#### Measurement

We are now entering the wide field era

• Single gains no longer adequate

• Gains are direction dependant

### **Components of DDEs**

#### Beams

• Pointing errors

• Atmosphere

### **Open Loop vs Closed Loop**

#### Open Loop

- Measurement seperated from target observations
- Holography, pan & scan
- Closed Loop
  - Beam determined by the target field

### Smirnov's DDEs

#### Extensive analysis of WSRT DDEs with MeqTrees



### **Differential Gains**



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# V. High Dynamic Range



# dE

#### • The Good

- Fly swatter approach
- Great maps

#### The Bad

- Rolls up beam, atmosphere, source structure
- Comutational cost
- Degrees of freedom

# Seperating beam and sky

 The beams can only be determined realatively with a good sky model

 Brisken suggested scanning around the sky to trace the flux over the beam by linked tracks of sources

## **Pointing Self-Cal**

Given a beam model solve for pointing errors

Low number of solvable terms
2 reals per antenna vs. 1 complex per source

• Our beam models are quite poor, does not consider the atmosphere

# Pointing Self-Cal

#### Resutts were poor





# **Pointing Self-Cal**

Not sufficient to model the effects

Scale parameter aborbs some of this

 Need better beam models and combine with atmospheric models

## Pointing Self-Cal success story

- WSRT pointing analysis
- The WSRT wobble



### **ATA Beams**

#### Open loop measurements



### **ATA Beams**



# ATA Squint





#### Beam measurement is not easy

Can constrain our calibration models

Limits degrees of freedom in our solutions