ADDITIONAL LESSONS FROM SATELLITE IMAGERY AND INVESTIGATION OF BIRCH AND ITS BREAKAGE

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Abstract

Additional lessons from the analyses of satellite imagery and investigation of birch and its breakage" is a discussion of the research, and its impact, on the use of high resolution satellite imagery in estimation of the Smolensk birch brake timing and consideration of anthropogenic origins of snow like white stains at locations of plane crash debris. The discussion is from the stand view of the involved investigators as well as outside observers of Polish reality. The most important conclusions are that: (i) the research related to the timing of the Smolensk birch breakage, while relatively simple and inconsequential in nature, proved to be the most vivid identifier of centrally coordinated corruption in Polish state and its private institutions, as well as all Polish mainstream media, collaborating and likely centrally coordinated in delivering disinformation and harassment of the independent research and involved scientists; (ii) considering that the initial assessment of birch position was offset from its ground measurements by 6 m at the stump, and about 4 m at the lying trunk, the satellite pictures support the conclusions based on birch physiology that the tree had to be broken before April 10 , 2010; (iii) despite widespread discussion of the above shifts, and various erroneous attempts of explaining them, the real mechanism causing them in the original assessment methodology of the birch positioning is still unknown; and (iv) the reaction of the media and their agents, collaborating on promoting the disinformation and harassment, to the research of anthropogenic origins of the seemingly snow like patches in place of the plane debris, which potentially could contribute an explanation regarding the causes of the Smolensk catastrophe, are consistent with conclusion (i) in terms of both disinformation and punitive actions in relation to the authors of the independent research.

Keywords *- Silver birch (betula pendula), birch physiology, birch sap bleeding, high resolution satellite imagery.*

Streszczenie

Dodatkowe wnioski z analizy zdjęć satelitarnych i dochodzenia właściwości brzozy i jej złamania" jest dyskusja na tematy dochodzeń i ich następstw w sprawach oceny czasu złamania brzozy Smoleńskiej i antropogenicznego pochodzenia białych plam pokrywających się przestrzennie z rozrzutem szczątków samolotu. Dyskusje są prowadzone z punktów widzenia zarówno badacza jak i zewnętrznego obserwatora. Podstawowe wnioski to: (i) badania złamania brzozy, choć stosunkowo proste i neutralne w konsekwencjach, okazały się jednym z najważniejszych osiągnięć niezależnych dochodzeń katastrofy Smoleńskiej w ujawnieniu mechanizmów polskiej korupcji i koordynacji służb specjalnych i instytucji państwowych, jak również prywatnych mediów głównego obiegu, w koordynowanej dezinformacji i publicznych represji w stosunku do niezależnych badań i naukowców; (ii) niezależnie od tego ze początkowe ustalenie położenia brzozy było przesunięte w stosunku do pomiaru naziemnego stojącego pnia o 6 m, a do pomiaru leżącego pnia o 4 m, zdjęcia satelitarne popierają wnioski oparte na fizjolog brzozy brodawkowatej, ze musiała ona być złamana na długo przed 10 kwietnia, 2010; (iii) pomimo szeroko rozpowszechnionej dyskusji powyższych przesunięć, i rożnych jakkolwiek błędnych, prób ich wyjaśnienia, prawdziwy mechanizm tego przesunięcia w oryginalnym oszacowaniu autora jest ciągle nieznany; i (iv) reakcje mediów głównego obiegu i współpracujących z nimi agentów dezinformacji, na badania antropogenicznego pochodzenia białych plam w miejscu rozrzutu szczątków samolotu, które potencjalnie mogą być kluczowe w badaniach przyczyn katastrofy Smoleńskiej, były spójne z wnioskiem (i) zarówno pod względem dezinformacji jak i podejmowania akcji represyjnych w stosunku do autorów niezależnych badań.

Słowa kluczowe *– Brzoza brodawkowata (betula pendula). fiziologia brzoz, wyciekanie sokow brzozowych, zdjecia satelitarne wysokiej rozdzielczosci..*

1. BACKGROUND

On Apr. 10, 2010, in Smolensk, Russia, Polish Air Force One aircraft TU-154M-101 has crashed near the Smolensk Northern airport. Despite a relatively benign impact with the ground, which didn't leave much of a crater, and didn't even scrape the dead grass on its surface, the aircraft disintegrated into an estimated 60 thousands pieces, most of which were size of about three to four cm. The so called Bodin's birch was said to be instrumental in destruction of the 80-ton jet that allegedly flew into it during a take-off acceleration at 80 m/s on 5 m height. However, some significant pieces of the aircraft were found already before the tree, while some past the tree, such as its stabilizer, according to the April 11, 2010, satellite image was located about 50 m before the crash site. These facts were omitted in the official Polish and Russian reports, that are claiming the location of all the parts based on the satellite image from Apr. 12, 2010, when many parts have already been moved from their original locations towards the main crash location.

The airplane crash killed 96 people, including Poland's President, 10 generals including 5 top NATO military leaders, high-ranking government officials, members of the Polish parliament and clergy, as well as a number of civilians including one US citizen. In one instant the course of Polish national and international politics have changed 180 degrees, and the opposition party in Poland took over all the government controls even before the president's body was examined by a doctor. It was the greatest and the most dramatic peace-based changeover in a country government personnel and politics ever. Subsequent disinformation attempts of unduly slandering the late president, generals, and pilots, in the most indiscriminant manner accusing them of drunkenness, bulling, and incompetence, attempted to falsify the course of events claiming various refuted later

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lies about the alleged course of events. The improbability of these lies in the light of knowledge of the accused individuals, the existing protocols, and the laws of physics and engineering, became a motivation for various scientists to do independent studies of various relevant issues related to this incident. In effect the actual reaction to the strenuous widespread efforts of disinformation and resulting lack of credible information relating to the incident resulted in the foundations of organizing the *Smolensk Conference* and creating the *Polish Parliamentary Committee for Investigating the Smolensk Catastrophe*, two independent organizations with many scientists undertaking the efforts towards a search for truth about the crash and its details. In addition to these formal organizations a multitude of initiatives took place conducting independent studies on various subjects related to the crash and associated with it scientific challenges and theories about various scenarios of the course of events.

