Figure 1 Map showing the sampling stations and tracks of air parcel divided into boxes of equal dimensions. The position of boxes was defined such that majority of the HYSPLIT trajectories pass through it. The orange, green and blue filled circle represents the location of sampling station at Kolkata, Kakinada and Bangalore respectively. The ocean layer represents the $\delta^{18}O$ in surface water isotopic composition, a compilation of available observations (in Schmidt et al. 1999). The isotopic composition remains fairly constant over the BoB with slightly depleted values near the Ganges delta (Box 7) due to the freshwater input. Solid pink circles represent the locations of rainwater samples collected for isotopic measurements over the BoB in the year 2012.
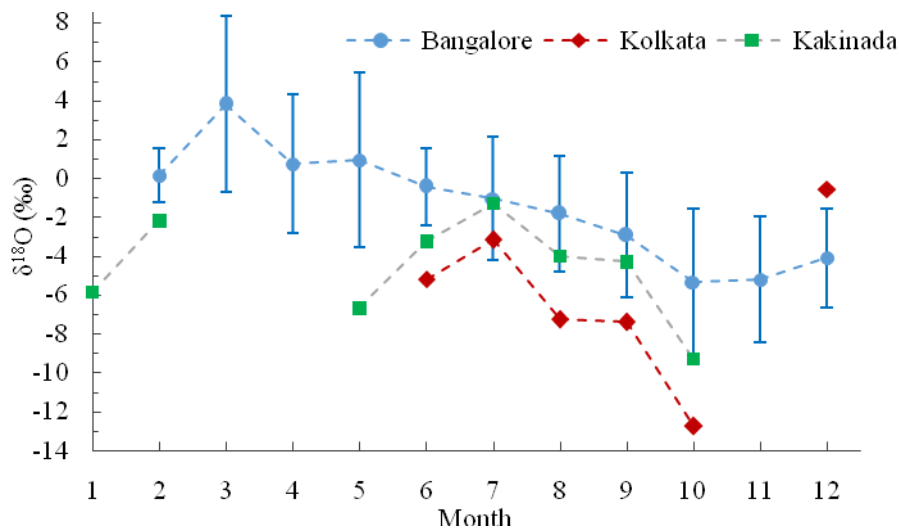

Figure 2 Monthly averaged $\delta^{18}O$ values for Bangalore (blue filled circle) station comprising samples for the years 2008-2014 including 2004 data from GNIP data base. The bars represent the scatter recorded (from Rahul P. and Rangarjan R.) in the observed values. Isotopic composition of Kakinada (green square) and Kolkata (red diamond) for the year 2004 are obtained from GNIP database.

