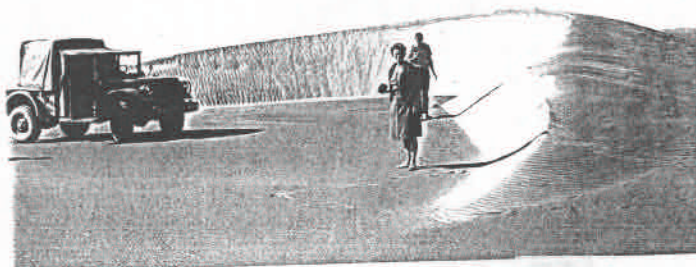
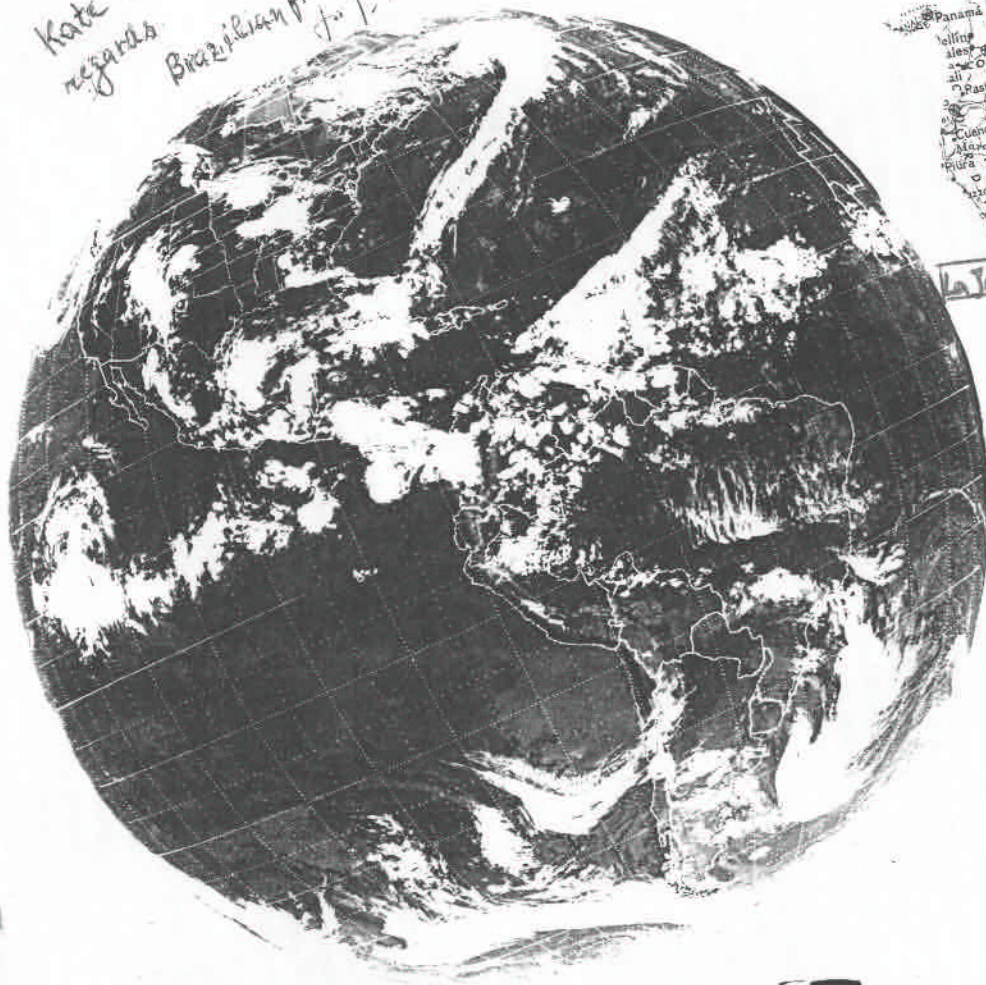


To Heinz and
Kate with our best
regards 10/8/78
Brazilian friends of Inpe
Jo 1-57



