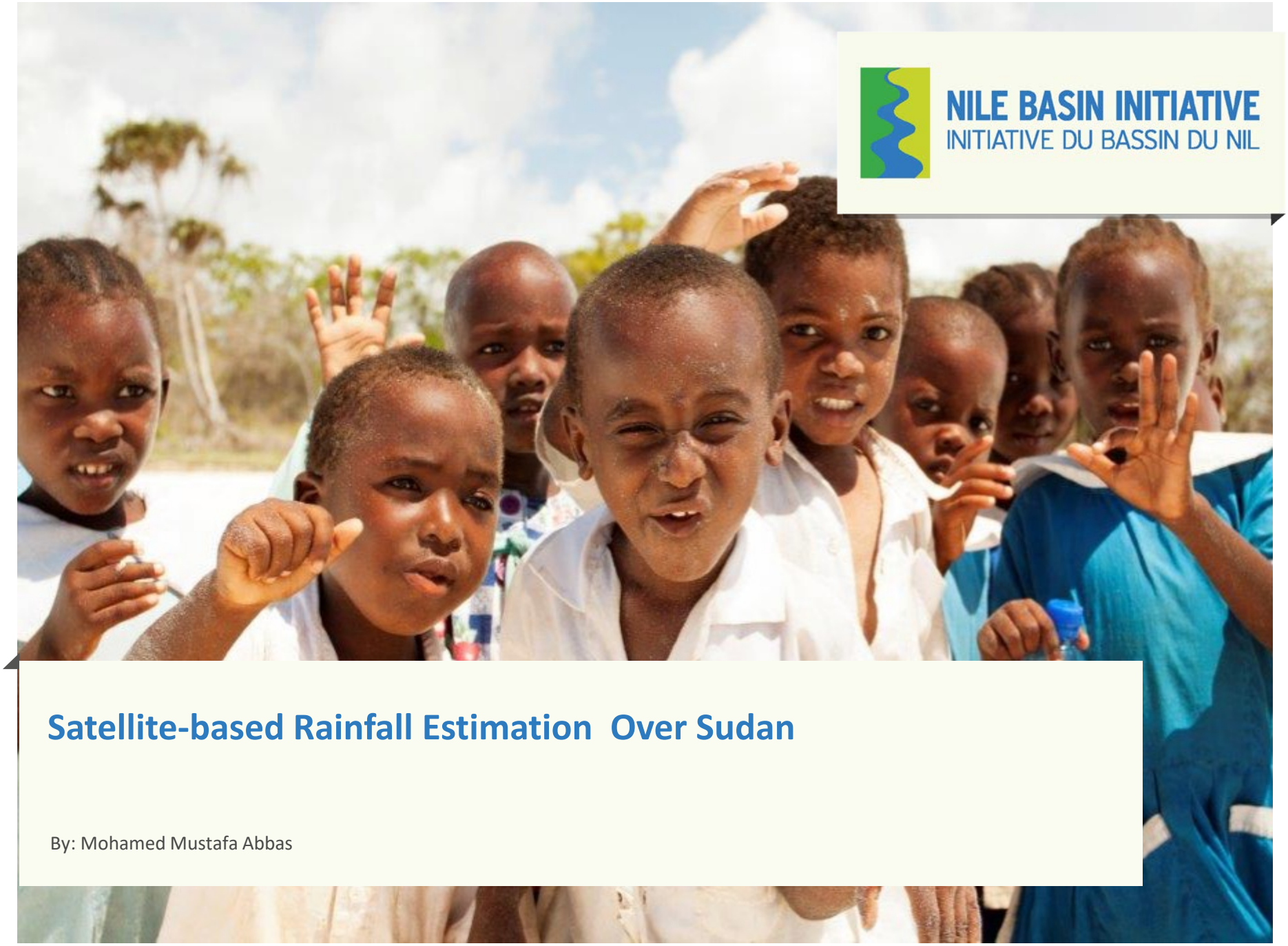

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Satellite-based Rainfall Estimation Over Sudan

