International Geographical Union
Commission C08.02 Arid Lands, Humankind, and Environment

Report on a meeting of members of the Commission "Arid Lands, Humankind, and Environment" and on a field trip to the Farafra Sandsea as part of the project „Egyptian Sand Accumulations", March 2010

From March 1st until 6th 2010 a field trip to the Farafra Sandsea and the White Desert took place. The field trip was organized by Prof. Mahmoud Ashour from the Ain Shams University, Cairo, Egypt, in co-operation with Prof. Olaf Bubenzer from the University of Heidelberg, Germany. In sum the group consisted of 34 participants who are partly students from different Egyptian Universities and graduated students, PhD-Students and post-docs as well as professors from the Ain Shams University in Cairo, from Syria and Yemen, the Desert Research Center and the Rangers from the White Desert National Park and the University of Heidelberg and University of Cologne.
The field-trip lead to the oasis of Farafra and to the White Desert in the Western Desert of Egypt.

Monday 01.03.2010
The group started together at Ain Shams University and went to the west reaching the oasis of Bahariya in the Western Desert and continued its way to Farafra oasis. On the way the different geomorphological features of desert landscape could be observed such as the vast plain of the northern Egyptian limestone plateau, the beginning of the famous 600 km long dune strip of Abu Muharik as well as the Black Desert in the Bahariya depression. The first stop was at Crystal Mountain – the remains of a now collapsed cave where speleothemes and calcite crystals report from once more humid conditions in this now hyper-arid region (see attached foto documentation). This point belongs to numerous natural monuments in the White Desert National Park. Here we were given a brief introduction in adequate behaviour of visitors in this fragile ecosystem. Some kilometres further southwest we visited the unique site of the mushroom rocks, which also document a very recent environmental change that led to these special morphological forms. Shortly after Sunset we reached the Farafra Oases. After dinner, Mahmoud Ashour, Olaf Bubenzer and Mahmoud Abd el Moneim introduced the whole group in the environment of the Western Desert and the planned activities for the next days.

Tuesday 02.03.2010
On the second day we headed towards the Farafra Sandsea. Here we heard a general introduction to the geology of the Western Desert, all large Egyptian sand accumulations and Farafra Sandsea.
The morphology of dune gives hints for a development of these accumulations under varying climatic conditions. Therefore it is not only necessary to describe and measure the dunes - the sampling of dune sand is a major subject in understanding the internal structure of large sand bodies and provides material for sedimentological, geochemical and geochronological analyses that in synopsis finally lead to a model of geochronostratigraphy and landscape development since the Pleistocene in this area.
On the base of new satellite images, Mathias Ritter designed the attached map (map 1) in which all visited sites are located. At the first sites (01, 02, 03) east of Bir Karawein the students were introduced to the coring equipment and the sampling technique (fig. 1) as well as field analyses of sediments by colour, visible grain size, bedding and aggregation.
After the drilling, the group went to the eastern margin of the Farafra Sandsea. We crossed the footlands of the escarpment and were looking for geological units that might be the source of the sands. At one site we found a profile which cut the Esna-Shale-Formation (Tpe) and was covered

by a very hard cemented fanglomerate. Samples were taken from the fanglomerates and the debris below (04 and 05).

Wednesday 03.03.2010

The drilling and sampling of a large profile was focus of this day. A huge sand profile was dug by a construction company close to the road between Farafra and Bir Karawein (06 and 07). The only weak stabilized well bedded sand accumulation was cut at a height of 12 metres. During the day, samples for sedimentological analyses were taken and also samples for OSL dating. Before the sampling, Olaf Bubenzer introduced the technique of OSL dating to the group and the necessity of keeping the sample away from any light exposure. Samples were taken stepwise from 0.5 metres down to 9.80 metres. A second group opened a trench on the surface of the sandbody to describe the internal structure. Another two groups did measurements of cross sections by the use of GPS and tachymetric instruments.

The second part of the day led the group to the south where we visited a site with playa sediments which were exposed for several meters and presented the wind blown root remains of the former vegetation around this former episodic lake (Fenek Playa). Further south we reached the beginning of the clearly developed dune strips and one of these ridges was climbed by the group to estimate the dimension and shape of the dunes by own experience (08). On top of a Pleistocene draa with Holocene overriding longitudinal silk, their formation, modification and actual processes was explained.

