F-root Anycast Placement Research using RIPE Atlas

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Goals of the Project

- Plan new F-root sites
- Optimise existing sites, if needed

RIPE Probe Measurements

Measurement 1030x:

- Every root server, every 240s
- DNS Request

  "`hostname.bind CH TXT`"
- DNS Response IDs site and node, e.g.

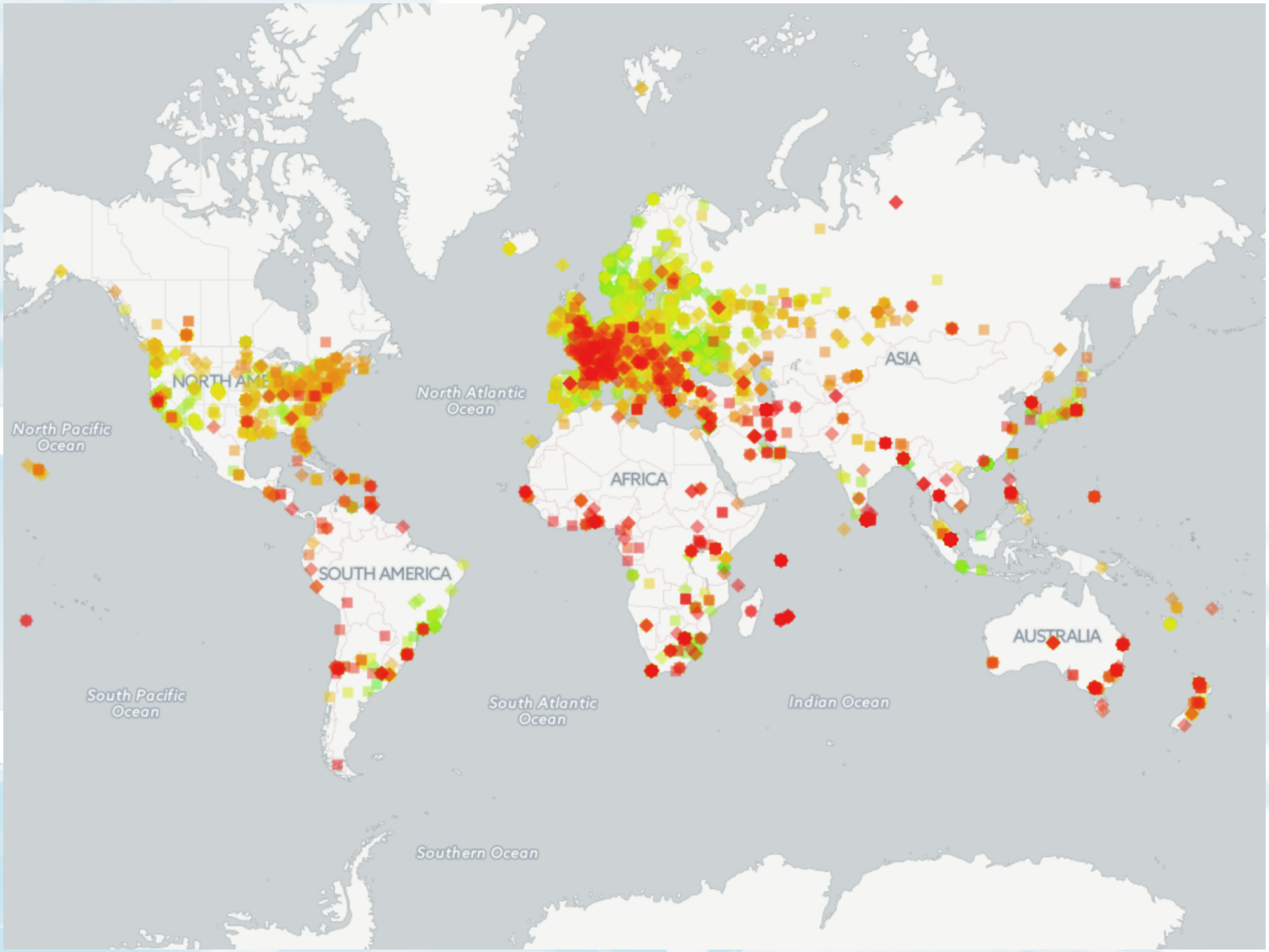
  `ams1a.f.root-servers.org`
- Also records response latency

