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.

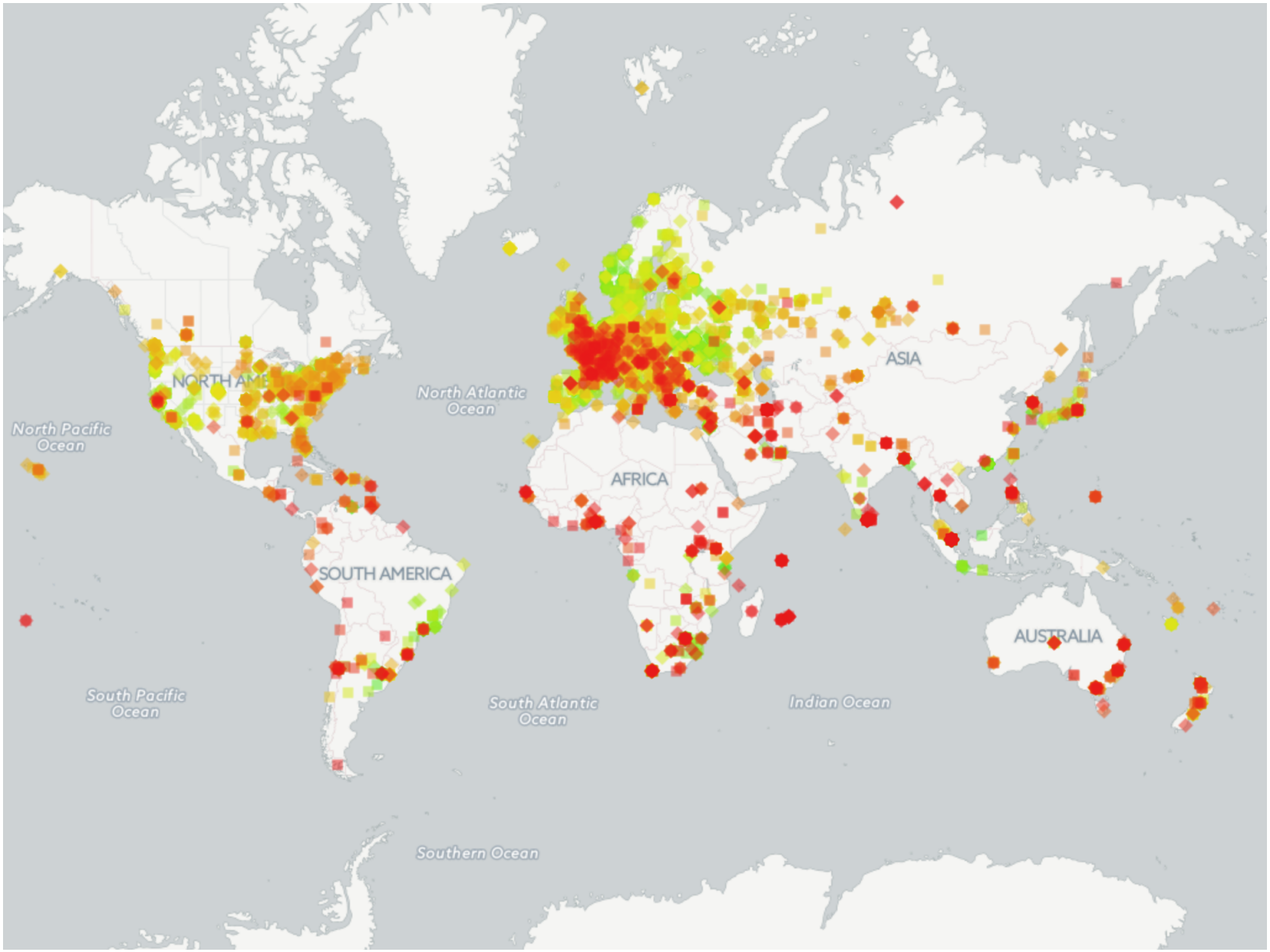
  `ams1a.f.root-servers.org`
- Also records response latency

