Drought Monitoring, Prediction and Adaptation under Climatic Changes

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With Three years' implement of Dragon II, some effective works have been carried out in our project 5341. The main achievements are: (1) improved understanding of land surface processes and land-atmosphere interactions over different underlying surfaces (e.g. agriculture land, desertification grassland, grassy marshland, river, lake), (2) algorithms for estimation of land surface parameters and heat fluxes, (3)drought monitoring for the northern Tibetan Plateau and the middle reaches of Yarlung Zangbo River (YR) and its two tributaries (4) training of young scientists in the area of water, climate and environment. Firstly, with the continuing of Chinese monitoring and observational networks, a large amount of observational data has been collected. It includes the data from 5 observation sites (networks). They are TORP/CAMP/Tibet Sites, Heihe Oasis-Desert Site, CAS Luancheng agro-ecological Observation Station (Hebei), CAS Xiaotangshan & Shunyi field experiment sites in Beijing, Maqu & the Yellow River Headwater Site. Secondly, combing AVHRR, MODIS and ASTER data, a set of algorithms for estimating land surface parameters and heat fluxes over the Tibetan Plateau has been achieved. As a major agricultural region in central Tibet Autonomous Region, the middle reaches of Yarlung Zangbo River (YR) and its two tributaries have been selected as a study area. Another study area is the northern Tibetan Plateau where CAMP/Tibet locates. On the basis of estimated bio-physical parameters from remote sensing data, together with the conventional meteorological data, SEBS (Surface Energy Balance System) has been applied to acquire the spatial-temporal characteristics of land surface parameters, surface heat fluxes, and DSI (Drought Severity Index) for the study area. Thus it provides scientific basis for crop growth monitoring, crop yield assessment and disaster monitoring. Thirdly, nearly 20 years' NOAA/NASA Pathfinder AVHRR Land (PAL) dataset and reanalysis data are used to derive land surface parameters for the Tibetan Plateau. Results show that from 1982 to 2000 both LST and surface air temperature increased on the TP. At the same time, both the near surface wind speed and surface sensible heat flux showed downward trends. These accelerated environmental changes inevitably have significant impacts on local energy and water cycle, the Asian monsoon and global changes.