

2013 Esri International User Conference

July 8–12, 2013 | San Diego, California

Weather maps are made easy

Phumudzo Charles Tharaga

South African Weather Service

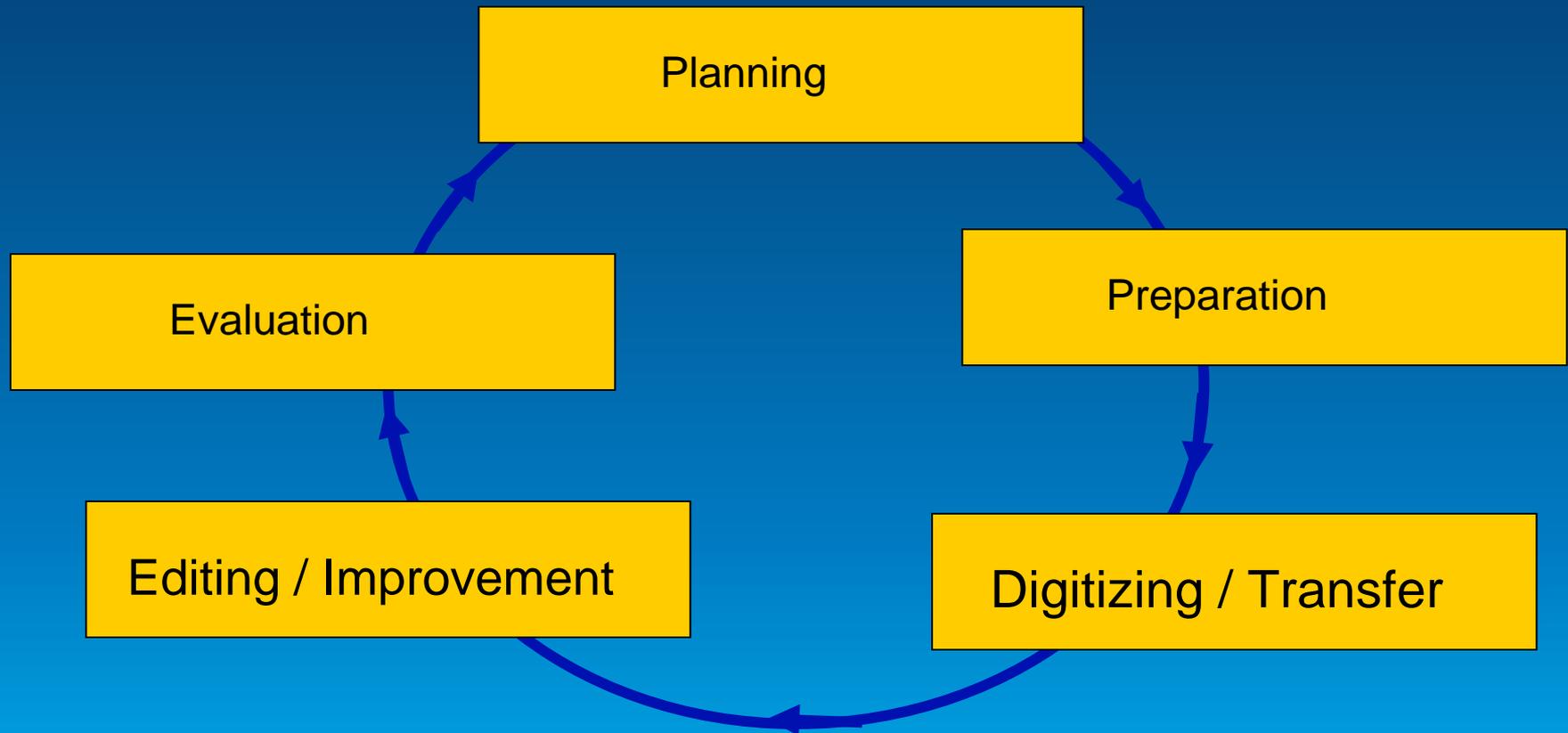
Map function in GIS

- Communicating through maps
- Storage
- Temporary communication
- Intermediate check of data
- Final report
- To be effective, must be correctly designed and constructed.

Data Collection Techniques

	Raster	Vector
Primary	Digital remote sensing images	GPS measurements
	Digital aerial photographs	Survey measurements
Secondary	Scanned maps	Topographic surveys
	DEMs from maps	Toponymy data sets from atlases

Stages in Data Collection Projects



Spatial Analysis (Definitions)

- Turns raw data into useful information
 - by adding greater informative content and value
- Reveals patterns, trends, and anomalies that might otherwise be missed
- Provides a check on human intuition
 - by helping in situations where the eye might deceive

Spatial Analysis (Queries)

- A GIS can respond to queries by presenting data in appropriate *views*
 - and allowing the user to interact with each view
- It is often useful to be able to display two or more views at once
 - and to link them together
 - linking views is one important technique of *exploratory spatial data analysis* (ESDA)

Spatial interpolation

- Values of a field have been measured at a number of sample points
- There is a need to estimate the complete field
 - to estimate values at points where the field was not measured
 - to create a contour map by drawing isolines between the data points
- Methods of spatial interpolation are designed to solve this problem

