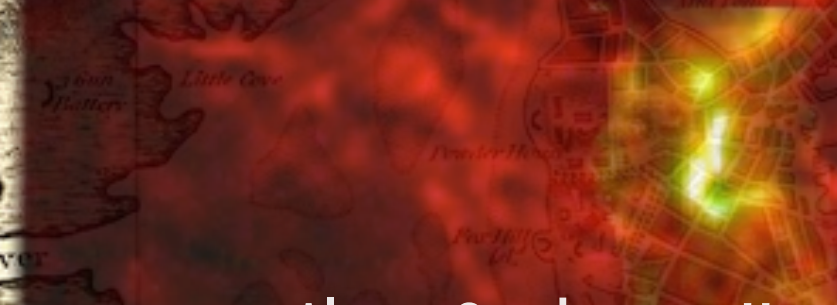
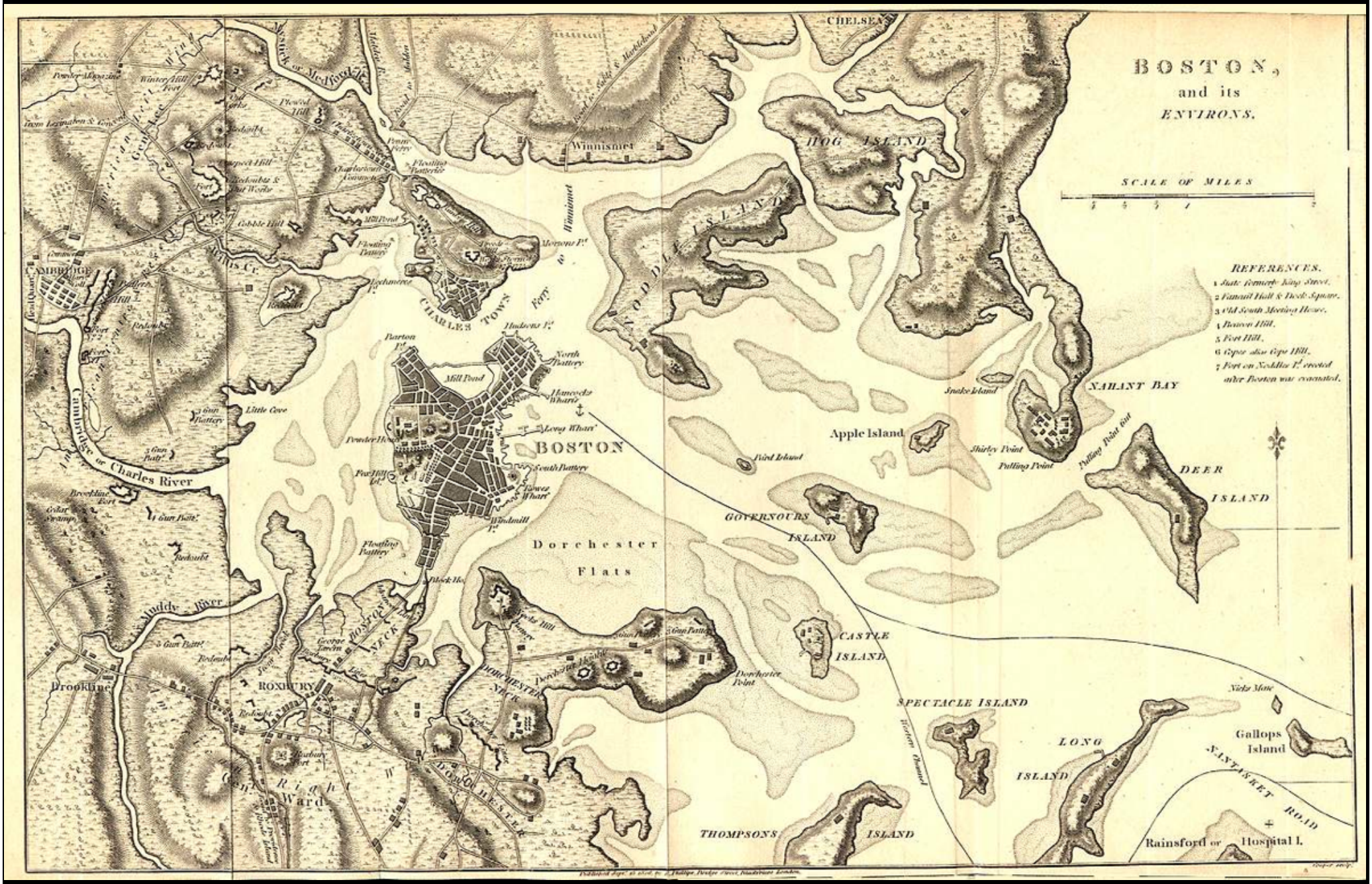
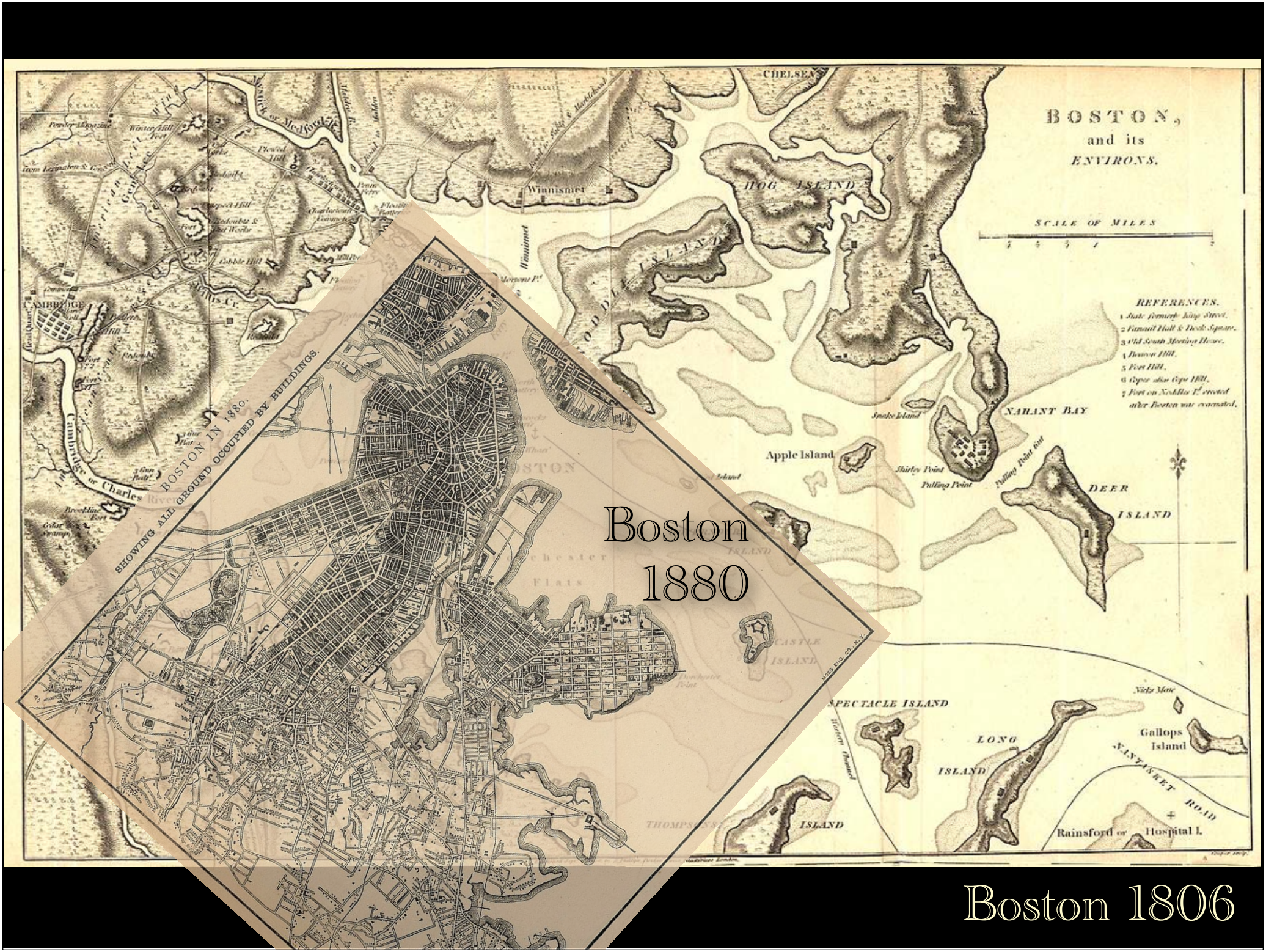
DO FILAMENTS CROSS "CORE" BOUNDARIES?



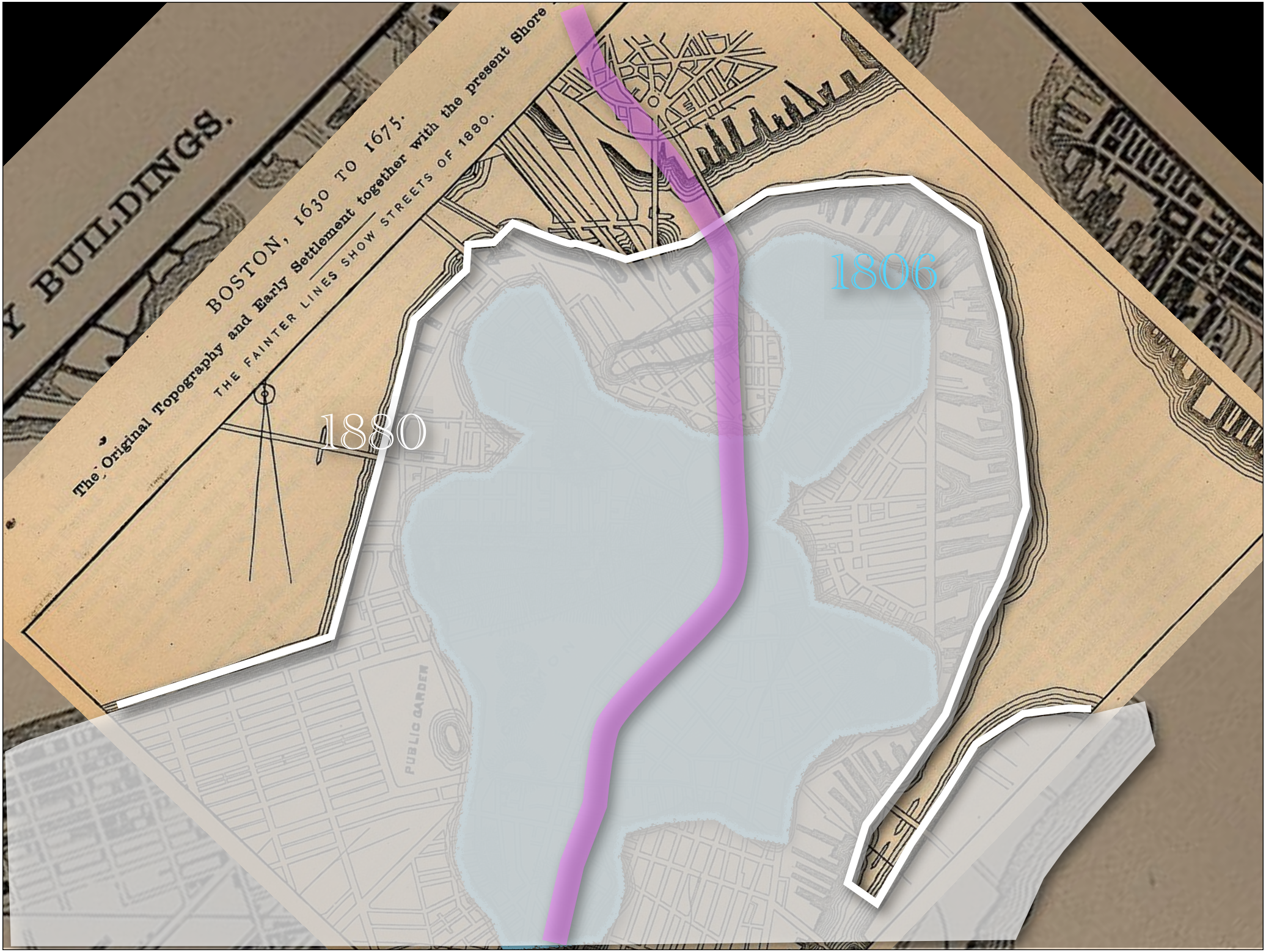
Alyssa Goodman & Hope Chen,
Harvard-Smithsonian Center for Astrophysics
+
Stella Offner, UMASS
Jaime Pineda, ETH Zurich & MPE


