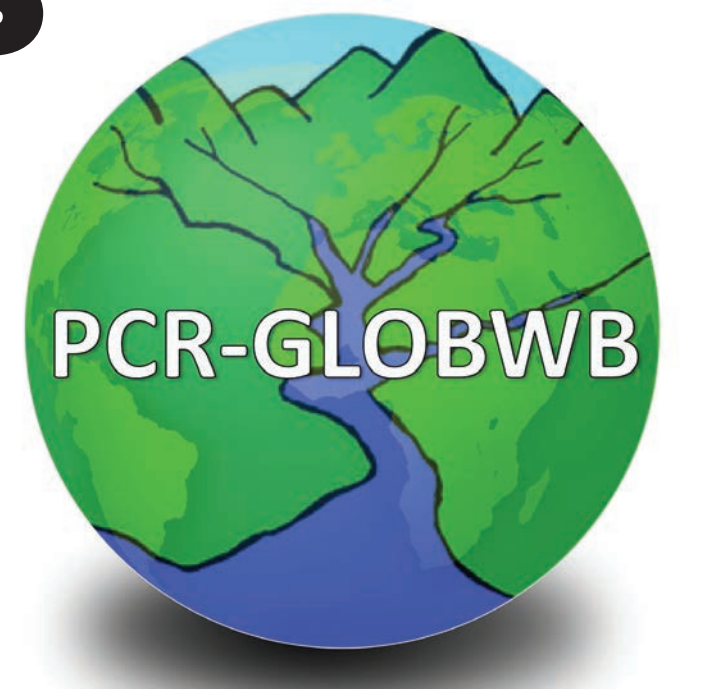


PCR-GLOBWB 30 arc-seconds: Challenges and Opportunities



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Introduction

- Hyper-resolution hydrological models are thought to provide stakeholders with more scale relevant information.
- Yet, their developments are hindered by computational loads and the representation of fine-scale hydrological processes.
- We modified PCR-GLOBWB to overcome these challenges.

Methods

- Updated parallelization scheme.
- Added lateral snow and ice movement.
- Incorporated a climatology based downscaling technique.
- The new global 30 arc-seconds PCR-GLOBWB was compared to the older 5 arc-minutes and 30 arc-minutes versions.

Results

- Increased resolution results in better estimates of river discharge (Fig 1.), especially for smaller catchments.

