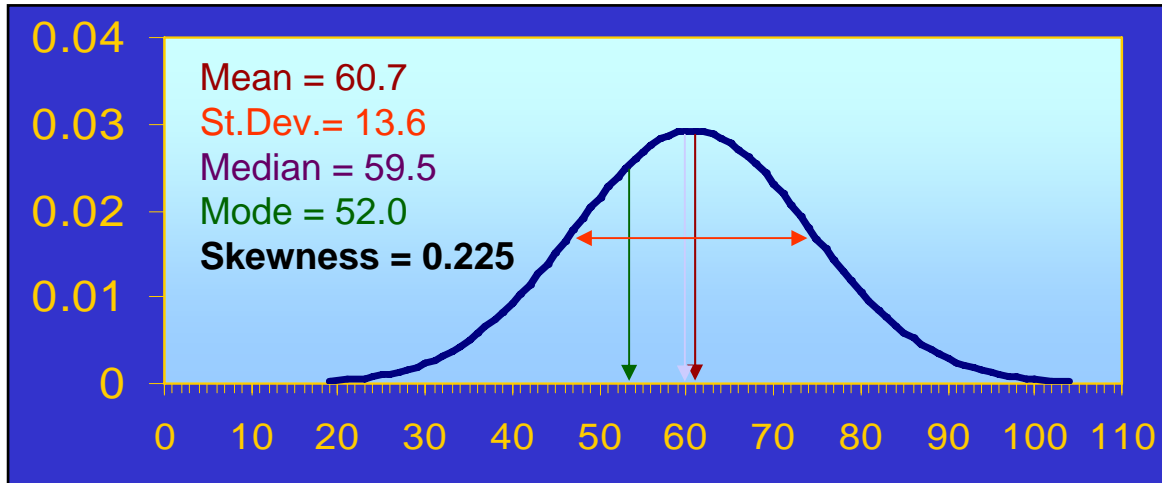
L3MPO



- **Local 3-Month Precipitation Outlook (L3MPO)**
- **Challenges**
 - *P data generally skewed*
 - *Usable national-scale skill entirely confined to Fall/Winter strong ENSO years in short to medium leads*
 - *Otherwise skill is statistically indistinguishable from zero*
- **But...**
 - *In fact, a good number of stations are considered quasi-normal*
 - *The source forecasts (CPC) do indicate usability (skill) in some places during certain seasons and situations*

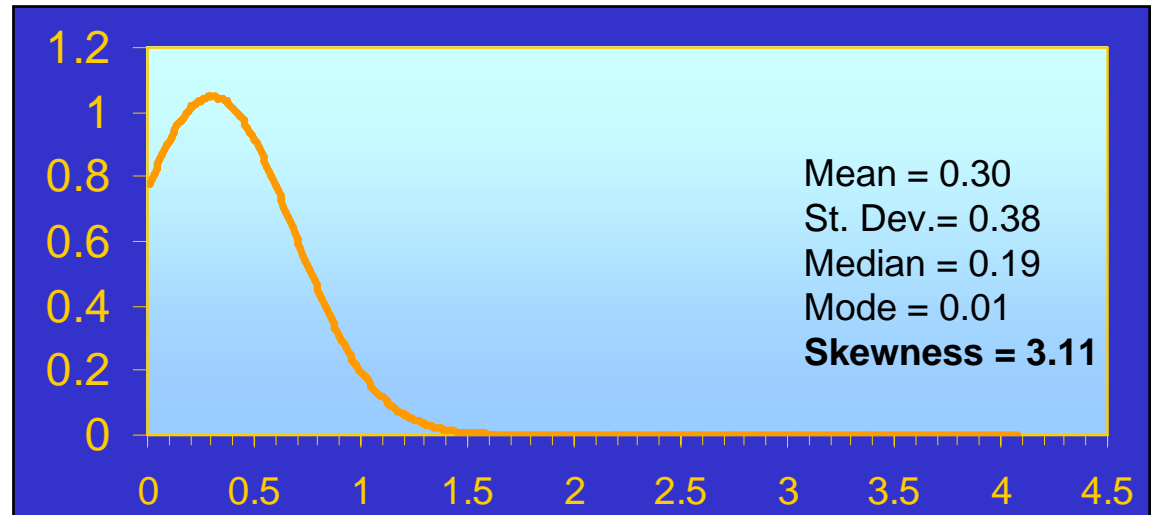


Precipitation Distribution



Temperature is a normally distributed variable, therefore the downscaling method based on regression can provide good estimates

Precipitation (right chart) is too skewed for normal distribution. The regression requires transformation of this variable..



