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- **Soil initialization:**
  - Reanalysis run: soil moisture at initial time
  - GCM runs: soil moisture in a “neutral” year of reanalysis run

- **Spin up:**
  - 3 years

- **Interior nudging?** No
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• **Boundary conditions relaxation:**
  - 15-point sponge zone
  - damping strengths decays exponentially toward interior

• **Time step:**
  – 100 seconds

• **Missing output variables:**
  – No
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• **Parameterizations:**
  – Non-hydrostatic, compressible dynamics
  – Kain-Fritsch2 mass flux convective scheme
  – Reisner mixed-phase microphysics
  – NOAH land scheme
  – USGS 25 land/24 vegetation categories
  – thermal/water layers: 4
  – Hong-Pan (MRF) counter-gradient, non-local K PBL
NARCCAP Domains
MM5 – Variables Submitted to Archive

- Reanalysis run: pr, zg500, huss, tas, uas, vas, snd, ts, zmla
- CCSM current: pr, zg500, huss, tas, uas vas, snd, ts, zmla, ps, psl, prc
- CCSM scenario: pr, zg500, huss, tas, uas, vas, snd, ts, zmla, ps, psl, prc

- Bottleneck? Script development
Iowa State

RESEARCH PLANS

• ENSO cycle in NARCCAP domain
• Extreme monthly (and more frequent?) precipitation
• Surface and upper air winds
Surface Wind Analysis (Pryor et al.)

Average of annual mean wind speeds (1979-2000)
Surface Wind Analysis (Pryor et al.)

Synthesis of trends
Surface Wind Analysis (Pryor et al.)

(a) NCDC-5421 1973-2000: 50th percentile
(b) NCDI DS3505 1973-2005: 50th percentile
(c) NCEP-1 1948-2006: 50th percentile
(d) NCEP-2 1979-2006: 50th percentile
(e) ERA-40 1973-2001: 50th percentile
(f) NARR 1979-2006: 50th percentile
(g) MM5 1979-2004: 50th percentile
(h) RSM 1979-2004: 50th percentile

(j) NCDC-5421 1973-2000: 90th percentile
(k) NCEP-1 1948-2006: 90th percentile
(l) NCEP-2 1979-2006: 90th percentile
(m) ERA-40 1973-2001: 90th percentile
(n) NARR 1979-2006: 90th percentile
(o) MM5 1979-2004: 90th percentile
(p) RSM 1979-2004: 90th percentile

Trends in annual mean wind speeds at 00 UTC
Surface Wind Analysis (Pryor et al.)

Trends in annual mean wind speeds at 12 UTC
Hydrologic Analysis (Takle et al.)

SWAT model domain
Simulation period: last 2 decades of 20C
Hydrologic Analysis (Takle et al.)

Streamflow Interannual Variability
Hydrologic Analysis (Takle et al.)

Precipitation Annual Cycle

![Graph showing precipitation cycle with different models and the ensemble mean. The x-axis represents months from January to December, and the y-axis represents precipitation in mm. The graph compares baseline, CRCM, ECPC, HRM3, MMSI, RCM3, WRFP, and the ensemble mean. The baseline shows the highest precipitation in the summer months, followed by a decrease in the autumn and winter. The CRCM and ECPC models show a similar pattern, but with minor variations. The HRM3 model is slightly lower than the baseline, while the MMSI and WRFP models are the lowest. The ensemble mean is the closest to the baseline but with a slightly lower peak.]
Hydrologic Analysis (Takle et al.)

Streamflow Annual Cycle

Monthly Streamflow

Streamflow (mm)
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Thank you