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Coordinador: Prof. Dr. Franco Urbani

Sociedad Venezolana de Espeleología. Apartado 47.334, Caracas 1041A, Venezuela.

Telefax: (58)-212-272-0724, Correo-e: urbani@cantv.net

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GÉNESIS DE LAS HELICTITAS: RESEÑA HISTÓRICA

*Por: MSc. Efrén JAIMEZ SALGADO**

ejaimenz@iga.cu

Grupo Pedro Borrás Astorga.

Comité Espeleológico Ciudad de La Habana

Mucho se ha teorizado sobre el origen del mas bello e interesante fenómeno del mundo subterráneo (las helictitas), conocidas en Francia como estalactitas excéntricas, dado que su crecimiento no se realiza de arriba hacia abajo como las estalactitas normales, sino haciendo toda suerte de círculos, espirales, tirabuzones, etc.

En la literatura espeleológica, estas fantásticas formas cristalinas del mundo subterráneo han recibido el nombre de helictitas (del vocablo griego helic, que significa espiral), haciéndose así alusión a una de las formas más comunes en que se les puede encontrar.

Ya desde los tiempos del precursor Eduardo Alfredo Martel, se hablaba acerca de estas sinuosas formaciones. Algunas teorías prematuras de entonces, invocaban la presencia de supuestas corrientes de aire que hacían variar la posición de las gotas de agua bicarbonatada, antes de evaporarse. Otras hipótesis como las de Chevalier, habían notado ya desde muy temprano que no eran las supuestas corrientes de aire, sino la inmovilidad de la atmósfera subterránea, una de las principales condiciones necesarias para la formación de las helictitas, siendo estas particularmente raras o escasas en los grandes salones donde las corrientes de aire se oponen a que la inmovilidad del aire sea una constante.

Brigitte y Jacques intentaron demostrar en el Congreso de Ljubljana que "el más riguroso confinamiento es el fenómeno que da lugar a las formas más bellas", haciendo observar que los espeleólogos hablan siempre de "nichos, capillas, y rincones de excéntricas".

Para ello, dichos autores partieron de explicar el clima de las zonas confinadas o cerradas, caracterizado por 3 fenómenos esenciales:

- a. La sedimentación del gas carbónico en las zonas más bajas de los compartimientos.
- b. La existencia de un gradiente de temperatura con sentido inverso al gradiente geotérmico que es sistemático en las zonas confinadas o cerradas.
- c. El hecho significativo de que el agua que llega más fría que el aire de la zona confinada y se estanca en los puntos más bajos, produce condensaciones que deben ser compensadas por evaporaciones en el conjunto de la cavidad.

Estos tres factores concurren en las zonas confinadas para determinar las tendencias al concrecionamiento en los puntos más altos, a la corrosión en los puntos más bajos, y al equilibrio en las zonas medias.

En los Estados Unidos, Holden (1942) reporta que "parece bastante cierto el hecho de que las helictitas de las Cuevas de Skyline, cerca de Front Royal, fueron formadas en pequeñas cámaras que estaban bastante cerradas y en las cuales el aire estaba estancado y la atmósfera saturada de vapor de agua". Otros autores consideraron en cambio que en la formación de las helictitas todo es cuestión de caudal (régimen de goteo) y si las condiciones que definen no se cumplen, solamente se formarán concreciones vulgares.

La influencia del caudal es, según ellos, particularmente evidente en el caso de los "macarrones", cuya forma demuestra que los mismos son alimentados por el interior. Andrieux (1965) por ejemplo, propuso asimilar la diferencia entre macarrones y excéntricas con la del caudal de alimentación. Según este autor, cuando el caudal de goteo es muy leve, el canal del macarrón es sinuoso, pero la concreción sigue creciendo rectilínea siempre que exista el goteo (lento pero existente). El crecimiento geotrópico se interrumpe (es decir que la concreción se vuelve excéntrica), cuando el caudal no asegura más ese goteo. El agua se limita entonces, según el autor, a humedecer la concreción y se escapa finalmente por evaporación.

Medidas posteriores (Roques, 1964), conducen a admitir que el caudal de un macarrón es de 0.000 001 l/s, mientras que el de una helictita es quizás de 0.000 000 01 l/s. Esto es nada menos que del orden de unas diez millonésimas partes de litros por segundo, o lo que es lo mismo menos de un litro por año.

Probablemente una de las ideas más sabias vertidas sobre el origen de estas caprichosas formaciones haya sido la ofrecida por el espeleólogo rumano Iosif Viehman, quien planteó que "la génesis de estos cristales de calcita se debe a causas múltiples" entre las que incluye, además de las ya antes mencionadas, también la de posibles impurezas de arcilla coloidal que se fijan por elección sobre algunas superficies cristalinas perturbando así, según este autor, el crecimiento del cristal; también la ausencia de un goteo regular con la precipitación de arcilla consecutiva (tomado de Andrieux, 1965), al aumento del pH de la solución en el momento de liberación del gas carbónico, etc.

Otros autores (Vander Breck, 1906) tomado de Núñez Jiménez (1984), se han referido al papel de las "fuerzas de cristalización" las que según ellos contrarrestan la fuerza de gravedad. En este aspecto particular del desarrollo de las

helictitas a partir de las llamadas fuerzas de cristalización, otro autor (Holden, 1942) consideró que como tal, debían entenderse estructuras cristalinas que mineralógicamente están constituidas de aragonita, dolomita, y calcita.

Prince (1908) desarrolló una teoría según la cual las excéntricas son monocristales romboédricos de calcita, cuyo eje ternario es paralelo al eje principal de crecimiento de las estalactitas. En este sentido, años más tarde el destacado espeleólogo español Llopis Llado (1970) agregó que "el progresivo desplazamiento de este eje, conduce finalmente a la formación de una helictita".

En Cuba, se destacan los trabajos de Núñez Jiménez (1957) quien sometió varios ejemplares de helictitas a un simple pero interesante experimento: partiéndolas, adaptó un tubo de goma a un extremo de estas formaciones, vertiendo luego a presión una solución coloreada (trazador), para que el líquido circulara por el interior de las helictitas. En pocos minutos según comprobó este autor, la solución había corrido a la largo de la formación por un verdadero conducto capilar. Agrega que las helictitas presentan un conducto central que sigue las irregularidades de las mismas, por lo que arriba a una conclusión parecida a la que llegó el investigador George P. Cerril cuando afirma: "es la capilaridad y no la gravedad, el principio que controla y que da dirección a la solución que lleva la caliza. Una pequeña gota de calcita cristalizada en la extremidad de la helictita no señala, probablemente, otra dirección de crecimiento hacia abajo. La dirección de la próxima gota de agua es controlada en parte por la primera, donde el mismo proceso se repite".

Investigaciones más recientes realizadas también en nuestro país (Jaimez, 1991; 1992), a partir del análisis de difractogramas de rayos X de helictitas de la Cueva Perdida (Gran Caverna de Santo Tomas; Pinar del Río) y de la Cueva de Bellamar, Matanzas, demostraron que las helictitas estaban constituidas básicamente por cristales romboédricos de calcita (CaCO_3) dolomita ($\text{Ca Mg}(\text{CO}_3)_2$) y en menor cuantía, otros carbonatos anhidros e hidratados, pero con predominio de los primeros.

Asimismo, Jaimez (1991; 1992) agrega como un elemento adicional a los ya antes vistos hasta aquí, el papel que juega al parecer el equilibrio dinámico que existe entre la presión parcial de vapor (Ppv) y la presión parcial de saturación (Pps) en los recintos cerrados o zonas de mayor confinación en las cavidades subterráneas, en los que el estado exudativo o "momento de sudor" del crecimiento de los espeleotemas bajo escaso caudal de goteo, se alcanza justo cuando el diferencial de ambas presiones parciales es igual a cero ($\text{Ppv} = \text{Pps}$). Los desplazamientos de Ppv hacia Pps y viceversa, bajo los ya citados regímenes de poca circulación de aire en las cámaras subterráneas, podrían ser según este criterio, otra de las causas que pudieran favorecer cada una de las desviaciones de las helictitas.

REFERENCIAS

- a. Andrieux, C (1965): Estudio de las estalactitas tubiformes cristalinas. Su mecanismo de formación y condicionamiento de sus dimensiones transversales (traducción del francés: en archivos de la SEC)
- b. Brigitte y Jacques, C: Formación de las Excéntricas. Mineralogía de las Cavernas (traducción del original). En archivos del GEPAB - SEC: 5 pp)
- c. Holden, R. J (1942): Notes on certain cave deposits. Bull of NSS (4). Washington, D.F
- d.. Jaimez Salgado, E (1991): Las Presiones Parciales de Vapor y de Saturación en el origen de la Helictita. Bol. Casimba (3)(2)(3): 42 – 43
- e.. Jaimez Salgado, E (1992): Las Presiones Parciales de Vapor y de Saturación en el origen de la Helictita. II Congreso Espeleológico de Latinoamérica y del Caribe, Federación Espeleológica de América Latina y del Caribe. Viñales: 26 – 27
- f.. Llopis Llado, N (1970): Fundamentos de Hidrogeología Cársica, Introducción al Estudio de la Geoespeleología. Blume, Madrid: 270 pp
- g. Núñez Jiménez, A (1957): Revista de la Sociedad Científica de Espeleología (1)(1): 15 – 18
- h. Núñez Jiménez, et. al (1984): Cuevas y Carsos. Editora Militar. La Habana, 431 pp
- i. Roques, H (1964): Contribution a l' etude statique et cinetique des systemes gaz carbonique-eau-carbonate. Ann Speleol : 255 – 484
- j. Viehman, J: Contribución al Conocimiento de las Formaciones Estalagmíticas de las Grutas. (Traducción del francés: en archivos de la SEC)

**Presidente del Grupo Pedro Borrás Astorga. Espeleólogo con más de 30 años de experiencia. Actualmente profesor del Curso "Mundo Subterráneo" en Universidad para Todos de la Televisión Cubana.*

Enlace absorción-descarga de la gran caverna de Santo Tomás: evidencias derivadas de un ensayo con trazadores artificiales

INTRODUCCIÓN

En agosto de 1994, a solicitud del Dr. Antonio Núñez Jiménez, entonces Presidente de la Sociedad Espeleológica de Cuba, el autor condujo un experimento con trazadores artificiales (salinos y fluorescentes) en la Sierra de Quemado, con el objetivo de identificar las eventuales relaciones hidráulicas entre la zona de absorción de Los Cerritos y los puntos de descarga conocidos de Río Frío, Resolladero de Santo Tomás y Mamposo (fig. 1). Los resultados de aquella campaña fueron presentados al año siguiente en el Congreso 55 Aniversario de la Sociedad Espeleológica de Cuba.¹ Excluyendo una coloración inducida de las aguas, realizada también por el autor en ocasión de una práctica de campo del curso 1987 de Hidrología Cársica de la Escuela Nacional de Espeleología, aquel ensayo fue el primer experimento con trazadores realizado en el sistema cavernario de la Gran Caverna de Santo Tomás.

Durante 15 días -del 10 al 24 de agosto- un grupo importante de espeleólogos, con el apoyo logístico de la Sociedad Espeleológica de Cuba y la Escuela Nacional de Espeleología, el Ministerio de las Fuerzas Armadas Revolucionarias, la Fundación de la Naturaleza y el Hombre y el Centro de Hidrología y Calidad de las Aguas condujeron el que es, hasta ahora, el experimento de trazado más completo llevado a cabo en un sistema cavernario cubano.

Los resultados permitieron obtener una visión mucho más precisa y completa de la hidrología y paleohidrología subterránea del mayor sistema cavernario del país que, sin embargo, no han sido aprovechados en toda su dimensión para reorientar tanto la exploración directa del sistema como para fundamentar el manejo de las cuencas hidrográficas que ingresan y drenan el macizo.

Resumen / Abstract

Se describen las relaciones hidráulicas identificadas mediante un ensayo con trazadores artificiales (salinos y fluorescentes) en la Sierra de Quemado y se comentan las implicaciones hidrológicas de los enlaces que se establecieron entre un grupo de formas de absorción, en la vertiente oriental, y otro grupo de formas de emisión en la vertiente occidental de la Sierra de Quemado, que alberga el sistema cavernario de la Gran Caverna de Santo Tomás, el mayor de Cuba hasta la fecha, con casi 47 km de galerías exploradas.

Palabras clave: enlace, absorción, ensayo

The hydraulic relations identified after a saline and fluorescent tracer test in the Sierra de Quemado are described. The hydrologic implications among the absorption (recharge) landforms of the eastern slope and the discharge (springs and caves) landforms of the western slope of the Sierra de Quemado are discussed. This territory comprises the -until now- biggest cave system of Cuba, the Gran Caverna de Santo Tomás, with almost 47 km of explored subterranean conduits.

Key words: link, absorption, test.

TIPOS DE TRAZADORES

El ensayo se condujo para obtener, tanto resultados cuantitativos como cualitativos. Los primeros, los más importantes, además de dirigirse a identificar un conjunto de conexiones hidráulicas entre puntos de absorción y de descarga, se diseñaron para separar las componentes de flujo y cuantificar los volúmenes recuperados de trazador.

