What is your idea?

Inspire Challenges are about solving big problems using next-generation ideas. We're looking for novel high-risk big data and ICT ideas that have the potential to lead to new scientific discoveries, or enhance the efficacy of development efforts. We want to see innovative ideas with promising potential for social impact that use open data to solve development problems faster, cheaper and with greater efficiency.

Use this section to briefly describe your idea.

- Indicate in one or two sentences **in bold** the essence of the idea.

  To develop a land parcel based big data system for better observing and assessing agricultural land use dynamics through the integration of remote sensing and crowdsourcing of land management activities.

- Why is the idea an unconventional or creative approach to the problem outlined in the topic?

  Previous observations of agricultural land use are either based on remotely sensed images or social surveys, which are characterized as pixel-based and individual-based approaches that focus on the biophysical features of agricultural land use the land managers who make land use activities, respectively. Though the processes, causes and consequences of agricultural land use change need to be better understood considering both aspects with timely observations, yet few studies have made such an integration. because social surveys are very expensive and time-consuming. Our idea is to apply a cheaper and more effective way (e.g. through mobile internet) to acquire land use information from land managers and further link it to land parcels managed by them.

- Describe the hypothesis for the proposal and why it is expected to succeed.
  - In pace with the recent prosperity of mobile internet (especially in China), human sensing and high resolution remote sensing (e.g. UAV images), the hypothesis of the innovating idea is through the integration of remote sensing monitoring and crowdsourcing of human activities. Specifically, information of land management will be crowdsourced from land managers and timely updated, which is dynamically related to biophysical features of land parcels monitored by remotely-sensed images.
  - We are going to design and apply a smart phone-based APP which is able to (i) visualize maps acquired from remote sensing with clearly visible land parcel boundaries; (ii) crowdsource land managers to identify their land parcels and to input the related land use activities on each of them. See a recent paper published by the applicant team in *Sensors*.

How will you pilot it?

Beyond simply great ideas, we're looking for great impact as well. We want ideas that can be put into practice in a short timeframe - to start making a real difference for real people today.

Use this section to briefly describe how the idea will be put into practice.

- Describe the implementation plan, including any new technologies or tools that will be developed.
    - To finalize the development of the APP and make it ready to use.
    - To develop a background system (e.g. a spatial database and advanced algorithms) that supports the APP through operating the crowdsourced and geotagged human sensing data with remotely sensed images, including reliability-checking, visualization etc.
    - To apply the APP into real-world practice, including the collection and analysis of the broadly-covered and timely-updated land parcel information.
- Explain how the work will be performed within the budget (USD$100,000) and time (12 months) allowed?
    - The APP development is supported by an existing project, which means the budget from CGIAR would be mainly for the development of background system (approximately USD$15,000), data collection (approximately USD$60,000, including training and monetary incentives for participants) and analysis (approximately USD$25,000).
    - 8 months are planned for data collection due to expected difficulties in applying the APP, including: selecting a county (in Northeast China) as the pilot region, collecting high resolution remote sensing images, interviewing and training of pilot farmers, and finally crowdsourcing. The rest 4 months would be spent for system development and analysis.
- What essential data will be generated during this pilot?
    - The parcel-based data combining the biophysical and socioeconomic features of agricultural land use will be generated in a county of Northeast China, covering no less than 10% of the total cropland area in the county.
- If the pilot is successful, what are the next steps?
    - The idea is particularly suitable for crowdsourcing agricultural land use information for small-holder farming systems, e.g. in China, because land management information is more difficult to acquire than large-scale farms. The successful pilot is supposed to be applied in similar subsistence farming systems where mobile internet is also popular.
    - To stimulate self-motivating of partcipants instead of monetary incentives, which starts from crowdsourcing of data and ends by supporting decision-making to data providers.