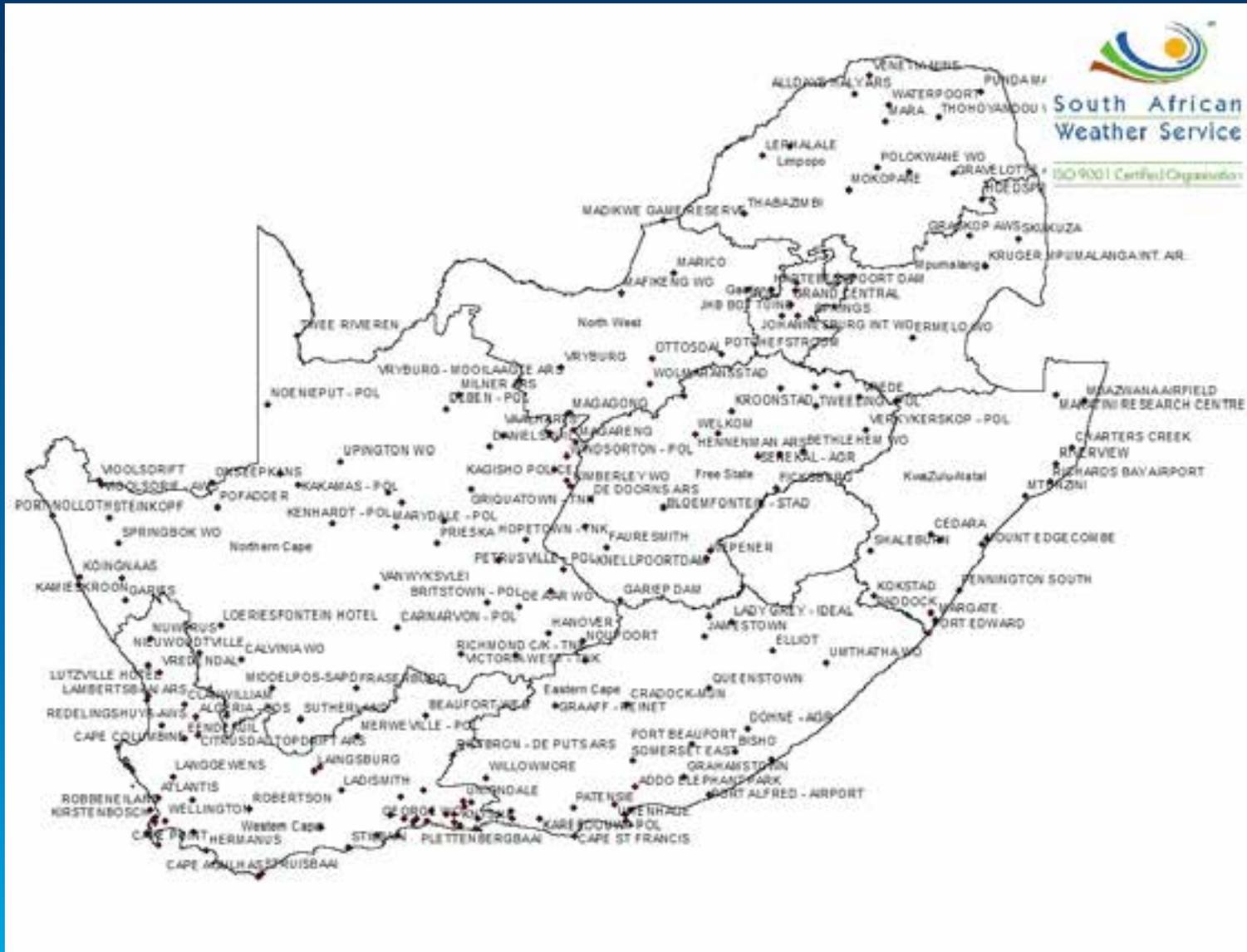
Inverse distance weighting (IDW)

The unknown value of a field at a point is estimated by taking an average over the known values

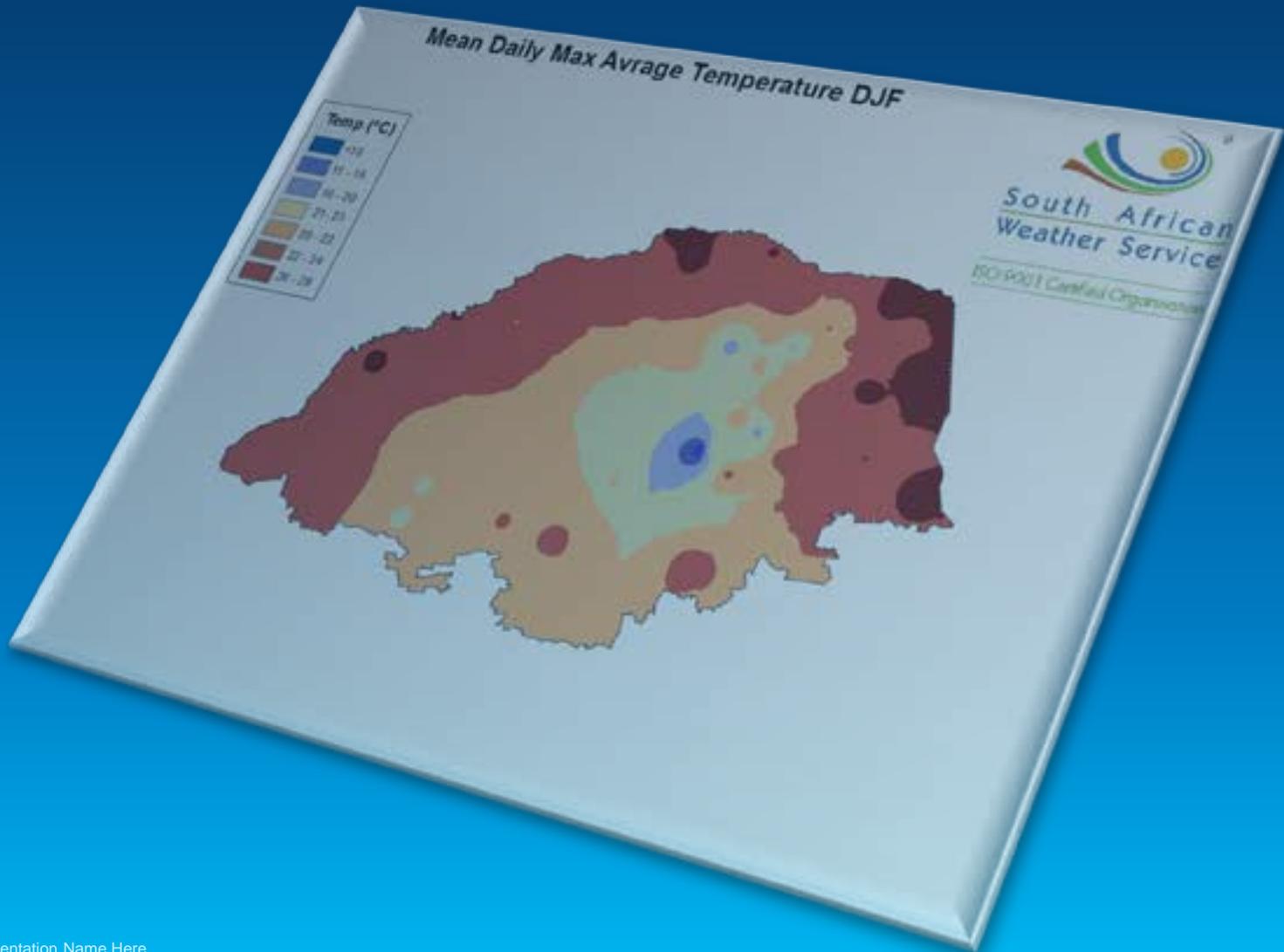
weighting each known value by its distance from the point, giving greatest weight to the nearest points
an implementation of Tobler's Law

