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Feasibility of large-scale water monitoring and forecasting in the Asia-Pacific region

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The Asian-Pacific region (including China, India and Pakistan) is home to 51% of the global population. It accounts for 53% of agricultural and 32% of domestic water use world wide. Due to the influence of Pacific Ocean and Indian Ocean circulation patterns, the region experiences strong inter-annual variations in water availability and occurrence of drought, flood and severe weather. Some of the countries in the region have national water monitoring or forecasting systems, but they are typically of fairly narrow scope. We investigated the feasibility and utility of an integrated regional water monitoring and forecasting system for water resources, floods and drought. In particular, we assessed the quality of information that can be achieved by relying on internationally available data sources, including numerical weather prediction (NWP) and satellite observations of precipitation, soil moisture and vegetation. Combining these data sources with a large scale hydrological model, we produced monitoring and forecast information for selected retrospective case studies. The information was compared to that from national systems, both in terms of information content and system characteristics (e.g. scope, data sources, and information latency). While national systems typically have better access to national observation systems, they do not always make effective use of the available data, science and technology. The relatively slow changing nature of important Pacific and Indian Ocean circulation patterns adds meaningful seasonal forecast skill for some regions. Satellite and NWP precipitation estimates can add considerable value to the national gauge networks: as forecasts, as near-real time observations and as historic reference data. Satellite observations of soil moisture and vegetation are valuable for drought monitoring and underutilised. Overall, we identify several important opportunities for better water monitoring and forecasting in the Asia-Pacific region.