RIPE Probe Visualisations

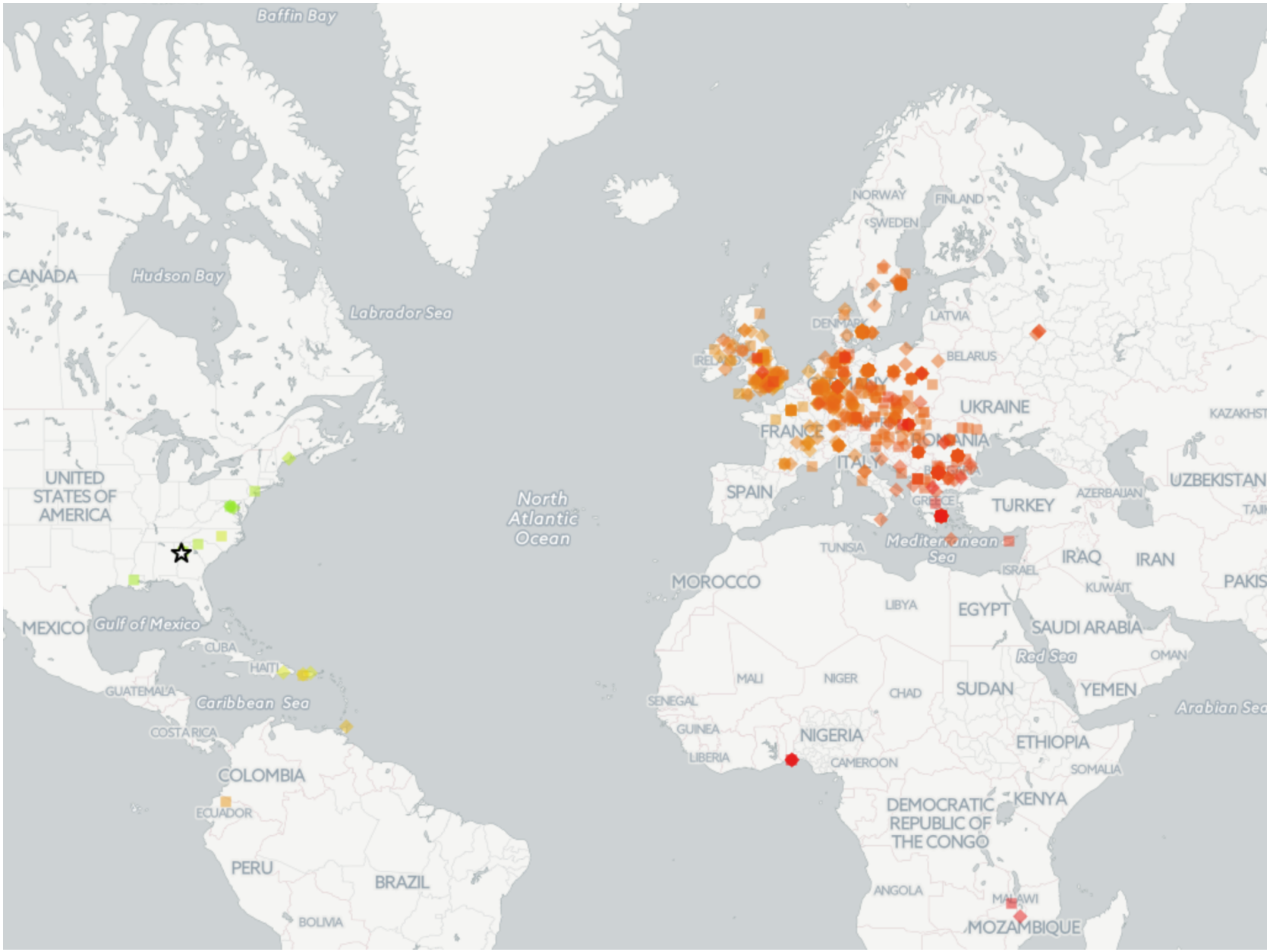
https://atlas.ripe.net/results/maps/

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