BOSTON,
and its
ENVIRONS.
SCALE OF MILES
REFERENCES.
1 State formerly King Street.
2 Faneuil Hall & Dock Square.
3 Old South Meeting House.
4 Beacon Hill.
5 Fort Hill.
6 Copse also Cope Hill.
7 Fort on Nobbles Pt. erected after Boston was evacuated.
BOSTON
CHELSEA
Winnisimet
HOG ISLAND
NOODLE ISLAND
CHARLES TOWN
CAMBRIDGE
Cambridge or Charles River
Muddy River
Brookline
ROXBURY
Dorchester Flats
Apple Island
Snake Island
NAHANT BAY
Pulling Point
DEER ISLAND
GOVERNOURS ISLAND
CASTLE ISLAND
SPECTACLE ISLAND
LONG ISLAND
THOMPSONS ISLAND
Gallops Island
Rainsford or Hospital I.
Little Cove
Mill Pond
North Battery
South Battery
Long Wharf
Lower Wharf
Windmill Pt.
Fort Hill
Dorchester Point
Nix's Mate

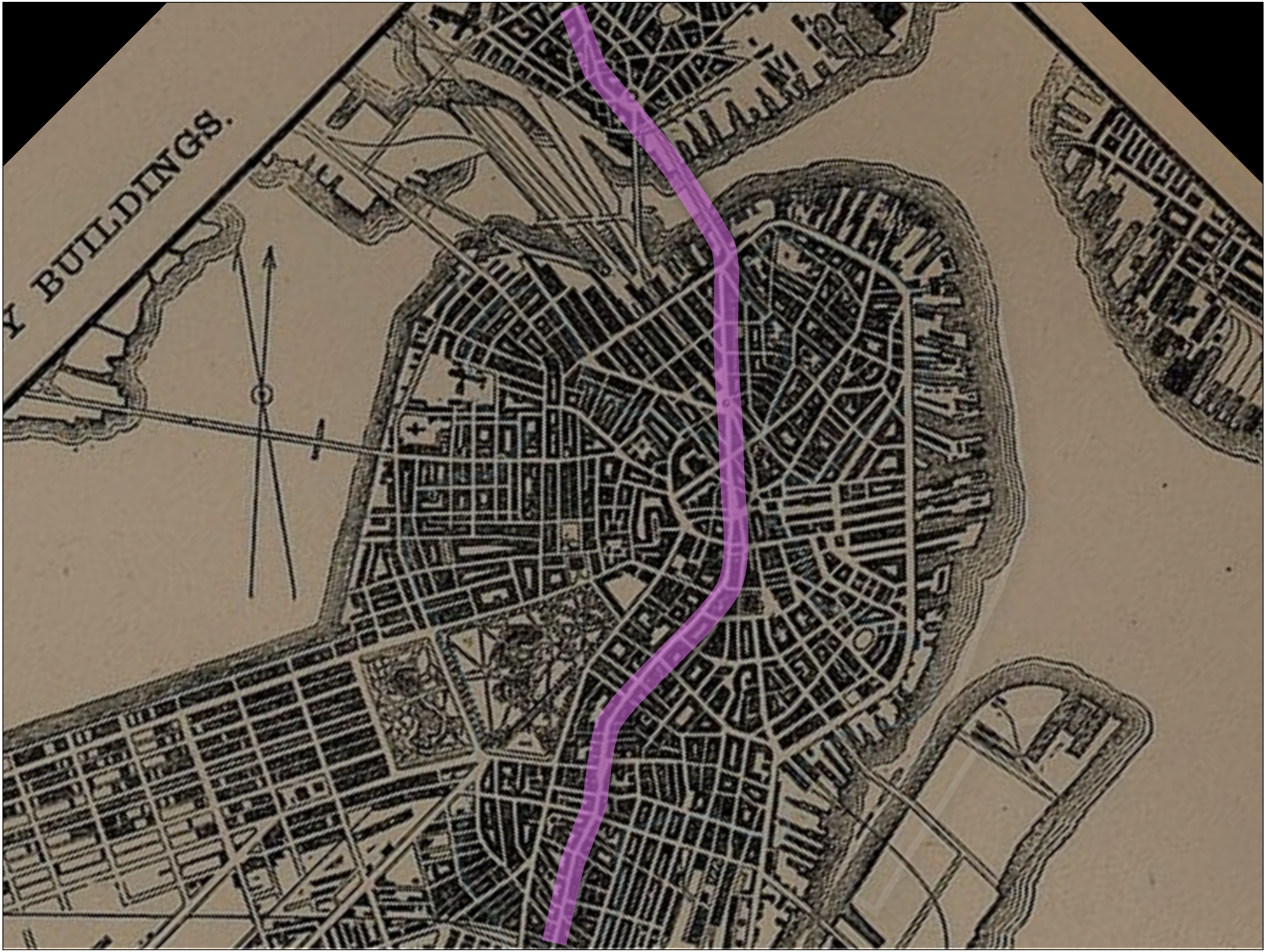
Boston 1806

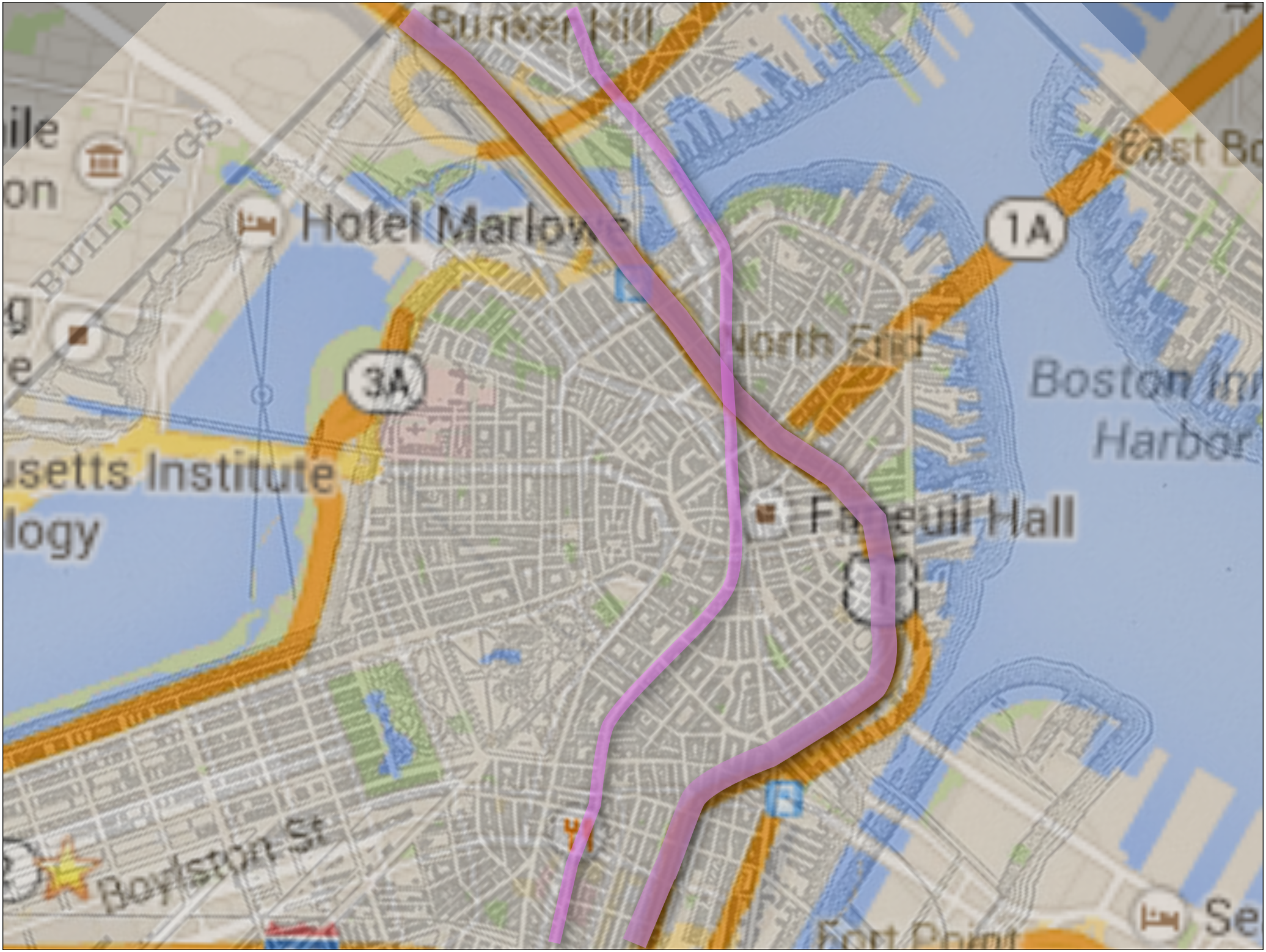

BOSTON,
and its
ENVIRONS.
SCALE OF MILES
REFERENCES.
1 State formerly King Street.
2 Faneuil Hall & Dock Square.
3 Old South Meeting House.
4 Beacon Hill.
5 Fort Hill.
6 Copse also Cope Hill.
7 Fort on Nobbles I.d erected after Boston was evacuated.
CHELSEA
Winnisimet
HOG ISLAND
NAHANT BAY
Snake Island
Apple Island
Shirley Point
Pulling Point
DEER ISLAND
SPECTACLE ISLAND
LONG ISLAND
Gallops Island
Rainsford or Hospital I.
Cambridge or Charles
BOSTON IN 1880.
SHOWING ALL GROUND OCCUPIED BY BUILDINGS.
Boston
1880
Boston 1806

