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Date	*Friday January 15th, 2010*
Meeting Room	*ETH Hönggerberg, HIL G 36.1 at 3 pm*
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Addressing the Groundwater Depletion Problem in India Through Better Planning and Management

Abstract:
In India, recent declines in national food security may point to systemic deficiencies of agri- cultural production. Over the past decade and in the face of declining public investments in irrigation projects, the growth of production has increasingly become reliant on the alloca- tion of large volumes of groundwater in an unsustainable manner. As a result, groundwater resources are depleted and their role in buffering climate variability is lost. Given future climate and food supply uncertainty as well as ongoing population pressure, it is vital that the connections between climate variability, unsustainable irrigation practices and their im- pacts on regional scale agricultural production be quantified and better understood. Such knowledge can then be utilized in the formulation of effective conjunctive water use strategies
specifically and agricultural sector strategies more generally. In our analysis, we focus on rice and maize production in the Telangana region in Andhra
Pradesh, which is characterized by a semi-arid tropical monsoonal climate. Traditionally, agricultural production was constrained by precipitation variations during the wet mon- soon season. However, the advent of inexpensive pump technology in the late 20th century, coupled with governmentally subsidized electricity has allowed year–round planting of water– intensive crops. Thus, the monsoon rains must not only drive wet season production but must also sufficiently recharge groundwater in order to support dry season production.
Using a 35 year dataset from Telangana, a non–linear Gaussian process district–level regression model is developed to model yearly rice and maize area set

aside during the dry season. Time–series of 8o climatological features are constructed that could potentially influ- ence agricultural outcomes. For model selection, we employ a wrapper approach. Bootstrap aggregation is utilized to improve prediction robustness. We show that inter–annual climate
1variations, in the form of the monsoon rains, play a significant role in determining the area of land set aside for dry season planting and thus affect total yearly production.
The results suggest that our modeling approach combined with more accurate monsoon forecast may lead to predictive skill for crop forecasts in some of the districts under consid- eration. We discuss how coupled climate / agricultural models that explicitly account for uncertainty in forecasts may be useful to decision makers and stakeholders as they attempt to use scarce surface and subsurface water resources more efficiently and sustainably.