出國報告(出國類別:其他)

# 2013 年美國地球物理聯合會 秋季大會

服務機關:交通部中央氣象局

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### 摘要

參與這次在美國舊金山舉行的 2013 年美國地球物理聯合會秋季大會 (American Geophysical Union, 2013 Fall Meeting),主要目的是希望透過會議參 與的機會,推廣本局所建置的地球物理資料管理系統(Geophysical Database Managemet System, GDMS),並且與各界進行意見交流。此外,也藉由參加會 議的機會,了解目前世界上,地球物理的主要研究方向及議題。以下即就參與 這次國際會議所汲取之經驗做一簡單之彙整:(1)目前,最主要提供世界各地 地震資料的單位就屬 USGS (U. S. Geological Survey ) 與 IRIS (Incorporated Research Institution for Seismology),他們已可在網路上建置方便的資料分享機 制。未來,本局 GDMS 若要推廣至國際上,相對應的網路資料分享機制也需再 做改進;(2)其他國際上主要地震觀測資料的提供單位,除了提供觀測資料外, 同時也提供一些加工過後的資料,讓使用者能更方便快速的獲得資訊,以評估 再進一步分析的可行性;(3)地震資料除了觀測地震所產生的訊號外,也有不 少研究以地震儀對大氣現象進行追蹤;(4)目前,世界各地有許多的地動 (tremor)研究,這些研究與傳統的地震監測方法差異甚大,但其資料卻有利於 研究震前或地下構造的活動特性;(5)目前世界各地已有許多的地震站與極大 量的地震訊號,人工處理這些觀測資料,曠日費時。本次會議中可發現有許多 自動化地震監測的程式,可協助進行地震監測的工作;(6)國際研討會是快速 獲取最新技術資訊非常好的場所,因此建議本局可以適時在國內舉辦國際研討 會,邀請國際上的專家至國內報告與交流。

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### 一、目的

美國地球物理聯合會秋季大會是由美國地球物理協會(American Geophysical Union, AGU)主辦,此會議固定於每年的12月於舊金山舉行(圖1.1)。該會主要目的是提供一個機會,讓世界各國從事地球物理相關研究的學者們,可於公開的場合進行研究發表與討論。該會議的規模可說是地球物理相關學門中,最大型的年度會議。2013年與會的人士,數目約有20,000人,每日發表的文章數目也約有4,000篇。可想而知,參加這類型會議可有效益的與外界交流研究結果。

此次,本人除了參與會議外,也於會議中,發表關於本局地震測報中心業務相關之論文。此論文的內容主要是介紹本局地震測報中心的地球物理資料管理系統-Geophysical Database Management System,GDMS(圖 1.2)。此系統蒐錄地震測報中心的各種觀測資料,如地震波、地震震源參數、自由場與結構物的地震響應、地殼變形、地下水等。此系統是建構在網路的平台上,利用網路的便利性,讓使用者可以更方便且迅速的獲得此系統的觀測資料,讓珍貴的觀測資料能更有效率的廣泛提供給學術研究單位進行科學研究。由此可知,該系統對於學術研究上的價值。

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圖 1.1、「2013 AGU FALL MEETING」宣傳網頁,資料摘自 http://fallmeeting.agu.org/2013/。

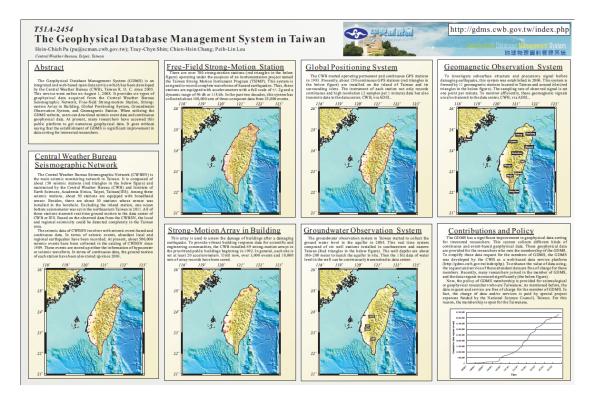


圖 1.2、本次會議的展示海報。其內容包含 GDMS 中各資料系統的測站分布與 GDMS 的資料申請量統計。

#### 二、過程

職於 102 年 12 月 8 日搭乘晚間 11 點 40 分華航 CI004 班次的飛機赴美,由於班機調度問題,延至隔日凌晨 1 時許起飛,到達美國舊金山的時間爲當地時間已是晚上 9 時許,離開機場後,直接搭乘地鐵到市區,再步行約 10 分鐘的路程至下榻旅館入住,此時已近晚上 11 時,再整理會議相關資料。在美期間,舊金山當地的天氣氣溫一般都在 10℃上下,氣候宜人。由於當地近海,常偶有降雨。幸運的是,參加會議的這一段時間,天氣十分晴朗,會議進行得很順利。由於職的研究工作之範疇多集中在地震、地下構造與火山研究部分,因此,主要關注的議程項目會集中於此 3 類。

12月9日爲第1日的議程。由於前日到達舊金山時已是夜間11時,故在參與會議前,需先領取各項資料,包含個人的識別證(圖 2.1),與申請領取各項繳費的證明等。由於此會議是地球科學相關類別中,規模最大的,與會時可以看到有許多的專業人士依序排隊領取證件的壯觀場面(圖 2.2)。承如前述的,此會議的與會人士眾多,發表的研究報告也十分龐大。因此,大會會於每日早晨,提供報紙,內容爲當日的議程(圖 2.3)。而本次與職研究工作之範疇相關的報告,多在3棟場館(Moscone South, West, North)中的 South3樓(圖 2.4、圖 2.5),而海報區則是集中在 South 的 Post Hall(圖 2.6)。

第1天的議程中,發現有數篇研究,其內容是颱風所造成的地振動訊號(如圖 2.7 與圖 2.8)。本人覺得相關議題頗爲有趣,雖然地表上的大氣研究與地表下的地震活動都屬於地球科學相關的研究,但研究方法差異甚大,能有觀測資料可以試著串聯起這兩大學門,是很棒的一件事。

除此之外,與 GDMS 一樣是提供地震資料的單位,IRIS,它們在網路上所提供的資料,除了地震波形,震源參數外,也提供一些頻譜分析的結果。未來,本局的 GDMS 也許也可朝加工資料的方向前進,讓 GDMS 的網站內容更豐富。

第 1 天的晚上,是大會舉辦的 Ice Break,相對於臺灣的會議,外國會議在 餐點招待上都比較簡單。此次的 Ice Break 只有提供汽水,啤酒與一些堅果類的 點心。 12月10日第2天議程(議程資料請參考附錄),此日的議程中,有一個主題,Seismic Anisotropy: Predictions, Observations, and Interpretations(圖 2.9),雖然相關議題看似與本局的業務相關,但細看其報告,多爲大尺度的地球構造研究,與可能造成災害的淺部地殼活動性-本局主要的觀測業務,尺度差異甚大。事實上,本日的議程中,有很多的研究是針對大尺度的地球構造或是板塊運動的科學性研究。

但在第 2 天的議程中,也有部分議程與本局業務相關,如自動化地震監測與定位等。這些研究,有許多都是在測試中,但可以發現,很多新的自動化監測工作,都是由許多年輕的研究學者所開發。他們所運用的方式,都經過複雜的數學轉換,簡化電腦運算,如圖 2.10。這些研究報告,除了簡化人工在地震監測中所扮演的吃重角色外,也讓本人覺得,未來的地球科學研究,在這些年輕且具有強大程式化能力的研究人員推動之下,地震資訊的取得將可以日趨簡易。

除此之外,也有火山研究相關的海報(如圖 2.11)。一般火山的形成,岩漿 來源多半來自隱沒地殼的部分熔融或是上部地函物質漫流至地表。而不同岩漿 來源的火山,在地表產生的位置會有所不同。但在這研究中,提出一些可能, 說明部分熔融的岩漿,其生成位置可能比原先的理論更廣。

也許是民族性所致,在AGU的全日議程中,大會僅會在上午的中場休息時間提供咖啡與下午議程的中場休息時提供軟性飲料與啤酒等(圖 2.12),與臺灣會議所提供的餐點形式差異很大。相較之下,臺灣會議就相對友善熱情多了。

12月11日第3天議程(議程資料請參考附錄),職於本日聽到一些關於誘發地震的一些研究(圖2.13)。目前,在礦區內,似乎已可以藉由一些模擬,成功的預測一些因注水作用產生的地震(圖2.14)。雖然目前無法預測天然地震,但似乎也爲地震預測開啓了一些可能的未來性。

除此之外,在構造演化的部分,臺灣的造山模式,始終存在許多可能。本次會議中,職發現,在伊朗半島地區,也有研究人員利用深埋再掘起的模式(exhumation)進行構造演化的解釋(圖 2.15)。顯示,造山模式與構造演化等之重要性,不止開放的臺灣,連封閉的伊朗也是研究的地區之一。

最後,在海報區,發現到一個特別的研究(圖 2.16),利用環境雜訊逆推速 度構造,進而解釋其地下的應力變化。職對於此研究存在許多好奇,原因是其 利用逆推地上構造的研究方法,解析度可能不高。但其研究卻利用相對的一些微小變化,解釋應力的現象。雖然存在很多問題,卻也難以否定其研究成果。也許在未來,本人需要再更增加關注於這一些新舊技術的演進。

12月12日第4天議程(議程資料請參考附錄),本日的議程中,有許多關於 Earily Warming 地震預警的相關海報(圖 2.17~圖 2.18)。由於相關研究,非職之專業。因此,本人帶回部分資料,給予本局相關同仁做爲參考。其後,又巧遇本局地震中心的外國顧問,吳大銘教授。其給予本局的 GDMS 一些建議。於此同時,也爲職引見 IRIS 的技術人員,期望藉由與他們交流的機會,可以使本局的 GDMS 系統更完善。當日近中午時,職有幸與本局地震中心的外國顧問,蔡義本教授,有見面討論的機會。在這次機會中,職與顧問有了很多深入的討論,主要討論的議題方向是臺灣地區的山崩研究。在此次的討論中,本人收益良多,也更確定接下來的研究方向與主軸。到了晚上,臺灣的地科中心在舊金山的四海酒樓舉行了臺灣之夜(Taiwan Night)。在會議中,看到了許多來自臺灣的研究學者,也有機會與他們做一些討論。

12月13日是最後1天議程(議程資料請參考附錄),本日的議程中,有本人的海報展示(圖2.19)。主要介紹的時間在上午,但由於此時,職還有另一篇共同作者的報告(圖2.20)。因此,職於上午期間有短暫離開。在整個上午的過程中,有許多國外的學者對於本局的 GDMS 相當有興趣。可惜的是,此系統目前只對臺灣的研究學者有開放。但至少有機會可以讓國外的研究人員知道臺灣有許多寶貴的觀測資料,增加未來更多國際合作的可能。