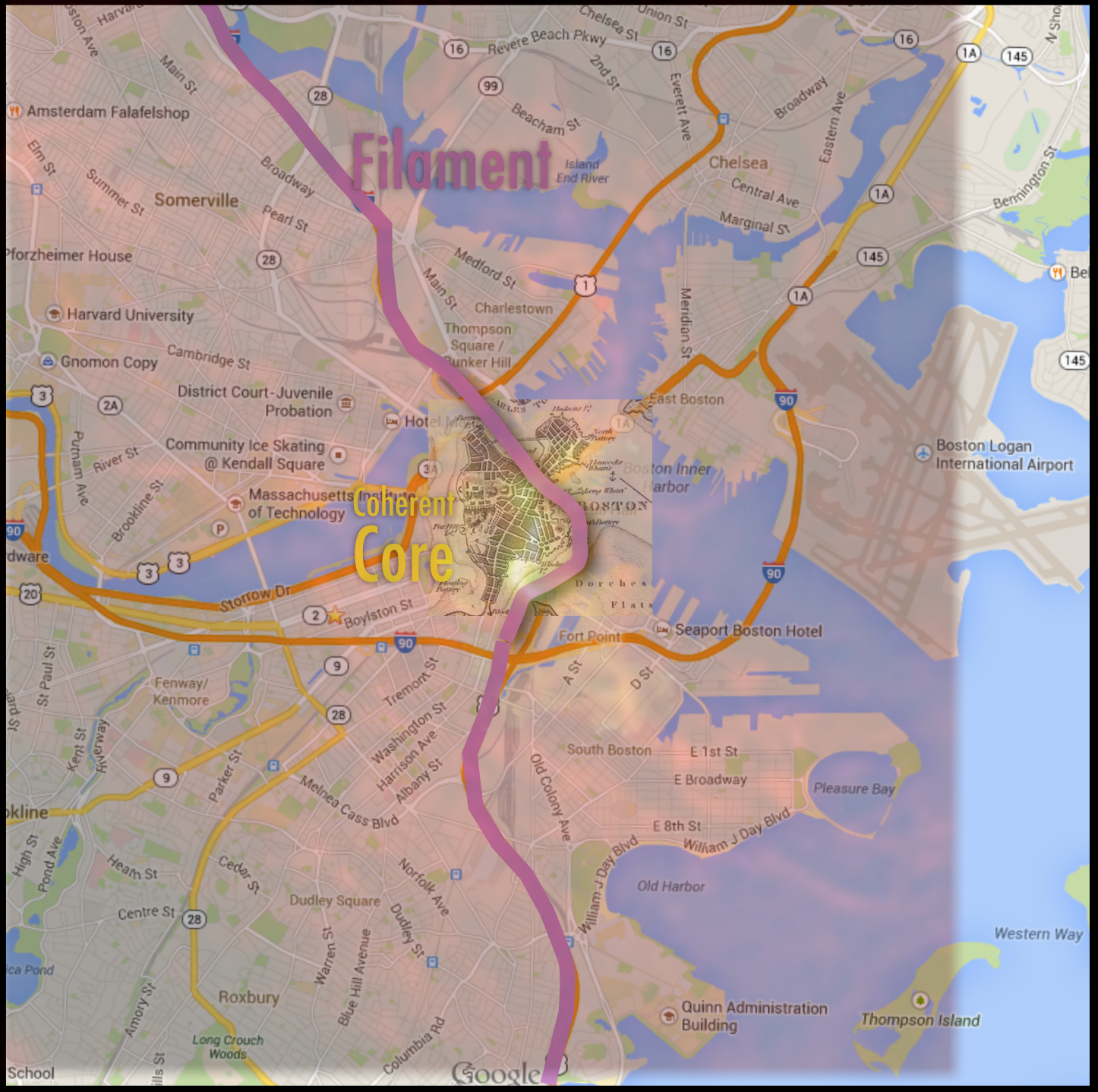

Y BUILDINGS.
Boston
1880

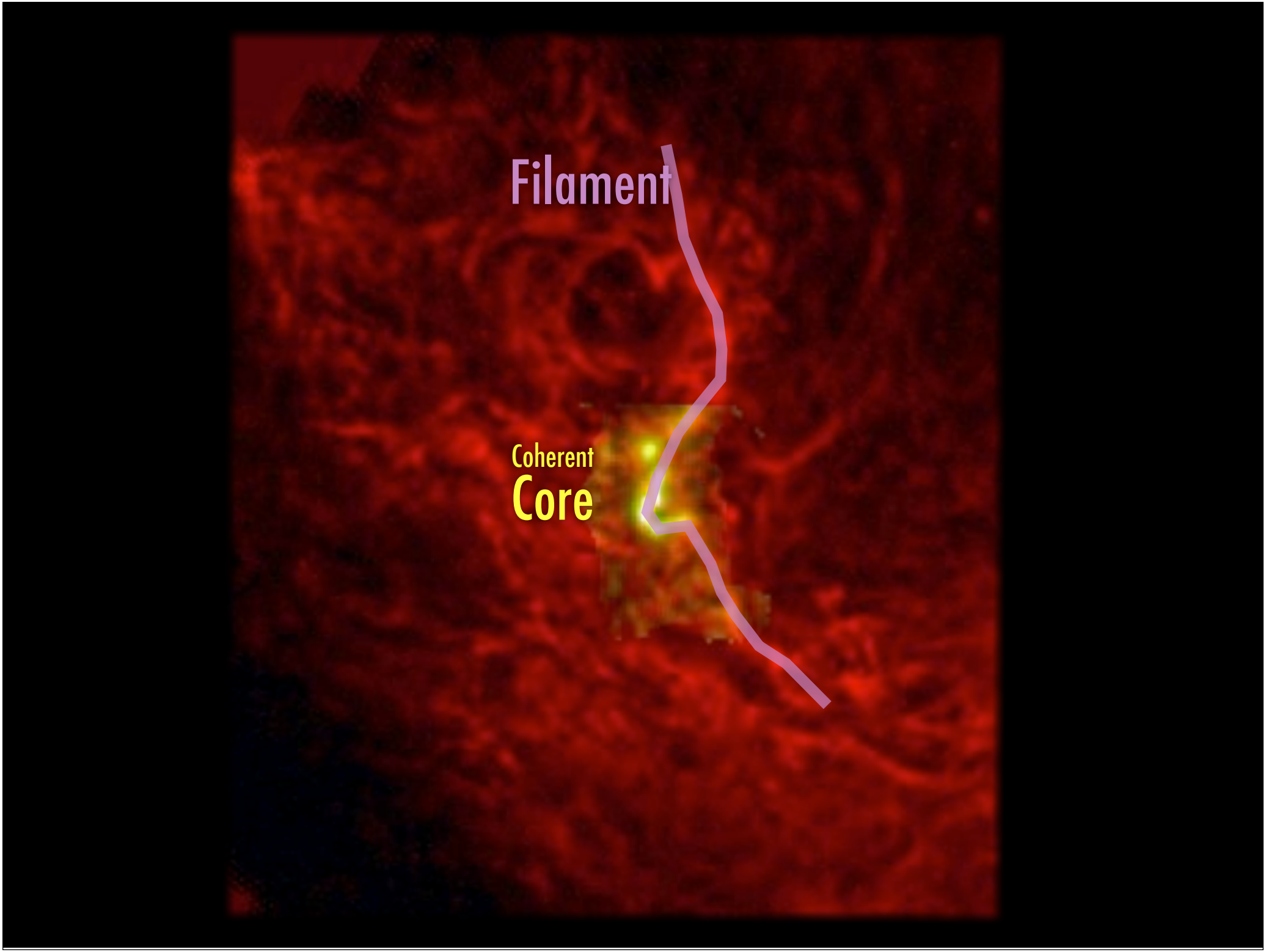

BUILDINGS.
BOSTON, 1630 TO 1675.
The Original Topography and Early Settlement together with the present Shore
THE FAINTER LINES SHOW STREETS OF 1880.
1880
1806
PUBLIC GARDEN


BOSTON, 1630 TO 1675.
The Original Topography and Early Settlement
THE FAINTER LINES SHOW
1880
1806
BOST
Dorc

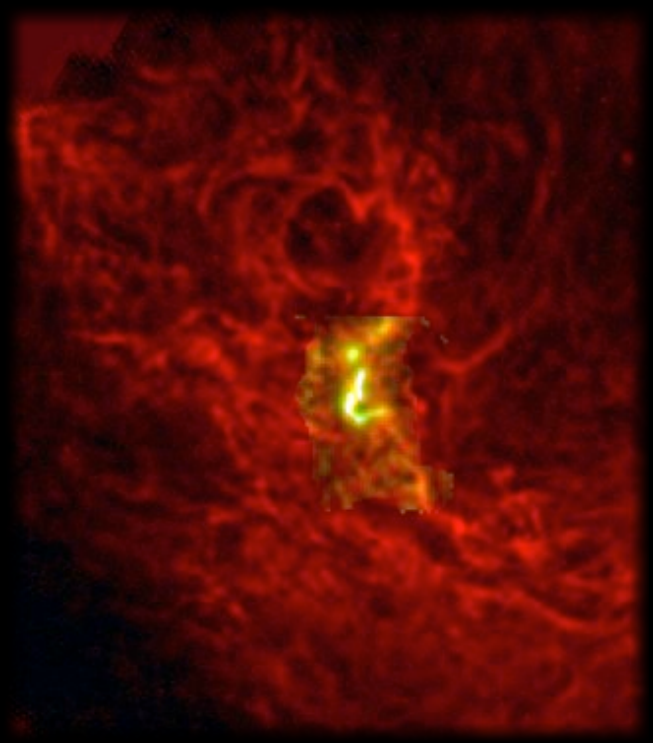

Y BUILDINGS.


Bunker Hill
Hotel Marlowe
1A
3A
North End
Boston Inner Harbor
Faneuil Hall
Boylston St
Fort Point


Filament
Coherent
Core
Amsterdam Falafelshop
Somerville
Harvard University
Gnomon Copy
District Court-Juvenile Probation
Community Ice Skating @ Kendall Square
Massachusetts Institute of Technology
Storrow Dr
Boylston St
Fenway/ Kenmore
Dudley Square
Roxbury
Long Crouch Woods
Charlestown
Thompson Square / Bunker Hill
East Boston
Boston Inner Harbor
Boston Logan International Airport
Chelsea
Seaport Boston Hotel
Fort Point
South Boston
E 1st St
E Broadway
E 8th St
Pleasure Bay
Old Harbor
William J Day Blvd
Western Way
Quinn Administration Building
Thompson Island
Island End River
Revere Beach Pkwy
Beacham St
Broadway
Central Ave
Marginal St
Medford St
Cambridge St
Tremont St
Washington St
Harrison Ave
Albany St
Melnea Cass Blvd
Parker St
Centre St
Norfolk Ave
Dudley St
Warren St
Blue Hill Avenue
Columbia Rd
Old Colony Ave
Google

