Lagrangian Data Assimilation group: Summary

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Chronological Summary

- Lagrangian dynamics; Chaotic transport - basics
- Lagrangian instruments (floats) and data coverage
- Current approaches for (classical!) data assimilation - augmented model and velocity reconstruction
- Velocity field and streamfunction reconstruction from Lagrangian data
- Boundary conditions and other issues

Spaghetti diagrams

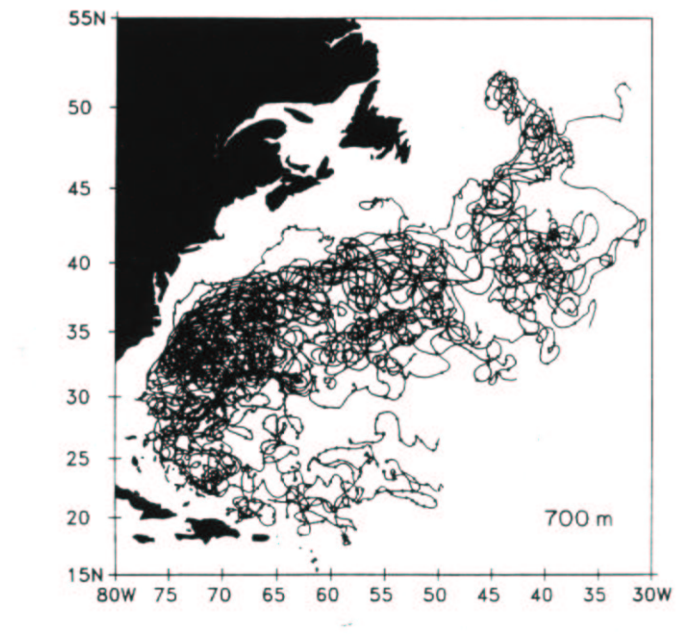
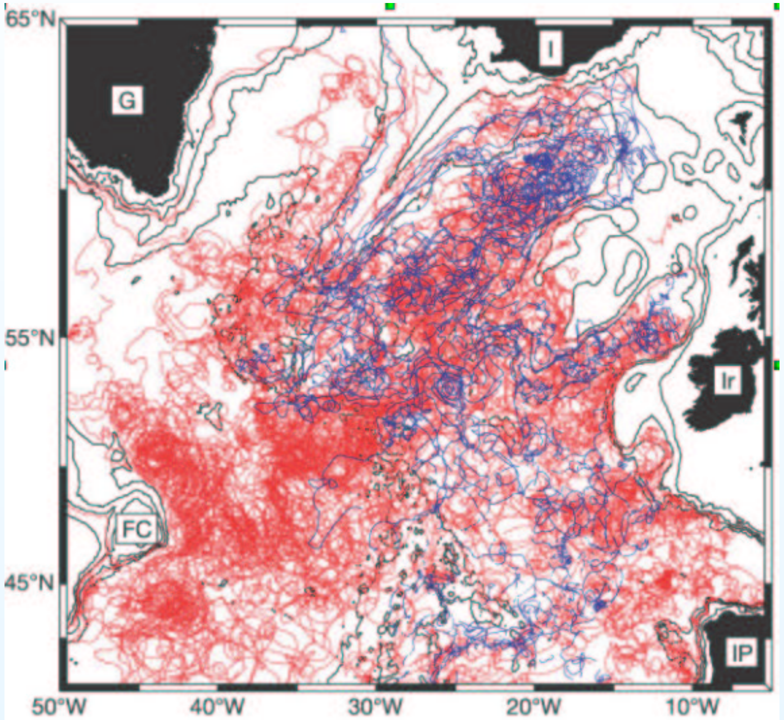


FIG.2. Trajectories for SOFAR floats at a nominal depth of 700m. Arrows along trajectories occur on 30 day intervals.



Velocity field and streamfunction reconstruction

Bower et al. 2002:

- Float tracks (from 10 to 60 months in length) grouped into 110 km square bins
- Mean velocity field by finite differencing
- Streamfunction using objective analysis (OA) techniques
- No time dependence

Can we reconstruct time-dependent streamfunction?

Time depedent streamfunction

- Some ideas for time-dependent velocity field and streamfunction:
  - Grouping data from a time interval that is small compared to flow time scale (slow-varying dynamics)
  - Streamfunction constructed using geometrical orthonormal functions (need boundary conditions)
  - Use the reconstructed velocity field as input to a quasigeostrophic model (need boundary conditions)
- Data assimilation schemes need a model - What can we do in absence of, e.g., boundary conditions?
  - Dynamic constraints (or consistency), e.g., geostrophy
  - Sensitivity to the mean velocity field