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



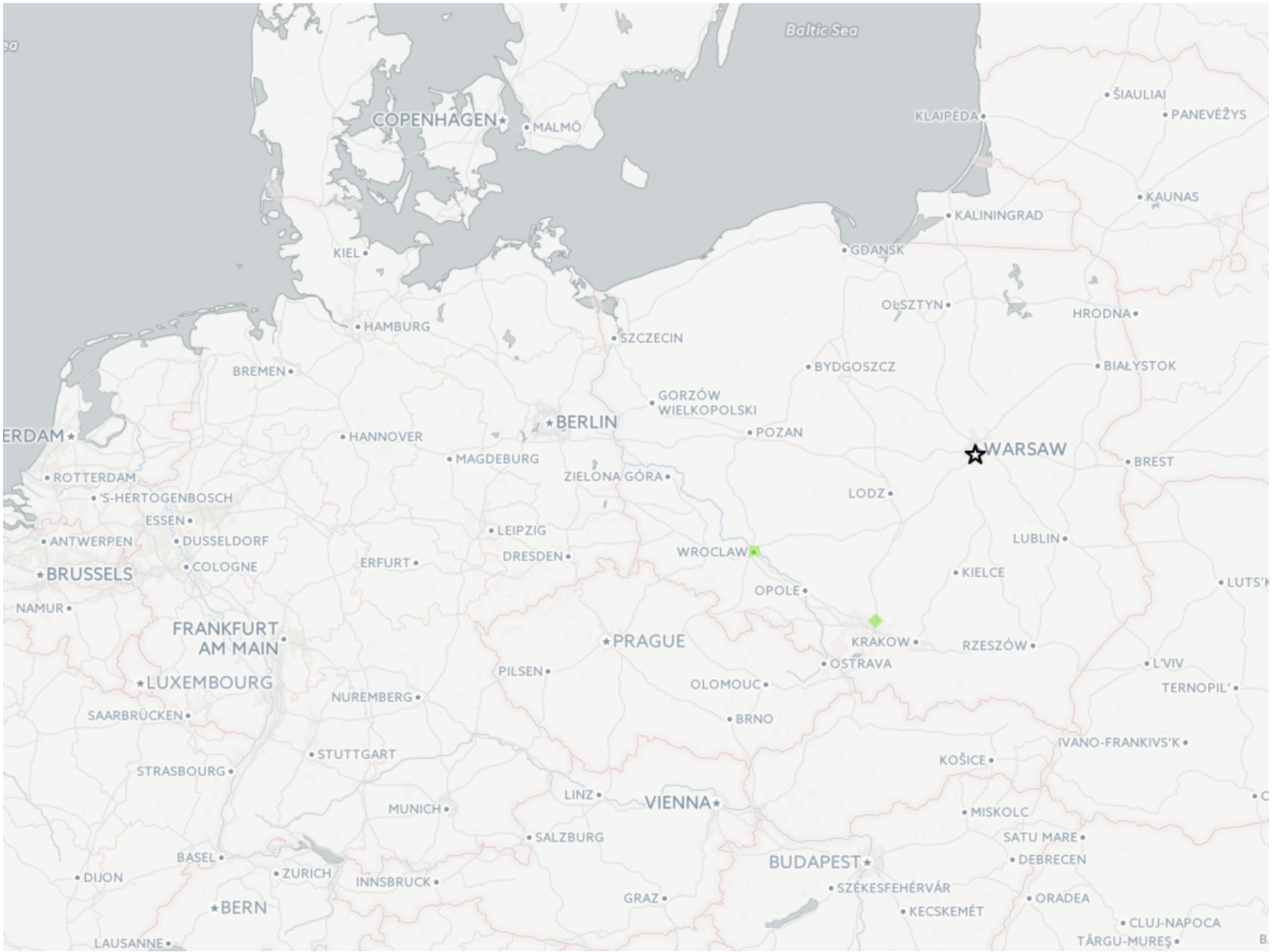
US Transit Misconfiguration (ATL1)



