

a)

Betweenness Values for Defined Stations CR-3D

Arrival Stations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16	0.0183	0.0133	0.0056	0.0086	0.0109	0.0137	0.0101	0.0105	0.013	0.0083	0.0086	0.0103	0.0068	0.0214	0.0131	NaN
15	0.0738	0.0371	0.0565	0.0622	0.0541	0.0636	0.0546	0.0857	0.0857	0.0633	0.0742	0.1282	0.0566	0.0563	NaN	0.06
14	0.0701	0.045	0.0504	0.0738	0.0697	0.0655	0.0464	0.0535	0.0617	0.0463	0.0653	0.0712	0.0473	NaN	0.0379	0.0506
13	0.0421	0.0282	0.0385	0.0403	0.0592	0.0507	0.0427	0.0583	0.0667	0.0718	0.0515	0.0685	NaN	0.0875	0.0899	0.0944
12	0.0539	0.0402	0.0461	0.0492	0.0804	0.0694	0.0519	0.1647	0.0873	0.0778	0.069	NaN	0.0891	0.0798	0.1133	0.0857
11	0.0587	0.0377	0.0403	0.0474	0.0578	0.0691	0.0519	0.0958	0.0859	0.112	NaN	0.0954	0.0804	0.1034	0.1176	0.0959
10	0.0471	0.0343	0.0417	0.0493	0.0658	0.0574	0.0551	0.0642	0.0904	NaN	0.102	0.1003	0.0909	0.1076	0.0915	0.115
9	0.0354	0.0315	0.033	0.0255	0.029	0.0468	0.051	0.063	NaN	0.0482	0.0356	0.0314	0.04	0.0355	0.0289	0.0357
8	0.0311	0.0262	0.0287	0.024	0.0718	0.0372	0.0404	NaN	0.0666	0.0776	0.0274	0.0965	0.0644	0.061	0.0764	0.0636
7	0.0168	0.0203	0.0133	0.0133	0.0214	0.0185	NaN	0.0357	0.0289	0.0319	0.0216	0.0274	0.0355	0.0264	0.0301	0.0366
6	0.0931	0.0736	0.0709	0.0905	0.0477	NaN	0.0474	0.0274	0.0228	0.0335	0.0292	0.0205	0.0185	0.0141	0.0135	0.014
5	0.0472	0.0513	0.0849	0.0282	NaN	0.0071	0.0651	0.0636	0.021	0.0346	0.0316	0.0293	0.0195	0.0141	0.0187	0.0148
4	0.0666	0.0551	0.0498	NaN	0.0047	0.0343	0.0154	0.0028	0.0051	0.0049	0.0023	0.0015	0	0.005	0.0053	0.0027
3	0.0443	0.0731	NaN	0.0248	0.0013	0.0121	0.0076	0.0011	0.0002	0.0042	0.0005	0.0012	0.0003	0.0013	0.0053	0.0005
2	0.022	NaN	0.0201	0.0059	0.0021	0.0039	0.004	0.0003	0.0003	0.0009	0.0073	0.002	0.0029	0.0047	0.0115	0.007
1	NaN	0.0531	0.0916	0.0324	0.0006	0.0072	0.0023	0.0006	0.0003	0.0009	0.0015	0.0001	0.0002	0.0002	0.0003	0.0021

