TAMDAKHT METEORITE: THE LAST MOROCCAN FALL. H. Chennaoui-Aoudjehane[1], A. Jambon[2], M. Bourot Denise[3], O. Boudouma[2], J. Gattacceca[4], P. Weber[5] P. Bonté[6]. [1]Université Hassan II Aïn Chock, Facutlé des Sciences, BP 5366 Maârif Casablanca Morocco (e-mail: h.chennaoui@fsac.ac.ma), [2]Université Pierre et Marie Curie-Paris6 ISTEP, Case 110, 4 place Jussieu, 75252 Paris France, [3]Muséum National d'Histoire Naturelle de Paris, Laboratoire d'Etude de la Matière Extraterrestre, Rue Buffon 75005 Paris France, [4]Université d'Aix Marseille III, CEREGE, France. [5]University of Bern, Laboratory for high Energy Physics, Switzerland. [6]LSCE Gif/Yvette France

History: On December 20th of 2008 at 22:37 hrs (local time; UT+00), witnesses from a number of locations in Morocco (Agadir, Marrakesh, Ouarzazate) observed a meteor with a W to E trajectory. According to the local newspaper, Al Massae (of December 27th), people from the high Atlas Mountains (between Marrakesh and Ouarzazate) heard a sound and felt an aftershock. Due to the high relief in this mountain region, covered with snow at this time of the year, searching for the meteorite was a difficult task. The first reports on finding meteorite pieces came a couple of weeks later from Tamdakht, a village near Ouarzazate. The largest impact pit is located near Oued Aachir (1.10 m diameter and 70 cm depth, 31°09.8'N, 7°00.9'W), 12 impact coordinates have been recorded. A strewnfield of at least 25 km long and 2 km wide has been outlined with a major axis oriented N 74°.

Physical characteristics: Total weight is presently estimated to be 100 kg. Pieces recovered as of February 15th 2009 are 30 kg, 5.1 kg, 3.8 kg, 3.69 kg, 2.4 kg, and a number of pieces below 2 kg. The largest fragment shows a nearly complete dull gray fusion crust, other pieces are 90% crusted to free of crust, often broken along pre-existing fractures. Unusual thick fusion crust, locally exceeds 1 mm.

Petrography: Abundant chondrules size is 0.1 to 1.5 mm with visible but not well-delimited outlines. Dominant olivine and orthopyroxene. Abundant chromite, rare clinopyroxene and ilmenite. Numerous pockets with chromite, plagioclase and phosphate (merrilite and Cl-apatite). Kamacite, with deformed Neumann bands, and taenite, twinned troilite. Copper. Mode: metal+troilite 10%.

Mineral compositions and geochemistry: Magnetic susceptibility log X = 5.3 (10^{-9} m^3/kg). Composition of Olivine is Fa18±0.5, orthopyroxene Fs16±0.3. Plagioclase Ab84±2. Chromite: Cr# =82. Kamacite with 5% Ni and taenite. Oxygen isotopes $\delta^{17}O$ = 3.26 ‰, $\delta^{18}O$ = 5.01 ‰, and $\Delta^{17}O$ = 0.65‰.

Cosmogenic isotopes: gamma ray activity measurements reveal ^{7}Be ^{22}Na ^{26}Al, ^{46}Sc, ^{54}Mn, ^{56}Co, ^{57}Co, ^{58}Co, ^{60}Co with a $^{22}Na/^{26}Al$ activity ratio of 2.1 (at the time of fall).

Classification: Accordingly Tamdakht is classified as an H5 ordinary chondrite, shock intensity is S3, weathering grade W0.

Conclusion: After the Benguerir fall (22nd November 2004) [1], it is the second Moroccan fall that has been well studied and declared by a Moroccan-French scientific group, with the significant cooperation of the local and international collectors.

References: [1] Chennaoui Aoudjehane H., Jambon A., Bourot Denise M. & Rochette P.(2006), *MAPS* 41, 231-238.