Among many scientists of the Smolensk Conference, the author of this report conducted studies related to the Bodin's birch tree wood properties, brake characteristics, physiological behavior, and spatiotemporal analysis of the tree changes and its surroundings. Results of these studies were presented at various conferences (e.g. [1, 2, 3, 4]) and interviews, and in publications varying from published abstracts [5], through conference proceedings [6, 7] to journal articles (e.g., [8]). Furthermore, the author also conducted research related to the Smolensk crash in spatiotemporal analysis of the crash site. The studies were based on use of high resolution satellite imagery for analysis of spatiotemporal changes on the crash site during the timeframe between Apr. 5 and 14, 2010. Similar to the birch studies discussed above, the results of the crash site studies were presented at various conferences (e.g., [9, 10 2, 11, 12]), and published in conference proceedings (e.g., [13, 14, 15]) and journal articles (e.g.,[16]).

The Smolensk Conferences of 2011, 2012 and 2013, brought many studies on diverse aspects relating to the Smolensk crash incident, none of which contradicted any of the general findings presented in any of the above cited presentations and publications. The main conclusions of the described research have not been undermined by any other unpublished studies known to the author; although, there have been independent contributions to the birch location research in the form of new field measurements that allowed for a better localization of the birch tree stump based on measurements in relation to the nearest municipalities. The new measurements confirmed one of the author's earlier claims that the government measurements in the Polish and Russian official reports were inaccurate, and they improved the localization of the tree originally suggested by this author by about 6 m at the stump and about 4 m at the gravity center of the fallen trunk. The source of error in the author's original assessment of the tree position is still unknown despite different unsuccessful attempts of guesstimating it. However, as documented in [2], these improved measurements did not change the main conclusion of the author's earlier studies that the tree must have been broken before Apr. 10, 2010. Such conclusion is based on the fact that the broken birch, which is a silver birch (*betula pendula*) with typical abundant discharging of large amounts of sap from any damage to the tree cambium, was on April 10, 11, 12, 13, and after, completely dry on the brake cross-section without any signs of sap discharge, which is probable for this species only if it is fallen outside of the vegetative season and it is impossible during Spring season, which was in the full swing on Apr. 10, 2010, when the local population was already collecting the birch sap from many of the local birch trees, and when other damaged birch trees in the Smolensk area were visibly sipping sap readily identifiable on different ground photographs.

All the abovementioned studies are available online; and therefore, they're not discussed here at length. However, certain points emerging from some of the abovementioned studies are worth a brief review. For example, the study on the Smolensk birch wood quality (i.e., [1, 8]) are based on the highest level of knowledge in this area and were analyzing the actual wood sample from the very subject tree. The results of this study are conclusive with regards to the estimated wood quality parameters and the assessment of the relative weakness of its trunk due to the presence of large knots from multiple limbs. Based on these and other studies (e.g., [17]) it is essentially proven that the Bodin's birch could not have broken off the wing of the TU-154M 101 on Apr. 10, 2010. Furthermore, a simple inspection of high resolution photography representing the tree brake, along with the conclusive information that that the vegetation season in Smolensk started in 2010 before Apr. 10, 2010, proves that the tree could not brake on Apr. 10, 2010, when other trees of the same species were discharging birch sap from any scars and brakes. This is a simple matter of this species physiology, which is known for its abandon production of birch sap, commonly harvested in Smolensk by local birch sap collectors for human consumption and commercial uses, who as a matter of fact were already collecting the birch sap on Apr. 10, 2010, when the crash took place[1].

It is the matter of silver birch physiology and properties of wood drying that a birch tree broken near the beginning of Spring will bleed the sap for weeks or even months, which was not present in the Bodin's broken birch brake cross-section after April 10, 11, 12, 13, and so on. On the other hand, when a birch is broken while the tree is dormant for a long time the wood on the brake dries up and shrinks the damaged cells. The wood cells that are chemically bound to water will bond with other wood cells when water is removed. Even when water is reintroduced (e.g., by rain) some of the wood cells will stay bonded with wood cells as opposed to going back to a water bond. As for the undamaged wood there are fluctuations in moisture content, but the cell walls always remain fully saturated and are thus in the "green" condition. Moisture in wood takes 3 forms, bound water which is water bound to the cell walls, free water which is liquid water in the cell lumen, and water vapor in the cell lumen. In healthy living trees, when the wood is considered to be in the “green” condition, the cell walls are fully saturated with water. When wood is dried the free water in the cell lumen is removed first – the point at which all of the free water is removed but all of the bound water in the cells remains is called the fiber saturation point which is around 30% moisture content (dry-basis). It is only when the bound water is removed that the mechanical properties begin to change. As the moisture content decreases from the fiber saturation point to 4-12% moisture

[1] This claim is based on an account of a blogger publishing on a Smolensk birch sap collector website and an article published in "*Smolenska Gazeta*".

content most of the mechanical properties increase in the neighborhood from 20% to 100% depending on the specific property. The changes in mechanical properties are associated with increased hydrogen bonding between the cell wall components as water is removed. Bleeding sap in broken birch prevents its damaged cells from drying out and closing up, but if the tree is broken during a dormant season, the exposed to air wood will dry relatively quickly sealing the exposed wood on the brake, which will stop the birch sap from sipping out. This is how it can be explained that the broken birch on Bodin's property didn't have any sap bleeding after Apr. 10, 2010, and was appearing to have dry wood on its brake.

2. NEW DEVELOPMENTS

2.1. The birch site analysis

Besides the abovementioned studies and the research presented there, there have been some other relevant to them developments outside of the Smolensk Conference. The new ground measurements of the broken birch location were taken independently by two crews that are known as the group of prof. Czachor and the group of min. Macierewicz.

The measurements from these groups are considered in [2], where they are treated as assumed new locations of the birch stump. Neither of the locations determined by the new measurements changed the main conclusion of the original study, even though, they have affected selection of the supporting arguments. The reason for the former is that the argument of lack of sap from silver birch (*betula pendula*) cambium damage is independent of the tree location within a minimum of several km range --- distance sufficient to observe change of climate and times of seasonal changes. In some cases a difference of a few hundred meters in elevations may mean a large difference in temperature and soil fertility and associated with it ecosystem productivity. This could be important because there is an inverse correlation between the soil fertility and the ecosystem productivity and consequently the amount of sap produced by the trees in a given location. However, in the case of Bodin's birch the soil potential and the growth of this tree are known from empirical samples and measurements, and they are very high in productivity. The soil sample from the location of the birch, provided by Dr. Gruszynski, was analyzed in a soil science laboratory and, as expected, it showed (Tab. 1) a very rich organic content with a high productivity potential [18].

Tab. 1. Analysis of Soil Sample taken from the surroundings of Bodin's birch.

