GEOLOGIC SETTINGS OF AEOLIAN FEATURES ON VENUS, E.R.Stofan[1], J.J. Plaut[1], R. Greeley[2], R.A. Arvidson[3], C. Elachi[1], M.A. Geringer[2], R.S. Saunders[1], G. Schubert[4], S.D. Wall[1], and C.M. Weitz[1], [1] California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA 91109, [2] Arizona State University, Tempe, AZ, 85287-1404, [3]Washington University, St. Louis, MO, 63130-4899, [4] Department of Earth and Space Sciences, UCLA, Los Angeles, CA, 90024.

The association of wind streaks and other aeolian features with local and regional geology can provide information about the possible sources and sinks of windblown material (1). Particulate matter can be produced by impact cratering, weathering by chemical and mechanical processes and volcanic eruptions. On Venus, mechanical weathering of rock and generation of sand and dust also may occur in association with the formation of tesserae, coronae, rift zones and ridge belts. Initial analysis of Magellan data indicates that the distribution of aeolian features on Venus is not random. Streaks and other features appear to be preferentially located in proximity to certain impact craters and some tectonically-deformed terrains. We discuss several regions on Venus in detail to illustrate these geologic associations. The regions have been chosen based on the abundance and variety of aeolian features and each represents a unique region on the planet. For each region, we discuss the local geology, possible sources of particulate matter, and the development of the wind streaks.

Mead Crater. Mead, a 275 km diameter double ring crater, is the largest preserved impact crater found to date on Venus. The area surrounding Mead is characterized by mottled radar-bright and dark plains with a large concentration of wind streaks. Aeolian features in the region include dark linear, dark transverse-ragged, radar-bright fan-shaped and dark wispy forms, and possible yardangs (1). Most streaks form in the lee of ridges in the plains, with some forming in the lee of small hills. Streaks range from a few to over 100 km long. Most of the streaks surrounding Mead indicate wind flow toward the equator, at least at the time the streaks formed. The region around Mead appears to be blanketed with particulate matter probably generated at the time of impact. The crater is surrounded by a faint radar-dark halo, also visible in emissivity data. The general area has lower backscatter and emissivity values than the average for the Venus surface, with some of the lowest backscatter regions corresponding to concentrations of wind streaks.

Carson Crater. Carson, 39 km in diameter, is surrounded by a distinctive radar-dark halo superposed on low-lying volcanic plains. Within the halo and in the region surrounding Carson, numerous streaks are found in the lee of small cones and ridges. The streaks are 10 to over 100 km long, and include radar-bright fan, dark wispy and dark linear forms. Most streaks indicate winds flowing toward the equator. Although Mead and Carson are unusual in their high concentration of aeolian features, most wind streaks on Venus are found in close proximity to impact craters. In addition, over 70% of craters with associated parabolic halos have adjacent streaks. We interpret the high correlation of impact craters and wind streaks to indicate that the impact process is the most efficient producer of particulate matter on Venus (1).

Tesserae. Two concentrations of wind streaks have been found in regions of complex ridge terrain or tesserae. To the southwest of Tellus Tessera, abundant wind streaks and some possible dunes are found in low-lying plains immediately adjacent to the complexly deformed region. Streaks range from about 10 to over 50 km long, and include radar-dark linear streaks and radar-bright and -dark fan-shaped forms. Streaks tend to form in the lee of ridges. Backscatter and emissivity values for the streaks in this region indicate that roughness differences produce the differences in the SAR signature of the streaks, with dark streaks representing smooth areas of deposition and bright streaks indicating rougher areas of scour (1).

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Hestia Rupes/Ovda Regio is also a region of tessera with a concentration of streaks. Streaks extend up and downhill from tessera blocks, indicating both up- and downslope winds (2). We suggest that radar-bright, high reflectivity material has been mass wasted from the highland blocks of tessera and carried by the winds below the altitude level (6054 km) at which high reflectivity material is typically found on Venus.

A small percentage of streaks is located in the vicinity of ridge belts where mechanical weathering has produced significant amounts of particulate matter to form aeolian features. Wind streaks form least frequently in association with volcanic features. In general, streaks in the lee of volcanic cones probably consist of impact-derived rather than volcanic materials. Explosive eruptions on Venus may be relatively rare (3). In general, on most planets, more sand and dust is an indication of age as most surface features weather and erode. On Venus, however, younger surfaces, such as those with relatively recent impact craters, have larger amounts of particulate matter. Recent impacts (e.g., Carson), regions of ongoing tectonic activity (e.g., tesserae) or elevated regions with unique weathering characteristics (e.g., Ovda Regio) are among the relatively few sites on the planet where particulate matter is present in significant amounts and can be moved by the wind.

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References: (1) R. Greeley *et al.*, *submitted, JGR*, 1992; (2) R.E. Arvidson *et al.*, *submitted, JGR*, 1992; (3) J.W. Head and L. Wilson, *JGR, 91*, 9407, 1986..

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