COMPUTING WATER-LEVEL GRADIENT VECTORS TO ASSESS CHANGES IN SHEET FLOW AND DIRECTION

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Presentation Outline

• Background – Where we left off (GEER 2015)
• Water Level Gradient Vectors (WLGV) visualization tools
• Confirmation with Dye Studies
• Example Application
• Conclusion
Use the EDEN model to compute water-level slopes and direction between model cells.
Water Level Vector Gradient Map

Use vector map to evaluate sheetflow and direction.
Water Level Gradient Vectors (WLGV) Visualization Tools

• Vectors for any EDEN cell and date
  • 57,000 cells, 9,200 days
• Maps – plan view
  • Difference resolution depending on area of the view
• Daily time series
  • Daily time series of WLGVs
• Rose Diagrams
  • Aggregate larger time scales of WLGVs
Vector Maps

- Daily snapshot
- Use grid averaging for visualizing larger scales
  - 3x3, 5x5, 7x7 grids (or pixels)
- Good for evaluating sheetflow patterns over large areas
Daily WLGV Time Series

- WLGVs and water levels for one EDEN cell (pixel) over a year.
- Good for analyzing individual pixels
Rose Diagrams

- Often used to summarize wind speed and direction

- Plot data in a circle:
  - Segmented by direction or time (months)

- Generate rose diagrams to summarize vectors over time

- Rose diagrams can be used to compare time periods or locations

Florence Nightingale's rose diagrams for evaluating mortality during the Crimea War
Detecting Changes in Flow Direction & Magnitude

- Displays distribution of vector over specified period – month, season, year

[Diagram showing flow directions and magnitudes for 1991-2008 and 2012]
Detecting Changes in Flow Direction & Magnitude

- Displays distribution of vector over specified period – month, season, year
Dye Studies

- EverTREX Field Tracer Tests
  - 3 Sites in WCA3A & B
  - 2006 and 2007
  - Michael Sukop 2008 Report
- S-356 Pump Test Dye Studies
  - Four releases
  - Fall 2015
The EverTREK Releases
EverTREK 2
Nov 29-Dec 5, 2006
S-356 Pump Test Dye Studies
S-356 Pump Test Dye Studies

November 13, 2015

October 15, 2015

November 13th pixel

October 9, 2015

2015q4
S-356 Pump Test Dye Studies

October 9th pixel

November 13, 2015

October 15, 2015

October 9, 2015

October 15th pixel
Application Example
L28 Canal

- Endangered Cape Sable seaside sparrow, subpopulation A (CSSS-A)
- Western flows on CSSS-A
S12s Flows

Nesting season
March 1 – July 15
Summary

• Water-level gradient vector (WLGV) visualization tools leverages EDEN model to provides insight to the magnitude and direction of sheet flow.
• Visual comparisons with dye studies shows approach is a good approximation of sheetflow.
• Tools able to look at large spatial areas to the grid/pixel level.
• Can use the approach to evaluate the interaction of hydrologic forcing/restrictions on sheetflow.
Thanks!

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