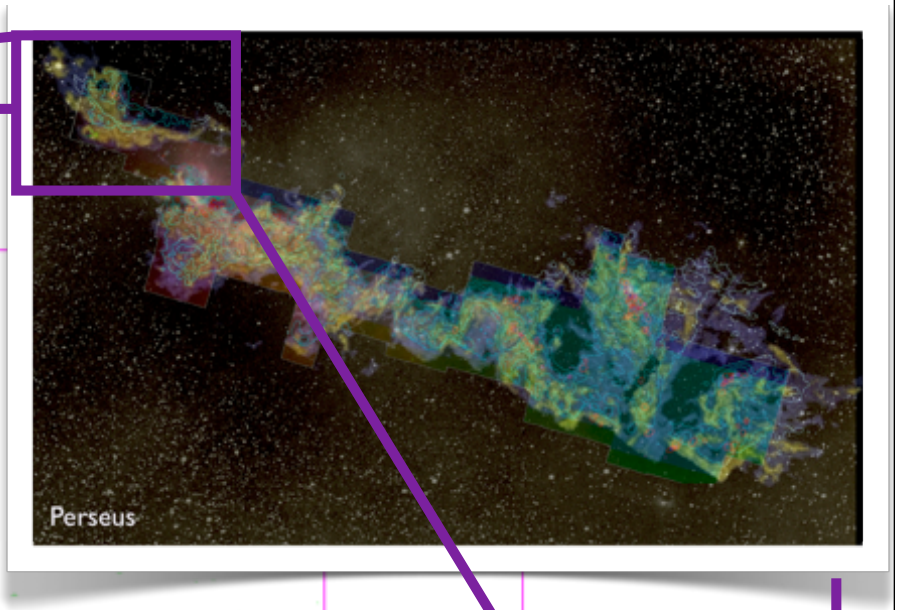

Filament
Coherent
Core

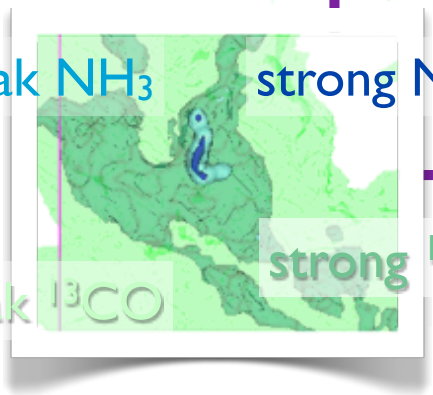
COHERENT CORES
ISLANDS OF CALM IN TURBULENT SEAS(?)



30-year story: Myers & Benson 1983, Goodman et al. 1998, Pineda et al. 2010, 2011, 2014

THE B5 REGION, IN PERSEUS

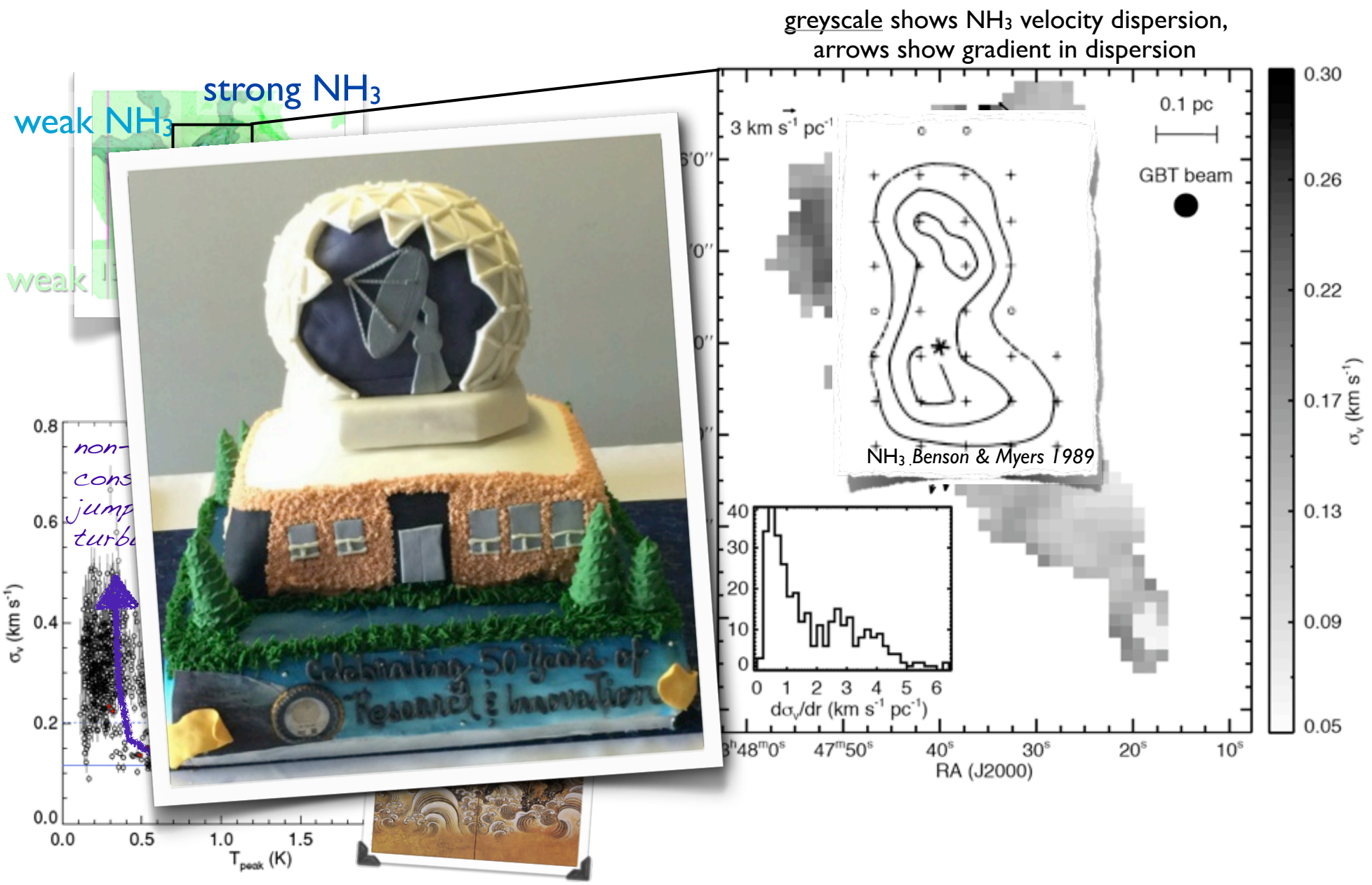




VLSR
Dec.
R.A.

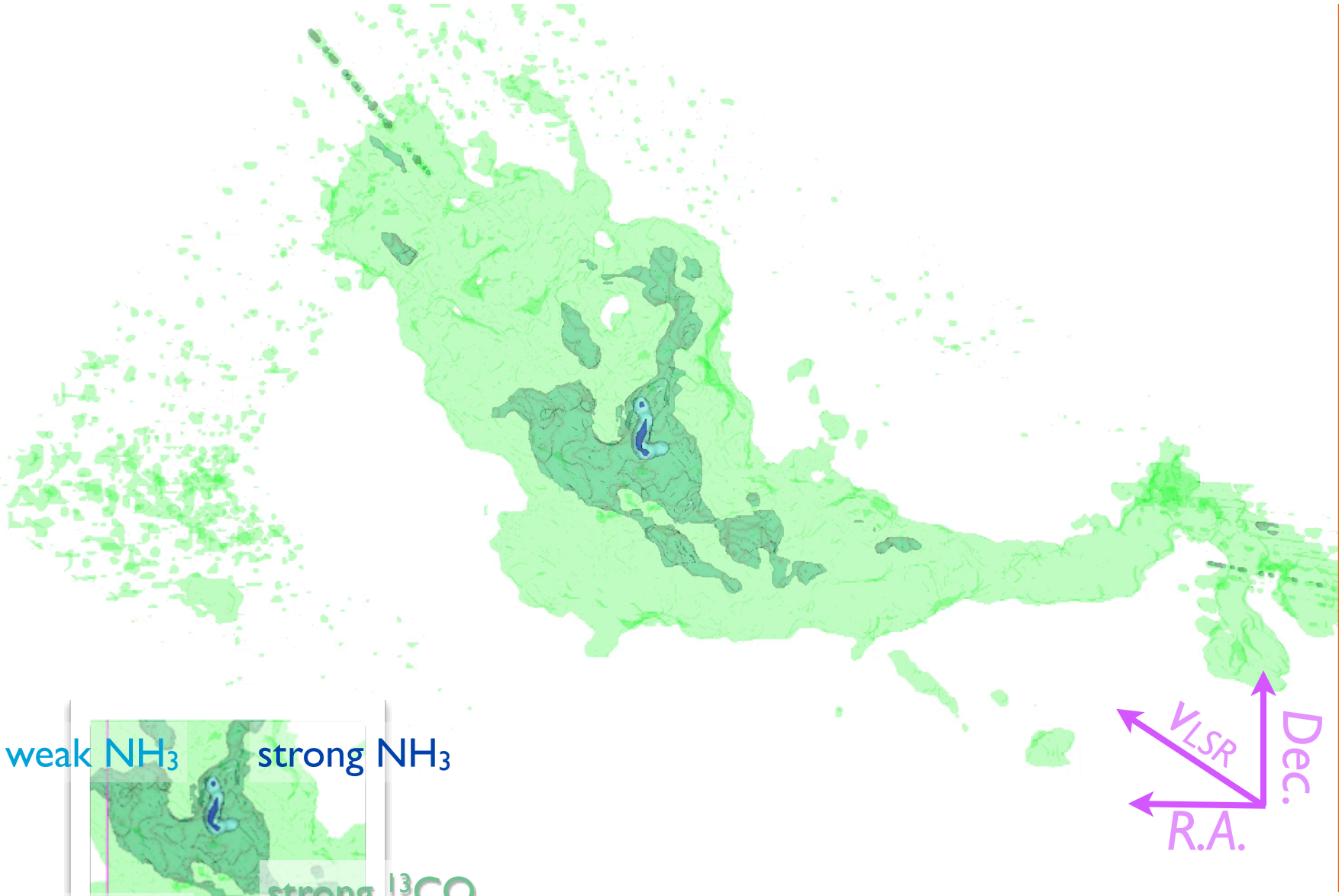
many thanks to Jaime Pineda & Jens Kauffmann for this figure
COMPLETE data: ^{13}CO from Ridge et al. 2006; NH_3 from Pineda et al. 2010

