Letter to the referee #2

We would like to thank the Referee #2 for the careful reading and constructive comments. We have addressed the comments carefully and revised the manuscript according to these suggestions. The details were presented as follows.

Specific comments:

1. Does the presence of a large body of water at the NamCo station affect aerosol levels at all?

   Response: No remarkable effect of the Nam Co Lake on observed aerosol masses was found. Firstly, when we checked the horizontal wind received at the station, there was no correlation between aerosol mass and wind crossing the lake. Secondly, we roughly estimated the contribution of potential lake salts (according to the NamCo lake salts reported by *Guo et al. (2012)*) to aerosol mass, basing on ionic species in observed aerosols at the Nam Co station. Consequently, its proportion was small compared to other sources.

2. Why are there so few data for the Ngari station compared to the others? Does the lack of data for a complete annual cycle bias the results from this station?

   Response: It is very pity that relative few data of online-$PM_{2.5}$ was obtained at the Ngari station, because of the extremely isolated and harsh conditions in this region, and then serious problems in power supply and equipment breakdown. Generally, the uncomplete annual cycle of online $PM_{2.5}$ didn't bias the results from this station, as we showed below:

   The totally valid datasets in on-line $PM_{2.5}$ were 1963 (hourly) and 88 (daily) during the periods of Oct-Nov 2011, Mar-May 2012, and Aug-Sep 2012 (Tab.2 and Fig. 1) at the Ngari station. We then gained the spring (with average of 16.8 ± 4.9 μg m^{-3} for the daily data) and autumn (17.8 ± 5.4 μg m^{-3}) online $PM_{2.5}$ datasets. If we consider the two periods as two converse seasonal conditions, there may be a small bias in the calculated $PM_{2.5}$ level at this site. Additionally, the completely annual samples (54 sets) of size-segregated particles were obtained by week collection (Tab. 3, and please see the information about sampled filters in the Tab. R1).

3. Where is the discussion of the aerosol composition? You list an IC, OC analyzer, and MS among the instrumentation, yet there is little mention of specific composition measurements. This would be very useful, especially using the diurnal variability mineral dust fraction to supplement the discussion of dynamic aerosol generation at the Ngari station (paragraph starting line 272). Will there be a companion paper discussing the composition measurements?

   Response: As the referee has mentioned above, aerosol chemical compositions are significant in identification of dust's occurrence. Hence, as one part of aerosol observation net in the HTP, the instrumentations of chemical analysis including IC, carbon analyzer and ICP-MS were displayed in Table 1. These results then provided the base of reconstruction of dust mass fractions in the sampled aerosol particles, which are 26% at the Ngari station and 29% at the QOMS station (in $PM_{2.1}$) (please see Line 229-230). A companion paper will present a comprehensive discussion of chemical compositions in size-segregated aerosols at the stations.

4. ~2 years is not a statistically significant amount of time for discussing seasonal variability in aerosol loadings. How did the meteorological conditions in the region during the 2011-2013 period compare to previous and subsequent years? Were the temperature, rainfall, and wind patterns typical?

   Response: We agree with that ~2 years is not a statistically significant amount of time for discussing seasonal variability. Then, we showed the seasonal patterns of HTP aerosol mass loadings in Section 3.3. We now use the more accrete words "seasonal patterns" in the lines 52, 332, 376 and 377 to instead of "seasonal variations" in old version of manuscript.

   Generally, the patterns of these meteorological parameters were very similar with the previous reports at near sites, respectively, at the Nepal Climate Observatory-Pyramid *(Bonasoni et al., 2010)*, the Nam Co *(Wan et al., 2015)*, and Southeastern TP *(Wang et al., 2010)*. No clear changes in seasonal patterns of these meteorological parameters were found in subsequent years at our stations. These stations (platforms) were set up for a major aim of meteorological observation with the typically regional meteorological conditions including the temperature, rainfall, and wind patterns *(Ma et al., 2008)*. Please see the datasets of station meteorology in 2011-2013 in the Table R2.