RIPE Probe Visualisations

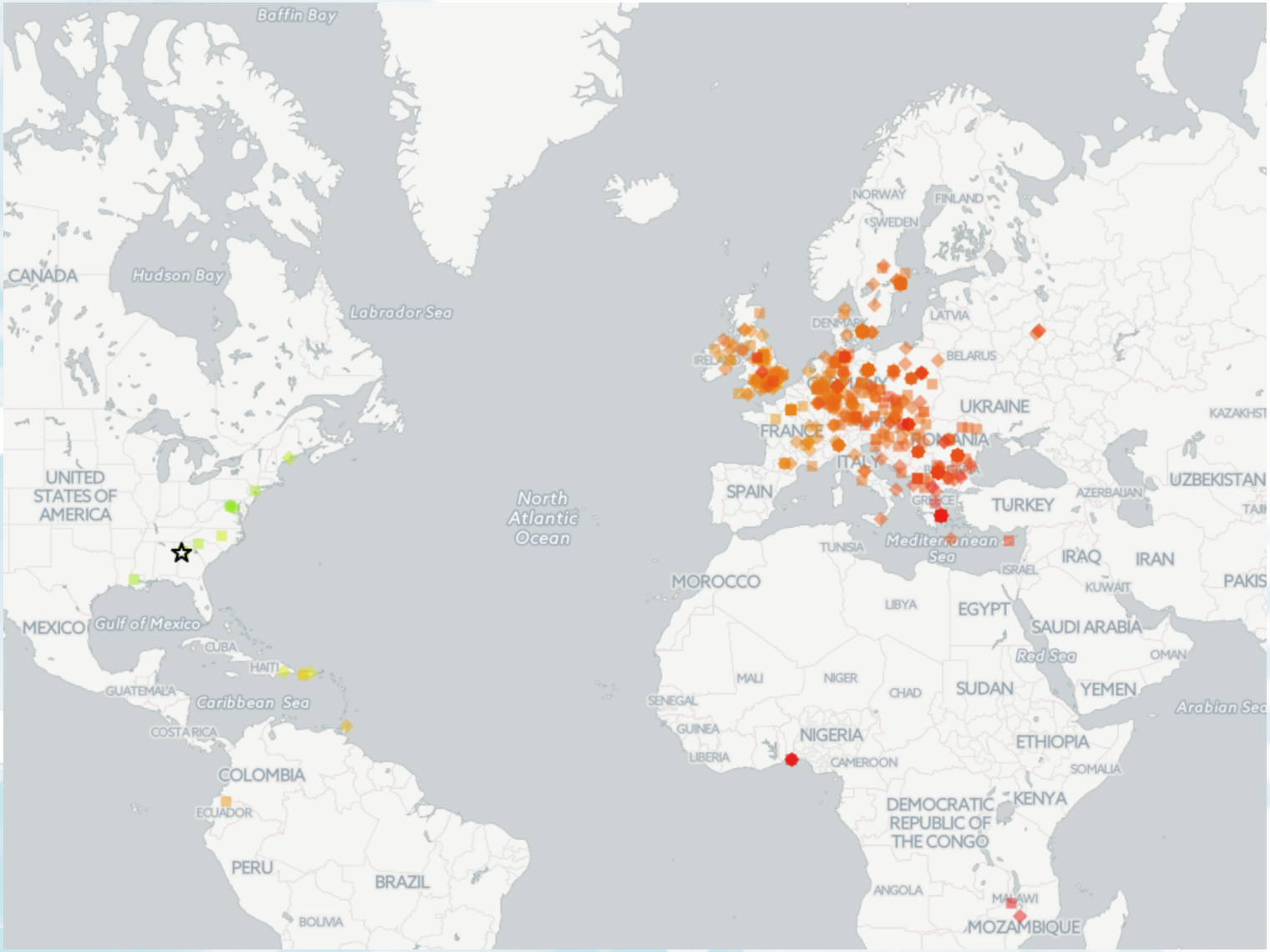
https://atlas.ripe.net/results/maps/

- not flexible enough for this analysis
- rolled my own using their API

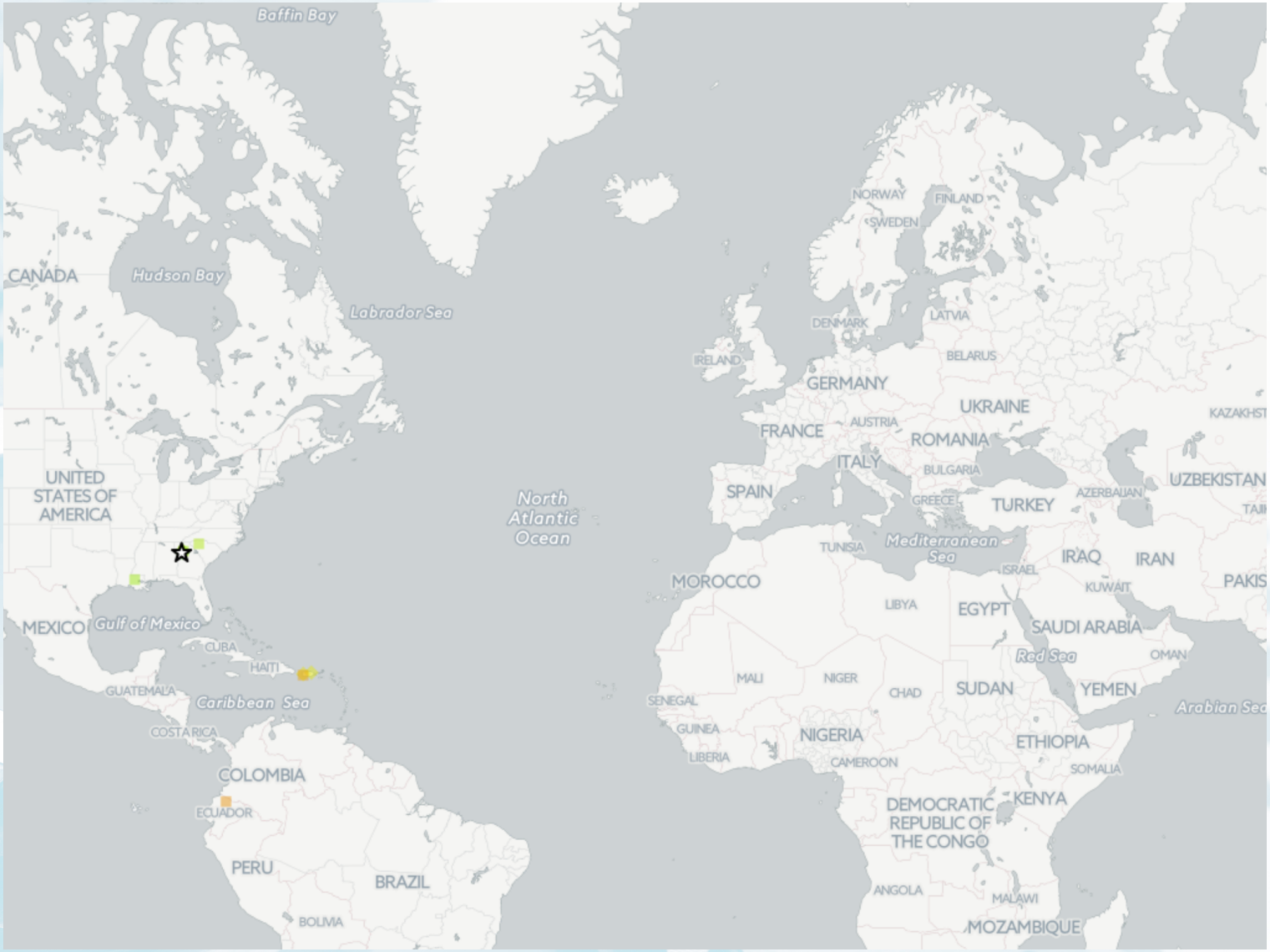
Global View of F-root Latency (red = 200ms+)



