

Summary Notes - **DRAFT**

California Spatial Reference Center (CSRC) Coordinating Council Fall Meeting

October 15, 2009 from 10:00 AM to 3:15 PM

Martin Johnson House, Institute of Geophysics and Planetary Physics, Scripps Institution of Oceanography at the University of California, San Diego

Agenda: See Appendix A

Attendees: See Appendix B

Minutes Prepared by Maria Turingan, Cordinator.

*Next Meeting: The Spring CSRC CC Meeting is scheduled on **May 6, 2010** (Thursday) in San Francisco at PG&E Headquarters on 245 Market Street, 94105 (Downtown/Financial District area). Thank you to Jeff Little and PG&E for hosting the meeting.*

Opening- Art Andrew

Welcome and Introductions

- Andrew began the meeting and introductions around the room followed.

Director's Report- Yehuda Bock

Shakeout at 10:15 AM

- **Great California Shakeout:** Bock thanked everyone for attending the meeting and opened his presentation with the Great California Shakeout website; see <http://www.dropcoverholdon.org/>:

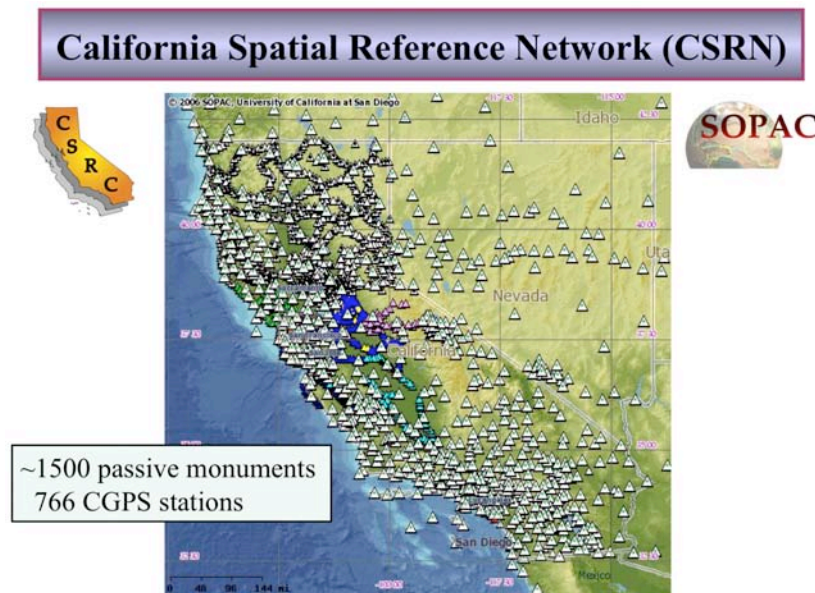


- Bock research working involves the development of an early warning system (EWS) that could provide a one-minute warning.
- Marti Ikehara asked if drills were conducted at UCSD and mentioned that in Hawaii, they hold monthly tsunami drills. UCSD has not organized campus drills.

CSRC Overview

- For Bock's PowerPoint slides, please see Appendix C.
- **CSRC funding** was reduced to \$100K resulting in staff layoffs. Though SOPAC funding for real-time GPS research and related projects have remained steady and we have submitted several proposals currently under review at NASA and USGS, CSRC has turned its focus on CRTN as the main project and source of future funding. CSRC's future depends on raising funds through the CRTN Consortium.
- **Height Modernization Projects in Northern California:** Our last height modernization project was the Central Coast Height Mod Project. The results and final report have been posted on the CSRC and it has been submitted to NGS.
- **California Spatial Reference System (CSRS), California Spatial Reference Network (CSRN), and National Spatial Reference System (NSRS):** With respect to conventional surveying techniques, we have met the CSRS densification goals as stated in the CSRC Master Plan with approximately 2,250 sites. The CSRN consists of approximately 1,500 passive stations and 766 CGPS stations. One participant requested clarification of CSRN, CSRS, and NSRS. The CSRS is

defined through the CSRN (the infrastructure points on the ground) and is a subset of the NSRS. Marti added there are CGPS stations that are not part of the NGS National Continuously Operating Reference Station (CORS) and the CSRS is denser. The NSRS and CSRS are based on geoid and atmospheric models, etc.

