

Exploring the sensitivity of seasonal climate forecasts to soil moisture initialization

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Project title (Theme II.3.4)

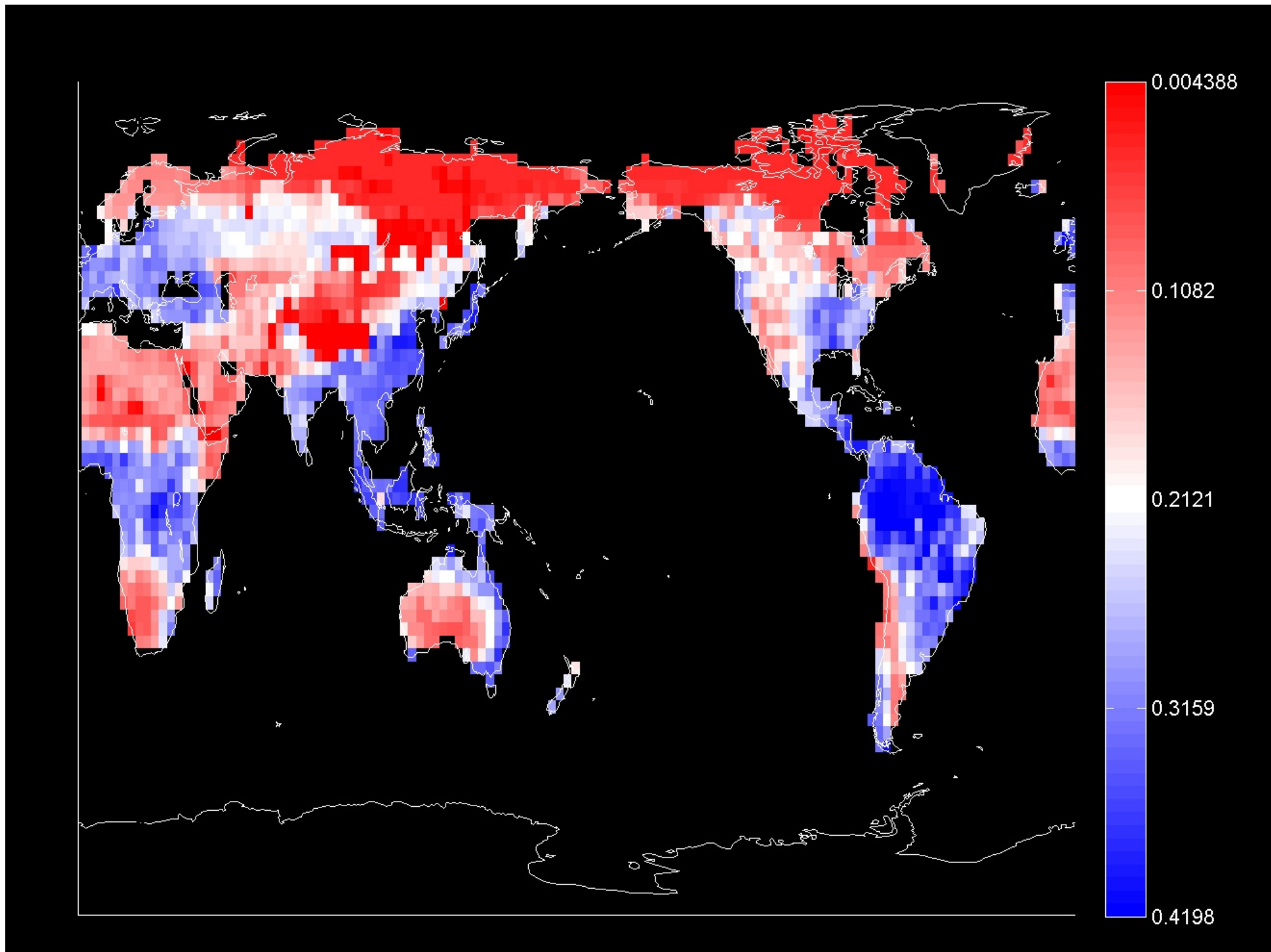
“Sensitivity of Seasonal Climate Forecast in the CCCMA GCM to Initialization of Land Surface Hydrological States”