Thursday 04.03.2010

This day, the northern part of the Farafra Sandsea was the destination for the group. Near Bir Karawein we turned north and followed the longitudinal dunes parallel to the escarpment and its foreland. At the foot slope depression the landscape alternates between longitudinal dunes (tending NNW-SSE) and a cuesta landscape with embedded playas in shallow sub-depressions (09). The very shallow ground water table is illustrated by several nebkhas that rise to impressive heights and hence are of considerable age (11). They seem to be linked to fissures and faults on the one hand and to a low altitude on the other. The surface gently dips towards north close to the sea surface level. The sandy accumulations tend to be influenced by a decreasing loss in sand that is marked by the occurrence of barchanoid forms which are indicators of shortage of sand in the whole system. At one point a sample from a barchanoid crest was taken. Further north, the forming power of moving sand could be seen in the weathered chalky limestone of the Khoman-Formation (Kuk). Pillars and mushroom-like stone formations occur here and one impressive example of an eolian corrasion wind channel could be found. Along a tectonically induced fissure wind, sand and also water worked deeply into the low resistant bedrock (12).

At the northern tip where the Farafra Sandsea begins, it interfingers with the White Desert. Here the group turned toward west and headed to the spring of Ain el Serw. This impressive spring mound rises several meters above a shallow depression where some palm trees occur. In the surrounding of Ain Serw the first outcrops of the Hefuf-Formation (Kuh) appear. This formation is considered to be the source of sand that builds the Farafra Sandsea. A comparative analysis of the sand bearing layers of this formation and samples from the sandsea will clarify this idea. In the shadow of the palm trees nearby the spring, the group used the opportunity of this rest to talk about the survey we made and discuss questions of landscape development in this very unique part of the Sahara.

Further towards west we crossed several shallow depressions with partly enormous remains of playa sediments. A shallow groundwater table and the succession of many small depressions formerly formed temporary lakes. Here the springs of Ain Khadra and El Santa were the last sites we visited that day. Nearby the playa sediments were formed into yardangs and root

remains within these sediments were exposed by eolian activity showing a former densely vegetated habitat under wetter climatic conditions.

Friday 05.03.2010

Visiting the northern and middle part of the Farafra Sandsea, the southern margin of this in total 170 km long sand accumulation was the working area for this day. Due to the large distance the group made only some short stops on the way. The changing morphology of the sandsea could be observed from the beginning in the north with long waves and rolling sands that changed into old Pleistocene draa (whalebacks) and further south recent longitudinal silk as an active feature appear on theses old megadunes. We passed a field of mega ripples where the different ways of sand movement was explained to the students (15). The southern quarter of the Farafra Sandsea is marked by a geological fault that runs WNW-WSE across this sandsea (16). The bedrock deposits dip gently towards north. This fault causes a difference in height of 30-40 metres with its lower part in the south. Most dunes streaks run across this fault without any larger disturbance. Short lee-dunes start at the small escarpment formed by the fault and continue some kilometres towards south.

The special situation below the escarpment was the reason for a former playa whose sediments and also traces of human occupation could be found. The layers dip towards north, the fault causes an escarpment and the dunes in the East and the West complete this blocking situation. Around the proposed margins of this former lake, trunks and roots of many trees could be found and many stone artefacts such as grinding stones and stone tools were scattered all over the place as well as ostrich shells.

At its southern tip the dunes streaks become more and more narrow and finally they disperse into barchans and mark again the lack in sand in the whole system. From the top of a cuesta we could clearly see this development (17).

The last site for this day is located in the middle part of the Farafra Sandsea. Here the drilling was done to a depth of 3 metres. The students were shown the techniques of drilling into loose sand using a tube for stabilizing the borehole. Samples for OSL-dating and sedimentological analyses were taken in 50 cm steps (18).

At the end of the day the whole group gathered and summarized the whole field trip. They concluded the aspects of landscape formation and the landscape development with regard to the geological setting of the area and the changing climatic conditions that together led to different environmental characteristics.

Every member of the group gave a short personal account to this field trip and was thankful for the opportunity to be a participant of the “Egyptian Sand accumulations project”. Everyone marked the chance that arises from such an international and interdisciplinary cooperation between several Egyptian, Syrian and Yemeni universities and institutions on one side and the universities of Heidelberg and Cologne on the other side. Personal contacts and friendships also developed from this field trip. The inter-cultural experiences we all made brought us closer together. Furthermore, all participants of the group pointed out that concerted practical work in the field is indispensable for a successful geoscientific education. The idea and wish for further enhanced cooperation in future was formulated in unison.

