



A seasonally coherent calibration (SCC) model for post-processing numerical weather predictions

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- Bias
- Skill
- Reliability
- **Climatology**



Bayesian Joint Probability modelling

- Log-sinh transformations
- Bivariate normal distribution
- Zero values treated as censored data
- Maximum likelihood method

$$\underbrace{\mu_o(m) \quad \sigma_o(m)}_{\text{Observed}} \quad \underbrace{\mu_f(m) \quad \sigma_f(m)}_{\text{Forecast}} \quad \rho(m)$$



$\mu_o(m)$

$\sigma_o(m)$



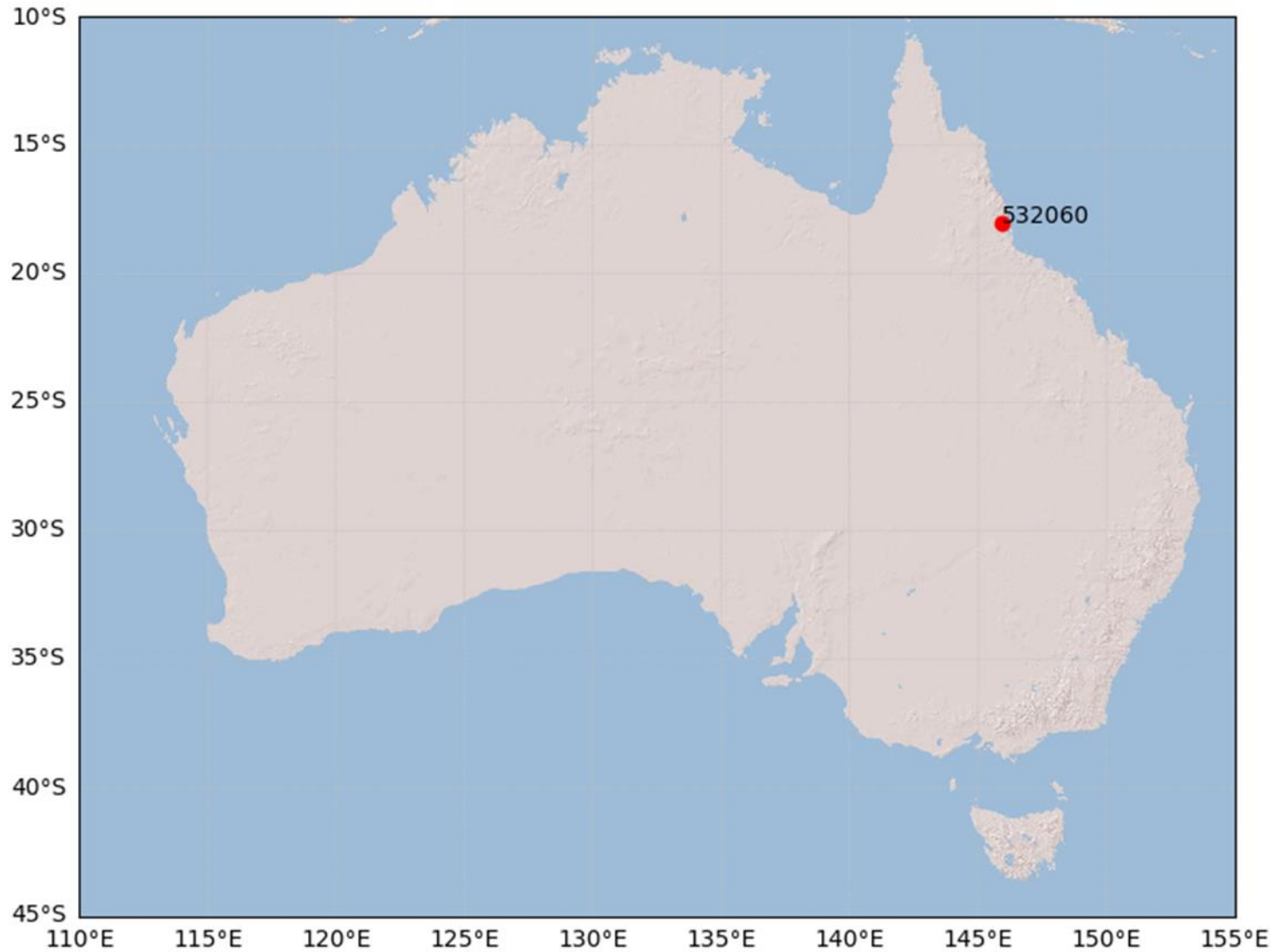
$$\mu_f(m)$$

$$\sigma_f(m)$$

$$\rho(m)$$



A study case

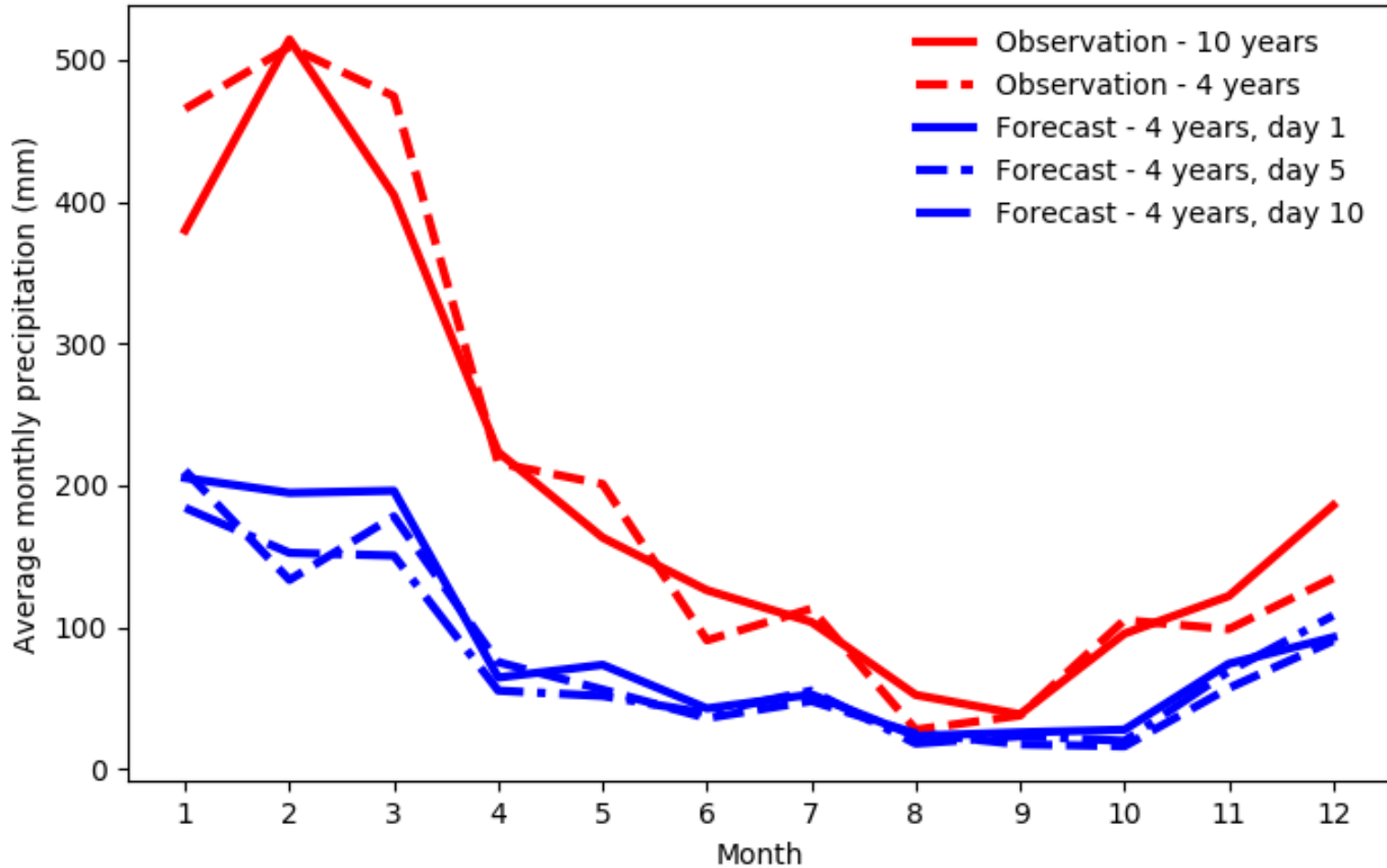




- **Forecast data**
 - ACCESS-G APS1 (deterministic)
 - 2011-2013 (4 years)
- **Observed data**
 - 2007-2016 (10 years)
- **Calibration**
 - Daily precipitation
 - Lead times: 1-10 days ahead