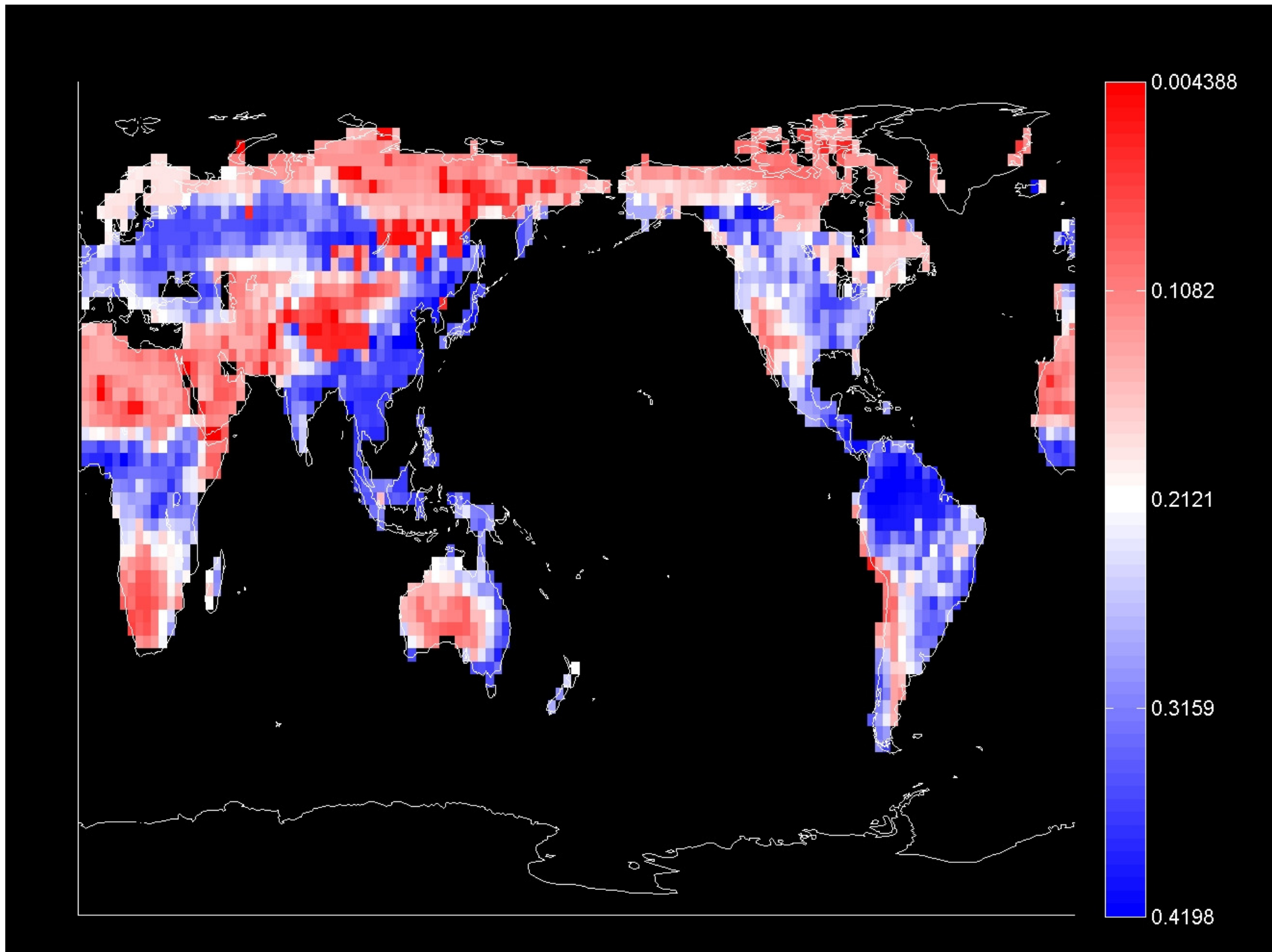
Project Justification

- Difficulty in knowing soil moisture (SM) for model initialization
- Demonstrated importance of SM in certain seasonal forecast models
- No direct method to measure soil moisture in an operational setting

Project phases

- Develop a bias-corrected Land-surface model forcing dataset for the period of 1979-2007.
- Calculate global soil moisture using the Canadian Land Surface Scheme (CLASS v3.4)
- Using realistic soil moisture for model initialization, compare against a standard initialized control run.