STRONG EVIDENCE FOR "VELOCITY COHERENCE" IN DENSE CORES



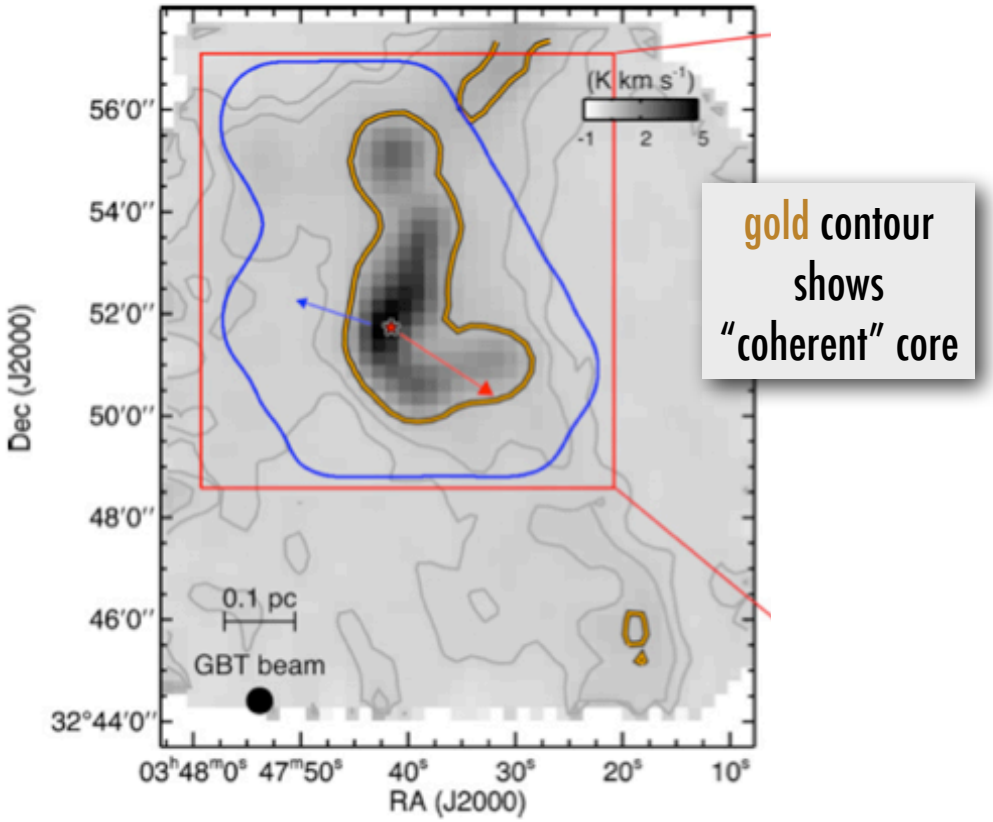
GBT NH_3 observations of the B5 core (Pineda et al. 2010)

POSITION-VELOCITY STRUCTURE OF THE B5 REGION IN PERSEUS



*many thanks to Jaime **Pineda** & Jens Kauffmann for this figure*
COMPLETE data: ^{13}CO from Ridge et al. 2006; NH_3 from Pineda et al. 2010

BUT THEN… VLA (JAIME) FOUND SUB-STRUCTURE

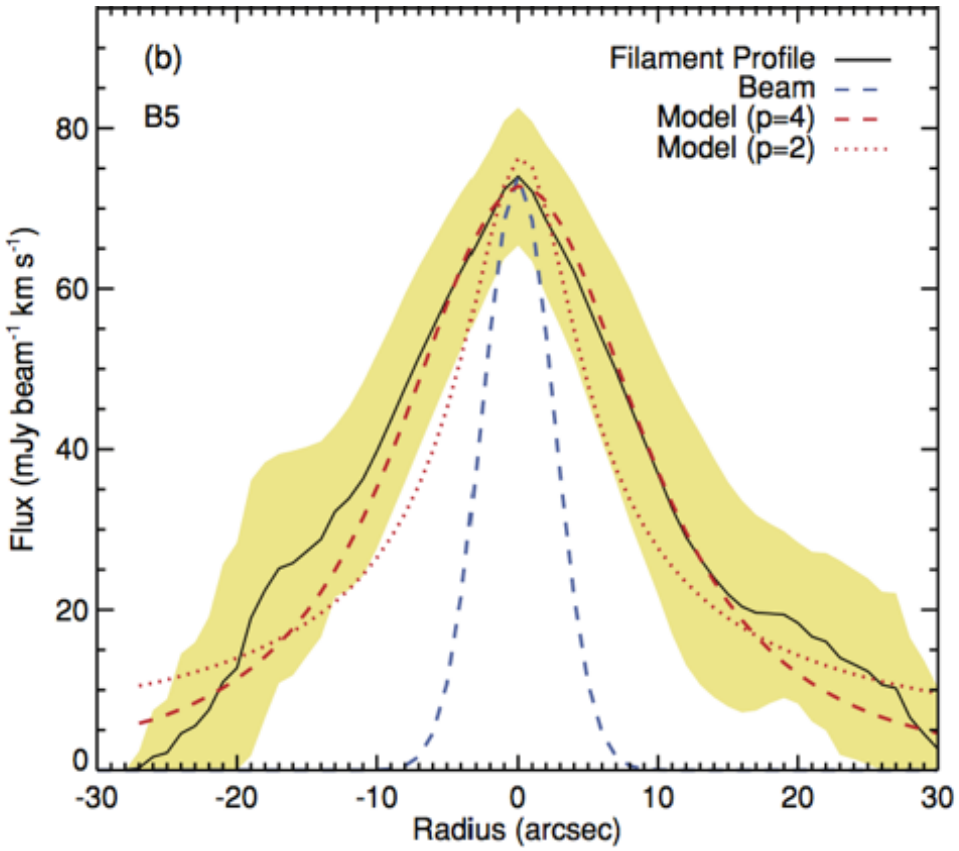


gold contour shows "coherent" core

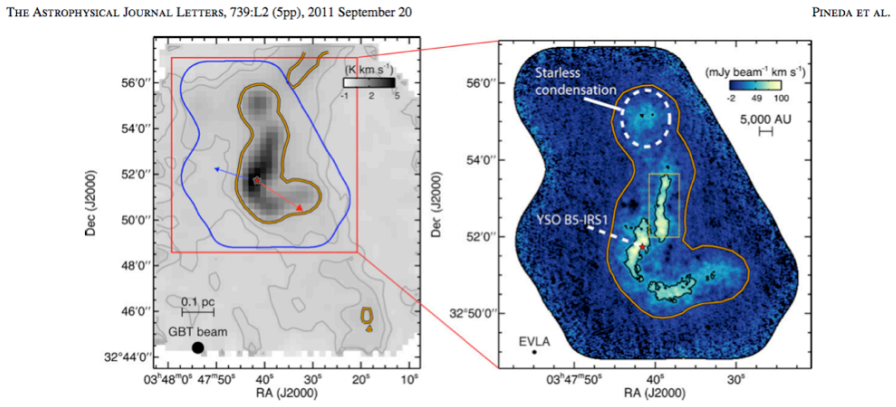
Figure 1. Left panel: integrated intensity map of B5 in NH_3 (1,1) obtained with GBT. Gray contours show the 0.15 and 0.3 K km s^{-1} level in NH_3 (1,1) integrated intensity. The orange contours show the region in the GBT data where the non-thermal velocity dispersion is subsonic. The young star, B5–IRS1, is shown by the star in both panels. The outflow direction is shown by the arrows. The blue contour shows the area observed with the EVLA and the red box shows the area shown in the right panel. Right panel: integrated intensity map of B5 in NH_3 (1,1) obtained combining the EVLA and GBT data. Black contour shows the 50 mJy beam^{-1} km s^{-1} level in NH_3 (1,1) integrated intensity. The yellow box shows the region used in Figure 4. The northern starless condensation is shown by the dashed circle.

Pineda et al. 2011

BUT MAYBE IT'S DIFFERENT?



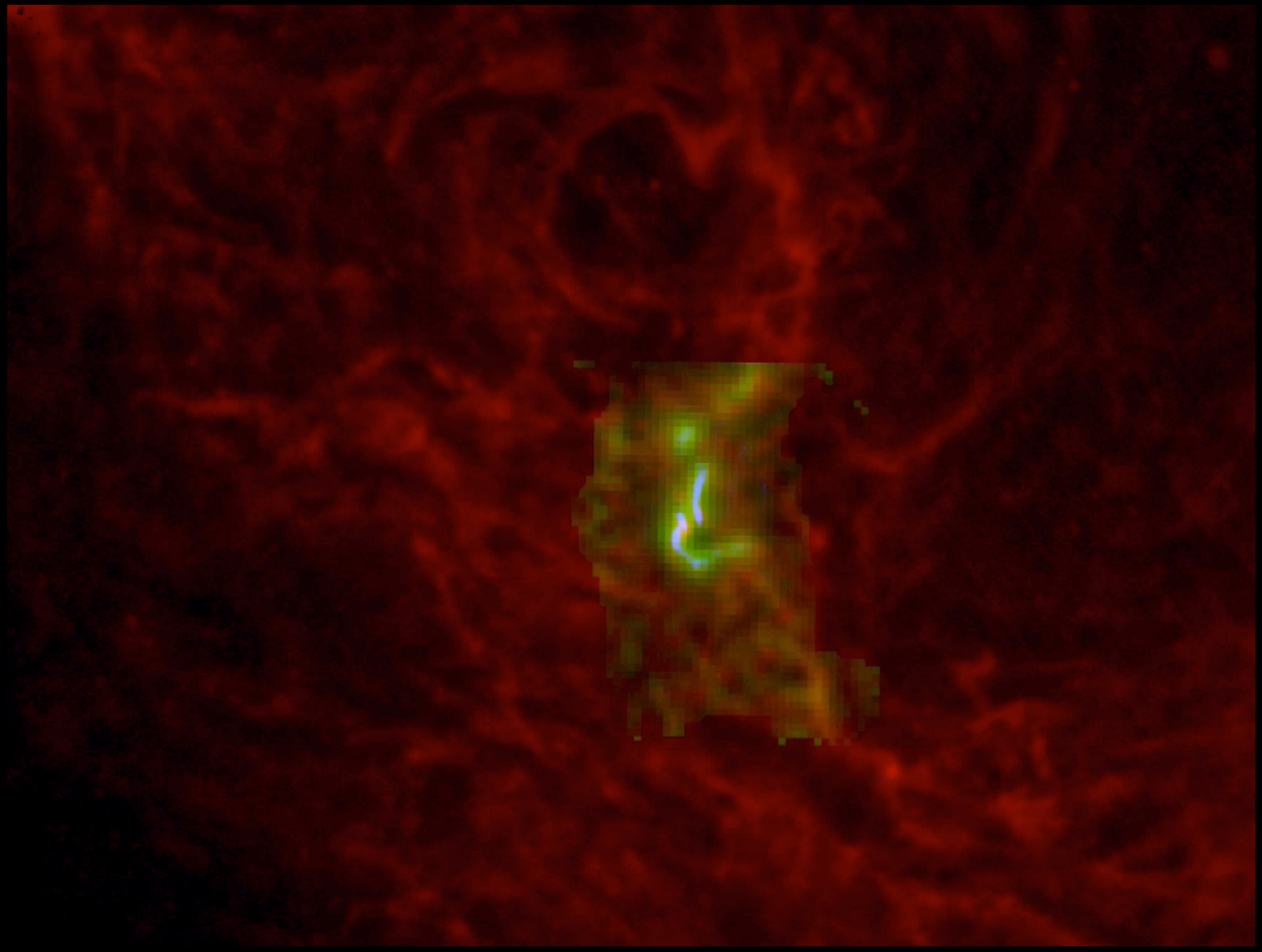
isothermal,
hydrostatic filaments,
not turbulent ones?