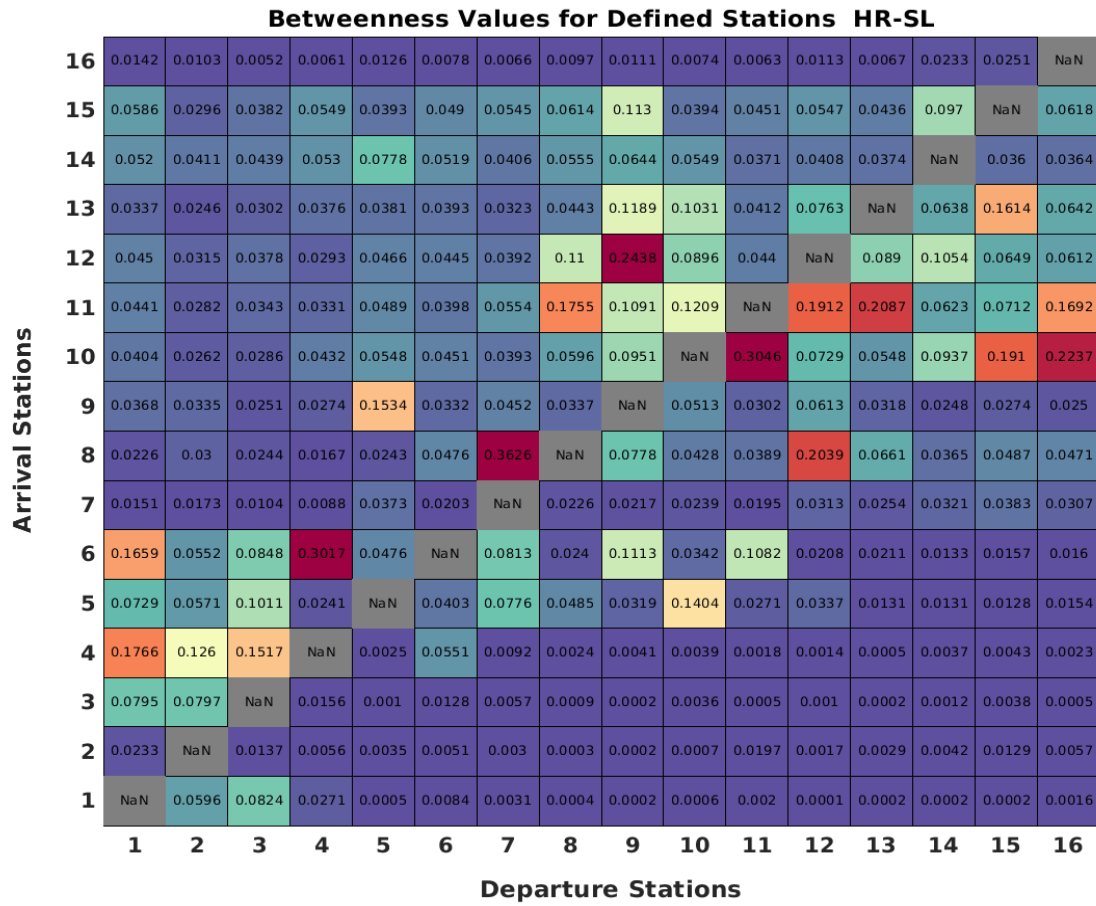
b)