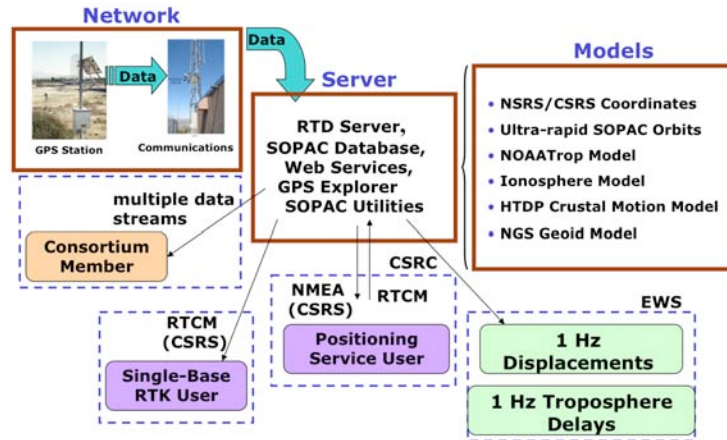


- **New CSRC 2009.00 epoch coordinates** have been published and include velocities and uncertainties to comply with the California Public Resource Codes and updated 2007.00 epoch coordinates. With the CRTN epoch date positioning service, epoch dates will be transparent. Whereas the Scripps Coordinate Update Tool (SCOUT) and the NGS Online Positioning User Service (OPUS) calculate precise coordinates statically, CRTN will provide coordinates in real time.

CRTN

- CRTN began in 2002 in Orange County with the first few stations and has developed into 130 stations. CRTN is directly tied to the CSRS and NSRS, fulfilling the requirements of the California Public Resources Codes. The processing occurs in real time with CRTN rather than post processing with traditional surveys.
- **The CRTN map highlights four priority expansion areas:** 1) NOAA GPS Meteorology/Flood Warning Area in partnership with the California Department of Water Resources (DWR) and NOAA, 2) Central Coast in collaboration with UNAVCO's Plate Boundary Observatory (PBO), 3) Central Valley Spatial Reference Network (CVSRN) in partnership with Caltrans, and 4) Cascadia Subduction Zone also in collaboration with PBO. The CRTN map is based on a backbone of 80 km spacing; however, PBO has mentioned a 40/50 km backbone grid. In Southern California, the density is in the order of 20 km spacing.
- **NSF/UNAVCO/PBO Perspective:** Although PBO data are freely available and accessible to anyone, CRTN will assist PBO in fielding users' inquiries, provide user support, and provide a united voice for the CRTN user community. In addition, nothing in the Business Plan, CRTN agreements, or any related legal document may imply NSF or government endorsement, promise, commitment, or level of service above the existing operational PBO standards.

