

Meridional flow measurements from GONG

Shukur Kholikov

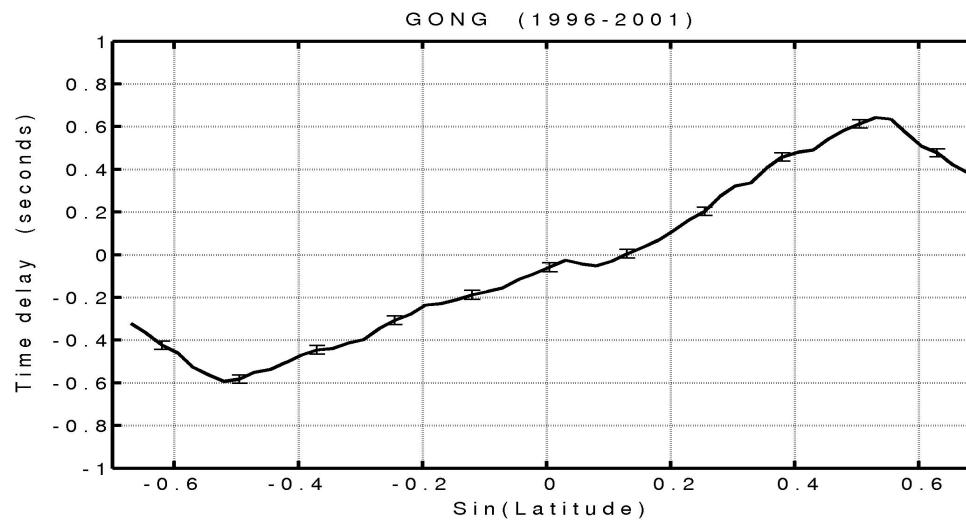
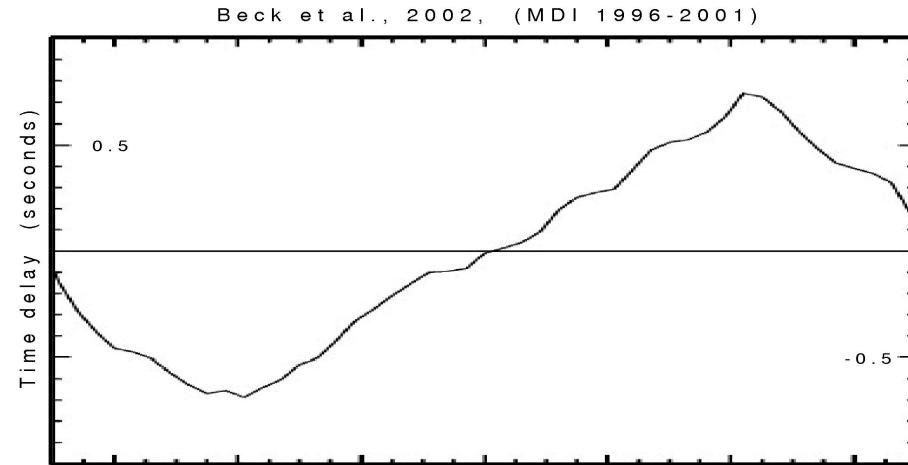
Contents