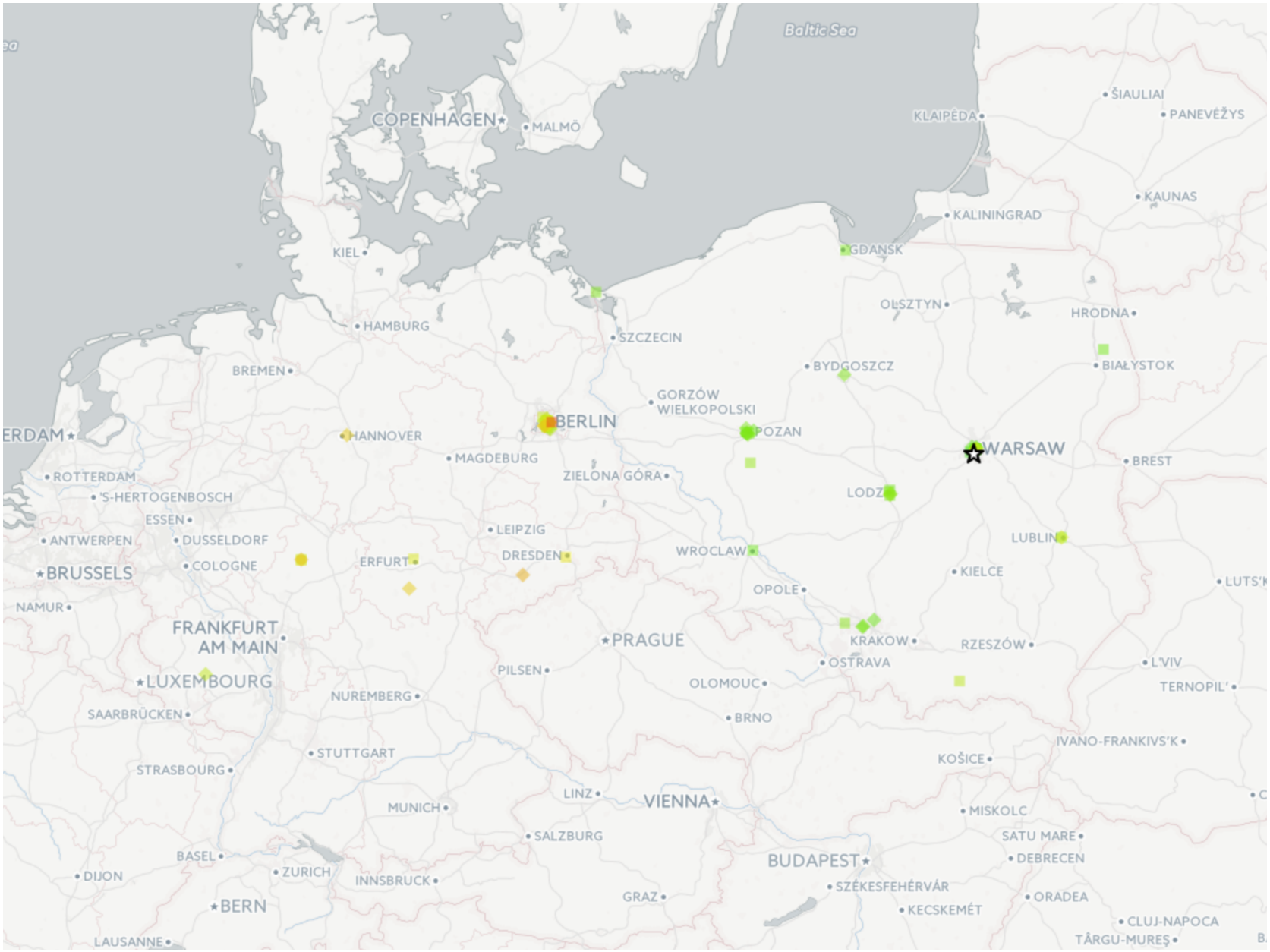
ATL1 - post reconfiguration

NO_EXPORT leak!