					Mehlich 1 mg/kg (ppm)						mg/kg	
Lab	Sample	LBC[1] (ppm $CaCO_3$/pH)	pH $_{CaCl2}$[2]	Equiv. water pH	Ca	K	Mg	Mn	P	Zn	NH_4-N	NO_3-N
58112	1	1195	6.45	7.05	7621	391.7	453.4	8.17	267.5	10.88	15.13	381.6
1. Soil Testing: Measurement of Lime Buffer Capacity (http://www.caes.uga.edu/Publications/displayHTML.cfm?pk_id=7335)												
2. Soil Testing: Soil pH and Salt Concentration (http://www.caes.uga.edu/Publications/displayHTML.cfm?pk_id=7336)												

Even without the soil sample the high productivity of the site was evident from the height and volume of the tree, which was at the level close to the maximum of its potential on high productivity sites. This means that the birch was exhibiting intense growth with a high biomass productivity; and therefore, an intense production of sap, which would have to be visible as large quantities of bleeding sap if the tree were broken on Apr. 10, 2010.

The arguments for the secondary conclusion that the satellite imagery supports the claim that the tree was broken already on Apr. 5, 2010, could be affected by the tree location of the tree trunk if it were, for example, 100 m away from the pile of the white garbage debris that was located next to the tree. Since the tree trunk was found to be only 6 m away from the garbage then at least two arguments decide that the satellite imagery still supports the claim that the tree was broken already on Apr. 5, 2010. First argument is that the garbage would not be visible under the tree on Apr. 5, 2010, if the tree crown were still intact then, because of the angle from which the image was taken (see [2] for details) the proximity of that garbage to the tree trunk, the height of the tree, and the width of its crown. The second argument is that the garbage pile visible on all images from Apr. 5, 11, and 12, would not have stayed in tact, piled up in the same location, in the same undisturbed manner, if the TU-154M jet aircraft flew over it on 5 m height, especially during the airplane acceleration after the command "odchodzimy". Additionally, from another yet point of view, another compelling argument is that based on an inspection of the images from different dates, and from Apr. 5, 11, and 12, one can conclude that the images of Apr. 5, 11, and 12, represent the same unchanged scenery, and that it is improbable that anything drastic could have happened on this scene between Apr. 5 and 12, which is consistent with all findings of other studies from the Smolensk Conference that the Polish Air Force One TU-154M-101 could not have collided with the said Bodin's birch.Given that the Polish government official investigating committee leader, dr. Lasek, has quoted in his public speeches an anonymous blogger as his authority, it will not be unreasonable to bring here some other examples of research and online publications by Polish bloggers, which are relevant to the discussed matter. External to the Smolensk Conference independent studies, confirm the conclusions that the tree had been broken before Apr. 10, 2010, and therefore, that the TU-154M-101 aircraft could not collide with the tree. These are various analyses, experiments, and data gatherings, conducted by the Polish bloggers 3zet, doradcar305, geoal, pico, and others, on www.salon24.pl.

For example, the blogger 3zet conducted a series of empirical experiments with various damages to silver birch (*betula pendula*) trees, documented with many hundreds (perhaps even thousands) of pictures demonstrating the behavior of this species in the presence of various damages made at the end of Winter season, which demonstrated abundance of sap bleedings caused by any kind of damage to cambium, such as scaring the bark, trunk cracks, damaged and cut branches, broken tree stumps (Fig. 1), wind brakes (

Fig. 2) and various other experiments. With no exception all birch trees damaged at the beginning of Spring produced abundant quantities of birch sap, even at the time of apparent frost when the seeping out sap was getting frozen on tree stumps. Even trees damaged shortly before the beginning of the Spring season and frozen at the time of bleeding (Fig. 3), continue bleeding as soon as they defrost as long as the open cells don't get shrank and closed by the drying process, which depending on air moisture and temperature may take between several days to a few months.

Fig. 1. Examples of birch (*betula pendula*) bleeding sap from a broken branch.

Other blogger, Doradcar305, demonstrated analysis based on tree physiology of silver birch (*betula pendula*) and examination of high-resolution photography, that leads to a proof that the tree must have been broken long before Apr. 5, 2010, because it didn't exhibit any development of its flowers and leaves on the broken treetop and branches, which would be an expected typical behavior for this species and many other perennial plants. Following online publication of this analysis, 3zet produced yet another series of experiments with cutting tree tops and branches and

Fig. 2. Birch (*betula pendula*) heavily bleeding sap from tree brake.

Fig. 3. Frozen sap on a broken birch (*betula pendula*) during early Spring.

demonstrating the expected normal development of leaves and flowers on the cut off treetops and branches (Fig. 4). Among other analysis of the available photographs from the Smolensk crash incident related to the alleged TU-154M-101 collision with the birch it's worth to bring up the observations of doradcar305 regarding the embedded in the tree metal parts with highly weathered and oxidized surfaces, appearance of which did not match at all the appearance of the aircraft parts and debris. Furthermore, the alleged wood shavings in the broken aircraft wing parts consisting of regular saw shavings, which are highly suspect to claim that they could have originated from the contact of the aircraft and the tree. These and the other discussed earlier anomalies and irregularities along with the indiscriminant and rather naive attitudes of the official Polish investigators and supporting them mainstream media beg the question if the misappearance of insincerity in the Polish government and the media is intentional or merely based on some kind of deeply rooted lack of interest in considering any counterarguments to the original official Russian report and an extreme ignorance. To answer this question we need to consider the reaction to the study the author presented on the second Smolensk Conference, which will be considered in the next section.

Fig. 4. Treetop cut before the vegetation season (left) some days later continues developing leaves on the ground (right).

2.2. The crash site analysis

New developments in the area of the spatiotemporal analysis of the crash site included various pan sharpening analysis intended to improve image readability, segmentation analysis intended to help with identification and displacement of various elements, computing the degree of coincidence between the white patches visible on Apr. 5, 2010, in the area of the crash site, and the actual distribution of the dispersed plain debris, and estimating differences in pixel signatures between different white patches.

Computing the degree of coincidence between the early white patches in location of the crash and the polygons of dispersed plane debris undertook the task of estimating the degree of coincidence between the occurrence of two independent events which took place over a common spatial location at two different times. Using the spatial correlation analyses of two event areas on high-resolution satellite images, the authors determine how paired the two events were, resulting in estimation of the naturalness of the occurred event. The spatial area of interest was the crash site of the Polish Air Force One TU-154M plane destruction on April 11, 2010, (Event 2), and spatially proximate to this area region of high spectral reflectance – assumable as snow covered region (Event 1), recorded on the satellite image taken on April 5, 2010.

