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## Heimsókn í vísindastofnanir í Bandaríkjunum, USGS, NSF, NOAA, CITM

Rannís í samstarfi við US Geological Survey skipulagði heimsókn til mikilvægra samstarfsaðila í Bandaríkjunum á sviði jarð- og umhverfsvísinda, þ.e. Jarðvísindastofnunar Bandaríkjanna, US Geological Survey (USGS), National Science Foundation (NSF), National Oceanic and Atmospheric Administration (NOAA) og Carnegie Institute for Terrestrial Magnetism (CITM). Í heimsókninni sem fór fram dagana 18.-19. mars sl. tóku þátt Bryndís Brandsdóttir, Raunvísindastofnun Háskólans, Sigrún Karlsdóttir, Veðurstofu Íslands, Hallgrímur Jónasson og Þorsteinn Gunnarsson, Rannís. Fleiri stofnunum var gefinn kostur á þátttöku en þær sáu sér það ekki fært vegna m.a. vegna niðurskurðar á útgjöldum.

Markmið ferðarinnar voru eftirfarandi:

- [ Að efla samstarf og skapa ný tækifæri fyrir íslenska vísindamenn á ofangreindum sviðum til að starfa með bandarískum vísindamönnum.
- [ Að nýta þá möguleika sem gætu falist í Horizon 2020 til að auka samstarf við bandarískar vísindastofnanir
- [ Að kynna rannsóknáherslur hér á landi og finna hvernig þær ríma við framtíðar áherslur USGS og NOAA með frekara samstarf í huga.
- [ Að skoða aukna möguleika á sameiginlegum rannsóknastyrkjum til íslenskra og bandarískra vísindastofnana og vísindamanna.

### Heimsókn til Jarðvísindastofnunar Bandaríkjanna, US Geological Survey (USGS), þriðjudaginn 18. mars, 2014, 8:30-12:00

Megintilgangur fundarins samkvæmt dagskrá (viðauki A) var að endurnýja samstarfssamning (Memorandum of Understanding) við USGS (viðauki B) og kynna sér starfsemi stofnunarinnar. Þar sem verksvið USGS er mjög víðtækt (sbr. viðauka C) var einungis farið yfir þætti á sérsviðum fundarmanna.

USGS fulltrúar sem rætt var við.

Suzette Kimball, Acting Director, USGS [suzette\\_kimball@usgs.gov](mailto:suzette_kimball@usgs.gov)

Jerad Bales, Associate Director, Water Resources Mission Area, USGS

[jdbales@usgs.gov](mailto:jdbales@usgs.gov) [www.water.usgs.gov](http://www.water.usgs.gov) [waterwatch.usgs.gov](http://waterwatch.usgs.gov)

Matt Larsen (or Sarah Ryker), Associate Director, Climate and Land Use Change Mission Area

Ingrid Verstraeten, Regional coordinator for Europe, Russia, Central Asia, Circum Arctic, International Programs Office. [imverstr@usgs.gov](mailto:imverstr@usgs.gov) [www.usgs.gov](http://www.usgs.gov)

Charles Mandeville, Volcano Program Coordinator, Natural Hazards Mission Area.  
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Matt Anderson, Senior Science Advisor, Ecosystems Mission Area

Rebecca Kenny, International Programs Office

Cecily Wolfe, ANSS Coordinator and Associate Program Coordinator for Earthquake Hazards, Global Seismographic Network, and Geomagnetism Programs [cwolfe@usgs.gov](mailto:cwolfe@usgs.gov) [www.earthquake.usgs.gov](http://www.earthquake.usgs.gov)

Sarah Gerould, Chief of Staff, Ecosystems Mission Area

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Thomas Cecere, Land Remote Sensing Program, [tcecere@usgs.gov](mailto:tcecere@usgs.gov)

*The USGS is focused on some of the most significant issues society faces, in which natural science can make a substantial contribution to the well-being of the Nation and the world. The USGS Science Strategy outlines the major societal issues that USGS science is poised to address. USGS mission areas are: Core Science Systems; Climate and land use change; Energy and minerals; Environmental health; Ecosystems; Natural hazards; Water.*

Í upphafi fundar bauð starfandi forstjóri USGS, Suzette Kimball gesti velkomna. Eftir almennar kynningar á milli fundarmanna fór Suzette yfir helstu þættina í starfsemi stofnunarinnar. Starfsemi USGS er dreifð um öll Bandaríkin. Hjá USGS vinna um 10.000 starfsmenn á yfir 400 stöðum. Hallgrímur fór yfir hlutverk RANNÍS. Síðan kynntu, Jerad Bales, Charles Mandeville og Thomas Cecere starfsemi sinna starfseininga.

Jerad Bales kynnti vatnamælingar og vöktun USGS [waterwatch.usgs.gov](http://waterwatch.usgs.gov) Á vefsíðunni má fylgjast með yfir 3000 vatnamælum. Sjávarfallamælar gegna ennfremur mikilvægu hlutverki við eftirlit með sjávarflóðum tengdum fellibyljum og öðrum stormum. USGS er ráðgjafi í grunnvatnsmálum, hefur eftirlit með vatnsbólum og metur vatnsforða. USGS fylgist einnig með jöklabúskap og jarðhitasvæðum.

Charles Mandeville: Auk þess að reka eldfjallastöðvar á Hawaii, í Kaliforníu, Yellowstone, Washingtonríki (Cascades) og Alaska veita starfsmenn USGS ráðgjöf og taka þátt í eldfjallaeftirliti víða um heim, Mexíkó, Mið- og Suður Ameríka, Karabískahafið, Kanaríeyjar, Afríka, Saudi-Arabía, Indónesía, Filippseyjar. Lögð er sérstök áhersla á að betrubæta þrívíddarspálíkön af öskufalli.

Thomas Cecere: Fór yfir hlutverk mismunandi banda Landsat8 gervitunglsins sem er búið tækjum til að skynja endurkast frá jörðinni og lofthjúpnum (Operational Land Imager, OLI) ásamt innrauðum hitaskynjara (Thermal Infrared Sensor, TIS). Öll Landsat gögn frá NASA hafa verið opin frá 2008 og hefur USGS séð um að vinna gögnin og koma þeim á framfæri. Samanlagt safna Landsat7 og Landsat 8 um 1000 myndum af jörðinni daglega. Landsat8 OLIbönd 1-7 og 9 sýna jörðina (nema endurkast frá yfirborði jarðar í 30 m upplausn), band 8 hefur 15 m upplausn, bönd 9 og 12 skynja skýjafar. Hægt er fá aðgang að næturmyndum úr Landsat8 en skilningur manna á því hvernig túlka ber band 11 er enn bágborinn.

Sigrún Karlsdóttir kynnti starfsemi Veðurstofu Íslands, uppbyggingu eftirlitskerfa, vöktunar og rannsókna á sviði veðurfræði, jarðskjálfta, GPS og vatnamælinga ásamt helstu verkefnum, þ.m.t. FutureVolc.

Bryndís Brandsdóttir fór yfir hvernig gervitunglamyndir úr Landsat 8 hafa gengt mikilvægu eftirlitshlutverki á Íslandi síðastliðið ár, frá því tunglinu var skotið á loft í febrúar 2013. Thomas lýsti ánægju sinni með hvernig gögnum væri komið á framfæri við almenning á Íslandi og nefndi sérstaklega Facebook. NASA og USGS hafa nú opnað aðgang að hita- og næturmyndum af Íslandi. Nánari upplýsingar má finna á

[http://www.nasa.gov/mission\\_pages/landsat/main/#.U3YJ5F5sK-Q](http://www.nasa.gov/mission_pages/landsat/main/#.U3YJ5F5sK-Q)

<http://remotesensing.usgs.gov/index.php>

<https://www.facebook.com/USGeologicalSurvey?fref=nf>

Þar sem ekki gafst tími til að kynna eldfjalla- og jöklarannsóknir á Íslandi voru þeir fyrirlestrar skildir eftir hjá USGS.