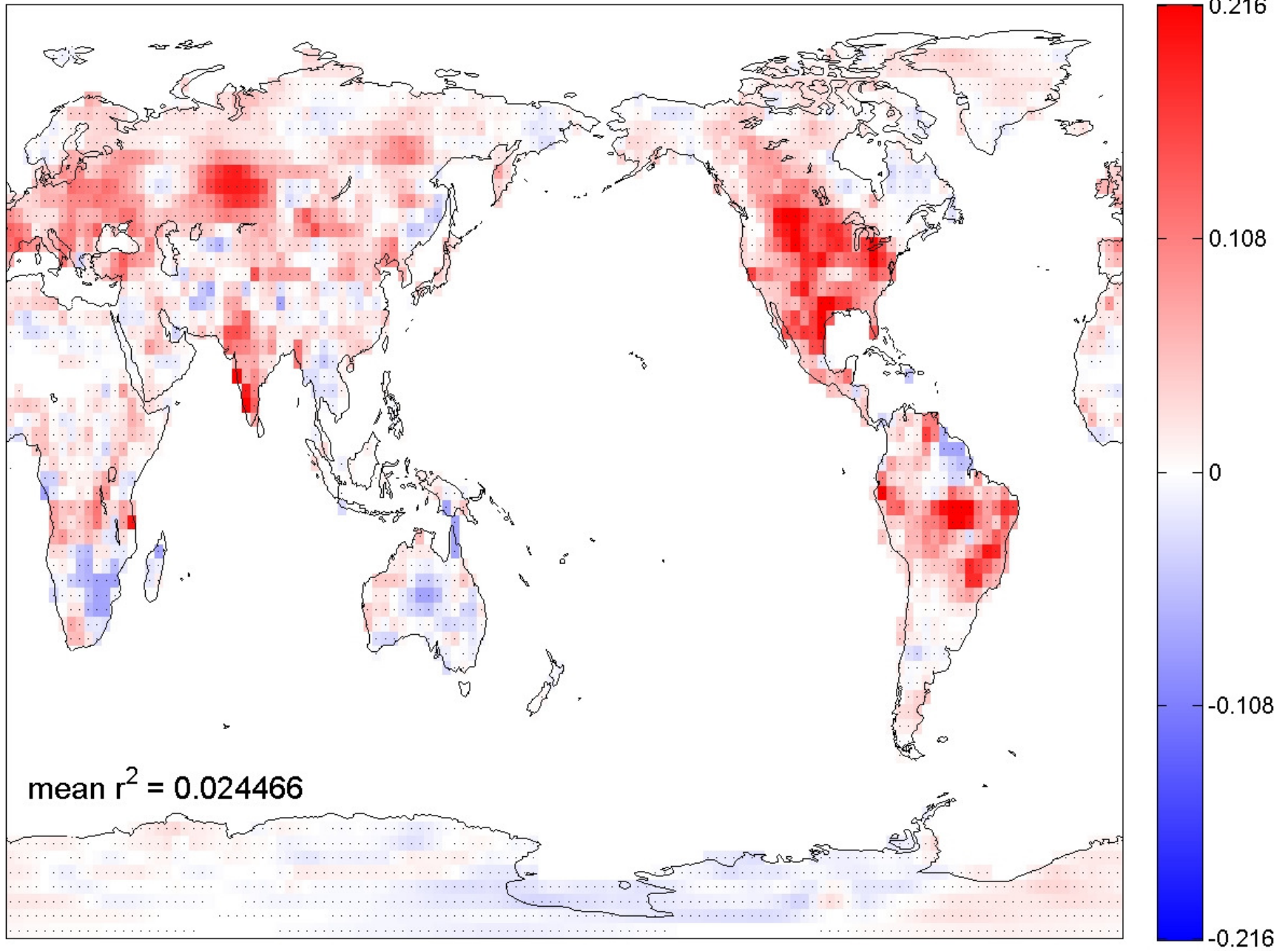
Forecast Model Details

- CCCMA 3rd Coupled Global Climate model
- T63 grid (64 x 128)
- 1986 → 2004 (19 years)
- Boreal summer start dates (April – Aug)
- 60 day forecast length
- 10 ensembles per forecast
- 1 correctly initialize set, 1 randomly shuffled set