By: Mohamed Mustafa Abbas

Content

- Background
- Objective
- Methodology
- Analysis
- Discusion
- Recommendations

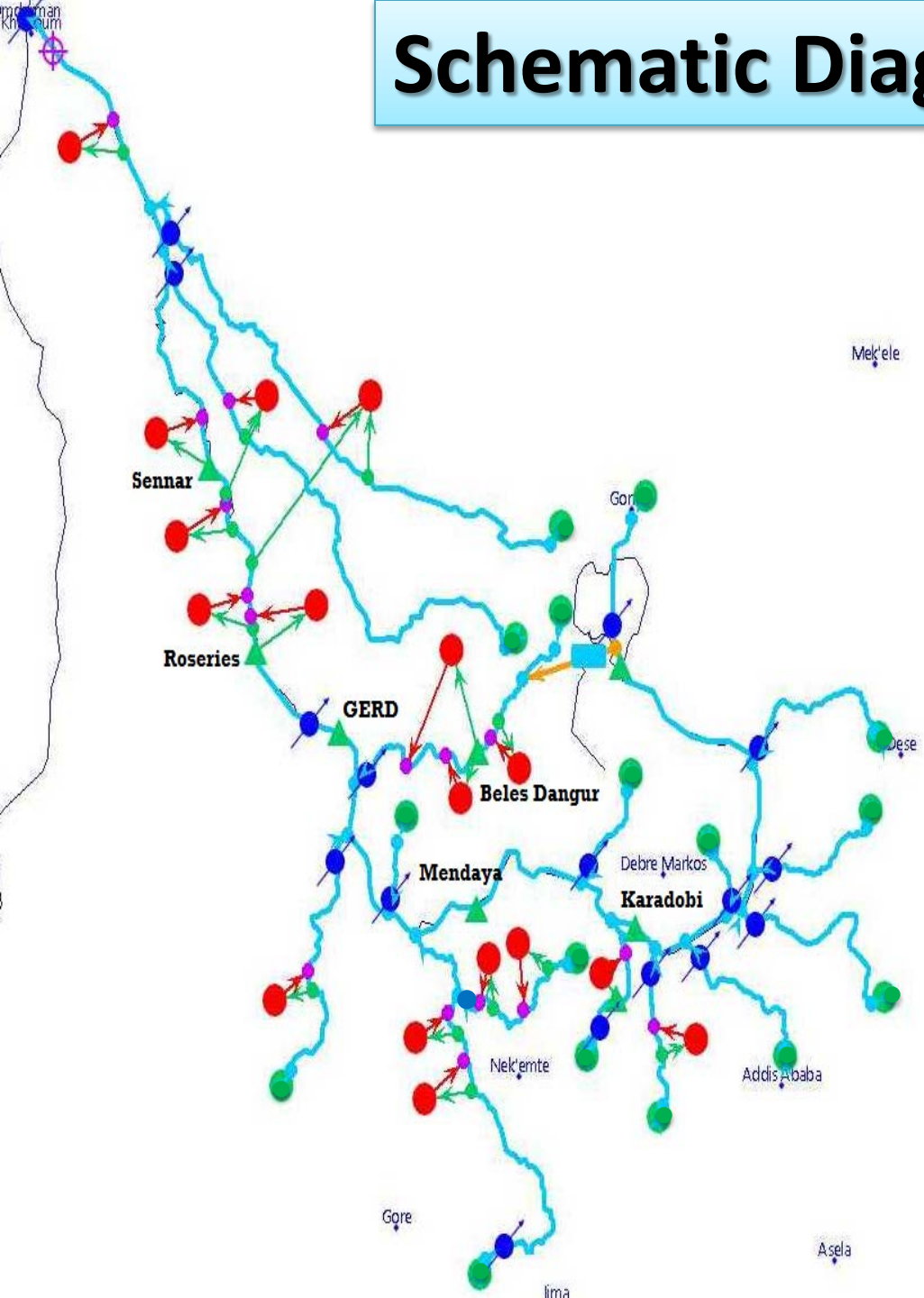
Background

- The satellite rainfall data have many applications in applied climatology and biogeochemical modeling, as well as in hydrology and agricultural meteorology. The satellite rainfall data are available through the International Water Management Institute is World Water and Climate Atlas (http://www.iwmi.org), as well as it available at the website of the Climatic Research Unit (http://www.cru.uea.ac.uk).
- Satellite proxies, particularly satellite rainfall estimate, have been used as alternatives because of their availability even over remote parts of the world.