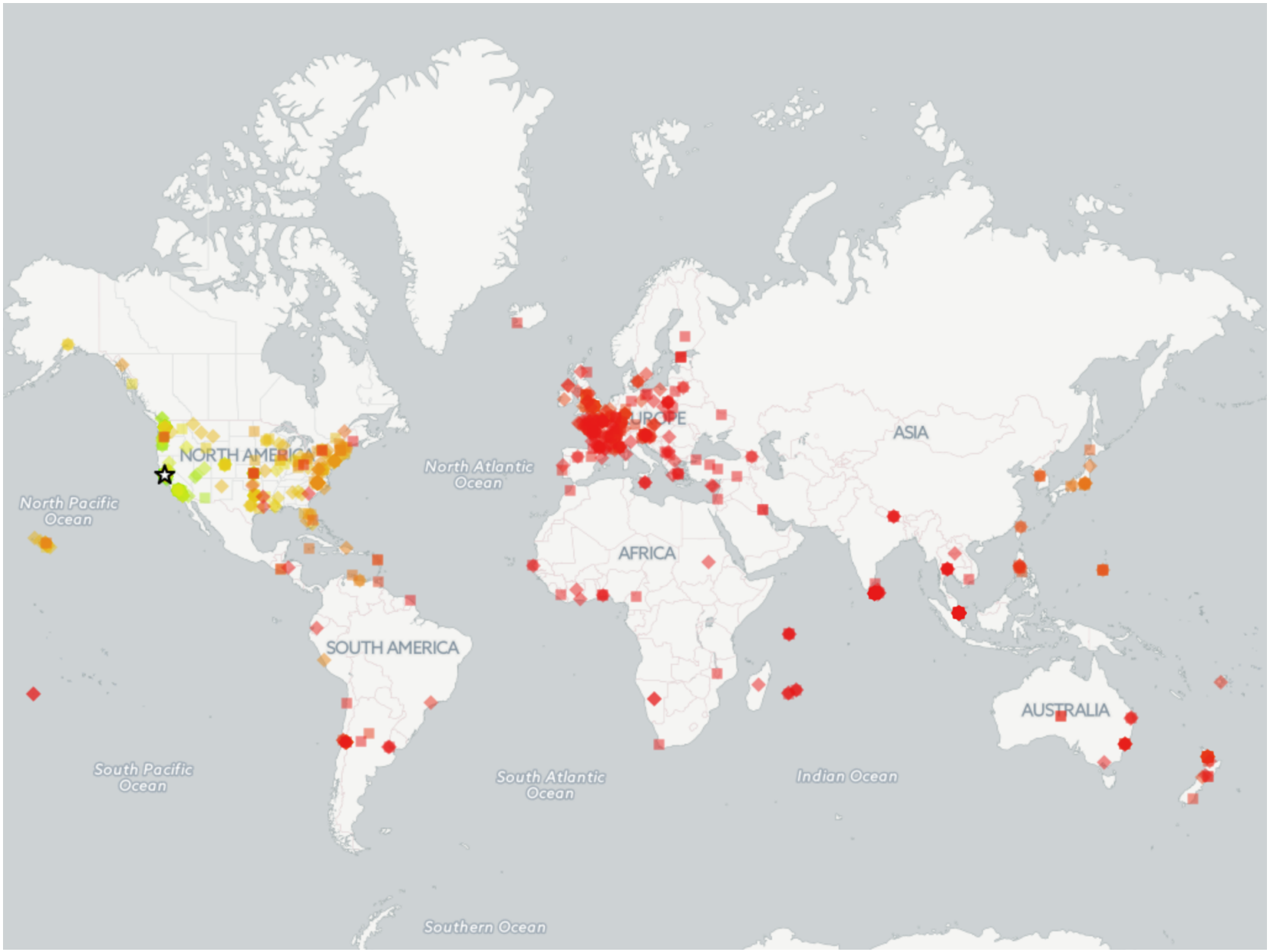
PLIX route server NO_EXPORT too strict



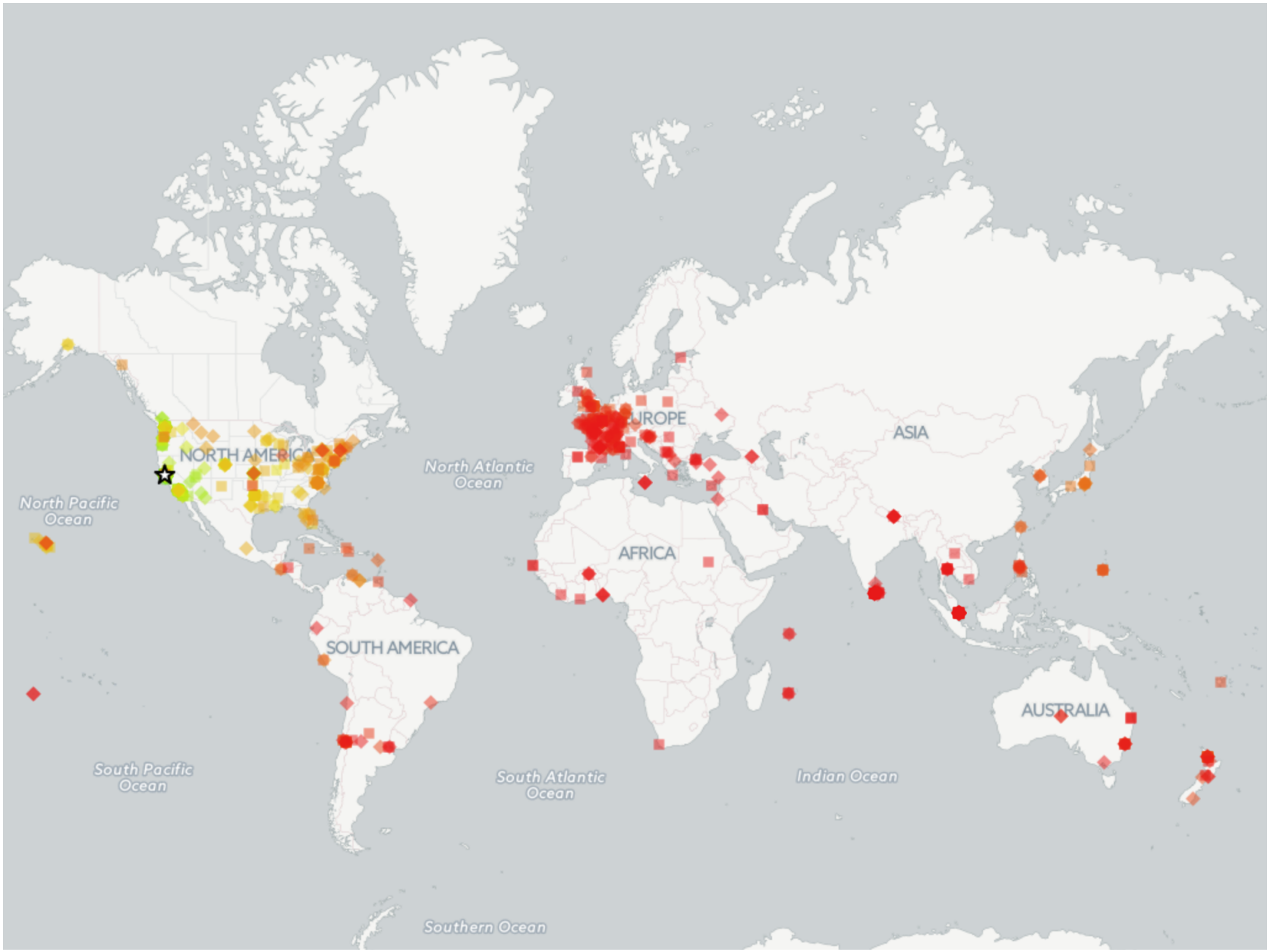
PLIX Fixed


