Hydrology

Zhi Li

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1 23 Unsolved problems in Hydrology

1.1 Catergorize Problems

1. Time variability and change
   - Climate Change → Q1,2,3.
   - Land-cover Changes on Hydrological Fluxes → Q4.
2. Space variability and scaling
   - understanding the nature of spatial variability of hydrological fluxes → Q5.
   - the relation betwrrn point-scale to catchment-scale → Q6.
3. Variability of extremes
   - Detection, Attribute, and Characteristics of flood-rich and drought-rich periods → Q9.
   - land-cover changes on floods and droughts → Q10.
   - temporal variability theme and flow path → Q7,8.
   - geomorphological process e.g. melting, landslides links with floods/droughts → Q11.
4. Interfaces in hydrology
   - fluxes and flow paths across compartments including physical-chemical-biological interactions → Q12, 13.
   - locally inter-compartment fluxes and address issues at regional scales with hyper-resolution, global hydrological modelling and data-driven methods e.g. groundwater recharge to oceans → Q13.
   - interaction under spatial-temporal variations between compartments to contribute to the degradation of water quality in catchment scale → Q14.
   - Water and health in a hydrological perspective → Q15.
5. Measurement and data
   - digital solutions to hydrology e.g. camera to particle detection → Q16
   - use of proxies, replacing few accurate data by less accurate data through data-mining → Q17.
   - fusion of quantitative with non-quantitative data e.g. social-economy, landuse from crowd-sourcing data → Q18.
6. Modelling methods
   - hydrological models adapted to changing conditions which is more process-based rather than calibration-based → Q19.
   - model structure uncertainty → Q20.
7. Interfaces with society
   - hydrological contribution to societal problems with water-societal interactions → $Q21.water-environment-energy-food-heathnexus$→ Q22.
- human-water interactions of ancient civilisations from hydrology to earth system sciences → $Q23$.