Fundarmenn voru sammála um að samstarf USGS og íslenskra stofnana bæri að rækta, margir fletir væru á því hvernig mismunandi einingar gætu unnið saman.

Af hálfu USGS kom fram mikill áhugi á því að efla samstarf við íslenskar vísindastofnanir einkum á þeim sviðum sem snerta vöktun og áhættumat í tengslum við náttúruvá og með rannsóknum á umhverfislegum og samfélagslegum afleiðingum loftslagsbreytinga. Ljóst er að margar stofnanir hér á landi gætu tekið þátt í því samstarfi. Íslenski hópurinn mun taka saman tillögur um áherslur í samstarfinu og senda til USGS við fyrsta tækifæri.

### **Heimsókn til National Science Foundation (NSF) í Bandaríkjunum, þriðjudaginn 18. mars 2014, 14:00-17:00.**

Megintilgangur fundarins samkvæmt dagskrá (viðauki D) var að kynna sér starfsemi NSF og skoða samstarfsmöguleika fyrir íslenska vísindamenn (viðauki E). Þar sem verksvið NSF er mjög víðtækt (sbr. viðauka F) var einungis farið yfir þætti á sérsviðum fundarmanna.

NSF fulltrúar sem við ræddum við:

Bonnie Thompson, Program Manager, Europe & Eurasia, NSF Office of International & Integrative Activities.

Simon Stephenson, Head, Arctic Sciences Section, Division of Polar Programs, Directorate for Geosciences (GEO)

Erica Key, Program Director, Arctic Observing Network, Office of Polar Programs

Saran Twombly, Program Manager, Long Term Research in Environmental Biology, Directorate for Biological Sciences (BIO)

Fae Korsmo, Acting Deputy Assistant Director, Directorate for Social, Behavioral and Economic Sciences (SBE)

Jennifer Wade, Associate Program Director for Geo PRISMS; and Petrology and Geochemistry, Division of Earth Sciences, (GEO)

Gregory Anderson, Program Director for Earth Scope, Division of Earth Sciences, GEO

Graham Harrison, Acting Head, International Science & Engineering Section, NSF Office of International and Integrative Activities.

*The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." With an annual budget of \$7.2 billion (FY 2014), we are the funding source for approximately 24 percent of all federally supported basic research conducted by America's colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing.*

Í upphafi bauð Bonnie Thompson gesti velkomna. Eftir almennar kynningar milli fundarmanna kynntu Hallgrímur Jónasson og Þorsteinn Gunnarsson rannsóknarverkefni sem tengjast Norðurlóðum og H2020. Síðan fór Bonnie yfir helstu þætti í starfsemi NSF sem er stærsti vísindasjóður í Bandaríkjunum á sviði grunnrannsókna og styður allar greinar vísinda, fyrst og fremst í háskólum og rannsóknastofnunum, nema heilbrigðisrannsóknir sem tilheyra NIH. Fram kom að ýmsir möguleikar væru á samstarfi við íslenska vísindamenn innan NSF, t.d. hefði NSF samstarfsform við rannsóknasjóði í öðrum löndum sem kallast collaborative research, en þá þyrftu rannsóknasjóðir annarra landa að taka gilt matsferlið hjá NSF en reglur Rannsóknasjóðs hér á landi leyfa slíkt ekki. Önnur samstarfsform hjá NSF gerðu ráð fyrir þátttöku og jafnvel stuðningi við vísindastarfsemi í öðrum löndum t.d. Science Across Virtual Institutes (SAVI) þar sem veittur er stuðningur til alþjóðasamstarfs hjá nemendum í rannsóknanámi, post doc og ungum vísindamönnum, sjá [www.nsf.gov/savi](http://www.nsf.gov/savi) Fyrir norðurlóðarannsóknir væri Belmont Forum sem NSF leiðir mögulegur stuðningsaðili við rannsóknir, sjá kynningu á Belmont Forum hér að neðan. Að lokum kom fram að oft er möguleiki á að íslenskir vísindamenn sækji um styrki frá NSF í samstarfi við bandaríska vísindamenn. Til greina kæmi að íslenskir vísindamenn fengju þannig styrki ef verkefnið væri talið það mikilvægt og að þátttaka íslensku vísindamannanna væri grundvallandi fyrir verkefnið.

Simon Stephenson fór yfir norðurlóðarannsóknir hjá NSF, hann kynnti stefnumótun, markmið, skipulag, viðfangsefni, áherslur á menntun, rannsóknainviði og rannsóknasamstarf.

Erica Keys kynnti Belmont Forum sem er sameiginlegt átaksverkefni rannsóknasjóða í ýmsum löndum til að efla rannsóknir á norðurlóðum. Belmont Forum auglýsir eftir umsóknum um rannsóknaverkefni um vöktun og sjálfbærni á Norðurlóðum (Arctic Observing and Research for Sustainability). Á fundinum var gengið frá því að Rannís gerðist aðili að næstu auglýsingu Belmont Forum þannig að íslenskum vísindamönnum gæfist kostur á að senda inn umsóknir um rannsóknaverkefni í samstarfi við vísindamenn frá öðrum löndum sem eiga aðild að Belmont Forum.

Jennifer Wade kynnti vistfræðirannsóknir, m.a. rannsóknaverkefni um vistfræði Mývatns sem NSF styður með þátttöku Árna Einarssonar, HÍ og Tony Ives, University of Wisconsin. Hún lagði áherslu á að þessum rannsóknum yrði haldið áfram og þær efldar með langtíma vöktunarsjónarmið í huga. Fae Korsmo kynnti rannsóknir á sviði félagsvísinda og hagfræði.

Gregory Anderson og Jennifer Wade kynntu rannsóknir á sviði jarðvísinda og loftslagsbreytinga. Þau lögðu mikla áherslu á samstarf við íslenska jarðvísindamenn, einkum á sviði eldfjallafræði og náttúruvár. NSF hefur áhuga á að styðja field school í eldfjallafræðum á Íslandi. Þau bentu á samstarfsform sem NSF styrkir s.s. Science, Engineering and Education for Sustainability (SEES) sem mögulegan vettvang fyrir þetta samstarf, sjá eftirfarandi hlekk [http://www.nsf.gov/geo/sees/sees\\_contacts.jsp](http://www.nsf.gov/geo/sees/sees_contacts.jsp) Einnig bentu þau á SAVI í þessu sambandi.

Graham Harrison kynnti rannsóknasamstarf við ESB á vettvangi Horison 2020. Þar er einkum lögð áhersla á samstarf á sviðum umhverfisvöktunar í hafinu, innviði til vöktunar, örtækni, norðurslóðarannsóknna og innviða tölvukerfa (cyberinfrastructure). Þátttaka bandarískra vísindamanna í ERA netum er vaxandi.

## **Heimsókn til NOAA (National Oceanic and Atmospheric Administration), 19. mars, kl. 09:00-12:00**

### **Almennt**

Tekið var á móti fulltrúum íslensku stofnananna af Dr. Terry L. Schaefer. Dagskráin, sjá viðauka G, var sett saman út frá óskum um umræðuefni frá íslensku sendinefndinni, sjá viðauka H.

