Seasonal Forecasting Using the Climate Predictability Tool (CPT)

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What is CPT?

Climate Predictability Tool (CPT) is an easy-to-use software package for making tailored seasonal climate forecasts.

Versions:
• Windows 95+
• Batch
CPT - Goal

Widespread creation and communication of quality-controlled seasonal climate forecasts that address specific needs of different user groups.

To produce forecasts that people can and want to use.
Why CPT?

CPT was developed to address some problems in producing seasonal climate forecasts at a number of the RCOFs:

- Slow production time - expensive pre-forum workshops expensive, and limited availability of monthly updates;
- Artificial skill, and lack of vigorous performance evaluation;
- Minimal consideration of global products.
CPT – Design principles

Easy to use – to minimize learning curve, and forecast production time

Hard to abuse – to minimize the risk of spurious predictions
“A common mistake that people make when trying to design something completely foolproof is to underestimate the ingenuity of complete fools.”

Douglas Adams

Portability – to enable NMSs with limited and outdated computer resources to use the software

Specificity – CPT is not a generic software package, or data management and quality control tool
How is CPT written?

Versions:

• Windows 95+
  – 49,612 lines of Fortran 95 (excluding the LAPACK SVD routines)
  – Salford FTN95, which provides extensions for accessing the Windows API

• Batch
  – 33,456 lines of Fortran 90 (excluding the LAPACK SVD routines)
  – tested with gfortran, ifort, nagfor, pgf90, pgf95
What does CPT do?

CLIMATE PREDICTABILITY TOOL

Evaluating seasonal climate predictability
Designed for MOS applications

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Model diagnostics

August SSTs (Mode 1)

SON Rainfall (Mode 1)

Temporal Scores (Mode 1)

$r=0.60$
Cross-validation
Retroactive forecasts and verification

CPT performs verification of retroactive probabilistic forecasts:

- Standard scores
- Attributes diagrams (reliability)
- ROC diagrams
- Weather Roulette
Real-time forecasting

Station: 2  2.88S, 40.12W

Thresholds:
- Climatology: FMA 1971 to FMA 1997
- Upper threshold: 899
- Lower threshold: 635

Probabilities:
- Year: 2011
- Probabilities: 32, 22, 46
- Odds: 0.47, 0.28, 0.85

Forecast ranges:
- Year: 2011
- Lower: 850
- Upper: 382, 1319

Graph showing predicted values:
- Normal
- Below-normal
- Above-normal
History of CPT

CPT 0: MATLAB code for performing CCA and PCR
CPT 1: (Dec ‘02) translated into Fortran 77 interfacing to LAPACK SVD routines
CPT 2: (Aug ‘03) converted to Fortran 95; GUI; validation; new forecasts
CPT 3: (Feb ‘04) mapping of station data; handling of missing values
CPT 4: (Feb ‘05) improved graphics
CPT 5: (Aug ‘05) forecast uncertainty; WMO SVSLRF verification; tailoring
CPT 6: (Nov ‘05) multiple users; exceedance probabilities
CPT 7: (Aug ‘06) data transformation; improved retroactive procedure
CPT 8: (May ‘07) retroactive forecast probabilities and verification; MLR
CPT 9: (Mar ‘08) DLLs; major internal restructuring
CPT 10: (Oct ‘09) multiple fields; extended EOFs; new interface; ensemble forecasts; new verification procedures; new input data formats
CPT 11: (Nov ‘10) multilingual interface; GCM validation; probabilistic verification scores; climatology maps
CPT 12: (Oct ‘11) verification of independent probabilistic forecasts
CPT Use

CPT downloads (circles) and known CPT courses (triangles) from 2003 to 2009.
Availability and support

The Windows version of CPT is freely available from:

http://iri.columbia.edu/climate/tools/cpt/

The Linux version is available upon request to:

cpt@iri.columbia.edu

The windows version contains an extensive set of help pages in HTML.

Tutorials and FAQ answers are available from:

http://iri.columbia.edu/climate/tools/cpt/

A Help Desk is available to answer questions:

cpt@iri.columbia.edu