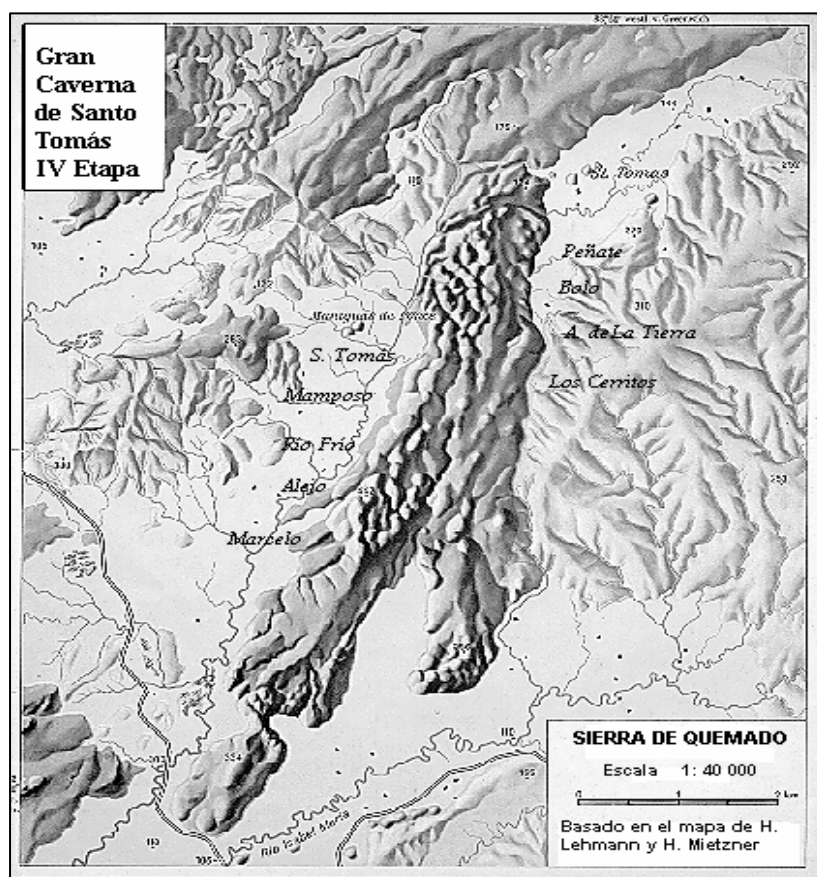


FIG. 1 *Puntos de inyección y detección.*

Esa información permite definir la propia estructura y el entorno de valores de aquellas variables que caracterizan el campo de propiedades físicas del macizo cársico ensayado, en este caso, parte de la Sierra de Quemado.

Para el análisis cuantitativo se empleó cloruro de sodio y, para el cualitativo, uranina vertidos en puntos diferentes de absorción, bajo un modelo de inyección instantánea. No se emplearon simultáneamente en Los Cerritos para prevenir que el exceso de sodio en el sistema alterase la salinidad por intercambio de bases y porque la cantidad de uranina requerida en correspondencia con los caudales de ingreso y salida del sistema, podrían impedir, por mecanismos de retardo, la detección visual del colorante que era un objetivo secundario del ensayo, con total independencia de la instalación y muestreo de hidrocaptos pasivos.

Durante esta campaña fueron colectadas 18 muestras de agua para análisis físico-químico con el fin de conocer, por primera vez en un muestreo simultáneo, la composición de base de las aguas que ingresan, circulan y descargan del macizo. También se construyó la curva de recesión de avenidas de Río Frío que, convenientemente procesada, permitió obtener algunos índices hidrodinámicos importantes como el espesor acuífero (de cavernamiento teórico) drenado, conductividad hidráulica saturada, transmisividad, almacenamiento, volumen del acuífero, tiempo de residencia de las aguas en el interior del macizo

y variación de volúmenes de agua subterránea en el sistema.

Para complementar la información hidrogeológica de base se documentaron siete estaciones geológicas donde se prestó especial atención a la medición de los indicadores geométricos e hidráulicos básicos de la red de grietas. Seis de estas estaciones se ubicaron en la Cueva de Mesa y una en la del Segundo Cauce. Ello permitió procesar, tridimensionalmente, las conductividades hidráulicas, el coeficiente de almacenamiento y el desarrollo espacial de los conductos subterráneos.

La comparación de ciertos parámetros hidráulicos actuales con algunos paleohidrogeológicos se realizó procesando los datos de las mediciones de 422 *scalops* en cinco estaciones de la Cueva de Mesa que, por sí mismos, también se emplearon para inferir ciertas condiciones de organización del paleoflujo en el sistema subterráneo.

La separación entre las componentes aleatorias y de tendencia en la distribución, posición y organización de la red de galerías que integran la Gran Caverna de Santo Tomás se realizó mediante el procesamiento estadístico de las longitudes acumuladas, dirección y dirección corregida de los conductos mapeados hasta esa fecha.

■ TIEMPOS DE PASO DE LOS TRAZADORES

La aplicación de las técnicas de trazadores (artificiales y ambientales) es sumamente eficiente y suele ser

bastante económica. A diferencia de otros territorios cársicos de Cuba y de Europa, la Sierra de los Órganos -en general-, debido a la baja mineralización de las aguas de lluvia que circulan por las cuencas epígeas alóctonas presenta condiciones muy favorables para el empleo de trazadores inorgánicos salinos en sistemas hidrológicos subterráneos con alimentación mayoritaria o exclusivamente alóctona. Baste decir que las distancias trazadas en la Sierra de Quemado resultaron satisfactorias, con una carga casi diez veces menor que la que recomienda la literatura especializada. Pero, de igual modo,

el grado de conexión de los conductos subterráneos, la información que se deriva del conocimiento directo -mediante la exploración espeleológica- de la red de drenaje subterránea, y la singularidad de su funcionamiento hidrológico convierten a la Sierra de Quemado en un inmejorable polígono de ensayo de diferentes trazadores en el carso tropical de montaña.

La tabla 1 muestra los tiempos indicadores del avance de los trazadores en el sistema, en tanto la figura 2, las curvas de tiempo de paso para cada punto de muestreo.

Tabla 1 Tiempos de paso de los trazadores artificiales					
Punto de inyección	Distancia entre los puntos de inyección y detección	Punto de detección	Tiempo (h)		
			1ra. aparición del trazador	A la concentración máxima del trazador	De paso total
Los Cerritos	1 850	Río Frío	48	52	21
Los Cerritos	3 600	Manantial de Alejo	-	45	12
Los Cerritos	1 800	Mamposo (Descarga subcauce a La Caoba)	-	58	-
Los Cerritos	1 100	Resolladero de Santo Tomás	25	31	20
Arroyo de la Tierra	1 100	Resolladero de Santo Tomás	16	18	10

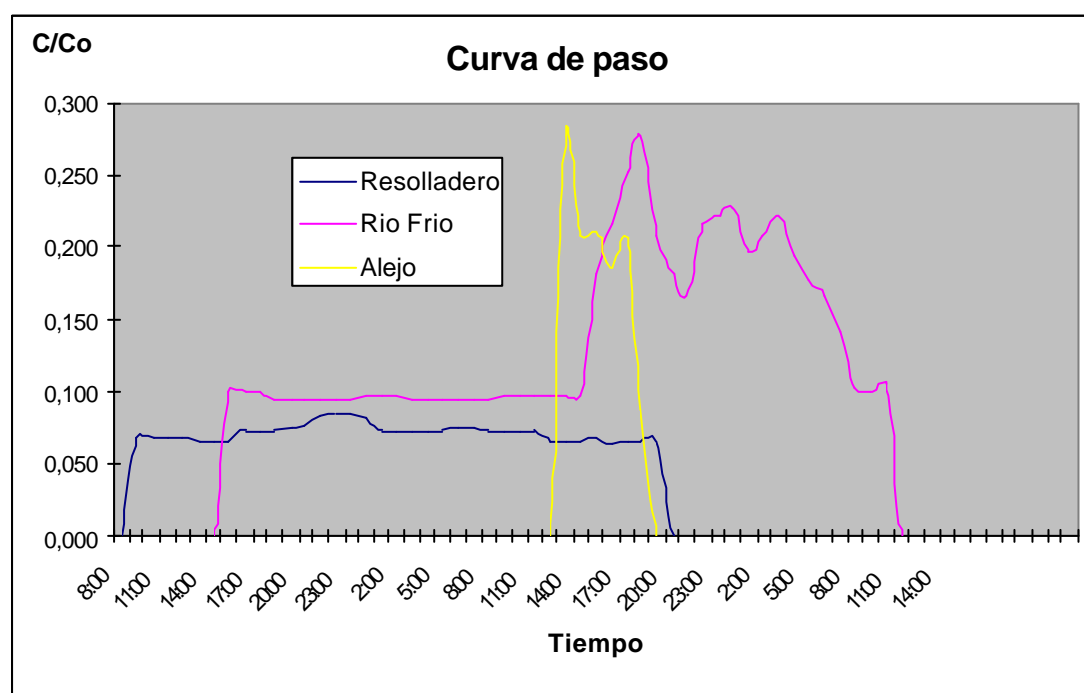


FIG. 2 *Curva de paso del trazador salino (C/Co; recuperación; tiempo (h)).*

ESTRUCTURA Y FUNCIONAMIENTO HIDROLÓGICO DEL SISTEMA ABSORCIÓN-DESCARGA

Mediante mediciones de caudal líquido (Q), temperatura (T), pH, potencial de Oxidación-Reducción (REDOX) y Conductividad Eléctrica de las Aguas (SPC) en 18 puntos (de los cuales ocho fueron de absorción y cinco de descarga) se realizó un balance preliminar de masas de la Sierra de Quemado. Este análisis permitió definir las contribuciones, mediante mezcla de aguas, de cada sistema de colección y descarga, estimar las concentraciones de mineralización total y caudal esperado en los puntos de descarga, fundamentar la selección de los modelos de flujo subterráneo y definir las componentes instantáneas de flujo concentrado y difuso, tanto autóctono como alóctono. Obviamente, parte de esta información fue empleada para definir las cargas de trazadores -es decir, los volúmenes a inyectar- las concentraciones de base (*background*) en el sistema, las concentraciones máximas esperadas en cada punto de descarga, los tiempos teóricos de tránsito y el límite mínimo de detección de trazador en cada punto. El ensayo permitió establecer un importante grupo de conexiones hidráulicas (fig. 3), que serán resumidas a continuación.

En primer lugar, se identificaron conexiones directas entre Los Cerritos y los siguientes puntos:

- Río Frío
- Una descarga subcauce al río La Caoba, a la altura de Mamposo.
- Manantial de Alejo, situado más al sur de Río Frío.
- Resolladero del Arroyo Santo Tomás

También se estableció, con uranina, una conexión cualitativa entre el Sumidero del Arroyo de La Tierra, al pie de la Sierra de Quemado, y el Resolladero de Santo Tomás. Se identificaron dos puntos adicionales de descarga al sur del Manantial de Alejo, no reportados por las exploraciones anteriores y, por tanto, no fueron monitoreados por lo que se desconoce si el trazador circuló por ellos.

Del balance de masas se derivaron dos modelos de flujo, uno del tipo de caja negra, que muestra que la descarga total instantánea es casi dos veces y media la de los caudales que ingresan y otro espectral, que mostró que el balance recarga-descarga es siempre positivo, lo que significa que las pérdidas locales de caudal en el interior del macizo se compensan durante la propia circulación subterránea.

Ambos resultados sugieren un desarrollo importante de conductos subterráneos de flujo concentrado, rápido, interconectados con una red complementaria de flujo difuso, más lento. El ensayo con trazadores, contando solamente las distancias lineales comunicadas, representa un incremento de 9 450 m de conductos subterráneos inexplorados en el sistema, sobre el total conocido de 46 616 m. Para el caso, por ejemplo, de la conexión Los Cerritos-Río Frío, aplicando el modelo de simulación del desarrollo de cavernas hipogénicas del autor,²⁻⁴ la longitud

probable de galerías que los conectan se estima no debe ser menor en no menos de 2 km con un máximo teórico admisible de 12,5 km y un valor probable del orden de los 7,2 km.

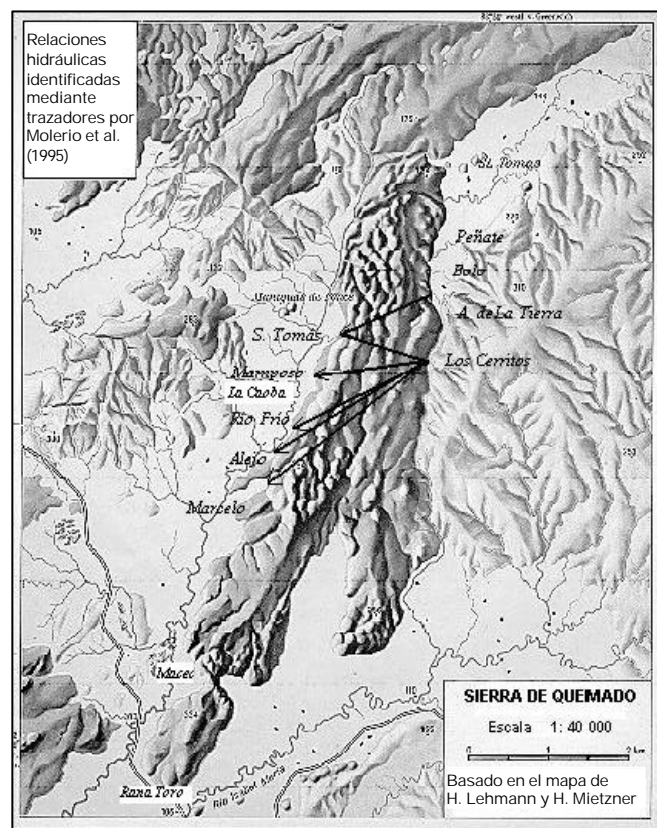


FIG. 3 Conexiones hidráulicas identificadas.

Las tasas de recarga natural del tiempo de retardo por el cauce y de disipación de avenidas del Arroyo Santo Tomás, fueron definidas a partir de los registros pluviométricos de la Estación Moncada, que muestran que la componente de lámina de lluvias que provoca respuesta en avenidas es del orden de los 105 mm. Este estímulo se disipa entre los 7 y 12 días, como máximo, para lluvias no torrenciales. Las avenidas para el 1 % de probabilidad fueron obtenidas aplicando la metodología de Batista⁵ para relaciones simples lluvia-escurrimiento. La capacidad de alimentación natural a través de los hoyos de montaña sobre el sistema, identificado por balance de cloruros y aplicando nuestra corrección para la concentración de cloruros en la aguas de lluvia de Cuba (Molerio, 1992) puede llegar a ser tan alta como el 90 % de la lluvia media anual, con un mínimo del orden del 70 % que, en cualquier caso, representan valores elevados pero que pueden explicar el desarrollo de fenómenos internos de mezcla de aguas autóctonas y alóctonas y la variedad de espeleotemas y el notable revestimiento secundario que exhibe el sistema subterráneo. El conocimiento hidrológico y espeleológico del sistema sugiere una estructura del sistema absorción-descarga -sin jerarquizar- como el que se resume en la tabla 2.