- Scale of the maps at South African Weather Service is 1:8000000

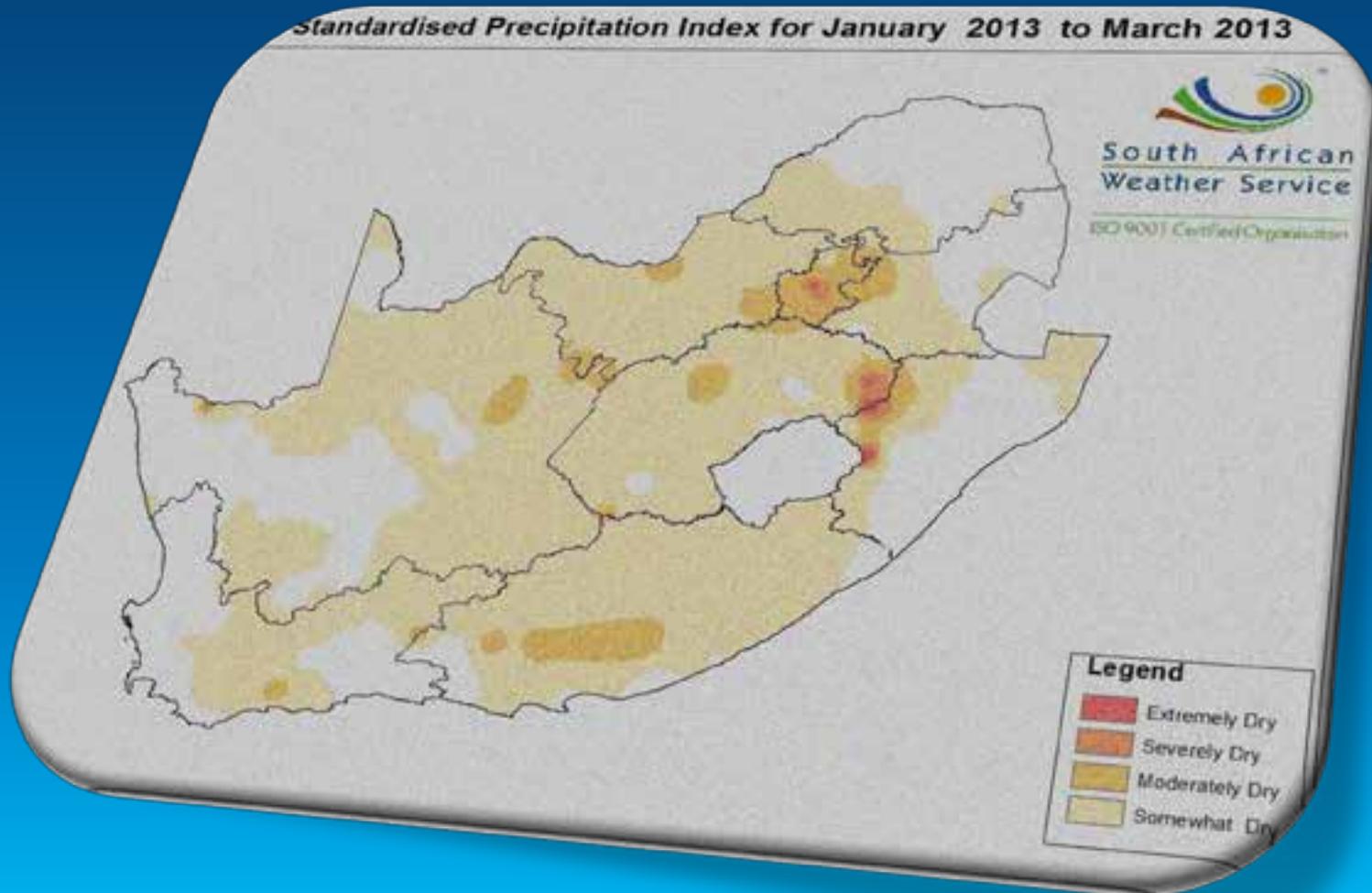