- **CRTN Components:**



- **There are four basic CRTN users:**
 1. Consortium member with access to multiple data streams
 2. Single-base RTK user
 3. Positioning service user (in development)- CSRS positions at the epoch requested
 4. Scientific user- for EWS research, displacements, and troposphere delays.
- **CRTN supports several models** including NSRS/CSRS or the Scripps Epoch Coordinate Tool and Online Resource (SECTOR) tool, which calculates epoch (date) specific coordinates, and incorporates the Horizontal Time Dependent Positioning (HTDP) crustal motion model, and geoid models. Scientist, such as seismologist, can utilize real time displacements and the NOAATrop real-time tropospheric delay model. One SIO graduate student researcher, Jim Means, uses CRTN real-time GPS delays to generate hourly GPS precipitable water plots to improve weather forecasting. During the ShakeOut experiment, the EWS was able to provide a 1 minute 20 second warning.
- **SOPAC funding** for real-time GPS research that leverages the CSRC and CRTN work include the NASA Making Earth Science Data Records for Use in Research Environments (MEaSUREs) and Advanced Information Systems Technology (AIST) Projects. SOPAC supports SCIGN, EarthScope, PBO, and Interferometric Synthetic Aperture Radar (InSAR) missions. The goals of these projects are the production and delivery of GPS data products and the GPS Explorer portal and support NASA goals.
- **Latency:** CRTN can meet users' latency requirements and has demonstrated to fall well within 1.2 seconds with close to 100% data completeness. Single RTK users' median latency in seconds (when data is available) is quite good, 0.5 seconds. Generally, OCRTN's, MWD's, and SDCRTN's sites fall within the required latency even with the variety of receivers. CRTN will work to improve latency by adding telemetry buffers, upgrading telemetry buffer firmware, and upgrading to cell transmission and to 3rd generation cellular technology. Further, PBO is in the process of testing, evaluating, and selecting caster software that will improve latency. Adrian Borsa, PBO Data Products Manager, commented that for the Cascadia project, LAN-Cell 2's will be installed.
- **American Recovery and Reinvestment Act (ARRA) Funding:** SOPAC has submitted a proposal to USGS for ARRA funding to upgrade 32 USGS stations, to replace Ashtech Z-12 receivers with GPS and some GNSS receivers, and to improve telemetry links.
- **Follow-up after the meeting:** Andrew created a CRTN Proposed Backbone Network Map; see appendix K.

CSRC Funding

Financial Report- Maria Turingan

- For Turingan's PowerPoint slides, please see Appendix D.

- **CSRC funding** from NGS was cut by 69% from FY07 to FY08, from \$960K to \$300, and further cut in FY09 to \$100K. Overall, 91% of CSRC's funding has come from federal and 9% from state and local sources.
- **FY09 Budget:** With a small carry forward balance from FY08 funds, \$101K will cover four main tasks/categories from July 1, 2009 to June 30, 2010: 1) Education and outreach, 2) CGP operations and maintenance, 3) Management and administration, and 4) the Executive Manager. Of the projected expenses, 45% will be used to cover salaries; 32% for Consultants; 9% for supplies, travel, and other; and 14% for overhead. The direct costs for salaries cover approximately 3.18 person months for the year and only 8.33% of the total SOPAC/CSRC staff effort.
- **Coordinating Council Membership:** The vacant positions on the Coordinating Council were highlighted. CSRC is trying to reinvigorate the Coordinating Council membership and requested that meeting participants help draw additional members and support CSRC education and outreach efforts.

CRTN Business Model- Art Andrew

- For Andrew's PowerPoint slides, please see Appendix E.
- Andrew reviewed the CRTN Business Model and highlighted the key points: the Consortium, membership, benefits, roles, data availability, cost recovery, infrastructure support, providers, implementation schedule, and proposed budget.

Consortium Meeting Summary- Maria Turingan

- For Turingan's PowerPoint slides, please see Appendix F.
- **An overview** of the Inaugural CRTN Consortium Meeting October 2, 2009 was presented:
 - Landmark and long awaited meeting
 - 20 Attendees: 13 interested Consortium members and 7 CSRC representatives
 - Positive meeting
 - Gaining momentum and support
 - CRTN Service Agreement- under review by potential members
 - Data and latency testing with potential members have begun
 - Brought new partners and supporters to CRTN
 - Recruited 10 provisional Consortium members to form a CRTN Bylaws Subcommittee.
- **Action items** from the meeting include:
 - Distribute the final draft of the CRTN Service Agreement- emailed to attendees on 10/07/09
 - Generate revenue through Consortium memberships
 - Continue latency testing
 - Review PBO maintenance costs of \$1.3K per station
 - Establish UNAVCO Memorandum of Understanding and subcontract
 - Establish contracts with CRTN Providers
 - Begin engaging provisional Consortium members
 - Form a CRTN Bylaws Subcommittee of provisional Consortium members
 - Draft CRTN Bylaws within 90 days
 - Hold quarterly Consortium meetings
 - Develop CRTN marketing materials for target audience such as agriculture, etc.