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

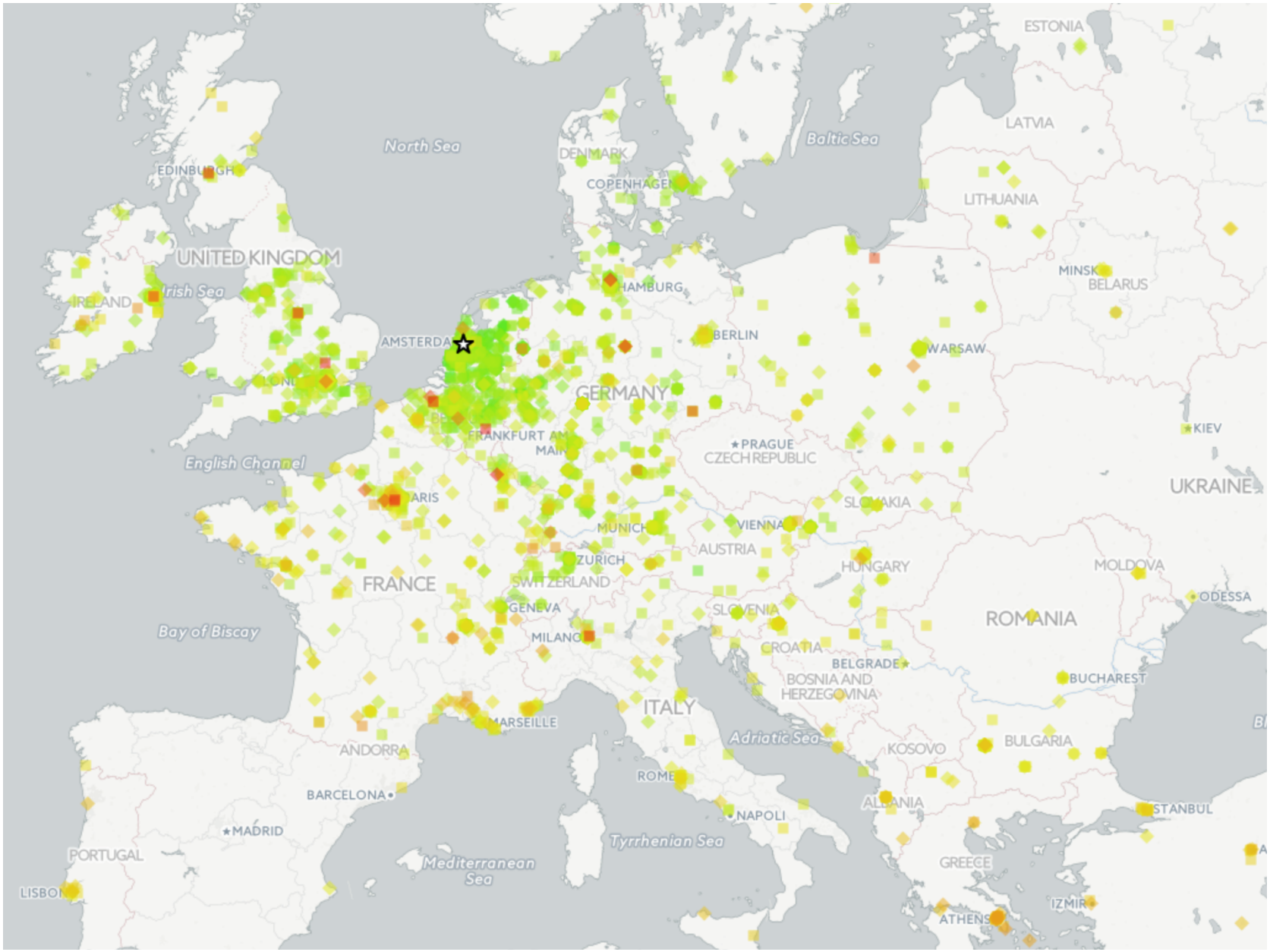
PAO1 over-connected - long reach IXes harmful?