Saturday 06.03.2010

The White Desert National Park stretches from the northern margin of the Farafra Sandsea to the Qus Abu Said Plateau and the Limestone-Plateau. NW of the road between Bahariya and Farafra the landscape differs from the area SE of this road. The nearly flat zone with shallow depressions, playas, nebkhas and small cuestas changes into an area with high stone pillars. A tectonical fracturing is illustrated by steep and flat walls of several tens of metres in height. Some isolated towers and pillars surround some depressions that can be found in between. We

stopped at El Babein “The Two Gates” an impressive formation of two white stone pillars. In the nearby depression at least 3 different levels of former surfaces can be found and give evidence of a change in environmental conditions. The last site was a big cave of some tens metres in height that seemed to be formed along a tectonic fracture. Here we gave a short conclusion on the last days that we spend together.

Report: Mathias Ritter, University of Cologne & Olaf Bubenzer, Heidelberg University

Map 1: Location of the visited sites in the Farafra Region (Ritter 2010).

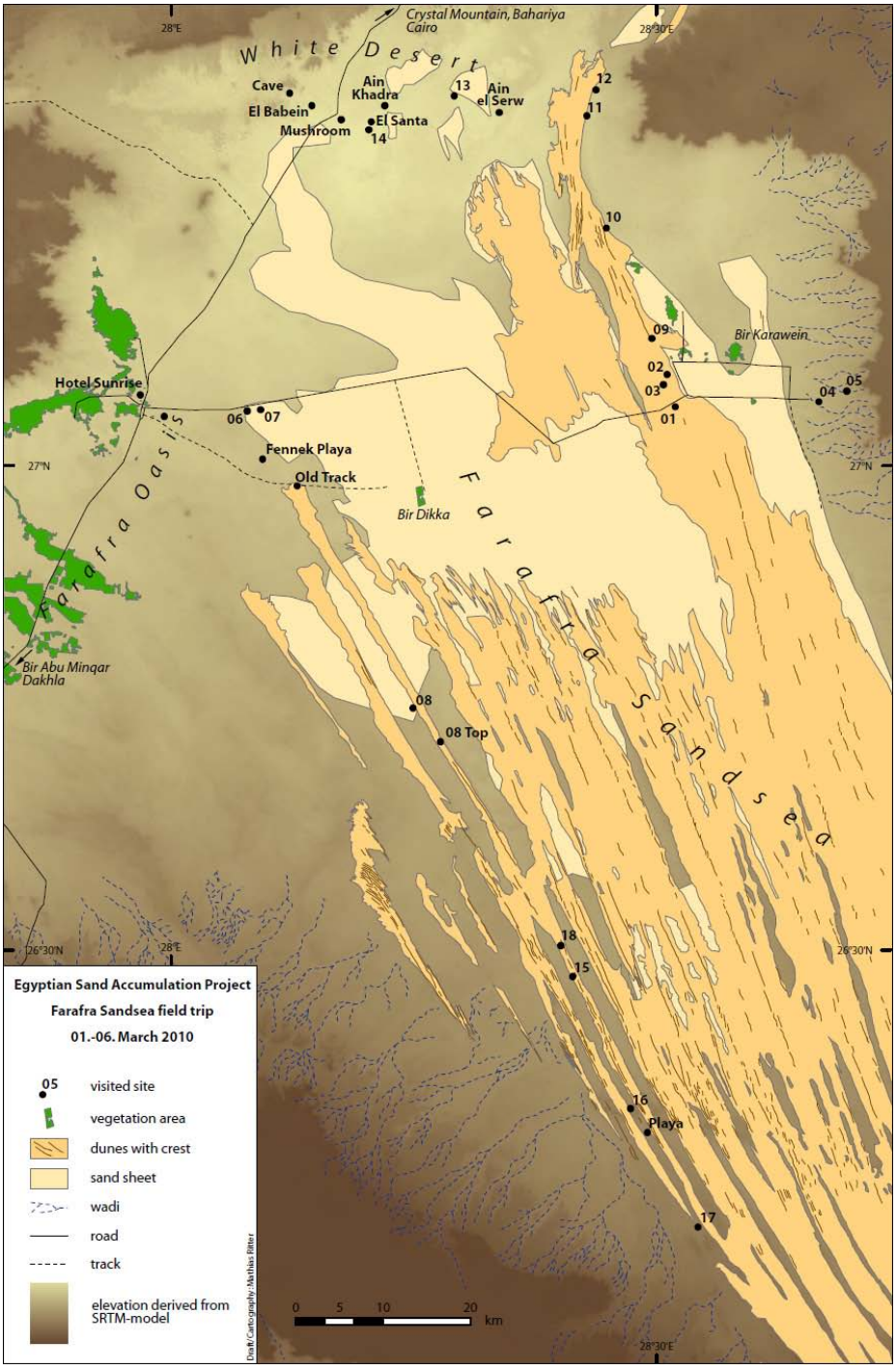

Fig. 1: Schematic drawing of the used coring equipment (Bubenzer 2001).