Dr. Robert Detrick<sup>1</sup> bauð fundarmenn velkomna og Hallgrímur fór yfir aðdraganda heimsóknarinnar og kynnti starfsemi Rannís. Síðan hófust erindi um starfsemi NOAA.

Sérfræðingar stofnunarinnar gáfu ítarlegar kynningar um sín viðfangsefni og var rætt um hugsanlega samstarfsfleti þar sem það átti við. Um sautján sérfræðingar NOAA tóku þátt í umræðunum.

Sigrún hélt stutta kynningu um starfsemi VÍ og Bryndís kynnti notkun á gervihnattamyndum og hvernig þær upplýsingar sem fá má frá NOAA hafa nýst við vöktun á náttúrunni bæði á landi og á sjó og mikilvægi þeirra. Hallgrímur og Þorsteinn kynntu rannsóknarverkefni sem tengjast Norðurslóðum og H2020.

Allar glærur sem farið var yfir voru sendar til þátttakenda og ásamt ítarefni sem Sigrún annars vegar og Bryndís hins vegar höfðu tekið saman og ekki var farið yfir á fundinum.

### **Yfirlit yfir kynningar NOAA**

Sea Ice – research and forecasting models; Dr. Robert Grumbine (NWS/NCEP) kynnti rannsóknir og reiknilíkön sem notuð eru m.a. við spár um dreifingu, magn og þykkt hafiss. Um er að ræða líkan sem tengir andrúmsloft við hafis (e. Coupled atmosphere – seaice model). Nánari upplýsingar er að finna á: <http://polar.ncep.noaa.gov/develop/icemodel/> RG sagði einnig frá rannsóknum og þróun m.a. á sjávarflóða og hafis reiknilíkani og hvernig sannprófun á hafisreiknilíkönnum hefur gengið.

Eric Madsen (NESDIS) sagði frá notkun gervihnattaupplýsinga við vöktun á hafis og samvinnu þeirra við Canadian Ice Service.

Amy Merten (OAR) kynnti rannsóknarhlutverk NOAA, sem miðar að því að styrkja starfsemi stofnunarinnar innan veður-, veðurfars- og hafræði. Stofnunin þróar reiknilíkön – næstu kynslóðarlíkön, sem nýtast í spáveðurfræði m.a. reiknilíkön sem taka á spám um fellibyli, skýstrokka, o.s.frv. Þau vinna einnig að þróun á radar-hugbúnaði. Þau taka virkan þátt í vinnu varðandi IPCC og fleiri rannsóknarverkefni á veðurfarsbreytingum. NOAA vinnur einnig að þróun og rannsóknum á reiknilíkönnum fyrir loftmengun, dreifingu hennar og loftgæði. Hafrannsóknir eru einnig mikilvægur þáttur í starfsemi NOAA og eru tvö setur tileinkuð rannsóknum á þessu sviði annað í Seattle og hitt í Miami. Ýmis verkefni eru ennfremur tengd norðurslóðarannsóknum. Fram kom í máli AM að sterk tengsl eru á milli NOAA og háskólasamfélagsins og 60% af fjármagni NOAA til rannsókna fer til þeirra.

Libby Jewett (OAR) kynnti hafrannsóknarverkefni, með áherslu á norðurslóðir. Baujur hafa verið við Ísland og hægt að nálgast rauntíma upplýsingar frá þeim um netið. LJ vinnur náið með Jóni Ólafssyni (Hafró/HÍ) og einnig með Héðni Valdimarssyni (Hafró). Mælitæki til að mæla seltu, CO2 o.fl., eru í Skógarfossi (Eimskip). En það skip siglir á milli Reykjavíkur og Maine. Þau eru virkir þátttakendur í AMAP og í ARGO.

<sup>1</sup> Þess má geta að Bob Detrick er hættur hjá NOAA og hefur verið ráðinn sem forstjóri Jarðskjálftastofnunar bandarískra háskóla (Incorporated Research Institutions for Seismology) (IRIS) sem vinnur í nánú samstarfi við USGS, sjá <http://www.iris.edu/hq/>



John McDonough (OAR) sagði frá því að þarfagreining væri mikilvæg til að styrkja rannsóknir þar sem þeirra væri þörf. Hann nefndi m.a. efnafræði hafsins og kortlagningu norðurslóða í hárrí upplausn. Kathy Crane (OAR) sagði frá norðurslóðarannsóknaverkefnum og mikilvægi þess að styrkja þær í framtíðinni. Eitt þeirra verkefna eru mælingar á ferskvatnsstreymi frá vestanverðum Grænlandsjökli. Mikilvægt er að halda slíkum mælingum áfram og rannsaka hvaða afleiðingar það getur haft á haf og hafstrauma. NOAA er tengt Norðurskautsráðinu (Arctic Council) m.a. við Biodiversity Program og hafa unnið með Guðmundi Guðmundssyni hjá NÍ. KC nefndi að það væru mikil tækifæri í samstarfi um norðurslóðarannsóknir.

Michael Smith (NWS) kynnti vatnafræðirannsóknir og hvernig þær nýtast við vöktun og spár um vatnsflóð. Mikilvægt er að geta tengt saman niðurstöður mismunandi reiknilíkana á notendavænu formi sem nýtist fyrir spár og fyrir viðbragðsaðila. Nán samvinna er á milli NOAA, USGS, NWS (National Weather Services) um vatnafræðimálefni.

Arthur Taylor (NWS/Office of Science and Technology) og Jesse Tayen (NOS) sögðu frá þróun og rannsóknum á sjávarflóðareiknilíkönunum, þ.e. SLOSH og ADCIRC. Nánari upplýsingar má sjá á:

<http://www.weather.gov/mdl/etsurge> og [http://slosh.nws.noaa.gov/etsurge\\_ESTOFS/](http://slosh.nws.noaa.gov/etsurge_ESTOFS/)

Amy Merten (NOS) kynnti Arctic ERMA verkefni – Emergency Response Management Application sjá <http://www.erma.unh.edu>. Þetta er notendavænt vef-viðmót þar sem allir geta farið inn og fengið upplýsingar um veður, hafstrauma, staðsetningar skipa o.s.frv. Viðbragðsaðilar geta fengið aðgang að lokuðum síðum með nánari upplýsingum sem nýst geta við björgunaraðgerðir. Þetta verkefni er Norðurskautsráðverkefni (Arctic Council) EPPR verkefni og eitt af megin markmiðunum er að deila upplýsingum sem nýst geta við björgunaraðgerðir.

### **Helsti ávinningur heimsóknarinnar**

Kynningarnar voru mjög áhugaverðar, enda NOAA mjög framarlega í veður-, veðurfars-, vatna- og haffræði rannsóknum. Mikilvægt er að halda áfram að styrkja þær tengingar sem fyrir eru á milli sérfræðinga NOAA og sérfræðinga á Íslandi, en eins og fram kom þá er góð samvinna við sérfræðinga innan Hafró og NÍ. Veðurstofa Íslands sér um efnamælingar í andrúmslofti fyrir NOAA og má styrkja það samstarf frekar (þetta kom þó ekki sérstaklega fram á fundinum) Ennfremur eru tækifæri til að þróa samstarf innan norðurslóðarannsóknna. Helsti ávinningur heimsóknarinnar fyrir Veðurstofu Íslands til skemmri tíma litið er:

- [ Hafis- og öldu-likanareiknigerð. NOAA er með öflug reiknilíkön til að spá fyrir um þróun hafiss og ölduhæðar. Dr. Robert Grumbine, sem kynnti þessa starfsemi kemur til Íslands í september 2014 og kemur þá vonandi á stuttan fund á VÍ til að ræða betur við sérfræðinga stofnunarinnar.
- [ Sjávarflóðareiknilíkön. Áhugavert verður fyrir VÍ að kynna sér nánar starfsemi NOAA á þessu sviði.