Objectives

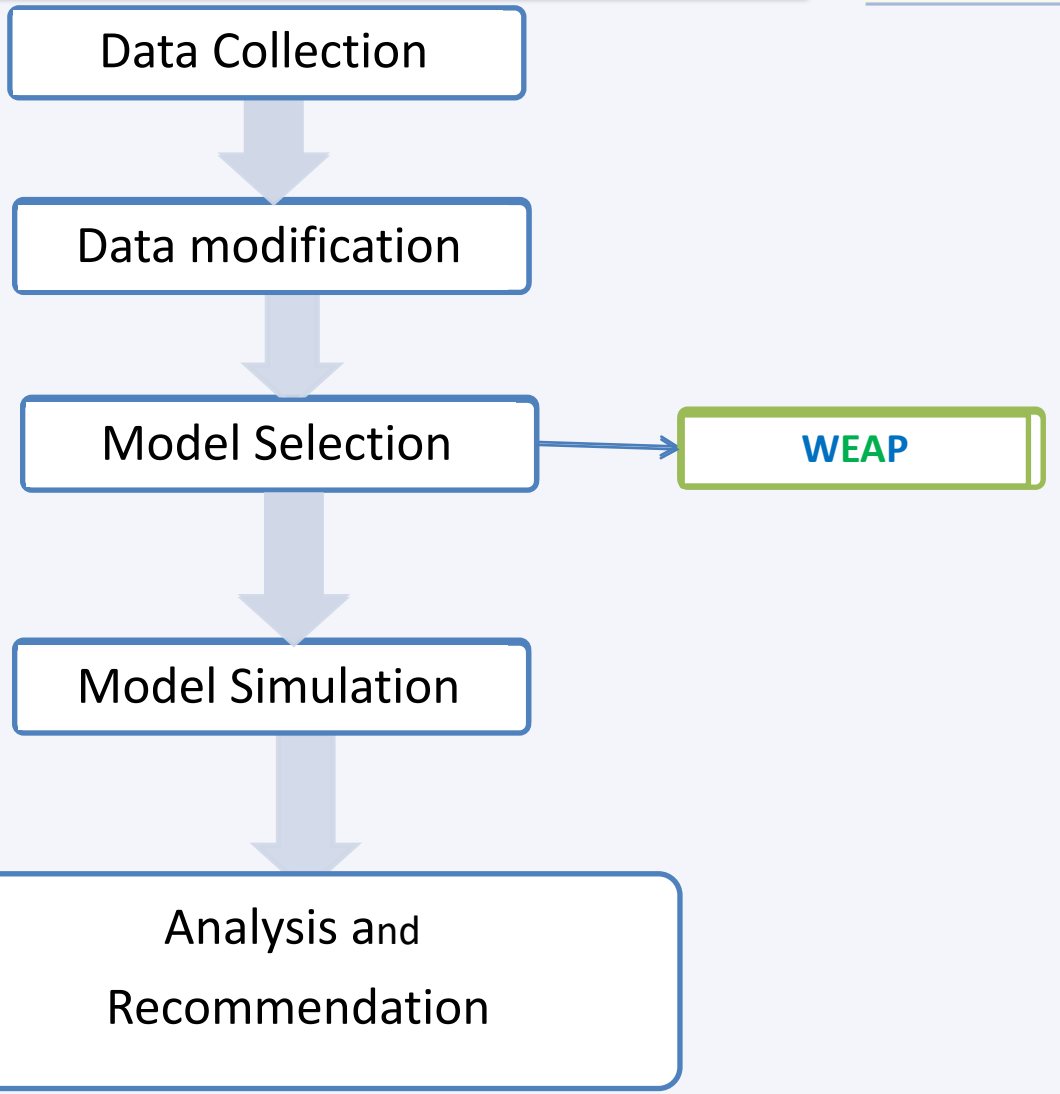
- To evaluate the satellite-based rainfall estimates.
- To predict stream flow from satellite data and hydrological modeling over the Blue Nile sub-basins.