a) Kolkata -48 hours

b) Kolkata -72 hours

c) Kolkata -96 hours

d) Bangalore -48 hours

e) Bangalore -72 hours

f) Bangalore -96 hours

200 m   500 m   1000 m   1500 m   2000 m   2500 m

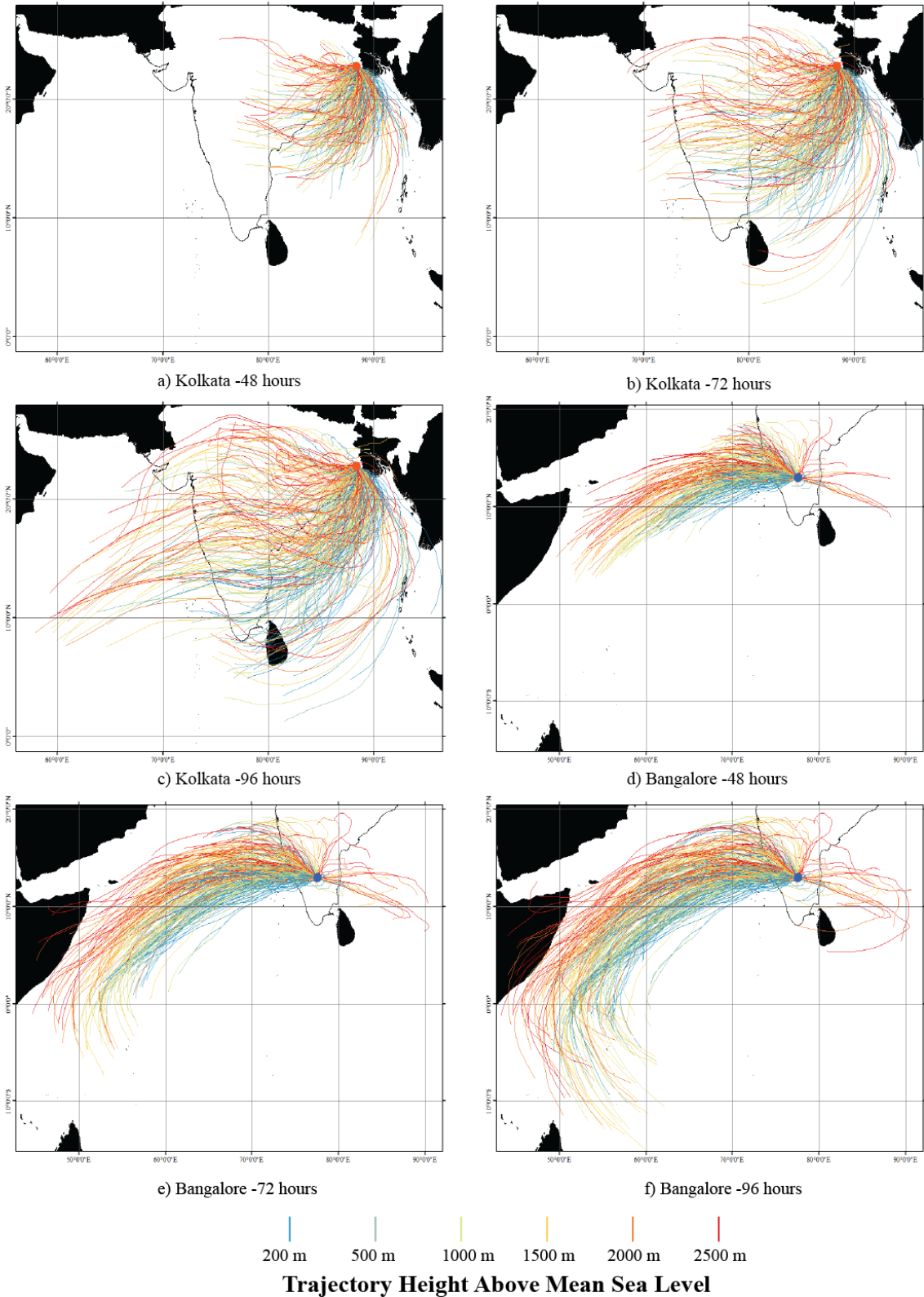**Trajectory Height Above Mean Sea Level**

