



## **The CLIVAR C20C Project: Skill of simulating Indian monsoon rainfall on interannual to decadal timescale.**

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The ability of atmospheric general circulation models (AGCMs), that are forced with observed sea surface temperatures (SSTs), to simulate the Indian monsoon rainfall (IMR) variability on interannual to decadal timescale is analyzed in a multimodel intercomparison. The multimodel ensemble has been performed within the CLIVAR International “Climate of the 20th Century” (C20C) Project. Whereas on interannual timescale there is modest skill in reproducing the observed IMR variability, on decadal timescale the skill is much larger. It is shown that the decadal IMR variability is largely forced, most likely by tropical sea surface temperatures (SSTs), but as well by extratropical and especially Atlantic Multidecadal Oscillation (AMO) related SSTs. In particular there has been a decrease from the 1960s to the 1990s that corresponds to a general warming of tropical SSTs. Using a selection of control integrations from the World Climate Research Programme’s (WCRP’s) Coupled Model Intercomparison Project phase 3 (CMIP3), it is shown that the increase of greenhouse gases (GHG) in the 20th century has not significantly contributed to the observed decadal variability. Furthermore, it is shown that even taking internal variability of the coupled climate simulations into account, the CMIP3 models do not capture the observed decadal variability.