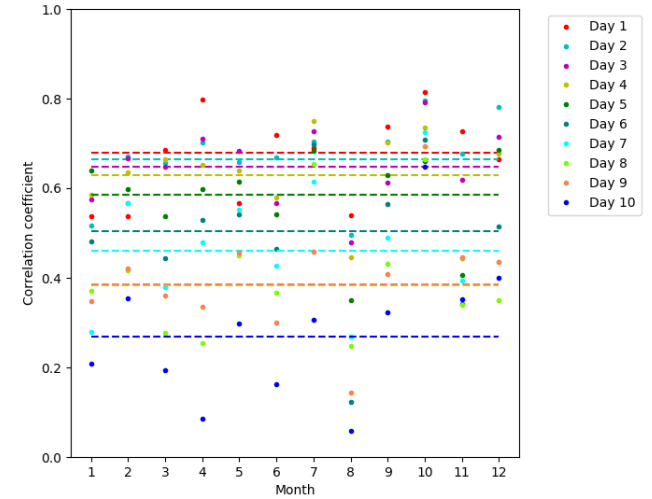
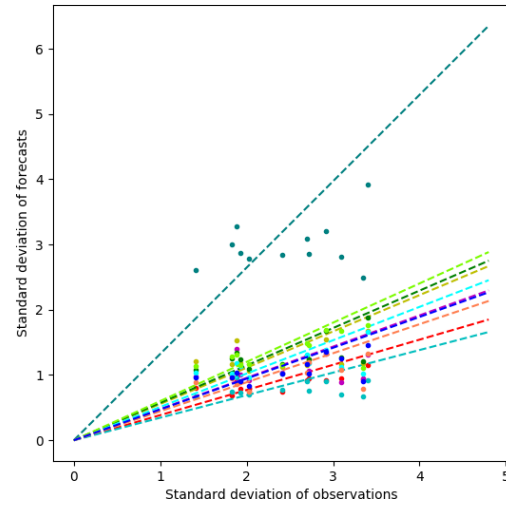
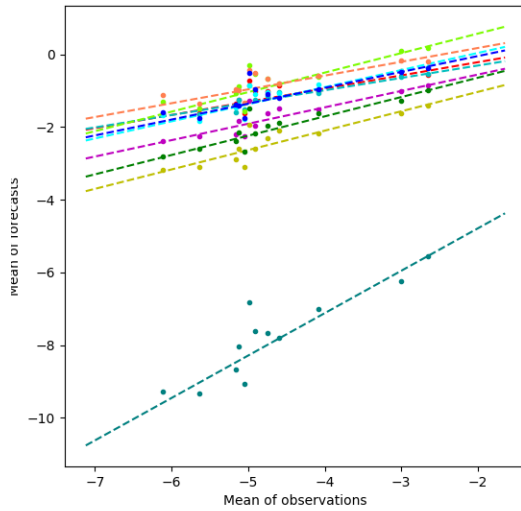
Average monthly precipitation





Relationships

WATERBURY ET AL. (2014)