US Transit Misconfiguration (ATL1)

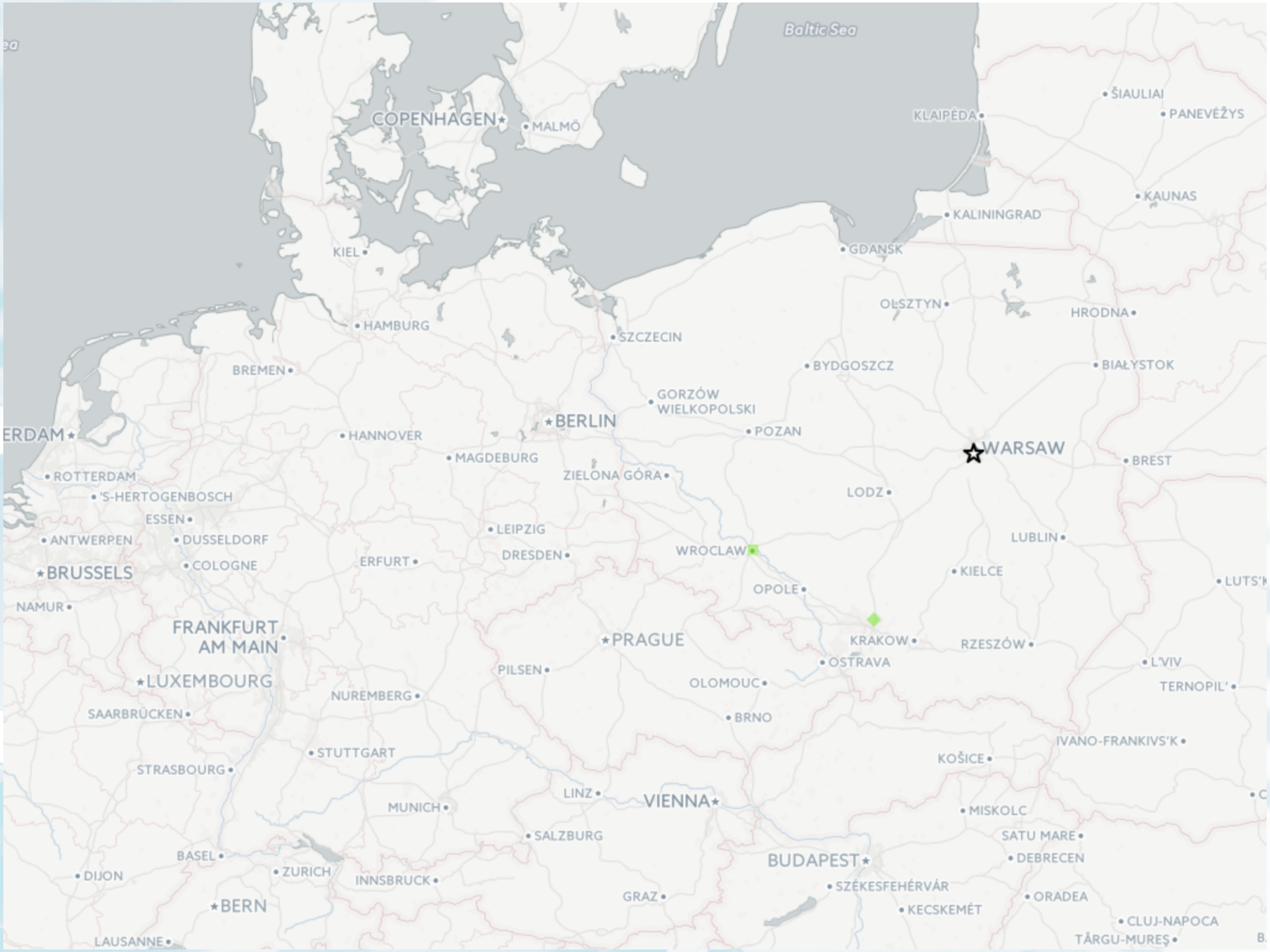


ATL1 - post reconfiguration

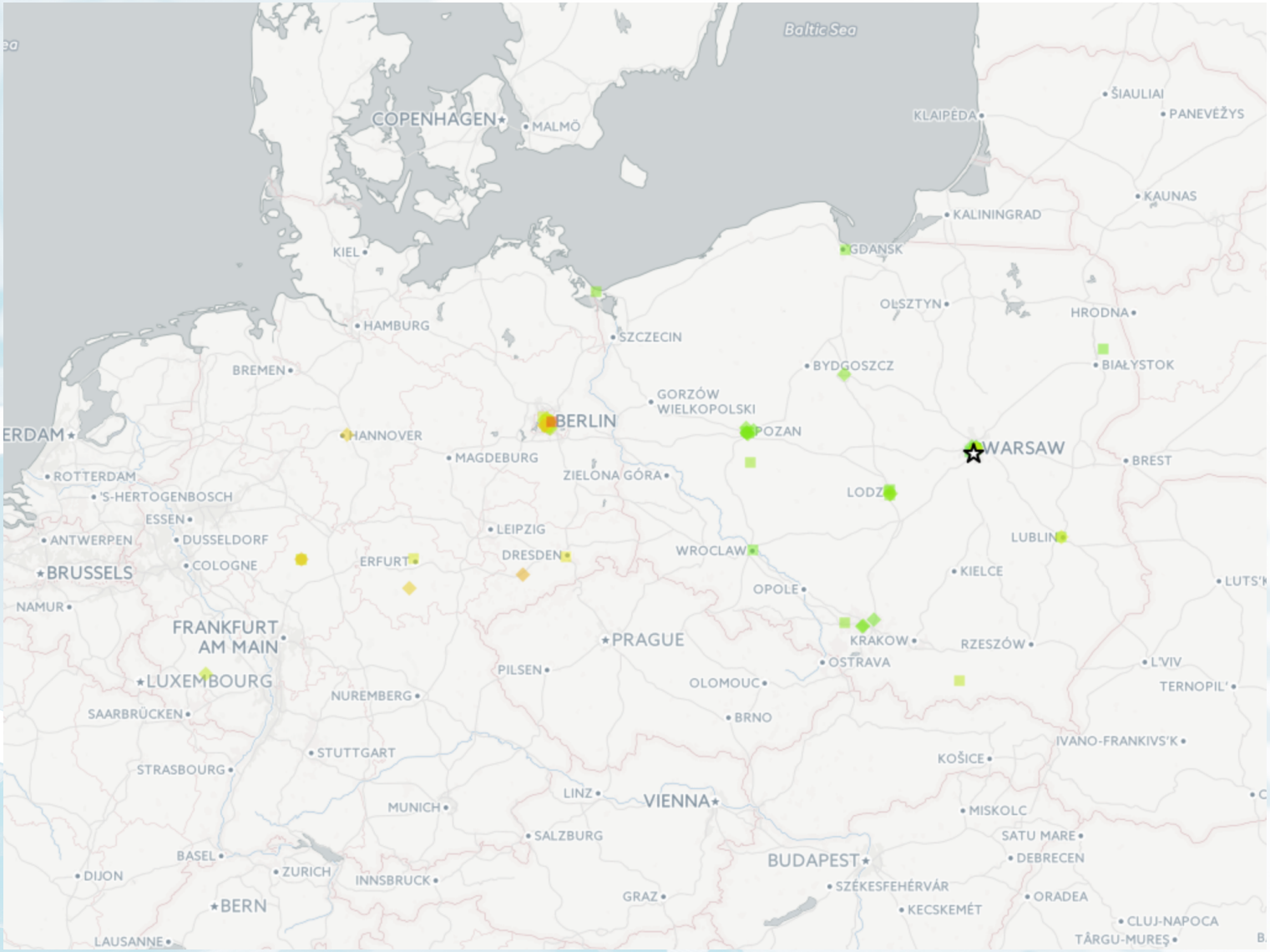


NO_EXPORT leak!