SAWS-Weather Station Network



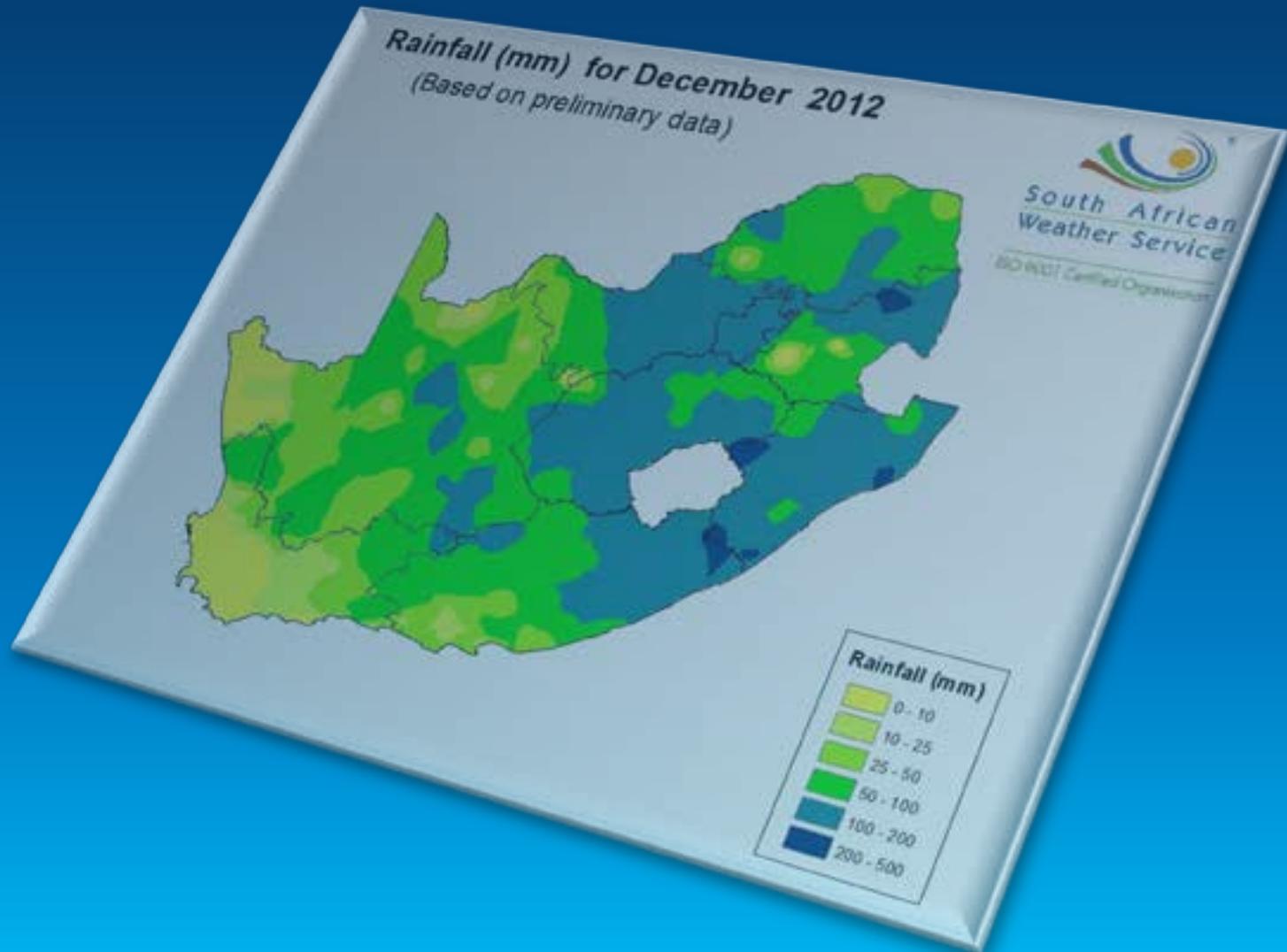
Maps for specific locations(IDW)