到了下午,與會的人士減少了,因此,本人有機會可以參觀了一些強地動的研究與一些儀器遲滯效應對於地動訊號的影響模擬及修正(圖 2.21)。

而在會議結束,用膳完畢後,職便收拾行囊,前往機場,搭乘華航 12 月 14 日凌晨的 CI003 的班機返回臺灣,返回臺灣的時間爲 12 月 15 日上午。



圖 2.1、職與職之會議識別證。

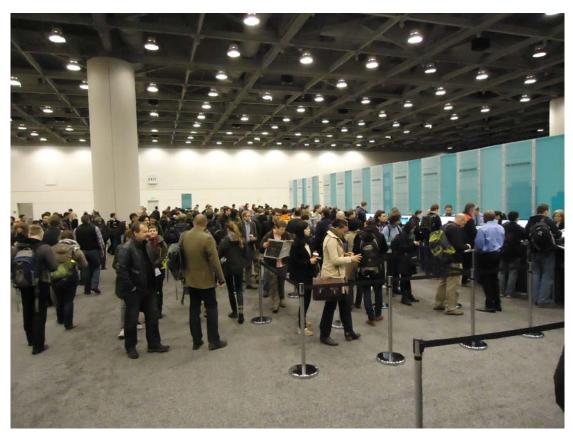


圖 2.2、大會報到處與領取會議識別證的排隊人潮。



圖 2.3、大會議程的第一日報紙。

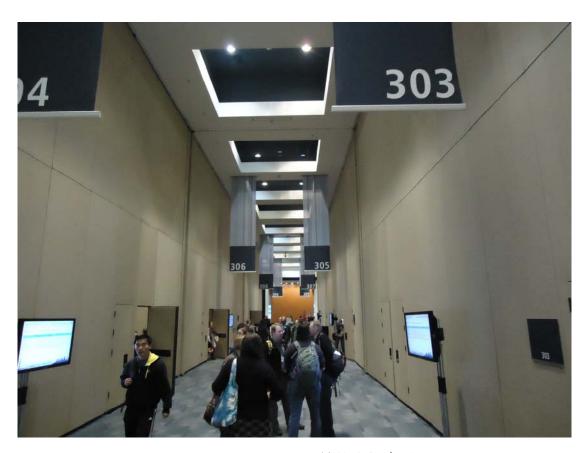


圖 2.4、Moscone South 三樓的幾個會議室。



圖 2.5、Moscone South 三樓的會議室。

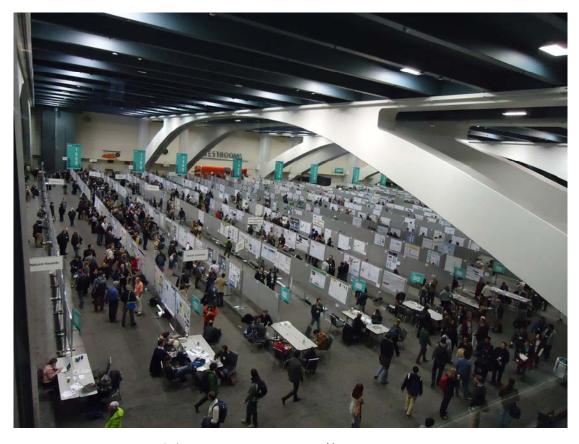


圖 2.6、Moscone South 的 Post Hall。

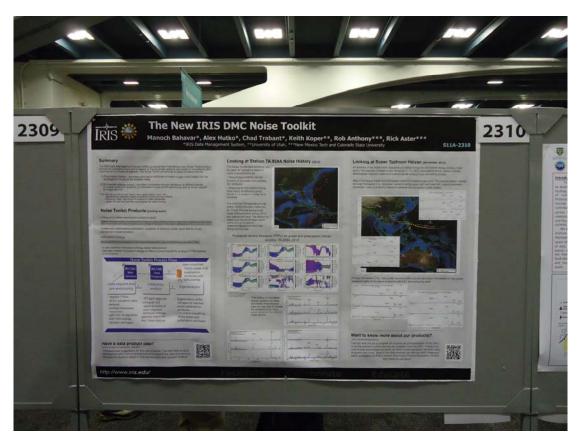


圖 2.7、與會海報 I。



圖 2.8、與會海報 II。

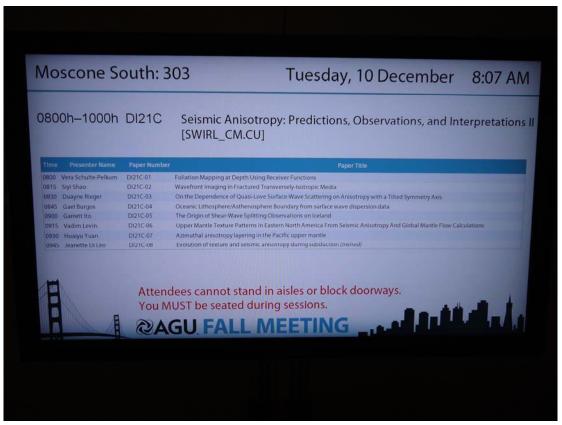


圖 2.9、第二日的部分議程。

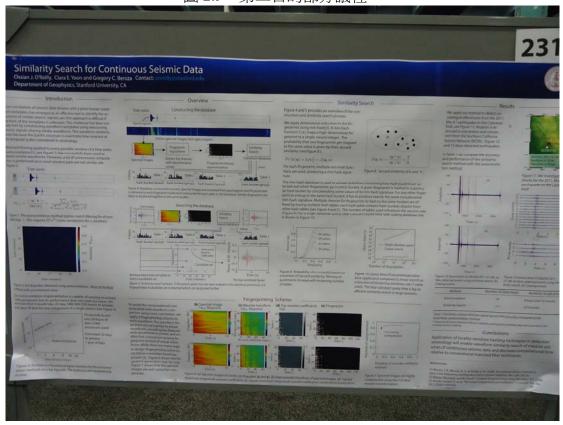


圖 2.10、與會海報 III。

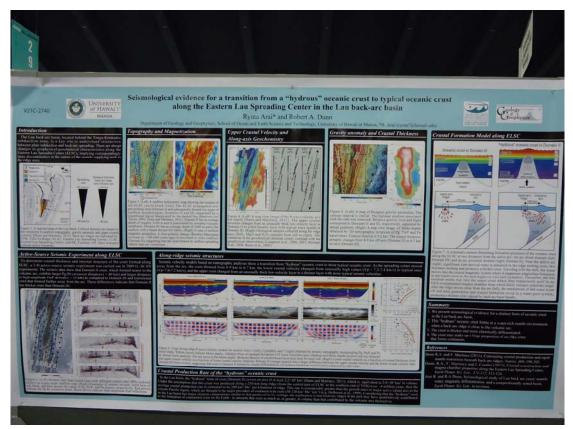


圖 2.11、與會海報 IV。



圖 2.12、會議在下午的中場休息。

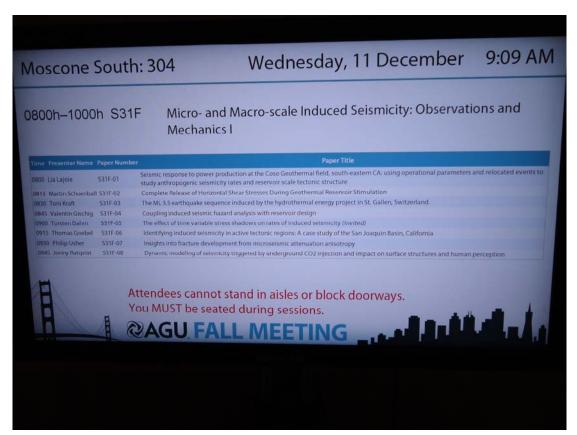


圖 2.13、第三日的議程表。

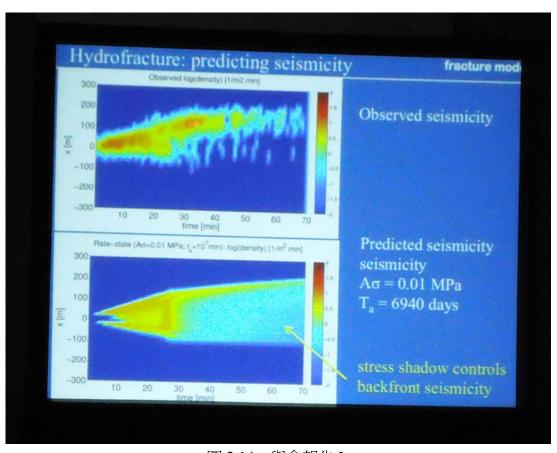


圖 2.14、與會報告 I。

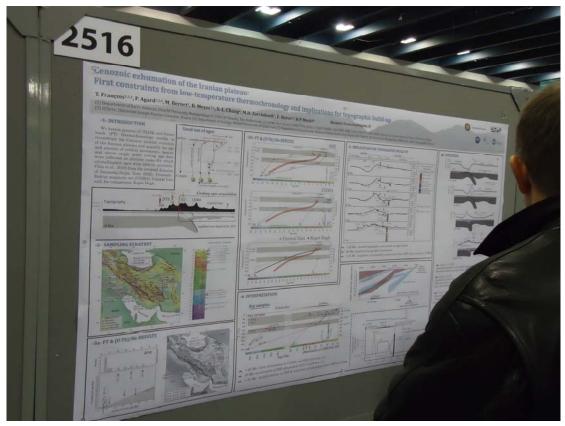


圖 2.15、與會海報 V。

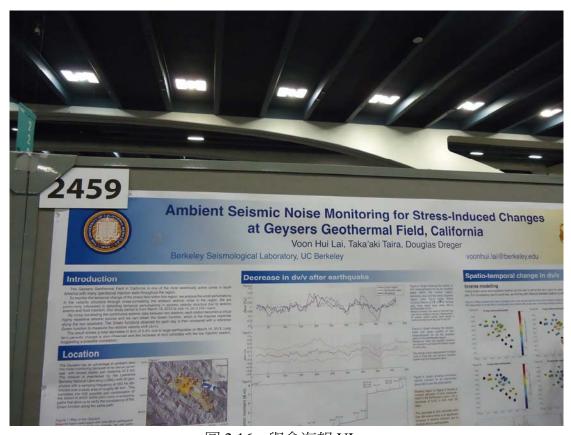


圖 2.16、與會海報 VI。

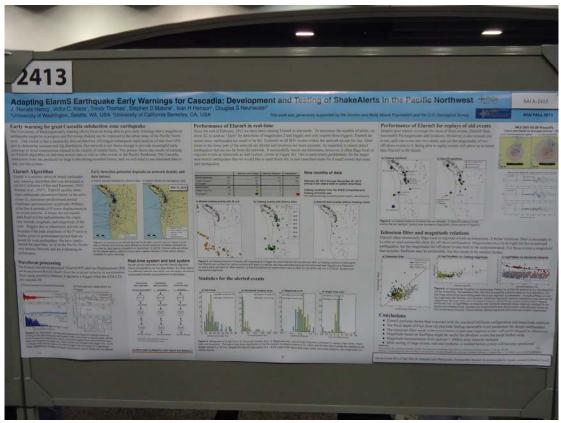


圖 2.17、與會海報 VII。

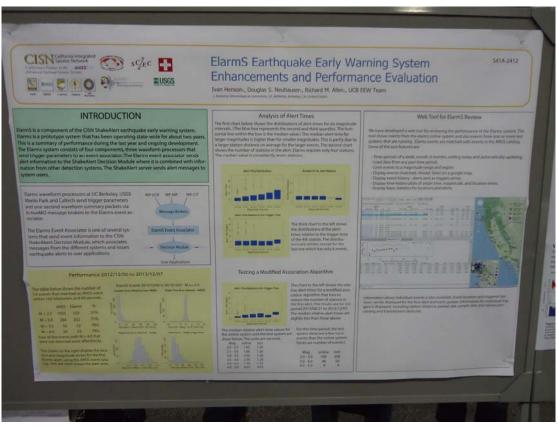


圖 2.18、與會海報 VIII。

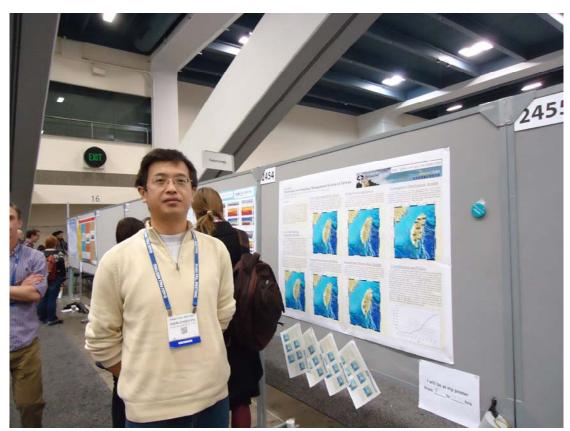


圖 2.19、本人與本人的海報之合照。

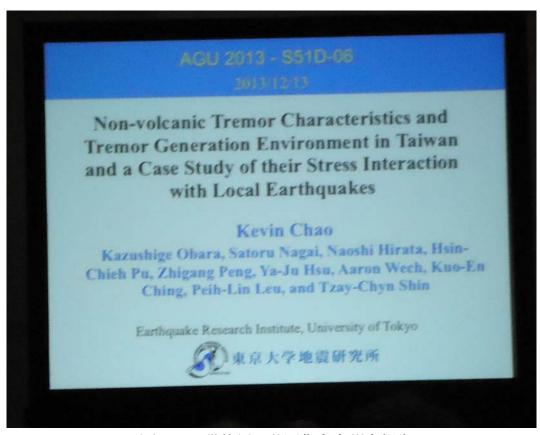


圖 2.20、職的另一共同作者之研究報告。

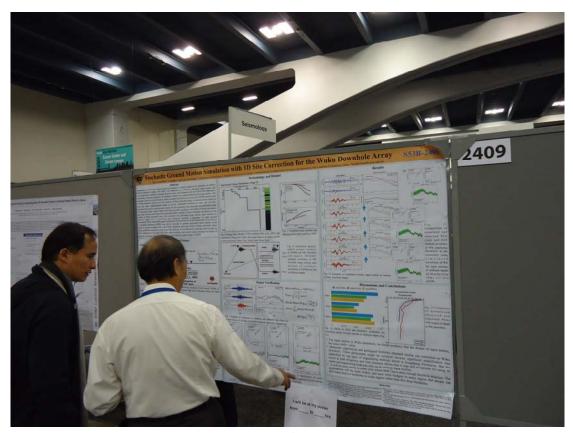


圖 2.21、與會海報 IX。

## 三、心 得

職有機會參加 2013 年的 AGU 秋季會議,感到十分的興奮。畢竟此會議的 規模盛大,參加的研究學者也眾多。因此,職能藉此機會了解現在主要的科學 議題,甚至是與他們討論和互動,收獲豐碩。

就會議的本質來看,誠如過程所述,每日的議程都十分豐富,不管是十分專精於某一研究方向的專業人士,或是研究範疇涉獵較廣研究學者,在這樣的會議中,皆可有相當的收穫。以本人來說,由於研究主題多以觀測現象的解釋爲主。因此,利用這種機會,多方面接觸各種研究,增加知識,對於未來解釋各種觀測現象是十分有利。

由於此會議在國際間具有相當的影響力,因此,才會有如此多的專業人士,選擇在此會議中發表其研究結果。事實上,職於 2010 年時亦曾參與過這個會議。與當時比較,除了近年來有增加手機的 APP 程式,方便與會人士查詢議程外,會議的本質差異並不大。感覺比較強烈的,倒是其參加會議的各項費用,皆有明顯的提高,從會議的論文投稿費到會議的註冊費皆是,累積增加的支出較 2010 年多了有近 70 美元。雖然會議有對某些地區的與會人士有補助,但臺灣並不在其中。由於其費用偏高(以 2013 年來計,投稿費與註冊費合計 495 美元),費用部分可說是此會議的一大缺點。

相較於 AGU 的秋季會議,臺灣每年皆有舉辦的地球物理或地質年會就相對 友善多了。雖然臺灣自行舉辦的會議,內容和規模皆難以與 AGU 秋季會議相提 並論。但會議的形式,其實差異不大。相反的,臺灣的學術研究會,註冊費與 餐點之提供,皆優於 AGU。因此,如果經費不足的研究人員或是學生,本人十 分建議其可以試著先多參與國內的會議。