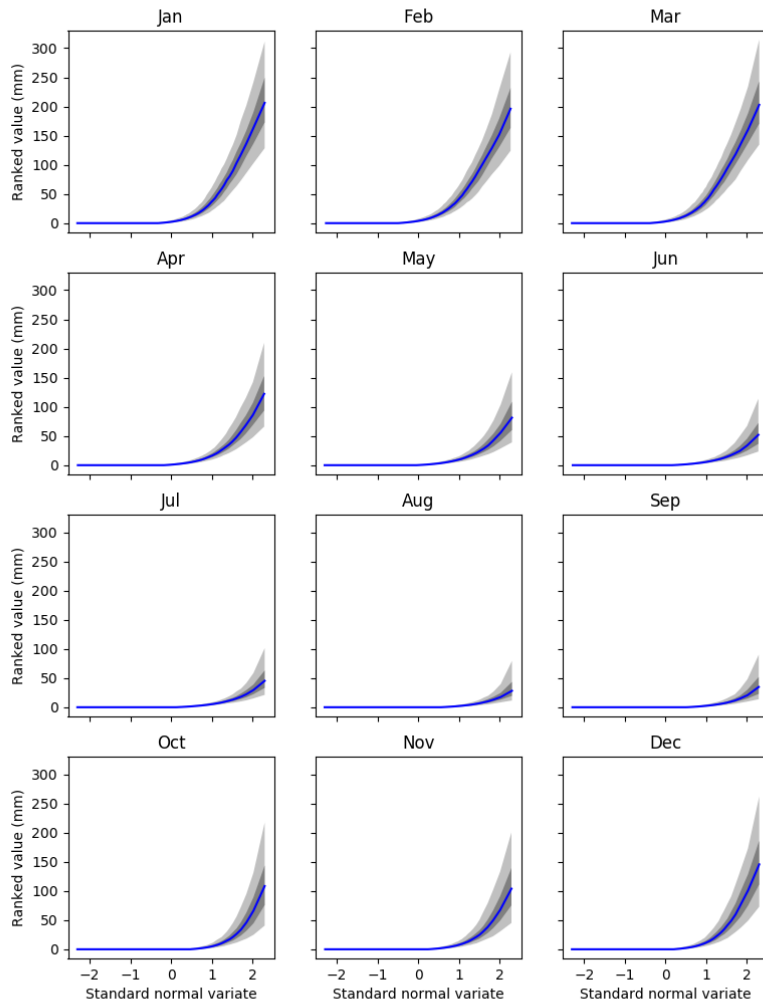
$$\mu_f(m) = \alpha \mu_o(m) + \beta$$

$$\sigma_f(m) = \gamma \sigma_o(m)$$

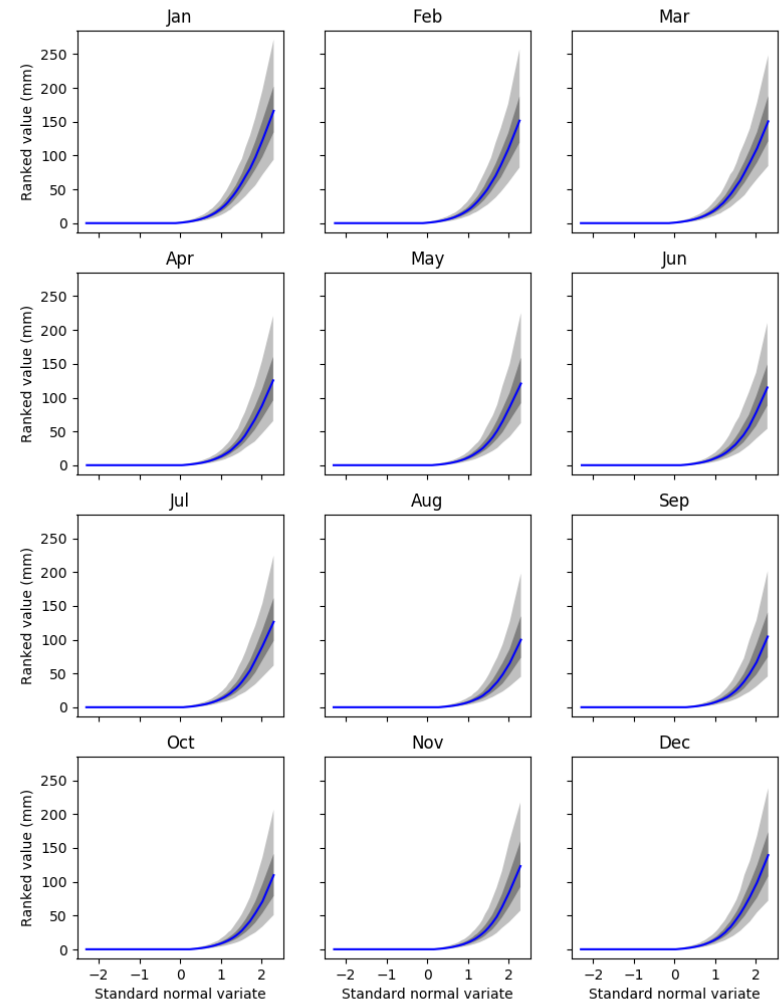