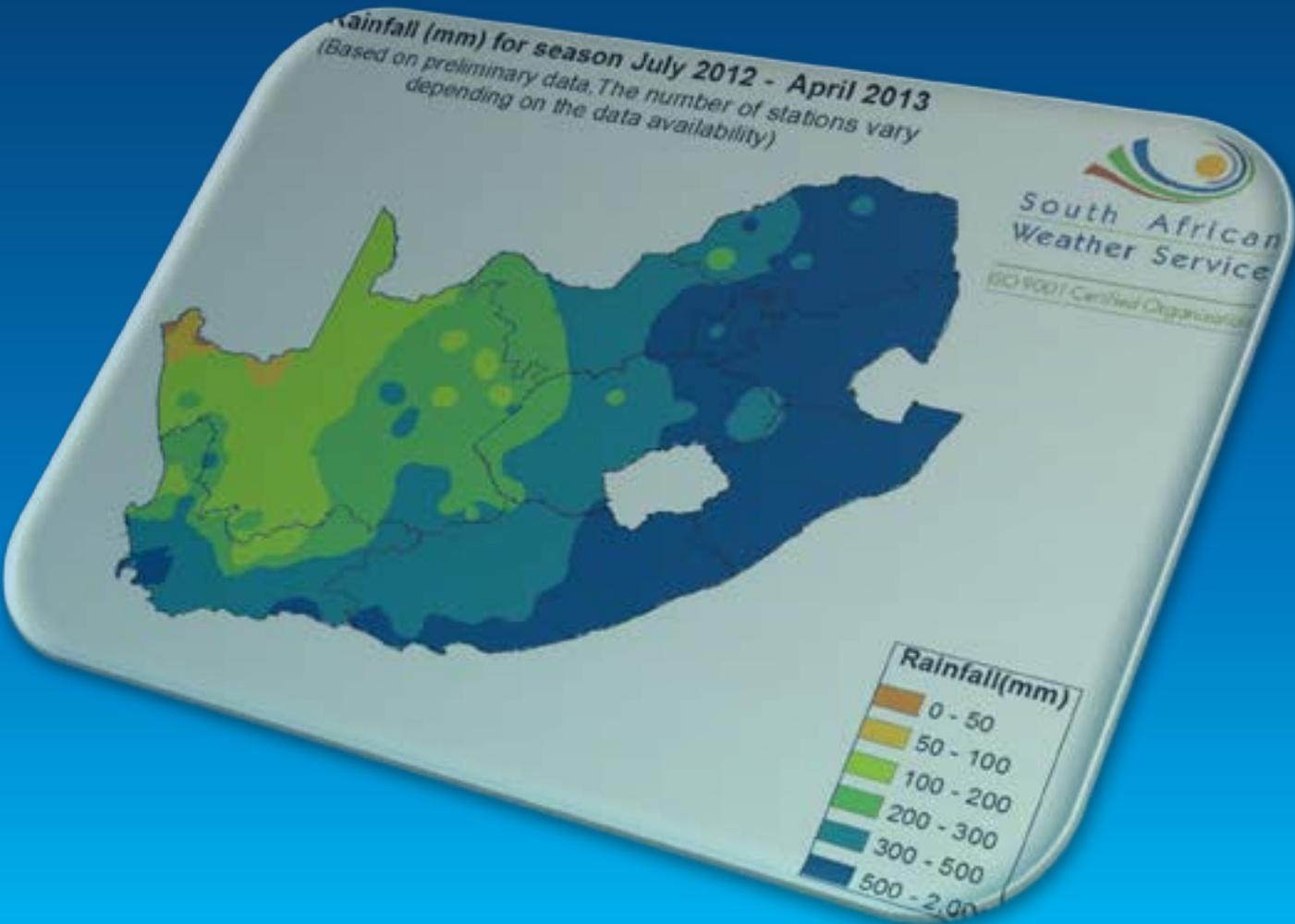
Drought Map(SPI) By IDW



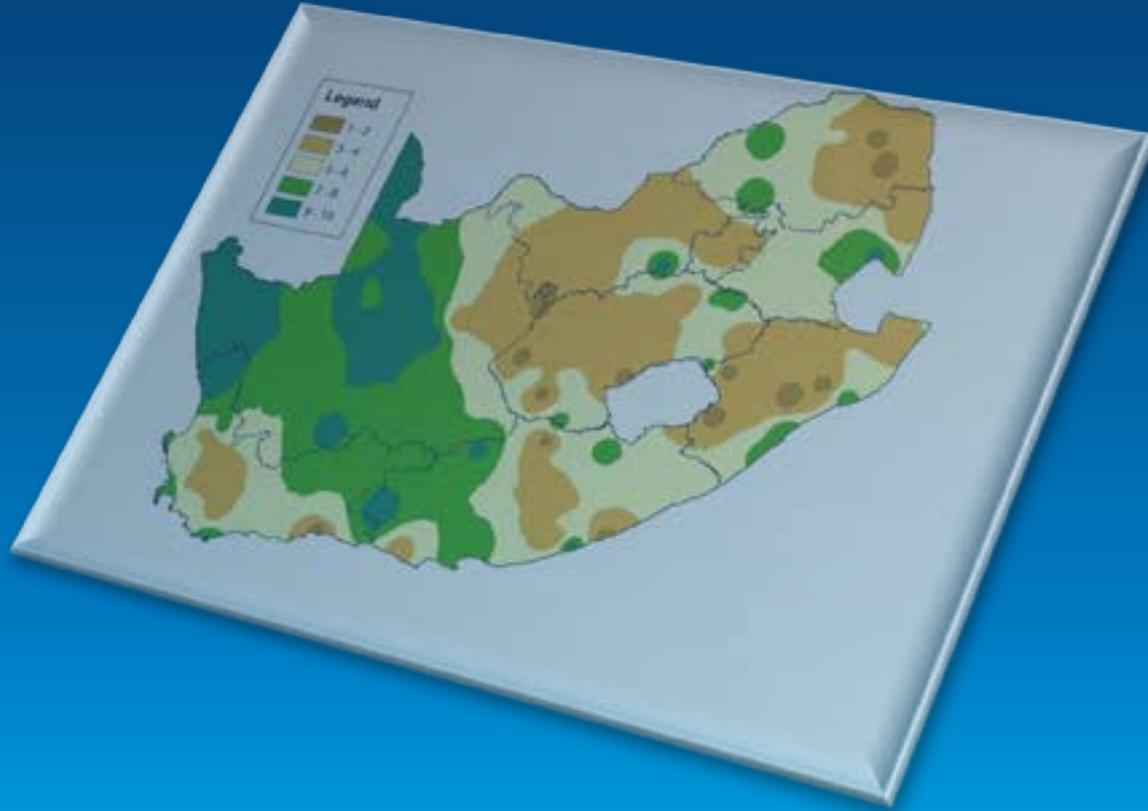
Monthly Rainfall maps



Seasonal Rainfall map (IDW)

