Current and future directions for development of subseasonal to multi-seasonal climate services

Jin Ho Yoo
Climate Services

Seasonal prediction
Prediction of weather statistics for a couple of seasons

*letters to nature*

*Forecasting Andean rainfall and crop yield from the influence of El Niño on Pleiades visibility*

Benjamin S. Orlow, John C. H. Chiang, & Mark A. Cane
Climate information for decision making

• Properties for Usable information (Cash et al. 2003, Kirchhoff et al. 2013)
  
  • Credibility: Quality of information, Provider’s reputation
    • Forecast accuracy
  
  • Salience: fitness to context of user
    • Scale, Variables, Products
  
  • Legitimacy: cleanliness of information from other factors
    • Objectivenss, Openness
  
• Co-production by “producers” and “users”
APEC Climate Center

• Established in 2005 by indorsement of 21 APEC economies

  Aims “enhancement economic opportunities, reduction of economic loss and protection of life and properties through: exchange of data, producing skillful prediction, targeted research and capacity building...”

APCC working groups - Representatives of NHMSs of member economies: 1st customer of APCC products
Multi Model Ensemble Seasonal forecast

6 month lead climate outlook

Probabilistic ENSO Forecast for 2023 AMJIAS

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* ENSO Intensity based on 3M Mean Niño3.4 SST Anomaly (Category Boundaries: +/-1.5, 1.0, 0.5°C)
Is our seasonal prediction improving? (credibility)

Global ACC of seasonal mean forecast from MME and individual models: Hindcast

Hindcast skill has been improved a lot

Collective improvement of prediction models

(participating group has been changed, better models, more models..)
Is our seasonal prediction improving?

Global ACC of seasonal mean forecast from MME and individual models: Forecast

For the forecast, improvement is not (yet?) apparent especially for the precipitation.
BSISO (Boreal Summer Intraseasonal Oscillation)

BSISO1: summer MJO
BSISO2: shorter time scale

Provides predictability source over south and southeast Asian countries in subseasonal time scale.

2 northward propagating modes associated with Asian Monsoon Variability
BSISO forecast (May to Oct.)

4 centers (NCEP, ECMWF, CWB, BoM)
Tailoring climate information

• Transforming information to enhance salience (and credibility)

• Scale: Climate info. >> user interest
  • Statistical downscaling

• Form (output): lack of knowhow to use the info.
  • Impact modeling
  • Analysis of model output
Applied products

Fire early warning (SEA)

- Global Fire Emission Database (GFED)
- Bias corrected Rainfall forecast

Initially (2016) targeted only for Indonesia (Borneo island), Met. Malaysia requested expansion of service area (2022)
Applied products

Crop yield prediction

- Predicting relative crop yield change compared with previous year
- Statistical yearly (growing season) crop yield forecast model
- Less skillful than JRC, USDA but longer lead-time
- Testing operation since 2019
Pacific Islands Countries
PICASO (Pacific Island Countries Advanced Seasonal Outlook)

- Statistical Downscaling and Bias-correction
- Covering 14 PICs
- Easy to use
- Minimum resource requirement (network access)
Agricultural Decision Support (@ Vanuatu)

- Weather and Seasonal forecast, Agromet indices (observation and forecast)
- Agricultural decision support (Crop modeling and Traditional Knowledge based)
- Crop data collection and DB update
- Information for public
  - Champion farmers (demonstration)
Production and Sales

• manufacturer uses weather and seasonal forecast for estimating demands: Planning of production and mobilization

• Challenges (personal communication),
  • Communication: Hate Probability, Above/below “Normal”
  • Perception: what you told is not what I felt, scales, climate change, difference between obs. Station and street
  • Accessibility: needs forecast between weather and seasonal timescale (!)
  • Effectiveness: Weather/Climate Factor is not (less) important (weather/climate proofing tech.): climate smart agriculture? Climate proof agriculture..
Numerous efforts are being made...

Which service will be kept in operation in the future?

R2O is important not only for production but also services
For future climate services

• Basis: credible information and data (forecast)
  • progressing but in real-time forecast?

• Appropriate forms and means of communications
  • Researches are getting active, sharing best (worst?) practices
  • Seamless services (Multi-seasonal – Subseasonal – Weather)

• Sustaining mechanism
  • Requires robust platform (e.g. C3S, APCC) of provision and user engagement
  • Multiple Players and multiple roles (NFCS?)
    • Global (regional) centers
    • NHMS
    • Sector users
    • Private sectors
  • Governance
NHMS is the key player

• Operational mandate of service provision

• Climate services is usually country, local specific

• Coordination with weather/climate information to the public
  • Multiple information can generate tension between NHMSs and outer information
  • Staffs (mostly developing countries) were not well trained and they are often reluctant to provide new (unknown) things

• Empowering NHMSs for climate services is key to sustaining the services
Thank you

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