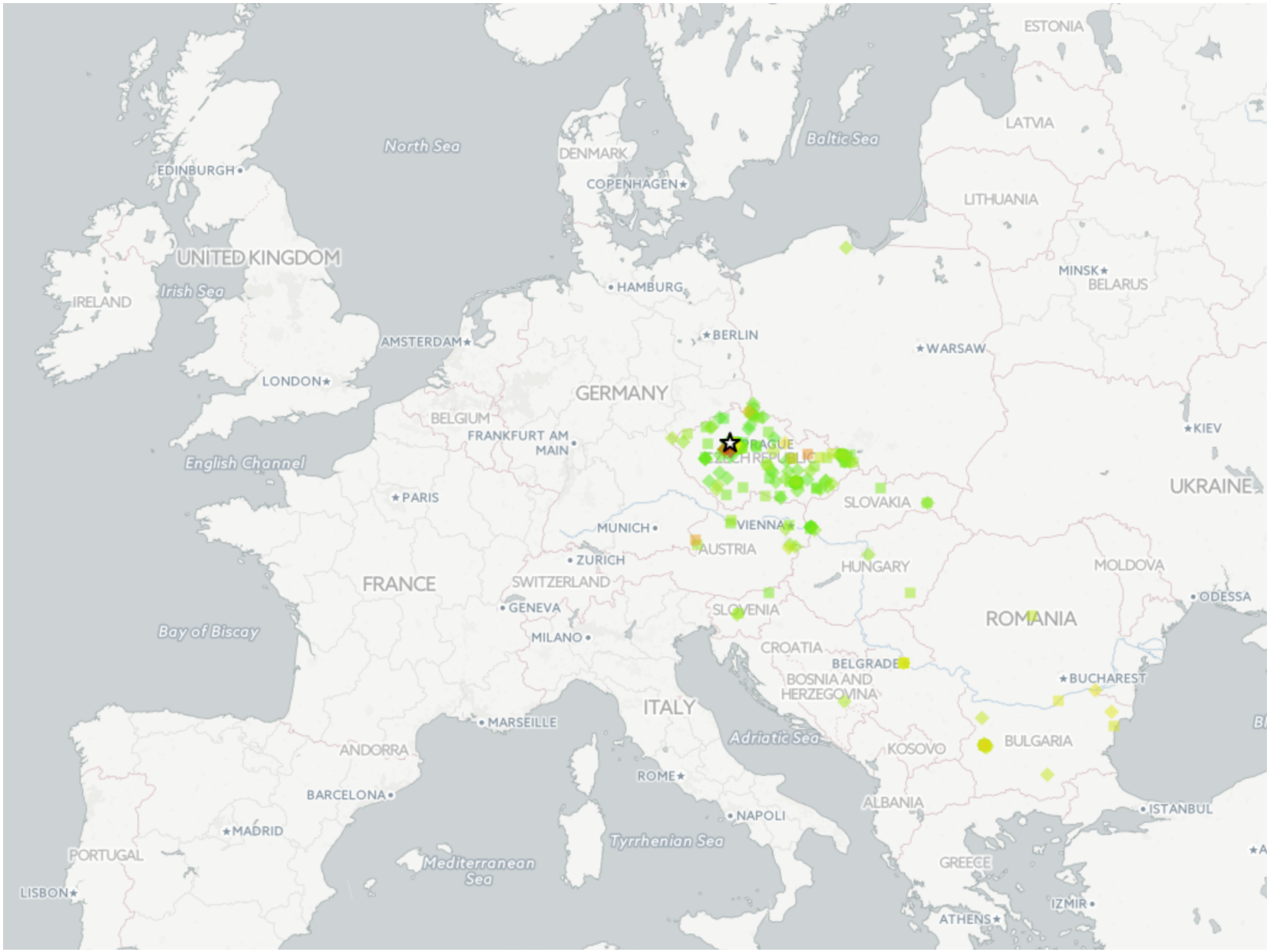
PAO1 after dropping route announcement to AS174