Technical comments:

1. Line 176: Please clarify that diameter is indicated.

   Response: Now, the text is "size-segregated airborne particles (with the diameters of <0.43 μm, 0.43-0.65 μm, 0.65-1.1 μm, 1.1-2.1 μm, 2.1-3.3 μm, 3.3-4.7 μm, 4.7-5.8 μm, 5.8-9.0 μm, and >9.0 μm, respectively) were collected weekly using airborne particle nine-stage samplers"

2. Line 192: either "the" or "any", not both

   Response: We corrected.

3. Line 217: spelling "therefore"

   Response: We corrected.

4. Line 222: space before bracket

   Response: We corrected.

5. Line 329: An “ambiguous relation” is vague and uninformative; from the plot, there appears to be no correlation between fine mode AOD and surface PM2.5

   Response: We refresh the sentence as “Furthermore, there was no correlation between hourly surface $PM_{2.5}$ mass and fine-mode AOD (at 500 nm) at this site (Fig. S4)”.

6. Fig. S4: Is there a purpose to showing that there is no correlation between PM2.5 and fine mode AOD? In the key, please make the symbol key (for the seasons) black so there is no confusion that colour indicates seasonality.

   Response: We use the black circles to mark the all points of the Fig. S4.

7. Fig. S2: Please indicate which subplot corresponds to each season. (*i.e.* (a) MAM (b) JJA…. etc)

   Response: We added “(a: March–May; b: June–August; c: September–November; d: December–February)” into the text of Fig. S2.

8. Please be consistent with italicizing abbreviations and Latin-derived phrases.

   Response: We checked.

Table R1. The information about collected filter samples at the Ngari station in this article.

Sample name	Sampling time (begin)	Sampling time (end)	Sample name	Sampling time	Sampling time
	2012			**2013**	
Ngari_2012W14	2012/04/01 11:00	2012/04/05 11:00	Ngari_2013W13	2013/03/25 10:30	2013/03/28
Ngari_2012W15	2012/04/09 11:00	2012/04/12 11:00	Ngari_2013W14	2013/04/01 10:00	2013/04/04
Ngari_2012W16	2012/04/16 11:00	2012/04/19 11:00	Ngari_2013W15	2013/04/08 10:05	2013/04/11
Ngari_2012W17	2012/04/23 11:00	2012/04/26 11:00	Ngari_2013W16	2013/04/15 10:00	2013/04/18