- GONG data
- Deep measurements
- Temporal variations

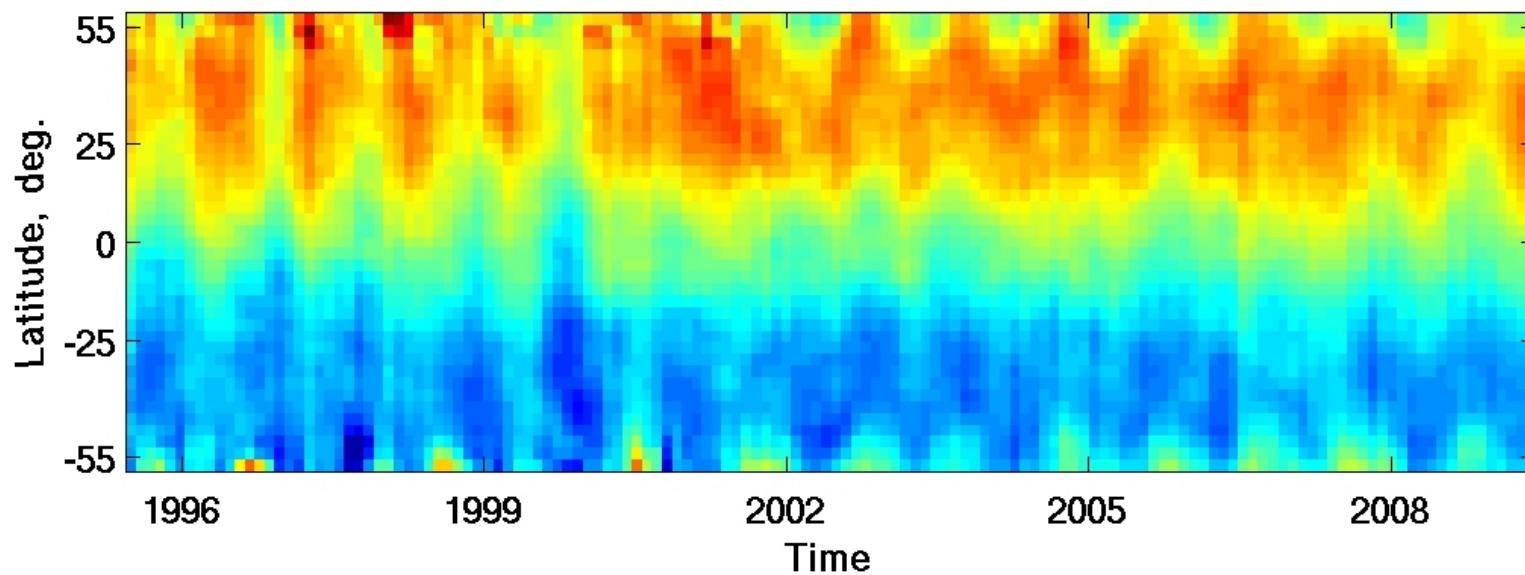
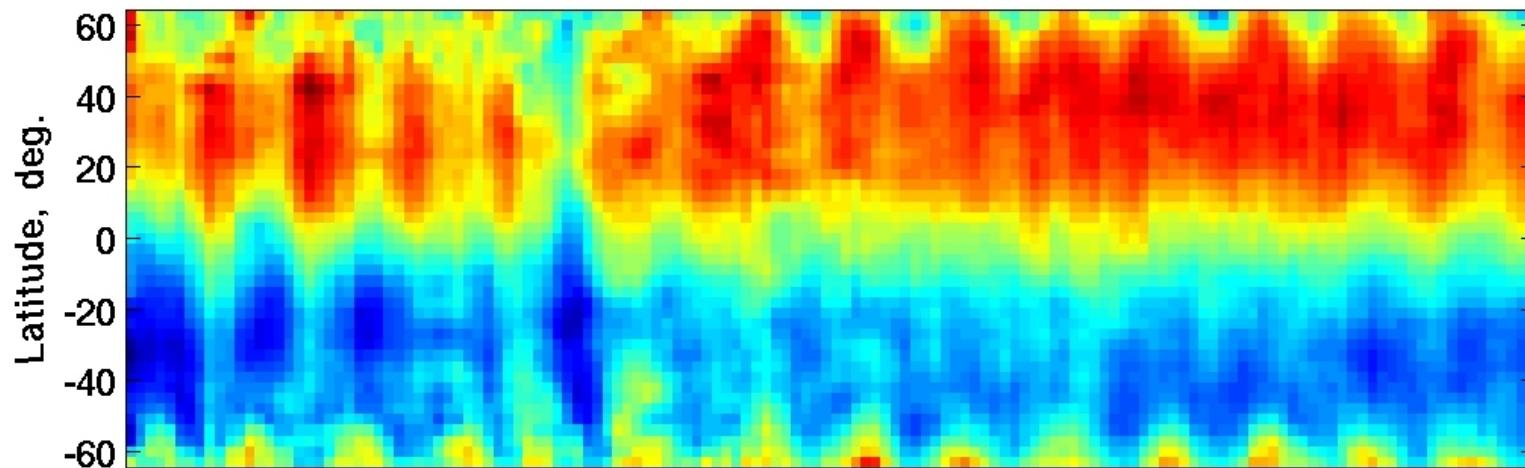
Data

- Spherical harmonic time series
- $L=0-200$
- Filtering
- Cross-correlations
- Travel time differences