### **Heimsókn til Carnegie Institute for Terrestrial Magnetism NOAA, 19. mars, kl. 13:30-15:30**

Í þessari heimsókn ræddum við (BB, HJ, SK og ÞG) við Selwyn Sacks, Alan T. Linde og Diana C. Roman.

Selwyn Sacks og Alan Linde hafa verið í nánu samstarfi við VÍ frá árinu 1979 þegar þeir, ásamt starfsmönnum VÍ, komu fyrir átta þenslumælum (strainmeters) af Sacks-Evertson gerð á Suðurlandsundirlendinu. Selwyn er hönnuður mælanna og réttthafi að tveimur einkaleyfum þeim tengdum. Þenslumælarnir eru steypfir í borholur og nema þar rúmmálsbreytingar í berginu. Mælunum var upphaflega komið fyrir til að mæla rúmmálsbreytingar sem hugsanlega forboða jarðskjálfta, enda

eru þeir sérstaklega næmir fyrir rúmmáls- og hitabreytingum og hafa sannað sig í eldfjallaeftirliti á Íslandi, Montserrat í Karabíska hafinu og víðar. Þannig sýndu mælarnir rúmmálsbreytingar skömmu fyrir eldgosið í Heklu í febrúar 2000 og einnig fyrir eldgosið í janúar 1991.

Mælar í rekstri voru sex til sjö að tölu fram á fyrsta áratug þessarar aldar, þar af voru fimm virkir. Frá 2009 hefur Carnegie fengið árlegan styrk frá Brinson Foundation í Chicago sem var notaður m.a. til að uppfæra mælana á árunum 2009 til 2012. En það voru þrír af upprunalegu mælunum. Til viðbótar var einn nýr mælir settur upp u.þ.b. 5 km suðaustur af Heklu. Í dag eru því fjórir mælar í rekstri, beintengdir við Veðurstofu Íslands. Í sumar munu Selwyn Sacks og Alan Linde koma til Íslands í tengslum við uppsetningu tveggja þenslumæla til viðbótar við þá fjóra sem fyrir eru, við Skóga og á Sólheimahéiði, til vöktunar á Eyjafjallajökli og Kötlu. Til viðbótar við framlag Carnegie í þetta verkefni er það styrkt af British Geological Survey, Veðurstofunni og Vegagerðinni.

Selwyn tjáði okkur að hann inni að þróun nýrrar aðferðar til að nema rúmmálsbreytingar með betri nákvæmni en áður. Selwyn leitar eftir fjármagni til verkefnisins m.a. héðan.

Diana C. Roman er í samstarfi við Kristínu Vogfjörð á VÍ um rannsóknir á Heklu.

### **Samantekt**

Hjá öllum stofnunum kom fram mikill áhugi á auknu samstarfi við íslenska vísindamenn á mörgum fræðasviðum svo sem haffræði, jarðvísindum, eldfjallafræði, loftslagsbreytingum, náttúruvá, áhættumat, vistfræði, norðurslóðarannsóknna, gerð reiknilíkana, rannsóknvöktunar o.fl. Ljóst er að margar stofnanir hér á landi gætu tekið þátt í þessu samstarfi. Mikilvægt er því að vekja athygli íslenska vísindasamfélagsins á þeim áhuga og möguleika sem fyrir hendi eru á samstarfi við þessar bandarísku vísindastofnanir.

## **VIÐAUKI B: Dagskrá heimsóknar til USGS, áhersluatriði.**

**Agenda Tuesday March 18 AM**

### **Visit to US Geological Survey**

In our visit to the USGS, the Icelandic team is interested in discussing the following topics dealing with understanding volcanos/crustal processes, and environment and climate, with the aim to strengthen our collaboration and explore possibilities for joint research proposals:

#### **Understanding Volcanos/Crustal Processes**

- [ Volcanoes - Seismic and geodetic monitoring of volcanoes. Monitoring methods and early warning systems, use of remote sensing such as radars and lidars to detect ash in the atmosphere.
- [ Deformation and geodynamics within the N-Atlantic. Earthquakes and crustal deformation - monitoring methods and early warning systems, research on forecasting possibilities.
- [ Subglacial volcanism and eruption products, jökulhlaups (large glacial floods associated with volcanism and geothermal activity).

#### **Environment and Climate**

- [ Arctic gateway research.
- [ Natural hazards in the Arctic including landslides and lahars - research and forecasting/warning possibilities. Avalanche - research and forecasting/warning possibilities.
- [ Remote sensing and environmental monitoring.
- [ Climatic conditions, topographical features and glaciers.
- [ Glacial processes and products, past and present.
- [ Monitoring of glacial flow and mass balance.
- [ Prediction of glacier response and glacial runoff under different environmental conditions.
- [ Isotopic analyses of the atmospheric hydrological cycle.
- [ Paleoclimatic information based on isotopic profiles of the Greenland ice cores.
- [ Marine geology and geophysical exploration.
- [ Evolution of oceanic rift systems and transform zones, plume-ridge interactions.

#### **Collaborative Research**

- [ Access to USGS physical laboratories – high P&T labs, other
- [ Exchanges of scientists.
- [ Strengthen ongoing collaborative research between the USGS Anchorage and Icelandic scientists.

#### **Specific Ongoing Projects:**

- [ FUTUREVOLC, Volcano Anatomy.
- [ SVALI, Ice2sea, CarbFix, NORDICCS, CRAICC, ARCTIC Seminars.



- [ Quaternary climatic variability, palaeoenvironments.
- [ Ice dynamic modeling, sea-ice monitoring and research.
- [ Seafloor bathymetric mapping, N-Atlantic.

## **Signing a Memorandum of Understanding of Scientific Cooperation between USGS and RANNIS**

Scientists we would like to meet at USGS include:

David Applegate, Associate Director, Natural Hazards - [applegate@usgs.gov](mailto:applegate@usgs.gov)

Marianne Guffanti - [marianne.guffanti@usgs.gov](mailto:marianne.guffanti@usgs.gov)

Ingrid Verstraeten - [imverstraeten@usgs.gov](mailto:imverstraeten@usgs.gov)

### **DRAFT AGENDA, Tuesday, March 18, 2014 at 8:30-12:00 p.m.**

8:30 Arrival and coffee (RM 3A409)

9:00 Welcome and general introductions– Suzette Kimball, Acting Director USGS

9:10 Short overview of USGS (10 minutes) – Suzette Kimball

9:20 Opening remarks by RANNIS - Hallgrímur Jónasson, General Director, Rannís

9:20 Signing of MOU- Kimball & Jonasson

9:30 Coffee Break

9:45 Detailed discussions (15 minutes on each side per topic)

1. Hazards including volcanology, seismic, landslides, lahars, and floods? – Mandeville & Sigrún Karlsdóttir and Bryndís Brandsdóttir
2. Environment (remote sensing applications and environmental health) – Dr. Larsen or Ryker/Bright & Sigrún Karlsdóttir
3. Climate change (hydrological cycle and glacier research) – Bales & Bryndís Brandsdóttir & Sigrún Karlsdóttir
4. Opportunities for Future Cooperation Verstraeten & Gunnarsson