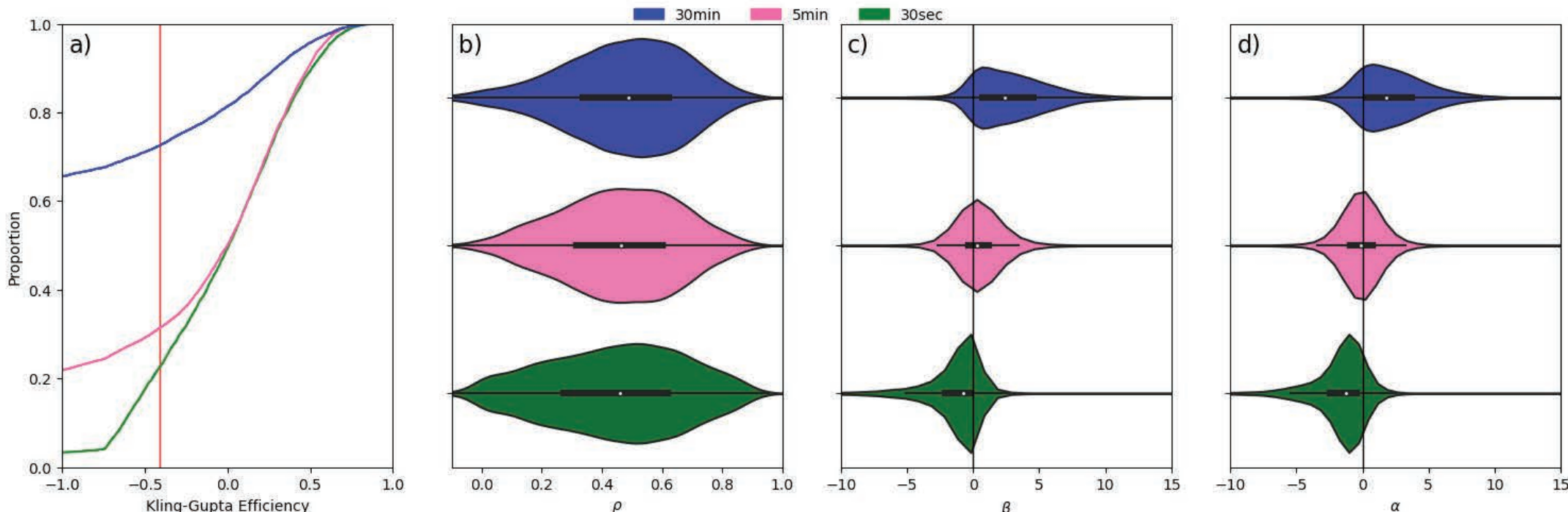


Figure 1: (a) KGE, (b) correlation component, (c) beta component, (d) alpha component calculated for daily river discharge from a 30 arc-minutes, 5 arc-minutes and 30 arc-seconds global PCR-GLOBWB simulation from 1985 - 2019. Values greater than -0.41 (red line) indicate the value at which stations improves upon the mean flow benchmark.

- Partitioning between the major water reserves differed in response to increasing model resolution. Relative rates of evaporation are greater for the 30 arc-seconds resolution and as a result, runoff values is smaller in the 30 arc-seconds resolution (Fig. 2).