Betweenness Values for Defined Stations CR-3D

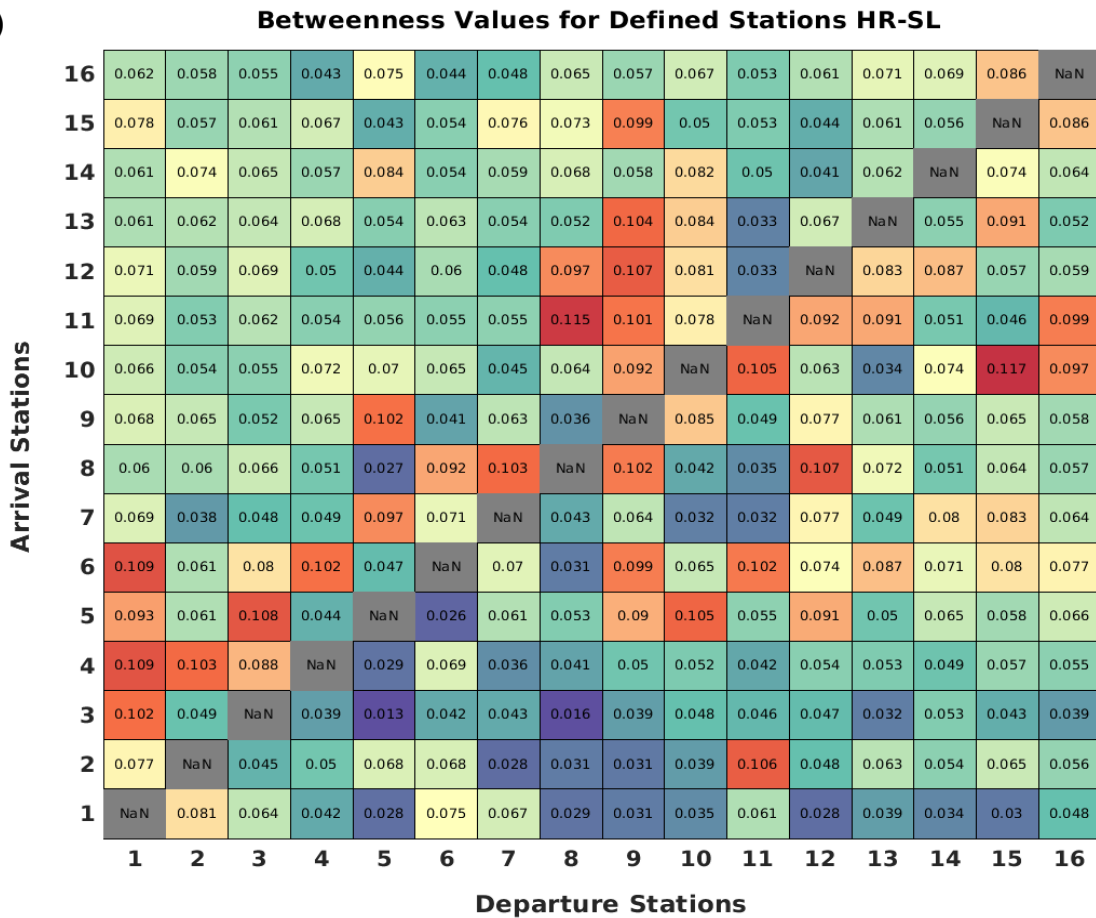
Arrival Stations	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
16	0.0544	0.051	0.0403	0.0409	0.0443	0.053	0.0499	0.0482	0.046	0.0504	0.0485	0.0383	0.0487	0.0431	0.0306	NaN
15	0.0665	0.0483	0.0618	0.0518	0.0405	0.0478	0.0519	0.069	0.051	0.0551	0.0588	0.0694	0.0535	0.0223	NaN	0.0567
14	0.056	0.0552	0.0507	0.0543	0.0512	0.0466	0.0461	0.0446	0.0381	0.0469	0.0593	0.049	0.0534	NaN	0.0529	0.0604
13	0.0514	0.0483	0.0559	0.0493	0.0567	0.0554	0.0486	0.047	0.0463	0.04	0.028	0.0407	NaN	0.0509	0.0412	0.0522
12	0.0581	0.0508	0.0573	0.0568	0.0516	0.0632	0.0428	0.0984	0.0479	0.0476	0.0356	NaN	0.0562	0.0542	0.0676	0.0565
11	0.0628	0.0479	0.0497	0.0529	0.0448	0.0644	0.035	0.0594	0.0539	0.049	NaN	0.0525	0.0356	0.0577	0.0517	0.0451
10	0.0527	0.0483	0.0543	0.056	0.0576	0.0563	0.0431	0.0472	0.0596	NaN	0.0535	0.0586	0.0382	0.0579	0.0382	0.0495
