Visual analytics
to explore iceberg behaviour

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Motivation

Extending previous research on tracking and visualizing the dynamic behaviour of features (*clouds, rip channels*)
Motivation

New case study: Antarctic icebergs
- break-up of ice shelves: indicator for ongoing processes with global implications ...

- Data: Antarctic Iceberg Tracking Database
  http://www.scp.byu.edu/data/iceberg/database1.html

- ID
- position (X,Y,T)
- size
- appearance / disappearance (X,Y,T)
- splits (X,Y,T)
- lifetime
- frequency
- distance travelled
- speed
- ...

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The problem

Main visualizations used: map, histograms...

- cluttered
- hard to see patterns (in time !), relations, trends
- exploration of other descriptive measures
Approach

- Recently started
- Use and users: establishing contacts

Main aims:
- derive descriptive measures of iceberg behaviour
- develop / adapt visualizations to explore icebergs:
  - abstract
  - quantitative info
  - user control
- create an environment
- evaluate its usability
Approach: spatial view

- Map overview
- Animation dynamics
- Other visualizations
Approach: space reduction

- Earth is divided into equally sized segments
- Here: 24 x 15°
- Occurrences in sectors are represented in a single dimension (space reduction)
Approach: time view

Visible
- clusters in space / time
- size
- lifetime
- movements across sectors
- some speed info

Controls
- no. of sectors
- attributes / events
- variable along the Y-axis

icebergs: colour = ID; radius = size
Approach: time view

Weddle Sea

Ross Sea
Approach: time view

- size
- lifetime
- frequency...
Approach: attribute view
scatter plot (1)

- enable *any* selection of attributes / events:
- simple example
Approach: attribute view scatter plot (2)

- grounded / locked and mobile icebergs
- differences in mobility
- trends: decreasing appearances and long travelling distances
Approach: attribute view scatter plot (3)

- majority of icebergs is small and short-living
General user controls

- zoom / pan
- querying
- selection of attributes to be displayed
- selection / filtering in views
- brushing / linked views
Challenging

Uncertainties:

- temporal resolution: irregular
- loss of track: possible if movement is fast
- sometimes difficult to distinguish sea ice and icebergs
Discussion

- **Statement:**
  Spatial reduction (from two dimensions to one) can be used for many applications in which data tend to be cluttered in the map view (or Space Time Cube); it is a method worth testing.

- There is a tendency to create complex visual environments, consisting of multiple (linked) windows and many additional tools. How can we offer flexible views and tools, and at the same time avoid confusion among the users of these environments?

- How can we make users aware of inconsistencies in the tracking data in our environment?