Figure 3 Backward air-mass Trajectories (-48 hours, -72 Hours and -96 hours prior to a rainy day at 200m, 500m, 1000m, 1500m, 2000m and 2500m above MSL for a single year (2004) at Bangalore and Kolkata during all rainy days of the SWM months. The modelling transect is chosen such that majority of the trajectories pass through it.
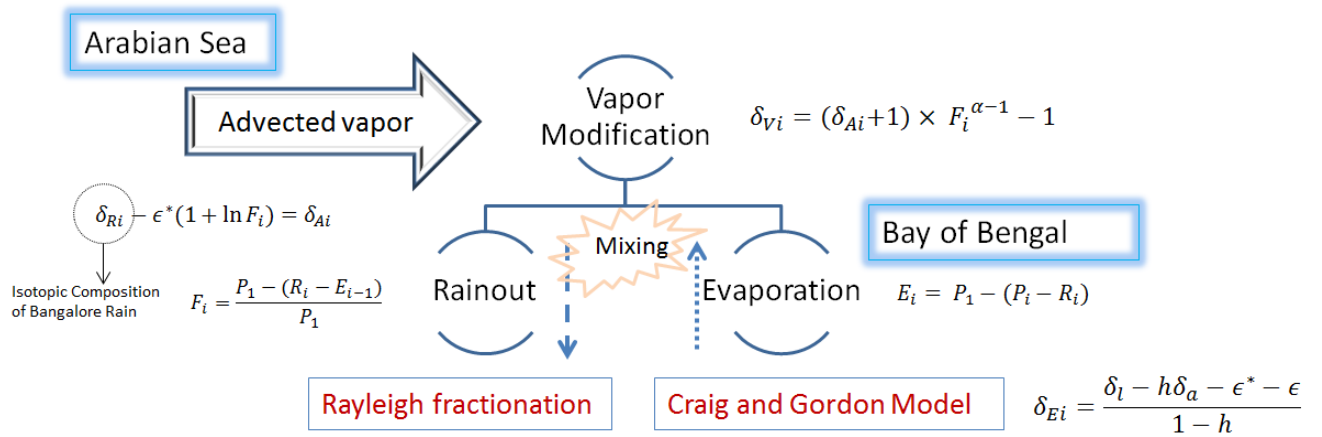
Figure 4 Schematic representation describing the modelling procedure and formulation for estimating the final isotopic values in rainwater at Kolkata .

The equations shown in the schematic are:

$$\delta_{vi} = (\delta_{Ai}+1) \times F_i^{\alpha-1} - 1$$

$$\delta_{Ri} - \epsilon^*(1 + \ln F_i) = \delta_{Ai}$$

$$F_i = \frac{P_1 - (R_i - E_{i-1})}{P_1}$$

$$E_i = P_1 - (P_i - R_i)$$

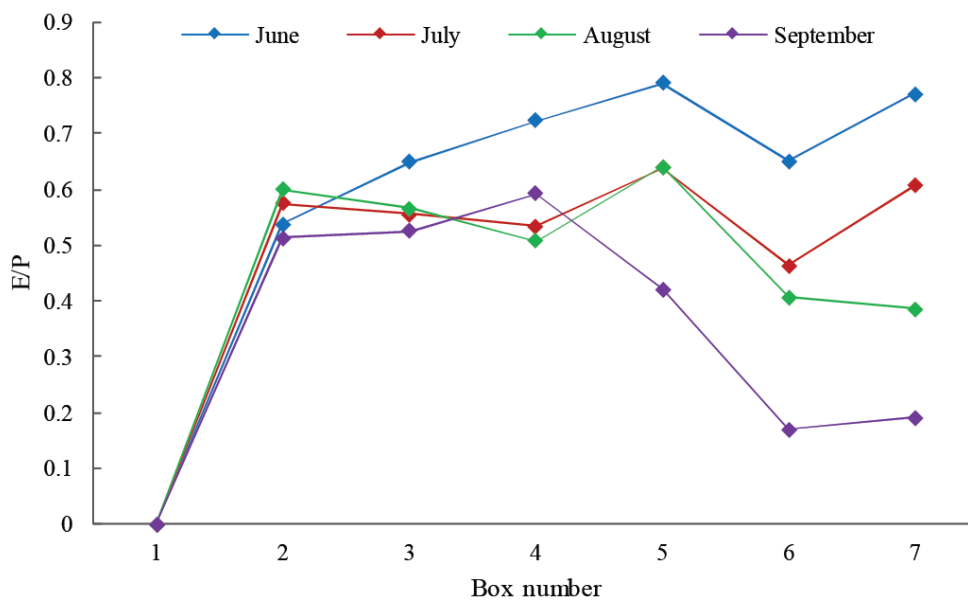$$\delta_{Ei} = \frac{\delta_l - h\delta_a - \epsilon^* - \epsilon}{1 - h}$$