Executive Manager's Report- John Canas

CRTN Outreach Efforts

- For Canas' PowerPoint slides, please see Appendix G.
- John underlined CRTN history and outreach efforts.

- **Follow-up after the meeting:** *Canas has been working to obtain a letter of support from the County Engineers Association of California (CEAC). His outreach efforts with Andrew's were successful and CEAC formally endorsed CRTN in a letter dated November 25, 2009; see appendix L.*

Caltrans Report- Mark Turner

Update

- **CRTN Outreach:** Turner commended the efforts of CRTN through the business plan, meetings with individual Caltrans Districts, and John Canas' outreach efforts. Over the years, Caltrans has watched how other states have built their real time networks and how they have managed, subsidized, developed policies, and evolved, etc. In several states, Department of Transportation agencies have made real time networks freely available.
- **CRTN Backbone Network:** Turner was positive about CRTN's progress, efforts to draw from private, public, and state support, and CRTN's focus on the establishment of a backbone network rather than densification. Though there are limitations with and disagreements about various aspects of the CRTN model, such as the network solution and positioning service, Mark remains optimistic that we will be able to overcome the obstacles and work through these issues. Caltrans and CSRC will continue to keep lines of communication open, support technical discussions, and work collaboratively to understand the problems and to offer solutions.
- **Caltrans Involvement in CRTN and CSRC:** Caltrans has been involved in CRTN's development, which has the attention of the Surveys Management Board and Deputy Directors. Fourteen Caltrans representatives have been assigned to participate in the CRTN Consortium. Because today's meeting is on a furlough Friday, the lack of attendance by Caltrans participants does not reflect the organizations interest and support of CRTN and CSRC, but Caltrans was still able to send some representatives: Bruce Urquhart, Ned Salman, Dick Davis, and Marti Ikehara.
- **Marketing CRTN to Caltrans and Other State Agencies:** Turner will be working with Caltrans Districts and various Departments to bring them up to speed, to develop experts, to market CRTN, as well as look at opportunities to support CRTN with in Caltrans and other State agencies, including the Offices of the State Chief Information Officer (CIO), Geographic Information Officer (GIO), and GIS. Mark, Dick, and Marti recently meet with Mike Byrne and Gary Darling from the Office of GIO and to draw attention to geodetic control, CRTN, and CRTN's role in establishing a backbone and geospatial framework for mapping. Darling also suggested that radiation sensors or other sensors could be added to the stations and, thus, appealing to the Office of Homeland Security and other State Offices. Building momentum and consensus at Caltrans involves a process: completion of feasibility reports, cost-benefit analyzes, concept papers, IT approval, and establishment of a service agreement, etc.

PBO/UNAVCO- Adrian Borsa

Partnership

- For Borsa's PowerPoint slides, please see Appendix H.
- **PBO GPS Network:** Borsa presented maps of the PBO GPS Network primarily in the Western United States, including Alaska. The PBO GPS Network, following fault areas to capture strain fields, was built to serve the scientific community. However, UNAVCO sees the benefits of the PBO GPS Network to other scientists and a larger community, utilizing real time data.
- **CRTN Partnership:** UNAVCO views a partnership with CRTN as an opportunity for PBO to reach out to communities it does not currently serve, to serve the public good, and to make real time available to rural areas, etc., without degrading PBO's primary goal and scope of work to serve scientists, as stated in their NSF award. UNAVCO may benefit by being able to work with a single consortium rather than individuals or multiple groups; perhaps CRTN could be that consortium. UNAVCO has not been approached by other groups to pursue this type of partnership.