- The analyses were conducted in four steps (Fig. 5).
- Segmentation – SLIC, Normalized Cuts.
- Generate variants – displacement up to 300% from center.
- Find the overlapping regions.
- Find the rate of overlap with the regions being displaced for 300 %..

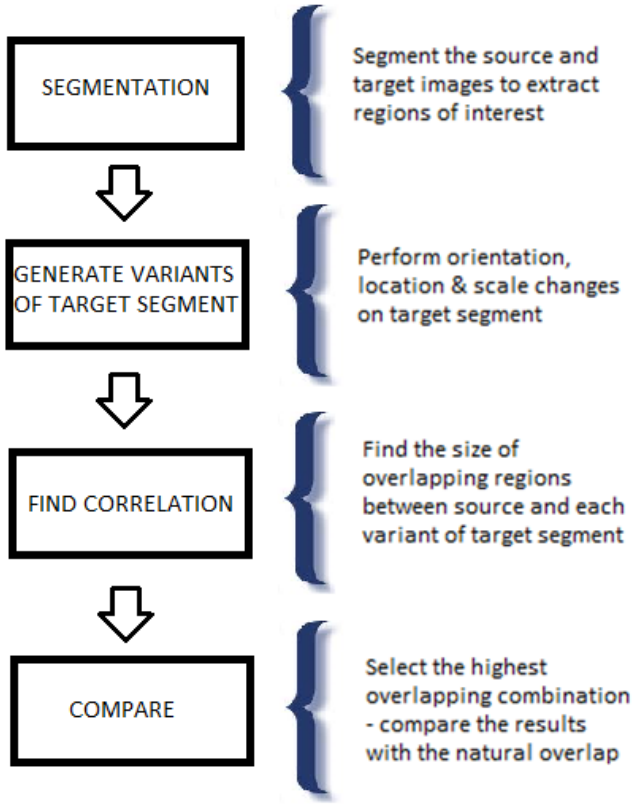

Fig. 5. Flowchart for the spatiotempral correlation analysis determining the degree of coincidence in similarities of the polygons of white patches on Apr. 5, 2010, and the spatial distribution of the plain debris on Apr. 11, 2010.

The results of the analysis are summarized in Fig. 6 and Fig. 7, and they indicate that by displacing the target region (flight crash region/Event 2) over the source region (white patches covered region/ Event 1) of the source image, either vertically or horizontally, the rate of overlap between the two different events is very high at a rate of about 75%, when compared to the overlap in other regions. In essence, these results mean that there is a strong likelihood that the crash in Smolensk at the given location was preceded by some explicit preparations on this very location, that might have, or might have not, been specifically intended for this purpose. For this reason that matter should be thoroughly investigated by the Polish and international Special Services.

The conducted study can be considered as preliminary in nature and were conducted primarily as a seed idea study for others to follow. This study was intended as an idea and encouragement for the official investigating committees to look into conducting this kind of analysis taking it to higher levels of advancement. To address any level of arbitrary

influence in this kind of study one should explore different methods of automatic segmentation of both polygons from Event 1 and 2.

Other study recently conducted in relation to the crash site and the early white patches was based on estimating differences in pixel signatures between different white patches on the Apr. 5, 2010, satellite image. This study attempted to identify and compare potential differences in digital signatures of pixels comprising various white patches on the images of Apr. 5, 2010. The need for the study was motivated by the fact that the digital images had much brother color resolution than human eye is able to see, and that different displays of the digital images were giving different impressions of the snow presence in the considered regions, while different seemingly white patches may have been representing other objects with high reflectance than snow.

The study data sample consisted of multiple polygons of larger snow-like patches on the crash site and on areas surrounding the crash site and the airport region. Three categories of likely snow accumulation were investigated, and they included roof tops, random field snow occurrences, and the crash site location white patches.

The methodology for the digital signature measurements and comparisons consisted of:

- Image polarization for unsupervised determination of white areas (e.g., Fig. 8 top);
- Image filtration and masking for filtering out too small patches (e.g., Fig. 8 bottom);
- Random selection of sample areas (Fig. 9) for pixel value sampling in three categories of samples:
    - Snowed up roof tops;
    - Snow patches in the field;
    - White patches on the crash site;
- Computing summary statistic for pixel values from different samples;
- Preliminary assessment and associated analysis;

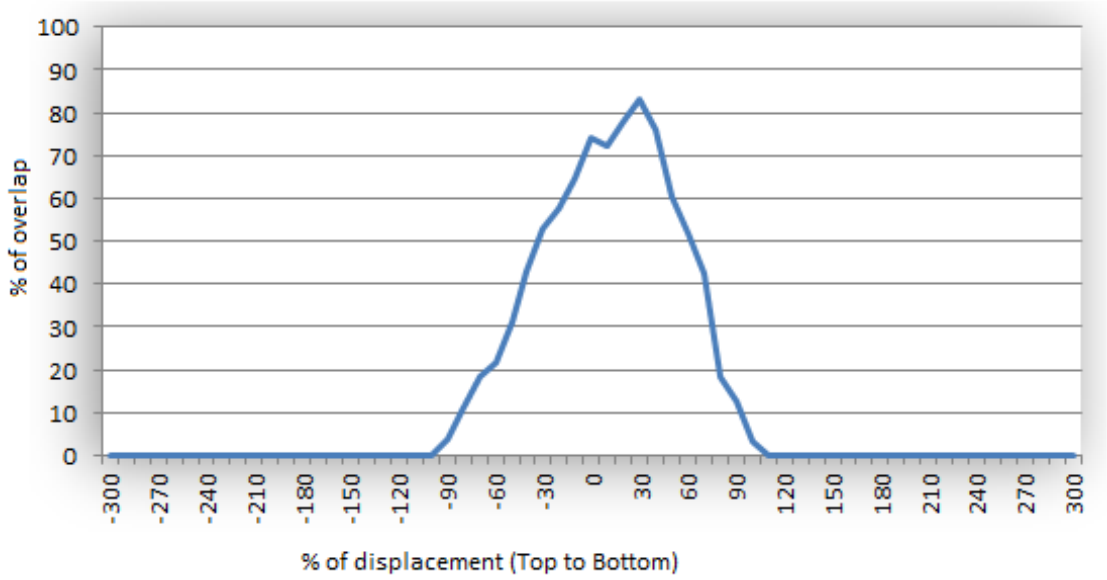

Fig. 6. Estimating the degree of coincidence by vertical displacement.