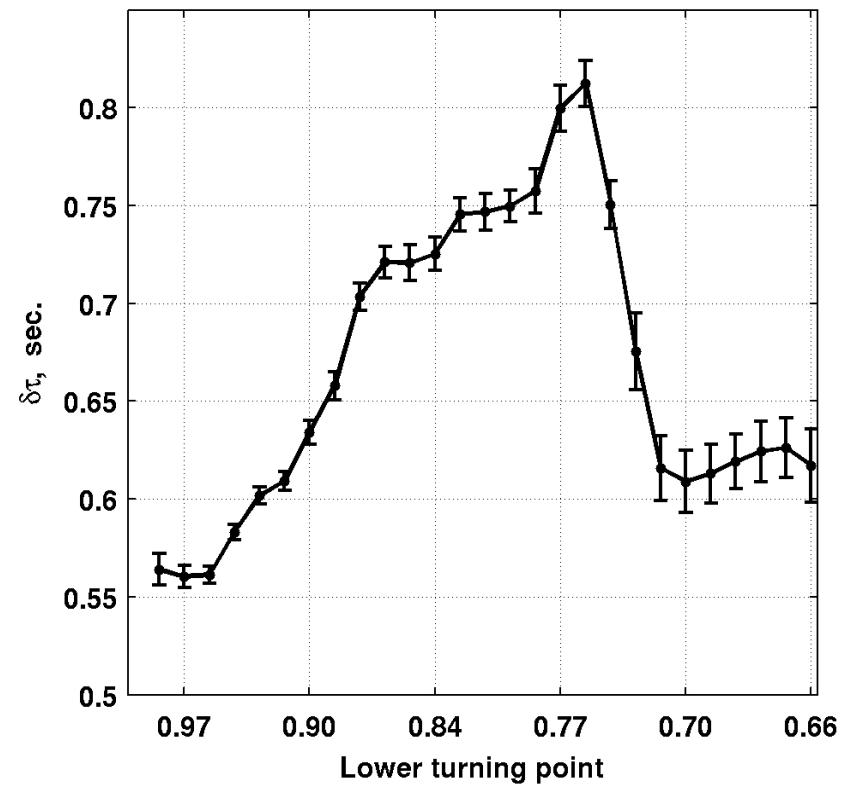
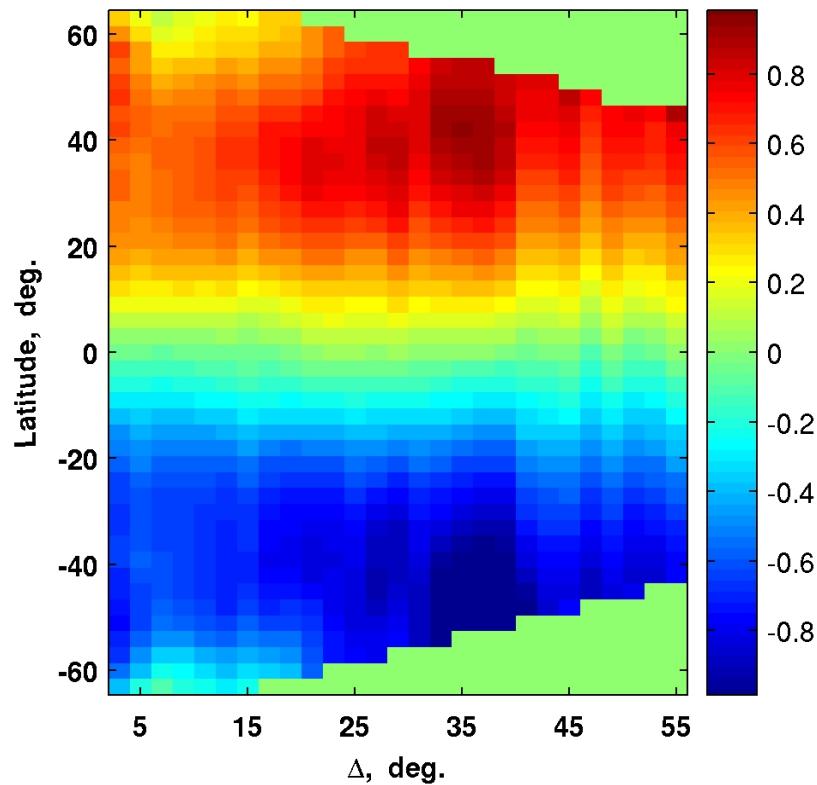
Small comparison