Pineda et al. 2011

BUT WHAT IF FILAMENTS CONTINUE ACROSS "CORE" BOUNDARIES?!

blue =VLA ammonia (high-density gas); green=GBT ammonia (lower-res high-density gas); red=Herschel 250 micron continuum (dust)

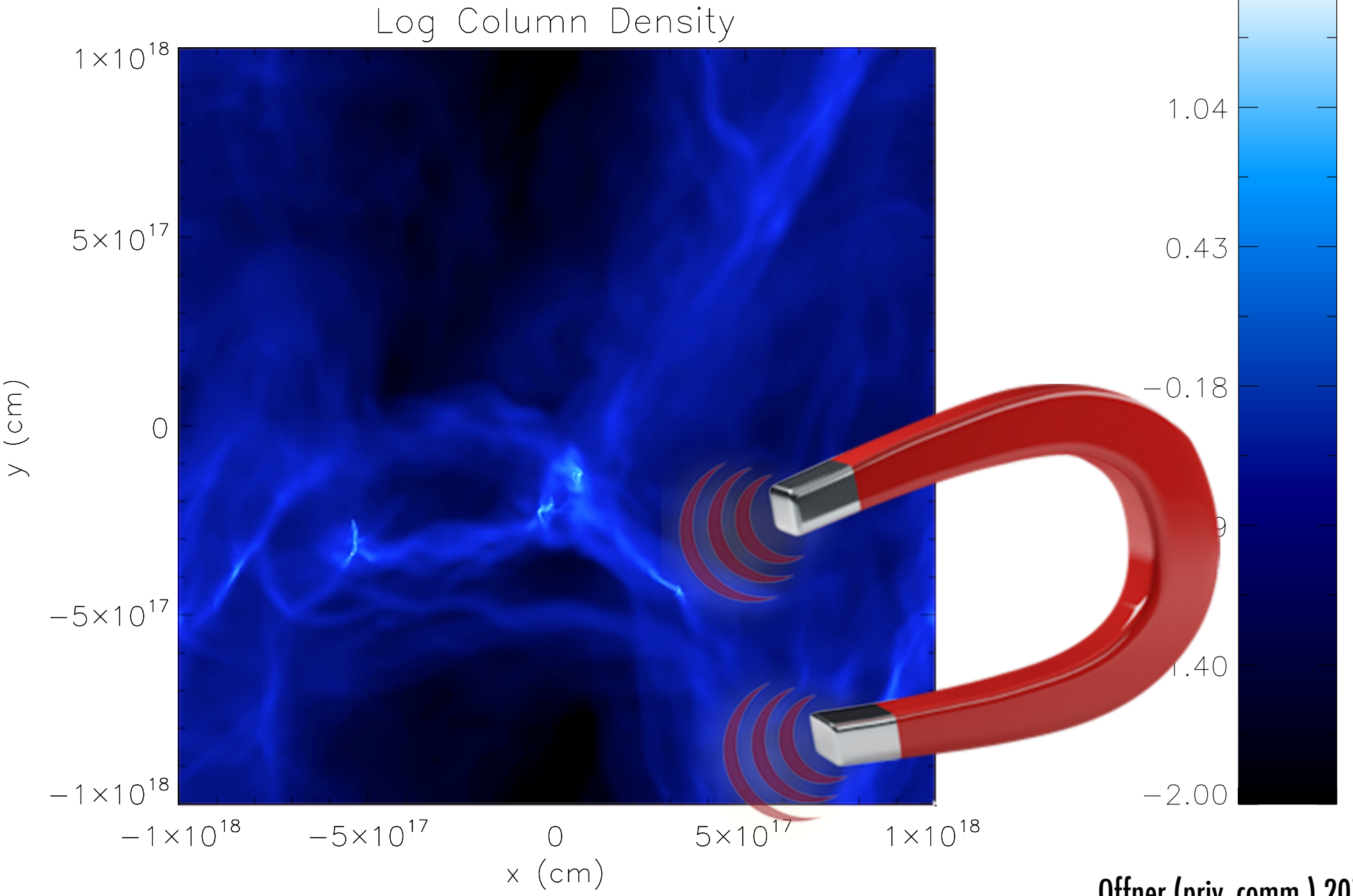


Goodman, Chen, Offner & Pineda 2014 in prep.

Herschel data from Gould Belt Survey

1998 2008

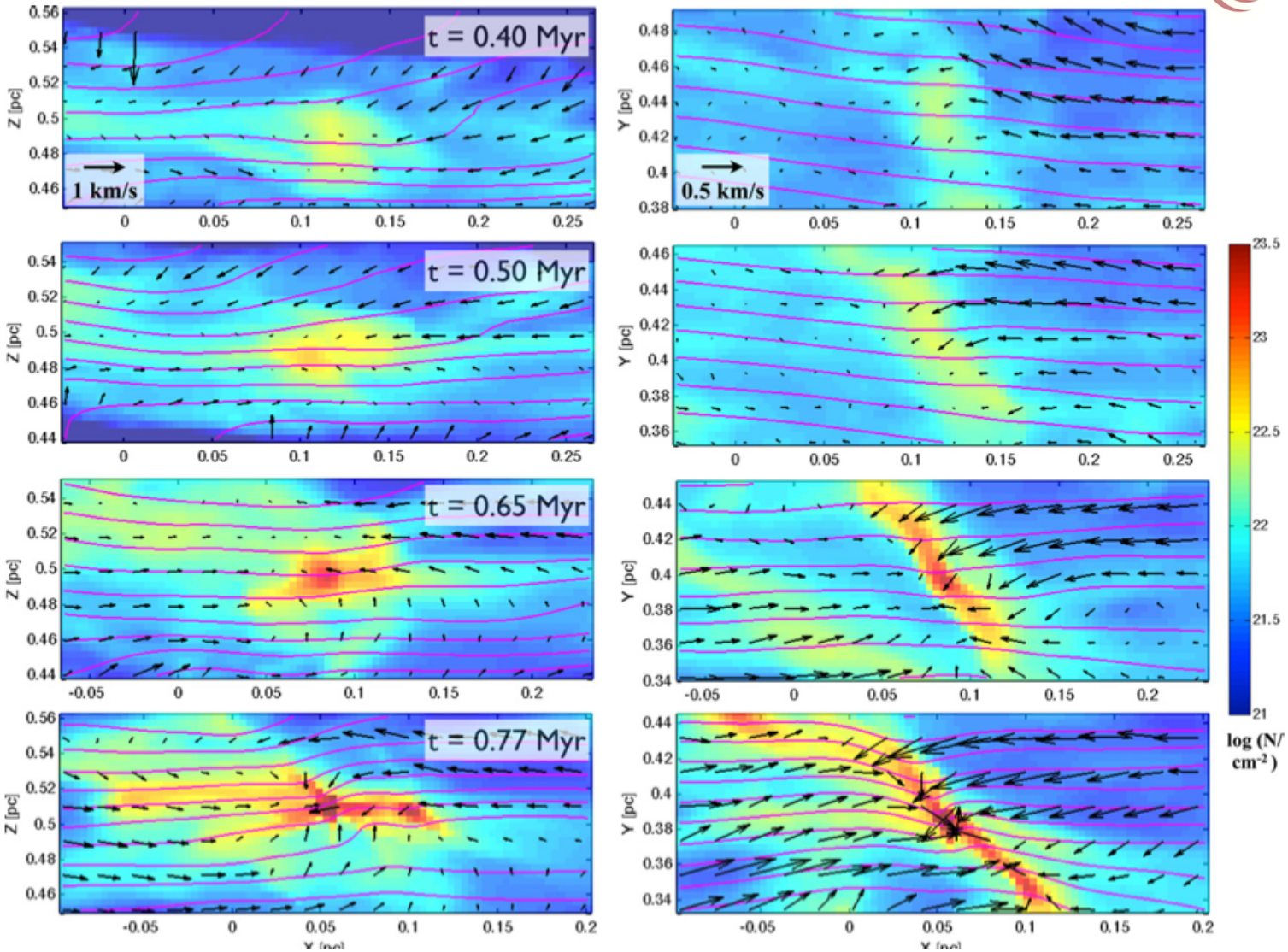
B5-ISH SIMULATION (NO MAGNETIC FIELD)



Offner (priv. comm.) 2014

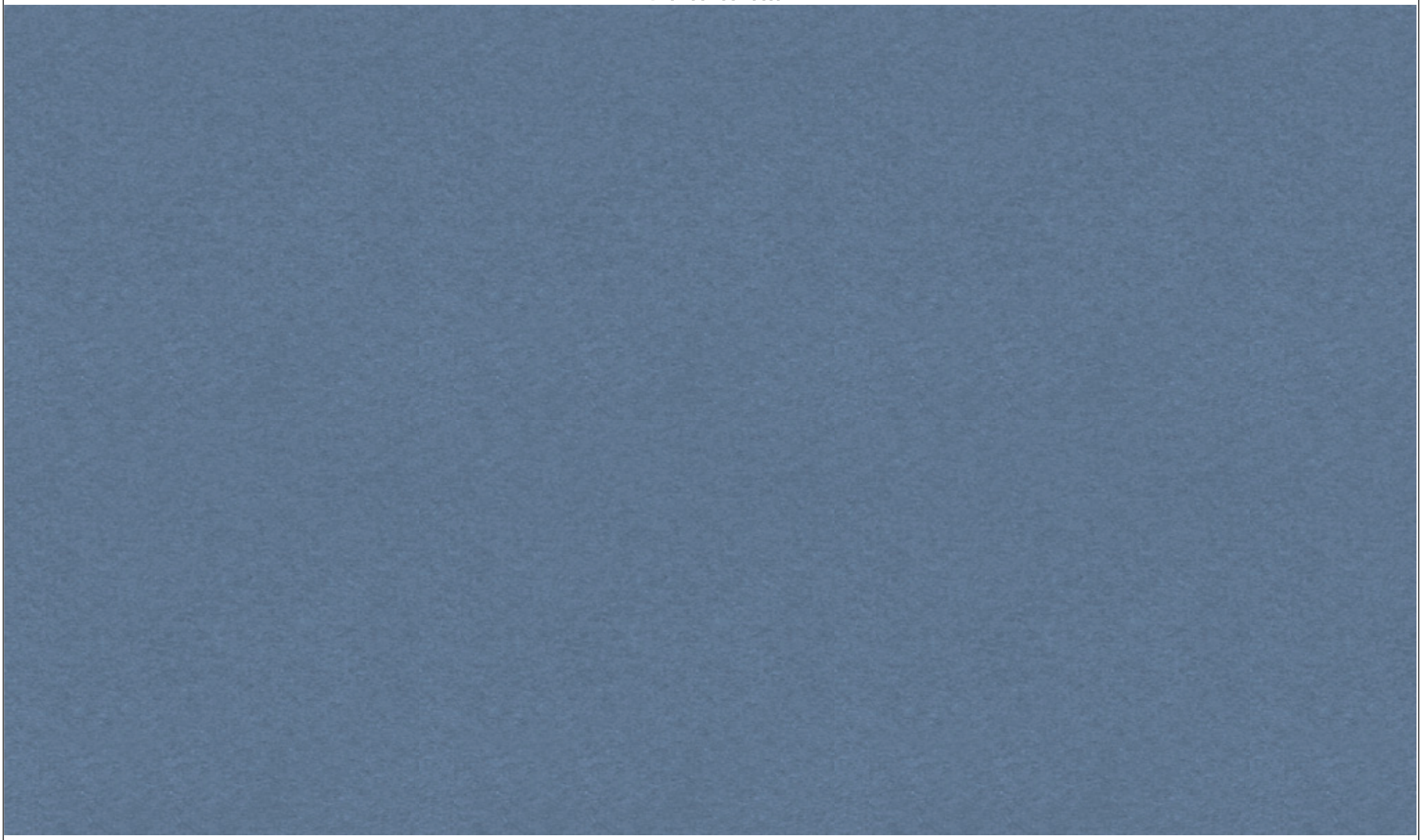
B5-ISH? SIMULATION (WITH MAGNETIC FIELD)