Schematic Diagram for BNRB:

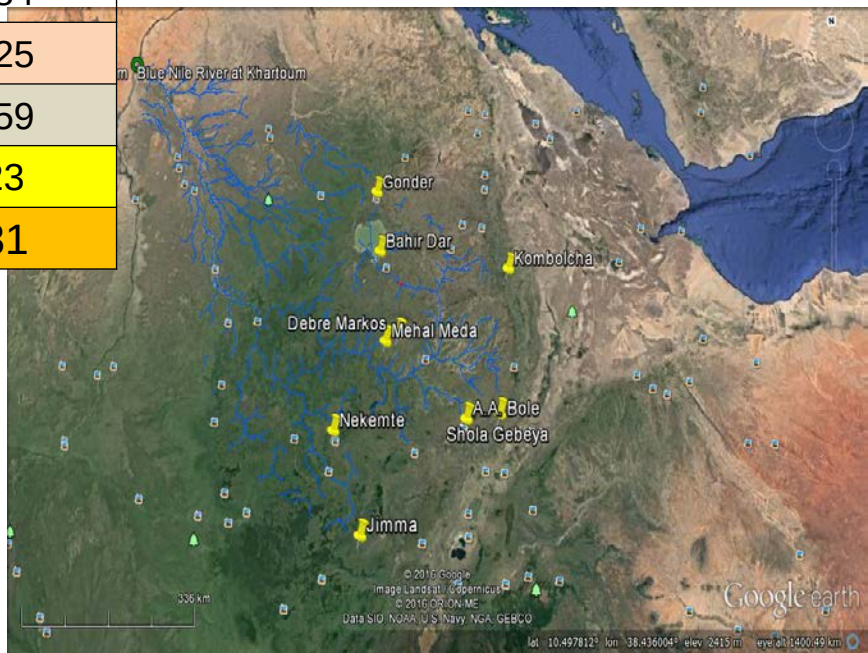


- [x] River (16)
- [x] Diversion (1)
- [x] Reservoir (8)
- [x] Groundwater
- [x] Other Supply
- [x] Demand Site (19)
- [x] Catchment (16)
- [x] Runoff/Infiltration (16)
- [x] Transmission Link (21)
- [x] Wastewater Treatment Plant
- [x] Return Flow (19)
- [x] Run of River Hydro (1)
- [x] Flow Requirement (1)
- [x] Streamflow Gauge (18)