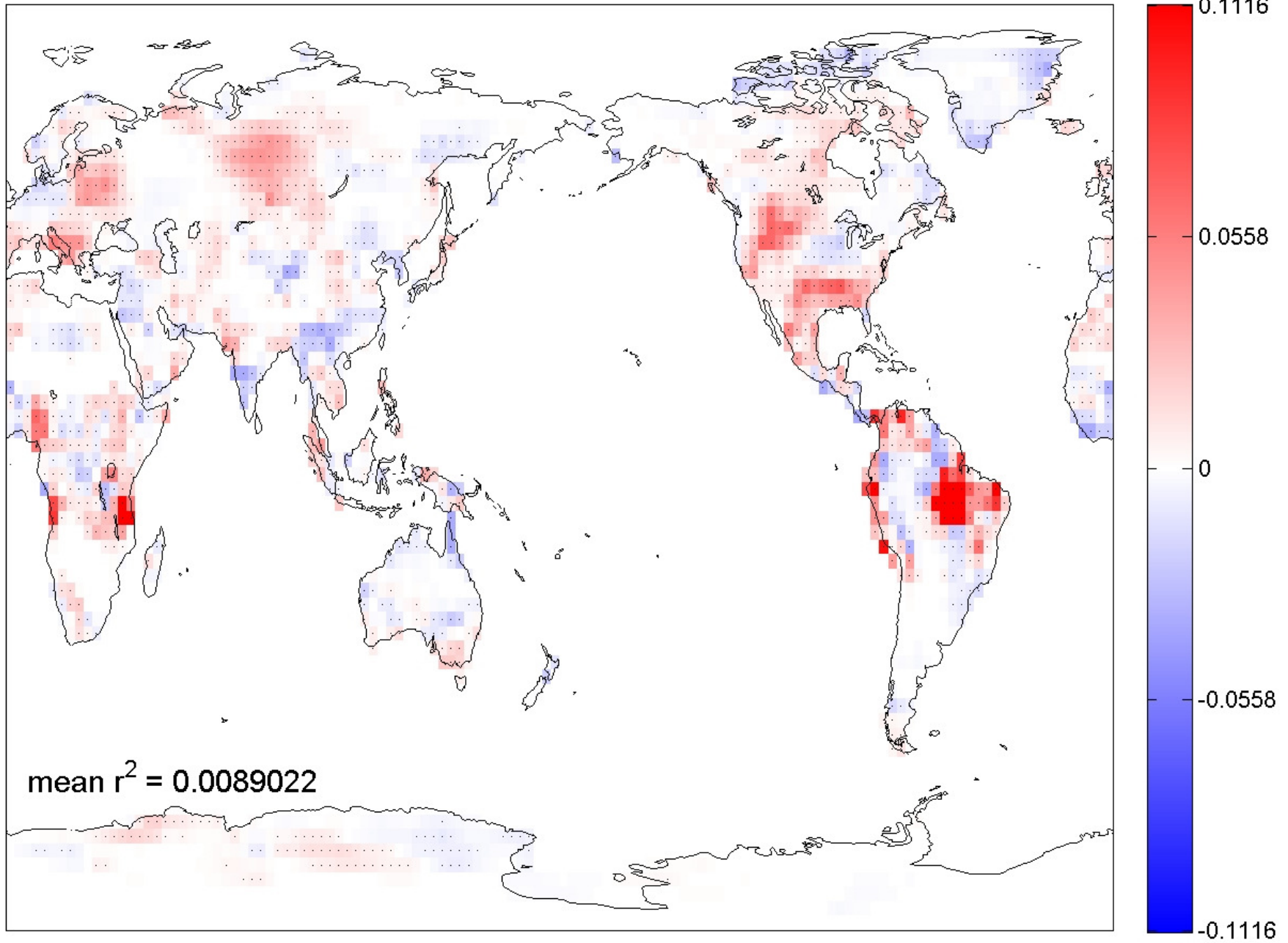
Forecast Skill Assessment

- Square of the correlation coefficient between 15-day forecast and observations (T derived from NCEP reanalysis)
- Difference in r^2 between series 1 and series 2 (r^2_{diff})
- Significance estimated with a monte-carlo simulation