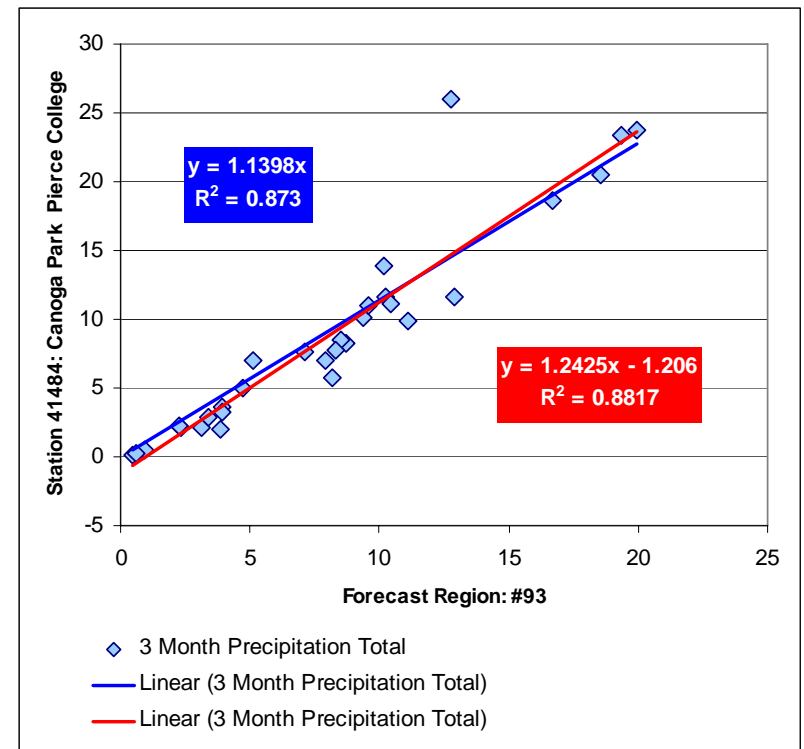
Marina Timofeyeva



NWS Climate Services L3MPO



- **Method**
 - **Modified L3MTO linear regression**
 - **To ensure precipitation is bounded at 0, regression set to one parameter: intercept is zero**
 - **An adjustment to the intercept is made if the recent trend (past 15 years) in difference between Station and Forecast Region is statistically significant (micro climate effect)**





NWS Climate Services

3MOLEI



- **3-Month Outlook of Local El Niño/La Niña Impacts (3MOLEI)**
 - *Experimental release: August 2008*
 - *For temperature at ~1200 stations*
 - *Uses homogenized data set developed by NCDC*
 - *Will be limited to 4000 stations in final form*



NWS Climate Services

3MOLEI



- **Forecast based on**
 - ***Conditional probabilities***
 - T,P(above, normal, below) at station based on historical record
 - Takes into account long-term trend using hinge (Livezey et al, 2007, in review)
 - ***Combined with CPC mean seasonal forecast for El Niño, Neutral, La Niña***
 - ***Tests built in to ensure validity i.e., not based on noise***

Historical Probabilities

Nino3.4 \ Term	Warm	Neutral	Cold
Above	67%	33%	11%
Near	13%	53%	28%
Below	20%	14%	61%



NWS Climate Services

3MOLEI



- **Objective**
 - ***Forecasts for other, locally relevant predictands***
 - High impact events
 - ***With capability for different numbers of classes, unequal classes***
 - Eg snowfall amounts, storminess
 - ***Predictands submitted by local Climate Services Focal Points***



NWS Climate Services

3MOLEI



- **Examples**
 - *Pacific Islands – Sea-level forecasts*
 - *Florida - Forecasts for “storminess” or the number of storms expected to occur during the dry season*
 - *Baltimore, Maryland – Forecast for the likelihood of a major winter snow event*



NWS Climate Services

Emerging Challenges for Field Offices

- **Climate Change**
 - Requirements
 - Customer services
 - New Products
- **NIDIS**
 - Pilot project participation
 - Customer services
 - Some training resources identified beginning FY09
- **NOAA Coastal Initiative**
 - Pilot project participation
 - Customer services
 - Training resources requested in FY09 & FY10



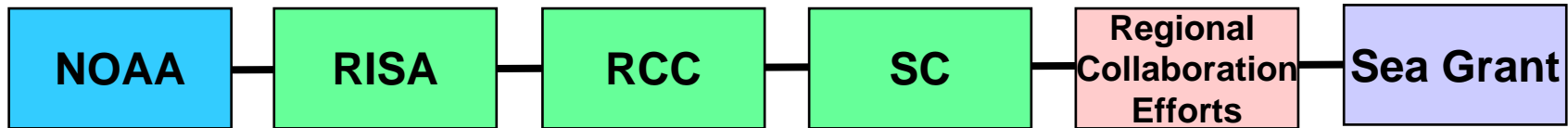
NWS Climate Services NCEP Computing Resources



- **L3MTO currently run on NOAA IDEA Center (NESDIS) backup server**
- **Migration to NCEP**
 - *Code rewritten for new environment*
 - *January 2008 contractor to CPC to transition*
 - *Contractor will help with routine maintenance and updates*
- **New products will go directly to CPC when ready**



NOAA Climate Services (Seasonal to Interannual)



NWS

OAR

NESDIS

NOS

What we have now

- Forecasts
- Monitoring
- Analysis
- Data archive
- Policy
- Training
- Outreach
- Partnership Development
- International
- Flood and flow
- Customer interface
- Forecast improvements
- Decision support tool development
- Coastal climatologies
- Applications research
- Regional and local expertise
- Policy support
- Data integration
- Data quality control