另一方面,此次參加會議時,發現到2013年的AGU,有很濃的中國味。在2010年時的AGU,雖然與會的人士中也有不少中國人。但這次(2013年)的會議,感覺更強烈。除了一般的研究人員外,還有不少年紀較輕的研究生參與其中。也許是近年來大陸的經濟愈來愈好,研究生參與會議的機會也增加了。

就研究方面的心得來看,國際上,其它提供觀測資料的單位,如 USGS 和 IRIS 等,它們有更完善的網頁介面可提供給使用者,本局若也有意朝類似的方

向前進的話。那麼,未來若能與其接觸與合作,也許可以使本局的 GDMS 在國際上的能見度更高。當然,在資料的提供上,除了原始的觀測資料外,也可仿照它們的模式,提供一些加工的資料,如頻譜特性或地震走時圖等。讓使用者能更方便快速的獲得資訊,以評估再進一步分析的可行性。

與會的那幾天,看到了一些新的研究類型和方向。例如:地震資料除了觀測地震所產生的訊號外,也有不少研究以地震儀對大氣現象進行追蹤;以地動(tremor)的觀測,探討地下構造的活動性,甚至是探尋其與地震前兆的關係;還有自動化地震監測的研究,可以大量節省人工與增加研究效率等。事實上,會議中還有很多有趣和前端的研究,職難以盡述,但在其中,最大的感想便是,國際研討會是快速獲取最新技術資訊非常好的場所。

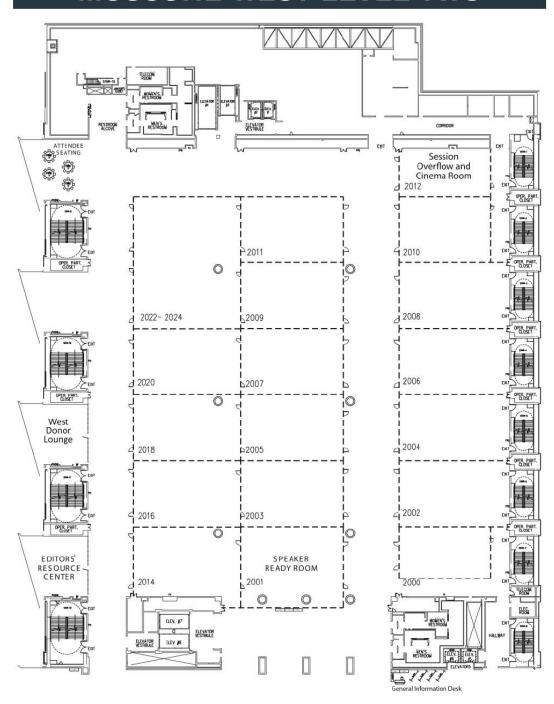
### 四、建議事項

職在參與完這次會議後,感覺受益良多,尤其在新知識的增廣部分。有了 更多的知識背景與見聞之後,相信對於未來的研究工作,勢必有相當之助益。 以下即爲本人參加 2013 年的 AGU 秋季會議後的幾點建議:

- 此種類型的國際研討會,提供一個平台,讓世界各地的研究人員得以有交流的機會。未來,如果本局的工作業務欲與世界接軌,在經費允許下,十分建議可以善加利用這種國際研討會的機會,吸取新知與交流。
- 2. 本局的 GDMS 系統設計之初衷爲分享觀測資料,由於此介面與程式的撰寫皆由本局同仁自行開發,甚是辛苦。未來,若能與其他有經驗的單位合作,不但有機會可以減少本局同仁的工作量,同時,亦有機會可以吸取他人之相關經驗。
- 3. 由於臺灣位在地震發生的頻繁區內,而本局的任務,就是觀測臺灣地區的地震活動,目前已觀測到的地震資料量極爲廣大;未來,可想而知,隨著觀測品質的提高,觀測量只會愈來愈多。因此,未來朝向半自動或全自動化的地震監測工作,應該是避免不了的。所以,建議本局可以開始逐步接觸相關於地震監測自動化的研究工作。

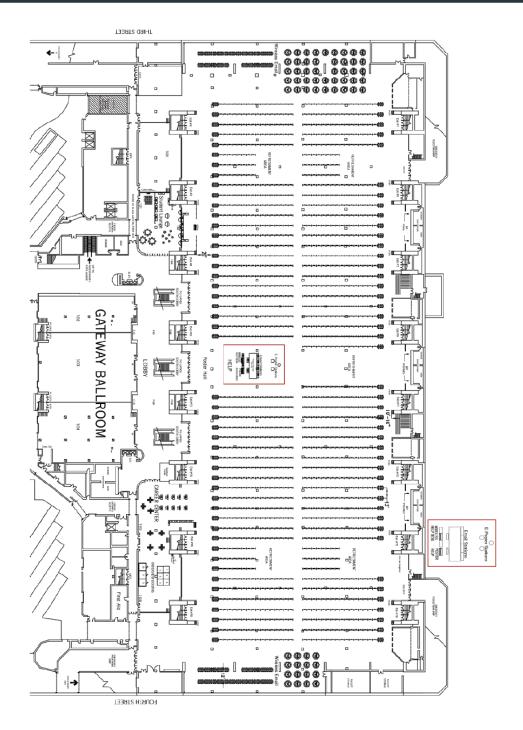
## 附錄、研討會場地與議程

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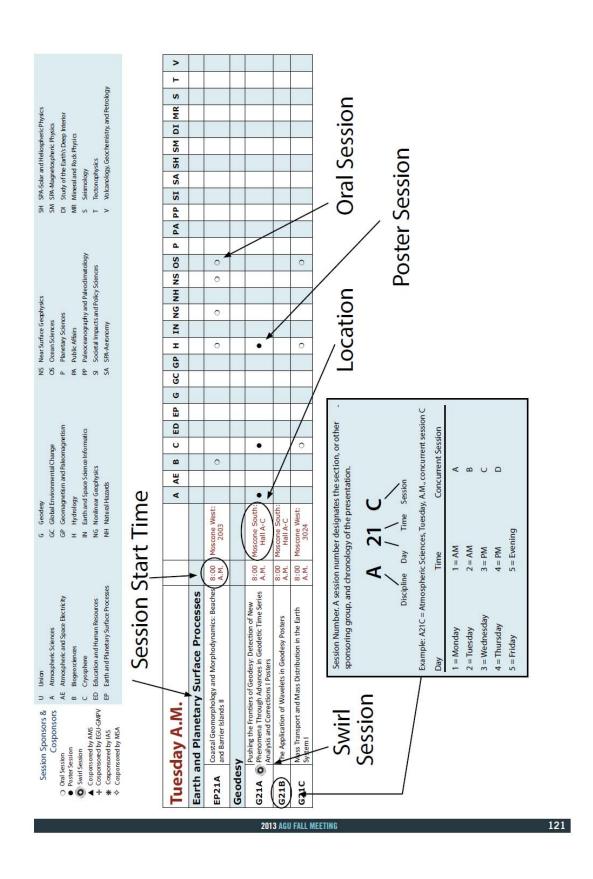


2013 AGU FALL MEETING 77

# **MOSCONE SOUTH POSTER HALL**



82 2013 AGU FALL MEETING



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SH11B	Voyager Leaves th	Voyager Leaves the Heliosphere? I Posters	8:00 A.M.	Moscone South: Hall A-C																								
SH11C	Solar and Heliosph Solar Wind	Solar and Heliospheric Physics General Contributions I: Solar Wind	8:00 A.M.	Moscone West: 2009																								
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SM11B	Probing Magnetos Measurements an	Probing Magnetospheric Dynamics With Multipoint Measurements and Simulations I Posters	8:00 A.M.	Moscone South: Hall A-C																								
SM11C	Asymmetric Magn	Asymmetric Magnetic Reconnection I	8:00 A.M.	Moscone West: 2016																			0					
SM11D	Case Studies in Storm-Time Electro sphere-Thermosphere Response I	Case Studies in Storm-Time Electrodynamics and Iono- sphere-Thermosphere Response I	8:00 A.M.	Moscone West: 2005				is.							ja .							0						
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2013 AGU FALL MEETING

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T11C	Deep Exploration Into the Lithosphere II Posters	8:00 I A.M.	Moscone South: Hall A-C																		•				
T11D	The Pacific-North America Plate Boundary Through Time: Translation, Rotation, Erosion, and 4-D Strain I Posters	8:00 A.M.	Moscone South: Hall A-C				•	•															•		
T11E	Circum-Arctic Lithospheric Evolution I	8:00 I A.M.	Moscone South: 302																		0				0
T11F	Continental Rifts and Rifted Margins I	8:00 I A.M.	Moscone South: 304																				0		0
Volcanol	Volcanology, Geochemistry, and Petrology																								
V11A	Fluids in Slabs: Chemical and Physical Studies of Volatile-Bearing Minerals in Subduction Zones I ▲ ❖	8:00 I	Moscone South: 310																		0	0		0	
V11B	Geochronology, Correlation, and Climatic Significance of Widespread Volcanic Ash Layers I +	8:00 A.M.	8:00 Moscone South: A.M. 306	0					0				0				0								
V11C	Ocean Islands and Large Igneous Provinces I	8:00 A.M.	8:00 Moscone South: A.M. 303												)	0					0				
V11D	Volcanism in California: Geophysics, Geology, and Geochemistry of the Young and the Restless I	8:00 A.M.	8:00 Moscone South: A.M. 308																						
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A12A @	© Climate Sensitivity and Feedbacks: Advances and New Paradigms II ▲	10:20 A.M.	Moscone West: 3010		0	0	9	0	0		0	0			0		0								
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A12C 💿	Remote Sensing of CO2 and CH4: From Missions to Science—Geostationary Observations II ▲	10:20 A.M.	Moscone West: 3006		0		5	0	0																
A12D	Tropical and Midlatitude Convective Storm Systems and Their Roles in Weather and Climate II ▲	10:20 A.M.	Moscone West: 3012	0																					
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AE12A	Lightning and Atmospheric Electricity in Thunderstorms II	10:20 A.M.	Moscone West: 3004	0															0						
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B12A	Biosphere-Atmosphere Greenhouse Gas Fluxes in Terrestrial Ecosystems II			0							0														
B12B	Carbon Transformations in Hydrothermal Systems I	10:20 A.M.													0							0			0
B12C	Emerging Frontiers in Biogeosciences II		Moscone West: 2006	0																					
B12D @	(3) Vulnerability of Permafrost Carbon to Climate Change I	10:20 A.M.	Moscone West: 2004			0																			
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C12A	Physical and Chemical Air-Snow-Ice Interactions: From the Micro to the Global Scale II	10:20 A.M.	Moscone West: 3005	0																					

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IN12A	Data Curation, Credibility, Preservation Implementation, and Data Rescue to Enable Multisource Science II	10:20 A.M.	Moscone West: 2020				0																					
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P12A	Atmospheric Escape, Upper Atmospheres, Ionospheres, and Plasma Interactions at Mars and Venus I	10:20 A.M.	Moscone West: 2007	0																								
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<b>Public Affairs</b>	ffairs																											
PA12A	Assessing Socioeconomic Benefits of Earth Observation Science I (Virtual Option)	10:20 A.M.	Moscone West: 3002																	0								
Paleoce	Paleoceanography and Paleoclimatology																											
PP12A	Beyond the Last Glacial Period: Characteristics, Impacts, and Forcing of Millennial-Scale Climate Variability II	10:20 A.M.	Moscone West: 2008																									
PP128 0	Sensitivity of Peatland Carbon Balance to Climate Change: Past and Future II	10:20 A.M.	Moscone West: 2010			0				0																		
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SPA-Ma	SPA-Magnetospheric Physics																											
SM12A	General Contributions: Magnetic Reconnection and Waves/Instabilities I	10:20 A.M.	Moscone West: 2016																									
SM12B	Magnetospheres Throughout the Solar System II	10:20 A.M.	Moscone West: 2018														0											
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Session Sponsors & Cosponsors Oral session Oral session  • Proster-Session • Proster-Session • A Cosponsored by EGU-GMPV  * Cosponsored by BMS  Cosponsored by MSA  Cosponsored by MSA	Monday P.M.	Probing Magnetospheric Dynamic Measurements and Simulations II	Study of Earth's Deep Interior	Linking the Earth's paring Predictions	Mineral and Rock Physics	Advances in Rock Physics and Faults to Reservoirs I Posters	Planetary Impacts a Theory I	ogy	Progress in the Res and 2013 Ms7.0 Lu	Seismology General Contributions II	Seismology Contrib	physics	Characterization of Posters	Circum-Arctic Litho	Seismology, Active South and East Asia	Seismology, Active South and East Asia	Seismology, Active Tectonics, and Gec South and East Asia III: Japan Posters	Continent-Continent Suturing II	Continental Rifts an	Deep Exploration Ir	logy, Geochen	
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V13B	Deep Crustal Processes in Magmatic Arcs II Posters	1:40 P.M.	Moscone South: Hall A-C																				•	
V13C	Fluids in Slabs: Chemical and Physical Studies of Volatile-Bearing Minerals in Subduction Zones II Posters	1:40 P.M.	Moscone South: Hall A-C																		•	•	•	
V13D	Geochronology, Correlation, and Climatic Significance of Widespread Volcanic Ash Layers II Posters +	1:40 P.M.	Moscone South: Hall A-C	•					•	_			•					•						
V13E	Mechanisms of Magma Ascent and Emplacement II Posters →	1:40 P.M.	Moscone South: Hall A-C					•					•									•	•	
V13F	Ocean Islands and Large Igneous Provinces III Posters	1:40 P.M.	Moscone South: Hall A-C													•					•			
V13G	Volcanism in California: Geophysics, Geology, and Geochemistry of the Young and the Restless II Posters	1:40 P.M.	Moscone South: Hall A-C							_														
<b>V</b> 13Н	Investigating Volcanic Conduits and Related Processes Through Experiments, Numerical Modelling and Observations I +	1:40 P.M.	Moscone South: 308																					
V13I	Tectonics and Magmatism in the Alaska-Aleutian, Cascadia, and Taupo-Tonga Subduction Systems I ♦ +	1:40 P.M.	Moscone South: 310												0								0	
Atmosph	Atmospheric Sciences																							
A14A	Emissions and Impacts of Short-lived Climate Forcers III ▲	4:00 P.M.	Moscone West: 3004		0			0	0					0				0	0					
A14B @	From Air Pollution to Climate Changes in Asia IV ▲	4:00 P.M.	Moscone West: 3008		0			0	0		0			0				O	0					
A14C 💿	Marine Trace Gases and Aerosols II ▲	4:00 P.M.	Moscone West: 3010																					
A14D	Research on Improving Weather Prediction for Mountain Terrain III	4:00 P.M.	Moscone West: 3012		0	0		0	0		0	0												
A14E	Weather-Driven Renewable Energy II ▲	4:00 P.M.	Moscone West: 3006		0			0	0		0	0			0		0	O	0					
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B14A	Climatic Controls on Net Ecosystem Exchange (NEE) I	4:00 P.M.	Moscone West: 2002	0																				
B14B	Geomicrobiology of Fe and Mn I	4:00 P.M.	Moscone West: 2006																			0		
B14C	N <sub>2</sub> O Fluxes and the Role in Carbon and Nitrogen Cycles: Processes, Measurement, and Modeling II	4:00 P.M.	Moscone West: 2003	0					0															
B14D	Scaling Ecosystem Observations Through Space and Time II	4:00 P.M.	Moscone West: 2000						0															
B14E @	Vulnerability of Permafrost Carbon to Climate Change III	4:00 P.M.	Moscone West: 2004			0																		
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C14A	Himalayan Glacier Dynamics II (Virtual Option)	4:00 P.M.	Moscone South: 104	0				0	0		0		0											
C14B	Remote Sensing of the Cryosphere III: Microwave Applications	4:00 P.M.	Moscone West: 3005					0			0													

