Detection of land subsidence phenomena in Kopais plain, Boeotia county, central Greece. Preliminary results

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Deposition of organic soils takes place in fresh water and coastal swamps. Due to water presence no oxidation procedure takes place and therefore organic material decomposes slightly. Balance is maintained because accumulation rate is higher than decomposition-oxidation rate. However, drainage of these areas disturbs this balance and creates the appropriate aerobic conditions under which organic matter oxidizes, usually with slow and steady rate. Oxidation is “accompanied” by land subsidence, the rate of which depends on the type of organic matter, depth of the aquifer and temperature.

Kopais plain has general W-E direction, is located in Boeotia county about 100km NW of Athens. It extends in an area of about 250,000 acres and came from the drainage of the homonymous lake, which was extending at the Eastern part of the basin with length of 23km, width 13km and maximum depth 4m. The bottom of the lake consists of a solid layer of clay up to 4 meters thick, rich in organic matter from the decay of plant debris. The lake sides were swamps covered with reeds, shrubs and flowering plants.

Mycenaeans who lived in Orchomenos town were the first to successfully drain the lake in 16th century BC carrying out important and impressive works. After the decline of Mycenaeans the drainage works were abandoned, destroyed and gradually, in the 13th BC century, the area flooded again and the lake was re-formed.

New drainage works were carried out in period 1882-1886 by “French Kopaida Company”. On 1886 discharge of the lake took place and Kopais was drained again.

However, the organic matter located at the bottom of the lake (peat), immediately after drying, self-ignited. The fire spread throughout the whole area of drained Kopais and burned all the peat located close to the surface, resulting to the subsidence of the ground surface by 4m. Consequently, drainage works appeared to be suspended above the ground and unable to drain the water. In 1887 Kopais became a lake again.

In 1895 the English company “Lake Copais Co. Ltd” undertook the continuation of the draining project which was completed in 1931, with the drainage of 241,000 acres of arable land.
In the recent years due to climate change and occurrence of heavy rainfall, the plain floods and parts of it are temporarily turned back into a lake.

After drainage of the lake, the plain has been cultivated intensively. Also, stockraising activity and industry were further developed. Economic development brought the expansion of existing settlements and the creation of new ones mainly in the western area of the dried lake.

The current research presents the results of an ongoing investigation revealing extensive deformations causing damages to buildings and infrastructure at the town of Aliartos and at the villages of Alalkmones, Agios Athanasios, Mavrogia, Agios Dimitrios, Karya and Agios Spyridonas. It is considered that these damages are resulted by land subsidence, mainly induced by the oxidation of the remaining organic material but also amplified by water pumping for watering, industrial and livestock purposes or even more from the natural compaction of the upper strata.