COMPARISON OF THE ICE COVER FISSURE SYSTEMS OF JOVIAN SATELLITE EUROPA AND FROZEN LAKE BALATON, HUNGARY. *R. Korzenszky[1], Sz. Bérczi[2], H. Hargitai[3], A. Kereszturi[4], S. Hegyi[5], Gy. Hudoba[6], A. Pinter[7], T. Varga[8]., S. Kabai[9], Sz. Nagy[2], A. Gucsik[10].* [1]St. Benedict Abbey, H-8237 Tihany, I. András tér 1., Hungary, [2]Eötvös University, Institute of Physics, Dept. Materials Physics. H-1117, Budapest, Pázmány P. s. 1/a. Hungary (bercziszani@ludens.elte.hu), [3]Eötvös University, Institute of Physics, Cosmic Materials Space Res. Gr. H-1117, Budapest, Pázmány P. s. 1/a. Hungary, [4]Collegium Budapest, Institute for Advanced Study, H-1014 Budapest, Szentháromság tér 2. Hungary, [5]Pécs University, Dept. Informatics and G. Technology, H-7624 Pécs, Ifjúság u. 6. Hungary, (hegyis@ttk.pte.hu) [6]Budapest Polytechnik, Regional Information and Education Center, H-6000, Székesfehérvár, Budai út, Hungary, [7]St. Benedict Archeabbey, H-9090 Pannonhalma, Vár 1., Hungary, [8]Aries Plus Kft. H-1111 Budapest, Bertalan L. u. 20. Hungary, [9]UNICONSTANT, H-4150, Püspökladány, Honvéd u. 3. Hungary, [10]University of West Hungary, Bajcsy-Zs. u. 4., Sopron, H-9400, Hungary.

Introduction: Voyager and Galileo images revealed the fracture system on Europa, showing evidences for strike-slip displacements comparable to the terrestrial plate-tectonics and dilation along cracks comparable to the local freezing-thawing of the ice on lakes [1]. The global character of Europa fracture system was owed the varying tidal stress forces of the Jupiter which results in motions of tables of ice swimming on a water ocean [2]. The terrestrial counterpart to the local band tectonics of Europa [3], [7] is on the frozen lakes connected to the freezing-thawing of the ice and the accompanying dilatation of the ice [4]. Such motions can be observed on Lake Balaton and other terrestrial lakes frozen in winter.

Observations: In winter Balaton freezes gradually and frequently for the middle of winter, the entire surface of the lake freezes. On Balaton's surface the ice is thin: 2-4 decimeters thick in most places as compared to the depth 2-4 meters in average. Local cracks are driven by the freezing-thawing process, resulting in opening and closing [5]. While the freezing ice expands the thawing one contracts and the shrinking and broken plates become separated. First cracks than open water surface appears between this plates. Later the space between the shrinken plates is filled by new surface material with different thickness and color, this way making visible these dilational bands. In February of 2006 a beautiful band was observed on the Balaton ice cover and this observation triggered our study on this comparison.

Fig. 1. Wide band on the ice in February, 2006. The two edges were pull apart and the band (ca. 20 meters width) opened almost perpendicular to the direction of two edges.

Fig. 2. Enlarged portion of Fig. 1. shows the details of the band. Parallel lines between the two large table edges (darker) refer that horizontal displacement occurred on the liquid subsurface. This is a probable strike-slip segment of a fault which moved the two parts apart.

Europa analogs: The Europan cryovolcanic counterparts of the observed ice phenomena are grey bands which are interpreted to be young strike-slip faults [7]. One such example is Astypalaea Linea (Fig. 3), an other is Yelland Linea (Fig. 4). Both Europan and Balatonian bands have curved edges; are cut by other cracks; and have different albedo – and probably younger age – than the surrounding ice.

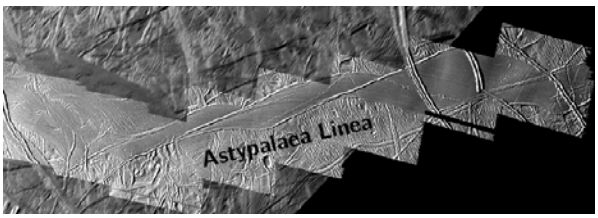

Fig. 3. Astypalaea Linea on Europa (PIA01644)

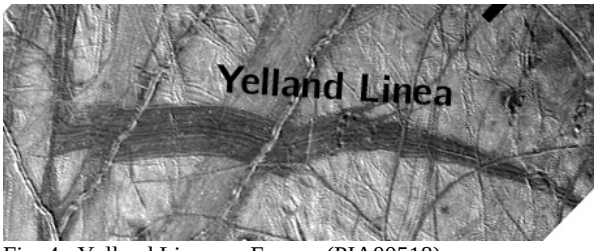

Fig. 4. Yelland Linea on Europa (PIA00518)

Cholnoky and Eötvös' works on the winter ice cover plane of Balaton: Loránd Eötvös carried out measurements on the Balaton Lake ice cover during the winter of 1901/02 and 1902/03. Cholnoky did worthy observations on the behaviour of the ice on the lake 1894/95 (Fig. 5.) [5]. One of his most important observation is the recurrence of the opening and closing places of the freezing-thawing process in the winter Balaton ice cover.

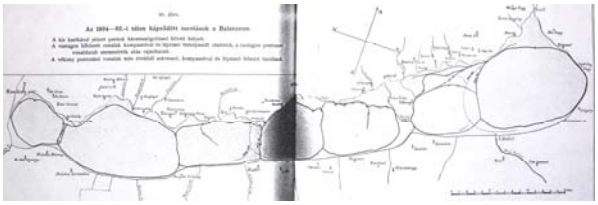

Fig. 5. The recurrence of the opening and closing places of the freezing-thawing process in the winter Balaton ice cover. The fissure system returns every frozen year on the same arrangement pattern on the ice cover of the lake. Fig 1 and fig 2. show the great band departing from the Tihany Peninsula southward to Szántód on the southern shore of the lake (Cholnoky, 1907).

During the 20th century, more accurate methods have been developed for observing large scale features of the Balaton lake ice. This resulted in a different interpretation of the main fissure system (Fig. 6.). However, even today observation of the actual *development* of fissures, cracks, bands, rafts of the lake ice is difficult because of the short period of snow-free lake ice and the frequent cloudy days that obscure the phenomena from airborn or satellite-based observations. During the last decades only few images have been taken showing snow-free lake ice on Balaton (Fig. 7) [8], [9], [10].

Fig. 6. The main fissure system as observed on February 23, 1982. [6]. Compare it with Cholnoky's interpretation of 1907 (Fig. 3)

Fig. 7. Airborn photomosaic of the ice-covered Balaton March 2, 1983 [6].

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