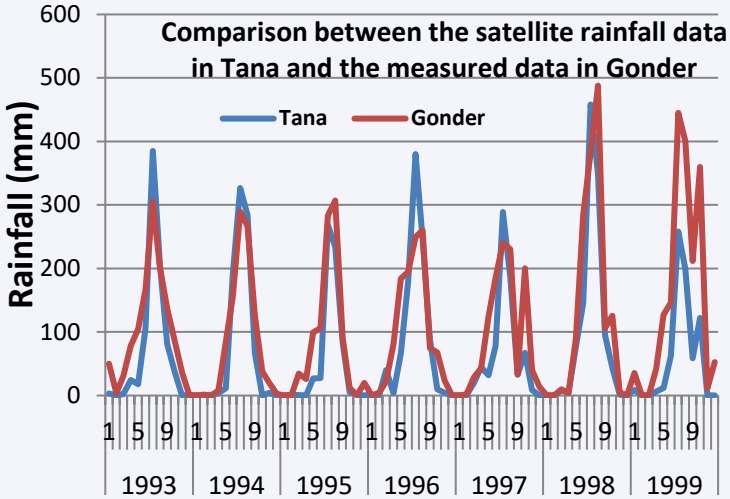
Research Methodology

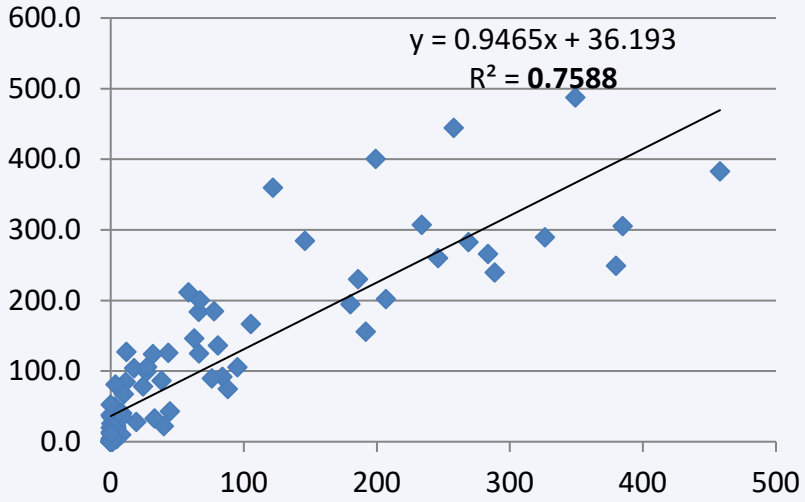


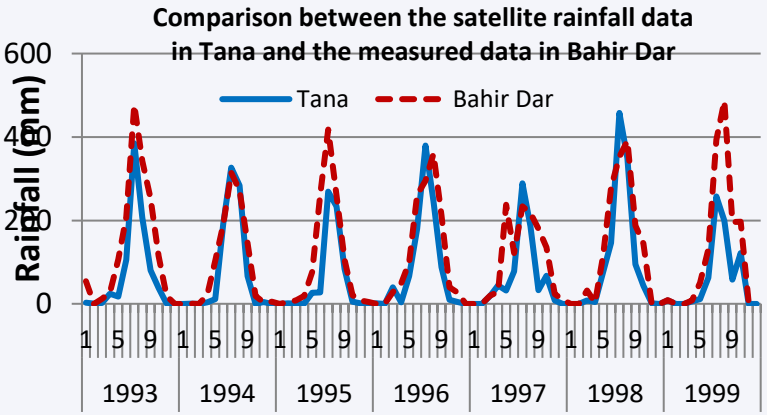
	Sub-basin	Longitude	Latitude	Elevation
1	Anger	36.5625	9.52298	1510
2	Beles	35.9375	11.0841	806
3	Bosheilo	38.125	11.3964	2399
4	Dabus	35	9.52298	1472
5	Didessa	36.25	8.89852	1792
6	Finchaa	37.5	9.83521	1541
7	Guder	37.5	9.21075	2067
8	Jemma	38.75	9.83521	1894
9	Muger	38.4375	9.52298	2067
10	N. Gojam	38.125	10.4597	2532
11	S. Gojam	37.1875	10.4597	1668
12	Tana	37.5	12.0208	1784
13	Weleka	38.75	10.4597	1625
14	Wonbera	35.625	10.4597	1559
15	Dinder	35.3125	12.0208	523
16	Rahad	34.6875	13.2697	431

