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5.3 TARGETED OBSERVATIONS AT NCEP: TOWARD AN OPERATIONAL IMPLEMENTATION

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1. INTRODUCTION

During the past three winters NCEP participated in four field programs concerning targeted observations, with the aim of improving short–range weather forecasts by adaptively taking dropsonde observations in sensitive areas. In the first field program (FASTEX, January–February 1997, Joly et al., 1999; Szunyogh et al., 1999a) the goal was to test different targeting methods in the field. Based on the FASTEX results NCEP chose to further test the Ensemble Transform (ET) technique (Bishop and Toth, 1996; 1999) in upcoming field programs. In January–February 1998 (NORPEX, Langland et al., 1999; Szunyogh et al., 1999b) and March 1998 (CALJET, Ralph et al., 1999) NCEP's goal was to evaluate the performance of an operationally feasible targeting methodology based on the use of the ET technique, both on the synoptic (NORPEX) and on the meso–scales (CALJET).

In January–February 1999 took place the 1999 Winter Storm Reconnaissance program (WSR99; Toth et al., 1999; Szunyogh et al., 1999c). This was a quasi–operational program designed to improve 24–96 hour forecasts of significant weather events over the continental US, including Alaska. The weather events (time and location) for which the forecasts were to be improved were selected by operational forecasters in field offices, coordinated by HPC. Sensitivity calculations were then carried out to find the area over the northeast Pacific from where extra data could most influence and improve the preselected forecast events. All adaptive data were used in the operational analysis/forecast cycle. The impact of the data was evaluated in near real time by using a parallel analysis/forecast cycle from where all adaptive data were excluded. As a new feature, the ET senstivity calculations were modified to directly identify the best flight track, out of a set of predesigned choices. With this development the targeted observation decision making algorithm can be fully automated.

In this paper we review important aspects of the targeting methodology: case selection, the performance of the targeting technique, and forecast improvement, based on yet unpublished results.

PROGRAM	***SIGNAL***		***VERIFICATION***			
	sp	***prc***	***sp***	***wnd***	***prc***	***SUM***
FASTEX	7+1–0			3–2		3–2
NORPEX	8+0–2	7+1–2	7–2	7–1	7–0	7–0
CALJET	3+1–1	4+1–0	5–0	3–1		4–0
WSRP–99	21+4–0	24+1–0	16–5	15–8	13–2	18–5
TOTAL	**39+6–3**	**35+3–2**	**28–9**	**28–12**	**20–2**	**32–7**
% SUCC.:	***81–94***	***87–95***	***76***	***71***	***91***	***85***
STAT.SIGN.:			***0.1***	***1***	*****	*****

TABLE 1: Targeting and verification summary for the ET–based targeting strategy used at NCEP for four field programs (left column). Surface pressure (sp) and accumulated precipitation (prc) signal results are shown in 2nd and 3rd columns. First/+second (–third) numbers in each column indicate number of cases when the absolute/local maximum was (was not) within the verification region. Last four columns on the right show surface pressure (sp), 1000–250 hPa winds, 12–hour accumulated precipitation, and overall forecast verification results. First (–second) number in each column represent number of cases where the forecast was improved (degraded). The bottom three lines show the total numbers for the four field programs, the overall success rate, and the corresponding statistical significance level (where appropriate). Star stands for significance levels below 0.01%.

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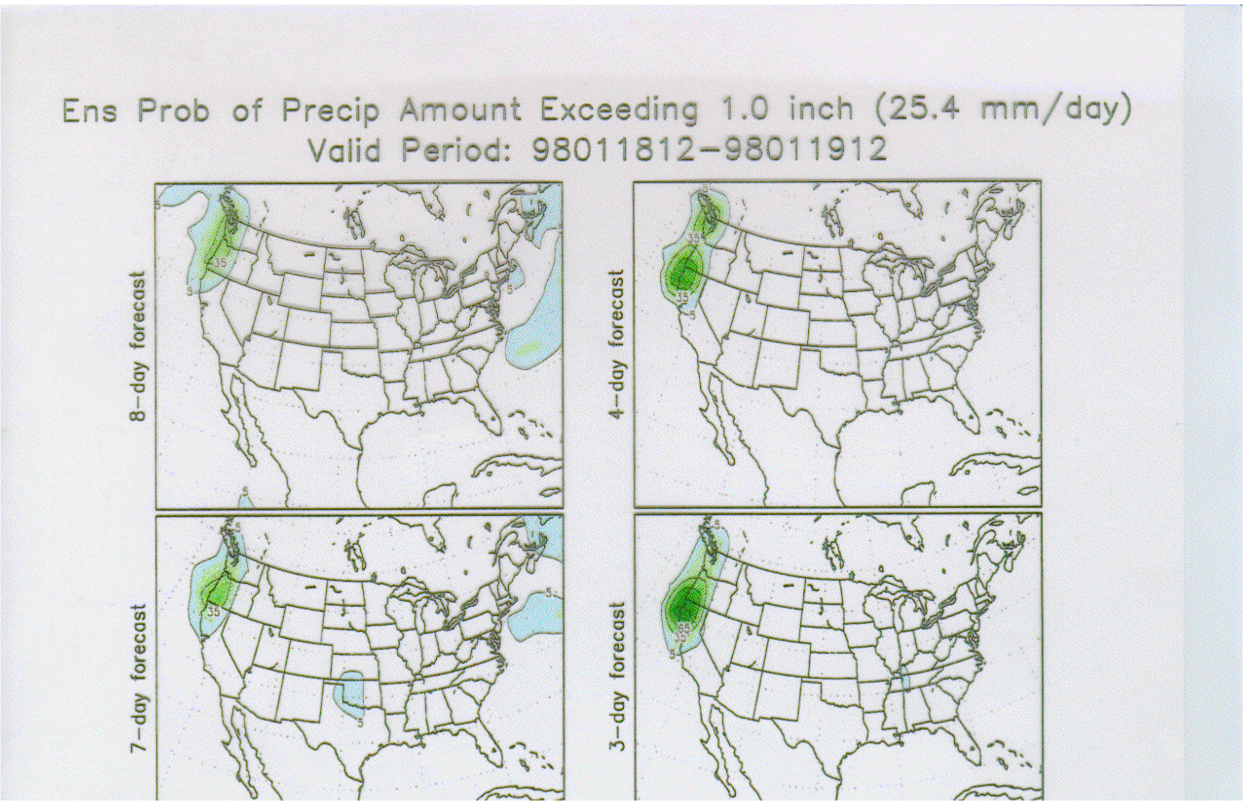

FIGURE 1: 1–8 days lead time ensemble–based Probabilistic Quantitative Precipitation Forecasts for 24–hour accumuated amounts exceeding one inch (25.4 mm), valid around January 19 0000UTC 1998.