9	0.0447	0.0416	0.0461	0.0411	0.0154	0.039	0.0485	0.0461	NaN	0.0543	0.0389	0.0268	0.0517	0.055	0.0469	0.0565
8	0.0558	0.0355	0.0528	0.0495	0.055	0.0487	0.0269	NaN	0.0581	0.0517	0.0168	0.0759	0.0478	0.0577	0.0686	0.0524
7	0.052	0.0307	0.0412	0.0506	0.0377	0.0439	NaN	0.0459	0.0578	0.0292	0.0242	0.0457	0.0467	0.0448	0.0443	0.0516
6	0.0589	0.0555	0.0454	0.0236	0.0319	NaN	0.0276	0.0243	0.0415	0.0432	0.0448	0.0496	0.0517	0.0514	0.0468	0.0455
5	0.0409	0.0374	0.0582	0.0352	NaN	0.0031	0.0349	0.0472	0.0403	0.0417	0.0437	0.059	0.0506	0.0474	0.0583	0.0432
4	0.0325	0.036	0.0197	NaN	0.0374	0.0292	0.0404	0.0333	0.0425	0.0442	0.0365	0.0388	0.0447	0.0464	0.0472	0.044
3	0.0388	0.0302	NaN	0.0425	0.0121	0.0272	0.0393	0.0128	0.0286	0.0385	0.0299	0.0396	0.0297	0.0376	0.0409	0.0277
2	0.0492	NaN	0.0448	0.0365	0.0276	0.0352	0.0251	0.0225	0.0268	0.0329	0.0336	0.0372	0.0431	0.0416	0.0396	0.047
1	NaN	0.049	0.0483	0.0345	0.0245	0.0434	0.0346	0.0253	0.0311	0.0339	0.0313	0.026	0.0293	0.0261	0.0285	0.0417
Departure Stations																