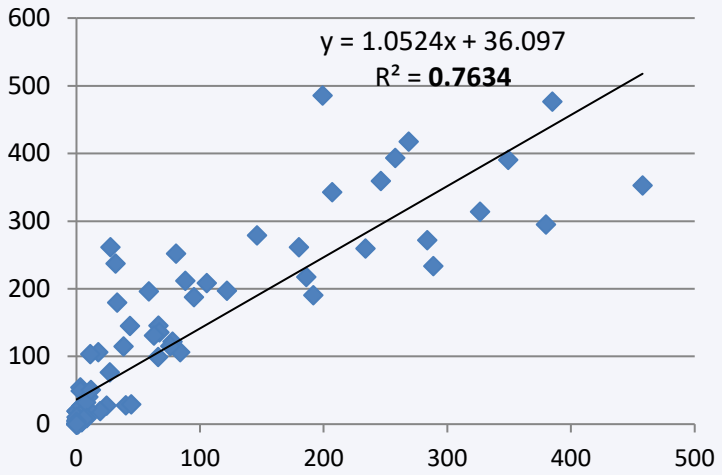


Comparison before Modification









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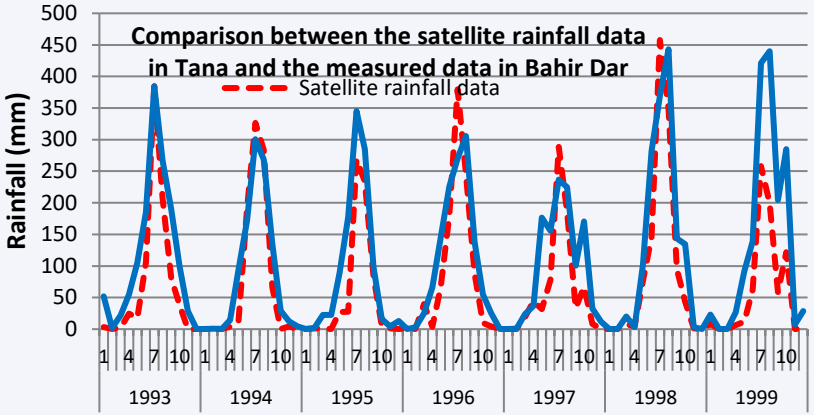

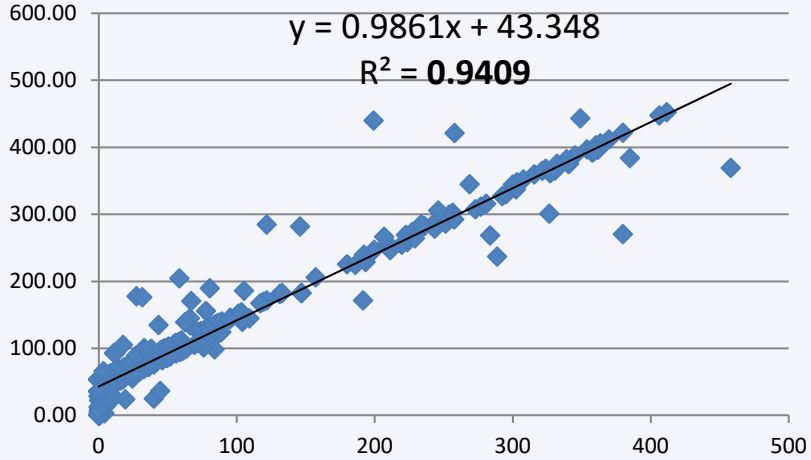

Station	River	Nash-Stucliffe Efficiency (NSE) %	Coefficient of Determination (r^2) %	Index of agreement (d) %
Eldeim	Blue Nile	89	95	97
Giwasi	Dinder	96	98	99
Hawata	Rahad	88	95	97
Khartoum	Blue Nile	67	88	92