Tabla 2
Estructura hidrológica del sistema absorción-descarga de la Gran Caverna de Santo Tomás

Punto o zona de absorción	Tipo de caudal	Punto o zona de emisión	Tipo de escurrimiento o recarga	Tipo de descarga	Funcionamiento hidrológico
Sumidero del Santo Tomás*	Alóctono	Resolladero del Santo Tomás*	Concentrado líneal (fluvial)	Concentrada	Permanente
Sumidero del Bolo*					Permanente
Sumidero del Peñate*					Permanente
Sumidero del Arroyo de la Tierra					Permanente
Sumidero de Los Cerritos					Estacional
Sumidero de Los Cerritos	Alóctono	Río Frío		Difusa	Estacional
		Manantial de Alejo			Estacional
		Mamposo (Descarga subcauce a La Caoba)			Estacional
Campo de dolinas (hoyos de montaña) en la cima de la Sierra de Quemado	Autóctono		Concentrado puntual	Difusa	Estacional
Zona de pérdidas de la Caoba	Alóctono	¿Resolladero del Santo Tomás?	Difuso	¿	Estacional
¿	¿	Manantial de la Rana Toro	¿	Concentrada	Permanente
¿	¿	Manantial de Maceo	¿	Concentrada	Permanente
Arroyo sin nombre	Alóctono	¿	¿	¿	Estacional o episódico

*Nota: Las relaciones marcadas con * se conocen por exploración espeleológica, las restantes fueron identificadas o sugeridas por el ensayo con trazadores.*

CONSIDERACIONES FINALES

El ensayo, sin lugar a dudas, resultó exitoso e incrementó, notablemente, la posibilidad de que existan nuevas galerías inexploradas en dirección suroeste y sur conectadas con el sistema actual. Ello eleva considerablemente las potencialidades espeleométricas del sistema subterráneo, pero plantea muchas dudas respecto a la dinámica de la hidrología subterránea del

territorio. En lo que respecta a la calidad de las aguas de la vertiente occidental de la Sierra de Quemado y la capacidad de autodepuración del sistema, las conexiones identificadas permiten avanzar, rigurosamente, en la gestión sostenible de los recursos hídricos del territorio.

Para la fecha en que se realizó el ensayo, el conocimiento hidrológico de la Sierra de Quemado y, especialmente, el de la posición de los puntos de absorción

y descarga, los caudales de ingreso y egreso, por no decir de la composición física y química de las aguas que entran y salen del sistema, eran bastante deficientes. Se excluyen, por supuesto, aquellos asociados a los hoyos de montaña en la cima de la Sierra de Quemado.

La situación, en general, no ha mejorado en la última década sobre todo para el territorio al sur del Arroyo de la Tierra -para los puntos de absorción- y, en el caso de los puntos de descarga, a los manantiales de las vertientes sur, occidental e, incluso, oriental. Las imprecisiones de entonces fueron las que impidieron monitorear, desde el principio del ensayo, los manantiales de Alejo, Marcelo 1 y Marcelo 2. Esto es todavía más importante si se tiene en cuenta que la mayor cantidad de trazadores se recuperó en el manantial de Alejo, lo que indica la estrecha y directa comunicación entre los Cerritos y este punto. La propia exploración espeleológica no ha progresado lo suficiente y queda aún por precisar si las galerías conocidas de la Gran Caverna de Santo Tomás se vinculan a Los Cerritos o, aquellas, con las descargas de Mamposo, Río Frío y Alejo.

El ensayo de trazadores aquí resumido dejó también abiertas algunas interrogantes pendientes de resolver, tales como:

- El régimen de interconexión hidráulica entre Los Cerritos y los puntos de Río Frío, Mamposo, Alejo, Marcelo 1, Marcelo 2 y Resolladero del Santo Tomás, repitiendo el ensayo en época de lluvias y avanzado el estiaje (por ejemplo, en el mes de febrero).
- La conexión hidráulica entre un arroyo sin nombre al suroeste de Los Cerritos y los puntos de descarga en la Ensenada de Los Rodríguez, Río Frío, Mamposo, Alejo, Marcelo 1 y Marcelo 2.
- La posición de las zonas de alimentación de los manantiales de la Rana Toro y Maceo.
- La posición de la zona de alimentación y rendimiento seguro de los caudales autóctonos de la Galería del Accidente, cuya identificación precisa resultaría de la mayor importancia para poder evaluar su eventual aprovechamiento hidráulico.
- La naturaleza de las pérdidas por flujo lateral del río La Caoba, en el extremo noroccidental de la Sierra de Quemado, a fin de identificar su relación con una eventual red subterránea independiente o vinculada a la Gran Caverna de Santo Tomás.
- La forma de las curvas de paso del trazador en los puntos Manantial de Alejo y Río Frío indica una estructura particular de la organización del flujo subterráneo en que alternan conductos saturados como aéreos que deben ser explorados directamente.

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REFERENCIAS

1. MOLERO LEÓN, LESLIE F.; C. ALDANA VILAS; E. FLORES VALDÉS; E. ROCAMORA Y ANA M. SARDIÑAS: Resultados de un ensayo con trazadores artificiales en la Gran Caverna de Santo Tomás, Pinar del Río, Cuba, Congreso Internacional LV Aniversario Sociedad Espeleológica, Cuba y Primera Reunión Iberoamericana, Ciudad de La Habana, p. 95, 1995.
2. MOLERO LEÓN, LESLIE F.: "Simulación matemática del desarrollo de las cavernas", Congreso 50 Aniversario Sociedad Espeleológica, La Habana: 55, 1990.
3. ———: "Mathematical Simulation of Karst Development", Internatl. Symp. Hydrology in the Humid Tropic Environment, Kingston, Jamaica, AIHS, pp. 9-22, 1997.
4. ———: "Modelo del desarrollo de cavernas y conductos cársticos", V Congreso Cubano de Geología y Minería. Memorias Geomin 2003, Ciudad de La Habana, Marzo 24-28 GQGC 09, pp. 84-9, 2003.
5. BATISTA SILVA, J. L.: "Gastos máximos en cuencas pequeñas", revista *Voluntad Hidráulica* (40), pp. 51-54, Ciudad de La Habana, Cuba, 1976.

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Indicadores de vulnerabilidad de acuíferos cárlicos

INTRODUCCIÓN

La vulnerabilidad de los acuíferos es una propiedad intrínseca de ellos que está relacionada con la estructura geológica, geomorfológica e hidrológica. Las condiciones climáticas, los usos de la tierra y el agua y la estructura económica condicionan los escenarios de peligro y los riesgos a que está sometido el sistema acuífero.

Los acuíferos cárlicos son mucho más complejos en la definición y caracterización de vulnerabilidad debido a la heterogeneidad y anisotropía de los horizontes acuíferos, la estrecha relación entre las formas del relieve y el drenaje (superficial y subterráneo), la evolución hidrológica y el grado de actividad hidrológica del sistema cárlico.

El carso es un fenómeno universal. Ello se debe a que las rocas carbonatadas -principalmente calizas y dolomitas- donde estos fenómenos tienen lugar, constituyen el 15 % de todas las rocas sedimentarias y subyacen el 75 % de la superficie del planeta. Algunos autores consideran que entre el 15 y el 20 % de las tierras emergidas están, en mayor o menor grado, carsificadas.¹⁻⁵ De este modo, el carso ocupa una superficie aproximada de 50 000 000 de kilómetros cuadrados de la superficie terrestre, en los más variados climas y regiones (fig. 1).

En algunos casos, muy pocos por cierto, el carso es un fenómeno local de poca importancia pero, en muchos países las rocas carsificadas ocupan áreas importantes o tienen una importancia económica de cierta relevancia, como es el caso de Estados Unidos, España, Francia, Jamaica, Puerto Rico y la antigua Yugoslavia. Así, se da, incluso, el caso de países, sobre todo insulares, como Barbados o Bermuda, cuya superficie está ocupada, totalmente, por rocas carsificadas.

Cualquier acción que se emprenda sobre un sistema natural presupone el conocimiento de su comportamiento ante el estímulo a fin de prever adecuadamente sus

Resumen / Abstract

La vulnerabilidad de los acuíferos es una propiedad intrínseca de los mismos que relaciona la estructura geológica, el relieve y la dinámica del flujo subterráneo. En los acuíferos cárlicos, tales relaciones se magnifican por la estrecha sinergia entre la litología, la evolución y tipo del relieve y las formas asociadas al drenaje superficial y subterráneo. En este artículo se describen un conjunto de indicadores de vulnerabilidad que toman en cuenta, como base esencial, la vulnerabilidad selectiva que presentan las formas cárlicas (dolinas, ponores, cuevas, simas) respecto al aparato cárlico en su conjunto.

Palabras clave: acuífero cárlico, vulnerabilidad, contaminación

Aquifer vulnerability is the intrinsic property that relates the geologic structure, landscape and groundwater flow dynamics. In karst aquifers this relation is magnified because the synergy among the lithology, the evolution and type of the landscapes and the landforms associated to surface and underground drainage. This paper describes several indicators for vulnerability that accounts, basically, for the selective vulnerability showed by the different karst landforms (dolines, ponors, caves, shafts)

Key words: karst aquifer, vulnerability, contamination

consecuencias. A casi un siglo de los fundamentales trabajos de Jovan Cvijic en el Krs de Yugoslavia no puede decirse que, en el carso, se conozca tal comportamiento.

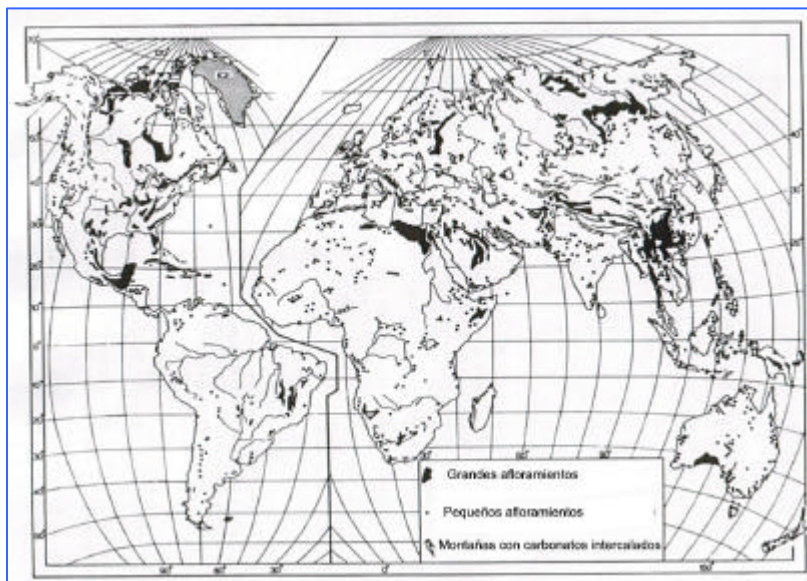


FIG. 1 *Distribución de las áreas cársticas del mundo (según Ford y Williams, 1983).*⁶

No solo como fuente de conocimiento primario, sino por la necesidad de actuar en beneficio de las economías nacionales es que se impone disponer de un claro concepto del karst y de los procesos que en él tienen lugar. Numerosos países en vías de desarrollo poseen vastas extensiones de sus territorios ocupadas por rocas carsificadas, de manera que el carso tiene un cierto peso en la conformación de sus economías y, por ende, debe ser evaluado con rigor y seguridad suficientes como para permitir realizar pronósticos certeros de su utilización.

Desde el punto de vista hidrológico, el carso es de una importancia excepcional. En Cuba, por ejemplo, el 65 % de la superficie del país está carsificada y, de los 6,3 km³ de recursos de aguas subterráneas de que dispone, el 80 % se encuentra en estos territorios.⁶

Sin embargo, a escala mundial, las regiones cársticas exhiben grandes contrastes. Pueden encontrarse tanto grandes reservas de agua subterránea como gran escasez de ellas, e incluso, zonas áridas; abundantes recursos minerales, de petróleo y gas o una absoluta pobreza de ellos; terrenos fértiles, aptos para el cultivo o tierras baldías. El aprovechamiento del carso implica el conocimiento de las leyes que rigen su funcionamiento. En este caso, se trata de un sistema dinámico, por cuanto estos se definen con aquellos en que tienen lugar procesos de transporte de masa y energía.

■ DEFINICIÓN DEL SISTEMA CÁRSICO

De acuerdo con estos criterios, el carso puede definirse como un medio acuífero peculiar caracterizado por las siguientes propiedades:⁷

- Es un sistema termodinámico abierto, es decir, en interacción con el medio exterior.
- Las variables del campo de propiedades físicas exhiben anisotropía tridimensional progresiva.
- El espacio que constituye el medio acuífero se presenta rigurosamente jerarquizado.

- La existencia de dominios de flujo inherentes a cada espacio.

- Un campo de propiedades físicas que se define y estructura para cada espacio.

- La fuerte influencia del efecto del factor de escala sobre el campo de propiedades físicas.

- La elevada dependencia respecto al tiempo de las propiedades físicas.

- La formación y desarrollo de estructuras autorreguladas de disipación de energía.

- Un cierto valor de inercia del sistema (memoria), esto es, la modulación de las respuestas a los estímulos inducidos natural o artificialmente, que dependen, sobre todo, de su estado inicial.

- La irreversibilidad del proceso de carsificación, es decir, su evolución unidireccional.

De este modo puede concluirse que el carso se caracteriza por constituir un sistema en el que interactúan diferentes espacios. Circunscribiéndonos a la fase líquida, esta interacción representa un intercambio de materia y energía entre los diferentes espacios constitutivos del sistema y entre estos y el medio exterior. De hecho, tales propiedades indican que la anisotropía y la heterogeneidad son el resultado del desarrollo diferenciado de la carsificación. Las formas del relieve se desarrollan selectivamente y, por ello, se comportan de manera diferente respecto a los flujos verticales u horizontales (fig. 2).