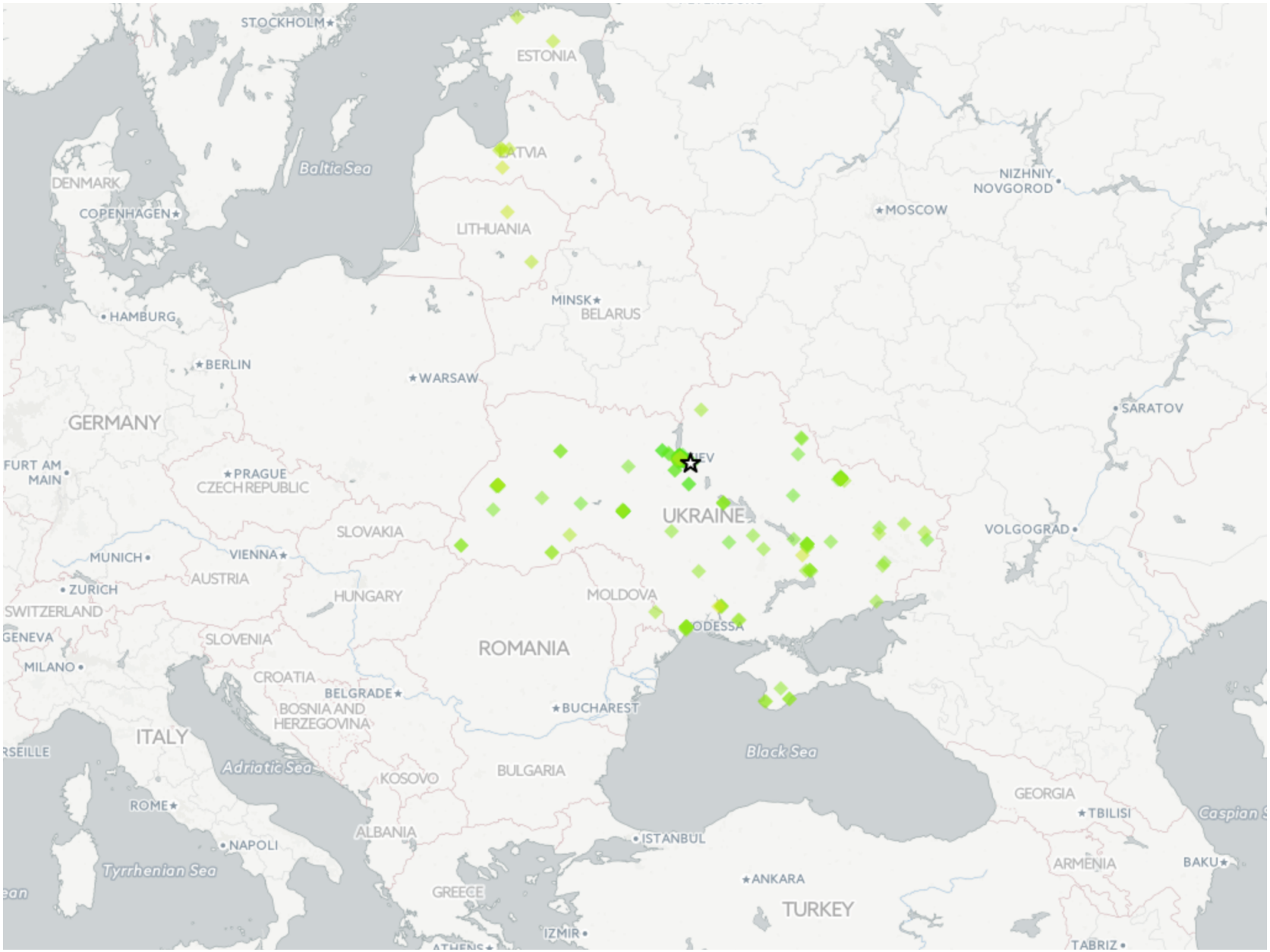
A closeup on AMS1



PRG1 probes


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

KBP1 probes - political boundaries?



Any Questions