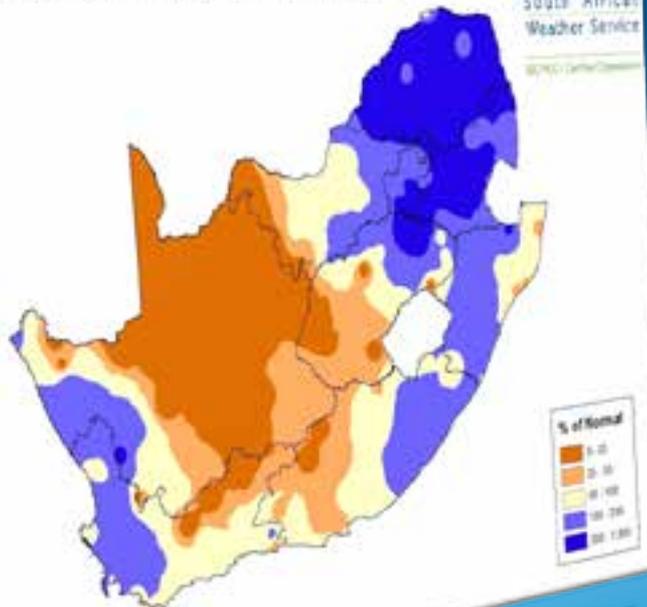


Decile Maps



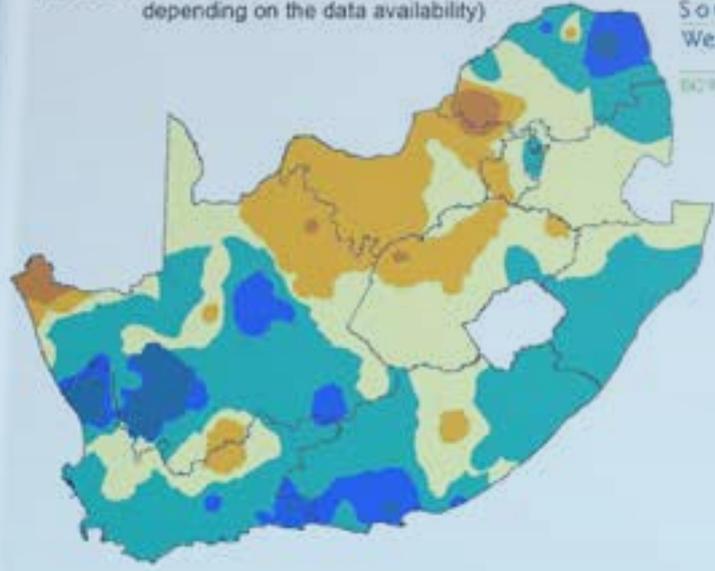
Percentage of Normal Rainfall Maps

Percentage of Normal Rainfall for April 2013
(Based on preliminary data. Normal period 1971-2000)

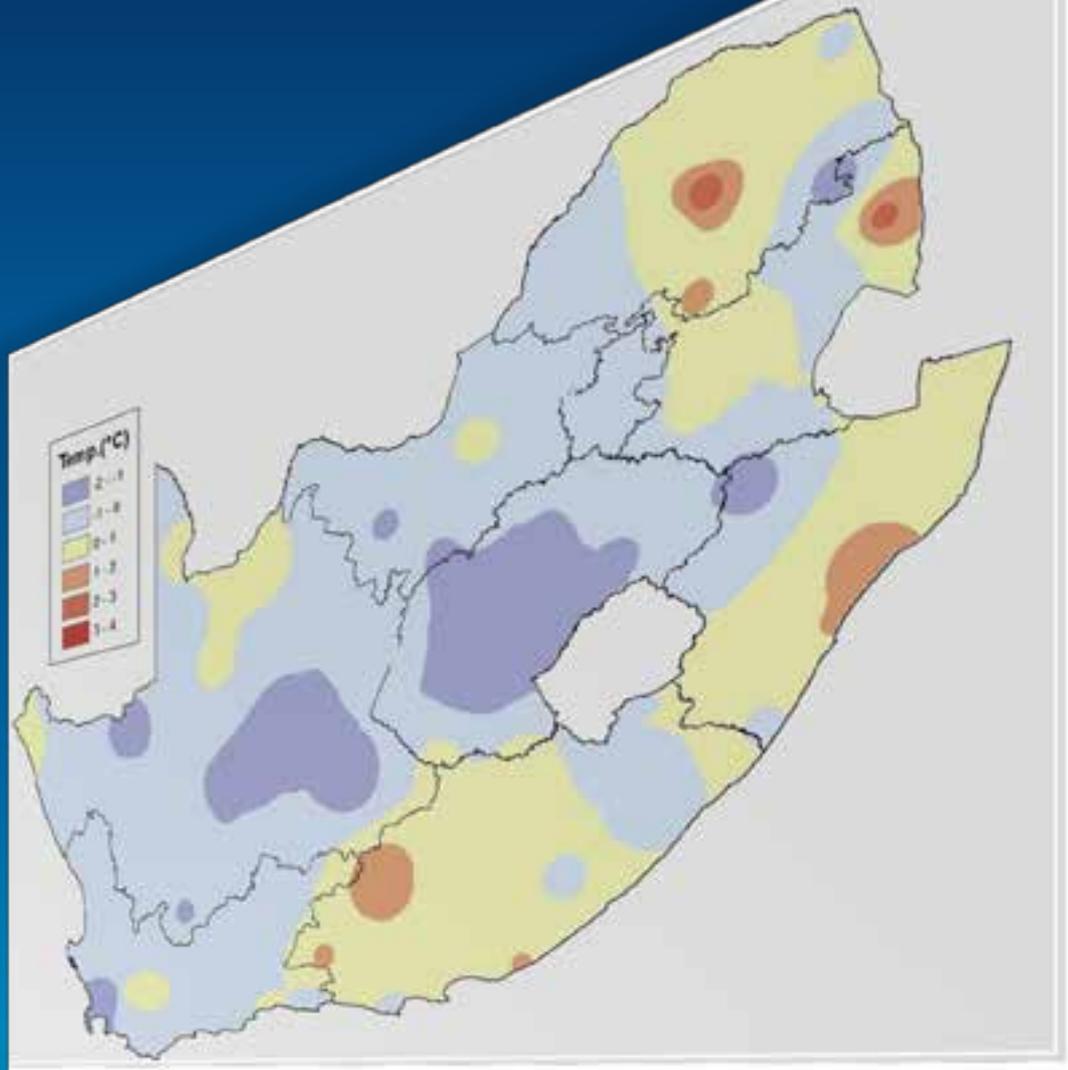


Percentage of normal rainfall for season
July 2012 - February 2013

(Based on preliminary data, The number of stations vary depending on the data availability)