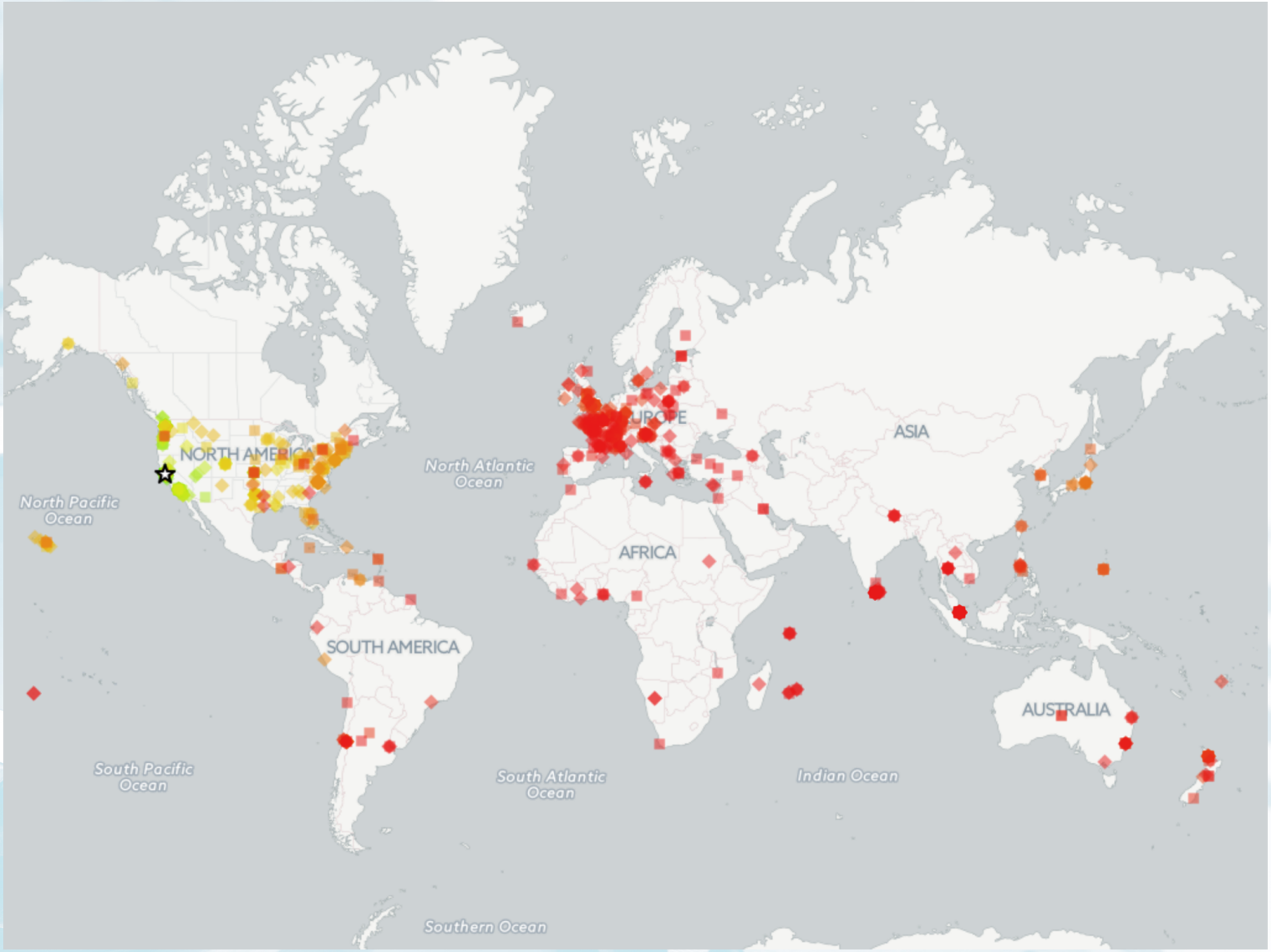
PLIX route server NO_EXPORT too strict



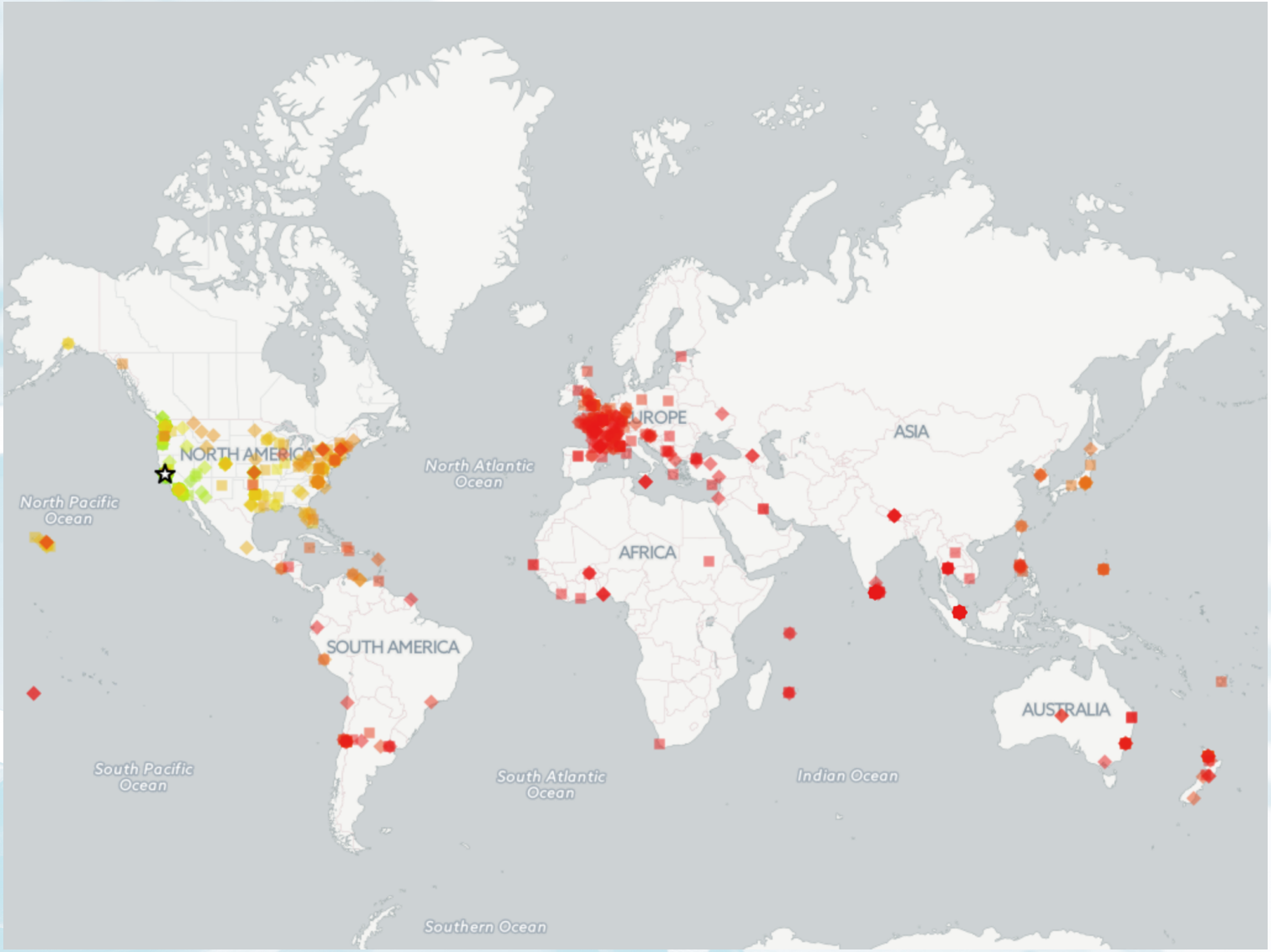
PLIX Fixed


Baltic Sea
COPENHAGEN
MALMÖ
ŠIAULIAI
KLAIPĖDA
PANEVĖŽYS
KAUNAS
KALININGRAD
KIEL
GDAŃSK
OLSZTYN
HRODNA
HAMBURG
SZCZECIN
BREMEN
BYDGOSZCZ
BIAŁYSTOK
GORZÓW WIELKOPOLSKI