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V21B	Investigating Volcanic Conduits and Related Processes Through Experiments, Numerical Modelling and Observations III Posters +	8:00 A.M.	Moscone South: Hall A-C																								
V21C	Tectonics and Magmatism in the Alaska-Aleutian, Cascadia, and Taupo-Tonga Subduction Systems III Posters $+\!$	8:00 A.M.	Moscone South: Hall A-C													•										•	
V21D @	Volcanic Flows, Blows, and the Atmosphere: Effusive-Ex- plosive Eruption Dynamics and Ash Cloud Processes I (Virtual Option) +	8:00 A.M.	Moscone South:	0										0													
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U22A	IPCC Climate Change 2013: Assessment of the Future — Future of the Assessment (Virtual Option)	10:20 A.M.	Moscone South: 102																								
U22B	Your Science Can Make a Difference. Are You Up for It? - AGU's Thriving Earth Exchange	10:20 A.M.	Moscone West: 3020																								
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A22A	Bjerknes Lecture (Virtual Option)	10:20 A.M.	Moscone West: 2022																								
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AE22A	Global Connections in Earth's Atmosphere-Electrical System I	10:20 A.M.	Moscone West: 3004	0						0											O						
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B22A	Carbon Cycle on Arid Lands in the Changing World: Biotic and Abiotic Processes I	10:20 A.M.	Moscone West: 2002							0																	
B22B	Deep Biosphere Research: Presence, Diversity, and Activity of Microbes II	10:20 A.M.	Moscone West: 2006																								
B22C	Dynamics of Global Forests Under a Changing Climate I	10:20 A.M.	Moscone West: 2000							0										0							
B22D	Soil Change and Soil Organic Matter Dynamics in the Anthropocene I	10:20 A.M.	Moscone West: 2004							0														0			
B22E	Dynamics of the Interaction Between Microbes and Environment Under Changes: Characterization, Adaptation, Control, and Selection I	10:20 A.M.	Moscone West: 3014								J	0															
B22F	Windows Into to the Deep Subsurface Biosphere: Coupled Geochemical and Biological Investigations of Terrestrial Hot Spring Ecosystems I	10:20 A.M.	Moscone West: 3011																								0
B22G (0)	Biosphere-Atmosphere Exchange, Biosynthesis, and Oxidation of Volatile Organic Compounds Across Terrestrial and Marine Ecosystems I	10:20 A.M.	Moscone West: 3012																								
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C22A	Climate Change and Cryospheric Systems II	10:20 A.M.	Moscone West: 3005							0									0								
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0S22B	Regime Changes in Estuarine and Coastal Systems II	10:20 A.M.	Moscone West: 3009																								
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P22A @	Characterizing Small Solar System Bodies I	10:20 A.M.	Moscone West: 2007														0										
P22B	Using Topography to Investigate the Evolution of Solar System Bodies I	10:20 A.M.	Moscone West: 2005					0																			
Public Affairs	fairs																										
PA22A	Improving Public Access to Science Research I	10:20 A.M.	Moscone West: 3016	0	0	0 0	0	0	0	0	0	0 0	0	0	0	0	0		0	0	0	0	0 0	0	0	0	0
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PP22A	Reconstructing Past Carbon Cycle Perturbations: Novel Developments and Applications II	10:20 A.M.	Moscone West: 2008			0				0						0											
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SA22A	Vertical Coupling and the Disturbance of the Winter Polar Atmosphere II	10:20 A.M.	Moscone West: 2011	0																							
SPA-Sola	SPA-Solar and Heliospheric Physics																										
SH22A	Exploring the Interstellar Medium Affected by the Heliosphere I	10:20 A.M.	Moscone West: 2009														0										
SPA-Mag	c Physics																										
SM22A	Aurora Dynamics and Applications II	10:20 A.M.	Moscone West: 2016																		0						
SM22B	Buildup and Dynamics of Ring Current and Radiation Belts at Earth I	10:20 A.M.	Moscone West: 2018																								
Study of	Study of Earth's Deep Interior																										
DI22A 💿	Seismic Anisotropy: Predictions, Observations, and Interpretations III	10:20 A.M.	10:20 Moscone South: A.M. 303																					0	0	0	0
Mineral a	Mineral and Rock Physics																										
MR22A0	Mechanisms of Mineral Carbonation, Hydration, and Oxidation, With Potential Applications Including Carbon Capture and Storage I	10:20 A.M.	10:20 Moscone South: A.M. 301							0		0															0
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S22A	Seismology Contributions: Seismicity IV	10:20 A.M.	Moscone South: 307											0	0								0			0	0
S22B 0	Advances in Seismic Imaging: Toward Integrated Geo- Models on All Scales—Theory II	10:20 A.M.	10:20 Moscone South: A.M. 305									0	_										0			0	
Tectonophysics	physics																										
T22A	Cratonic Lithosphere and Dynamics: What Can Present-Day Cratonic Structure Tell Us About Craton Formation and Evolution? II	10:20 A.M.	10:20 Moscone South: A.M. 306																				0	_	0		0
T22B	Earthquake Recurrence Revisited: New Insights From Paleoseismic and Geomorphic Investigations II	10:20 A.M.	10:20 Moscone South: A.M. 308											0											0		
T22C	Investigating Marine Records of Climate-Tectonic Interactions in Active Orogens: Southern Alaska and Other Convergent Margins I	10:20 A.M.	10:20 Moscone South: A.M. 310					0								0											
T22D	New Views on Strike-Slip Fault Zones II	10:20 A.M.	10:20 Moscone South: A.M. 302						0					0											0		

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PP23B	Reconstructing Past Carbon Cycle Perturbations: Novel Developments and Applications III Posters	1:40 P.M.	Moscone South: Hall A-C		_	•				•						•									
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PP23D 0	Gimate Variability From Multiple Reconstructions I	1:40 P.M.	Moscone West: 2010							0															
SPA-Aeronomy	nomy																								
SA23A	Vertical Coupling and the Disturbance of the Winter Polar Atmosphere III Posters	1:40 P.M.	1:40 Moscone South: P.M. Hall A-C	•																					
SA23B	heric Modification and	1:40 P.M.	Moscone West: 2011																		0				
SPA-Sola	SPA-Solar and Heliospheric Physics																								
SH23A	Coupling the Multiphysics of the Heliosphere From the Deep Interior to the Corona: Observations, Modeling and Data Assimilation II Posters	1:40 P.M.	Moscone South: Hall A-C																						
SH23B	First Results From the Interface Region Imaging Spectrograph (IRIS) II Posters	1:40 P.M.	_																						
SH23C	IBEX and the Evolving 3-D Heliosphere II Posters	1:40 P.M.	Moscone South: Hall A-C																						
SH23D	Solar Events and Their Earth Connection During the Ascending Phase of Solar Cycle 24 I	1:40 P.M.	Moscone West: 2009																		*				
SPA-Mag	SPA-Magnetospheric Physics																								
SM23A	Aurora Dynamics and Applications III Posters	1:40 P.M.	Moscone South: Hall A-C																	•					
SM23B	Bow Shock, Magnetosheath, and Magnetopause Processes I	1:40 P.M.	Moscone West: 2016														*								
SM23C	Buildup and Dynamics of Ring Current and Radiation Belts at Earth II	1:40 P.M.	Moscone West: 2018																						
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DI23A ©	DI23A © Probing the Earth's Interior I Posters	1:40 P.M.	Moscone South: Hall A-C							•													•		•
DI23B.6	DI23B© Geophysical Observations and Models of Subduction I	1:40 P.M.	Moscone South: 303																				0	0 0	0
Mineral a	Mineral and Rock Physics																								
MR23A6	Computational Advances and Applications in Mineral Physics I Posters	1:40 P.M.	Moscone South: Hall A-C									•										•			
MR23B	Planetary Impacts and Interiors From Experiments and Theory III Posters	1:40 P.M.	Moscone South: Hall A-C														•					•			•
MR23C	Physics and Rock Mechanics—From rs II—Flow	1:40 P.M.	Moscone South: 301																			0		0	0
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S23A 💿	Advances in Seismic Imaging: Toward Integrated Geo- Models on All Scales—Shallow/Industry III Posters	1:40 P.M.										•										•		•	
S23B		1:40 P.M.	Moscone South: Hall A-C																						
S23C	A Decade of EarthScope Advances in Research, Infrastructure, and Education II	1:40 P.M.	Moscone South: 305				0	0	0		0	0		0								0		0	0
S23D 0	Advances in Nuclear Test Monitoring From Multiple Technologies II	1:40 P.M.	Moscone South: 307	0	0			0			0		0		0	0									

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SH24A Sc	Solar Energetic Particles During the Weak Solar Cycle 24 I	4:00 P.M.	Moscone West: 2009																								
SPA-Magne	SPA-Magnetospheric Physics																										
SM24A Pr	Bow Shock, Magnetosheath, and Magnetopause Processes II	4:00 P.M.	Moscone West: 2016														0										
SM24B B	Buildup and Dynamics of Ring Current and Radiation Belts at Earth III	4:00 P.M.	Moscone West: 2018																								
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DI24A 6	DI24A. Geophysical Observations and Models of Subduction II	4:00 P.M.	Moscone South: 303																					0	0	0	0
Mineral and	Mineral and Rock Physics																										
MR24A FE	Advances in Rock Physics and Rock Mechanics: From Faults to Reservoirs III: Reservoirs	4:00 I	Moscone South: 301																				0	0		0	0
Ω MR24B tu N	Constraints and Uncertainties on the Composition, Structure, and bynamics of the Earth's Lithosphere, Upper Mantle, and Transition Zone From Multidisciplinary Studies I	4:00 P.M.	Moscone West: 2005								0						0						0	0	0	0	0
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T24C Sc	Seismology, Active Tectonics, and Geomorphology in South and East Asia VII: Geomorphology	4:00 I	Moscone South: 304					0																	0		
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V24A "	Melting and Melt-Rock Reaction From Source to Surface Ⅱ 十	4:00 P.M.	Moscone South: 310																				0	0			
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V24C E	Exsolution, Degassing, and Regassing of Magmatic Volatiles II	4:00 I	Moscone South: 308																								
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A31A N	Fast Physics in Climate Models and Cloud-Resolving Models: Parameterization, Evaluation, and Observation Posters ▲	8:00 A.M.	Moscone South: Hall A-C					•		•			•														