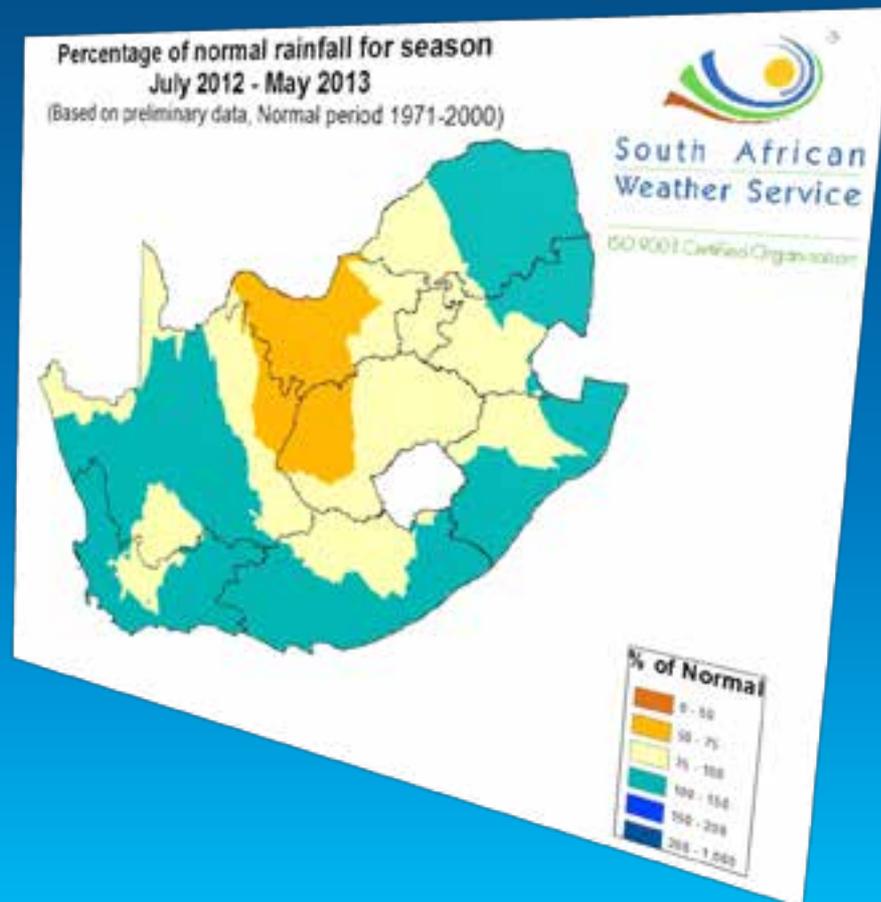


Temperature Deviation Maps

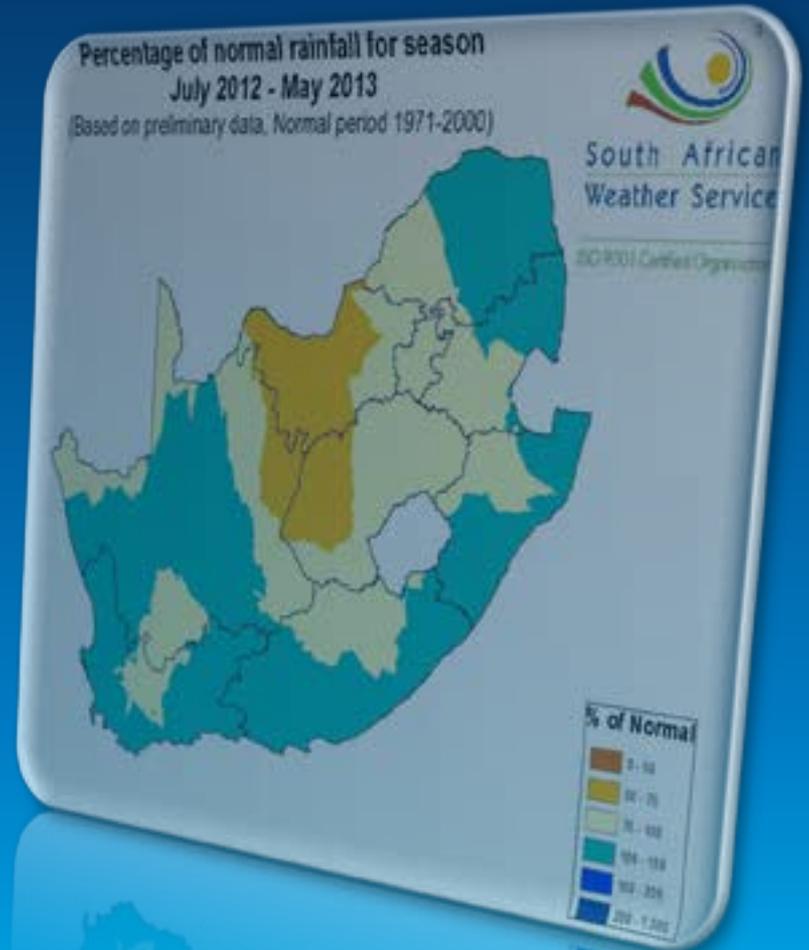
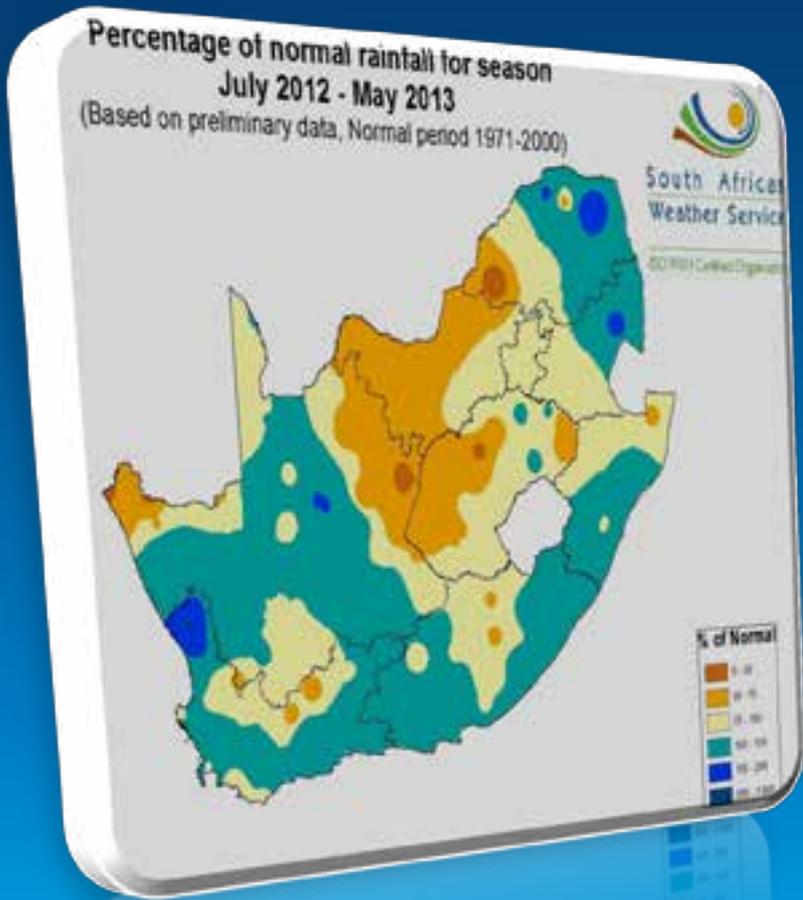


Kriging

- A technique of spatial interpolation firmly grounded in geostatistical theory
- The *semivariogram* reflects Tobler's Law
 - differences within a small neighborhood are likely to be small