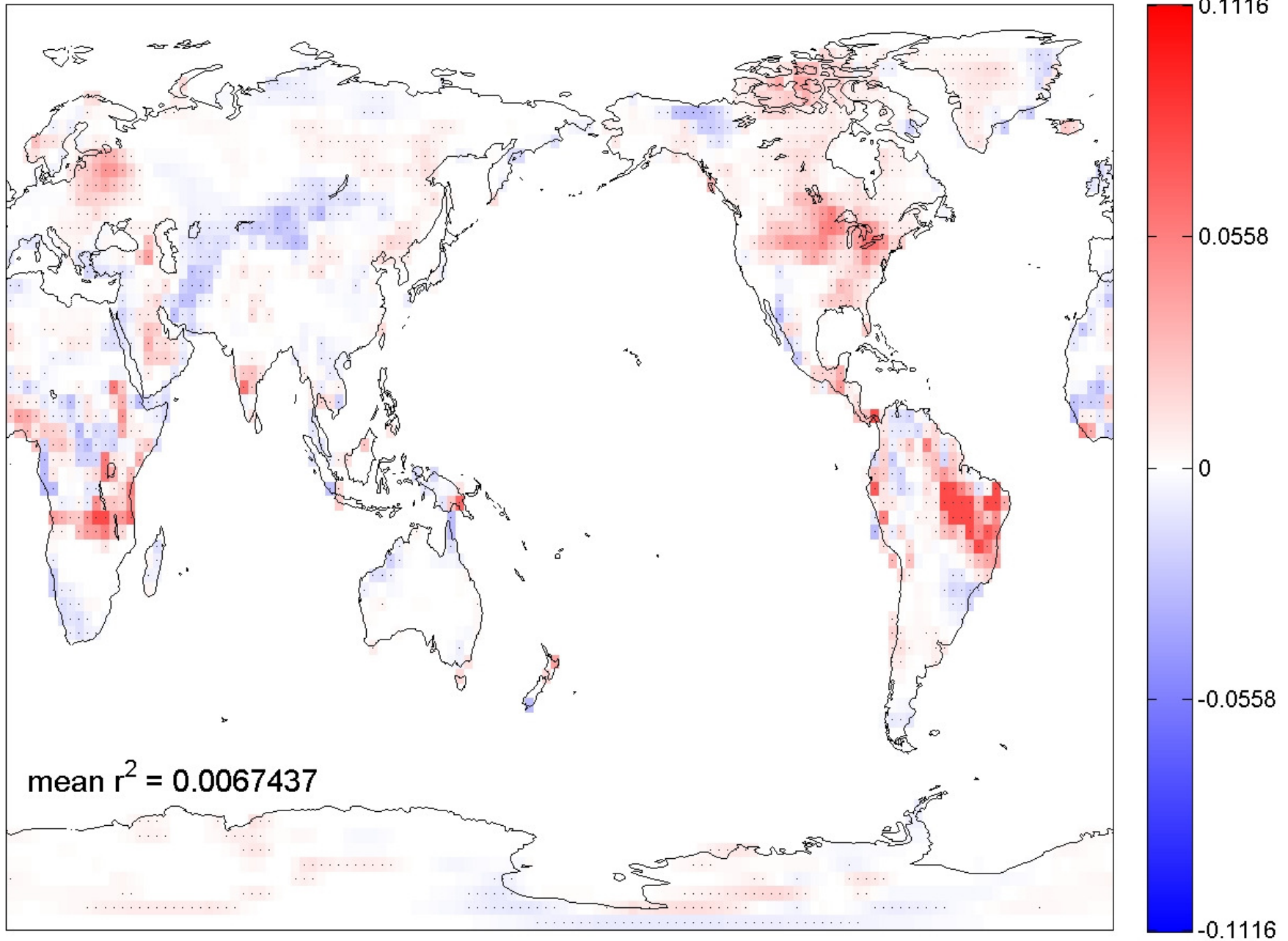
CORR Jun-Aug n Temp AIR1 95 1



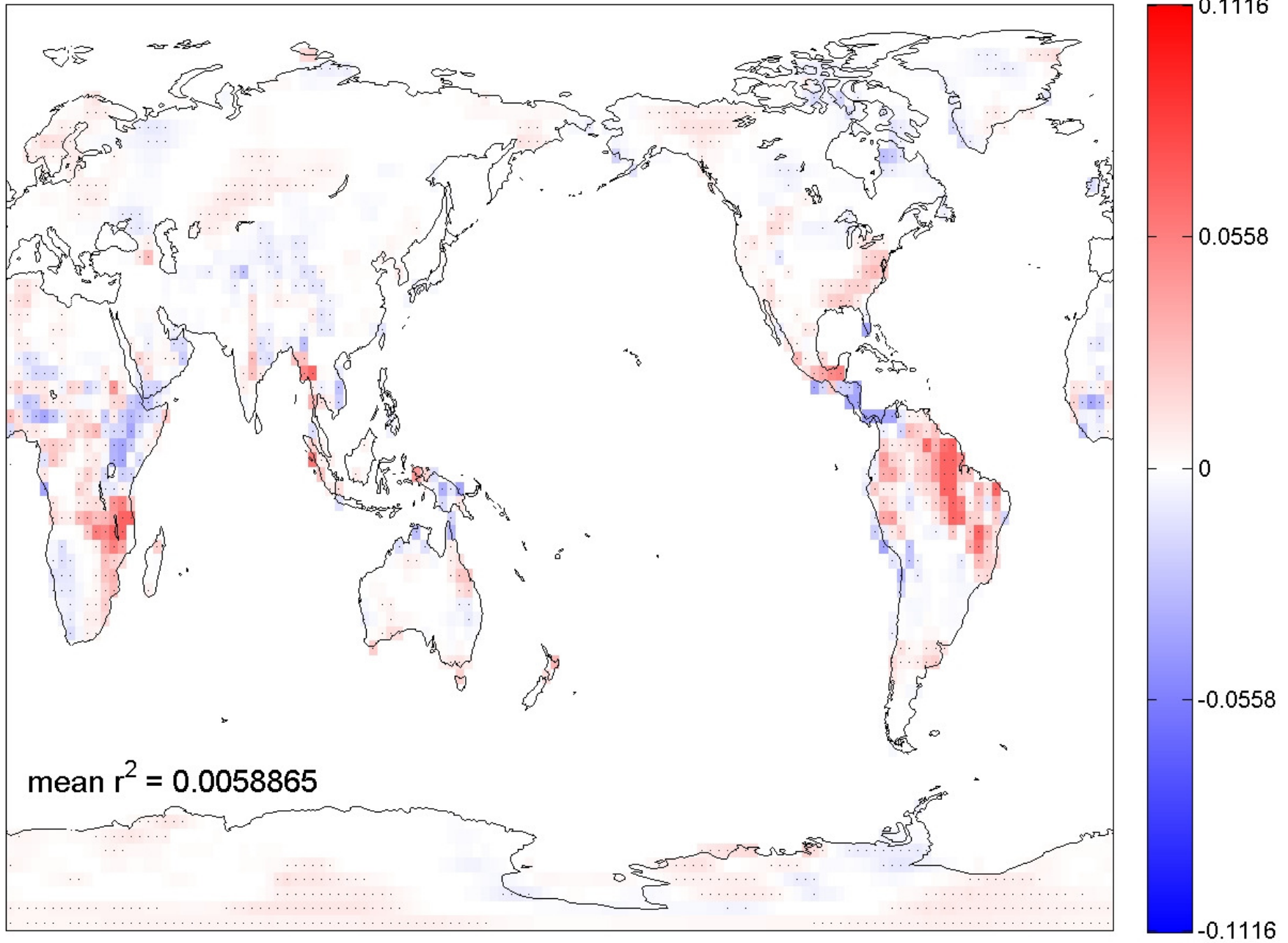
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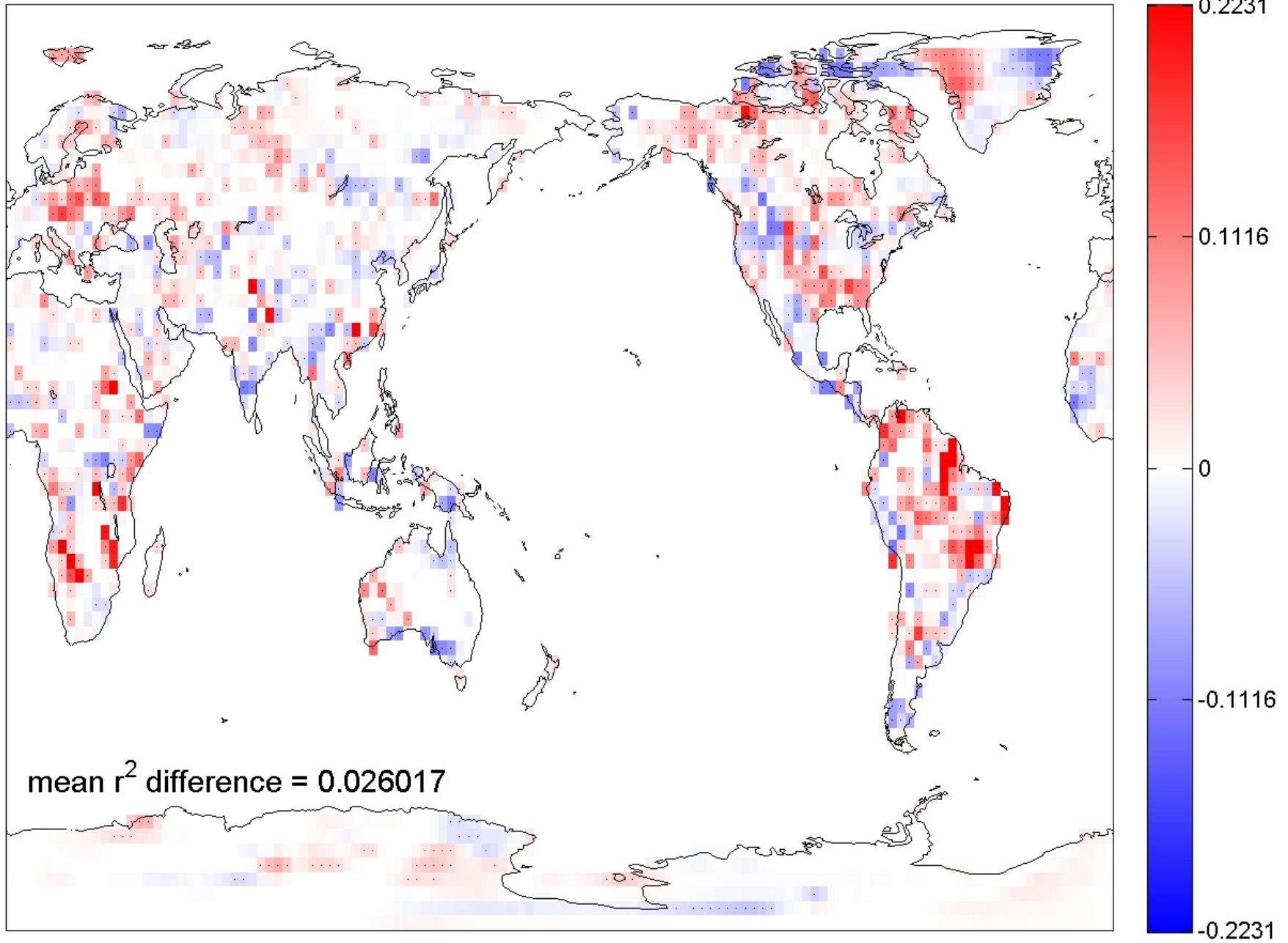