$$\rho(m) = \rho$$



SCC

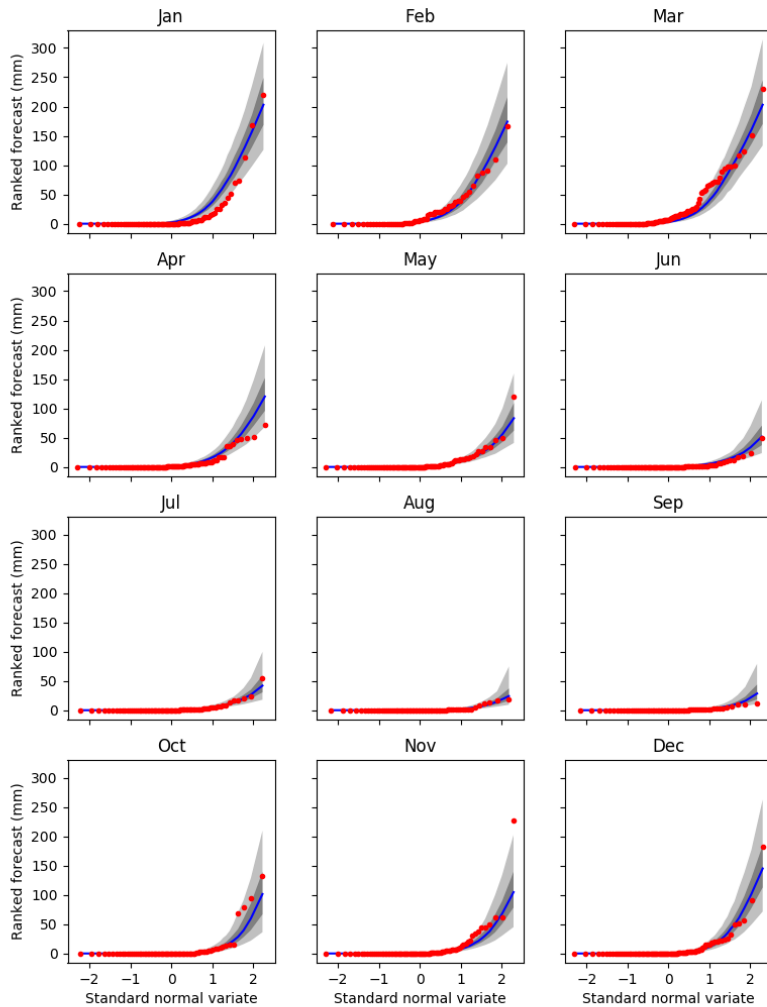


RPP

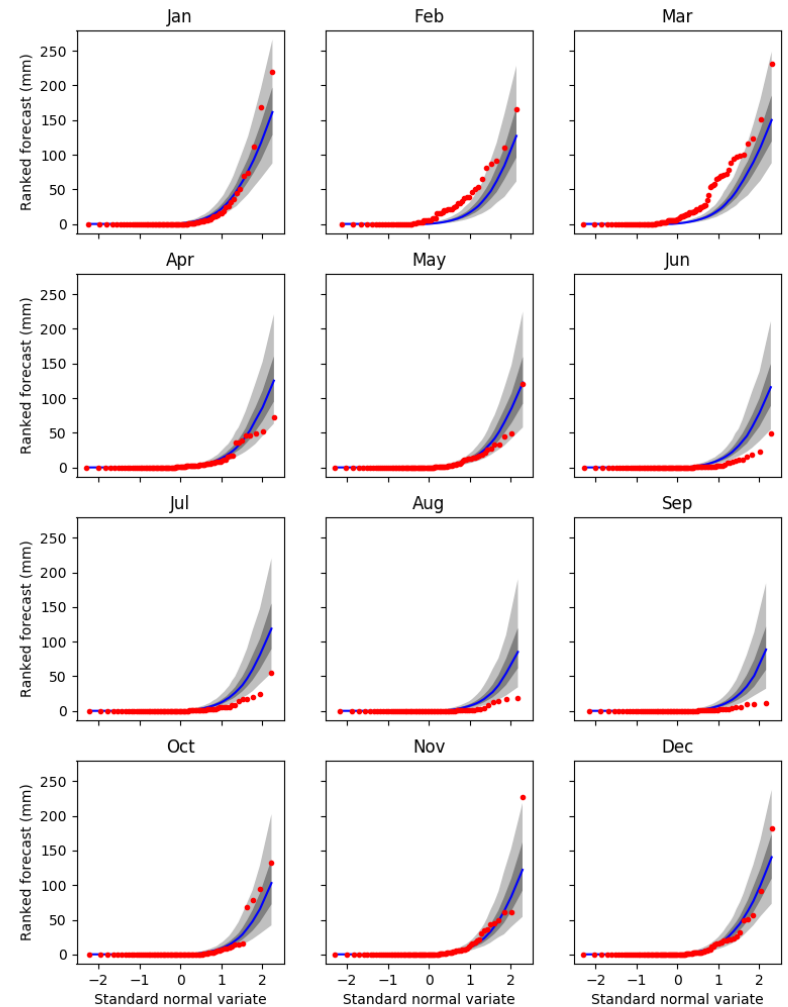




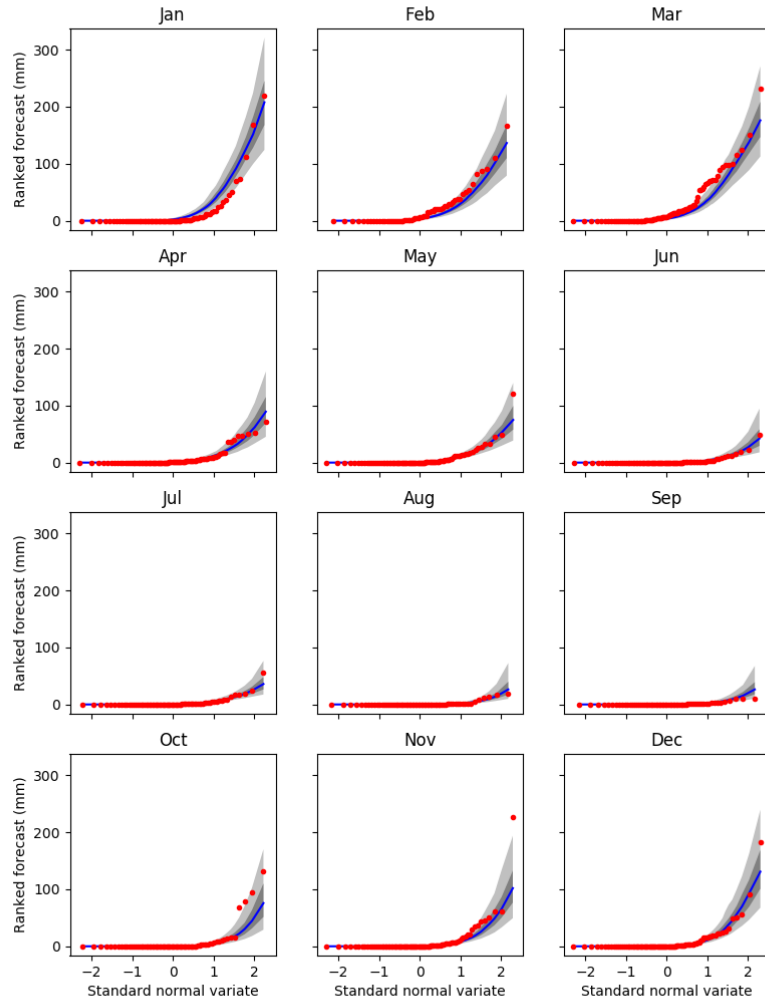