 - differences rise with distance



IDW vs Kriging



Other interpolation functions

Spline

Natural neighbour

Trend

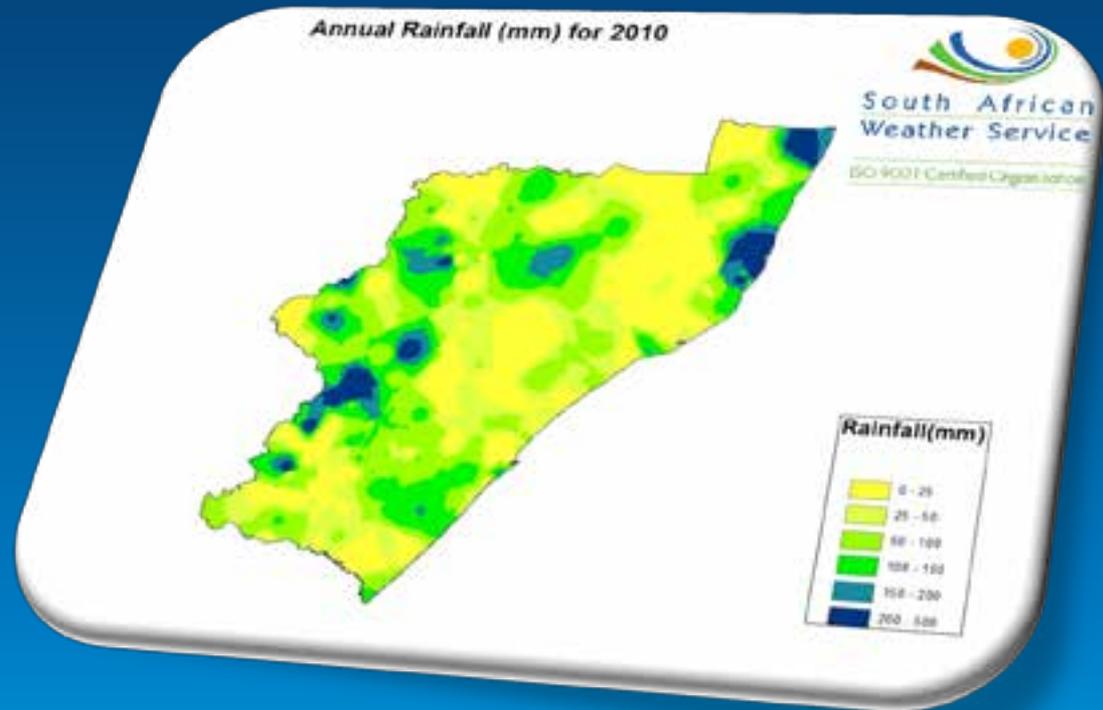
Polynomial functions

Kriging:

Ordinary

Universal

Co-kriging



Conclusion

- Maps are the most important tools of telling a story about all types of weather events.

??????????

Thank you