Las dolinas, las simas verticales y las cavernas horizontales y subhorizontales que absorben la escorrentía superficial (*overland flow*) o el flujo concentrado en corrientes fluviales transportan grandes volúmenes de agua que penetran rápidamente en el acuífero. Las respuestas a estos ingresos concentrados son, también, más o menos rápidas, en dependencia del estado inicial del sistema y de sus propiedades inerciales. Por lo común, cuando tales formas están conectadas con acuíferos que no presentan una superficie piezométrica virtual, sino que prevalece el

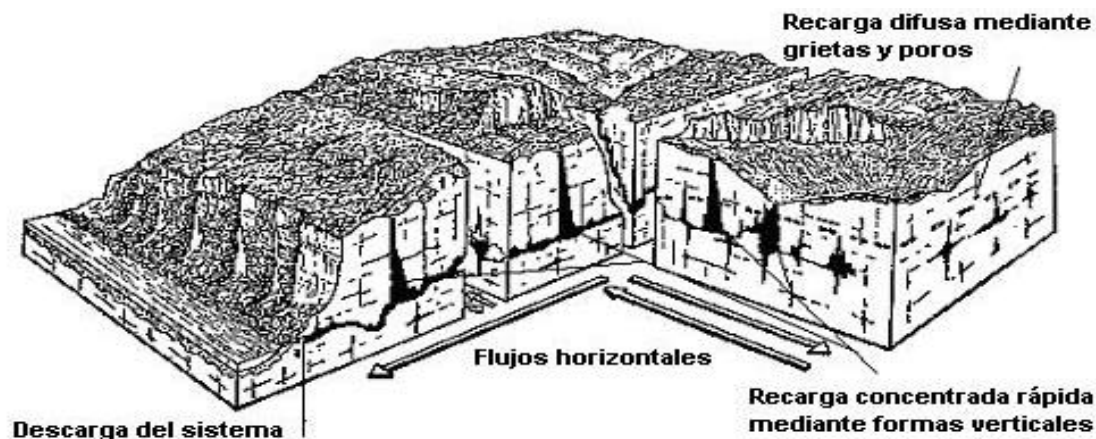


FIG. 2 Esquema idealizado de un sistema cársico que muestra los rasgos extremos de la recarga natural de las aguas de infiltración (modificado y adaptado de Mangin, 1985).

Tabla 1 Espacios constitutivos del sistema cársico. ⁷					
Categorías	Denominación del espacio	Volumen con relación al sistema	Longitud característica	Régimen de flujo	Diámetro
<ul style="list-style-type: none"> - Espacio agrietado no cársico - Macro - Discontinuidad - Espacio cársico 	1. Cavernas	$V \leq 1 \%$	km	No lineal de alta velocidad	m
	2. Grietas y discontinuidades en general	$1\% \leq V \leq 5 \%$	km	No lineal de alta velocidad	mm - m
	- Fallas		km	Lineal	m
	- Diaclasas.		km	Lineal	mm-cm
	- Planos de estratificación		km	Lineal	cm
	- Planos de esquistosidad		cm	Lineal	mm
<ul style="list-style-type: none"> - Espacio poroso - Espacio agrietado no cársico - Micro - Espacio cársico - Discontinuidad 	3. Poros de la matriz rocosa microfracturas:	$5\% < V \leq 40 \%$	mm	No lineal de baja velocidad (microflujo)	$\leq 0,1 \text{ mm}$
	- Esfoliación		mm		10 mm
	- Esquistosidad		mm		0,1 mm
	- Clivaje				
	4. Matriz sólida	$V > 40 \%$	-	No lineal de baja velocidad (no flujo)	$< 1 \text{ mm}$

flujo en conductos o a lo largo de zonas fuertemente transmisivas, las respuestas suelen ser muy rápidas, de tipo de flujo a pistón, que constituye un patrón muy útil para explicar y describir matemáticamente la hidrodinámica de la contaminación en el acuífero.

Las formas cársticas menos desarrolladas, las cavernas rellenas de arcilla, las grietas y las diaclasas, en general, se comportan con más lentitud a estos ingresos, retardando el flujo hacia la zona saturada y, en consecuencia, produciendo un segundo pico de avenidas en los niveles de las aguas subterráneas o retardando la respuesta en el transporte de masas.

Estos dos comportamientos extremos producen una compleja interacción y un comportamiento singular del sistema respecto a los procesos de transporte de masas. En tanto las propiedades físicas son diferentes para cada uno de los espacios involucrados, las respuestas en el tiempo son también diferentes. El flujo multifásico es más comúnmente en los sistemas cársticos que en cualesquiera otros, como los granulares o aún en rocas agrietadas de otro tipo. El desarrollo intenso de la carsificación en la zona no saturada (ZNS) de los acuíferos permite el desarrollo de dos patrones de infiltración hacia las aguas subterráneas (fig. 1).

Así se reconocen, una recarga rápida, concentrada, que tiene lugar a través de formas verticales del tipo de simas conectadas con las aguas subterráneas o que siguen cavernas horizontales o subhorizontales. El flujo superficial hacia estas formas ocurre por dos vías fundamentales: una escorrentía superficial difusa y otra, concentrada, a lo largo de los cauces de las corrientes fluviales absorbidas por estas formas cársticas.

Y una recarga lenta, difusa, que tiene lugar a través de los poros, diaclasas y grietas menos carsificadas. El flujo superficial hacia estas formas ocurre por dos vías fundamentales: la escorrentía superficial difusa y la infiltración directa sobre la superficie, desnuda o no, de las rocas carsificadas.

Ambos mecanismos son importantes para explicar la hidrodinámica de la contaminación en acuíferos cársticos. La diferencia en las concentraciones, líneas de flujo y tiempos de tránsito y de arribo están controladas, precisamente, por el sistema de recarga a través de la zona no saturada.

La modelación matemática o las soluciones analíticas deben considerar, asimismo, cuándo los focos de contaminación son puntuales o difusos. En tanto un grupo de condiciones de contorno del problema de la infiltración concierne al desarrollo diferenciado del carso, otro grupo depende de los efectos antropogénicos sobre el carso. Por ello, el uso de los terrenos y de las aguas cársticas

influyen fuertemente en la generación de los escenarios de peligro y los riesgos de contaminación.

INDICADORES DE VULNERABILIDAD

Foster e Hirata⁸ definieron la vulnerabilidad como una función de las propiedades de la zona no saturada. Cuando, en acuíferos cársticos, tales propiedades están bien identificadas, se requieren muy pocas modificaciones conceptuales del criterio de estos autores.

La vulnerabilidad de los sistemas acuíferos ha sido definida de acuerdo con los criterios de Molerio^{9,10} y se muestra en la tabla 2.

Para el caso particular de la evaluación de los escenarios de peligro asociados a la nitrificación de acuíferos, recientemente,^{11,12} consideraron, con cierto detalle, los factores de control de la vulnerabilidad en los acuíferos cársticos cubanos.

El aspecto distintivo más importante en los acuíferos cársticos es que, en ciertos casos, debido al desarrollo de formas cársticas que enlazan, sin solución de continuidad, la superficie del terreno con el acuífero, no hay zona no saturada que amortigüe o mitigue el efecto del paso de los contaminantes hacia el acuífero. Ello hace que las formas cársticas de absorción y de conducción tengan un valor puntual sumamente importante, exclusivo y totalmente diferente del terreno que las circunda más allá de su cuenca de alimentación. Por eso, la noción de vulnerabilidad, escenario de peligro y riesgo es absolutamente diferente para cada forma cárstica que, por ello, deben ser documentadas y evaluadas de manera independiente.

CONCLUSIONES

La geología, posición geográfica y la estructura económica de una región definen los problemas ambientales más importantes de los acuíferos. La vulnerabilidad de los acuíferos es una propiedad intrínseca de ellos que está relacionada con la estructura geológica, geomorfológica e hidrológica. Las condiciones climáticas, los usos de la tierra y el agua y la estructura económica condicionan los escenarios de peligro y los riesgos a que está sometido el sistema acuífero.

En el carso existe una relación directa, sinérgica, entre el drenaje superficial y subterráneo, actual y pretérito, y las formas del relieve por las que se conduce ese drenaje. El rasgo distintivo de la vulnerabilidad en ellos es que cada forma es un sistema de flujo local y, por ende, un ente de vulnerabilidad particular, exclusivo e independiente de los demás (tabla 3).

Tabla 2 Indicadores de vulnerabilidad intrínseca general de los acuíferos cársicos					
1. Litología	Calizas y dolomitas	Yeso, anhidrita y sal	Clásticas carbonatadas, greda y caliche	Siliciclásticas	Igneas y metamórficas en general
2. Estructura geológica	Capas horizontales y homoclinales suaves	Plegamientos anticlinales y sinclinales	Fallamiento	Fallas y plegamientos alternos	Plegamientos de tipo chevron y sobreempujes
3. Patrón de la carsificación	Agrietamiento y estratificación	Porosidad	Agrietamiento	Estratificación	Agrietamiento y porosidad o porosidad y estratificación
4. Macrorrelieve	Valle (incluyendo grandes poljes y uvalas)	Valles	Llanuras	Montañas y macizos aislados	Costas
5. Geosistema	Ambientes especiales: · Pequeña isla · Montaña aislada. · Humedal. · Bosque húmedo	Llanuras interiores	Llanuras costeras	Montañas medias	Montañas bajas
6. Tipo de flujo	Difuso	Libre colgado	Libre profundo	Confinado interestratal	Confinado artesiano
7. Tipo hidrodinámico	Libre	Semilibre	Semiconfinado	Confinado	Artesiano
8. Tipo de recarga del acuífero	Concentrada directa	Concentrada indirecta	Difusa sobre la roca aflorante	Difusa sobre la cobertura	Retardada
9. Descarga del acuífero	A red fluvial permanente o estacional	Humedal	Laguna	Playa o Costa	A red fluvial episódica
10. Funcionamiento hidrológico del acuífero	Permanente	Estacional	Episódico	Merofósil por inundación	Merofósil por sedimentación
11. Tiempos de regulación	De 1 año o mayores	Entre 6 y 11 meses	Entre 3 y 6 meses	Menores de 1 mes y hasta una semana	Una semana o menos
12. Rango de fluctuación estacional de las aguas subterráneas	Aflorantes o hasta el 75 % del espesor de la ZNS	Entre el 50 y 74 % del espesor de la ZNS	Entre el 20 y 49 % del espesor de la ZNS	Entre el 10 y 19 % del espesor de la ZNS	Menos del 19 % del espesor de la ZNS
13. Espesor de la zona no saturada	Inexistente	Mayor que 0 y hasta 5 m	Mayor de 5 y hasta 10	Mayor de 10 y hasta 25	Mayor de 25 m
14. Con cobertura	Sedimentos autóctonos	Sedimentos alóctonos	Interestratal	Criptocarso activo	Criptocarso inactivo
15. Sin cobertura	Libre	Descubierto	Denudado	Exhumado	Relictico
16. Conductividad hidráulica de la Zona No Saturada	Mayores de 10^{-2} m/s	Entre 10^{-3} y 10^{-2} m/s	Entre 10^{-4} y 10^{-3} m/s	Entre 10^{-5} y 10^{-4} m/s	Entre 10^{-6} y 10^{-5} m/s

Tabla 3

Formas cársicas. Las formas cársicas puntúan individualmente y se cartografían, asimismo, como entes individuales que poseen su propia vulnerabilidad intrínseca

1. Formas de absorción de tipo lapíes	Libre	Semilibre	Cubierto	Desmantelado	Litoral	Campos aislados
2. Formas de absorción de tipo ponor	Enlazado con el acuífero	Enlazada con cavidad directa	Enlazada cavidad indirecta o inversa vertical	Enlazada cavidad indirecta o inversa horizontal	Colgado	Fondo cubierto por sedimentos
3. Formas de absorción de tipo dolina	Lacustre absorbente	Lacustre emisiva	Enlazada con el acuífero	Enlazada con cavidad directa	Enlazada con ponor o con cavidad directa, indirecta o inversa	Fondo cubierto por sedimentos
4. Formas de absorción de tipo de valles	Ciegos o absorbentes	Surgentes o resurgentes	Colgados	Inversos	Desactivados	Fósiles
5. Formas de conducción de tipo cuevas o simas	Directas autóctonas o alóctonas	Indirecta absorbente	Indirecta de sapeamiento lateral	Inversa	Seudogalería	De cualquier otro tipo o subtipo genético

REFERENCIAS

- LA MOUREAUX, P. E., B. MORERE WILSON AND B.A. MEMON: "Guide to the Hydrology of Carbonate rocks". *Studies and Reports in Hydrology*, Unesco, Paris, 345, 1984.
- HERAK, M. AND STRINGFIELD: *Karst. Important Karst Regions of the Northern Hemisphere*. Elsevier Publ. Co., Amsterdam, 551, 1972.
- SWEETING, M. M.: *Karst Landforms*. McMillan, London, 362, 1972.
- BURGER, A. AND L. DUBERTRET: *Hydrogeology of Karstic Terrains*. Internatl. Ass. Hydrol., París, 1975.
- MOLERIO LEÓN, LESLIE F.: "Aproximación Multidisciplinaria a un Modelo Matemático del Desarrollo del Karst", *Ingeniería Hidráulica*, Ciudad de La Habana, X(2):133-144, 1989.
- MOLERIO LEÓN, LESLIE F.: "Esquema geoespeleológico preliminar de Cuba (Memoria explicativa del mapa de las regiones cársicas de Cuba a escala 1:1 000 000). Simposio XXXV Aniversario, Sociedad Espeleológica, Ciudad de La Habana, 68, 1975.
- MOLERIO LEÓN, LESLIE F.: Dominios de Flujo y Jerarquización del Espacio en Acuíferos Cársicos, Aniversario, Sociedad Espeleológica, Ciudad de La Habana, 54, 1985.
- FOSTER, S. S. D. AND R. HIRATA: *Groundwater Pollution Risk Assessment a Methodology Using Available Data*. Pan American Center for Sanitary Engineering and Environmental Science (CEPIS), Lima, Perú, 1988.
- ANTIGÜEDAD, I. Y OTROS: Curso Avanzado sobre contaminación de aguas subterráneas. Monitoreo, evaluación, recuperación, 2 vols., Castellón, 324, 1997.
- MOLERIO, L.F.; E. FLORES AND A. MENÉNDEZ: *Vulnerability of Karstic Aquifers*. Draft Report. IHP-V Project 3.2. Monitoring Strategies for Detecting Groundwater Quality Problems, Ciudad de La Habana, 10, 1997.
- GUTIÉRREZ J. AND L. F. MOLERIO: *Nitrates In Cuban Groundwaters*. in/ L. Candela, *Agricultural Threats to Groundwater Quality*, 1996.
- MOLERIO LEÓN, L.F. AND J. GUTIÉRREZ DÍAZ: *Agricultural Impacts on Cuban Karstic Aquifers* in/ Drew, D. & H. Hötzl [Eds.] (1999): *Karst Hydrogeology and Human Activities*, A.A. Balkema, Rotterdam, 76-78, 1999.