Figure 5 Ratio of evaporation and precipitation estimated (E/P) for each boxes for different months of the year 2004 covering entire SWM time.
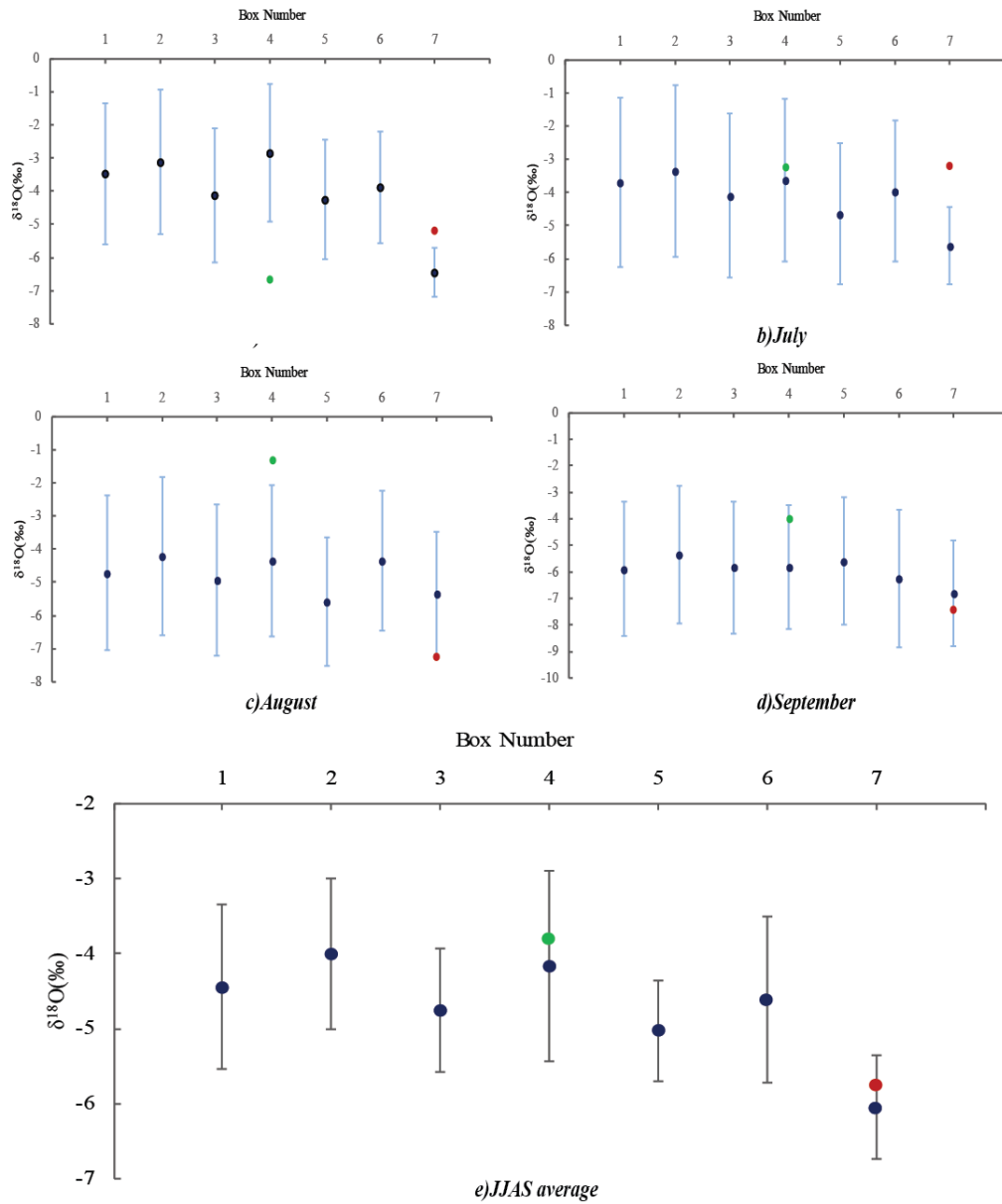
Figure 6 Dark blue represents the $\delta^{18}O$ (‰) mean modelled value for rain over each boxes as calculated using the Rayleigh's distillation equation (5a-5d for the individual SWM months and 5e for the whole period of the SWM). The bars represent the standard deviation. Green and red solid circles represent the mean observed isotopic composition of rain at Kakinada and Kolkata respectively for the year 2004.

