

4.2.6. SOUTH POLE: TRIPLE OZONESONDE FLIGHTS

Special SPO ozonesonde flights were part of the Teachers Experiencing Antarctica project sponsored by the National Science Foundation. A teacher from the United Nations International School in New York was assigned to work with CMDL at SPO to participate in the preparation of ozonesondes, distribute the ozone profile data to students, including examples of ozone hole measurements from ozonesondes, and later to present numerous lectures to students on experiences with ozone science at the south pole.

Three different models of ECC ozonesondes were flown on four triple-ozonesonde flights at the south pole in January 1999. The objective of the experiment was to observe any differences between the Science pump 4A, 6A, and ENSCI 2Z ECC ozonesondes. The 4A model was used in the 1980s. Because the 4A's used in this test had been stored for more than 8 years, they were sent to the manufacturer to be reconditioned. The 6A and 2Z sondes are the current models manufactured by the two different suppliers. The 2Z model uses a molded plastic sensor instead of Teflon. The 2Z also has its own interface board that transmits data every second. The 4A and 6A sondes use a TMAX board that sends data every 7 seconds. The 4A sonde pump runs on a 6-V motor versus 12-V for the 6A and 2Z models. A secondary

objective was to observe the differences in the ozone sensor response using 1% KI buffered cathode solutions and 2% KI unbuffered. The first ozonesonde package was a dual sonde using 6A sondes, each with a different cathode solution. Different solutions were not used in individual sondes on the triple flights since the main objective was model comparison. However, the four triple-ozonesonde packages were flown in pairs (one triple in the morning and one in the afternoon) with 2% KI or 1% KI buffered for each pair of triple ozonesondes. Table 4.9 summarizes the results and gives the total ozone measured by each ozonesonde and the Dobson spectrophotometer measured values. The residual ozone for the ozonesonde total above balloon burst altitude was computed by the constant mixing ratio method at 7 hPa or lower if the balloon did not make it to 7 hPa.

The different ECC models agree very well in the troposphere. Even at low concentrations, all of the ozone measurements nearly always fall within about $\pm 10\%$. In the stratosphere the ENSCI 2Z tends to give 1-5% higher ozone than the Science Pump 6A model. The reconditioned 4A sondes were generally about 1 to 5% lower in ozone than the 6A models. The ozonesondes using the 1% KI buffered solutions gave about 10% more ozone than the Dobson spectrophotometer. The 2% KI solution profiles compare much better at 2-3% greater total ozone than the Dobson.

TABLE 4.9. SPO Dual and Triple Ozonesonde Flights: January 1999

Flight No.	Type	GMT: Day/Time	Sonde No.	Board	Cathode Solution	Total Sonde (DU)	Ozone Dobson (DU)
AS617-a	Dual	Jan. 11	6A6367	TMAX	1% KI buff.	305	266
AS617-b		00:22	6A6368		2% KI unbuf	269	"
AS618-a	Triple	Jan. 14	6A6255	TMAX	1% KI buff	296	264
AS618-b		23:18	4A1043-r		"	278	"
AS619			2Z1039	V2C	"	299	"
AS620-a	Triple	Jan. 15	6A6247	TMAX	2% KI unbuf	267	265
AS620-b		04:36	4A1039-r		"	255	"
AS621			2Z1032	V2C	"	276	"
AS622-a	Triple	Jan. 17	6A6292		2% KI unbuf	255	263
AS622-b		22:04	4A1012-r	TMAX	"	253	"
AS623			2Z1091	V2C	"	266	"
AS624-a	Triple	Jan. 18	6A6325	TMAX	1% KI buff	281	260
AS624-b		03:35	4A1031-r		"	272	"
AS625			2Z1100	V2C	"	291	"

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