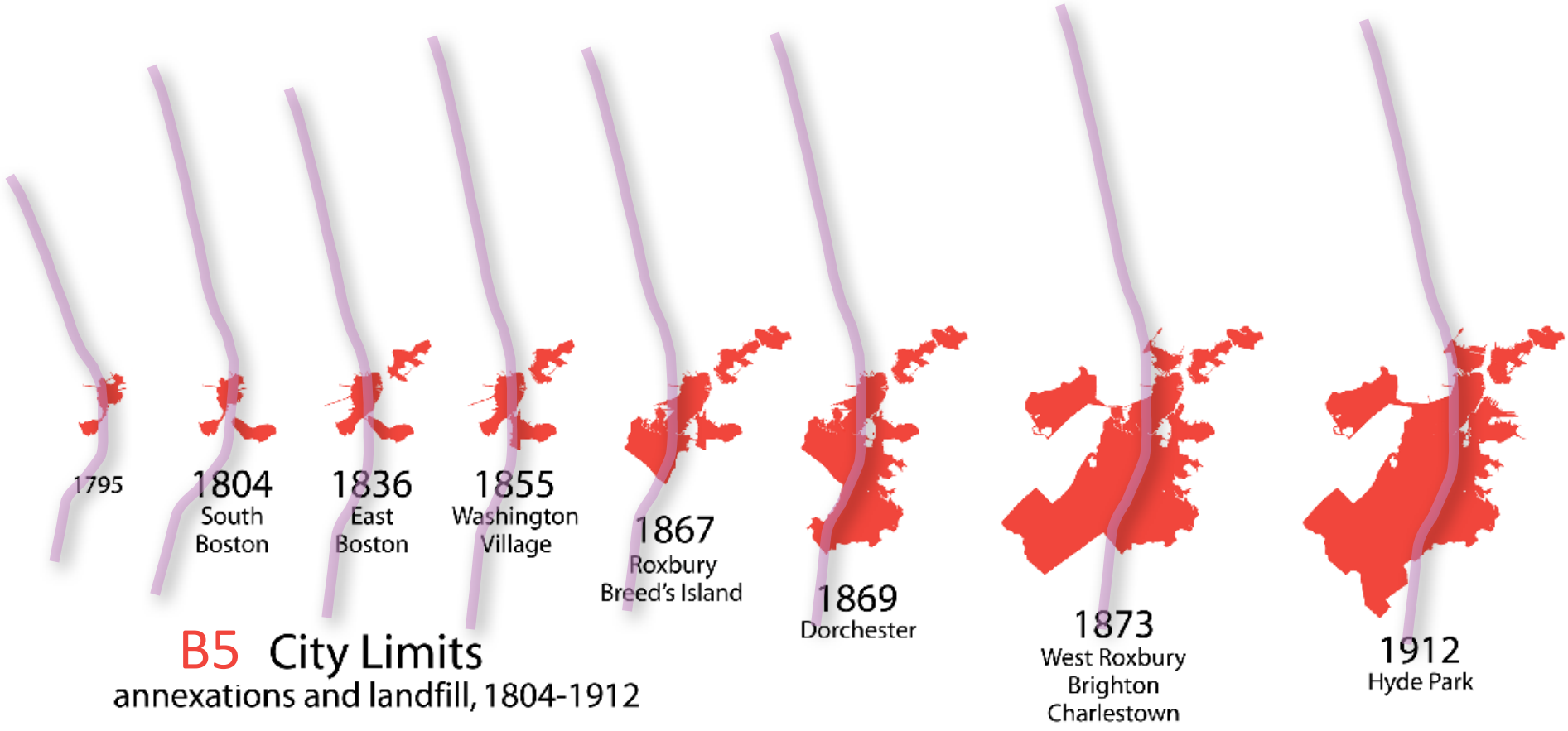
THE ASTROPHYSICAL JOURNAL, 785:69 (20pp), 2014 April 10



Chen & Ostriker 2014

SHHH...

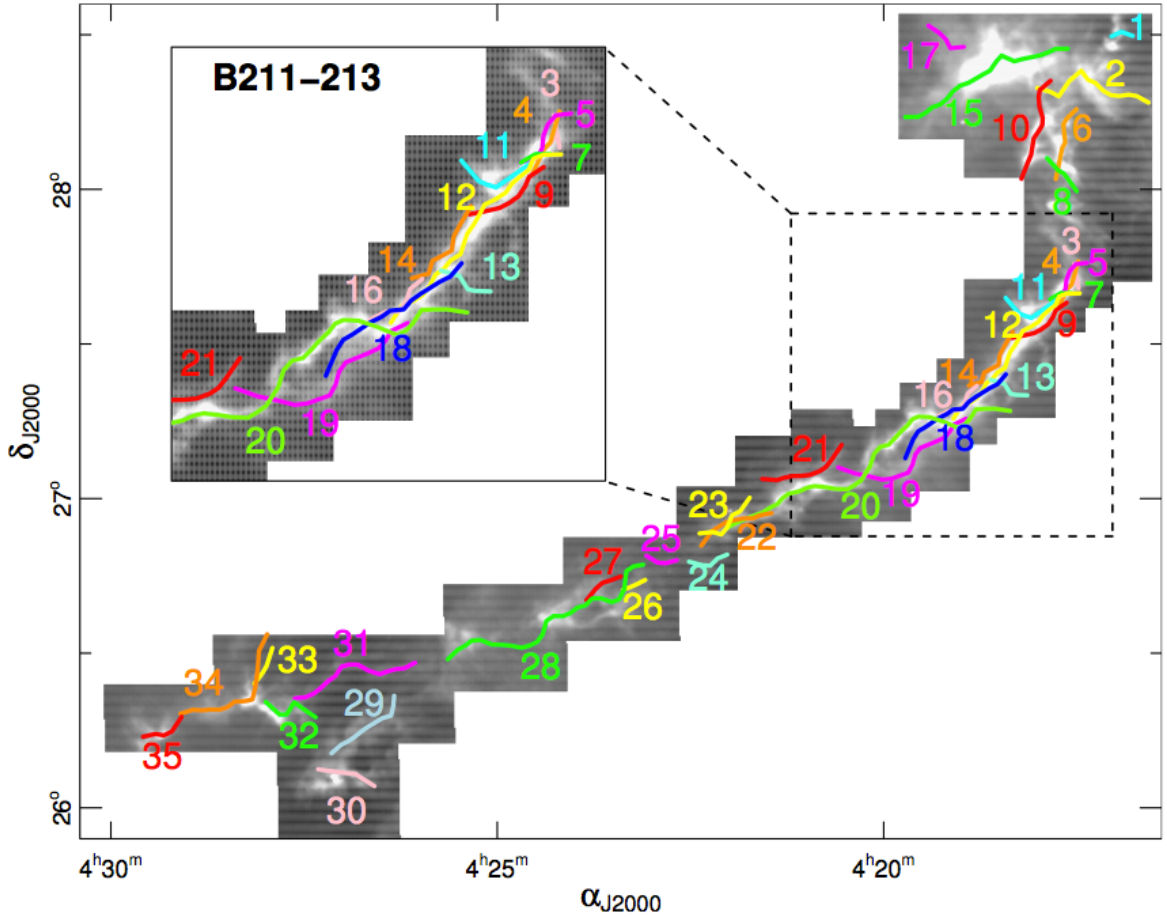


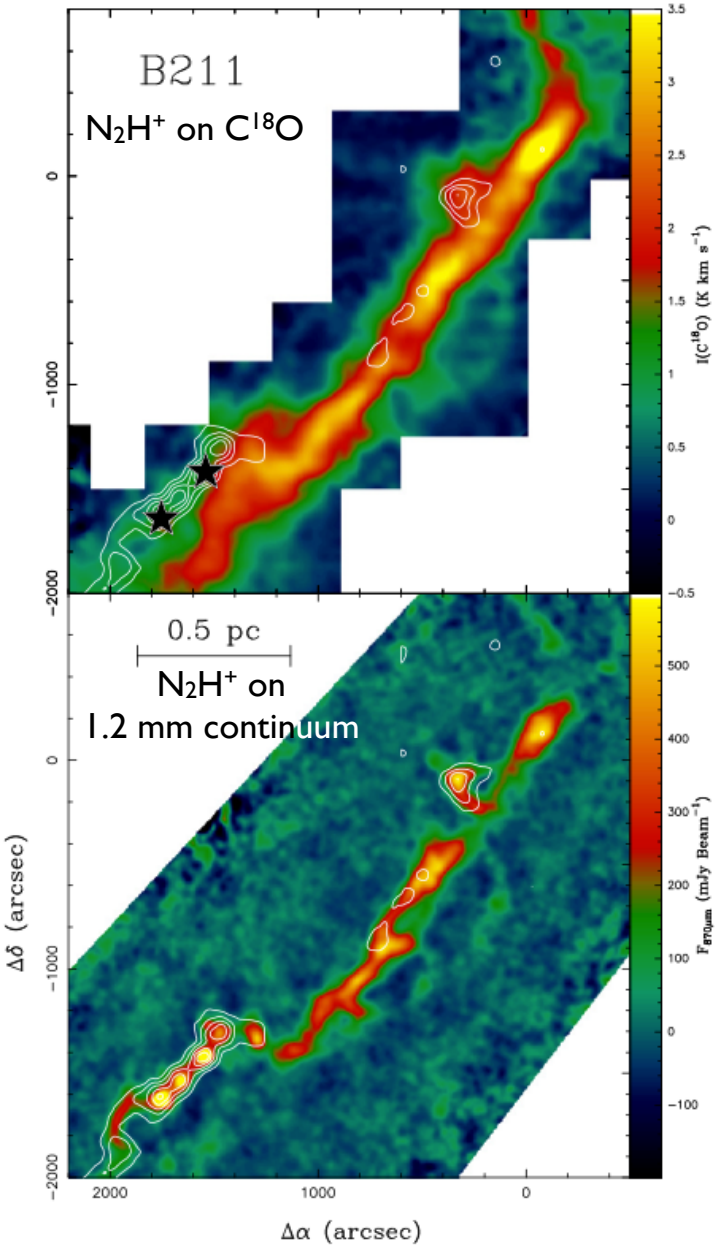


Filaments offer pre-existing density enhancement.

Collapse is rapid enough that aboriginal filament is not erased, even within a "coherent core."

In B5, small bound cluster will form c. 40K years from now.