- **CRTN Backbone:** PBO offers CRTN a backbone network of approximately 150 stations on an 80 km grid (exact grid spacing and station list to be determined), upgraded communications, and real time 1 Hz data in BINEX format.
- **Cost Recovery Plan:** CRTN offers PBO a cost recovery plan for data load from non-science users, support to the non-science users, and outreach opportunities to an important community not currently served, such as surveyors, as well as a cost sharing partner for network communications, software, and station upgrades.
- **PBO Budget:** Meeting participants asked questions regarding the PBO budget. Borsa discussed costs for CRTN's portion of the real time streaming software license, communication costs, network maintenance, person effort, station upgrades, and unscheduled station maintenance visits, etc. Some attendees at the Inaugural CRTN Consortium meeting also asked for clarification and thought that \$1.3K per station seemed high.
- **Casadia Real Time Project:** Borsa spoke briefly about the PBO Cascadia Real Time Project, an ARRA funded project supporting science and natural hazards research, which will also benefit the CRTN-PBO partnership by covering a subset of the CRTN stations and leveraging station upgrade, real-time network control software, and system/network administration costs.
- **Latency:** PBO has been working to improve latency by upgrading data communication and software and expects the new real-time network control software to be operational January 1, 2010.
- **Data Availability:** All data will be available directly from the PBO website in Binex and RTCM formats in the global reference frame ITRF2005. CRTN plans to add value to the PBO data streams by providing epoch date coordinates, static datum, and a positioning service in reference to CSRS and NSRS in real time.
- **Private Network Providers:** UNVACO proceeds cautiously to support local and state governments without competing with private network providers. Thus, not all the sites will be made available to CRTN nor to the public, especially in urban areas. At this time, UNAVCO has not drafted a policy dealing with private vendors.

NGS Report- Renee Shields

Update

- For Shields' PowerPoint slides, please see Appendix I.
- **Height Modernization Program:** Shields presented an update on the National Geodetic Survey (NGS) and the Height Modernization Program. Though NGS has been operating on a continuing resolution, they still expect funding for GRAV-D and Height Modernization and hope that there will be funds for state/regional grants. Some Height Modernization Programs were funded by earmarks.
- **New Vertical Datum:** Shields also discussed NGS' challenges and outlined the National Geodetic Survey Ten-Year Plan: Mission, Vision, and Strategy 2008-2018. They are paving the way for the new vertical datum. They will be organizing working groups and summits to prepare for the change.
- **Real Time Policy:** CSRC members asked Shields about NGS' policy towards real time. NGS recognizes that real time is driving the community and changing the field. William Henning is charged with heading the RTN team to draft the RTN guidelines. Though a draft document was released for review by a limited audience, it is planned for public release and comment by the end of the year.

Bylaw Changes- John Canas

NGS Representatives - Non-Voting Status

- See Appendix J, email to the CSRC Coordinating Council regarding the executive decision to change the two NGS positions to non-voting ex-officio CSRC Coordinating Council members.
- **Amended Bylaws Approved by CSRC CC Members:** Canas called for a vote of the Coordinating Council members present at the meeting to endorse the revisions as approved by the CSRC

Executive Committee on September 30, 2009 and emailed to the Coordinating Council on October 3, 2009. The 14 Council members present during the vote unanimously endorsed the revisions; see attendance and list of Council members who voted, Appendix B.

Closing

Comments

- **Next Meeting:** Jeff Little offered to host the Spring 2010 meeting at PG&E Headquarters in San Francisco and asked for dates in May.
- **Follow-up:** *Little secured a meeting room for the next CSRC CC Meeting on May 6th, 2010 (Thursday).*

Adjourn

- The meeting adjourned at approximately 3:15 PM.

Appendices

- A. Agenda
- B. Attendees
- C. Bock's CSRC Director's Report
- D. Turingan's CSRC Funding Presentation
- E. Andrew's CRTN Business Model Presentation
- F. Consortium Meeting Summary Presentation
- G. Canas' Executive Manager's Report
- H. Borsa's PBO/UNAVCO Report
- I. Shields' National Geodetic Survey Update
- J. Email to the CSRC Coordinating Council dated October 13, 2009 regarding the executive decision to change the two NGS positions to non-voting ex-officio CSRC Coordinating Council members.
- K. CRTN Proposed Backbone Network Map, November 13, 2009
- L. CEAC Letter of Endorsement for CRTN, November 25, 2009