SCC



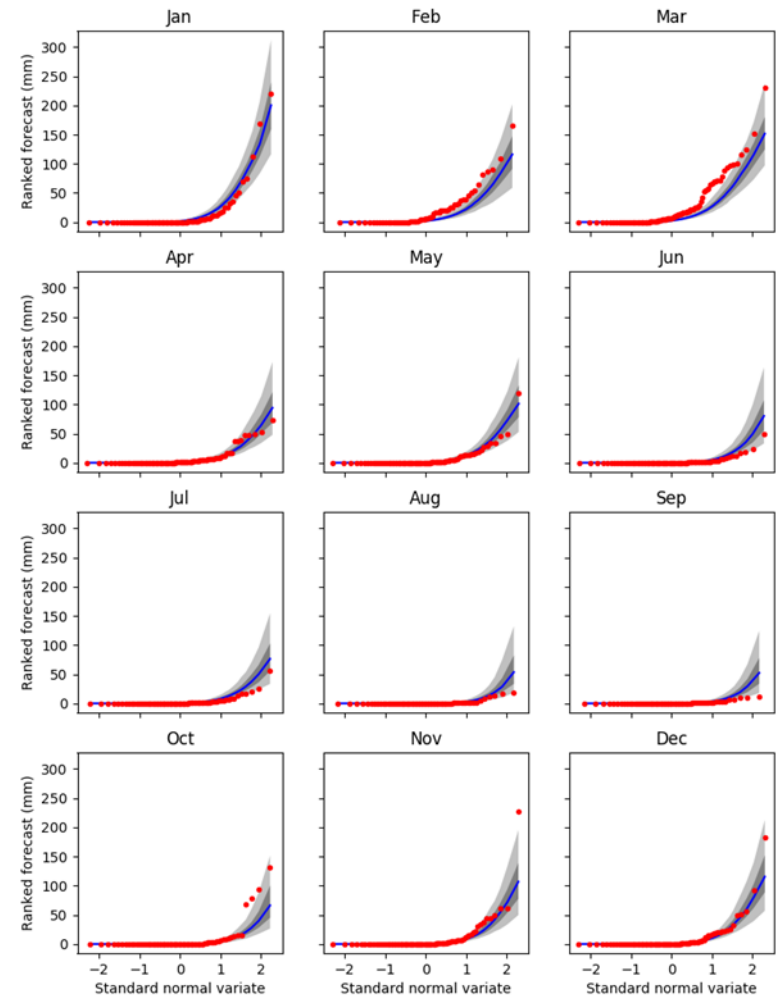
RPP



SCC

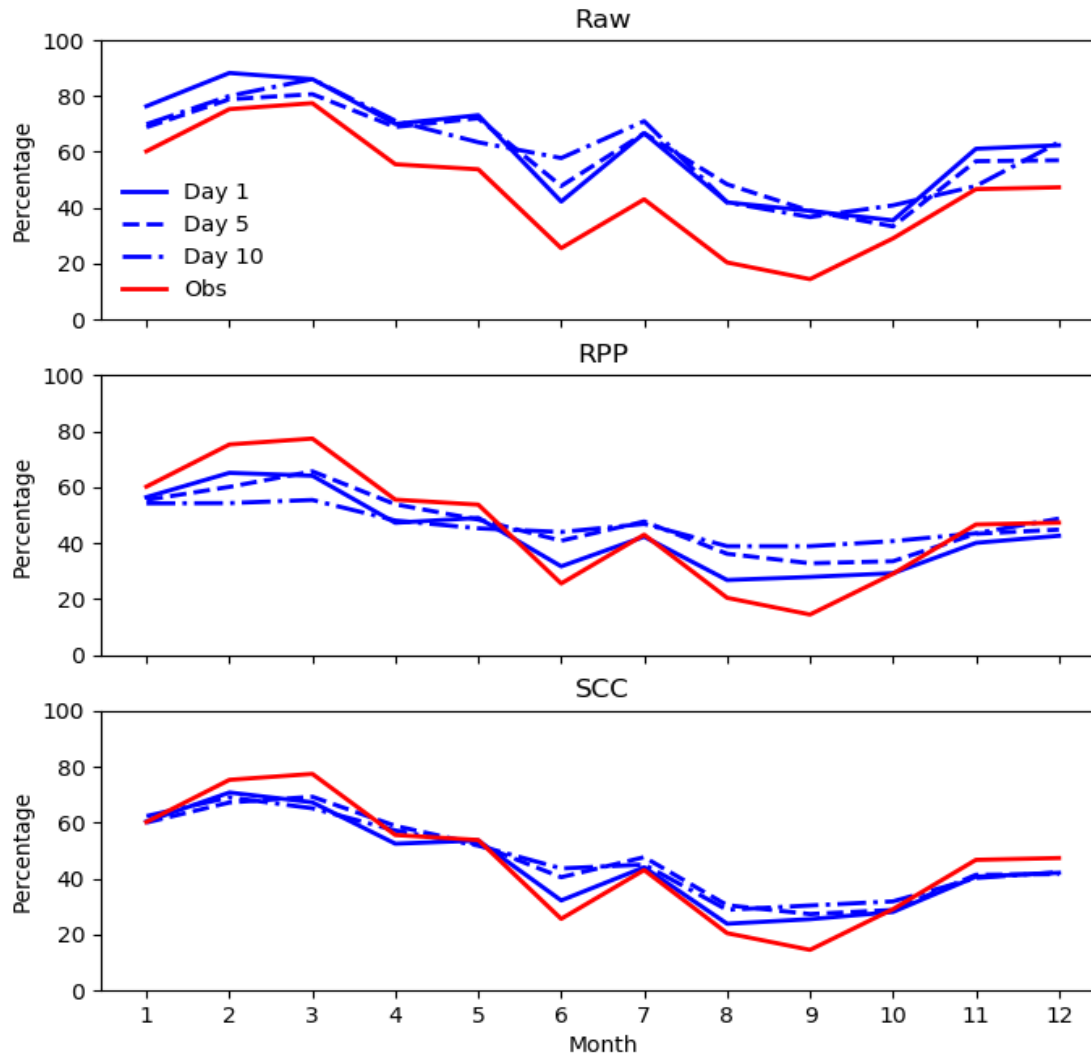


RPP



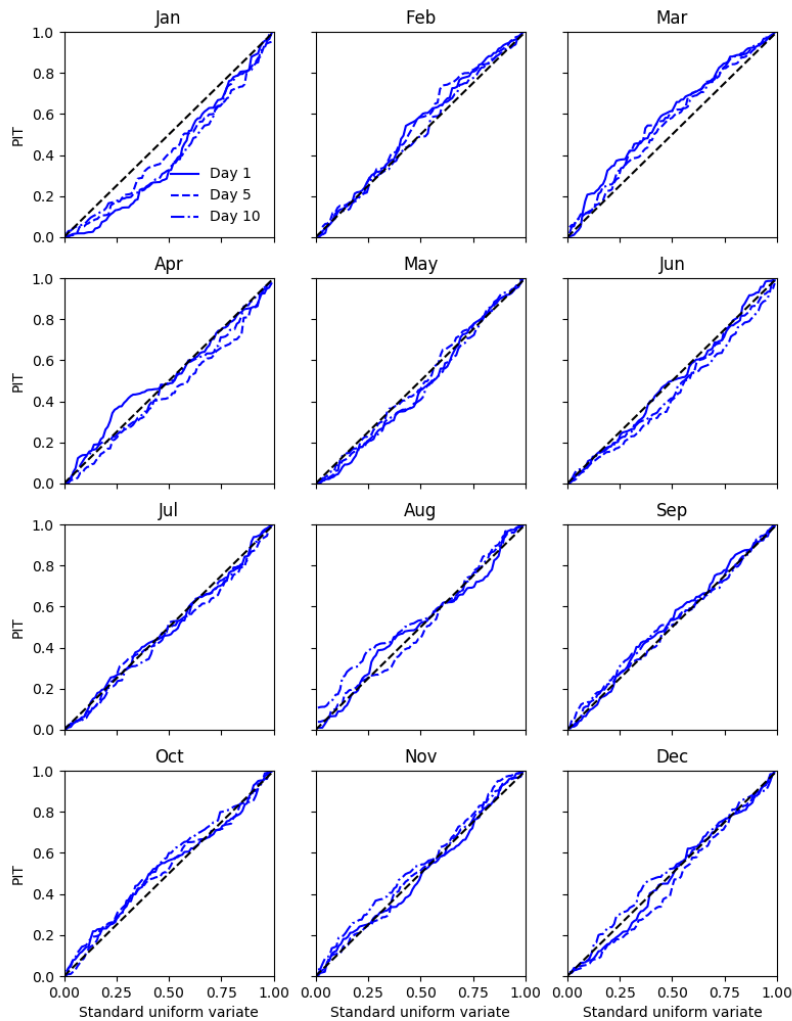