Wed	Wednesday A.M.			4	AE	8	C	ED EP	U	9	GP	I	Z	IN NG NH NS	Z	so s	۵.	РА	ЬР	SI	SA	S H	SA SH SM DI	MR	v	T	>
Mineral	Mineral and Rock Physics																										
MR31A	Advanced Techniques for Experimental Geophysics and Mineralogy I Posters	8:00 A.M.	Moscone South: Hall A-C																				•			•	•
MR31B	Constraints and Uncertainties on the Composition, Structure, and Dynamics of the Earth's Lithosphere, Upper Mantle, and Transition Zone From Multidisciplinary Studies II	8:00 A.M.	Moscone West: 2007								0						0						0		0	0	0
Seismology	ÁBC																										
S31A	Constraints on Lithosphere-Asthenosphere Coupling Using Seismic and Geodetic Techniques Posters	8:00 A.M.	Moscone South: Hall A-C																				•			•	
S31B	Nonseismology Seismology: Diverse Non-Earth Applications of Seismological Techniques Posters	8:00 A.M.	Moscone South: Hall A-C				•			•				•	•												
S31C	Seismology Contributions: Constraining Crustal Structure I Posters	8:00 A.M.	Moscone South: Hall A-C																								
S31D ©		8:00 A.M.	Moscone South: 305										0										0			0	
S31E	Characterization and Modeling for Nuclear Test Monitoring and Verification I	8:00 A.M.	Moscone South: 307												0					0						0	
S31F	Microscale- and Macroscale- Induced Seismicity: Observations and Mechanics I	8:00 A.M.	Moscone South: 304											0	_									0			
Tectonophysics	physics																										
T31A	Evolution of the Northern Tibetan Plateau: Lithospheric Geodynamics, Plateau Uplift, and Links to Climate Change I Posters	8:00 A.M.	Moscone South: Hall A-C					•																			
T31B	Evolution of the Northern Tibetan Plateau: Lithospheric Geodynamics, Plateau Uplift, and Links to Climate Change II Posters	8:00 A.M.	Moscone South: Hall A-C					•																			
T31C @		8:00 A.M.	Moscone South: Hall A-C						•														•	_	•		
T31D	Innovative Approaches to Constraining Lithospheric Deformation in Space and Time I Posters	8:00 A.M.	Moscone South: Hall A-C					•																			•
T31E	Neotectonics and Earthquake Potential of the Eastern Mediterranean Region II Posters	8:00 A.M.	Moscone South: Hall A-C																						•		
T31F	Recent IODP Investigations of Circum-Pacific Subduction Zones I Posters	8:00 A.M.	Moscone South: Hall A-C									•		•		•							•	•	•		
T31G	Recent IODP Investigations of Circum-Pacific Subduction Zones II Posters	8:00 A.M.	Moscone South: Hall A-C									•		•		•							•	•	•		
Volcanol	Volcanology, Geochemistry, and Petrology																										
V31A	Melting and Melt-Rock Reaction From Source to Surface III Posters +	8:00 A.M.	Moscone South: Hall A-C																				•	•			
V31B	Exsolution, Degassing, and Regassing of Magmatic Volatiles III Posters	8:00 A.M.																									
V31C	From Magmas to Ore Deposits: Tracking the Transition I	8:00 A.M.	Moscone South: 310																								
V31D @	Geochemistry of Geologic Carbon Sequestration: Miner-	8:00 A.M.										0												0			
V31E	The Early Earth II	8:00 A.M.	Moscone South: 306								0						0						0	0		0	0
V31F	Permian-Triassic Environmental and Climatic Extremes and Biotic Responses I	8:00 A.M.	Moscone South: 302	0		0										0			0							0	0

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		8:00 A.M.		10:20 A.M.		10:20 A.M.	10:20 A.M.	10:20 A.M.	10:20 A.M.	10:20 A.M.		10:20 A.M.		10:20 A.M.	10:20 A.M.	10:20 A.M.	10:20 A.M.		10:20 A.M.		10:20 A.M.		10:20 A.M.
2 U Union 2 A Atmospheric Sciences AE Atmospheric and Space Electricity B Blogeoxcences C Cryosphere C Cryosphere Py ED Education and Human Resources EP Earth and Planetary Surface Processes	A.M.	Volcanic Flows, Blows, and the Atmosphere: Effusive-Explosive Eruption Dynamics and Ash Cloud Processes III +		Water, Energy, and Food Security in a Changing World: Finding Solutions Through Integration of Physical and Social Sciences	S	Fingerprinting Sources and Transformation of Sulfate Aerosol Using Sulfur and Oxygen Isotopes▲	New Atmospheric Sciences Fellows Presentations (Virtual Option)	The Southern Ocean: Clouds, Aerosols, and the Air-Sea Interface I	Understanding Emissions of Air Pollutants and Greenhouse Gases in China I	Advances in Atmospheric Inverse Modeling of Land-Atmosphere Exchange Processes I ▲	ce Electricity	Lightning Effects on the Near-Earth Space Environment and Lightning Production of NOx II		Carbon Cycling in Coastal Wetlands: From Microscale to Macroscale I	Land Use and Climate Change Impacts on Water-Related Ecosystem Services I	and Microbial Effects on Organic old Ecosystems I	Novel Approaches for Considering Future Vegetation Distributions I		Climate Change and Cryospheric Systems IV		Climate Literacy: Impacts, Evidence, and Best Practices From Research and Evaluation I (Virtual Option)		Biophysical Interactions in Rivers: Restoration and Management II
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0 • • 4 + * ♦	We	V31G	Union	U32A	Atmos	A32A	A32B	A32C	A32D	A32E	Atmos	AE32A	Bioge	B32A	B32B	B32C	B32D	Cryosphere	C32A	Education	ED32A	Earth	EP32A

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Dynamic	Processes	Dynamic Processes in Mars's Atmosphere I	10:20 A.M.	Moscone West: 2007	0																					
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Emiliani L	ecture (Vi	Emiliani Lecture (Virtual Option)	10:20 A.M.	10:20 Moscone South: A.M. 103																						
SPA-Aeronomy																										
Aeronom Max I	y Near the	Aeronomy Near the Turbopause From Solar Min to Solar Max I	10:20 A.M.	Moscone West: 2011																						
r and H	eliosph	SPA-Solar and Heliospheric Physics																								
Coronal	Heating an	Coronal Heating and Solar Wind Acceleration: Theory, Observations, and Simulations II	10:20 A.M.	Moscone West: 2016																		0	_			
Seed Pop Energetic	ulations, /	Seed Populations, Acceleration, and Transport of Solar Energetic Particles From the Low Corona II	10:20 A.M.	Moscone West: 2009																						
netospl	SPA-Magnetospheric Physics	ysics																								
Integrat Inner M	Integrating Theories and Inner Magnetosphere II	Integrating Theories and Observations of the Earth's Inner Magnetosphere II	10:20 A.M.	Moscone West: 2018																						
Earth's	Study of Earth's Deep Interior	nterior																								
Multidis Mantle	Multidisciplinary Constra Mantle Heterogeneities I	Multidisciplinary Constraints on the Nature and Scale of Mantle Heterogeneities I	10:20 A.M.	10:20 Moscone South: A.M. 303																				0	0	0
nd Roc	Mineral and Rock Physics	S																								
Fluids a	Fluids and Melts in the Ea Core-Mantle Boundaries I	Fluids and Melts in the Earth's Interior: From Crust to Core-Mantle Boundaries I	10:20 A.M.	Moscone South: 301																			0			0
Seismology																										
Seismol	ogy Contrib	Seismology Contributions: Megaearthquakes I	10:20 A.M.	10:20 Moscone South: A.M. 307						0					0								0			0
Advance Models	ss in Seismi on All Scale	Advances in Seismic Imaging: Toward Integrated Geo- Models on All Scales—Shallow V	10:20 A.M.	10:20 Moscone South: A.M. 305									0										0			0
Microso vations	Microscale- and Macrosc vations and Mechanics II	Microscale- and Macroscale- Induced Seismicity: Observations and Mechanics II	10:20 A.M.	10:20 Moscone South: A.M. 304											0									0		
gy, Ge	ochemis	Volcanology, Geochemistry, and Petrology																								
Chemica	l Evolution	Chemical Evolution of the Earth's Mantle I ♦ +	10:20 A.M.	10:20 Moscone South: A.M. 306																			0	0	0	
Geology, mal Alte	, Geophysic ration in G	Geology, Geophysics, and Flow Modeling of Hydrothermal Alteration in Geothermal and Volcanic Systems I	10:20 A.M.	10:20 Moscone South: A.M. 310								0														
Permian and Biot	-Triassic En	Permian-Triassic Environmental and Climatic Extremes and Biotic Responses II	10:20 A.M.	10:20 Moscone South: A.M. 302															0							0

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Poster Session	Session	Biogeosciences			6			,			A		Public Affairs	.≌						2	IR Mir	MR Mineral and Rock Physics	d Rock	Physics					
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SM33B	Snapshot of Earth F Posters	Snapshot of Earth From Juno and Earth-Based Assets II Posters	1:40 P.M.	Moscone South: Hall A-C																									
<b>SM33C</b>	Integrating Theories and Inner Magnetosphere III	Integrating Theories and Observations of the Earth's Inner Magnetosphere III	1:40 P.M.	Moscone West: 2018																									
Study of	Study of Earth's Deep Interior	nterior																											
DI33A O	Geophysical Observ Posters	Geophysical Observations and Models of Subduction III Posters	1:40 P.M.	Moscone South: Hall A-C																						•	•	•	
DI33B	The Detection and Migra Earth's Interior II Posters	The Detection and Migration of Melt and Volatiles in the Earth's Interior II Posters	1:40 P.M.	Moscone South: Hall A-C											•											•	•	•	
DI33C 💿	Probing the Earth's Interior II	Interior II	1:40 P.M.	Moscone South: 303								0														0	0	0	•
Mineral a	Mineral and Rock Physics	SO																											
MR33A	Fluids and Melts in the Earth's Inte Core-Mantle Boundaries II Posters	Fluids and Melts in the Earth's Interior: From Crust to Core-Mantle Boundaries II Posters	1:40 P.M.	Moscone South: Hall A-C																					•			•	_
MR33B0			1:40 P.M.	Moscone South: Hall A-C							•		•															•	_
MR33C	Plastic and Transpo	Plastic and Transport Properties of Deep Earth Materials	1:40 P.M.	Moscone South: 301																					0		0	0	•
Seismology	λb																												
S33A 💿		Advances in Seismic Imaging: Toward Integrated Geo- Models on All Scales—Mantle/Global/Theory VI Posters	1:40 P.M.	Moscone South: Hall A-C										•											•		•	•	
S33B 0		Characterization and Modeling for Nuclear Test Monitoring and Verification II Posters	1:40 P.M.	Moscone South: Hall A-C													•				•						•	•	
S33C	Geophysical Monito Posters	Geophysical Monitoring for Geologic Carbon Storage II Posters	1:40 P.M.	Moscone South: Hall A-C																									
S33D	Microscale- and Macroscale-Indu vations and Mechanics III Posters	Microscale- and Macroscale-Induced Seismicity: Observations and Mechanics III Posters	1:40 P.M.	Moscone South: Hall A-C												•										•			
S33E	Seismology Contrib	Seismology Contributions: Mega-earthquakes II	1:40 P.M.	Moscone South: 307						0						0									0		0	0	
S33F	Seismology Contrib	Seismology Contributions: Constraining Crustal Structure	1:40 P.M.	Moscone South: 305																									
Tectonophysics	hysics																												
T33A	Collision, Accretion Evolution of Conge	Collision, Accretion, Slab-Windows, and Oroclines: The Evolution of Congested Subduction Zone III Posters	1:40 P.M.	Moscone South: Hall A-C								•													•		•		
T33B	Collision, Accretion Evolution of Conge	Collision, Accretion, Slab-Windows, and Oroclines: The Evolution of Congested Subduction Zone IV Posters	1:40 P.M.	1:40 Moscone South: P.M. Hall A-C								•													•		•		
T33C	The Microstructura Slip II Posters	The Microstructural Record of Aseismic to Seismic Fault Slip II Posters	1:40 P.M.	1:40 Moscone South: P.M. Hall A-C																						•	•		
T33D	Evolution of the No ic Geodynamics, Pla Change III	Evolution of the Northern Tibetan Plateau: Lithospher- ic Geodynamics, Plateau Uplift, and Links to Climate Change III	1:40 P.M.	1:40 Moscone South: P.M. 306					0																				