12:00 Wrap-up and Informal Highlights Verstraeten & Jonasson

**12:00 -13:00 Potential lunch in USGS cafeteria. TBC**

AGREEMENT  
TO EXTEND THE  
THE MEMORANDUM OF UNDERSTANDING  
BETWEEN  
THE U.S. GEOLOGICAL SURVEY  
OF THE DEPARTMENT OF THE INTERIOR  
OF THE UNITED STATES OF AMERICA  
AND  
THE ICELANDIC CENTRE FOR RESEARCH (RANNIS)  
UNDER THE  
MINISTRY OF EDUCATION, SCIENCE AND CULTURE  
(MENNTAMALARADUNEYTIÐ) OF THE  
REPUBLIC OF ICELAND  
FOR  
SCIENTIFIC AND TECHNICAL COOPERATION IN  
EARTH SCIENCES, AS AMENDED AND EXTENDED

The Memorandum of Understanding (MOU) for Scientific and Technical Cooperation in Earth Sciences between the U.S. Geological Survey (USGS) of the Department of the Interior of the United States of America and the Icelandic Centre for Research of the Republic of Iceland, (the Parties) was originally signed by the Rannsoknarad Islands (RANNIS), January 28, 1982, and by the USGS, April 9, 1982. The MOU was amended and extended on April 9, 1990, April 9, 1998, and April 12, 2007, each for eight year periods. During this time, the Parties have cooperated in the exchange of technical knowledge and augmentation of technical capabilities in the areas of Earth resources and geological, geophysical, and hydrological phenomena. The cooperation includes exchange of information and expertise, and joint studies of mutual interest in such areas.

The Parties agree that this cooperation has been beneficial to both organizations. In accordance with Article VIII of the 1982 MOU, the Parties have agreed to extend the MOU for another eight years, effective from April 9, 2013.

This Agreement shall enter into force upon signature.

Done at Reston, Virginia, United States, in duplicate, in the English language.

FOR THE  
U.S. GEOLOGICAL SURVEY  
OF THE DEPARTMENT OF  
THE INTERIOR OF  
THE UNITED STATES OF AMERICA:

FOR THE  
ICELANDIC CENTRE FOR RESEARCH  
UNDER THE MINISTRY OF  
EDUCATION, SCIENCE AND CULTURE  
OF THE REPUBLIC OF ICELAND:



Signature



Signature

Suzette M. Kimball

Hallgrímur Jónasson

Acting Director  
Title

General Director  
Title

March 18, 2014  
Date

March 18, 2014  
Date

## **VIÐAUKI C:**

**Yfirlit yfir verkefni USGS, sjá [http://www.usgs.gov/start\\_with\\_science/programs.asp](http://www.usgs.gov/start_with_science/programs.asp)**

**Biological Informatics Program** The mission of the Biological Informatics Program is to create the informatics framework, provide the scientific content, and develop the public and private partnerships needed for the understanding and stewardship of our Nation's biological resources. The Biological Informatics Program provides credible, applicable, unbiased information for science-based decision-making, particularly as it pertains to the conservation, management, and use of the Nation's biological resources.

**Carbon Sequestration** Scientists at the U.S. Geological Survey (USGS) are working to assess both the potential capacities and the potential limitations of the various forms of carbon sequestration and to evaluate their geologic, hydrologic, and ecological consequences. In accordance with the Energy Independence and Security Act of 2007, the USGS has developed scientifically based methods for assessment of biologic and geologic carbon sequestration.

**Climate Change Research and Development** The USGS Global Change Research and Development Program supports fundamental scientific research to: 1) understand processes controlling Earth system responses to global change over broad temporal and spatial scales; and 2) understand and model impacts of climate and land-cover change on ecosystems and other natural resources.

**Climate Change Science Applications and Decision Support** The USGS integrates climate- and environmental-change datasets with conceptual and digital models across disciplines including remote sensing, geography, geology, biology, and hydrology to better understand impacts to natural resources, agriculture, and human populations on decadal and regional time scales, local to global spatial scales, and weather to climate process scales.

**Climate Effects Network (CEN)** The Climate Effects Network (CEN) is a consortium of observation and research programs that collect, share, and use data, models, and related information to assess climate impacts on ecosystems, resources, and society. CEN provides network coordination, data management, enhanced funding for existing monitoring programs, and new data collection to create a national scientific capacity that is "greater than the sum of the parts."

**Coastal and Marine Geology Program (CMGP)** The Coastal and Marine Geology Program conducts research on changes in the coastal and marine environment, whether naturally occurring or human induced. Changes in this environment can endanger our quality of life, threaten property, pose risk to fragile environments, and affect livelihoods. The management challenge faced by all coastal communities is to balance the competing needs of citizens, government, industry, and the environment. Sound marine science is critical for making such management decisions

**Contaminant Biology Program** The USGS Contaminant Biology Program investigates the effects and exposure of environmental contaminants to the Nation's living resources, particularly those under the stewardship of the Department of the Interior

**Cooperative Research Units - Biology (CRU)** The Cooperative Research Unit program was established in 1935 to enhance graduate education in fisheries and wildlife sciences and to facilitate research between natural resource agencies and universities on topics of mutual concern. Today, there are 40 Cooperative Research Units in 38 states. Each unit is a partnership among the U.S. Geological Survey, a State natural resource agency, a host university, and the Wildlife Management Institute.

**Cooperative Water Program (Coop)** Provide reliable, impartial, and timely information needed to understand the Nation's water resources through a program of shared efforts and funding with State, Tribal, and local partners to enable decision makers to wisely manage the Nation's water resources.

**Core Science Informatics** Core Science Informatics (CSI) coordinates and develops data integration

services, capacity, and framework for Bureau science programs. Incorporating the Community for Data Integration and the Powell Center, CSI supports identification and development of best practices and standards to ensure efficiencies and innovation. Through a network of data consultants, CSI works with USGS science programs, partners, and industry to create new paradigms for accessing, integrating, visualizing, and delivering USGS data and information.

[Earth Surface Dynamics \(ESD\)](#) Focuses on documenting, analyzing, and modeling the character of past and present environments and the geological, biological, hydrological, and geochemical processes involved in environmental change so that future environmental changes and impacts can be anticipated.

[Earthquake Hazards Program \(EHP\)](#) The Earthquake Hazards Program is part of the National Earthquake Hazards Reduction Program (NEHRP) led by the National Institute of Standards and Technology (NIST). The USGS role in NEHRP is to provide Earth sciences information and products for earthquake loss reduction. The goals of the USGS' EHP are: improve earthquake hazard identification and risk assessment methods and their use; maintain and improve comprehensive earthquake monitoring in the United States with focus on "real-time" systems in urban areas; and improve the understanding of earthquakes occurrence and their effects and consequences.

[Energy Resources Program \(ERP\)](#) The mission of the USGS Energy Resources Program is to understand the processes critical to the formation, accumulation, occurrence, and alteration of geologically based energy resources; to conduct scientifically robust assessments of those resources; and to study the impact of energy resource occurrence and/or production and use on both environmental and human health.

[Federal Geographic Data Committee \(FGDC\)](#) The Federal Geographic Data Committee is an interagency committee that promotes the coordinated development, use, sharing, and dissemination of geospatial data on a national basis. This nationwide data publishing effort is known as the [National Spatial Data Infrastructure \(NSDI\)](#). The NSDI is a physical, organizational, and virtual network designed to enable the development and sharing of this nation's digital geographic information resources. FGDC activities are administered through the FGDC Secretariat, hosted by the U.S. Geological Survey.