Ngari_2012W18	2012/04/30 11:00	2012/05/03 11:00	Ngari_2013W17	2013/04/22 10:00	2013/04/25
Ngari_2012W19	2012/05/07 11:00	2012/05/10 11:00	Ngari_2013W18	2013/04/29 10:00	2013/05/02
Ngari_2012W20	2012/05/16 11:00	2012/05/19 11:00	Ngari_2013W19	2013/05/06 10:00	2013/05/09
Ngari_2012W21	2012/05/21 11:00	2012/05/24 11:00	Ngari_2013W20	2013/05/13 10:00	2013/05/16
Ngari_2012W35	2012/09/01 11:00	2012/09/04 11:00	Ngari_2013W21	2013/05/20 10:00	2013/05/23
Ngari_2012W37	2012/09/10 10:00	2012/09/13 10:00	Ngari_2013W22	2013/05/27 10:00	2013/05/30
Ngari_2012W38	2012/09/15 10:00	2012/09/18 10:00	Ngari_2013W23	2013/06/03 10:00	2013/06/06
Ngari_2012W39	2012/09/24 10:00	2012/09/27 10:00	Ngari_2013W24	2013/06/10 10:00	2013/06/13
Ngari_2012W40	2012/10/01 10:00	2012/10/04 10:00	Ngari_2013W25	2013/06/17 10:00	2013/06/20
Ngari_2012W41	2012/10/08 10:00	2012/10/11 10:00	Ngari_2013W26	2013/06/24 10:00	2013/06/27
Ngari_2012W42	2012/10/15 10:00	2012/10/18 10:00	Ngari_2013W27	2013/07/01 10:00	2013/07/04
Ngari_2012W43	2012/10/22 10:00	2012/10/25 10:00	Ngari_2013W28	2013/07/08 10:00	2013/07/10
Ngari_2012W44	2012/10/29 10:00	2012/11/01 10:00	Ngari_2013W29	2013/07/15 10:00	2013/07/18
Ngari_2012W45	2012/11/05 10:00	2012/11/08 10:00	Ngari_2013W30	2013/07/22 10:00	2013/07/25
Ngari_2012W48	2012/11/27 10:00	2012/12/01 10:00	Ngari_2013W31	2013/07/29 10:00	2013/08/01
Ngari_2012W49	2012/12/03 10:00	2012/12/08 10:00	Ngari_2013W32	2013/08/05 10:00	2013/08/08
			Ngari_2013W33	2013/08/12 10:00	2013/08/15
			Ngari_2013W34	2013/08/19 10:00	2013/08/22
			Ngari_2013W35	2013/08/26 10:00	2013/08/29
			Ngari_2013W36	2013/09/09 10:00	2013/09/12
			Ngari_2013W37	2013/09/09 10:00	2013/09/12
			Ngari_2013W38	2013/09/16 10:15	2013/09/19
			Ngari_2013W39	2013/09/23 10:00	2013/09/26
			Ngari_2013W40	2013/09/30 10:00	2013/10/03
			Ngari_2013W41	2013/10/07 10:00	2013/10/10
			Ngari_2013W42	2013/10/14 10:30	2013/10/17
			Ngari_2013W43	2013/10/21 10:30	2013/10/24
			Ngari_2013W44	2013/10/28 10:00	2013/10/31
			Ngari_2013W45	2013/11/04 10:10	2013/11/07
			Ngari_2013W46	2013/11/11 10:20	2013/11/14