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T33E 💿	Geodynamic Modeling of Lithosphere Deformation: Advances and Challenges II	1:40 P.M.	Moscone South: 302						0														0	0		
T33F	Recent IODP Investigations of Circum-Pacific Subduction Zones III	1:40 P.M.	Moscone South: 304								0			0		0							0	0		
Volcanole	Volcanology, Geochemistry, and Petrology																									
V33A	Chemical Evolution of the Earth's Mantle II Posters $\dotplus$ $\diamondsuit$	1:40 P.M.	Moscone South: Hall A-C																				•	•		
V33B	From Magmas to Ore Deposits: Tracking the Transition II Posters	1:40 P.M.	Moscone South: Hall A-C																							
V33C	Geology, Geophysics, and Flow Modeling of Hydrothermal Alteration in Geothermal and Volcanic Systems II Posters	1:40 P.M.	Moscone South: Hall A-C								•															
V33D	The Early Earth III Posters	1:40 P.M.	Moscone South: Hall A-C							•						•							•		•	•
V33E	Permian-Triassic Environmental and Climatic Extremes and Biotic Responses III Posters	1:40 P.M.	Moscone South: Hall A-C	•	•	_										•		•							•	•
V33F	Magma Plumbing, Transport, and Eruption at Basaltic Volcanoes I $+ \diamondsuit$	1:40 P.M.	Moscone South: 310						0															0		
V33G	Mineralization Processes in Biological and Inorganic Environments I (Virtual Option) ♦	1:40 P.M.			0																					
<b>V33H</b>	Physical Volcanology of Eruptions Involving Water I	1:40 P.M.	Moscone South: 308					0						0		0	_	0								
Planetary	Planetary Sciences																									
P33B	Whipple Lecture (Virtual Option)	2:40 P.M.	Moscone West: 2022																							
Union																										
U34A	Understanding and Monitoring Abrupt Climate Change and Its Impacts (Virtual Option)	4:00 P.M.	Moscone South: 102																							
Atmosph	Atmospheric Sciences																									
A34A	Measurements, Modeling, and Evaluation of Emissions II	4:00 P.M.	Moscone West: 3008		0	_		0	0		0					0										
A34B 💿	Molecular Chemistry and Physicochemical Properties of Organic Aerosols III	4:00 P.M.	Moscone West: 3010		0				0		0				0	0										
A34C	The Madden-Julian Oscillation: Its Initiation, Identification, and Structure III $\diamondsuit$	4:00 P.M.	Moscone West: 3012					0	0		0					0										
A34D	Advances in Subgrid-Scale Turbulence and Cloud Parameterizations for Cloud-Resolving Models II $\Leftrightarrow$	4:00 P.M.	Moscone West: 3006																							
A34E	Innovative Topics in Atmospheric Science II	4:00 P.M.	Moscone West: 3004																							
Biogeosciences	iences																									
B34A 💿	Low- and No-Altitude Remote Sensing: Inno tems and Applications I	4:00 P.M.	Moscone West: 2006									0														
B34B ©	Understanding Uncertainty in Remotely Sensed Vegeta- tion Data Products I	4:00 P.M.	Moscone West: 2004						0																	
B34C 💿	Urban Areas and Global Change III	4:00 P.M.	Moscone West: 2002	0													0		0							
Cryosphere	ıre																									
C34A	Improved Glacier Mass Balance Assessment and Projection: Methods and Modeling II	4:00 P.M.	Moscone West: 3005																							
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Earth an	Earth and Space Science Informatics																								
IN34A	Search, Discovery, and Visual Representation of Scientific Data II	4:00 P.M.	Moscone West: 2020																						
Nonlinea	Nonlinear Geophysics																								
NG34A	Lorenz Lecture (Virtual Option)	4:00 P.M.	Moscone South: 104																						
Natural Hazards	Hazards																								
NH34A	Interdisciplinary Approaches to Natural Hazards: Environmental, Economical, and Societal Significance II	4:00 P.M.	Moscone South: 309	0			0	0	0		0		0		0		0	0	_				0	0	0
Near Sur	Near Surface Geophysics																								
NS34A	Advances in Exploration Geophysics II	4:00 P.M.	Moscone West: 2000					0		0	0		0										0		
Ocean Sciences	ciences																								
0S34A	Thirty Years of ENSO Research: Dynamics, Predictability, Modeling, Impacts III	4:00 P.M.	Moscone West: 3007	0					0				0					0							
Planetar	Planetary Sciences																								
P34A	High Priority Investigations for Venus Exploration I	4:00 P.M.	Moscone West: 2009	0				0								0								0	0
P34B 0	lcy Bodies: From Laboratory to Space Missions I	4:00 P.M.	Moscone West: 2011																				0		
P34C	Impact Cratering: Terrestrial Observations and Planetary Applications I	4:00 P.M.	Moscone West: 2016					0																	
Paleocea	Paleoceanography and Paleoclimatology																								
PP34A	Miocene Climate I	4:00 P.M.	Moscone West: 2010	0	0	0									0										
PP34B	Molecular Paleoclimatology: What Biomarkers Tell Us About the Earth's Climate System II	4:00 P.M.	Moscone West: 2008																						
SPA-Sola	SPA-Solar and Heliospheric Physics																								
SH34A	Parker Lecture (Virtual Option)	4:00 P.M.	Moscone West: 2022																0		0				
SPA-Mag	SPA-Magnetospheric Physics																								
SM34A	Probing Magnetospheric Dynamics With Multipoint Measurements and Simulations IV	4:00 P.M.	Moscone West: 2018																						
Study of	Study of Earth's Deep Interior																								
DI34A ©	Probing the Earth's Interior III	4:00 P.M.	Moscone South: 303							0													0		0
DI348	DI34B O State of the Art in Computational Geoscience II	4:00 P.M.	Moscone South: 305			0		0		0		0	0			0							0	0	0
Mineral	Mineral and Rock Physics																								
MR34A	Plastic and Transport Properties of Deep Earth Materials	4:00 P.M.	Moscone South: 301			0																			
Seismology	λδι																								
S34A	Gutenberg Lecture (Virtual Option)	4:00 P.M.	Moscone South: 103																						

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Ses				4:00 P.M.	4:00 P.M.	4:00 P.M.			4:00 P.M.	4:00 P.M.				5:00 P.M.			8:00 A.M.		8:00 A.M.	8:00 A.M.	8:00 A.M.	8:00 A.M.	8:00 A.M.
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V41E	Earth System Oxygenation: An Inside Job? I + ♦	8:00 A.M.	Moscone South: 302		0	•																	0	0		
Planetary	Planetary Sciences																									
P41B	Sagan Lecture (Virtual Option)	9:00 A.M.	Moscone West: 2022		0																					
Union																										
U42A	Hydrometeorological Research at the Computational Frontier: Data-Intensive Prediction and Social Impact Assessment of Natural Disasters (Virtual Option)	10:20 A.M.	10:20 Moscone South: A.M. 102								0			0												
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A42A	Extratropical and High-Latitude Storms, Teleconnections, 10:20 and the Changing Arctic Climate II	10:20 A.M.	Moscone West: 3012			0			0	0	0		0			0										
A42B	Measurements, Modeling, and Evaluation of Emissions IV	10:20 A.M.	Moscone West: 3008		0			0	0	_	0					0										
A42C	Ozone-Climate Connections II ❖	10:20 A.M.	Moscone West: 3006		0	_		0	0	_			0			0										
A42D	Regional Climate Modeling III	10:20 A.M.	Moscone West: 3004		0						0															
A42E	Satellite Measurements for Climate Model Evaluation, Diagnosis, and Improvements II	10:20 A.M.	Moscone West: 3010						0	_																
Biogeosciences	iences																									
B42A	New Developments in Geochemistry to Examine Environmental Impacts of Oil Sands Mining I	10:20 A.M.	Moscone West: 2003	0					0	_	0															
B42B	Ecological Disturbance: Observing and Predicting the Impacts of Landscape Disturbance III	10:20 A.M.	Moscone West: 2006	0					0	_	0			0					0							
B42C	Ecosystem Structure: Remote Sensing Observations and Modelling of Its Influence on Radiation Regimes and Gas Exchanges I	10:20 A.M.	Moscone West: 2004						0	0																
B42D	The Bio-atmospheric N Cycle: N Emissions, Transformations, Deposition, and Terrestrial and Aquatic Ecosystem Impacts II	10:20 A.M.	Moscone West: 2002	0					0	0	0					0										
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C42A	Glacier Monitoring From In Situ and Remotely Sensed Observations III	10:20 A.M.	Moscone West: 3005						0																	
C42B	Innovative Methods and Applications for Quantifying Glacier Processes I	10:20 A.M.	Moscone West: 3007																							
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EP42A	Sharp Lecture (Virtual Option)	10:20 A.M.	Moscone West: 2022																							
Geodesy																										
G42A	Inference of Glacial Dynamics and Earth Rheology From Geodetic and Geophysical Observations (GIA) I	10:20 A.M.	Moscone West: 3024			0									0								0		0	
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GC42A 6	GC42A S Future Land Use Change and Climate II	10:20 A.M.	Moscone West: 3001	0	0	•		0			0						0	_	0							
GC42B 💿	How Reliable and Accurate Are CMIP5 Climate Simulations? I	10:20 A.M.	Moscone West: 3003	0							0	0							0							
GC42C 💿	Ex Situ Carbon Mineralization II (Virtual Option)	10:20 A.M.	Moscone West: 3002	0	0						0								0					0		

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Solar and Heliospheric Physics General Contributions V: 10:20 Moscone West:   A.M.   Control Mass Ejections and Coronal Allvein Waves:   A.M.   Control Mass Ejections and Coronal Allvein Waves:   A.M.   Control Mass Ejections and Coronal Allvein Waves:   A.M.   Control Mass Ejections and Coronal Allvein West:   A.M.   Control Mass Ejections and Coronal Allvein West:   A.M.   Control Mass Ejections and Coronal Allvein West:   A.M.   Control Mass Ejections of Earth's Deep Interior   A.M.   Control Mass Ejections of Ejection West:   A.M.   Color Massons South:   A.M.   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   A.M.   Confined on All Scales—Data/Arrays VIII   A.M.   Confined on All Scales—Data/Arrays VIII   A.M.   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   A.M.   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:   Confined on All Scales—Data/Arrays VIII   A.M.   Color Massons South:	SA42A		10:20 A.M.	Moscone West: 2011																	0	0				
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Plasma Access to the Inner Magnetosphere I   10:20   Moscone West:   A.M.   Plasma Access to the Inner Magnetosphere I   10:20   Moscone South:   A.M.   2018   Advances in Rock Physics and Rock Physics and Rock Mechanics: From   10:20   Moscone South:   A.M.	SH42A		10:20 A.M.	Moscone West: 2016																						
Plasma Access to the Inner Magnetosphere I   AM   Plasma Access to the Structure and Dynamics of the Inner Magnetosphere I   AM   Plasma Access to the Structure and Borde Mechanics: From   10:20   Moscone South:   AM   Plasma Access to the Inner Access t	SPA-Mag	netospheric Physics																								
New Constraints on the Structure and Dynamics of the   10:20   Moscone South:   A.M.   30.3     New Constraints on the Structure and Dynamics of the   10:20   Moscone South:   A.M.   A.M.   30.1     Seismology Contributions: Signal Processing, Networks, 10:20   Moscone South:   A.M.   A	SM42A		10:20 A.M.	Moscone West: 2018																						
New Constraints on the Structure and Dynamics of the   10:20   Moscone South:   A.M.	Study of	Earth's Deep Interior																								
Advances in Rock Physics and Rock Mechanics: From   10:20   Moscone South:   Advances in Rock Physics and Rock Mechanics: From   A.M.   30.1   Advances in Rock Physics and Rock Mechanics: From   A.M.   30.2   Advances in Seismic Imaging: Toward Integrated Geo-   10:20   Moscone South:   A.M.   30.2   Advances in Seismic Imaging: Toward Integrated Geo-   10:20   Moscone South:   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Geo-   10:20   Moscone South:   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Geo-   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Geo-   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Geo-   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Geo-   A.M.   30.5   Advances in Seismic Imaging: Toward Integrated Thermochronology in Earth Science   10:20   Moscone South:   Origin, Evolution, and Impacts of High Topography in   10:20   Moscone South:   A.M.   30.5   Advancement, Advancement, and Application of   10:20   Moscone South:   Origin Evolution is and Peterology in Earth Science   A.M.	DI42A®			Moscone South: 303																				0 0		0
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Mineral a	Mineral and Rock Physics																										
MR43A	Constraints and Uncertainties on the Composition, Structure, and Dynamics of the Earth's Lithosphere, Upper Mantle, and Transition Zone From Multidisciplinary Studies III Posters	1:40 P.M.	Moscone South: Hall A-C							•							•						•	•	•	•	_
MR43B O Computat	Computational Advances and Applications in Mineral Physics II	1:40 P.M.	Moscone South: 303									0											0				
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S43A	Seismology Contributions: Mega-earthquakes IV Posters	1:40 P.M.	Moscone South: Hall A-C						•					•									•		•		
S43B	Mining Signals From Noise With Cross-Correlation Techniques I Posters	1:40 P.M.	Moscone South: Hall A-C												•												
S43C	Advances and Challenges for Earthquake Early Warning Systems II	1:40 P.M.	Moscone South: 305											0											0		
S43D	Earthquake Triggering and Interaction II	1:40 P.M.	Moscone South: 307																						0		
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T43A	Controls on Fault Rupture Patterns III Posters	1:40 P.M.	Moscone South: Hall A-C											•											•		
T43B	Origin, Evolution, and Impacts of High Topography in Continental Interiors II Posters	1:40 P.M.	Moscone South: Hall A-C					•															•		•		
T43C	Subduction Plate Boundaries From the Trench to Subarc and Beyond I Posters	1:40 P.M.	Moscone South: Hall A-C																					•	•		
T43D	Subduction Plate Boundaries From the Trench to Subarc and Beyond II Posters	1:40 P.M.	Moscone South: Hall A-C																					•	•		
T43E	Subduction Plate Boundaries From the Trench to Subarc and Beyond III Posters	1:40 P.M.	Moscone South: Hall A-C																					•	•		
T43F	The Development, Advancement, and Application of Integrated Thermochronology in Earth Science II Posters	1:40 P.M.	Moscone South: Hall A-C					•																			
T43G	Deformation Processes: Microstructure, Rheology, and the Effects of Fluids I	1:40 P.M.	Moscone South: 306																				0	0	0	0	_
Т43Н	Linking Earth Surface Dynamics and Deep Tectonic Processes II	1:40 P.M.	Moscone South: 302																				0	0		0	_
T43I	The Geodynamics of Plate Tectonics III	1:40 P.M.	Moscone South: 304									0					0						0	0	0	0	_
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V43A	Earth System Oxygenation: An Inside Job? II Posters + ♦	1:40 P.M.	Moscone South: Hall A-C		•																		•	•			
V43B	Assessing Volcanic Processes Through Novel Monitoring Approaches I Posters +	1:40 P.M.	Moscone South: Hall A-C	•				•						•											•		
V43C	Volcanic Flow and Magma Properties: Field, Laboratory, and Hazard Assessment I + ↔	1:40 P.M.	Moscone South: 310											0			0							0			
V43D	Stress, Strain, and Mass Changes at Volcanoes: Using Geodesy and Seismology to Interpret Volcanic Unrest I +	1:40 P.M.	Moscone South: 308						0															0	0		
Global Er	Global Environmental Change																										
GC43B	The Tyndall History of Global Warming Lecture: Early Agriculture: Land Clearance and Climate Effects (Virtual Option)	2:40 P.M.	Moscone West: 2022	0	0													0	0	-							