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"REPORT OF EFRAIN MERCADO TO THE SVE ABOUT THE INTERNATIONAL SPELEOLOGICAL CONGRESS IN GREECE, 2005":

REPLY BY DR. PAVEL BOSAK AND COMMENTS BY FRANCO URBANI

Our friend Efrain Mercado wrote a summary of his activities as the Venezuelan Delegate (by proxy) to the International Speleological Congress, Greece, August 2005 (See this *Bulletin* No. 63, Sept. 2005). As a result there were some replies and comments by Dr. Arrigo Cigna and Dr. Franco Urbani (see this *Bulletin*, No. 65, Nov. 2005). Now I received another reply, this time from Dr. Pavel Bosak. So in the following pages I will comment on Bosak's message.

1) REPLY to the report of Efrain Mercado by Pavel Bosak

----- Original Message -----

From: Bosak@gli.cas.cz

Sent: 10/17/2005 9:13:07 AM

To: arrigocigna@tiscali.it; emercado@caribe.net

Cc: andy@andyeavis.com

Subject: RE: Protest of Venezuela

Dear Efrain (and also others),

I obtained your letter. I am afraid that you completely do not understand the situation, resp. you have information only from one side. But to start, my name is Bosak and not Bozak, pls, if you want to contact me sometimes in the future, use the proper name.

Concerning Venezuela vs Slovakia, which in reality is the SVE vs. Smida's expedition, I made nothing "elegant" with unfortunate problem, simply it was not included in approved agenda in advance, but in spite of it we dealt with the problem. The UIS Bureau proposed solution (unfortunately it was not in my possibilities to change Vietnamese time-schedule, we were pressed to go somewhere to some official meeting, therefore we could not continue in discussion on the problem, we had some 3 minutes to another more important points included to agenda). Solution /with some delay, I agree/ was fulfilled. In spite of this, the SVE members again and again have been attacking the problem not even waiting for the respective letter, is it serious behavior?. The situation could not be solved by other decision, as proof from the SVE side was not transparent (proved).

The UIS Bureau will deal with that problem again, even if it was closed by excuse letter from participants of the expedition. Based on available data I cannot understand different decision than adopted in Hanoi. If there are appearing different evidences, we can judge in different manner, nevertheless such evidences have been missing until now.

As the member of the UIS Bureau you have to take care on interests of the UIS - you have to collect real facts on the problem from all the parties involved and not only to hear one party of the story, more which is more loudly.

After some years in service you will understand that problems caused or presented by South American countries are highly specific, sometimes far from reality how is understood by me (I am not the only).

As the UIS Bureau member, first you have to study in detail the UIS Statute - especially the beginning - who is national delegate (what she/he is representing), how it is selected (elected), this is the must, more now available in Spanish and English, not only French.

Especially South American member countries of the UIS are known not to fit completely to the sense of the UIS Statute - there are even organizations usurping the right to decide who is "good" and who is not "good enough" for the caving in the respective country, even when such organization is not the only in the country, and even when "invador" collaborates with other official caving club in the country - the most evident situation is in Mexico with at least 8 big caving bodies - no mutual agreement on representations towards the UIS has been existing, Venezuela with 4 caving bodies known to me (the same), Costa Rica with two bodies (the same); similar or very close situation exists also in Europe (the worse is situation in Albania; situation in Croatia was solved but I am afraid on fragile fundaments), or in Asia (Lebanon, here thanks to God without usurpation to make permission for caving within the country). For the future of the UIS, and to prevent problems like now we are facing with so-called Venezuela/Slovakia affair, the UIS must solve the problem without respect to "traditional partner" of the UIS in the past. Such countries (or even only single clubs!) cannot represent the state within the state, they cannot have different conditions like other countries.

Entering the UIS the member country automatically agrees with all the principal documents of the UIS and the country must follow them all (and all documents approved later by the UIS Assembly General without respect that the respective country voted against). They cannot use selectively only some of documents (fitting to respective situation), the UIS Statutes being the most important each time. I have to admit, that I (in past-position of Secretary General/Treasurer) have not been interesting who is paying annual fees of the country, to pay is the only duty of the member country, but the payer is not automatically the national delegate (for example in Slovakia with the only unified Society, the annual fees are covered by Administration of Slovak Caves from its own bank account, but Slovakia is represented by persons approved by the SSS Board; very similar is situation in Great Britain, in the past the same was in Czechoslovakia, where annual payments before 1990 were payed by Ministry of Culture, and Swiss fees has been traditionally covered by Swiss Academy of Sciences for long tens of years).

Returning to your problem. I was from the beginning very little involved in the affair, before it became the affair. My only role in all the story was that I gave to organizers of the first expedition (to Marek Audy, I did not know Smida at that time personally) e-mail address of Urbani, even I knew that there can be eventually problems, but for me the SVE was the traditional partner of the UIS and, unfortunately, I did not know contacts to other groups in Venezuela, although I knew about their existence. Unfortunately, Urbani behaved as dead beetle (I have been knowing him since about 1984-85), what is well-know to me at least from the time when Urbani served as the Secretary Adjunct of the UIS (his not correspondence time he explained simply by the problems with computer and changes of e-mail address). I do not know why Urbani did not answered that time (he must answer that question), I recommended to expedition members to try again and again, as Urbani, as geologist, can be in the field for long time, i.e. out of the office. The expedition wanted to obtain information if there exists something like cave in site. Expedition was prepared as normal trip, not exclusively caving event. But expedition finally went as they did not wanted to wait another weeks and months. Unfortunately, expedition walking on touristic path saw the cave, the start of the "problem". After the expedition, Mr. Audy prepared detailed report incl. all topography, photos, report on expedition and send it to Urbani as demanded by the UIS Ethic Code. Because no reaction, I personally urged Urbani on the same e-mail address as expedition tried to contact him and Urbani replied that parcel is not arriving, which can be explained by disorder in Venezuela asking if possible to send again. Parcel was send again (100 USD cost per each mail) and after about 2 months we obtained confirmation of obtaining, and only after the whole story fully started.

So from the point of view of UIS Ethic Code with accepted ammendments - the expedition made all what was in its power before and after, it means that the expedition started in good will and not to pinch somebody something (what they did not know before) they wanted to touristically visit something and eventually to discover something if ocaasion - (1) expedition contacted locals on officially existing contact address recommended by the UIS official, but unfortunately did not obtained any comment (normally such situation means yes, but probably not in South America) - this is the only fault in the whole story from expedition side, and (2) after the trip, the expedition delivered all materials to the national caving club (locals) they contacted earlier even if locals were not physically involved in the expediton. What you want more? More if expedition was planned as touristic trip to know new regions eventually to make reconaissance, the approval of locals is not necessary in that case; the chance that you discover something really important in unknown terrain is very low, unfortunately they succeeded. I know tens of real caving expeditions with completely no contacts with locals, big discoveries and no problems from locals!? I know situations (in Europe!), on the contrary, when locals stol discoveries to foreing expeditions and immediatelly after expedition left the site they made prolongation before foreigners published original (primary) results (published data were not actual in the moment of appearance).

I have to state also, what is broadly accepted, that if the cave is known but no published plan exists, the cave does not exist; such situation is normal at least here in Europe. If cave is known and plan does not exist but the entrance is marked by cadaster number or by some other sign (table of ownership) - the cave officially exists. The Slovak expedition with one Czech participant made the detailed research before it started, so if the cave plan existed that time on internet or in published form, they know it. I was not present physically, but one caver (I have any reason not to believe him) told me, that in distant parts of the cave no traces of earlier human presence were detected. I cannot understand, simply, that somebody can protest against the increasing of knowledge on respective cave? or even against the discovery of new and for science important cave! when not having ownership rights to the cave. I understand only if somebody is protesting against used poor and bad sentences and words.

I have been refusing the use of not proper words in contacts among people in official use, with no respect if caver or not. I was extremely shocked by very special (frankly said) Smida's letter, which he wrote himself, even expedition members were "surprised" as informed only after the distribution. I pressed personally members of expedition to appologize for the letter. But the use of improper words is not merrit of the problem! The merrit is who robbed who? , or is there any real background that Slovak discovery in Venezuela was robbery? as interpreted by the

SVE. Who made the bad step? - Smida or the SVE attacking him about robbery! If in civilized World, and if the cave was really known before, it is enough to mention this officially - published in journal, presented on the SVE web page, distributing e-mail information! many possibilities in our globalised World. Why to make the internationalized problem immediately? More the SVE knew about the trip to Roraima (or in which hell it was)! Many unclear questions and dark positions to me, something smelling to my experienced nose.

To solve the problem I want to obtain the answer to 1 principal question:

- where the Cueva de Ojos Cristal (or what is the name) was published before the Smida's expedition, in that case I want to obtain hard copy with map or ISSN or ISBN number or respective publication, eventually internet (web) address.

Unfortunately, my experience with Urbani long before the affair, this causa caused no change in my opinion, was really not very ideal, starting with Paleokarst book and ending with his position of the UIS Bureau member (he never appeared on any meeting and his activity was zero and he used his membership to improve his position; unfortunately he was not the only past-UIS Bureau members behaving in that direction, when we will eventually meet in the future I can name them). I have to admit, unfortunately, I lost the trust to him years before all the story. He can be nice guy, but not for me, serious academic cannot behave like him, or I do not understand South American reality, which is probably more close explanation of my insufficiency. I was also informed (without any details) by past-Secretaries General on similar problems with Venezuelans also in the past (somebody else discoveries were presented as the SVE discoveries)!

With regrets, I would like to inform you (as member of the CSS Board) that, unfortunately, the SVE cannot obtain any excuse letter of the Czech Speleological Society (CSS), which is due to organization structure of the CSS given by its Statutes (the CSS Board discussed this point twice on its meetings), except the letter with regrets of use of improper words written by non-member of the CSS. From the CSS point of view the expedition was not officially approved (nobody asked for that; please do not interpret that the expedition or trip or whatever it was was for the CSS illegal, no!!) therefore does not represent the official event of the CSS. For explanation, the CSS Board has been approving so-called central events with official use of the CSS logo (trade mark) only for very limited number of activities - especially meetings of cavers, workshops, symposia, conferences, congresses and some exceptional activities, like some years ago the use of special device for underwater exploration in the Hranická Abyss. On the other hand, the CSS Board is approving all activities of organisational units without legal statute (i.e. dependent to the CSS Board), like Central Commissions. Expeditions to foreign countries are under responsibility of individual club(s); I cannot remember that the CSS Board (since the CSS establishment in 1978 and before 1990 with completely different organisational structure: centralized) approved any expedition as official CSS activity (except "recommendation" for obtaining permission to leave the country during so-called communistic system in pre-1990 period, but such recommendation was needed to any activity in the "West", not only expeditions, but trips or congresses too). What is the result, Marek Audy was private member of the expedition, which realisation is not necessary to be approved by the Board of the CSS (organized by Slovaks). The CSS represents the union of independent caving clubs. Caving clubs are completely responsible (according to valid Czech law) for their activities and their activity is not approved by the CSS Board because of independence of clubs and their Board; there exists only annual report on activities of clubs given to secretary of the CSS. The role of the CSS, i.e. case when the CSS Board can inherit internal affairs of the clubs, is only in establishing of new club, cancellation of club or if there are illegal activities (against valid Czech law and the CSS Statutes) endangering the club existence, or to judge problems between/among clubs. Even in the case that Audy is member of caving club associated to the CSS, and he is, even caving club has no responsibility on activity of its members when the respective activity does not appear within official, i.e. approved, club activities, i.e. mentioned in official minutes from Club Board meeting. More, pls, accept that excuse letter demanded by Hanoi Bureau meeting was already written - note that not by Smida (from him you cannot expect anything) but by Marek Audy.

The problem Venezuela versus Slovakia/Czech is not international problem, resp. problem on international level, but problem of two entities (bodies) - the SVE and the expedition headed by Smida. The SVE does not represent the only or unified Venezuelan body with whole-Venezuelan competence, but one club from 4 or 5 existing, so the SVE has no right to decide on permission for caving on territory of Venezuela (except the situation that such decree was legally obtained from respective governmental body; which was clearly not the reality in time of the respective expedition; if yes I want to see such document); the Smida's club is associated in the SSS, but in fact is legally independent, it is not proved if expedition was official activity of the club itself (like in Czech). I do not understand why the problem was internationalized and trip was signed as illegal (please do not write anybody about the Venezuelan protest, it is protest of one single club - the SVE), if it is only due to internal situation in Venezuela?, after I am very sad. I have nothing against anything and anybody (even with bad experience in the past), but when the UIS Bureau is solving such "problems", when even the Ethic Code was kept, the UIS Board will do nothing else

in the future that negotiating hundreds of quite local problems and having no force for solution of more important international problems. Unfortunately, such step was done....

I have no reason to apologize to anybody as I did nothing illegal or unserious. Please accept, that the expedition was Slovak expedition (other country), why shall I cover foreigners, I can understand eventually that in case of Czechs, but from Czech Republic, only one caver was present. I felt from the beginning that something is wrong in the whole story, something is false, some principal evidence is missing. The role of the UIS Secretary General is to see the problems independently and to prevent to accept completely wrong decisions or decision on profit of one of parties. As I stated above the Ethic Code was kept and fulfilled.

I will not react to any future contacts until it is not proved in clear manner (by independent body) and without any doubts that the respective cave was publically known before Smida's expedition (i.e. published and not only visited by some local), more the SVE must legally prove that the owner of rights to cave in the moment of expedition was the SVE. Simply the SVE must finish to cry loudly and it must open their cards and play seriously. Venezuelans and all other countries, incl. clubs like the SVE, must also follow the UIS Ethic Code, which is valid for everybody and not only for expeditions. Any attempt of eventual falsification from the SVE side (new anti-dated letters and reports, anti-dated maps in the SVE archives, ... etc.) will deepen the crisis, which is completely artificial and clerly serving for the SVE profit. I have to mention, that there exists good proof if "previous" maps of Venezuelans are correct or not, the nature of it was already published ("another attack against the SVE").

I summarize:

- excuses for improper sentences and words were written;
- there is no proof that Cueva of Crystal Eyes was known (publically) before the Smida's expedition as maps and materials were published by the SVE only after results of foreign expedition (trip) were publically announced;
- there is no proof that Smida's expedition entered exclusive ownership of the SVE as the cave was not visible marked by table or by other means;
- the SVE is one of several caving clubs in Venezuela and has no, by government approved, right to limit caving activity on the territory of Venezuela, in spite that the SVE has been traditional partner of the UIS.