Table R2. The seasonal characteristics (mean ± standard deviation) of monthly air temperature (T), relative humidity (RH), wind speed (WS), pressure (P), and precipitation amount (PA) at four HTP stations for the time period 2011-2013. ND means no data. The abbreviations DFJ, MAM, JJA, and SON are for the different seasons: December-January, March-May, June-August, and September-November, respectively. The daily datasets were used. Note that the PA showed in each month is the totally amount in that month.

Periods	T (°C)	RH (%)	WS (m s^{-})	P (hPa)	PA (mm)	T (°C)	RH (%)	WS (m s^{-})	P (hPa)	PA (mm)	T (°C)	RH (%)	WS (m s^{-})	P (hPa)	PA (mm)	T (°C)	RH (%)	WS (m s^{-})	P (hPa)	PA (mm)
	Ngari station (79°42′E, 33°23′N, 4,264 m a.s.l.)					**QOMS station (86°57′E, 28°21′N, 4,300 m a.s.l.)**					**Nam Co station (90°57′E, 30°46′N, 4,746 m a.s.l.)**					**SET station (94°44′E, 29°46′N, 3,326 m a.s.l.)**				
Jan-11	-12.9	30.2	2.3	600.5	0.0	-4.4	23.9	5.0	599.2	0.0	-10.5	38.7	4.7	562.1	3.7	-4.4	61.2	0.1	675.1	2.0
Feb-11	-8.2	32.6	3.7	601.5	0.0	-4.4	27.9	4.2	602.2	2.5	-10.7	39.2	3.0	567.9	2.5	-1.5	61.1	0.0	677.0	9.8
Mar-11	-4.0	22.8	3.5	604.4	0.0	-0.2	31.3	4.5	603.2	0.0	-6.4	41.2	3.6	566.7	1.1	0.9	69.9	0.4	677.1	32.8
Apr-11	0.4	23.2	3.2	606.5	0.0	1.9	44.6	3.6	605.1	2.9	-3.4	56.7	2.9	NA	12.1	3.6	73.9	0.8	679.4	31.4
May-11	6.8	22.1	2.9	607.5	4.7	7.5	50.3	3.5	605.2	2.0	3.6	58.2	3.2	NA	26.0	10.3	66.5	0.0	679.4	6.2
Jun-11	10.8	35.3	2.9	605.6	5.3	10.8	53.4	3.6	604.4	28.7	6.6	68.2	2.9	NA	90.2	11.1	76.4	0.2	677.8	54.2
Jul-11	16.1	28.0	3.0	605.3	0.2	11.6	67.6	3.1	605.9	64.1	8.7	74.4	2.8	571.0	118.5	13.0	81.1	0.9	678.2	95.8
Aug-11	14.0	36.3	2.5	607.6	15.2	10.9	67.6	2.6	607.2	113.1	8.0	63.7	2.8	572.8	71.6	12.3	75.3	1.0	680.1	76.8
Sep-11	10.5	33.8	2.4	607.2	15.5	9.8	61.9	2.9	607.0	27.4	7.0	63.9	2.9	571.7	95.6	10.7	82.1	0.8	679.8	94.8
Oct-11	1.3	18.8	2.2	608.4	0.0	3.9	46.0	2.9	607.5	3.2	1.4	50.6	3.3	571.7	19.0	5.2	76.5	1.0	681.7	23.2
Nov-11	-3.3	18.4	2.3	607.8	0.0	-0.4	35.5	2.8	606.2	0.0	NA	NA	NA	570.4	3.9	-1.1	72.4	0.1	681.0	9.0
Dec-11	-6.7	15.4	2.8	602.9	0.0	-1.3	31.1	4.4	603.1	0.0	-6.7	30.0	4.2	566.1	0.0	-1.7	66.3	0.7	678.7	0.6
Jan-12	-12.4	25.7	2.7	598.6	0.0	-6.9	32.4	5.8	598.4	2.9	-12.8	46.8	3.9	564.0	3.7	-3.5	69.7	1.9	677.0	0.0
Feb-12	-8.4	30.2	3.6	598.8	0.0	-3.1	26.6	6.5	600.6	5.0	-9.0	39.4	4.5	565.8	2.5	-0.2	65.2	2.1	677.2	4.8
Mar-12	-4.6	21.4	3.7	602.6	0.0	-0.1	30.4	5.6	602.0	3.3	-5.9	39.5	3.8	567.7	1.1	0.7	70.1	2.1	678.9	25.2
Apr-12	0.8	30.6	2.8	604.9	0.0	3.2	40.1	4.9	603.7	0.0	-2.0	63.1	3.0	570.5	13.9	3.8	76.5	1.2	679.8	118.4
May-12	5.3	22.7	3.2	606.3	0.0	6.9	42.7	4.7	604.8	0.0	3.7	54.6	3.2	571.9	26.6	7.9	72.4	0.8	681.0	70.0
Jun-12	10.6	28.6	2.9	604.7	8.1	11.6	49.4	4.8	603.4	9.7	9.4	55.8	3.2	571.0	88.0	11.3	83.8	0.7	678.7	199.8
Jul-12	16.3	24.1	2.7	604.7	4.0	12.0	62.0	4.1	605.3	65.1	9.2	72.4	2.9	573.7	118.3	13.3	82.8	1.4	679.8	100.6
Aug-12	14.4	44.5	2.9	607.5	31.2	11.2	62.2	3.6	607.1	76.0	7.7	65.4	2.5	575.6	71.6	12.6	80.9	1.3	682.0	175.2