Exploring the World's

Driest climate, and the dunes of the Pampa de la Joya, Peru
University of Wisconsin field research July, 1964

Largest watershed, and cycle and re-cycling of Amazon waters
Invitation by INPE, San Jose dos Campos, Brazil, 1978, 1982

Most Expensive Waterway, and the threat to the Panama Canal
water supply by deforestation
In cooperation with Panama Canal Company, Balbao, 1988, 1989

How the La Joya project came off For many years, teaching UW Met. 403 (Micromet.) and 404 (Physical Met.) I devoted parts of class-discussion to wind-erosion and the dynamics of dune movements I supplemented memories from home (Kürische Nehrung) always by an aerial photo of barchan dunes which fascinated me from the first time on I had seen it in Leet and Judson's UW-textbook *Physical Geology*.

The picture was made in 1930 by the Shippee-Johnson Peruvian Expedition, using light airplanes to discover sand-covered ruins of ancient Peru. Apparently, the dune picture was made because of its beauty or esthetic appeal. I told my students that modern aerial photogrammetry of the numerous identically shaped but variously sized dunes should provide the best basis for dune dynamics studies.

One of my geology students came after class with an article: *The barchans of southern Peru*, Journal of Geology, 1959. From aerial photogrammetrical charts made for general purposes in 1955 and 1958, Finkel determined the 3-year movement of about 80 dunes. On the ground in La Joya he measured crestheight and horn-spread for these dunes. His purpose was a formula for sand-transport. Finkel, a soils-physicist, was concerned about aeolian sand being trapped in irrigation channels, a hazard for arid-land development.

Missing in Finkel's and other's research were measurements of wind-stress in its dependency on aerodynamic roughness of the ground, and the diurnal/annual course of solar radiation. Furthermore, sand-grain size distribution at La Joya were insufficiently known. Significant work done in La Joya during the 1890's was ignored.

By coincidence, Reid Bryson had initiated around 1960 the Center for Climatic Studies at UW. His program included field work. Previous target areas had been the Canadian tundra, also the Rajasthan desert. Reid accepted my proposal for a La Joya Project and supplied the funds. The rather ambitious program included micrometeorology, dune mapping and surveying, re-evaluation of earlier field work, experiments on dunes, mineralogy, paleoclimatology, and characteristic winds along South America's pacific coast. Pampa de la Joya field work was done from 1 to 15 July, 1964. Significant support had come from friend Paul Dalrymple (USArmy Quartermaster Corps) by putting at our disposal two U.S. Army trucks from an USA-pool in Lima to use in La Joya.

Scientific results are summarized 1978 on 264 pages of *Exploring the world's driest climate*, (edited by H.&K.Lettau) Report 101, Institute of Environmental Studies (IES). Later, K.&H.L. were rewarded by invitations to present results of their dune-experiments at international meetings, one in Las Vegas, one in Aarhus, Denmark.

Brazil: During the 1970's, INPE (*Instituto de Pesquisas Espaciais*), the brazilian equivalent of NASA, had sent several scientists to UW Madison for Ph.D.-work. Luiz Molion accepted H.L. as "doctor-father". Dr. Molion returned to INPE, and H. & K.L. were invited to continue research with Molion at San Jose dos Campos, Brazil, Jul. 1 to Aug. 15, 1978. The result was a publication on Amazonia's hydrologic cycle & the role of atmospheric recycling in assessing deforestation effects. Other visits in Brazil followed in later years.

Panama: Bill Snow, a Ph.D. candidate at UW with Werner Schwerdtfeger as advisor, had previously served as meteorologist at the Panama Canal Company. From Bill I heard that deforestation on the Rio Chagres watershed had reduced the water yield for the Panama Canal, and that there are multi-annual hydrologic data fit for evapoclimatonic evaluation. By coincidence Major U.L. got an USAF-assignment in Panama. Family visits provided the chance to contact hydrologists of the Canal Company. A treasure of unpublished data were made available for H.L.'s later publications. The data documented, and evapo-theory explained, that, and why, deforestation of tropical watersheds reduces water yield while in temperate climates deforestation normally increases it.