**Introduction**

Bioearth (http://www.cereo.wsu.edu/bioearth/) is a team effort between several groups to create a regional-scale earth systems model of the interactions between carbon, nitrogen, and water at the land/atmosphere interface to provide information for natural and agricultural resource management. Mapping the extent of irrigation provides insight into the amount of evaporation and transpiration in an area, which contributes to understanding hydrology at the land/atmosphere interface. The goals of this project are to (1) evaluate currently available irrigation extent maps, (2) create a composite map of irrigated areas in the Columbia River Basin, and (3) document the uncertainties involved.

---

**Agreement Maps and Data**

Red = 0, non-irrigated agreement
Orange = 1, WSDA irrigated, data set non-irrigated
Blue = 2, data set irrigated, WSDA non-irrigated
Green = 3, irrigated agreement

---

**Ozdogan and Gutman**

**Misalignment**

- Visually judged to not align with WSDA data in all areas, even when displayed in consistent datum
- Data sets were created independently
- Error possibly due to sampling or recording errors
- Error can result when the angle of the remote sensing device is not accounted for in the data

---

**Conclusions and Discussion**

**Doll and Siebert**

- Original data not primarily based on remote sensing information
- Sources of Error
  - Large pixel size shows less detail, leads to more inaccuracy
  - Original data measured percentage of cell equipped for irrigation, not necessarily areas of active irrigation

**Ozdogan and Gutman**

- Other Sources of Error
  - Data collected during different years
  - MODIS (Moderate Resolution Imaging Spectroradiometer) in 2001
  - NASS (United States Department of Agriculture National Agricultural Statistics Service) in 2002
  - Irrigation potential based on climate, which varies annually

Based on percentage of cells in agreement, the Doll and Siebert threshold that agrees most strongly with the WSDA data set is both the 25% or 50% thresholds.

---

**Data Processing and Agreement Analysis**

- Acquire data from Ozdogan and Gutman (2008) and Doll and Siebert (2005) as well as an irrigation extent map created by the Washington State Department of Agriculture (WSDA).
  - Doll and Siebert data measure percentage of cell equipped for irrigation.
  - Ozdogan and Gutman data measure fraction of irrigated area per cell.
  - WSDA data are binary.
- Obtain projection information, if absent, to align data.
- Implement irrigation thresholds.
  - Set three thresholds for irrigation, 0%, 25%, 50%
  - If a cell is more than 50% irrigated, it is labeled as irrigated, etc.
- Create a numerical attribute code for irrigation.
- Convert data to raster file type. Specify cell size so that data match.
- Use Snap to Raster to ensure cell alignment.
- Clip files to WSDA data extent.
- Use weighted sum to calculate agreement.

---

**Areas for Future Work**

- Explore other methods of data alignment to reduce error in comparison with Ozdogan and Gutman data set
- Make further comparisons between independent data sets and WSDA irrigation data (Thenkabail et al., 2008)

---

**References**


---

**Acknowledgements**

I would like to thank the National Science Foundation for funding this Research Experience for Undergraduates at Washington State University. This work was supported by the National Science Foundation's REU program under grant number 0754980.

I would like to thank Dr. Adam and Kirti Rajagopalan for advising me as an undergraduate summer researcher.

I would like to thank the graduate students and postdocs who assisted me with my project and welcomed me into their office for the summer, especially Elizabeth Allen and Kiran Chinnayakanahalli.