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Advanced Techniques for Experimental Geophysics and Animaralogy It. Amorphous Materials, Metts, and Mething P.M. 301   Advances and Challenges for Earthquake Early Warning   4:00   Moscone South:	A A Ologo			foscone West: 2018											0						
Advances Techniques for Experimental Geophysics and 4:00 Moscone South:  Advances and Challenges for Experimental Geophysics and Advances and Challenges for Earthquake Early Warning P.M.  Advances and Challenges for Earthquake Early Warning P.M.  Advances and Challenges for Earthquake Early Warning P.M.  Systems III  Earthquake Triggering and Interaction III  P.M.  Advances and Challenges for Earthquake Early Warning P.M.  Systems III  Earthquake Triggering and Interaction III  P.M.  Advances and Challenges for Earthquake Early Warning P.M.  Systems III  P.M.  Advances and Challenges for Earthquake Early Warning P.M.  Systems III  P.M.  Systems III  P.M.  Systems III  And Moscone South:  P.M.  And Mass Spectrometry III  Noolsy, Geochemistry, and Petrology  Nools, Geochemistry, and Petrology  Nools, Geochemistry, and Mass Changes at Volcanics  And Mass Spectrometry III  Mass Spectrometry III  Mass Spectrometry III  Geodesy and desirnology to Interpret Volcanic  Groodsy and Earth Assessment III  And M.M.  And M.M.	A ologo																				
Advances and Challenges for Earthquake Earth Warming   4:00   Moscone South:   Advances and Challenges for Earthquake Earth Warming   4:00   Moscone South:   Advances and Challenges for Earthquake II   P.M.   Advances and Challenges for Earthquake II   P.M.   Advances and Challenges for Earthquake II   P.M.   Advances South:   A:00   Moscone South:   A:00   A:00   Moscone South:   A:00   A:00   Moscone South:   A:00   A:	Seismology S44A Advances and Challen S44B Earthquake Triggering Tectonophysics T44A the Effects of Fluids II T44B Integrated Studies of Iniking Earth Surface of Iniking Earth Surface of Iniking Earth Surface Iniking Earth Surface Iniking Earth Surface of Iniking Earth Surface of Iniking Earth Surface Inikin		_	loscone South: 301																	0
Advances and Challenges for Earthquake Early Warning 4:00 Moscone South:  Earthquake Triggering and Interaction III  Phy. 305  Earthquake Triggering and Interaction III  Phy. 305  Deformation Processes: Microstructure, Rheology, and Part Surface Organics and Deep Tectonic Phy. 306  Integrated Studies of Slow Earthquakes II Phy. 307  Integrated Studies Of Slow Earthquakes II Phy.	Jop Jop																				
Earthquake Triggering and Interaction III	igor loor	Early Warning		loscone South: 305									0								
Deformation Processes: Microstructure, Rheology, and 4:00 Moscone South:  the Effects of Fluids II  Integrated Studies of Slow Earthquakes II  P.M. Assone South:    P.M. Assone South:   P.M.   P.M.	loon			oscone South: 307																	
the Effects of Fluids II  Integrated Studies of Sow Earthquakes II  Integrated Studies II  Integrated Studie	olor																				
Integrated Studies of Slow Earthquakes II 4:00 Moscone South:  Linking Earth Surface Dynamics and Deep Tectonic  Processes III Linking Earth Surface Dynamics and Deep Tectonic  Processes III Linking Earth Surface Dynamics and Deep Tectonic  Processes III Linking Earth Surface Dynamics and Deep Tectonic  Processes III Linking Earth Surface Dynamics and Deep Tectonic  Processes III Noclaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Noclaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Individual Para Assessment II + ▲  Individual Para Assessment II + ◆  Indiv	<ul> <li>IAB Integrated Studies of: Linking Earth Surface Processes III</li> <li>Independent Processes III</li> <li>Indep</li></ul>	ss: Microstructure, Rheology, and		oscone South: 306																$\circ$	0 0
Univing Earth Surface Dynamics and Deep Tectonic   4:00   Moscone South:   Processes II   Pro	Linking Earth Surface Processes III Processes III Processes III			oscone South: 304					0												0
Notcaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Notcaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Notcaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Notcaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Notcaric Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  Stress, Strain, and Mass Changes at Volcanoes: Using Geodesy and Seismology to Interpret Volcanic P.M.  A A E B C ED EP G GC GP H IN NG NH NS MS P PA PP SI SA SH SM	olcanology, Geochemist	Tectonic		oscone South: 302																	0
Volcanic Flow and Magma Properties: Field, Laboratory, 4:00 Moscone South:  In move attended Assessment II + ▲ In move attended Assessment II + A In move a		ry, and Petrology																			
Innovations and Challenges in Microanalysis and Botope 4:00  Strass Spectrometry I + A  Strass Strain and Mass To Be to B  Strain and Mass To Be to	V44A Volcanic Flow and Ma and Hazard Assessme			oscone South: 310									0		0						0
Stress, Strain, and Mass Changes at Volcanoes: Using P.M. A A RE B C ED EP G GC GP H IN NG NH NS MS P PA PP SI SA SH SM	V44B Innovations and Chall			loscone South: 303																0	0
A AE B C ED EP G GC GP H IN NG NH NS MS P PA PP SI SA SH				oscone South: 308					0												
	riday A.M.					В		EP		GP	I		Ĭ	NS M				SH		_	DI MR
	U51A Solutions for North Ar	Solutions for North American Water Security Challenges (Virtual Option: On Demand Only)	8:00 M	8:00 Moscone South: A.M. 102	0	0	0	0	0		0	0	0	0		0				3	

ED C ED	Union Atmospheric Sciences E Atmospheric and Space Electricity Biogeostiences Cryosphere Education and Human Resources Earth and Planetary Surface Processes		G Geodesy GC Global Environmental GP Geonagnetism and Pa H Hydrology IN Earth and Space Scient NG Nonlinear Geophysics NH Natural Hazards	decodesy Global Environmental Change Geomagnetism and Paleomagnetism Hydrology Earth and Space Science Informatics Norlinear Geophysics Natural Hazards	ange omagneti nformati	.E 5		8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	Near Surface Geophysics Ocean Sciences Public Affairs Pale ocean graphy and Paleoclimatology Saleocean graphy and Polecy Sciences SPA-Aeron cmy	ace Geo Science Science airs nograph nograph nomy	physics s y and Pe	ileoclim cy Sden	atology			SM SP	SH SPA-Sdar and Helogaher Chrysics SM SPA-Magnetospheric Physics DI Study of the Earth's Deep Interior MR Mineal and Rock Physics Seismology T Tectonophysics V Vicandogy, Geodhemistry, and Petrology	and Hel retosph he Earth nd Rock gy gy hysics igy, Geo	llospher eric Phy 1's Deep Physics chemist	icPhysic sics Interior ry, and F	setrolog	>	
l .				A AE B	U	ED EP	U	GC GP	I	Z	Z U	NH NS	SO	_	PAP	PP SI	I SA	SH	NS I	DI MR	S	۰	>
ž	SPA-Solar and Heliospheric Physics																						
Pe	Alfvén Waves in the Solar Corona Posters	8:00 A.M.	Moscone South: Hall A-C																				
Siss	Turbulence and Dissipation in the Solar Wind Plasma: Current Challenges II Posters	8:00 A.M.	Moscone South: Hall A-C								•								•				
T T	e: Observations, Simula-	8:00 A.M.	Moscone South: Hall A-C								•								•				
solar icat	Transients in the Inner Helio- Future Missions II (Virtual	8:00 A.M.	Moscone West: 2022																0				
P	SPA-Magnetospheric Physics																						
ymm	Dawn-Dusk Asymmetries in Solar Wind-Magneto- sphere-Ionosphere Systems II Posters	8:00 A.M.	Moscone South: Hall A-C											•									
to th	Plasma Access to the Inner Magnetosphere II Posters	8:00 A.M.	Moscone South: Hall A-C																				
Spatiotemporal Behavio sphere System I Posters	r of the Magnetosphere-Iono-	8:00 A.M.	Moscone South: Hall A-C														•						
esseo	Dynamical Processes of the Cusp/Polar Cap Ionosphere I	8:00 A.M.	Moscone West: 2018														0						
uI de	Study of Earth's Deep Interior																						
nts on	New Constraints on the Structure and Dynamics of the Lower Mantle III Posters	8:00 A.M.	Moscone South: Hall A-C																	•	•		•
Mineral and Rock Physics	S																						
chniqui I: Nove	Advanced Techniques for Experimental Geophysics and Mineralogy III: Novel Methods	8:00 A.M.	Moscone South: 301																	0		0	0
ontrib	Seismology Contributions: Signal Processing, Networks, and Instrumentation II Posters	8:00 A.M.	Moscone South: Hall A-C							•												•	
iggerii	Earthquake Triggering and Interaction IV Posters	8:00 A.M.	Moscone South: Hall A-C																			•	
dilS-	Oceanic Strike-Slip Faulting: Transforms to Intraplate I Posters	8:00 A.M.	Moscone South: Hall A-C																		•	•	•
ow Sli	Interplay of Slow Slip, Tremor, and Earthquakes II	8:00 A.M.	Moscone South: 307				0																
From	Mining Signals From Noise With Cross-Correlation Techniques II	8:00 A.M.	Moscone South: 303									0											
ntribi tion I	Seismology Contributions: Predictions and Observations of Ground Motion I	8:00 A.M.	Moscone South: 305																				
ring ir	Active Monitoring in Geophysics Posters	8:00 A.M.	Moscone South: Hall A-C																		•		

Frida	Friday A.M.			4	AE	0	ED	F	U	GC GP	I		ğ	IN NG NH NS	NS	so	4	PA PP	IS	SA	SH SM	DI MR	R	-	>
T51B	New Frontiers in Asia-Pacific Earth Sciences II Posters	8:00 A.M.	Moscone South: Hall A-C							•	•														
T51C	Observation and Modeling of the Influence of Stress on Seismic Ruptures I Posters	8:00 A.M.	Moscone South: Hall A-C																				•		
T51D	Observation and Modeling of the Influence of Stress on Seismic Ruptures II Posters	8:00 A.M.	Moscone South: Hall A-C																				•		
T51E	The Geodynamics of Plate Tectonics IV Posters	8:00 A.M.	Moscone South: Hall A-C									•					•					•	•	_	•
T51F	The Geodynamics of Plate Tectonics V Posters	8:00 A.M.	Moscone South: Hall A-C									•					•					•	•		•
T51G	Deformation Processes: Microstructure, Rheology, and the Effects of Fluids III	8:00 A.M.	Moscone South: 306																			0	0		0
Т51Н	Fault Zone Structure from the Surface to the LAB: Constraints from Seismology, Geodesy, Field Observations, and Rock Mechanics I	8:00 A.M.	Moscone South: 302						0													0	0		
T51I	Subduction Plate Boundaries From the Trench to Sub-arc and Beyond IV	8:00 A.M.	Moscone South: 304																			0	0		
Volcanol	Volcanology, Geochemistry, and Petrology																								
V51A	Developments and Applications of Nontraditional Stable Isotope Geochemistry I Posters + ♦	8:00 N A.M.	Moscone South: Hall A-C																			•			
V51B	Garnet: Common Mineral, Uncommonly Useful I Posters ❖	8:00 A.M.	Moscone South: Hall A-C																			•		•	
V51C	Magma Differentiation: The Plutonic-Volcanic Connection I Posters	8:00 A.M.	Moscone South: Hall A-C																			•			
V51D	Volcanic Flow and Magma Properties: Field, Laboratory, and Hazard Assessment III Posters $+ \diamond$	8:00 A.M.	Moscone South: Hall A-C											•			•					•			
V51E	Stress, Strain, and Mass Changes at Volcanoes: Using Geodesy and Seismology to Interpret Volcanic Unrest III Posters +	8:00 A.M.	Moscone South: Hall A-C						•														•	•	
V51F	Innovations and Challenges in Microanalysis and Isotope Mass Spectrometry II + ❖	8:00 A.M.	Moscone South: 310																			0	0	0	
V51G	Pattern to Process: Remotely Sensed Observations of Volcanic Deposits and Their Implications for Surface Processes I	8:00 M	Moscone South: 308					0									0								
Union																									
US2A	400 ppm CO2 : Communicating Climate Science Effectively (Virtual Option: On-Demand Only)	10:20 A.M.	10:20 Moscone South: A.M. 102																						
Atmosph	Atmospheric Sciences																								
A52A	Atmospheric Boundary Layer Processes and Turbulence II ▲	10:20 A.M.	Moscone West: 3004			0				0	0		0			0									
A52B	Constituent Source Characterization, Transport, and Chemistry I ▲	10:20 A.M.	Moscone West: 3010			0		0		0	0		0			0		0				0	_		
A52C	Local Sources of Arctic Pollution and Their Impacts II	10:20 A.M.	Moscone West: 3008		Ŭ	0	•			0	0					0									
A52D 💿	Mineral Dust Aerosols: From Small-Scale Insights to Large-Scale Understanding III ▲	10:20 A.M.	Moscone West: 3012		0	0	•	0		0												0	0		0
A52E	New Particle Formation II ▲	10:20 A.M.	Moscone West: 3006			0		0		0	0					0									
Biogeosciences	iences																								
B52A	Beyond Changes in Mean Climate: The Impacts of Climate Variabilities on Terrestrial Ecosystems II	10:20 A.M.	Moscone West: 2000	0						0	0														