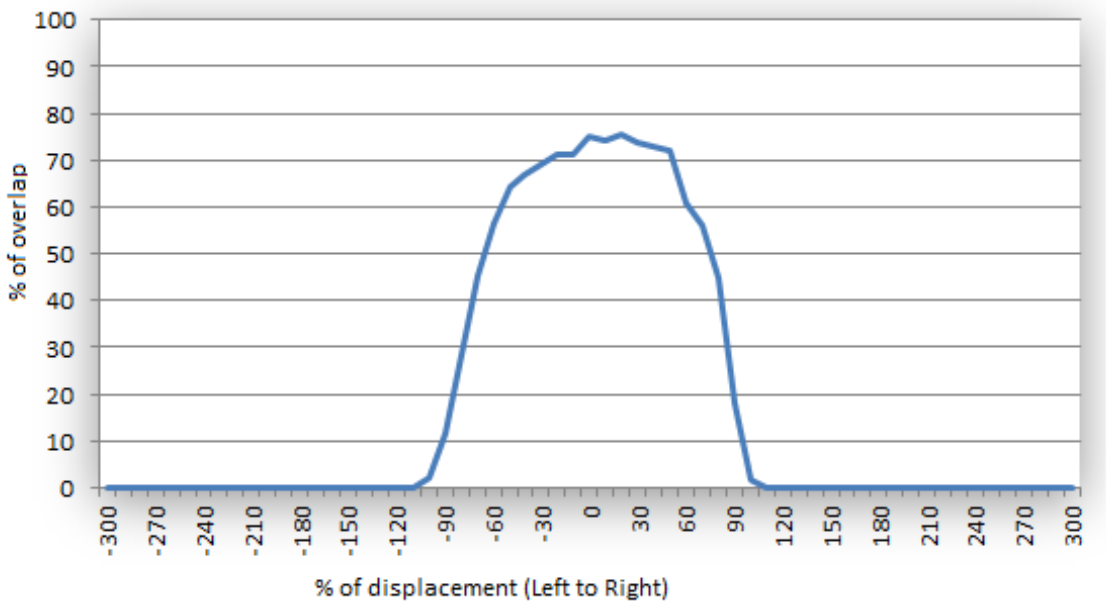

Fig. 7. Estimating the degree of coincidence by horizontal displacement.

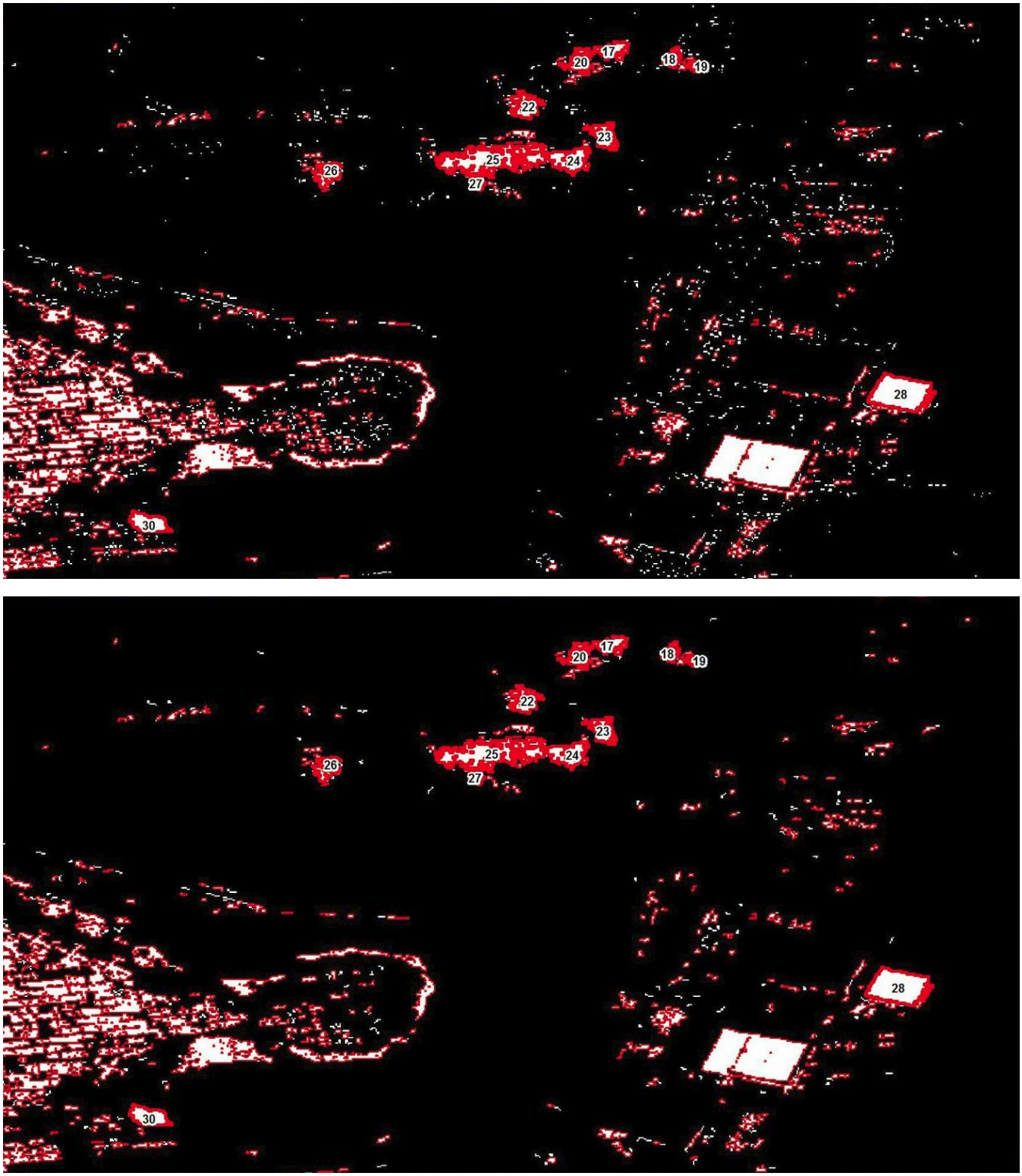

Fig. 8. Polarized satellite image taken on Apr. 5, 2010, with automatically determined polygons of potential snow patches in the region of the Smolensk North airport, without filter (top) and with filtered out small patches (bottom). Numbered patches are examples of the selected data locations.