GONG measurements $\Delta = 8, 11^\circ$



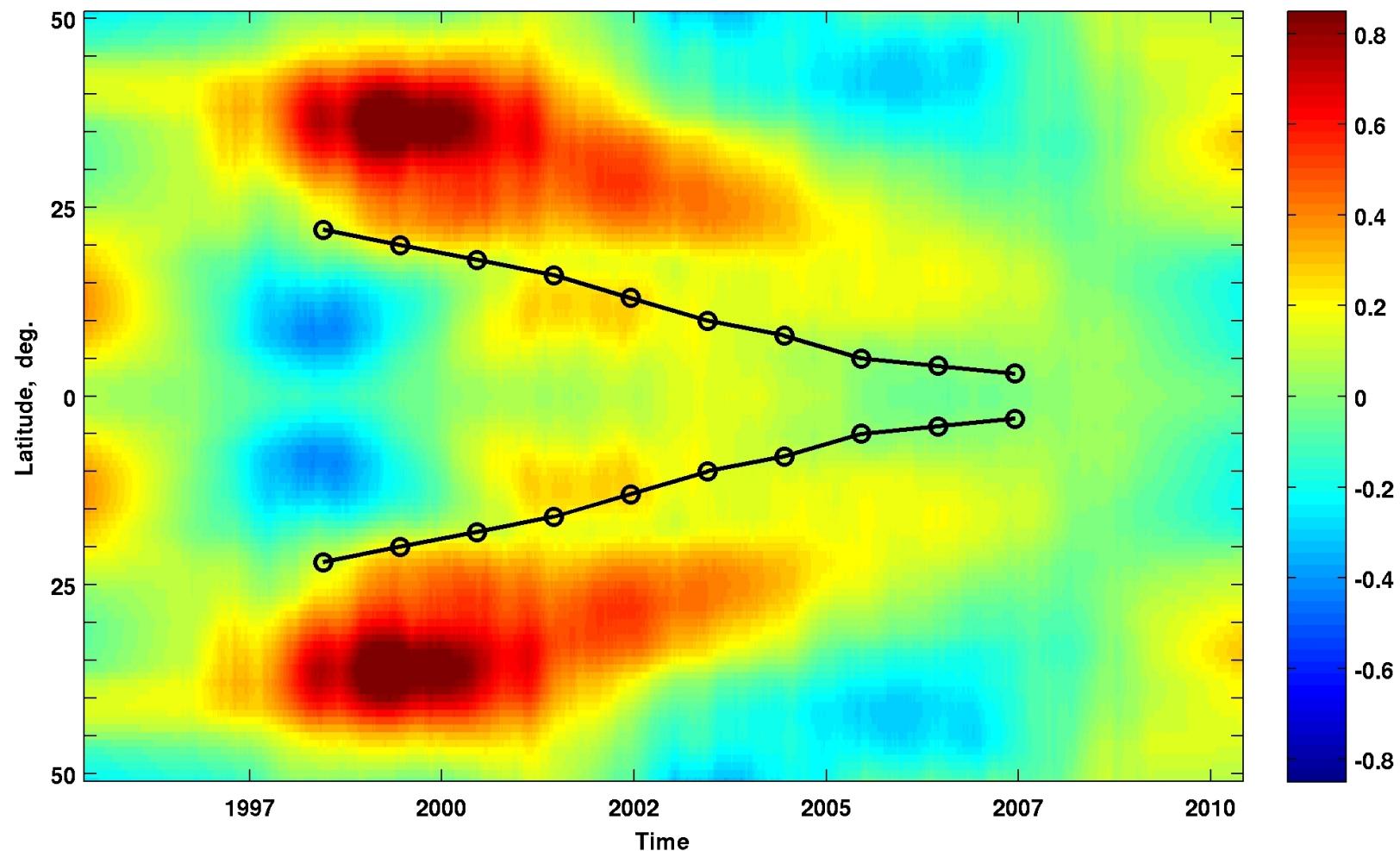
Travel time differences vs depth



Temporal variations of meridional flow: earlier results

- P. Giles, correlation with cycle
- D.Y. Chou, 2005, correlation with cycle
- J. Beck, 2002, ???
- L. Gizon, 2004, ???
- Svanda, 2008, correlates with cycle
- I. Gonzalez Hernandez, 2010, anticorrelation
- D. Hathaway, 2009, 2010, anticorrelation

GONG measurements



Some conclusions

- Correlation with solar cycle..?
- Systematics???
- Outflows from active latitudes or global meridional flow changes?
- High latitude measurements might help (HMI)

Center-to-limb variations of mean travel time