BERLIN
POZAN
HANNOVER
WARSAW
MAGDEBURG
BREST
ZIELONA GÓRA
ROTTERDAM
LODZ
'S-HERTOGENBOSCH
ESSEN
LEIPZIG
LUBLIN
ANTWERPEN
DUSSELDORF
DRESDEN
WROCLAW
BRUSSELS
COLOGNE
ERFURT
KIELCE
OPOLE
NAMUR
FRANKFURT AM MAIN
PRAGUE
KRAKOW
RZESZÓW
L'VIV
OSTRAVA
LUXEMBOURG
PILSEN
OLOMOUC
TERNOPIL'
NUREMBERG
SAARBRÜCKEN
BRNO
IVANO-FRANKIVS'K
STUTTGART
KOŠICE
STRASBOURG
LINZ
VIENNA
MUNICH
MISKOLC
SALZBURG
SATU MARE
BASEL
BUDAPEST
DEBRECEN
DIJON
ZURICH
INNSBRUCK
SZÉKESFEHÉRVÁR
GRAZ
ORADEA
BERN
KECSKEMÉT
CLUJ-NAPOCA
LAUSANNE
TÂRGU-MUREŞ

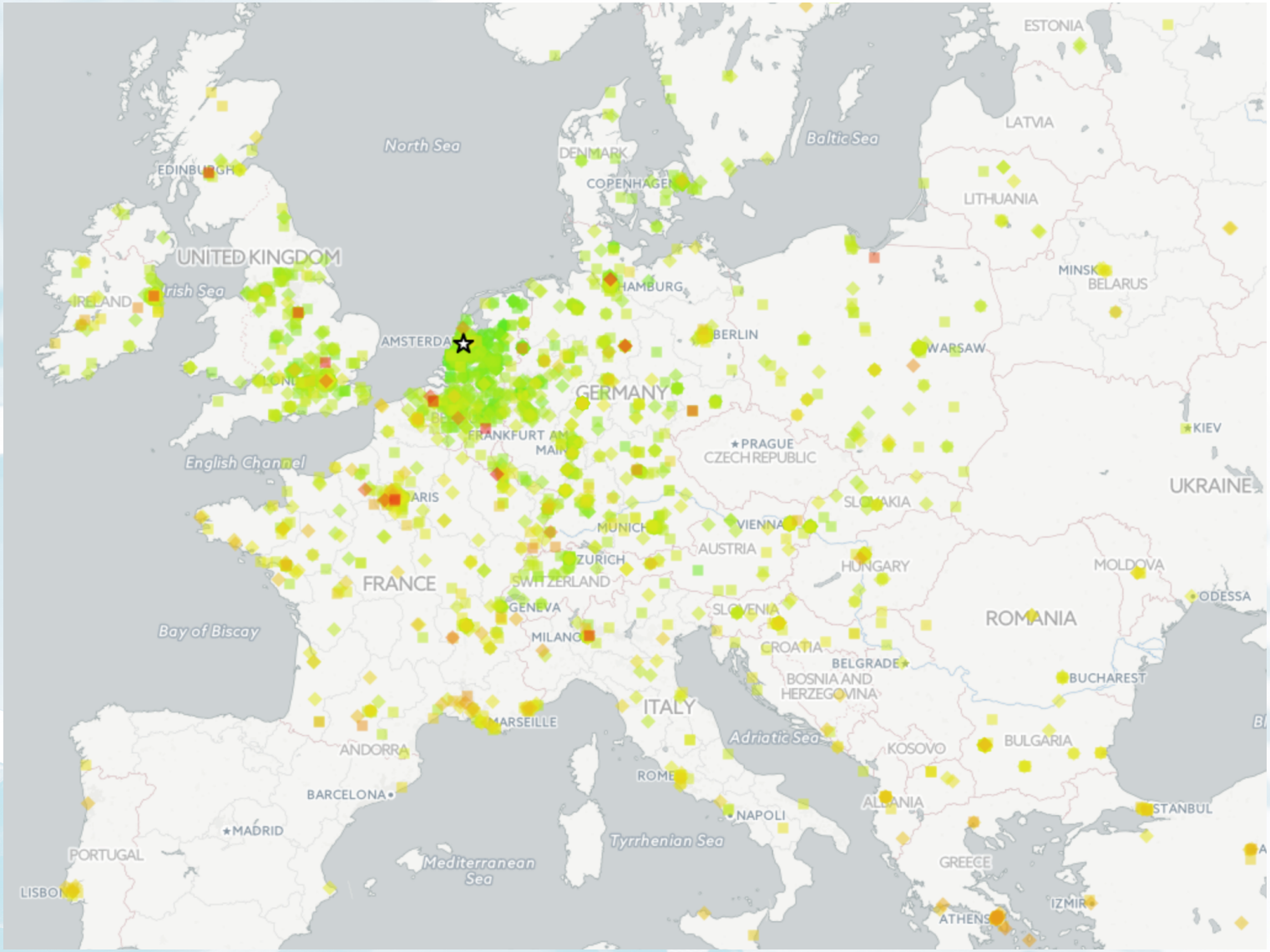
PAO1 over-connected - long reach IXes harmful?