The results of the study were inconclusive due to a large variation in pixel values (Tab. 2). While there seems to be some regularities and patterns of values that might have distinguish the crash areas from the other snow patches, the large variation in the pixel values in essence was making all possible conclusions statistically insignificant. For a more conclusive results the sampling of the different patch values should be subjected to higher rigor in segmentation and filtrating, as well as buffering the sampled areas to eliminate the multiple edge effects of the small and irregular shapes of all the samples. Similar to the earlier discussed research this study was intended as a seed idea for further analysis by other interested investigators.

Various other attempts of research into methodology were made along exploration of auto segmentation and improved methods of pan sharpening to improve the identification of photographed objects and readability of the images, but up to this point they have not yet yield significant results worthwhile describing them in detail.

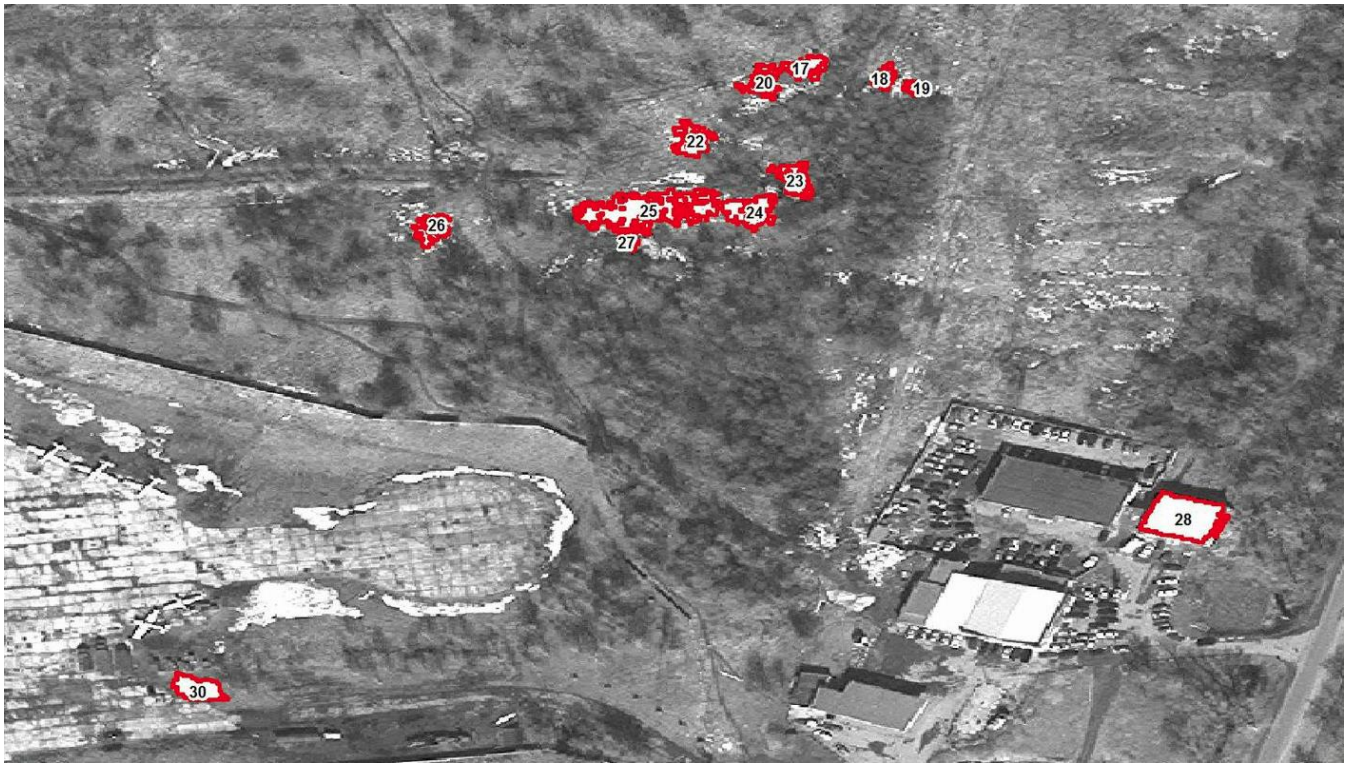

Fig. 9. Numbered patches are examples of the selected data locations: i) snowed up roof tops (e.g., 28); ii) Snow patches in the field (e.g., 17-20, 22, 27, 30); and iii) White patches on the crash site (e.g., 23-26).

Tab. 2. Pixel value summary statistics for testes data samples and preliminary assessment of pixel value patterns.

UniqueID	Feature	MeanPixel	VarCoef	PixelCount	MinPixel	MaxPixel	RangePixel	StDevPixel	SumPixel	VarietyPixel	MajorityPixel	MinorityPixel	MedianPixel	Rel_STD
31	Building	473		889	355	668	313	56	420070	217	466	355	474	12%
34	Building	474		111	364	614	250	50	52630	73	473	364	473	11%
35	Building	527	**19%**	771	356	862	506	63	406492	215	524	363	530	12%
28	Building	692	541	837	355	1076	721	137	579284	286	618	355	631	20%
25	Crash	560		986	355	1096	741	136	551792	375	402	367	540	24%
26	Crash	561		172	355	942	587	149	96528	123	454	356	544	27%
23	Crash	564	**2%**	210	355	971	616	149	118528	139	410	357	556	26%
24	Crash	586	568	330	356	952	596	143	193487	199	704	358	573	24%
1	Field	612	**12%**	454	357	1067	710	180	277641	266	379	357	577	29%
2	Field	705	589	1278	358	1066	708	136	901131	413	781	360	741	19%
3	Field	614		474	355	975	620	139	291009	267	689	356	601	23%
4	Field	635	**7%**	777	355	902	547	153	493079	335	796	359	660	24%
6	Field	611	**7%**	2305	355	1177	822	171	1407577	578	562	360	584	28%
7	Field	615	**2%**	903	355	907	552	134	555571	355	712	355	646	22%
16	Field	757	**11%**	765	357	1060	703	195	579260	344	883	357	841	26%
29	Field	609	**11%**	741	355	977	622	174	450926	359	505	355	578	29%
5	Field	535		2629	355	953	598	127	1407726	473	492	558	510	24%
15	Field	629		730	356	970	614	163	459036	378	424	357	624	26%
32	Field	521		350	355	886	531	126	182506	199	430	355	493	24%
33	Field	571	**8%**	1077	355	1174	819	159	614805	425	470	356	543	28%
14	Field	486		217	356	860	504	97	105434	125	392	357	470	20%
11	Field	633		1770	355	1226	871	169	1119597	541	365	360	628	27%
13	Field	542		473	355	791	436	113	256135	239	406	358	544	21%
12	Field	537	**11%**	490	355	813	458	107	262965	255	420	357	540	20%
8	Field	637	**9%**	4102	355	1046	691	157	2611248	579	762	385	650	25%
10	Field	582	**8%**	1457	355	1028	673	164	847361	472	448	380	541	28%
9	Field	611	**7%**	569	355	958	603	156	347447	302	883	355	592	25%
21	Field	553	**6%**	199	355	931	576	154	109963	134	409	358	510	28%
30	Field	657	**7%**	279	368	1126	758	175	183267	180	513	368	620	27%
22	Field	524		212	355	1000	645	132	111028	136	365	355	490	25%
20	Field	526		177	356	846	490	124	93113	115	379	356	503	24%
17	Field	601		160	357	1002	645	159	96216	117	523	365	587	26%
18	Field	508	**8%**	77	364	848	484	112	39131	54	592	364	476	22%
19	Field	499	**9%**	53	368	811	443	105	26469	40	460	368	481	21%
27	Field	442		47	360	578	218	50	20767	35	363	360	427	11%