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H52D	Measurements, Modeling, and Characterization of Hydrologic, Geomorphic, and Volcanic Responses to Earthquakes II	10:20 A.M.	Moscone West: 3014					0																0	0	0
H52E	Open-Source Programming, Scripting, and Tools for the Hydrological Sciences III	10:20 A.M.	Moscone West: 3020																							
H52F	Approaches for Obtaining and drologic Systems I	10:20 A.M.	Moscone West: 3018																							
H52G	n a Changing iriability	10:20 A.M.	Moscone West: 3016														0		0							
Earth an	Earth and Space Science Informatics																									
IN52A	Big Data in the Geosciences: New Analytics Methods and Parallel Algorithms I	10:20 A.M.	Moscone West: 2010	0	0	0		0	0	0	0		0		0	0		0					0	0	0	0
IN52B	Semantically Enabling Annotation, Discovery, Access, and 10:20 Integration of Scientific Data I	10:20 A.M.	Moscone West: 2020	0			0		0	_		0														
Natural Hazards	Hazards																									
NH52A	Innovations in Tsunami Hazard Analysis, Mittgation, and Preparedness III	10:20 A.M.	Moscone South: 309												0	_	0									
Ocean Sciences	ciences																									
0S52A	Sediment Transport by Turbidity Currents: Simulation and Observation I **	10:20 A.M.	Moscone West: 3009					0																		
Planetar	Planetary Sciences																									
P52A	Thermal Modeling of Terrestrial and Planetary Bodies II	10:20 A.M.	Moscone West: 2009																							0
P52B	Titan: A Solar System Enigma I	10:20 A.M.	Moscone West: 2007																							
<b>Public Affairs</b>	fairs																									
PA52A	Geoscience Through the Lens of Art II (Virtual Option: On-Demand Only)	10:20 A.M.	Moscone South: 104				0												0							
Paleocea	Paleoceanography and Paleoclimatology																									
PP52A	Pilocene Climate Variability From the Tropics to the Poles I	10:20 A.M.	Moscone West: 2008																							
SPA-Sola	SPA-Solar and Heliospheric Physics																									
SH52A	Propagation of Solar Wind Transients in the Inner Heliosphere and Implications for Future Missions II	10:20 A.M.	10:20 Moscone West: A.M. 2016																			0				
SPA-Mag	SPA-Magnetospheric Physics																									
SM52A	Decadal Challenges for Solar and Space Physics I (Virtual Option: On-Demand Only)	10:20 A.M.	Moscone West: 2022																	0	0					
SM52B	Solar Wind Influence on Dayside Transients I	10:20 A.M.	Moscone West: 2018																							
SM52C	Space Weather Research and Operations: Transforming Physical Knowledge to Actionable Information I	10:20 A.M.	Moscone West: 2011											0						0	0					
Mineral	Mineral and Rock Physics																									
MR52A	Advanced Techniques for Experimental Geophysics and Mineralogy IV: Spectroscopy and Applications	10:20 A.M.	Moscone South: 301																				0		0	0
Seismology	ygy																									
S52A	Interplay of Slow Slip, Tremor, and Earthquakes III	10:20 A.M.	Moscone South: 307						0																	

			Geodesy Global Environmental Change	Change			NS OS		Near Surface Geophysics Ocean Sciences	Seophys	Ñ					SPA-Sol	ar and h	SPA-Solar and Helicopheric Physics SPA-Magnetcopheric Physics	hysics	ysics		
Oral Session AE Atmospheric and Space Electricity GP Geomagnetism and Paleomagnetism  B Biogeosciences Swirl Session B Biogeosciences Swirl Session C Cryosphere Cosponsored by AMS Cosponsored by EQU-GIMPY Cosponsored by EQU-GIMPY B Earth and Planetary Surface Processes NG Nonlinear Geophysics Cosponsored by MS B Earth and Planetary Surface Processes NH Natural Hazards	GP Geomagnetism a H Hydnology IN Earth and Space? NG Nonlinear Geoph NH Natural Hazards	netism a 3y d Space ! ir Geoph; tazards	scien ysics	aleomagr æ Inform	netism natics		4 4 4 8 8		Planebuy Sciences Public Affairs Paleoceanogaphy and Paleocimatology Societal Impacts and Policy Sciences SPA-Aeronomy	aphy an	d Paleod Policy So	ilmatok	<b>/6</b> 0		S T >	Study of the Mineral and Seismology Tectonophy Volcanology	Study of the Ear Mineral and Roo Seismology Tectonophysics Volcanology, Ge	DI Study of the Earth's Deep Interior MR Mineral and Rock Physics S Seismology T Tectonophysics V Vocanology, Geochemistry, and I	ep Inter ics nistry, ar	Study of the Earth's Deep Interior Mineral and Rock Physics Seismology Tectonophysics Volcanology, Geochemistry, and Petrology	ogy	
Friday A.M.	4	4	AE	В	ED	EP G	GC GP		Z I	N S	NHN	SO SN	S	PA	8	SIS	SA SH	ΣS	DI	Σ	S	>
Mining Signals From Noise With Cross-Correlation 10:20 Moscone South: 303 A.M.	10:20 Moscone South: A.M. 303	1										0										
Seismology Contributions: Predictions and Observations 10:20 Moscone South: 305 of Ground Motion II	10:20 Moscone South: A.M. 305																					
Fault Zone Structure From the Surface to the LAB: Con-straints From Seismology, Geodesy, Field Observations, A.M. 302	10:20 Moscone South: A.M.					0														0	0	
Subduction Plate Boundaries From the Trench to Sub-arc 10:20 Moscone South: and Beyond V A.M. 304	10:20 Moscone South: 304																			0	0	
Volcanology, Geochemistry, and Petrology																						
Developments and Applications of Non-Traditional 10:20 Moscone South: A.M. A.M. 306	10:20 Moscone South: A.M. 306																		0			
Footprints of Magma Chamber Dynamics in Eruptive 10:20 Moscone South: Products I A.M. 310	10:20 Moscone South: A.M. 310																					
Assessing Volcanic Processes Through Novel Monitoring 10:20 Moscone South: Approaches II + 308		0	0			0					0										0	
Friday P.M.	•	٩	AE	ВС	ED	EP G	GC GP		H	S N	IN NG NH NS OS	NS O	S P		PA PP	SI S	SA SF	SH SM DI MR	DI		S	>
Comprehensive Test Ban Treaty Organization (Virtual 1:40 Moscone South: Option: On-Demand Only) P.M. P.M.																						
Atmospheric Sciences																						
Atmospheric Impacts of Oil and Gas Development III 1:40 Moscone South: Posters ▲ Hall A-C Posters				•			•				•		•		•	•				•		
Atmospheric Reanalysis: Developments and Verification 1:40 Moscone South: Posters Hall A-C							•		•													
Constituent Source Characterization, Transport, and 1:40 Moscone South: Chemistry II Posters ▲ Hall A-C				•		•	•	•	•	•			•		•					•		
Linking Air Quality and Climate Change Metrics Posters 1:40 Moscone South: Hall A-C				•			•	•			•		•			•						
Measuring and Modeling the Greenhouse Gas Emissions 1:40 Moscone South: of Cities and Localized Rural Sources III Posters ▲ Hall A-C				•		•	•			•						•						•
New Particle Formation III Posters ▲ 1:40 Moscone South:				•		•	•	•					•									
Atmospheric Boundary Layer Processes and Turbulence 1:40 Moscone West: 11.4 ■ 1.40 Moscone West: 3004				0			0		0	0		0	0									
Atmospheric Impacts of Oil and Gas Development IV 1:40 Moscone West: (Virtual Option: On-Demand Only) ▲ P.M. 3002				0			0				0	0	0		0	0				0		

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SPA-Sola	SPA-Solar and Heliospheric Physics																									
SH53A	Scientific Aspects of Space Weather Forecasting III Posters	1:40 P.M.	Moscone South: Hall A-C																	•	•					
SH53B	Turbulence in the Heliosphere: Observations, Simulations, and Theory II	1:40 P.M.	Moscone West: 2009										0								0	0				
SPA-Mag	SPA-Magnetospheric Physics																									
SM53A	Decadal Challenges for Solar and Space Physics II Posters	1:40 P.M.	Moscone South: Hall A-C																	•	•					
SM53B	Dynamical Processes of the Cusp/Polar Cap Ionosphere II Posters	1:40 P.M.	Moscone South: Hall A-C																	•						
SM53C	Solar Wind Influence on Dayside Transients II Posters	1:40 P.M.	Moscone South: Hall A-C																							
SM53D	Space Weather Research and Operations: Transforming Physical Knowledge to Actionable Information II Posters	1:40 P.M.	Moscone South: Hall A-C											•						•	•					
SM53E	Spatiotemporal Behavior of the Magnetosphere-Ionosphere System II	1:40 P.M.	Moscone West: 2018																	0						
Seismology	A.B.																									
S53A	Comparative Structural Seismology of China and the U.S.: Recent Advances and Future Directions I Posters	1:40 P.M.	Moscone South: Hall A-C																			•			•	
S53B	Seismology Contributions: Predictions and Observations of Ground Motion III Posters	1:40 P.M.	Moscone South: Hall A-C																							
S53C	Seismology Contributions: Signal Processing, Networks, and Instrumentation III	1:40 P.M.	Moscone South: 305									0													0	
S53D	Oceanic Strike-Slip Faulting: Transforms to Intraplate II	1:40 P.M.	Moscone South: 307																					0	0	0
S53E	Mining Signals From Noise With Cross-Correlation Techniques IV	1:40 P.M.	Moscone South: 303												0											
Tectonophysics	hysics																									
T53A	Deformation Processes: Microstructure, Rheology, and the Effects of Fluids IV Posters	1:40 P.M.	Moscone South: Hall A-C																			•	•	•		•
T53B	Deformation Processes: Microstructure, Rheology, and the Effects of Fluids V Posters	1:40 P.M.	Moscone South: Hall A-C																			•	•	•		•
T53C	Fault Zone Structure From the Surface to the LAB: Constraints From Seismology, Geodesy, Field Observations, and Rock Mechanics III Posters	1:40 P.M.	Moscone South: Hall A-C						•														•	•		
T53D	Fault Zone Structure From the Surface to the LAB: Constraints From Seismology, Geodesy, Field Observations, and Rock Mechanics IV Posters	1:40 P.M.	Moscone South: Hall A-C						•														•	•		
TS3E		1:40 P.M.	Moscone South: 302																					0		
T53F	Subduction Plate Boundaries From the Trench to Sub-arc and Beyond VI	1:40 P.M.	Moscone South: 304																				0	0		
Volcanol	Volcanology, Geochemistry, and Petrology																									
V53A	Footprints of Magma Chamber Dynamics In Eruptive Products II Posters	1:40 P.M.	Moscone South: Hall A-C																							
V53B	Innovations and Challenges in Microanalysis and Isotope Mass Spectrometry III Posters + ❖	1:40 P.M.	Moscone South: Hall A-C																			•	•		•	
V53C	Pattern to Process: Remotely Sensed Observations of Volcanic Deposits and Their Implications for Surface Processes II Posters	1:40 P.M.	Moscone South: Hall A-C					•									•									

Frida	Friday P.M.			4	AE B	0	ED	<b>G</b>	U	GC GP	I	Z	N N	NG NH NS	S	so	_	PA PP		SI	SAS	SH SM	M	I MR	8	-	>
Education																											
ED54A	Toward a Sustained, Comprehensive, Intensive Approach to Broadening Participation in the Geosciences II	4:00 P.M.	Moscone South: 301		0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0	0	0	0	0
Earth and	Earth and Planetary Surface Processes																										
EP54A	Using Predictive Models to Inform River Management and Restoration II	4:00 P.M.	Moscone West: 2003								0																
Geodesy																											
G54A	Measurements and Geophysical Applications of Current and Future Global Geodetic Networks and Missions III	4:00 P.M.	Moscone West: 3024			0					0				0	0							0			0	
Global En	Global Environmental Change																										
GC54A	Solar Irradiance: Observations, Proxies, and Models II	4:00 P.M.	Moscone West: 3003	0																		0					
GC54B	Imbalance in Nature as the Cause of Global Change II	4:00 P.M.	Moscone West: 3001	0	0	_					0									0							
Geomagn	Geomagnetism and Paleomagnetism																										
GP54A	Advanced Methods in Dynamo Modeling II	4:00 P.M.	Moscone South: 300																				0	•			
Hydrology																											
H54A	C2-tope: Using Multiple Isotopes to Understand Water-sheds II	4:00 P.M.	Moscone West: 3018		0																						
H54B ©	Conventional and Enhanced Geothermal Systems: Characterization, Stimulation, Simulation, and Seismicity II	4:00 P.M.	Moscone West: 3011																						0		
Natural Hazards	lazards																										
NH54A	Innovations in Tsunami Hazard Analysis, Mitigation, and Preparedness V	4:00 P.M.	Moscone South: 309													0		0									
Ocean Sciences	iences																										
0S54A	The Carbonate System Chemistry of Coastal Ecosystems: Physical, Chemical, and Biological Drivers III	4:00 P.M.	Moscone West: 3009		0					0																	
Planetary	Planetary Sciences																										
P54A	Destination: Europa II	4:00 P.M.	Moscone West: 2005																								
P54B	The Science of Exploration as Enabled by the Moon, NEAs, and the Moons of Mars III	4:00 P.M.	Moscone West: 2007																			0					0
Paleocea	Paleoceanography and Paleoclimatology																										
PP54A	Past Terrestrial Climates in the Middle Latitudes of the Southern Hemisphere II	4:00 P.M.	Moscone West: 2008					0		0																	
PP54B	Recent Advances in the Study of Ocean Anoxic Events II	4:00 P.M.	Moscone West: 2010		0	_																					
SPA-Sola	SPA-Solar and Heliospheric Physics																										
SH54A	Turbulence in the Heliosphere: Observations, Simulations, and Theory III	4:00 P.M.	Moscone West: 2009										0										0				
Seismology	gy																										
S54A	Comparative Structural Seismology of China and the U.S.: Recent Advances and Future Directions II	4:00 P.M.	Moscone South: 303																				0			0	
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