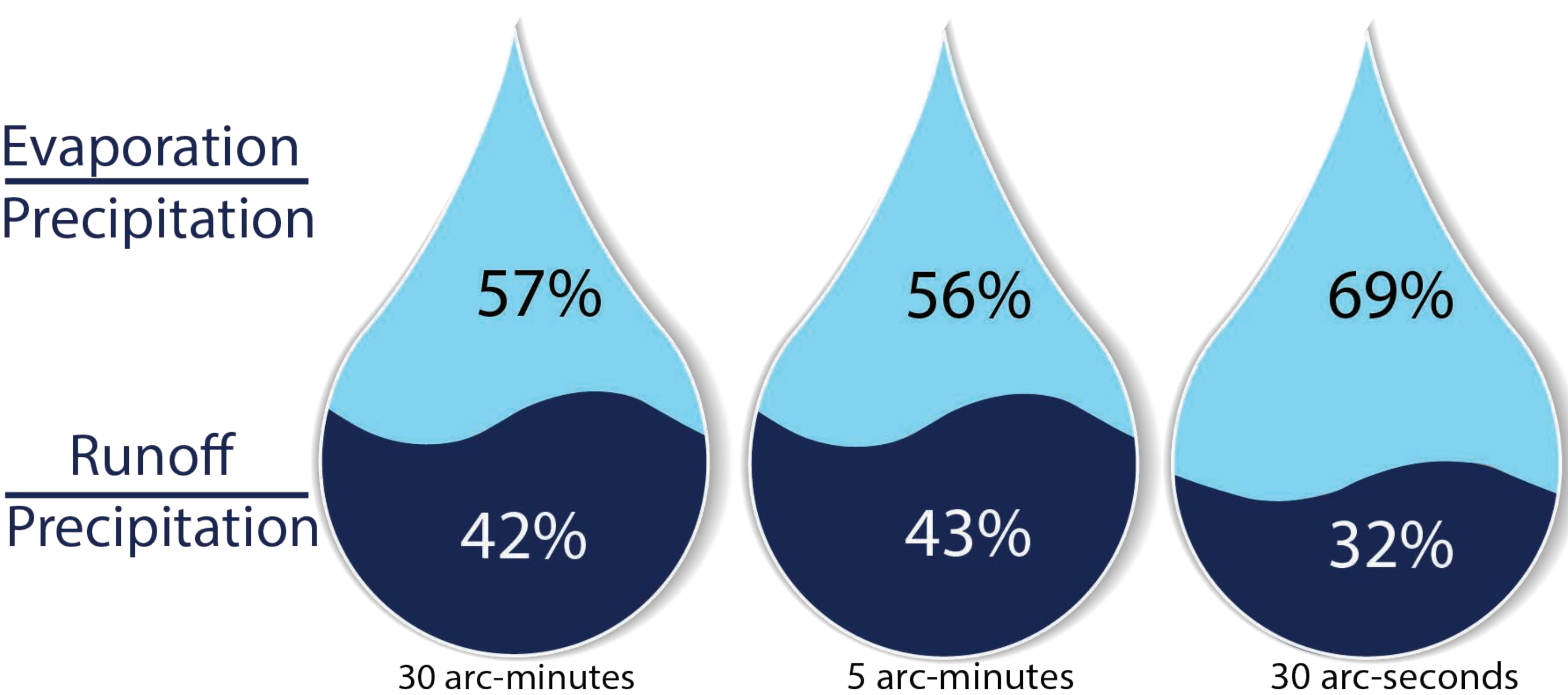
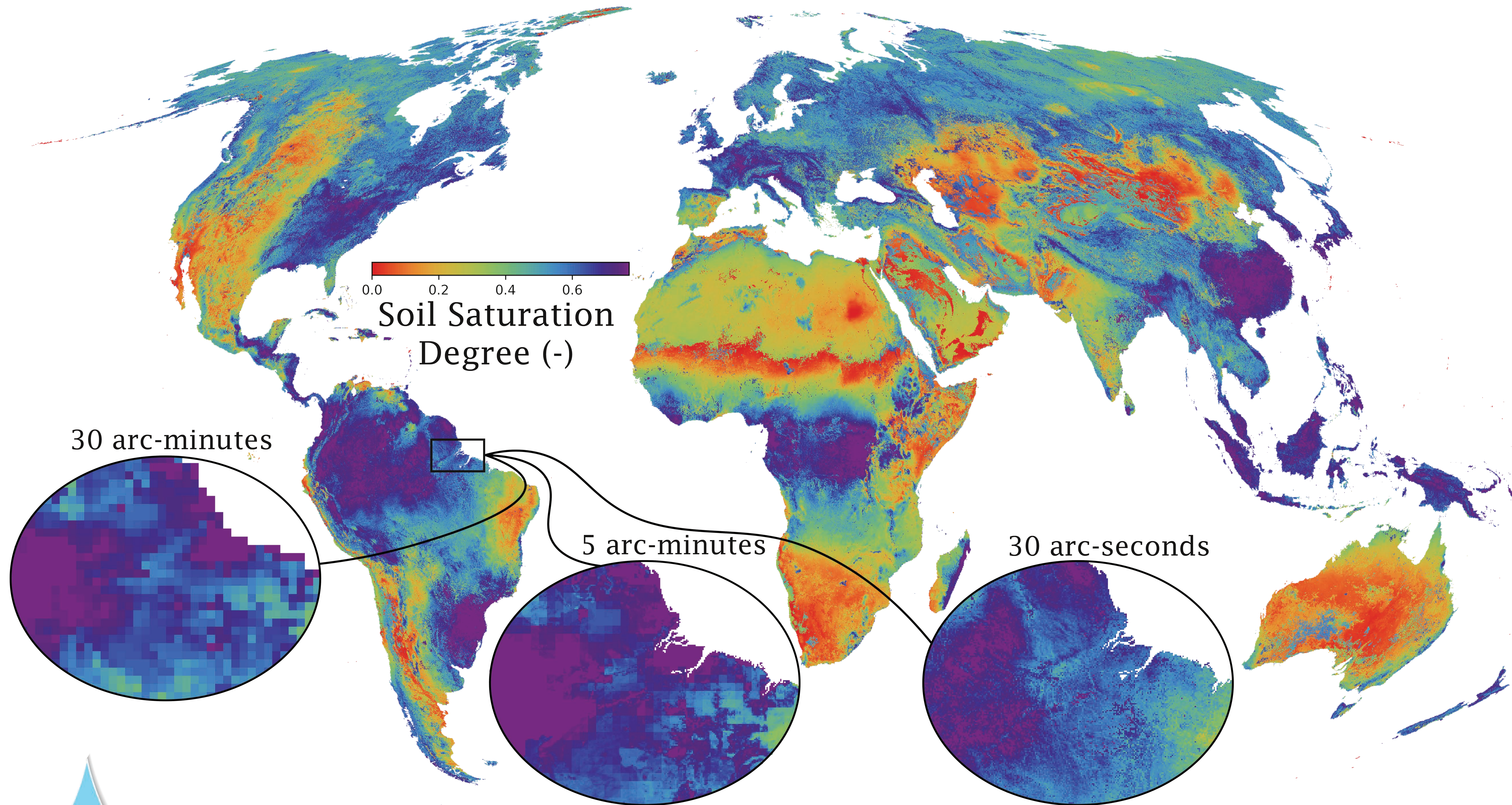


Figure 2: Evaporation:Precipitation and Runoff:Precipitation ratios for the 30 arc-minute, 5 arc-minute and 30 arc-seconds simulation.



Global multi-decadel hyper-resolution hydrological models are possible with today's computers



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