2.3. The associated events of the Polish reality

The spatiotemporal study of the crash site had little follow up in the media and the blogosphere. It attracted little attention even thought the potential implications of these findings are very serious, because they may be pointing to a cause-effect relationship between some early activities of the Russian authorities in place of the future crash site and the later TU-154M crash at the very same location. This situation lend itself to various speculations linking this research to alleged developments claimed to take place at the Okęcie Airport in Warsaw, Poland, on Apr. 10, 2010, prior to the TU-154M flight to Smolensk. There is no evidence of the connection between the said issues, and suggesting any relationships of this type would be beyond the scope of the author's research and intend.

Contrary to the above situation, the spatiotemporal analysis of the birch location site met with a broad interest; although, for wrong reasons and not due to its actual merit. The study main reasoning explained during the original presentation (Fig. 10) was basically ignored, and all attention was focused solely on the localization of the fallen treetop and its snag, which later was recognized to be likely mistaken with a pile of trash including white plastic bags. Ironically, changing the interpretation of the identified object into the pile of trash was implying the same result, but much stronger, confirmation of an early tree breakage, because the pile of while trash could not had been visible under a standing tree crown on Apr. 5, 2010, while this was additionally proving that the TU-154M could not at all fly over this location at 5 m height. Yet, these facts were overshadowed by coordinated medial attacks defying any rational reasoning, discussion, or even just mare consideration of the analyzed data.

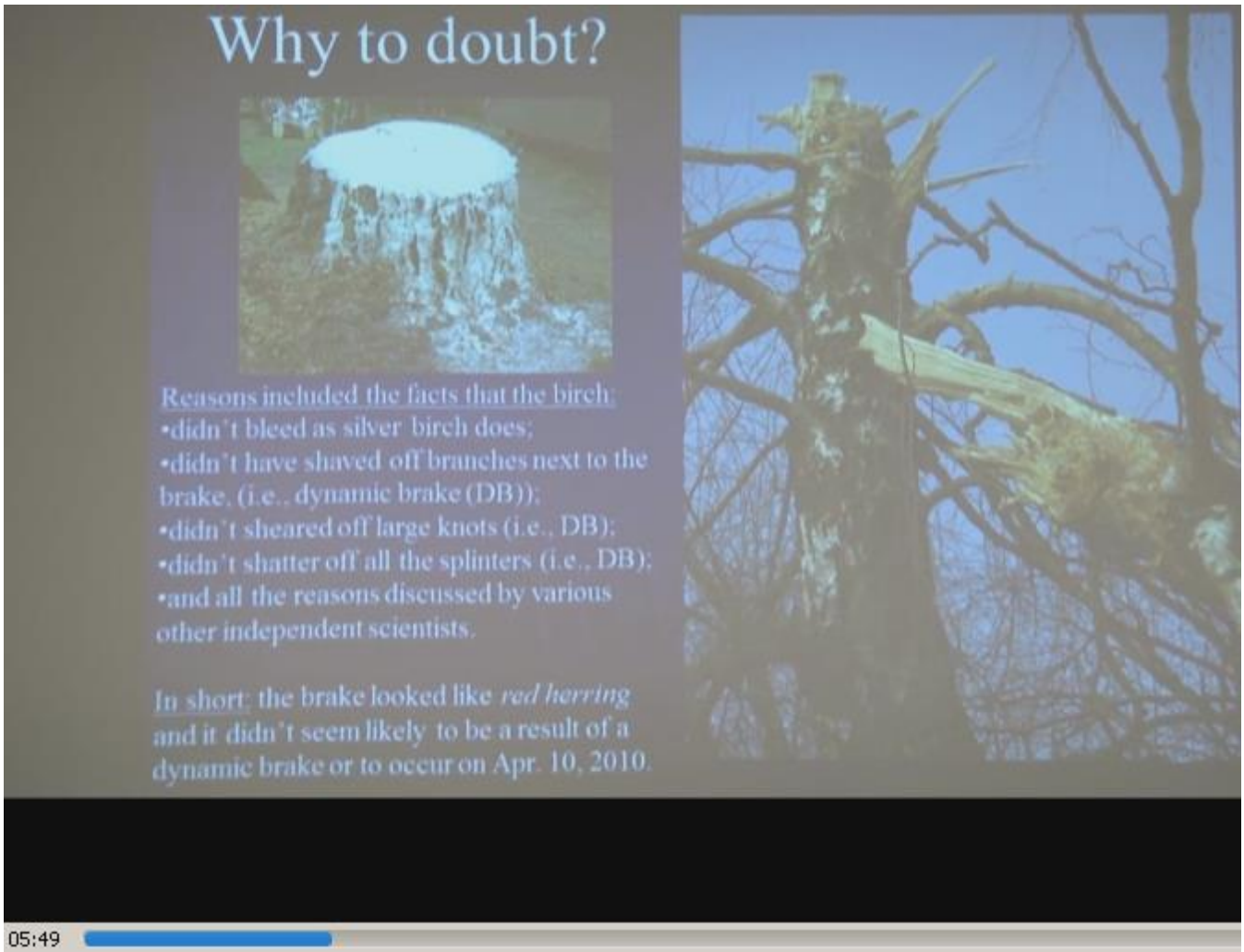

Fig. 10. Screenshot from the original presentation explaining why the birch had to be broken before Apr. 10, 2010. (e.g., fragment of the presentation: "*... suche kompletnie drewno, ktore nie moglo byc zlamane poprzedniego dnia, ani dwa dni wczesniej, ani trzy dni wczesniej...*"

What seemed initially to be just a squabbling of several anonymous Internet "trolls" and only the most unprincipled media became soon a slandering contest of lies and falsifications delivered by all the mainstream media, including all the Polish TV stations and the biggest Polish newspapers.