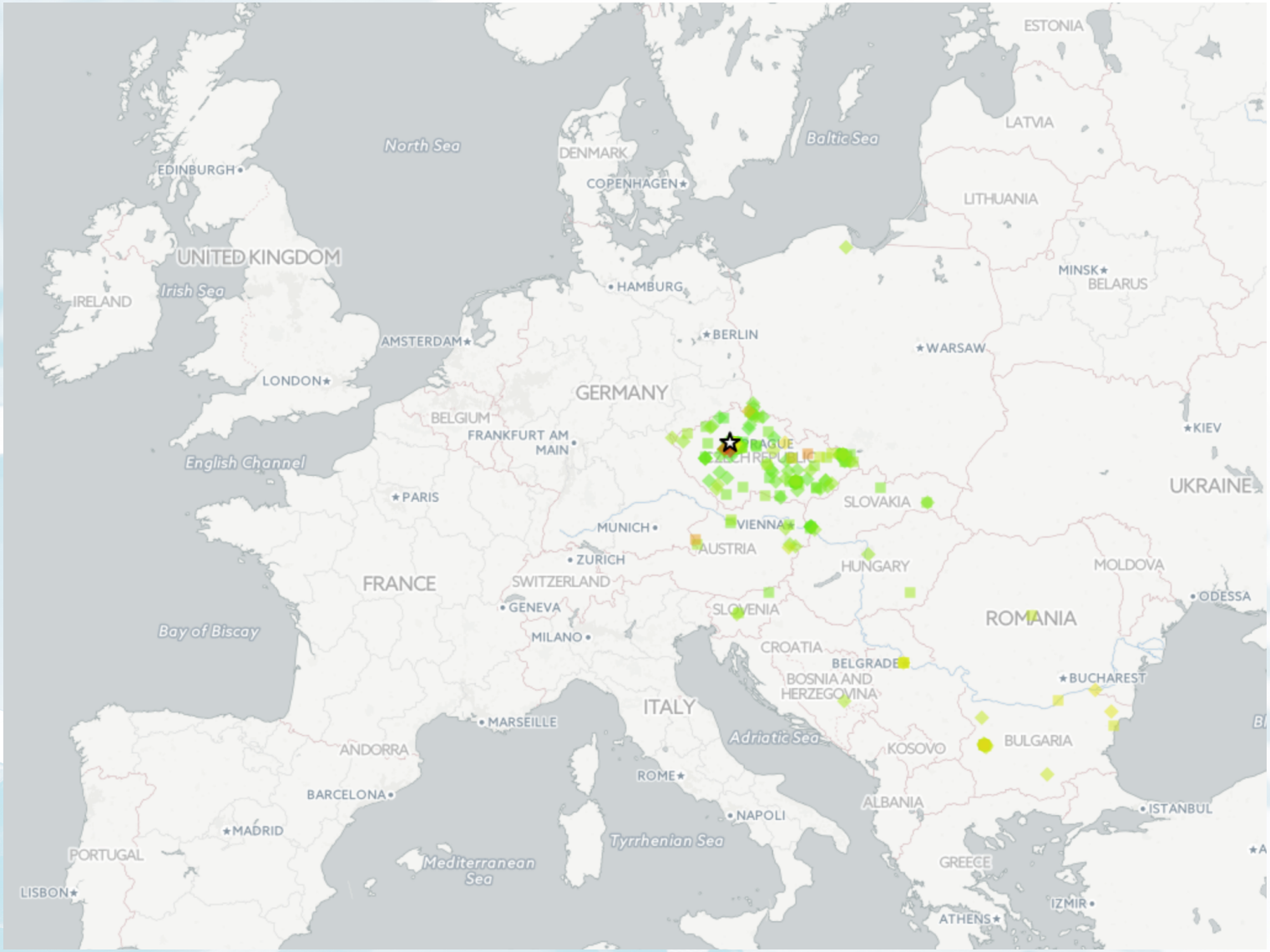
PAO1 after dropping route announcement to AS174



