# Time variability and change

1. Is the hydrological cycle regionally accelerating/decelerating under climate and environmental change, and are there tipping points (irreversible changes)?
2. How will cold region runoff and groundwater change in a warmer climate (e.g. with glacier melt and permafrost thaw)?
3. What are the mechanisms by which climate change and water use alter ephemeral rivers and groundwater in (semi-) arid regions?
4. What are the impacts of land cover change and soil disturbances on water and energy fluxes at the land surface, and on the resulting groundwater recharge?

# Space variability and scaling

1. What causes spatial heterogeneity and homogeneity in runoff, evaporation, subsurface water and material fluxes (carbon and other nutrients, sediments), and in their sensitivity to their controls (e.g. snow fall regime, aridity, reaction coefficients)?
2. What are the hydrologic laws at the catchment scale and how do they change with scale?
3. Why is most flow preferential across multiple scales and how does such behaviour co-evolve with the critical zone?
4. Why do streams respond so quickly to precipitation inputs when storm flow is so old, and what is the transit time distribution of water in the terrestrial water cycle?

# Variability of extremes

1. How do flood-rich and drought-rich periods arise, are they changing, and if so why?
2. Why are runoff extremes in some catchments more sensitive to land-use/cover and geomorphic change than in others?
3. Why, how and when do rain-on-snow events produce exceptional runoff?

# Interfaces in hydrology

1. What are the processes that control hillslopeâ€“ripարianâ€“streamâ€“groundwater interactions and when do the compartments connect?
2. What are the processes controlling the fluxes of groundwater across boundaries (e.g. groundwater recharge, inter-catchment fluxes and discharge to oceans)?
3. What factors contribute to the long-term persistence of sources responsible for the degradation of water quality?
4. What are the extent, fate and impact of contaminants of emerging concern and how are microbial pathogens removed or inactivated in the subsurface?

# Measurements and data

1. How can we use innovative technologies to measure surface and subsurface properties, states and fluxes at a range of spatial and temporal scales?
2. What is the relative value of traditional hydrological observations vs soft data (qualitative observations from lay persons, data mining etc.), and under what conditions can we substitute space for time?
3. How can we extract information from available data on human and water systems in order to inform the building process of socio-hydrological models and conceptualisations?

# Modelling methods

1. How can hydrological models be adapted to be able to extrapolate to changing conditions, including changing vegetation dynamics?
2. How can we disentangle and reduce model structural/parameter/input uncertainty in hydrological prediction?

Interfaces with society

1. How can the (un)certainty in hydrological predictions be communicated to decision makers and the general public?
2. What are the synergies and tradeoffs between societal goals related to water management (e.g. waterâ€“environmentâ€“energyâ€“foodâ€“health)?
3. What is the role of water in migration, urbanisation and the dynamics of human civilisations, and what are the implications for contemporary water management?