The unpaved muddy yard after a heavy summer rain is the heaven of earthworms, toads, plants and my childhood’s imagination. With the naïve drawing of earning a living without missing the beauty of nature, I got enrolled in the Department of Hydrology and Water Resources. The academic trainings during the past 6 years tells that nature will not reveal its true beauty without one's tireless work in decoding it. I enjoy the challenges and their aesthetic returns and hope to continue this hard way in The Henry Samueli School of Engineering, University of California, Irvine.

Computer codes are my language in expressing academic understandings. The Github records (<https://github.com/morepenn>) depict a fuzzy track of my research interests. The dense green grids in the time bar are milestones I passed along the way. It is embarrassing to admit that it takes me more than a month writing a Xinanjiang model four years ago. But as the iterative structure was distilled, the later process-based models like TOP model, HyMod, Shanbei Model and water balance models became logical conclusions once their constitutive functions had been established. As models were constructed, Professor Lihua Xiong encouraged us to “hack” them from the easiest part, parameters. I still remember the thrill when a satisfying parameter set was produced after refreshing trials by simulating the evolution of species. I enjoyed the specific tricks of iterative evolving in the gene algorithm, particle swarm optimize algorithm, SCE-UA algorithm. This study experience expanded my vision that data could tell us knowledge if they were well organized.

My undergraduate degree proposal deals with the water-heat correlation pattern simulation across temporal scales. The similarity of constitutive functions in such models forced me to discover the mechanism behind them. There are two distinct forks, one aims at 'integrating' detailed processes along temporal and spatial paths to reveal the general picture, the other starts from a systematic perspective. The former gets its gene from mechanics, the latter inherits a thermodynamics view. My graduate supervisor Assistant Professor Zhentao Cong introduced me a compromised way, the stochastic soil moisture model. Like most of the hydrological models, this model takes the point scale soil column as the central in precipitation participation. However, a stochastic analysis perspective enables us to bypass the difficulty to analyze iterative model structures. The stationary and temporal mean solution of the Kormogorov Forward Stochastic Differential Equation provides general knowledge of a point scale soil using characteristics distilled from the input observations. I generalized it to a basin scale form by introducing the soil storage capacity distribution curve into the main equation. Later, the stochastic control function of runoff, evapotranspiration and leakage were deduced based on it. I still get a long way to go along this path, such as considering the seasonal fluctuation of precipitation and evapotranspiration using harmonic analysis, detecting the long temporal range hydrological pattern's sensitivity to the meteorological and underlying surface characteristics.

Another of my research interest lies in stochastic hydrology. I enjoy the wisdom of reorganizing our knowledge in the context of probability theory. This ideological trend starts from Leibniz, Bernoulli, Jeffreys, Jaynes, and is gaining its support in the hydrology community. I tried to verify the results of the stochastic analysis mentioned above in the context of information theory. The theoretical framework originated from the doctor thesis of my senior fellow apprentice Doctor Wei Gong. I was so excited to find a crystalline theory that quantifies the information contribution of data and model in math. The excitement made me underrate its logical and methodological difficulties at first. Fortunately, the discussion with researchers from different areas and the trials using various methods did pay at last. The information flow between watershed hydrological terms shows a maximum point at seasonal scale, which perfectly confirmed the conjecture of the stochastic soil moisture model.

Data obtained from different sources are constantly flooding in in this digit age. Models developed by various research groups occupy the journals periodically. I want to quantify their specific contributions. What is the advantage of one data source over another, in which model? When is it high time to push the simulation forward and when to intensify the observations? In a general point of view, models are no more than compressors of observations, observations form a model if they are intensive enough to enable an efficient interpolation. The existed data-driven and process-based models should be complementary (for example, the Budyko curve could instruct the construction of kernel functions in support vector regression, and vice versa). These could be re-organized in the context of algorithm complexity. As I know, many researchers have started this work. I should catch the trend and make my own contributions in the frontier.

Nothing could compare with having fun in one's job. For me, the most interesting job is to keep finding secrets of different complex interlocking earth systems. Though sometimes I would complain that the research work turns the beautiful scene into hell once I attempted quantify its material, energy and information flows. But the joy of finding new things pays all. To do research is not like adding bricks to the grand edifice of knowledge. The knowledge edifice would grow by itself if it were well organized. I want to keep pushing down and re-constructing the projection of it in my mind again and again, until one day this projection is strong enough to influence the reason of others. Maybe a career in university or research institute is my best choice.

I learned UCI through Doctor Steve Weijs. Steve is doing excellent work in constructing an iterative research loop that balances observations and simulations.

Considering the statements above, I believe I possess the ability and motivation to make a trace in the discipline of earth science. I hope you will take a favorable decision regarding my admission to the Ph.D. program and I look forward to joining the big family of EPFL.