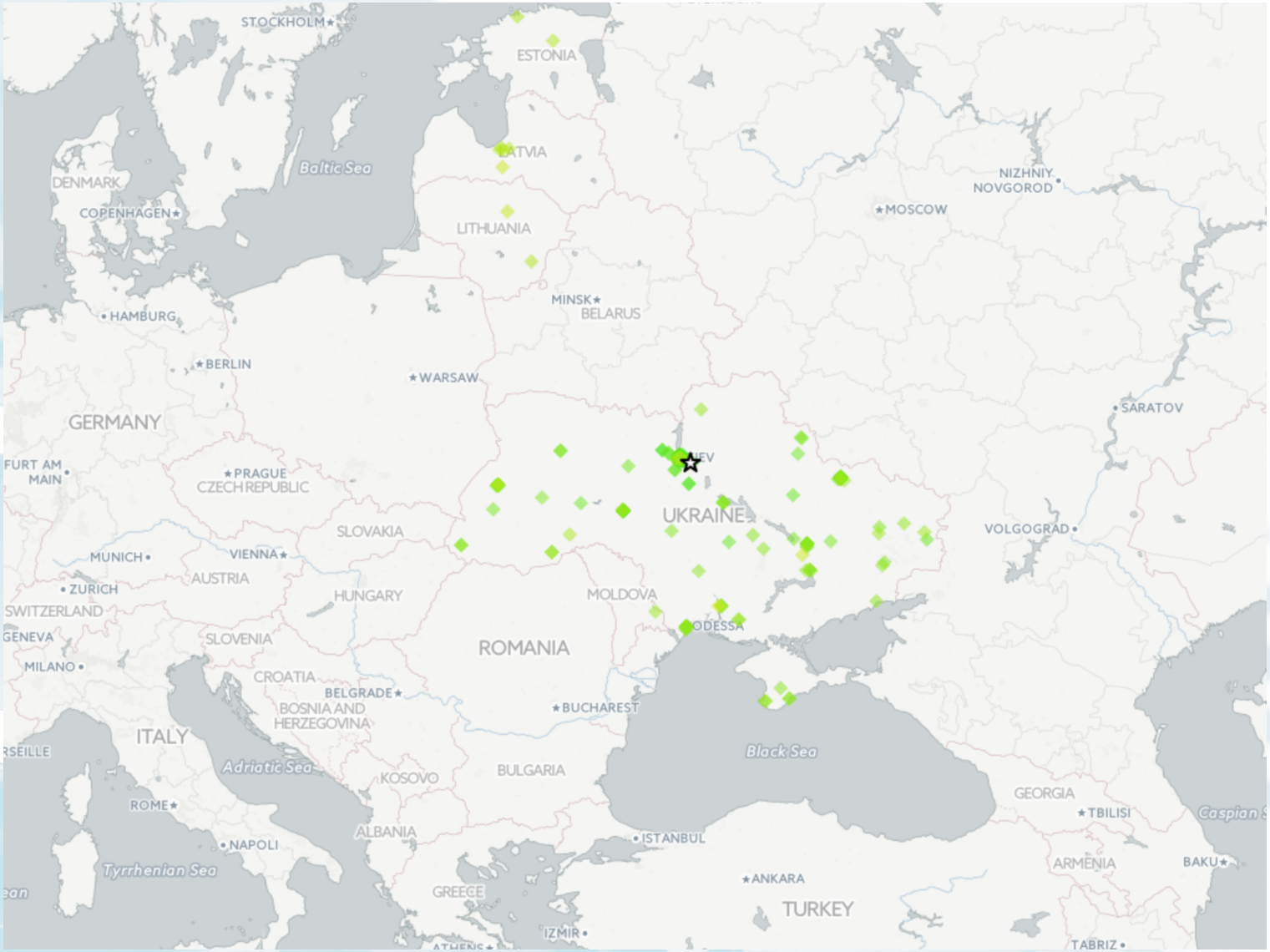
A closeup on AMS1



PRG1 probes


ESTONIA
LATVIA
North Sea
Baltic Sea
DENMARK
EDINBURGH
COPENHAGEN
LITHUANIA
UNITED KINGDOM
MINSK
BELARUS
IRELAND
Irish Sea
HAMBURG
BERLIN
AMSTERDAM
WARSAW
LONDON
GERMANY
BELGIUM
FRANKFURT AM MAIN
PRAGUE
KIEV
English Channel
UKRAINE
PARIS
SLOVAKIA
MUNICH
VIENNA
AUSTRIA
ZURICH
HUNGARY
MOLDOVA
FRANCE
SWITZERLAND
GENEVA
SLOVENIA
ODESSA
ROMANIA
Bay of Biscay
MILANO
CROATIA
BELGRADE
BOSNIA AND HERZEGOVINA
BUCHAREST
ITALY
MARSEILLE
Adriatic Sea
KOSOVO
BULGARIA
ANDORRA
ROME
BARCELONA
ALBANIA
ISTANBUL
NAPOLI
MADRID
Tyrrhenian Sea
PORTUGAL
Mediterranean Sea
GREECE
LISBON
IZMIR
ATHENS

KBP1 probes - political boundaries?



Any Questions