Without any doubts, now play is on the SVE side, it MUST abandon dangerous present position and tactics and to prove without any doubts and with fully serious approach to seriousness of situation, that cave was published and map was publically available before its "rediscovery" by Slovaks and that the SVE had legal ownership right to the cave, which was marked e.g., by table in front of this "excellently and completely surveyed and explored cave". Other questions are not very important.

PB

PS:

I must admit that I have enough of all this story.

I take no care that some Venezuelans have been dealing with my person in official publications in spite that they have no reason (even if it can represent base for legal steps against them) and they are playing with false cards.

I am bad that I distributed address of the SVE? I need the SVE permission to do that? (how stupid in function of Secretary General with the principal role to distribute information about caving in the whole caving World - to mention the UIS Statutes in this place). If I am totally bad /even up to criminal/, why you elected me as the third in rank UIS official for another term - 2005-2009? Why the Assembly elected me by so many voices and not selected out?

I have to admit, that, unfortunately based on the whole story, the SVE seems to me as completely not serious group of people following some kind of profits which I cannot understand, in fact acting against the UIS. If they do not want to be the UIS members, they can go, we will thank them for all they did in the past and finito, basta.

I spent with the question of expected (interpreted) robbery (but there is question who robbed who?) long tens of hours, hours which I could, can and will be able to spend for other, more important, UIS issues (conservation problems in BiH,, preparation of my last UIS Bulletin, to distribute UIS Bulletins to proper addresses). You are loosing my time, your time, and profit of the UIS.

If you want to obtain from me another reaction to the whole story (other than legal) you must offer something more than loudly crying group of strange guys with mentality far from the normal civilization.

If there is no proof for my above-mentioned questions I will start officialy and more loudly with the use of words liar, robber as I did in my not numerous completely private e-mails.

If you want to follow in non serious support of non proved arguments, you can, it is your right, but without me as person having something common with the UIS.

Howgh!

2) COMMENTS by Franco Urbani to the reply of Pavel Bosak

I feel that the reply of Dr. Bosak as in other previous messages he does not adhere to the truth and, in fact, may mislead any unaware readers especially other UIS Bureau members; therefore it deserves several comments from my side. I will copy Dr. Bosak message (in blue) and will include my comments (in black). The bold letters in Bosak's message are mine:

Dear Efrain (and also others),

I obtained your letter. I am afraid that you completely do not understand the situation, resp. you have information only from one side. But to start, my name is Bosak and not Bozak, pls, if you want to contact me sometimes in the future, use the proper name.

Efraín Mercado does have the full information since that is of public domain in the web. The SVE does not hide cards.

I not going to comment about the rude way you addressed the misspelling of your surname.

Concerning **Venezuela vs Slovakia**, which in reality is the **SVE vs. Smida's expedition**, I made nothing "elegant" with unfortunate problem, simply it was not included in approved agenda in advance, but in spite of it we dealt with the problem.

Dr. Bosak, you clearly misunderstand the problem, it is **not** a Venezuelan vs. Slovakia problem. It is a **Slovak-Czech generated problem**, the Venezuelan Speleological Society (SVE) -a NGO- only found out that the SSS-CSS expedition was illegal and against the principles of the UIS Code of Ethics.

Even more it was not a "**Smida's expedition**" it was a **Slovak Speleological Society (SSS) and Czech Speleological Society (CSS) expedition** since all their publications are always signed by a member of the CSS (M. Audy) and a member of the SSS (B. Smida). Again, they are signing as members of such national societies.

In addition, within the journal *Speleforum* 2003, which is the official CCS publication and Dr. Bosak is the principal editor, we read: "*Summary: Cristal eyes (Czech-Slovak expedition to quartzite karst in Venezuelan Guiana). Czech-Slovak speleological expedition (Czech Speleological Society and Slovak Speleological Society) was focused on exploration of caves in quartzites in the western part of Roraima....*"). So, Dr. Bosak do not change matters at this point only to twist them at your convenience.

The UIS Bureau proposed solution (unfortunately it was not in my possibilities to change Vietnamese time-schedule, we were pressed to go somewhere to some official meeting, therefore we could not continue in discussion on the problem, we had some 3 minutes to another more important points included to agenda). Solution /with some delay, I agree/ was fulfilled. In spite of this, the SVE members again and again have been attacking the problem not even waiting for the respective letter, is it serious behavior? The situation could not be solved by other decision, as proof from the SVE side was not transparent (proved).

This is the first time I come to know that a "**solution**" was agreed. If so, why you never communicated it to the SVE who was the party that formally sent the documents to the UIS in Hanoi? Perhaps that was one of your main errors as a General Secretary: if a solution was agreed, then, why you did not disseminated such solution to the people involved?

On the other hand, the members of the FEALC that assisted to Hanoi communicated us that you tried to postpone and postpone the discussion of this issue until the very last moment of the meeting; without showing any interest to properly discuss this issue. Now I hope that you may show good will for a clear dialogue about this issue in the UIS meeting at Beirut.

Contrary to your opinion, the SVE position was always very clear and transparent and in the public domain: See full details in this *Bulletin* (No. 60, June 2005, www.fealc.org) whose full content was previously handled to you in the Hanoi meeting by Abel Vale; so it was, it is and it will be completely available for the speleological community on the web.

The UIS Bureau will deal with that problem again, even if it was closed by **excuse letter from participants of the expedition**. Based on available data I cannot understand different decision than adopted in Hanoi. If there are appearing different evidences, we can judge in different manner, nevertheless such evidences have been missing until now.

Misleading again Dr. Bosak, since such **excuse letter** does not exist or at least was never sent to the SVE and if it was received by yourself or the UIS you should have publicly disseminated it on time just to stop further developments. Could we interpret that this was a lack of care in your functions as Secretary General of the UIS?

As the member of the UIS Bureau you have to take care on interests of the UIS - you have to collect real facts on the problem from all the parties involved and not only to hear one party of the story, more which is more loudly. After some years in service you will understand that problems caused or presented by South American countries are highly specific, sometimes far from reality how is understand by me (I am not the only).

You request Mr. Mercado to "take care" of the UIS interest, well that is exactly what he is doing, trying to place this issue in the proper dimension for a proper discussion in favor of long term UIS interests. I am sure that Mr. Mercado will have the willingness to properly represent the Latin American countries within the whole UIS community. However, it is really a delicate concern the way you speculate in a broad way about the speleological status of Latin American countries without providing details; this represents a clear predisposition against a regional speleological community to which you should (actually you must) work with in a proper way. This is even more delicate considering your current and higher position within the UIS.

As the UIS Bureau member, first you have to studied in detail the UIS Statute - especially the beginning - who is national delegate (what she/he is representing), how it is selected (elected), this is the must, more now available in Spanish and English, not only French.

Mr. Mercado knows extremely well the UIS documents, for that reason he represented us in Greece, and now in Beirut.

Especially South American member countries of the UIS are known not to fit completely to the sense of the UIS Statute - there are even organizations usurpating the right to decide who is "good" and who is not "good enough" for the caving in the respective country, even when such organization is not the only in the country, and even when "invador" collaborates with other official caving club in the country - the most evident situation is in Mexico with at least 8 big caving bodies - no mutual agreement on representations towards the UIS has been existing, Venezuela with 4 caving bodies known to me (the same), Costa Rica with two bodies (the same); similar or very close situation exists also in Europe (the worse is situation in Albania; situation in Croatia was solved but I am afraid on fragile fundaments), or in Asia (Lebanon, here thanks to God without usurpation to make permission for caving within the country).

This is quite a serious matter that you bring up, but also remember that the UIS has no competence to deal on how a country appoints its representatives. On the other hand, most of the so called "problems" that you are speaking and I think I know most of them, were not created by South American cavers, they were rather created by the foreign parties that came to Central and South America thinking that they are just going to their own backyards.

On the other hand, when you use the word "usurpating" you are putting yourself as a supra-national judge. It would be interesting to know the opinion of the whole UIS Bureau regarding the issues you mention of other countries. Do you know the opinion of the cavers of those countries?, well I should remind you that no UIS delegation is more or less legitimate than other, and that according to the UIS regulations, the internal election of UIS country delegates is not its competence. It is also alarming the way you use the word "invador" because in Latin American and Venezuela we always have "open doors" to foreign speleologists that explore under the UIS Code of Ethics; many of those international speleological groups had participated with the SVE in cave exploration in Venezuela in a professional, respectful, candid and friendly manner. Thus, you divisionist intents between nationals and foreigners are really a shame

In addition, just as a reminder, the UIS Code of Ethics and by-laws were translated into Spanish some years ago by Rafael Carreño a member of the Sociedad Venezolana de Espeleología as a contribution to the whole speleological community. Thus, at least in Venezuela, the UIS by-laws are well known. Therefore, I would suggest that eventually the UIS Code of Ethics should be also translated into the Czeck and Slovak languages.

For the future of the UIS, and to prevent problems like now we are facing with so-called Venezuela/Slovakia affair, the UIS must solve the problem without respect to "traditional partner" of the UIS in the past. Such countries (or even only single clubs!) cannot represent the state within the state, they cannot have different conditions like other countries.

Again Dr. Bosak it is quite difficult to me to believe that to continue your cover-up of the **SSS-CSS affair generated problems**, in you high and respectful position of vice-president of the UIS you could promote the idea to "solve" problems **"without respect to traditional partners"**. Besides, according to its statutes the UIS is not entitled to mix with the internal matters of a country.

Entering the UIS the member country automatically agrees with all the principal documents of the UIS and the country must follow them all (and all documents approved later by the UIS Assembly General without respect that the respective country voted against). They cannot use selectively only some of documents (fitting to respective situation), the UIS Statutes being the most important each time. I have to admit, that I (in past-position of Secretary General/Treasurer) have not been interesting who is paying annual fees of the country, to pay is the only duty of the member country, but the payer is not automatically the national delegate (for example in Slovakia with the only unified Society, the annual fees are covered by Administration of Slovak Caves from its own bank account, but Slovakia is represented by persons approved by the SSS Board; very similar is situation in Great Britain, in the past the same was in Czechoslovakia, where annual payments before 1990 were payed by Ministry of Culture, and Swiss fees has been traditionally covered by Swiss Academy of Sciences for long tens of years).

The UIS payment procedures have nothing to do with the SSS-CSS affair.

In any case, for the public knowledge, the SVE is the second older speleological society in Latin America (after the Sociedad Cubana de Espeleología), and yes, since its start 55 years ago, our society with its economical limitations (as practically most of world-wide speleological societies) had paid the UIS fees, because as all will agree those fees are important for the UIS work.

Returning to your problem. I was from the beginning very little involved in the affair, before it became the affair. My only role in all the story was that I gave to organizers of the first expedition (to Marek Audy, I did not know Smida at that time personally) e-mail address of Urbani, even I knew that there can be eventually problems, but for me the SVE was the traditional partner of the UIS and, unfortunately, I did not know contacts to other groups in Venezuela, although I knew about their existence. Unfortunately, Urbani behaved as dead beetle (I have been knowing him since about 1984-85), what is well-know to me at least from the time when Urbani served as the Secretary Adjunct of the UIS (his not correspondence time he explained simply by the problems with computer and changes of e-mail address). I do not know why Urbani did not answered that time (he must answer that question), I recommended to expedition members to try again and again, as Urbani, as geologist, can be in the field for long time, i.e. out of the office. The expedition wanted to obtain information if there exists something like cave in site. Expedition was prepared as normal trip, not exclusively caving event. But expedition finally went as they did not wanted to wait another weeks and months. Unfortunately, expedition walking on touristic path saw the cave, the start of the "problem".

This is quite a different story of what you officially wrote on August 4, 2004 as UIS General Secretary in which you say: "*I personally supervised the preparation of the 2003 expedition, I made consultation of necessary steps and controlled if the UIS Ethic Code is fulfilled.*" So why you did not contacted the Venezuelan UIS Delegate Mr. Rafael Carreño? Why all the fuss about if Franco Urbani answered or not emails because as you well know the contact had to be done with the official Venezuelan delegate Mr. Carreño and not me? Would not rather be you the main violator of the UIS Code of Ethics?

On the wrong presumption that I did not answer emails due to computer problems, that was correct in the 80's and early 90's but since 1997 I have wide band access and answer all my mails in a timely manner (as can be confirmed by many UIS members, and particularly many European UIS delegates). But remember that the SSS-CSS expedition had **one full year of preparations since their early 2002 pre-visit** so they could have send a regular letter to the SVE P.O.Box which they knew since after the expedition they did send a CD to it, or could send emails to the other email addresses clearly shown on the *Boletín de la Sociedad Venezolana de Espeleología* that the CSS and SSS libraries receive since many years ago.

After the expedition, Mr. Audy prepared detailed report incl. all topography, photos, report on expedition and send it to Urbani as demanded by the UIS Ethic Code. Because no reaction, I personally urged Urbani on the same e-mail address as expedition tried to contact him and Urbani replied that parcel is not arriving, which can be explained by disorder in Venezuela asking if possible to send again. Parcel was send again (100 USD cost per each mail) and after about 2 months we obtained confirmation of obtaining, and only after the whole story fully started.

On this new twisted story of the 100 US\$ shipments I prefer to give you the benefit of the doubt as you are an academic person and rather believe that Mr. Audy (CSS) and Mr. Smida (SSS) have tricked you with such absurd tale. The real fact is that they send a plain envelope with a two pages letter and a single CD by regular air-mail post to the SVE P.O.Box (<10 US\$).

Such a small shipment to reach the cost 100 US\$ should have been sent by overnight express courier like DHL or FedEx and their tracking service would have made it impossible to get lost and the reception by me or any other member of the SVE would be clearly documented.

In addition, as far as we all know the above international express courier companies *never* send shipments to "P.O. Box" addresses.