Percentage of wet days

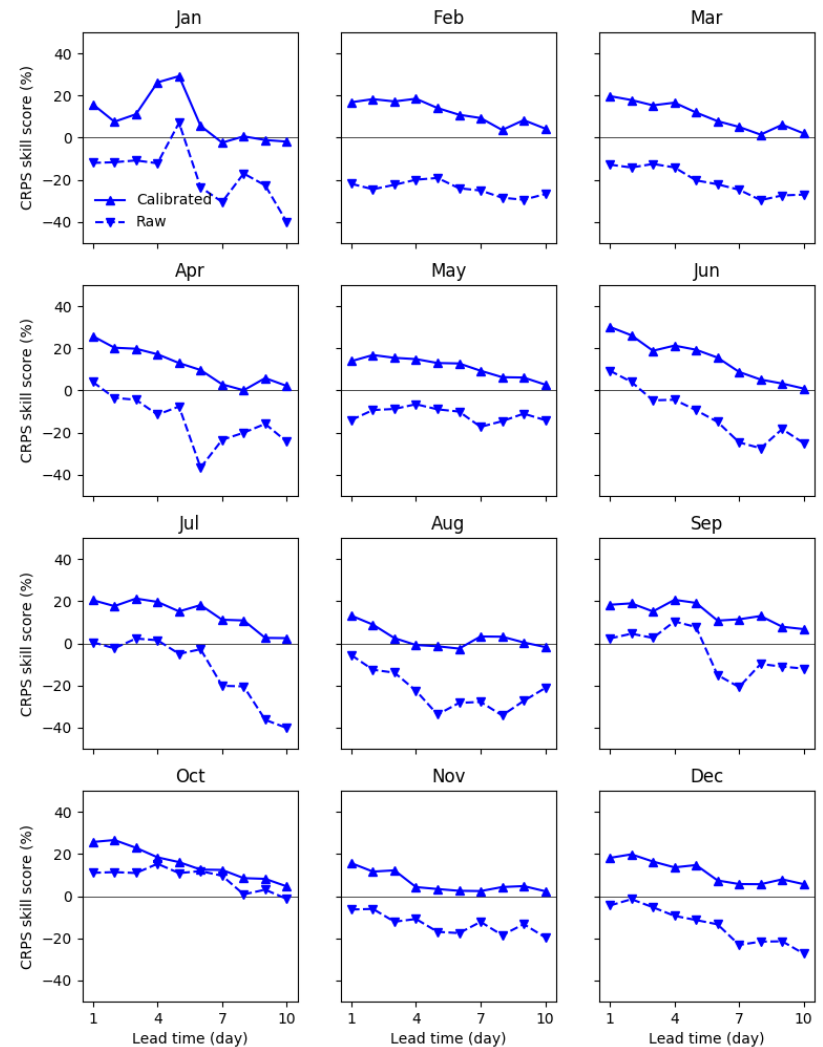




Reliability



Skill





- **Forecast climatology should be checked**
- **The SCC model**
- **Can work with short NWP archive data**
- **Correct seasonal climatology**
- **Reliable ensemble spread**
- **Much improved skill over raw forecasts**