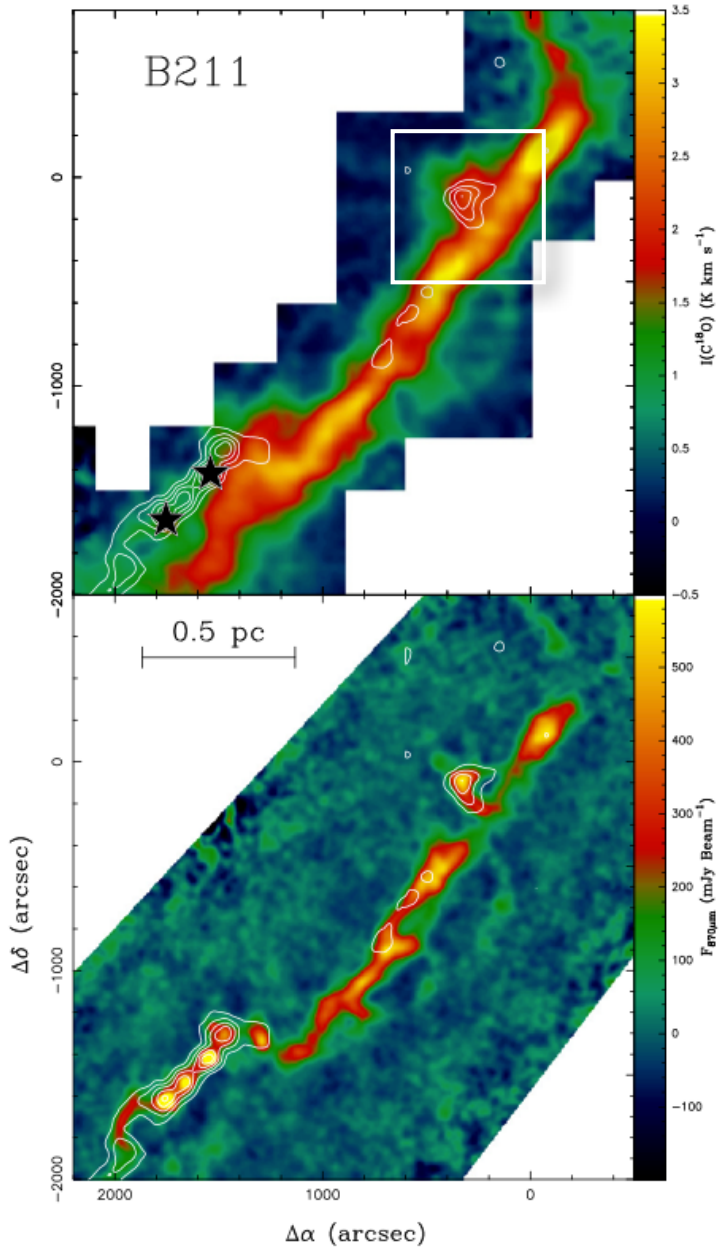
Now, we (all!) need to try FIVe, from Hacar et al. 2013, to study "coherent" core-filament relation.

Filaments offer pre-existing density enhancement.

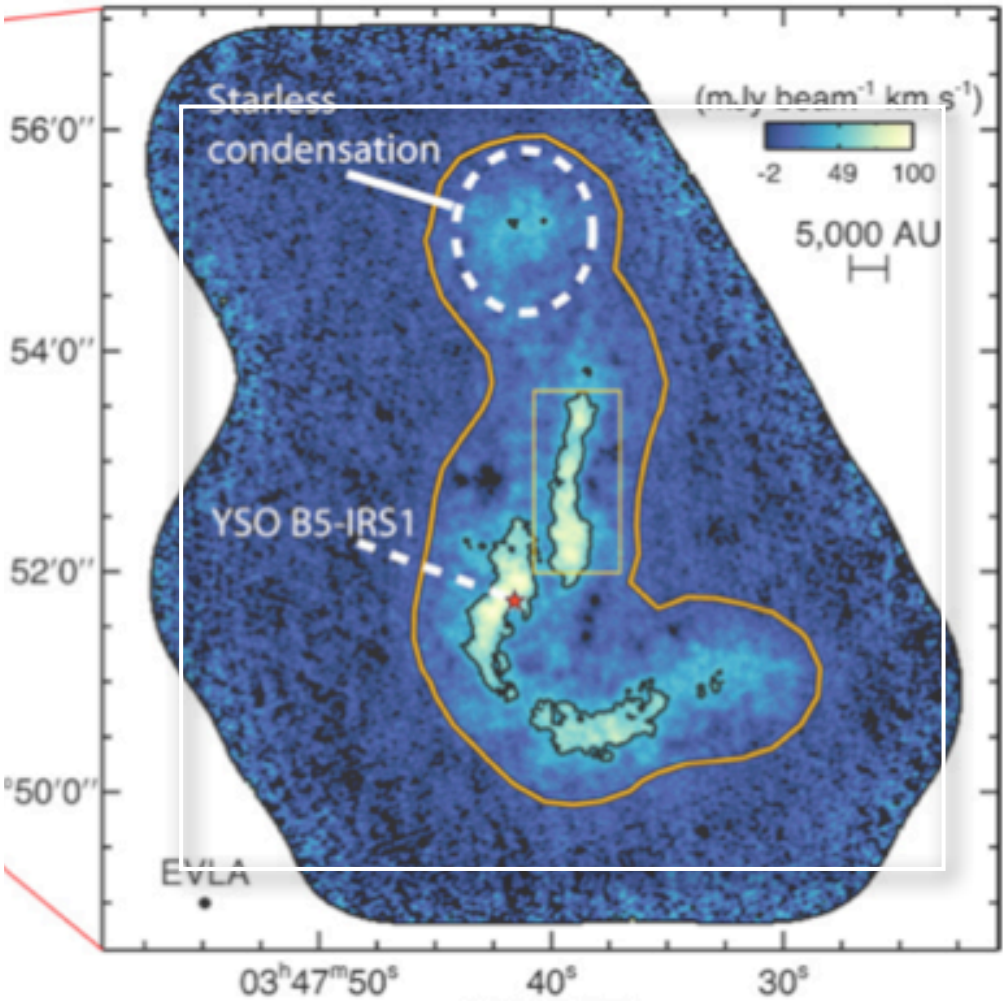
Collapse is rapid enough that aboriginal filament is not erased, even within a "coherent core."

In B5, small bound cluster will form c. 40K years from now.

COMPARING SCALES



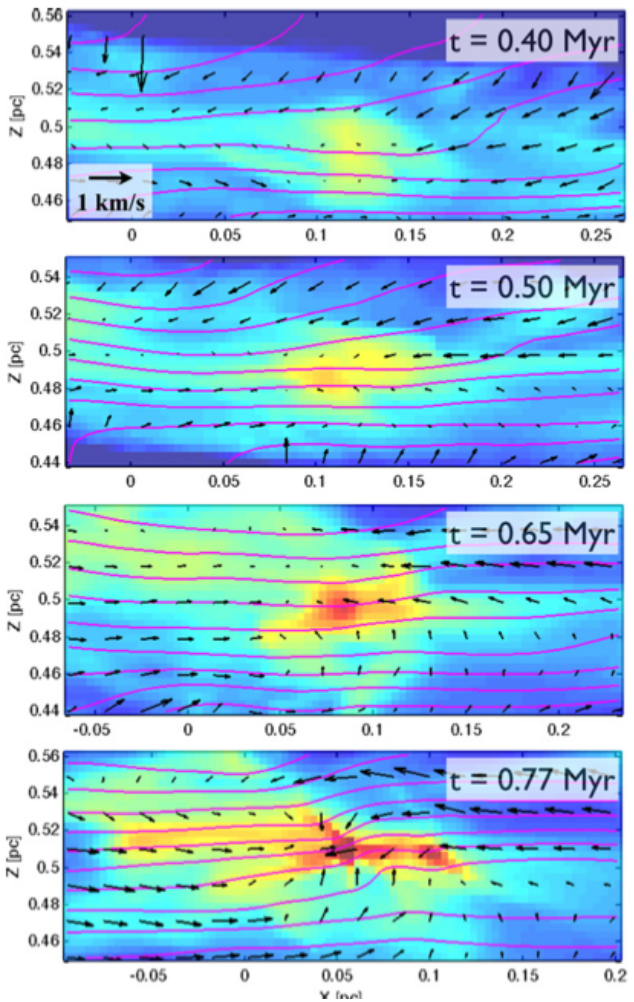
Taurus (Hacar et al.)

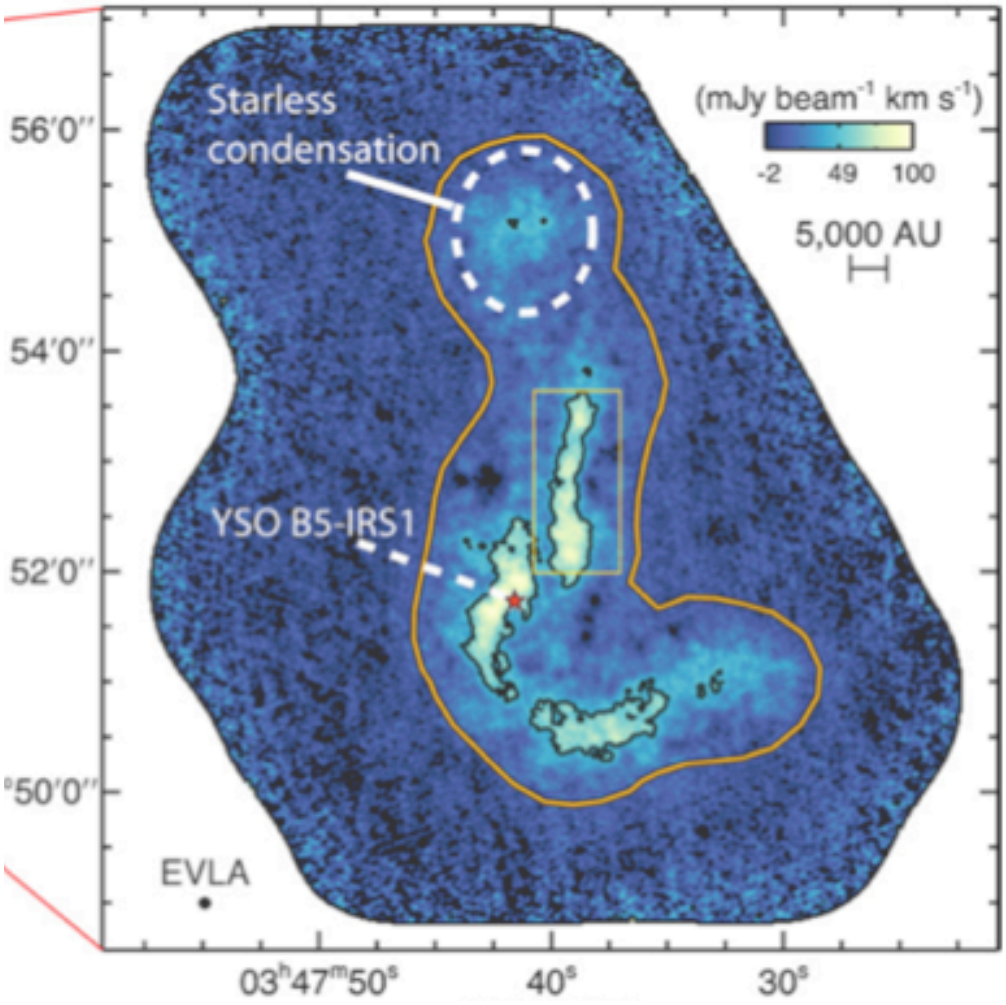


B5 (Pineda et al.)

TO THE SAME SCALE...

THE ASTROPHYSICAL JOURNAL, 785:69 (20pp), 2014 April 10





MHD (Chen & Ostriker 2014)

B5 (Pineda et al.)

Nessie to B5, the movie.