So from the point of view of UIS Ethic Code with accepted amendments - the expedition made all what was in its power before and after, it means that the expedition started in good will and not to pinch somebody something (what they did not know before) they wanted to touristically visit something and eventually to discover something if occasion - (1) expedition contacted locals on officially existing contact address recommended by the UIS official, but unfortunately did not obtained any comment (normally such situation means yes, but probably not in South America) - this is the only fault in the whole story from expedition side, and (2) after the trip, the expedition delivered all materials to the national caving club (locals) they contacted earlier even if locals were not physically involved in the expedition. What you want more? More if expedition was planned as touristic trip to know new regions eventually to make reconnaissance, the approval of locals is not necessary in that case; the chance that you discover something really important in unknown terrain is very low, unfortunately they succeeded. I know tens of real caving expeditions with completely no contacts with locals, big discoveries and no problems from locals!? I know situations (in Europe!), on the contrary, when locals stole discoveries to foreign expeditions and immediately after expedition left the site they made prolongation before foreigners published original (primary) results (published data were not actual in the moment of appearance).

Wrong again Dr. Bosak, I have to repeat you that some of the people of the SSS-CSS team made an earlier trip to Roraima one year before (that I could believe that it was a tourist trip!). But the SSS-CSS January 2003 expedition was clearly organized as a fully speleological activity. If not so, how could you explain that only by chance they happen to carry in a 1 ½ day long walking trip all the caving gear needed to survey and be ready for a wet and cold 2.6 km of passages? Plus the complete subterranean photo equipment needed by Mr. Audy's to take the great photographs of large underground galleries? To say that the 2003 expedition was just a "tourist" activity is an absurd excuse. But on the other hand, if such visit to Roraima was going to be just a tourist one I may ask: Why you did bother to fulfill the Code of Ethics as you say? A tourist visit does not require it (or, does it?).

However, to show your obvious contradictions look what your colleagues Audy and Smida say (see <http://audy.speleo.cz/Roraima/Ojos/esp.html>): *"...durante el transcurso de ese año 2002, la Sociedad Checa de Espeleología (ČSS) y la Sociedad Eslovaca de Espeleología (SSS) se dedicó a motivar gente, a preparar el material necesario y a planificar la logística que nos permitiera hacer la exploración sin necesidad de contratar un helicóptero..."* ("during the year 2002, the CSS and the SSS, motivated persons, prepared the needed material and made the logistic preparation in order to proceed with the exploration without the necessity to hire a helicopter"). After reading these contradictions, you should take care of your own credibility.

I have to state also, what is broadly accepted, that if the cave is known but no published plan exists, the cave does not exist; such situation is normal at least here in Europe. If cave is known and plan does not exist but the entrance is marked by cadaster number or by some other sign (table of ownership) - the cave officially exists.

I agree with the first part and that is exactly the case, since the aforementioned cave was never before surveyed and that fact has never been argued by the SVE or myself, contrary to what the SSS-CSS team induces to believe to the unaware reader in order to accuse the SVE and me as "robbers".

By the way, what do you mean by a "table of ownership"? Do you think that speleo groups should hang "tables of ownership" in the caves they explore? If hanging tags is a common practice in the Czech or Slovak republics is your decision, however, we are not mandated to adopt this kind of procedures (see below).

The Slovak expedition with one Czech participant made the detailed research before it started, so if the cave plan existed that time on internet or in published form, they know it. I was not present physically, but one caver (I have any reason not to believe him) told me, that in distant parts of the cave no traces of earlier human presence were detected.

Again, neither the SVE nor I have ever contended that we worked in the cave before them and that has been stated in all SVE publications. As an example see this *Bulletin* (No. 67, p. 2, January 2006). Regarding, the finding of galleries without human footprints is absolutely banal and I can tell you that a dozen of Venezuelan speleologists also found another additional 8.4 km of interconnected passages without footprints, neither from a CSS-SSS cavers nor from any other human being.

I cannot understand, simply, that somebody can protest against the increasing of knowledge on respective cave? or even against the discovery of new and for science important cave! when not having ownership rights to the cave. I understand only if somebody is protesting against used poor and bad sentences and words.

We have never complained against then increase of knowledge of the Venezuelan underground, we only arose the fact that they acted against the UIS Code of Ethics in Venezuelan territory. On the other hand, we truly accepted that they did a nice job, as follows:

Sent: Sunday, September 14, 2003 6:23 PM Subject: Roraima 2003

*Dear Mr. Audy Marek and other members of the Czech and Slovak Speleological Societies.
Expedition to Roraima. Jan. 2003*

*.....
- Finally I must say that **you really did a good work**, but this fact does not preclude all the previous statements.
Sincerely yours, Franco Urbani*

I have been refusing the use of not proper words in contacts among people in official use, with no respect if caver or not. I was extremely shocked by very special (frankly said) Smida's letter, which he wrote himself, even expedition members were "surprised" as informed only after the distribution. I pressed personally members of expedition to appologize for the letter. But the use of improper words is not merriit of the problem! The merriit is who robbed who? , or is there any real background that Slovak discovery in Venezuela was robbery? as interpreted by the SVE. Who made the bad step? - Smida or the SVE attacking him about robbery! If in civilized World, and if the cave was really known before, it is enough to mention this officially - published in journal, presented on the SVE web page, distributing e-mail information! many possibilities in our globalised World. Why to make the internationalized problem immediately? More the SVE knew about the trip to Roraima (or in which hell it was)! Many unclear questions and dark positions to me, something smelling to my experienced nose.

I am amazed by you capacity to go on and on in the cover-up of the SSS-CSS affair twisting facts and even your own previous statements. So this paragraph really deserves a more careful and detailed analysis:

1) If you reject the use of **not proper words**, why you fully endorsed the dirty letter written by Smida (SSS) and Audy (CSS) when you wrote the following message as an answer to mine referring to the dirty letter?:

Sent: Wednesday, August 04, 2004 6:35 AM Subject: RE: From Venezuela

*Franco, I expected that our correspondence solved the problem. It seems that not. Why you wrote what you wrote in Bolletin No. 50 (or what was the number). **They must defend themselves. I fully stay on their side.**
Pavel*

2) We may partially indulge and agree that only the use of improper words could not merit of the problem, but understand that **the problem** arose from the SSS-CSS team much before they used the improper words. But of course such dirty words in fact accentuated their previous created problem by them.

3) Talking about improper words, notice the quite nasty use of the verb **rob** even in your above message, such verb has only been used by the SSS-CSS team and you to discredit the SVE and myself.

Please Dr. Bosak, show the speleological community the documentation that me or the SVE are "robbing" something.

4) You are a member of the Directive Board of the CSS so if you and your Society are correct enough as it should be -not to endorse the use of improper words- how it is possible that even right now (April 2006) the quite infamous, unspeakable and dirty letter wrote by members of the SSS-CSS exploration team against the Venezuelan speleologists is still posted in the **official** web page of the **CSS** (download at www.speleo.cz/soubory/clanky/110/cartauis.pdf). See excerpts of the beginning and end of such despicable letter both in Spanish and your language, as follows:

La verdad sobre
cómo fue descubierta la cueva más larga en cuarcitas
Cueva Ojos de Cristal (Roraima, Escudo de Guayana, Venezuela)
6
cómo Franco Urbani de la SVE roba descubrimientos, induce en error y miente



El día 27 de Julio de 2004 hemos conocido, mediante nuestro amigo, por internet, la versión electrónica del Boletín Informativo de la Federación Espeleológica de América Latina y del Caribe (FEALC) Nro. 20

Branislav Šmída (Sociedad Eslovaca de Espeleología)
Marek Audy (Sociedad Checa de Espeleología)



Pravda o tom,
ako bola objavená najdlhšia jaskyňa sveta v kvarcitoch
Cueva Ojos de Cristal (Roraima, Escudo de Guayana, Venezuela)
alebo
ako Franco Urbani zo SVE **kradne objavy, zavádza a klame**

Dňa 27. júla 2004 sme sa prostredníctvom nášho priateľa mohli na internete oboznámiť s elektronickou verziou bulletinu Boletín Informativo de la Federación Espeleológica de América Latina y del Caribe

Branislav Šmída (Slovenská speleologická spoločnosť)
Marek Audy (Česká speleologická společnost)

5) If you refer of data "robbery", we can comment that the total topography of the cave "Sistema Roraima Sur" reached a depth of -72 m and a horizontal distance of 10.8 km (now the longest quyarzite cave in the world) was totally surveyed by 14 members of the SVE with the participation of 7 members of the Oxford University Cave Club (UK) and one member of the Sociedad de Ciencias Aranzadi (Spain). So that is our survey and no data whatsoever was taken from any other group.

I must stress and summarize again that such dirty letter was:

- 1) Published in the official web page of the CSS,
- 2) Bears the logos of both societies (SSS and CSS), and
- 3) It is signed by one member of each society in representation of them.

So to me this is an official letter of BOTH societies.

With these undeniable facts your intentions to clear the name of the CSS out of this affair (see your first paragraph) go away. But all to the contrary -unless shown differently- both societies are buried to their necks in the aftermath of dirt created by Smida, Audy and yourself.

To solve the problem I want to obtain the answer to 1 principal question:

The problems created by the SSS-CSS team and **mostly complicated by yourself** will not be solved by your trivial question (below) since it was already answered in the document handed to you in Hanoi in 2004. But at any

rate for clarity and the benefit of other readers I will summarize the same answers with new wording, but for more details please read the SVE document again.

- where the Cueva de Ojos Cristal (or what is the name) was published before the Smida's expedition, in that case I want to obtain hard copy with map or ISSN or ISBN number or respective publication, eventually internet (web) address.

Here again the answer that you already well know: The SVE never surveyed such cave before the SSS-CSS team and the SVE has never attempted to show the contrary.

In the first abstract published by the SVE in the NSS 2004 Convention, we mention that the cave was "*measured by a previous Czech and Slovak caving team*", after this, in a Venezuelan congress we stated: "*...En el año 2003 una expedición no autorizada de checos y eslovacos topografió 2,4 km en la Cueva ... (...during the year 2003, a non authorized Czech and Slovak expedition measured 2.4 km of the cave*" Even more, a longer mention about the Czech and Slovak expedition appeared in <http://www.fealc.org/boletines/boletin50.htm>. So in all publications and conferences made by Venezuelans, the Czech and Slovak exploration was always mentioned as the antecedent survey. This shows that the insistence of Dr. Bosak to use as a leitmotiv the supposed fact that the SVE never mentioned the Czech and Slovak exploration completely lacks of any sense.

And moreover, I have also said several times that I have **never** visited the cave, so how can I "**rob**" a cave that I do not even know. To make believe the contrary was just a diverting trick created by the SSS-CSS team against the SVE. So please stop such smoke screens.

Unfortunately, my experience with Urbani long before the affair, this causa caused no change in my opinion, was really not very ideal, starting with Paleokarst book and ending with his position of the UIS Bureau member (he never appeared on any meeting and his activity was zero and he used his membership to improve his position; unfortunately he was not the only past-UIS Bureau members behaving in that direction, when we will eventually meet in the future I can name them). I have to admit, unfortunately, I lost the trust to him years before all the story. He can be nice guy, but not for me, serious academic cannot behave like him, or I do not understand South American reality, which is probably more close explanation of my insufficiency.

Certainly for me this paragraph is quite low, since the professional matters of two decades ago have nothing to do with the current SSS-CSS affair. For readers to know what Dr. Bosak refers I give a summary:

1) In the 80's, Dr. Bosak invited me to write a chapter about Venezuela for his paleo-karst book but due to many unexpected problems, I had to decline in a very late date; so at that moment I apologized to him for this delayed decision. In any case, regarding this single anecdote, I also must say that after writing more than 500 publications in approximately 40 years as speleologist and as a university professor of geology, one more or one less paper will not make any change in my professional career, and

2) As a former Joint-Secretary for South America in the UIS Board it is absolutely true that I never attended to any of the UIS Bureau meetings between 1986-1993 but the fact is that I had no access to funding for such activities and the UIS does not provide for them either (In addition, I must say that practically no Latin American science foundation funds traveling for administrative duties, they only and strictly fund the participation to academic meetings). So Dr. Bosak: are you sure that those facts make me **not** a "nice guy," and **not** a "serious academic"?

3) As for my activities in the UIS Bureau I must declare that you never cared about what I was (and many other delegates were) doing or not doing in favor of the UIS. In your long stay as General Secretary you never provided advice or guidelines, but you well know that many Latin American speleologists and myself had worked hard to make Latin American speleology stronger. A quite different matter was with the past-Presidents Dr. Adolfo Eraso and Dr. Paolo Forti with whom we, Latin Americans in general and Venezuelans in particular, always positively interacted. As for my work in favor of Latin American speleology I leave the analysis to my colleagues of FEALC.

I was also informed (without any details) by past-Secretaries General on similar problems with Venezuelans also in the past (somebody else discoveries were presented as the SVE discoveries)!

Please Dr. Bosak, do not speak rubbish to discredit the SVE and me. Please, as soon as possible present the proofs to the speleo community that in the past "**somebody else discoveries were presented as the SVE discoveries**".

With regrets, I would like to inform you (as member of the CSS Board) that, unfortunately, the SVE cannot obtain any excuse letter of the Czech Speleological Society (CSS), which is due to organization structure of the CSS given by its Statutes (the CSS Board discussed this point twice on its meetings), except the letter with regrets of use of improper words written by non-member of the CSS. From the CSS point of view the expedition was not officially approved (nobody asked for that; please do not interpret that the expedition or

trip or whatever it was for the CSS illegal, no!!) therefore does not represent the official event of the CSS. For explanation, the CSS Board has been approving so-called central events with official use of the CSS logo (trade mark) only for very limited number of activities - especially meetings of cavers, workshops, symposia, conferences, congresses and some exceptional activities, like some years ago the use of special device for underwater exploration in the Hranická Abyss. On the other hand, the CSS Board is approving all activities of organisational units without legal statute (i.e. dependent to the CSS Board), like Central Commissions.

I certainly do not expect an **excuse letter** from the CSS or you. But the correct way would be that **you** write an excuse letter not to the SVE and not to me, but to the whole UIS speleological community to whom you have deceived.

If such illegal expedition was not officially approved by the CSS, why the expedition members up to today (April 2006) still use the CSS logo?, and why in the CSS official web page still appears the improper and dirty "cartaus" letter?

If the CSS procedures you mention are true then I come to think that you have a serious internal problem of discipline. So before trying to clean other houses, clean yours first.

In addition, as I must repeat here what Audy and Smida wrote in the official CSS journal *Speleoforum* 22: 63 (2003): "*Summary: Cristal eyes (Czech-Slovak expedition to quartzite karst in Venezuelan Guiana)... (Czech Speleological Society and Slovak Speleological Society) was focused on exploration of caves in quartzites in the western part of Roraima...*", and you Dr. Bosak are the main editor, so it is impossible to believe that you did not realize that Mr. Audy was identifying himself as a member of the CSS. Therefore, how you can deny the official participation of the CSS?