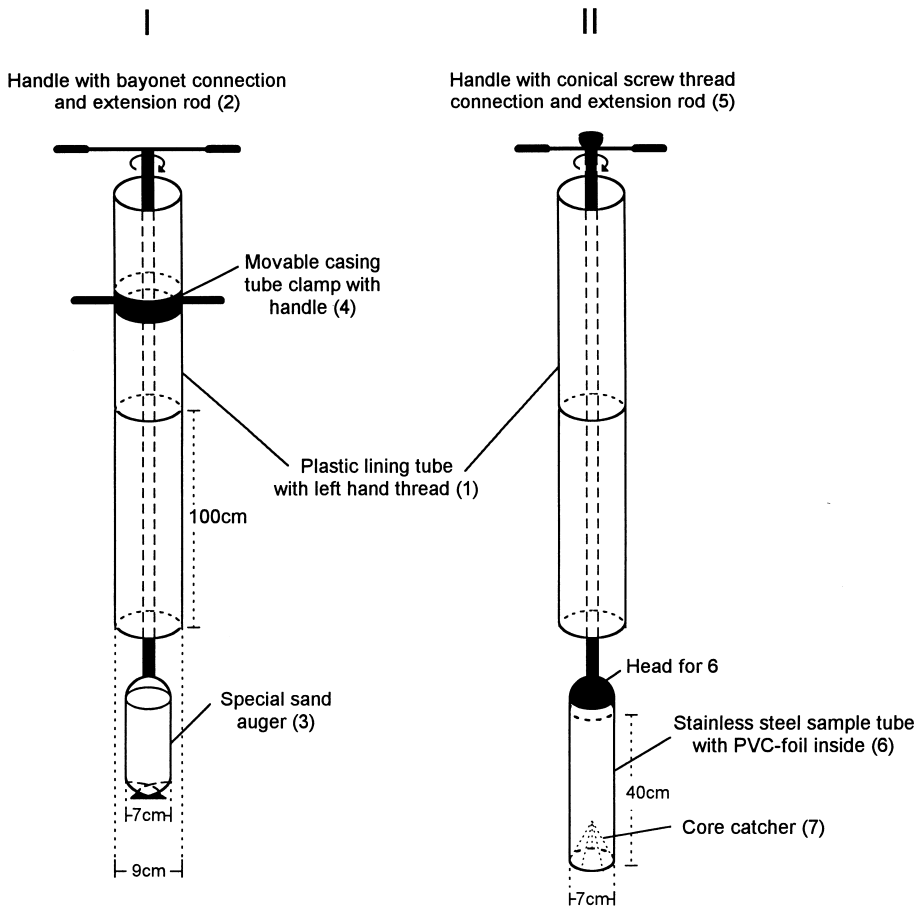

Foto documentation

(Fotos by Mathias Ritter and Olaf Bubenzer)

Foto 1: Group near Crystal Mountain

Foto 2: Introduction in the field

Foto 3: Discussion with students

Foto 4: Introduction to the coring equipment

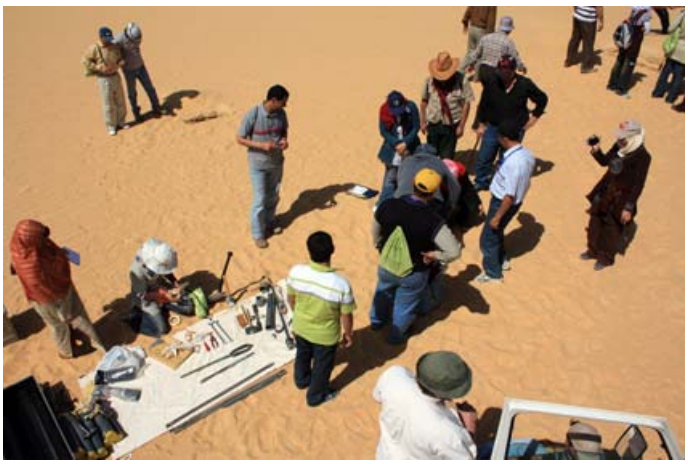

Foto 5: Coring

Foto 6: Sampling

Foto 7: Group on the dunes of the Farafra Sandsea

Foto 8: Measurement of ripples in the Farafra Sandsea

Foto 9: Cars and part of the group in the north of the Farafra Oasis