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Giwasi	Dinder	62	84	85
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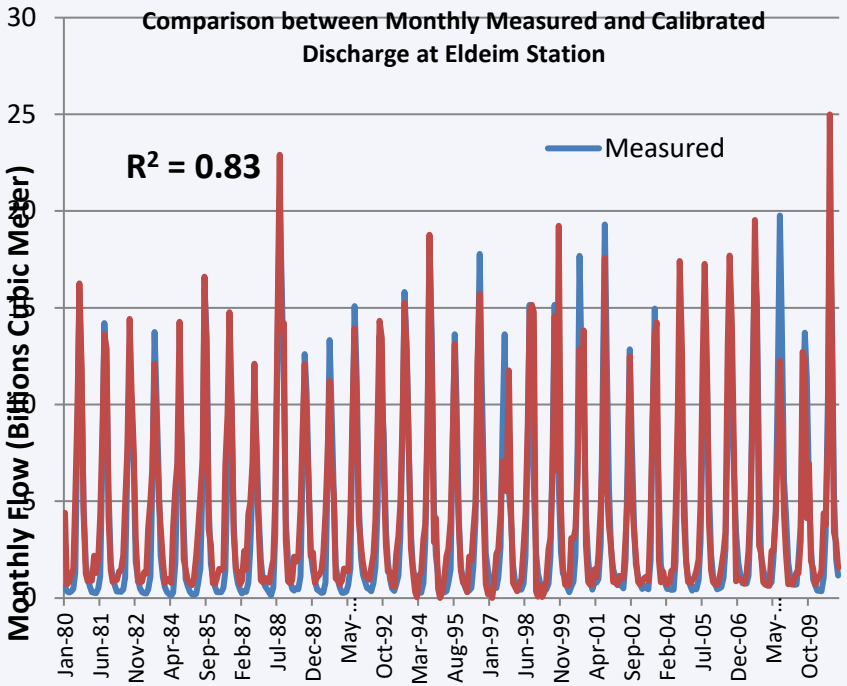

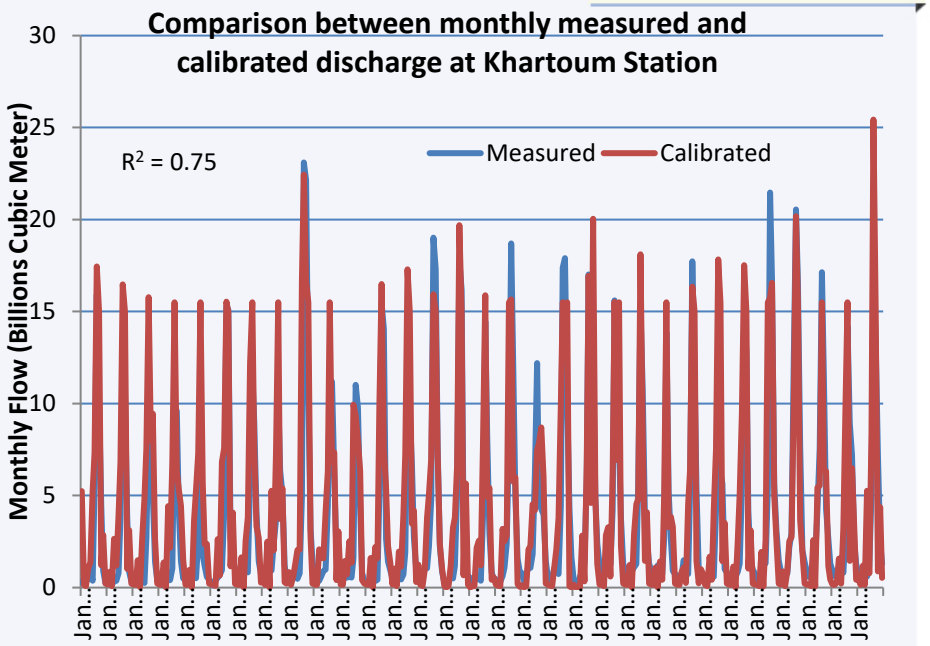

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Recommendations:

- Results show that utilizing and adjusting the CFSR precipitation data to Blue Nile river basin model provides stream discharge that are as good as or better than using traditional weather gauging stations.
- The modified satellite rainfall data represent the ground rainfall station in a very good efficiency, without depending on the representative measured data (which some time are difficult, costing, and time consuming).
- Development of network monitoring system for the all hydrological parameters in the Basin.

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THANK YOU
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