Expeditions to foreign countries are under responsibility of individual club(s); I cannot remember that the CSS Board (since the CSS establishment in 1978 and before 1990 with completely different organisational structure: centralized) approved any expedition as official CSS activity (except "recommendation" for obtaining permission to leave the country during so-called communistic system in pre-1990 period, but such recommendation was needed to any activity in the "West", not only expeditions, but trips or congresses too). What is the result, Marek Audy was private member of the expedition, which realisation is not necessary to be approved by the Board of the CSS (organized by Slovaks). The CSS represents the union of independent caving clubs. Caving clubs are completely responsible (according to valid Czech law) for their activities and their activity is not approved by the CSS Board because of independence of clubs and their Board; there exists only annual report on activities of clubs given to secretary of the CSS. The role of the CSS, i.e. case when the CSS Board can inherit internal affairs of the clubs, is only in establishing of new club, cancellation of club or if there are illegal activities (against valid Czech law and the CSS Statutes) endangering the club existence, or to judge problems between/among clubs. Even in the case that Audy is member of caving club associated to the CSS, and he is, even caving club has no responsibility on activity of its members when the respective activity does not appear within official, i.e. approved, club activities, i.e. mentioned in official minutes from Club Board meeting.

If so, why Marek Audy does not signs the dirty "cartaus" letter as a member of his own Caving Club but rather he does as a CSS representative (?). Could you choose another more convincing argument?

More, pls, accept that excuse letter demanded by Hanoi Bureau meeting was already written - note that not by Smida (from him you cannot expect anything) but by Marek Audy.

This must be a phantom letter. Why Mr. Marek Audy never sent the letter to the SVE or me? Or even worst, if you have it, why as the General Secretary of the UIS you did not disseminate it? That could have prevented further complications.

One more question Dr. Bosak: What do you imply by saying that from Branislav "Smida ... you cannot expect anything" ? Shall I presume that you try to lead me to think that he is the only "bad" guy in the affair and the SSS is the only "bad" Society?, or should I understand that you have some pre-arrangement with Mr. Smida regarding this affair? Again, before trying to clean other houses, clean yours first.

The problem Venezuela versus Slovakia/Czech is not international problem, resp. problem on international level, but problem of two entities (bodies) - the SVE and the expedition headed by Smida. The SVE does not represent the only or unified Venezuelan body with whole-Venezuelan competence, but one club from 4 or 5 existing, so the SVE has no right to decide on permission for caving on territory of Venezuela (except the situation that such decree was legally obtained from respective governmental body; which was clearly not the reality in time of the respective expedition; if yes I want to see such document); the Smida's club is associated

in the SSS, but in fact is legally independent, it is not proved if expedition was official activity of the club itself (like in Czech). I do not understand why the problem was internationalized and trip was signed as illegal (please do not write anybody about the Venezuelan protest, it is protest of one single club - the SVE), if it is only due to internal situation in Venezuela?, after I am very sad. I have nothing against anything and anybody (even with bad experience in the past), but when the UIS Bureau is solving such "problems", when even the Ethic Code was kept, the UIS Board will do nothing else in the future that negotiating hundreds of quite local problems and having no force for solution of more important international problems. Unfortunately, such step was done....

It is amazing that a former General Secretary of the UIS for several terms and now its recently elected Vice-President, may write such and un-respectful text about the internal speleological matters of a country not even knowing what is going on here. This *must* alert all members of the UIS, because without even consulting the national delegate, a member of the UIS Bureau is putting in doubt the speleological institutional structure of a country that he has not even visited as a tourist. This is extremely serious, because if this practice is accepted (or more awful, ***backed with the silence*** of the other members of the UIS Bureau) will place a terrible precedent that may be capriciously applied in the future against any country member. It is simply not justified that a person who is a member of the UIS Bureau give subjective and biased opinions or moreover ***insult*** the members of any speleological group or people of any country member of the UIS. In this sense, I must remind you that Venezuela is affiliated to the UIS since 1967, and the members of the Venezuelan speleological community have historically maintained a great, positive and productive relationship with the Union.

Now let me help you understand why the SSS-CSS generated problem was internationalized: It was mainly due to your incompetent and biased actions, only trying to cover up the affair, but not going to its roots.

If the phantom letters you mention really existed to solve the problem, you simply had to disseminate them on time and the whole affair would not have reached Hanoi, Greece and even now in Beirut.

I rather see your whole message as a self declaration of failure and deceive as an UIS officer.

Regarding the good relationships of the SVE with other Venezuelan speleo groups, I may just tell you that it can be demonstrated with *facts* not with words. The SVE and other Venezuelan speleo groups had organized together regular congresses and symposia, the SVE bulletin is an open journal that had published high standard maps and publications made by members of other speleo groups (as well as members of other Venezuelan and international - particularly Latin American- institutions), the SVE provided ground support in promoting young speleo groups particularly at a national universities' level where a lot of enthusiastic students are exploring Venezuelan caves, the SVE openly shares partnership explorations with other speleo groups in different regions of our country. That only occurs in speleological communities that work in harmony.

I have no reason to apologize^o to anybody as I did nothing illegal or unserious. Please accept, that the expedition was Slovak expedition (other country), why shall I cover foreigners, I can understand eventually that in case of Czechs, but from Czech Republic, only one caver was present. I felt from the beginning that something is wrong in the whole story, something is false, some principal evidence is missing. The role of the UIS Secretary General is to see the problems independently and to prevent to accept completely wrong decisions or decision on profit of one of parties. As I stated above the Ethic Code was kept and fulfilled.

No more further comments.

I will not react to any future contacts until it is not proved in clear manner (by independent body) and without any doubts that the respective cave was publically known before Smida's expedition (i.e. published and not only visited by some local), more the SVE must legally prove that the owner of rights to cave in the moment of expedition was the SVE. Simply the SVE must finish to cry loudly and it must open their cards and play seriously. Venezuelans and all other countries, incl. clubs like the SVE, must also follow the UIS Ethic Code, which is valid for everybody and not only for expeditions.

No more further comments.

Any attempt of eventual falsification from the SVE side (new anti-dated letters and reports, anti-dated maps in the SVE archives, ... etc.) will deepen the crisis, which is completely artificial and clerly serving for the SVE profit.

How you as vice-President of the UIS can go as low as to think that the SVE will forge maps and documents? We do not have hidden cards, all we have it is now in public domain and available in Internet. This is just a wicked tactic to bypass the real point of this affair, so I will not going to lose my time commenting on it.

I have to mention, that there exists good proof if "previous" maps of Venezuelans are correct or not, the nature of it was already published ("another attack against the SVE").

I do not understand

I summarize:

- excuses for improper sentences and words were written;

You well know that something written but not disseminated equals to its non-existence. But if by chance you have such "written" statements in your files please disseminate them now -even if it is too late-.

- there is no proof that Cueva of Crystal Eyes was known (publically) before the Smida's expedition as maps and materials were published by the SVE only after results of foreign expedition (trip) were publically announced; there is no proof that Smida's expedition entered exclusive ownership of the SVE as the cave was not visible marked by table or by other means;

We said already tens of times that we did **not** survey the cave before the SSS-CSS team. To make people believe the contrary is just a fabrication by the SSS-CSS team to reverse the blame of their illegality to the SVE.

Are you satisfied now with this even more explicit declaration?

At least one of the large entrances was known by guides since 1994 and two of the members of the SVE in a tourist visit did enter a few tens of meters before. But again, the SSS-CSS team was the first one to survey and publish almost ¼ part of the whole cave. **Again**, the SVE has never contested that fact. There are not Venezuelan publications in which it is stated that the SVE made the first survey of this cave; on the contrary, we do indicate that your friends made the first preliminary map of this cave. On the other hand, you are trying to banalize this as an "I saw it first" affair, which is what kids do when they are playing. The "I saw it first" then is just relevant for the exclusive "glory" of your friends. But science -and speleology- cannot be justified violating principles of ethic, sovereignty of a country, and good willingness, moreover in a country like Venezuela in which the SVE had never denied support to fair and cooperative foreigner speleologists that want to explore our country.

So, the problem starts in the Smida-Audy letters in which they tried to make believe differently in order to discredit the SVE as "robbers".

The SVE has no "ownership" of any Venezuelan cave, therefore we do not mark caves. In addition, I must remind you that "marking" is against contemporary cave conservation practices.

Also you and the SSS-CSS team must understand that we do not need to inform or ask for permission to foreigners to explore caves in our own country.

- the SVE is one of several caving clubs in Venezuela and has no, by government approved, right to limit caving activity on the territory of Venezuela, in spite that the SVE has been traditional partner of the UIS.

We did not limit the caving activities in Venezuela and we can not do so, since we are a Non-Governmental-Organization with no enforcement functions. But as the National speleo organization we only applied our right to know who did explorations in Venezuela against the UIS Code of Ethics (and it is still done by members of the SSS and CSS).

Without any doubts, now play is on the SVE side, it **MUST** abandon dangerous present position and tactics and to prove without any doubts and with fully serious approach to seriousness of situation, that cave was published and map was publically available before its "rediscovery" by Slovaks and that the SVE had legal ownership right to the cave, which was marked e.g., by table in front of this "excellently and completely surveyed and explored cave". Other questions are not very important.

Wrong Dr. Bosak, now the play is on your side so please show the UIS speleological community all those phantom documents that you mention in your message, which if they really exist you unacceptably have kept them secret, working against the spirit of the UIS and making the problems grow.

On the other hand, none of our publications ever said that the SSS-CSS team "rediscovered" the cave. In fact we do not care about any kind of "protagonic roles" that you systematically try to defend which for us is totally irrelevant. In any case, the real merit for the "discovery" of this cave relies on the Pemón indigenous people that visited this place years ago.

Also show the word the alleged SVE mischief's that you have denounced in your message. If you do not do so then you become an accomplice.

PB

PS: I must admit that I have enough of all this story.
Me too, I totally agree with you.

I take no care that some Venezuelans have been dealing with my person in official publications in spite that they have no reason (even if it can represent base for legal steps against them) and they are playing with false cards.

Then, I urge you to show to everybody the "false cards" of the SVE.

I am bad that I distributed address of the SVE? I need the SVE permission to do that? (how stupid in function of Secretary General with the principal role to distribute information about caving in the whole caving World - to mention the UIS Statutes in this place). If I am totally bad /even up to criminal/, why you elected me as the third in rank UIS official for another term - 2005-2009? Why the Assembly elected me by so many voices and not selected out?

I cannot answer those questions since I was not in Greece, but I may suggest that the voters did not know **your other side** as clearly demonstrated in this opportunity. In any case, please do not overact, we never accuse you as a "criminal;" it is ridiculous, and almost parodic. Thus, please, do not try to distract the attention of the main point, to hide lies using other lies and to put in our mouths words that we had never used and will never use.

I have to admit, that, unfortunately based on the whole story, the SVE seems to me as completely not serious group of people following some kind of profits which I cannot understand, in fact acting against the UIS. If they do not want to be the UIS members, they can go, we will thank them for all they did in the past and finito, basta.

Everybody knows that the SVE and I never had acted against the UIS, we only asked the UIS to enforce its own regulations. But if such regulations are now a burden to the UIS Bureau, why don't you raise in Beirut the motion to remove them all.

There is nothing worst that having a law and not having the "guts" to enforce it.

I spent with the question of expected (interpreted) robbery (but there is question who robbed who?) long tens of hours, hours which I could, can and will be able to spend for other, more important, UIS issues (conservation problems in BiH,, preparation of my last UIS Bulletin, to distribute UIS Bulletins to proper addresses). You are loosing my time, your time, and profit of the UIS.

I absolutely agree.

If you want to obtain from me another reaction to the whole story (other than legal) you must offer something more than loadly crying group of strange guys with mentality far from the normal civilization. If there is no proof for **my above-mentioned questions** I will start officialy and more loadly with the use of words lier, robber as I did in my not numerous completely private e-mails.

Your **above-mentioned questions** have already been answered now and before (please read again the Hanoi report). But I hope you are satisfied now with the newly worded and more explicit answers given in this reply. For me it is pretty strange to read your own words just written above: *"I have been refusing the use of not proper words in contacts among people in official use, with no respect if caver or not."* In this sense, I would really like to know if the rest of the UIS Bureau will back you regarding the insulting words you used and that increased this affair.

On the other hand, in the future, I will really appreciate (and again, I am sure that all readers will appreciate - particularly non European speleologists-) just to be quite modest, and avoid the use of "neocolonial wordings" (e.g. "strange guys with mentality far from the normal civilization"), which is another kind of "not proper words," and an explicit discriminatory -almost racist- statement.

If you want to follow in non serious support of non proved arguments, you can, it is your right, but without me as person having something common with the UIS.

No more further comments.

Howgh!
????????????????

Here a summary of my opinions:

- Dr. Bosak, your message constitutes a self-declaration of you incompetent and biased actions as UIS General Secretary in a case that touches one of you co-nationals.
- This must show the other UIS Bureau members that you as Vice-President cannot be placed in a position that could jeopardize the relations and good will between nations and speleo organizations.
- The UIS must seriously debate the future of its Code of Ethics since this is not an isolated case, but of course this went much further due to the nasty actions and letters by members of the SSS and CSS.
- The SVE, the Venezuelan national speleo organization with 55 years of high standards of speleological activities has been subjected to the lowest possible level of vulgar offences and defamation by Branislav Smida (SSS), Marek Audy (CSS) and Pavel Bosak (CSS). Of course I do not expect from such persons to back-up or excuse (see above) but at least I would expect a **more active action** by the new UIS Bureau.
- The UIS Bureau must also remember that since the SVE sent the first documents at the meeting of Hanoi and later in Greece It has never received not even a single acknowledgement of receipt.

Caracas, 19th April 2006

Franco Urbani

P.S. Since I am a member of the *UIS Advisory Committee* please also take this Reply as my personal non-solicited advice to the UIS Bureau.

Advisory Committee

Members (alphabetic order):

[Arrigo CIGNA](#), Italy.

[Andy EAVIS](#), Great Britain.

[Alain MANGIN](#), France.

[Fritz OEDL](#), Austria.

[Franco URBANI](#), Venezuela.