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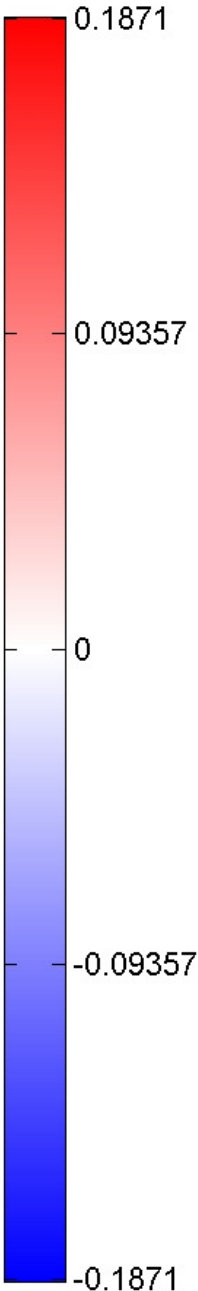
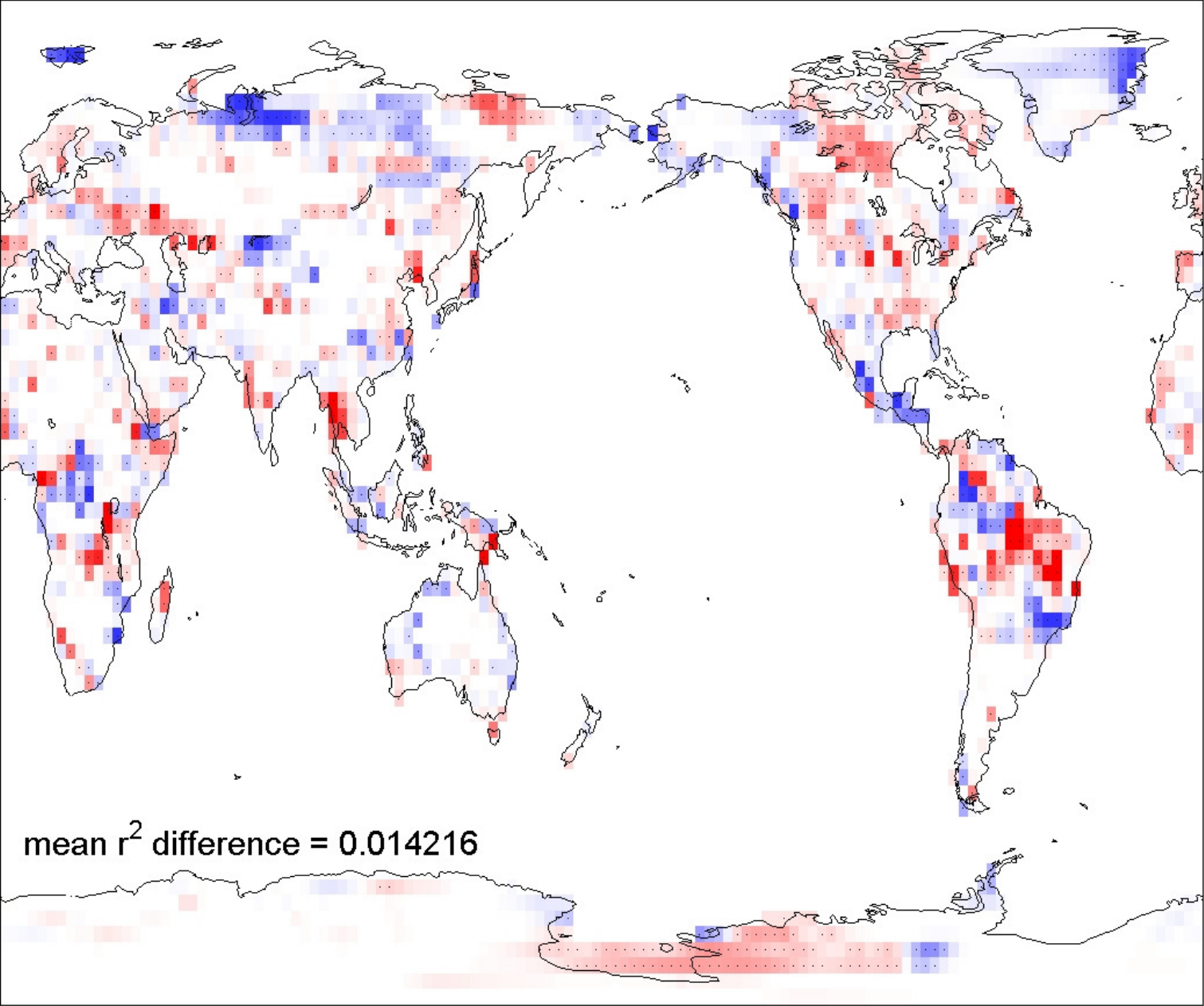
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Apr Aug - Temp AIR1 95 90 100 2



Apr Aug - Temp AIR1 95 00 10 2



Current research directions

- Soil moisture / forecast skill for extreme percentiles of dry/wet conditions
- Examine periods of particular forecast skill in regions to see what contributed to that success
- Examine variability of soil moisture in particular areas (e.g. Canadian Prairies)