Sep-12	10.0	35.1	2.6	608.5	1.2	9.5	57.8	3.5	608.0	11.4	6.5	58.8	3.0	576.1	98.7	10.4	80.8	1.4	683.1	168.8
Oct-12	-0.8	29.6	2.2	608.1	0.0	2.7	41.8	4.1	606.9	0.0	-3.1	41.6	3.1	573.1	16.1	7.1	78.6	1.7	683.5	42.2
Nov-12	-5.7	21.7	2.3	605.5	0.0	-1.3	29.2	5.0	604.3	0.0	-6.5	39.9	4.9	570.4	3.7	0.7	64.5	1.8	681.6	0.6
Dec-12	-9.1	25.7	2.5	603.9	0.0	-2.6	23.8	5.5	603.2	0.0	-7.5	33.6	5.3	568.3	0.0	-2.8	63.8	1.7	680.2	0.2
Jan-13	-15.8	37.4	1.8	602.7	0.0	-4.6	23.8	6.6	601.1	0.0	-12.1	32.5	3.4	566.4	0.2	-4.4	60.7	1.6	677.2	0.0
Feb-13	-13.0	51.9	2.2	603.8	0.0	-5.0	40.0	4.1	604.0	6.5	-9.4	45.0	3.3	569.0	2.3	-0.6	63.5	1.6	679.1	1.2
Mar-13	-4.0	29.8	2.9	607.2	0.0	-0.4	30.0	4.4	605.1	0.0	-5.9	43.4	2.9	570.9	1.9	2.3	70.6	1.4	679.2	46.2
Apr-13	0.7	25.8	3.2	605.7	0.0	3.3	38.0	4.7	604.1	0.0	-2.1	52.4	3.4	571.1	0.6	3.9	77.7	1.5	678.3	36.6
May-13	5.8	22.3	3.4	606.7	0.0	7.9	42.5	4.8	604.3	1.4	2.5	61.8	3.3	572.8	15.4	8.5	71.9	1.6	678.4	0.2
Jun-13	12.8	29.3	2.9	605.9	23.0	NA	NA	NA	NA	23.9	8.5	60.0	3.0	575.5	49.4	12.3	76.7	1.4	678.4	68.6
Jul-13	15.6	29.7	2.7	605.8	11.9	11.9	62.8	4.0	605.5	85.1	9.4	70.3	2.9	575.7	128.7	13.8	83.3	1.3	677.6	44.2
Aug-13	13.6	52.4	2.3	607.8	65.3	10.9	61.8	3.7	607.0	57.4	8.8	58.2	2.6	577.4	95.6	13.0	75.6	1.1	679.8	93.4
Sep-13	8.8	41.4	2.3	608.6	21.4	9.0	56.0	3.6	607.4	6.4	5.1	69.5	2.8	NA	81.7	9.4	81.1	1.1	681.3	159.4
Oct-13	2.8	30.0	2.1	609.6	3.7	3.9	48.7	3.8	608.3	33.9	1.8	85.6	2.9	NA	107.5	5.2	76.7	1.3	682.2	0.4
Nov-13	-5.0	22.3	2.3	607.1	0.0	-1.0	27.8	4.1	606.3	0.0	-8.9	52.5	3.4	NA	4.9	-0.1	68.3	1.4	681.6	0.0
Dec-13	-9.0	23.1	2.3	603.3	0.0	-3.1	25.4	5.5	602.8	0.0	-10.6	48.1	3.6	NA	0.0	-3.5	62.8	1.3	678.2	0.0
Min	-26.1	4.2	0.3	592.4	0.0	-12.1	2.0	1.6	592.9	0.0	-20.5	15.8	1.1	555.0	0.0	-9.8	24.8	0.0	669.7	0.0
Max	19.9	90.8	6.9	616.5	16.7	13.9	93.2	15.6	613.3	27.9	12.3	89.4	9.9	579.5	26.8	16.4	94.8	3.9	687.6	44.2
Mean	1.6	29.2	2.7	605.4	0.2	3.5	42.8	4.3	604.6	0.6	-0.7	52.8	3.4	570.7	1.3	4.8	72.7	1.1	679.5	1.6
S.D.	10.0	14.7	1.1	3.7	1.1	6.4	17.4	1.6	3.2	2.4	8.0	17.0	1.4	4.4	3.3	6.3	10.8	0.7	2.9	4.1

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