[Fisheries: Aquatic and Endangered Resources Program \(FAER\)](#) The Fisheries: Aquatic and Endangered Resources Program (FAER) focuses on the study of aquatic organisms and aquatic habitats from the molecular genetic level to species and population interactions with the environment. Aquatic pathogens, invertebrates, mussels, fishes, and the unique role of aquatic communities in ecosystems are investigated to provide scientific information to natural resource managers and decision makers.

[Geomagnetism](#) The mission of the Geomagnetism Program is to monitor the Earth's magnetic field. Using ground-based observatories, the Program provides continuous records of magnetic field variations covering long timescales; disseminates magnetic data to various governmental, academic, and private institutions; and conducts research into the nature of geomagnetic variations for purposes of scientific understanding and hazard mitigation.

[Geographic Analysis and Monitoring \(GAM\)](#) The goal of the USGS Geographic Analysis and Monitoring (GAM) Program is to understand the patterns, processes, and consequences of changes in land use, land condition, and land cover at multiple spatial and temporal scales, resulting from the interactions between human activities and natural systems.

[Global Seismographic Network \(GSN\)](#) The Global Seismographic Network (GSN) is a permanent digital network of state-of-the-art seismological and geophysical sensors connected by a telecommunications network, serving as a multi-use scientific facility and societal resource for monitoring, research, and education. Formed in partnership among the USGS, the National

Science Foundation (NSF) and the Incorporated Research Institutions for Seismology (IRIS), the GSN provides near-uniform, worldwide monitoring of the Earth, with over 150 modern seismic stations distributed globally. GSN stations are operated by the USGS Albuquerque Seismological Laboratory, the IDA group at UC San Diego, and other affiliate organizations.

[Groundwater Resources Program \(GWRP\)](#) Provides objective scientific information and develop interdisciplinary understanding necessary to help assure the availability of the Nation's groundwater resources.

[Hydrologic Networks and Analysis](#) Supports stations documenting the long-term flow characteristics and trends on climatic and other natural variations; monitoring or documenting Supreme Court Decrees and river basin compacts to which the U.S. government is a signatory; acts as part of the flood-forecasting network of the National Weather Service (NWS) and support the mission of other bureaus of the Department of Interior or the U.S. Army Corps of Engineers.

[Hydrologic Research and Development \(HRD\)](#)

[International Programs](#)

[Invasive Species Program](#) The Invasive Species Program provides methodologies and information to address threats to ecological systems and native species due to the introduction and spread of invasive species.

[Land Remote Sensing \(LRS\)](#) The Land Remote Sensing Program operates the Landsat satellites and provides the Nation's portal to the largest archive of remotely sensed land data in the world, supplying access to current and historical images. These images serve many purposes from assessing the impact of natural disasters to monitoring global agricultural production.

[Landslide Hazards Program \(LHP\)](#) The mission of the Landslide Hazards Program is to provide information that leads to the reduction of losses from landslides and increase in public safety through improved understanding of landslide hazards and strategies for hazard mitigation. In pursuit of the program mission, the LHP conducts landslide hazard assessments, pursues landslide investigations and forecasts, provides technical assistance to respond to landslide emergencies, and engages in outreach activities.

[Libraries](#) The USGS Library program supports all of the fundamental scientific research conducted within the USGS. The library serves both internal and external users with comprehensive access to the literature, data, and information necessary to understand the mission areas of the USGS and make critical decisions about how to proceed with research initiatives and investigations in the earth and natural sciences.

[Mineral Resources Program \(MRP\)](#) The USGS Mineral Resources Program (MRP) provides scientific information for objective resource assessments and unbiased research results on mineral potential, production, consumption, and environmental effects. The MRP is the sole Federal source for this information.

[National Climate Change and Wildlife Science Center](#) The National Climate Change and Wildlife Science Center (NCCWSC) responds to the research and management needs of partners and provides science and technical support regarding the impacts of climate change on fish, wildlife and ecological process. The Center is taking the lead on establishing the Department of the Interior regional Climate Science Centers.

[National Cooperative Geologic Mapping Program \(NCGMP\)](#) The National Cooperative Geologic Mapping Program (NCGMP) produces accurate geologic maps and 3-D geologic frameworks that provide critical data for sustaining and improving the quality of life and economic vitality of the Nation. [Geologic maps](#) are indispensable to understanding earth surface processes and ground-water availability and quality, supporting DOI land management decisions, mitigating hazards, assisting in ecological and climatic monitoring and modeling, and understanding onshore-offshore sediment processes. NCGMP is unique in the Federal Government as it

supports the production of most geologic maps in the United States through a successful [Federal-State-university](#) partnership.

[National Geological and Geophysical Data Preservation](#) The Energy Policy Act of 2005 ([Public Law 109-58](#) , Sec. 351) established the National Geological and Geophysical Data Preservation Program in the USGS and outlined the following goals:

Archive geological, geophysical, and engineering data, maps, well logs, and samples

Provide a national catalog of archived materials

Provide technical and financial assistance to State geological surveys and relevant Department of the Interior bureaus for archived materials

[National Geospatial Program](#) The National Geospatial Program (NGP) organizes, maintains, and publishes the geospatial baseline of the Nation's topography, natural landscape, and built environment. The baseline is The National Map, a set of databases of map data and information from which customers can download data and derived map products and use web-based map services. Through the Geospatial Liaison Network, the NGP works with cooperators to share the costs of acquiring and maintaining these geospatial data. [The National Atlas of the United States of America®](#), the small-scale component of The National Map, fosters an understanding of broad geographic patterns, trends, and conditions useful for national assessments. The [Federal Geographic Data Committee](#) promotes consistent data and metadata standards, system interoperability, and cross-government best business practices for geospatial resources, policies, standards, and technology as part of the [National Spatial Data Infrastructure](#).

[National Streamflow Information Program \(NSIP\)](#) With over 7,300 streamgages, the National Streamflow Information Program provides the Nation with streamflow information to help protect life and property and manage our water resources.

[National Stream Quality Accounting Network \(NASQAN\)](#) Focuses on the water quality of four of the Nation's largest river systems—the Mississippi (including the Missouri and Ohio), the Columbia, the Colorado, and the Rio Grande.

[National Water Quality Assessment Program \(NAWQA\)](#) Provides an understanding of water-quality conditions and how those conditions may vary locally, regionally, and nationally; whether conditions are getting better or worse over time; and how natural features and human activities affect those conditions.

[National Water-Use Program](#) Examines the withdrawal, use, and return flow of water on local, State, and national levels.

[Priority Ecosystems Science \(PES\)](#) Provides science in support of adaptive management of ecosystems that have near-term societal concern and significant long-term societal value.

#### [Science Impact](#)

[State Water Resources Research Institute Program \(WRI\)](#)

[Status and Trends of Biological Resources Program](#) The Status and Trends of Biological Resources Program monitors, analyzes and reports on the status and trends Nation's living resources and the habitats on which they depend. To protect and conserve these resources entrusted to their care, land and resource managers must first understand the condition of and threats to those resources.

[Terrestrial, Freshwater, and Marine Ecosystems Program](#) Studies conducted by USGS Terrestrial, Freshwater, and Marine Ecosystems scientists provide the basic science needed to understand the factors that control ecosystem structure, function, dynamics, condition, and provision of goods and services in context of linkages and interactions with the surrounding landscape. This information is used to model and predict future changes to ecosystems, how external stressors such as land use change and climate change will affect ecosystem resiliency, and to develop management alternatives in the face of stressors. Ecosystem science is also used to restore



degraded landscapes and freshwater systems, sustain plants and animals, and find means to adapt management to global change.

