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GLOBAL PRESSURE FIELDS FROM SCATTEROMETER WINDS

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The ability to retrieve marine surface pressure fields from scatterometer wind measurements has been demonstrated (Brown and Levy, 1986; Harlan and O'Brien, 1986; Hsu et al., 1997; Hsu and Liu, 1996; Zierden et al., 2000) but is limited to the midlatitudes. Patoux et al. (2002) propose a simple planetary boundary layer (PBL) model for estimating surface pressures near the equator and thus producing pole-to-pole, swath-long surface pressure fields from scatterometer data.

The simple tropical PBL model described by Stevens et al. (2002) is adapted to estimate the pressure gradient from a surface wind measurement with a simple parameterization for the entrainment flux at the top of the boundary layer. A pressure field is fit to the pressure gradients by least-squares optimization. It is then blended with the midlatitude surface pressure fields obtained from QS data with a two-layer similarity model (Patoux and Brown, 2001, 2002; Brown and Levy, 1986).

An example of the resulting swath is shown in Fig. 1. For reference, the corresponding European Centre for Medium-Range Weather Forecast (ECMWF) surface analysis is shown in the background (dashed lines). Comparisons with buoy-measured bulk pressure gradients are made on various cases to assess the model.

The SeaWinds-on-QuikSCAT (QS) scatterometer measures surface winds over the ocean with a 25-km resolution and a 1700-km-wide swath. Pole-to-pole QS-derived surface pressure fields could be used to initialize numerical weather forecast (NWF) models. These pressure fields contain superior information about the location of fronts and low centers, especially in the Southern Hemisphere where measurements are scarce, and could prove valuable for assimilation.

QS-derived surface pressure fields are available at pbl.atmos.washington.edu.

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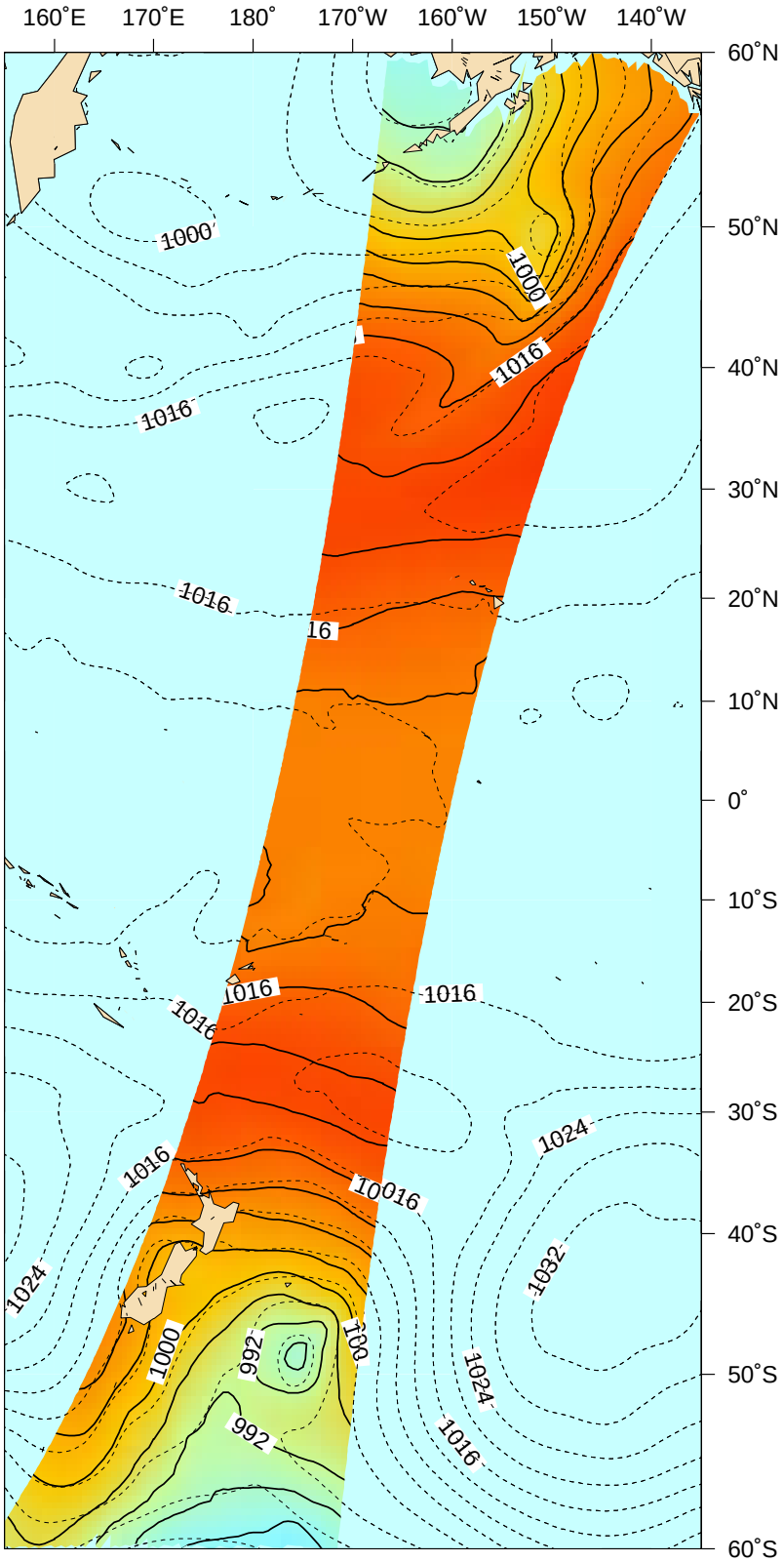

Figure 1: Example of a swath-long surface pressure field retrieved from scatterometer data