The attacks on the author were targeted at different parts of the Polish society and they varied: i) from a primitive electronic manipulation of clippings from the author's video presentation, creating for the lowest denominator of the society a cheap laugh; ii) through a libelous misinterpretation of the author's gestures and through lies about the author's allegedly dishonest claims of authorship---for the average laymen; and iii) to publishing an attempt of refuting the author's work by the Polish Intelligence service satellite imagery analysis ordered by the Polish Military

Prosecutor Office---for the more involved part of the society. The ordering, preparation, and releases, of these attacks and the report were followed by ordering, preparations, and release, by Polish Public TV, a provocation based on interrogatories by the IPN (The Institute of National Remembrance) into the author's past from the early 1980-ties, 33-yearold history. The interrogatories were processed by the IPN in a special out-of-ordinary "Rush" order not available to other historians attempting to study the same material, and they turned out documents with erroneous entries (written out of order in a standard form), attempting to imply inaccurately that the author was allegedly registered already in 1982 as a "TW" (Polish Secret Agent) of the communist SB (Security Service). This action was assisted by all mainstream media in Poland picking up the topic of the allegations, which was irrelevant to the author's study, and making it more prominent with articles and comments of individual reporters of these media, all of whom, along with the mainstream media, kept silent on this subject when a year and a half later the author was cleared of all the allegations by the Polish Court designated to such matters.

The significance of the described above events is that the likelihood of all of them originating independently of each other is quite improbable, while the silence of the media, after the Polish Court decision, bespeaks of malintent and interests in other purposes than reporting the news based on truth. The likelihood of the above events occurring independently is about the same as the likelihood of natural and independent occurrence of all the fantastic anomalies the author reported in his study, such as:

- the biggest snow patches on Apr. 5, 2010, being similar in size, shape, and locations, to the spatial distribution of the plain crash debris; and
- the biggest patch of snow on Apr. 5, 2010---when almost all snow was gone---occurring at the location of snow scarcity on Jan. 26, 2010---when there was snow almost everywhere except for this location; and
- the biggest silver birch (*betula pendula*), with the most leaves and flowers, bleeding no sap after braking during the sap harvesting season; and
- the high-resolution satellite images taken on Apr. 5, 11, and 12, 2010, looking essentially the same despite a large 20 m high tree with crown diameter about 12 to 14 m wide being transparent on Apr. 5 and not obstructing the view on a white pile of trash under it; and
- the TU-154M jet flying 5 m over a pile of plastic bags without disturbing them; and a number of other fantastic events taking place during the Smolensk tragedy after which the country of Poland changed its political course 180 degrees in the opposite direction of what it was before the tragedy.

It seems a matter of logic that all the attacks on the author must have come from an organ able to command all the involved institutions, and were centrally coordinated. The fact that they were coordinated between the special services, such the Polish Military Prosecutor's office, the Polish Military Intelligence, the Polish institutions such as the Institute of National Remembrance, the Polish national TV, and all the mainstream media activities in Poland and abroad, along with a large number of anonymous and identifiable individuals, bespeaks of a central control manipulating the subordinate institutions participating in this kind of coordinated multi-institutional and multi-services actions of mass-disinformation. With this level of centrally controlled interference against any independent studies regarding the Smolensk tragedy it becomes more understandable why, for example, the head of Polish Academy of Sciences appears to believe that he has to do only science supporting his current government as if he had no sense of decency and scientific integrity, and why some of the University Provosts (e.g., AGH) have no ethical integrity collaborating in the persecution of Polish professors, such as in the cases of prof. Ronda and prof. Witakowski, who are persecuted due to their participation in the independent research of the Smolensk tragedy and related public discussions. In this respect the studies of this author made the greatest contribution to the understanding Polish reality and the environment surrounding the Smolensk tragedy, the lack of legitimate investigation of this event, and the continuing disinformation surrounding this subject, as well as the sources and mechanisms of the terror and oppression associated with the hidden organized subversion against investigation of the Smolensk tragedy.

3. CONCLUSIONS

There are five major conclusions from the above.

- The first conclusion from the author's research on the spatiotemporal analysis of the birch scenery changes is that the spatiotemporal analysis of the satellite imagery supports the claim that the tree was broken prior to Apr. 5, 2010, for all considered assumptions of the tree locations including those most recently reported by the groups of prof. Czachor and min. Macierewicz. However, the earlier wood quality study and various engineering calculations and simulations had already proven prior to this study that the TU-154M-101 could not crash as a result of the alleged collision with the Bodin's birch tree; and therefore, the finding that the birch tree was broken before Apr. 5, 2010, while likely accurate, is really inconsequential from the technical point of view, and it did not contribute to any new elements capable of changing any other earlier conclusions---it merely supports them.
- The common conclusion from both spatiotemporal analyses of the high-resolution satellite imagery from April 5, 2010, with respect to the birch study and the crash site studies, is that the respective scenes of the birch site and the crash site locations have been subject to some relevant activities preceding Apr. 5, 2010, which might have been directly or indirectly associated with the crash and related to it course of events, and which have not been investigated by official Polish and Russian committees.
- The conclusion from the response to the discussed studies is that the real battle for truth about the Smolensk tragedy is not in the domain of sciences and engineering but in the domain of propaganda and demagogy, because the author's study were unique mainly in simplicity of appeal to laymen, while they have triggered the coordinated attacks against them and their author attempting to even falsify alleged dirt in his unrelated past from over 30 years ago.
- Furthermore, a seemingly unrelated but an important conclusion from the above is that the current

establishment in Poland operates in the same manner as the Stalinist era communists who were destroying in any achievable ways all individuals who might have shown any treat to the upheld obliging versions of propaganda lies and history falsifications. This conclusion follows directly from the characteristics of the attack.

- The final conclusion is that the author's study have likely reviled elements of strenuously protected secrets of the Smolensk tragedy, which bespeaks of lack of full transparency, thoroughness, and integrity, of the official investigations regarding this incident, and that the official sources collaborate in hiding from the public the true facts related to the Smolensk catastrophe, which can further imply that they either may have played a direct role in the tragedy or may be collaborating with, and/or protecting those, who did.

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