**Figure S1:** Betweenness values calculated for CR-3D and HR-2D based on (a, c) Dijkstra's solution and (b, d) improved method by Costa et al. (2017).

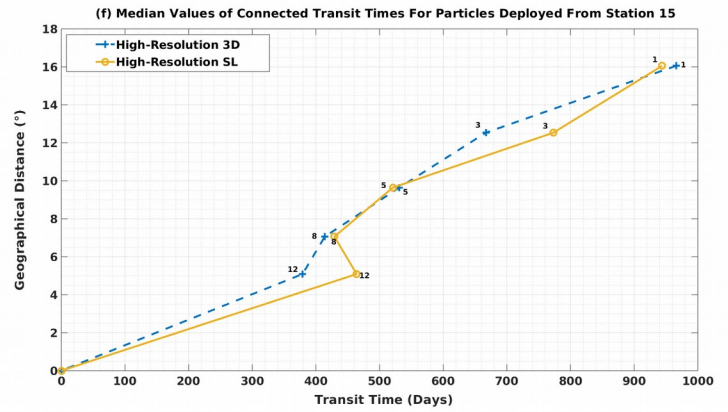
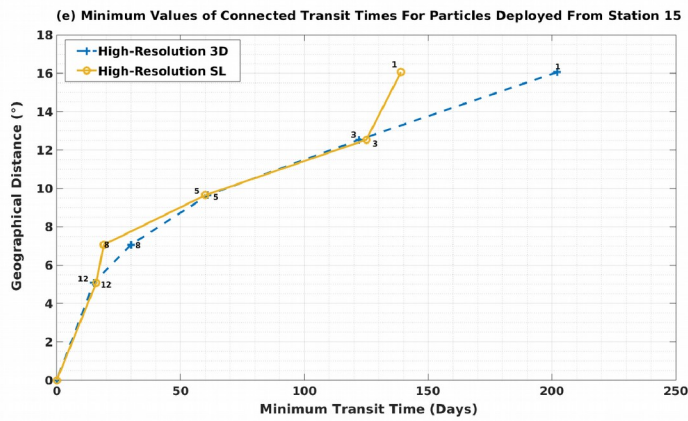
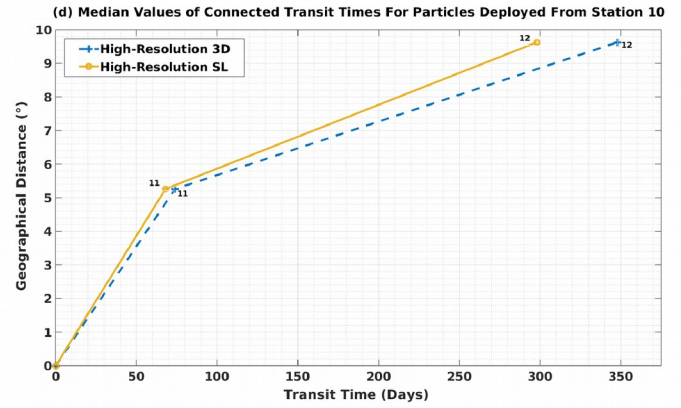
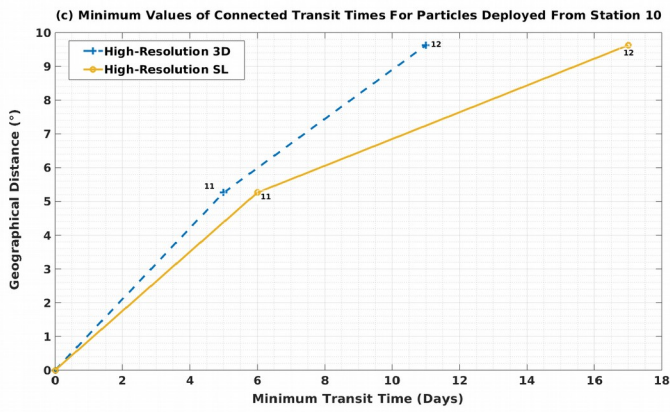
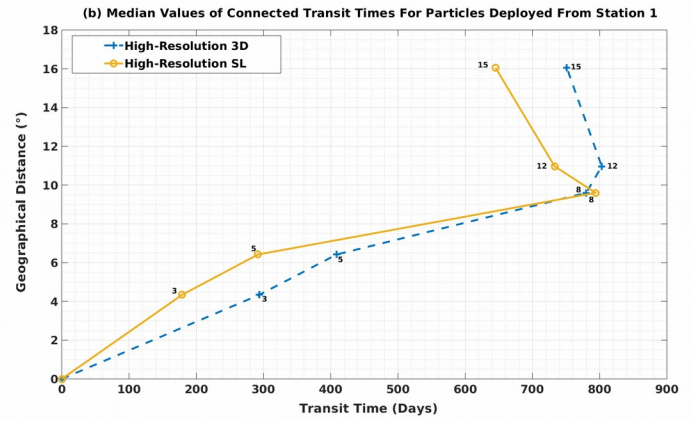
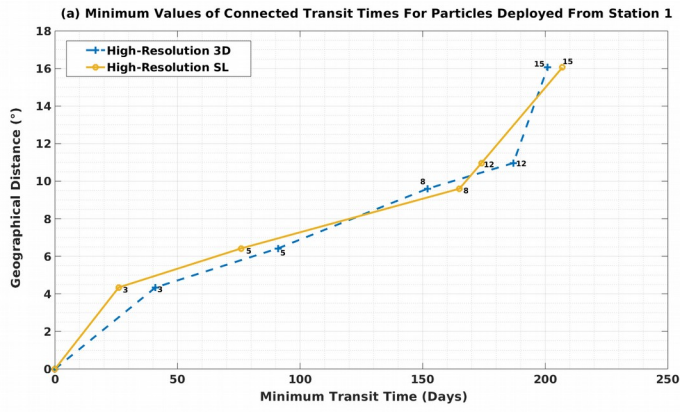
c)



d)



**Figure S1, continued:** Betweenness values calculated for CR-3D and HR-2D based on (a, c) Dijkstra's solution and (b, d) improved method by Costa et al. (2017).



**Figure S2:** Comparison of HR-3D and HR-SL minimum and median transit time, (a, b) Along diagonal direction for particles deployed initially from station 1. (c,d) Along front for particles deployed initially from station 10. (e,f) Along diagonal direction for particles deployed initially from station 15.