[Toxic Substances Hydrology Program](#) The USGS Toxic Substances Hydrology Program provides objective scientific information on environmental contamination to improve characterization and management of contaminated sites, to protect human and environmental health, and to reduce potential future contamination problems.

[Volcano Hazards Program \(VHP\)](#) The overall objectives of the Volcano Hazards Program are to advance the scientific understanding of volcanic processes and to lessen the harmful impacts of volcanic activity. The Volcano Hazards Program monitors active and potentially active volcanoes, assesses their hazards, responds to volcanic crises, and conducts research on how volcanoes work. The Program issues "timely warnings" of potential volcanic hazards to responsible emergency-management authorities and to the populace affected. Thus, in addition to obtaining the best possible scientific information, the program works to effectively communicate its scientific findings to authorities and the public in an appropriate and understandable form.

[Wildlife: Terrestrial and Endangered Resources](#) USGS scientists supported by the Wildlife Program conduct research on diverse natural resource topics involving wildlife and their habitat, marine mammals, threatened and endangered species, pollinators and plants; research includes, for example wildlife disease, genetics, basic life history and changing landscapes. Scientists provide technical support and tools for applications like structured decision making.

Viðauki D: Dagskrá heimsóknar til NSF

## NATIONAL SCIENCE FOUNDATION

*March 18, 2014*

### *“NSF and RANNIS: Looking Forward”*

Hallgrímur Jónasson, General Director, Rannís  
Thorsteinn Gunnarsson, Head of Division, Analysis & Evaluation, Rannís  
Sigrun Karlsdóttir, Director, Natural Hazard, Icelandic Met Office  
Bryndís Brandsdóttir, Professor, Institute of Earth Sciences, Univ. of Iceland

**NSF Meeting Location: Stafford II, Room 1155.05**

**AGENDA, Tuesday, March 18, 2014 at 2:00-5:00 p.m.**

- 1:50 p.m.           **Arrival:** NSF Visitors' Reception Desk and Walk to Stafford II Bldg.
- 2:00 p.m.           “Welcome to NSF and Introductions”
- Bonnie Thompson**, Program Manager, Europe & Eurasia,  
                          NSF Office of International & Integrative Activities
- 2:10 p.m.           **RANNIS: Opening Remarks**
- 2: 30                “NSF Arctic Discipline and Interdisciplinary Activities: Cooperative  
                          Research, Education, and Networks”
- Simon Stephenson**, Head, Arctic Sciences Section, Division of Polar  
                          Programs, Directorate for Geosciences (GEO)
- 3:00 p.m.           “Introduction to NSF Research Activities in Environmental Biology, Social  
                          Sciences, and Advanced Cyber Infrastructure”
- Saran Twombly**, Program Manager, Long Term Research in  
                          Environmental Biology, Directorate for Biological Sciences (BIO)
- Fae Korsmo**, Acting Deputy Assistant Director, Directorate for Social,  
                          Behavioral and Economic Sciences (SBE)
- Informal Q&A

NSF Agenda, March 18, 2014, continued.

3:30 p.m. “NSF Earth Sciences and Climate Change Activities Supported by the Geosciences Directorate (GEO)”

**Jennifer Wade**, Associate Program Director for Geo PRISMS; and Petrology and Geochemistry, Division of Earth Sciences, GEO

**Gregory Anderson**, Program Director for EarthScope, Division of Earth Sciences, GEO

4:15 p.m. “NSF and RANNIS: Discussion of Mutual Interests, Mechanisms, and Future Directions”

**Graham Harrison**, Acting Head, International Science & Engineering Section, NSF Office of International and Integrative Activities

4:45 p.m. “Highlights & Informal Wrap-up”

NSF Contact:

Bonnie H. Thompson  
Office of International and Integrative Activities (IIA)  
National Science Foundation  
4201 Wilson Boulevard  
Arlington, Virginia 22230  
Stafford II Building, room 1155

Telephone: (703) 292-7248  
[bhthomps@nsf.gov](mailto:bhthomps@nsf.gov)

## Viðauki E: Áhersluatriði í heimsókn til NSF

*Wednesday March 18 PM*

### **National Science Foundation**

In our visit to NSF, the Icelandic team is interested in discussing US-Icelandic research cooperation in the fields of Physical and Earth Sciences and Arctic Sciences; climate change; cooperation between funding agencies; participation in Horizon 2020, Marie Skłodowska-Curie (ITN, IOF, IIF); Belmont Forum; and the Arctic Circle.

Other interesting discussion points include; collaboration between Icelandic and US-NSF funded programs (GeoPrisms, Earthscope, Cascadia, IODP, Hazards SEES), possibilities for Icelandic research institutes already participating in NSF funded projects, and whether there are any further possibilities within these programs. Also, joint educational programs and summer schools.

Contacts at NSF include:

Bonnie H. Tompson, [bhthomps@nsf.gov](mailto:bhthomps@nsf.gov) (703) 292-7248 and Anna M. Kerttula de Echave, [akerttul@nsf.gov](mailto:akerttul@nsf.gov) (703) 292-7432.

Barbara Ransom, Program Director OCE - [bransom@nsf.gov](mailto:bransom@nsf.gov)

Donna Blackman, MGG - [dblackma@nsf.gov](mailto:dblackma@nsf.gov)

GeoPrisms Program:

Bilal U. Haq, OCE - [bhaq@nsf.gov](mailto:bhaq@nsf.gov)

Jennifer Wade, EAR - [jwade@nsf.gov](mailto:jwade@nsf.gov)

## **Viðauki F**

### NSF At a Glance

The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..." With an annual budget of \$7.2 billion (FY 2014), we are the funding source for approximately 24 percent of all federally supported basic research conducted by America's colleges and universities. In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing.

We fulfill our mission chiefly by issuing limited-term grants -- currently about 11,000 new awards per year, with an average duration of three years -- to fund specific research proposals that have been judged the most promising by a rigorous and objective merit-review system. Most of these awards go to individuals or small groups of investigators. Others provide funding for research centers, instruments and facilities that allow scientists, engineers and students to work at the outermost frontiers of knowledge.

NSF's goals--discovery, learning, research infrastructure and stewardship--provide an integrated strategy to advance the frontiers of knowledge, cultivate a world-class, broadly inclusive science and engineering workforce and expand the scientific literacy of all citizens, build the nation's research capability through investments in advanced instrumentation and facilities, and support excellence in science and engineering research and education through a capable and responsive organization. We like to say that NSF is "where discoveries begin."

Many of the discoveries and technological advances have been truly revolutionary. In the past few decades, NSF-funded researchers have won some [212 Nobel Prizes](#) as well as other honors too numerous to list. These pioneers have included the scientists or teams that discovered many of the fundamental particles of matter, analyzed the cosmic microwaves left over from the earliest epoch of the universe, developed carbon-14 dating of ancient artifacts, decoded the genetics of viruses, and created an entirely new state of matter called a Bose-Einstein condensate.

NSF also funds equipment that is needed by scientists and engineers but is often too expensive for any one group or researcher to afford. Examples of such major research equipment include giant optical and radio telescopes, Antarctic research sites, high-end computer facilities and ultra-high-speed connections, ships for ocean research, sensitive detectors of very subtle physical phenomena and gravitational wave observatories.