Table 1Rainwater d18O values measured on samples collected across BoB for the SWM (CTCZ expedition) time of 2012.

S no.	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	$\delta^{18}O$(‰)
1	18.99	89.39	-1.74
2	18.99	89.39	-1.55
3	18.99	89.39	-1.53
4	19.02	89.39	-1.31
5	19.00	89.60	-4.26
7	19.00	90.00	-4.80
8	19.00	88.84	-3.71
9	19.00	88.84	-3.58
10	19.00	88.84	-3.55
11	19.01	88.80	-2.60

12	19.01	89.00	-3.18
13	19.01	89.00	-0.06
14	19.01	89.01	-2.04
15	19.01	89.01	-2.14
17	19.01	89.01	-1.42
18	19.00	89.01	-1.54
19	19.02	89.01	-1.32
20	19.02	89.01	-0.06
21	19.02	89.02	-0.04
22	19.02	89.02	-3.55
23	19.00	89.02	-2.98
24	19.00	89.00	-2.68
25	19.01	89.00	-2.84
26	19.01	89.01	-0.71
27	19.01	89.01	-0.78
28	19.01	89.00	-0.88
29	19.01	89.00	-0.97
30	19.01	89.01	-0.81
31	19.01	89.01	-0.14
32	18.06	89.01	-0.57
33	16.69	88.98	-1.98
34	14.51	88.86	-0.36

Table 2 Shows fraction of remaining vapor over each box and the isotopic composition of vapor derived based on model results over each box for the year 2004. The values in brackets are the standard deviation from the calculated mean value.

Box	1	2	3	4	5	6	7	
f	*0.9354*	*0.9676*	*0.8748*	*0.9903*	*0.8588*	*0.8872*	*0.6804*	
$\delta^{18}O_v(‰)$	*-13.11* *(±2.57)*	*-13.10* *(±2.58)*	*-13.08* *(±2.50)*	*-13.08* *(±2.52)*	*-13.06* *(±2.39)*	*-13.03* *(±2.33)*	*-12.98* *(±1.96)*	*June*
f	*0.9262*	*0.9586*	*0.8895*	*0.9295*	*0.8369*	*0.7504*	*0.9125*	
$\delta^{18}O_v(‰)$	*-13.24* *(±2.75)*	*-13.23* *(±2.74)*	*-13.22* *(±2.75)*	*-13.20* *(±2.74)*	*-13.18* *(±2.73)*	*-13.16* *(±2.73)*	*-13.12* *(±2.72)*	*July*
f	*0.9135*	*0.9591*	*0.888*	*0.9407*	*0.8192*	*0.9286*	*0.8327*	
$\delta^{18}O_v(‰)$	*-14.19* *(±2.95)*	*-14.18* *(±2.96)*	*-14.16* *(±2.95)*	*-14.15* *(±2.94)*	*-14.12* *(±2.94)*	*-14.11* *(±2.93)*	*-14.08* *(±2.93)*	*August*
f	*0.8987*	*0.9511*	*0.8986*	*0.8859*	*0.9103*	*0.8673*	*0.7761*	
$\delta^{18}O_v(‰)$	*-15.32* *(±3.21)*	*-15.31* *(±3.21)*	*-15.29* *(±3.20)*	*-15.27* *(±3.20)*	*-15.25* *(±3.20)*	*-15.23* *(±3.19)*	*-15.19* *(±3.18)*	*September*