Another essential element in NSF's mission is support for science and engineering education, from pre-K through graduate school and beyond. The research we fund is thoroughly integrated with education to help ensure that there will always be plenty of skilled people available to work in new and emerging scientific, engineering and technological fields, and plenty of capable teachers to educate the next generation.

No single factor is more important to the intellectual and economic progress of society, and to the enhanced well-being of its citizens, than the continuous acquisition of new knowledge. NSF is proud to be a major part of that process.

**Specifically, the Foundation's organic legislation authorizes us to engage in the following**

**activities:**

- A.** Initiate and support, through grants and contracts, scientific and engineering research and programs to strengthen scientific and engineering research potential, and education programs at all levels, and appraise the impact of research upon industrial development and the general welfare.
- B.** Award graduate fellowships in the sciences and in engineering.
- C.** Foster the interchange of scientific information among scientists and engineers in the United States and foreign countries.
- D.** Foster and support the development and use of computers and other scientific methods and technologies, primarily for research and education in the sciences.
- E.** Evaluate the status and needs of the various sciences and engineering and take into consideration the results of this evaluation in correlating our research and educational programs with other federal and non-federal programs.
- F.** Provide a central clearinghouse for the collection, interpretation and analysis of data on scientific and technical resources in the United States, and provide a source of information for policy formulation by other federal agencies.
- G.** Determine the total amount of federal money received by universities and appropriate organizations for the conduct of scientific and engineering research, including both basic and applied, and construction of facilities where such research is conducted, but excluding development, and report annually thereon to the President and the Congress.
- H.** Initiate and support specific scientific and engineering activities in connection with matters relating to international cooperation, national security and the effects of scientific and technological applications upon society.
- I.** Initiate and support scientific and engineering research, including applied research, at academic and other nonprofit institutions and, at the direction of the President, support applied research at other organizations.
- J.** Recommend and encourage the pursuit of national policies for the promotion of basic research and education in the sciences and engineering. Strengthen research and education innovation in the sciences and engineering, including independent research by individuals, throughout the United States.
- K.** Support activities designed to increase the participation of women and minorities and others underrepresented in science and technology.

**Viðauki G: Dagskrá heimsóknar til NOAA**

**NOAA-Iceland Discussions**  
 March 19, 2014  
 9:00 am to 12:00pm  
 SSMC3 Room 11836  
 1315 East-West Highway, Silver Spring, MD  
**Proposed Schedule and Agenda**

<b>Time</b>	<b>Topic</b>	<b>Speaker</b>	<b>Office</b>
9:00-9:10	Opening remarks	Dr. Detrick Hallgrimur Jonasson	OAR, Assistant Administrator Director General, Icelandic Centre of Research (RANNIS)
9:10-9:30	Sea Ice - research and forecasting models	Sean Helfrich Dr. Robert Grumbine Bryndis Brandsdottir, Sigrun Karlsdottir	National Ice Center, NESDIS NWS/NCEP SI/IMO
9:30-9:55	Hydrology	Sigrun Karlsdottir Dr. Michael Smith Mr. Ernest Wells Sean Helfrich	IMO NWS/Office of Hydrological Development NWS/Office of Climate, Weather, and Water Services National Ice Center, NESDIS
10:00-11:00	Cooperation with OAR; specific topics TBD	Dr. Robert Detrick Hallgrimur Jonasson Libby Jewett Kathy Crane John McDonough Bryndis Brandsdottir, Sigrun Karlsdottir	OAR, Assistant Administrator Director General, Icelandic Centre of Research (RANNIS) Director, Ocean Acidification Program Climate Observation/Arctic Program (invited) Acting Director, Ocean & Exploration Research SI/IMO
11:05-11:25	Storm Surge	Sigrun Karlsdottir	IMO



		Mr. Arthur Taylor Dr. Jesse Feyen	NWS/Office of Science and Technology NOS/Office of Coast Survey
11:25-11:40	Remote Sensing - weather and distribution of airborne material	Sigrun Karlsdottir (TBD) Sean Helfrich	IMO NESDIS National Ice Center, NESDIS
11:40-11:50	Arctic ERMA	Amy Merten	Chief of NOS/Office of Response and Restoration's Spatial Data Branch
11:50-12:00	Discussion		

Iceland Participants:

Hallgrímur Jonasson, director general, Icelandic Centre of Research, RANNIS, (chair of the delegation).

Bryndis Brandsdóttir, senior research scientist and chair, Science Institute, University of Iceland, Thorsteinn Gunnarsson, head of division, RANNIS

Sigrun Karlsdóttir, director of natural hazards, Icelandic Meteorological Office (IMO)

NOAA Participants:

OAR: Dr. Robert Detrick, Libby Jewett, Kenneth Lang, Terry Schaefer, Kathy Crane, John McDonough

NESDIS: Eric Madsen, Sean Helfrich

NWS: Renee Tatusko, Michael Smith, Arthur Taylor, Dr. Robert Grumbine

NOS: Jesse Feyen, Amy Merten

Office of International Affairs: Elizabeth McLanahan, Pam Toschik, Laura Hens

## **Viðauki H: Áhersluatriði í heimsókn til NOAA**

*Wednesday March 19 AM*

### **National Oceanic and Atmospheric Administration**

With reference to present collaboration between NOAA and Icelandic scientists, the Icelandic Centre for Research would like to pursue the possibility of establishing a collaboration agreement with NOAA of some kind, which would serve as a platform for facilitating further joint research within the North-Atlantic, seafloor research projects being one example.

The Icelandic team is interested in discussing the following topics with the aim to strengthen our collaboration and explore possibilities for joint research proposals:

#### **Environment and Climate**

- [ Arctic gateway research.
- [ Natural hazards in the Arctic including landslides and lahars - research and forecasting/warning possibilities. Avalanche - research and forecasting/warning possibilities.
- [ Remote sensing and environmental monitoring.
- [ Climatic conditions, topographical features and glaciers.
- [ Glacial processes and products, past and present.
- [ Monitoring of glacial flow and mass balance.
- [ Prediction of glacier response and glacial runoff under different environmental conditions.
- [ Isotopic analyses of the atmospheric hydrological cycle.
- [ Paleoclimatic information based on isotopic profiles of the Greenland ice cores.
- [ Marine geology and geophysical exploration.
- [ Evolution of oceanic rift systems and transform zones, plume-ridge interactions.
- [ Remote Sensing - both regarding weather related issues and distribution of airborne material such as volcanic ash.
- [ Sea ice - Research and forecasting models.
- [ Hydrology - especially regarding floodings and forecast of river-related floods as well as risk assessment related to the matter.
- [ Storm surge - forecasting methods and risk assessment.
- [ Climate change - research especially regarding the Arctic region and how that can affect sea level changes, Gulf stream pattern, wave patterns, NAO, AO, extreme weather, etc.

- [ Atmospheric chemistry - regarding research on air quality and forecasts and warnings as well as research on changes in atmospheric chemistry due to climate change.

### **Specific Ongoing Projects**

- [ SVALI, Ice2sea, CarbFix, NORDICCS, CRAICC, ARCTIC Seminars.
- [ Quaternary climatic variability, palaeoenvironments.
- [ Ice dynamic modeling, sea-ice monitoring and research.
- [ Seafloor bathymetric mapping, N-Atlantic.

Contacts at NOAA include:

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Renee L. Tatusko - [Renee.L.Tatusko@noaa.gov](mailto:Renee.L.Tatusko@noaa.gov)